



COMMITTEE OF THE WHOLE

Regular Meeting Agenda

November 17, 2022
5:30 PM
6738 Dixon Street
Milton, FL 32570

- 1. Open Meeting**
- 2. Invocation**
- 3. Pledge of Allegiance**
- 4. Approval of Agenda for Additional Items**
 - Recommendation for Additional Items from Staff
 - Recommendation for Additional Items from Council
- 5. Persons to Appear**
- 6. Agenda Items**
 - Staff Items**

Item # 2022-987
Milton Planning Board Highway 90 Involvement

Administration

Councilwoman Shari Sebastiao

Item # 2022-969
Discussion of 2022.12 Wastewater Treatment Plant Project Manager Solicitation

Item # 2022-970
Discussion of 2021.08 CDBG Admin Services Clyde Gracey Community Center Expansion

Item # 2022-971
Discussion of 2021.09 CDBG Engineering Services Clyde Gracey Community Center Expansion

Item # 2022-980
RFP 2022-09 Historic Milton Highway 90 Transportation Solutions

Item # 2022-986
Police Pension Board Application

Economic Development
Councilwoman Shannon Rice

Item # 2022-483
Business Improvement Program FY 2023 Cycle 2

Emerald Coast Regional Council
Councilman Vernon Compton

Finance
Councilman Casey Powell

LEAP
Councilman Vernon Compton

Parks & Recreation
Councilman Jeff Snow

Public Safety
Mayor Heather Lindsay

Public Works
Councilman Robert Leek

Stormwater
Councilman Matt Jarrett

7. Board & Committee Reports
Community Improvement Board
Councilman Vernon Compton

Historic Preservation Board
Councilwoman Roxanne Meiss

Pensacola Perdido Bay Estuary Program
Councilman Vernon Compton

Item # 2022-721

Blackwater River Water Quality and Solutions to Closure of Oyster Harvest Area

Item # 2022-988

Comprehensive Management Plan

Tourist Development Council

Councilman Jeff Snow

Transportation Planning Organization

Councilman Vernon Compton

Item # 2022-730

Complete Streets Discussion for Design Collaboration with FDOT

8. Council Reports

9. City Attorney's Report

10. City Manager's Report

11. Public Input

12. Adjournment

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this meeting is asked to advise the City at least 48 hours before the meeting by contacting City Hall, 6738 Dixon Street, Milton, or by calling 983-5410.

"If any person decides to appeal any decision made by the board, agency, or commission, with respect to any matter considered at such meeting or hearing, he or she will need a record of the proceedings, and that for such purpose, he or she may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based." FS 286.0105



Milton Planning Board Highway 90 Involvement

MEETING DATE	PREPARED BY
November 17, 2022	Planning Department Tim Milstead, Planning Director



Agenda Item # 2022-969

Discussion of 2022.12 Wastewater Treatment Plant Project Manager Solicitation

MEETING DATE

November 17, 2022

PREPARED BY

Diane Ebentheuer, Purchasing
Agent/Risk Manager

BACKGROUND

The City solicited proposals for a Wastewater Treatment Plant Project Manager.

SUMMARY

Bid opening was held on 10/17/2022. There were not any proposals submitted. City Purchasing Policy, section 3.5, states: .."If a Request for Proposal or a Formal invitation to bid does not garner any response, the City Council may grant authority to the City Manager to secure the services and/or product by another means."

RECOMMENDATION

Request Council grant authority to the City Manager to secure the services by another means.

ATTACHMENTS

1. 2022.12 Bid Tab



BID TABULATION

10/17/2022 2:00 p.m.

Present for the City of Milton:

Diane Ebentheuer
Curtis Krebs
Joe Cook
Sandi Woodbery

Purchasing Officer
Chief Financial Officer
Public Works Director
Grants Coordinator

Others in attendance:

None

Bid opening was held at 2:00 p.m. The purpose of the meeting was to receive bids for the following solicitation:

RFP 2022.12 WWTP Project Manager / Coordinator

1 No Submittals

2

3



Agenda Item # 2022-970

Discussion of 2021.08 CDBG Admin Services Clyde Gracey Community Center Expansion

MEETING DATE

November 17, 2022

PREPARED BY

Diane Ebentheuer, Purchasing
Agent/Risk Manager

BACKGROUND

The City solicited bids for Administrative Services for the Clyde Gracey Community Center Expansion through use of CDBG funding.

SUMMARY

See attached letter from Grants Coordinator. The City did not receive the Community Development Block Grant (CDBG).

RECOMMENDATION

Reject award of bid to Ark Engineering.

ATTACHMENTS

1. Email City did not receive CDBG grant award for Community Center

Diane Ebentheuer

From: Sandra Woodbery
Sent: Wednesday, October 26, 2022 10:31 AM
To: Diane Ebentheuer
Cc: Randy Jorgenson
Subject: Coronavirus CDBG-CV Application

Diane,

CDBG-CV Program was a competitive grant and received more applications than available funding. The exclusion of a predominately industrial census tract from the Community Center's shelter service area was considered a project weakness. The inclusion of this excluded census tract required rounding up to meet the 51% LMI National Objective. Special considerations were expected for this exclusion due to the special Coronavirus CDBG-CV Program objectives and the successful pre-application review. Unfortunately, no special considerations were afforded and the City of Milton did not receive the grant award.

Let me know if you have any questions or need any additional information.



Sandra "Sandi" Woodbery
Grants Manager
Phone: 850-983-4704
Email: swoodbery@miltonfl.org

Under Florida's public records laws, the City of Milton's emails may be considered public record and subject to inspection or disclosure to the public. If you do not wish to have your emails possibly disclosed to the public, please do not communicate with the City of Milton through email.



Agenda Item # 2022-971

Discussion of 2021.09 CDBG Engineering Services Clyde Gracey Community Center Expansion

MEETING DATE

November 17, 2022

PREPARED BY

Diane Ebentheuer, Purchasing
Agent/Risk Manager

BACKGROUND

The City solicited bids for Engineering Services for the Clyde Gracey Community Center Expansion through the use of CDBG funding.

SUMMARY

See attached letter from Grants Coordinator. The City did not receive the Community Development Block Grant (CDBG).

RECOMMENDATION

Reject award of bid to Jones Phillips & Associates, Inc.

ATTACHMENTS

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Grants Manager
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Agenda Item # 2022-980

RFP 2022-09 Historic Milton Highway 90 Transportation Solutions

MEETING DATE

November 17, 2022

PREPARED BY

Ed Spears, Director of
Economic Development, Tim
Milstead, Planning Director

BACKGROUND

In July, 2022, City Council voted to allocate funds and authorize a Request for Proposals for professional firms and/or individuals to review the alternatives for the proposed widening of Caroline Street (US HWY 90) through the Milton Historic District. The purpose of the engagement would be to review FDOT's preferred alternative and non-chosen alternatives and to provide new alternatives that address traffic congestion in the area while promoting the redevelopment, historic preservation and economic growth in the business district. One response was received by the RFP deadline. The response from Geo One Tech, LLC is attached to this agenda item. The response was reviewed by an interdepartmental team of City staff. The reviewers deemed the submission as responsive to the RFP. The review team identified several strengths of the submission as well as several concerns. The applicant, consisting of three highly qualified, educated, credentialed and experienced planning and transportation professionals, has many years of experience both working inside FDOT and along with FDOT. They have led planning, design and complete street projects for FDOT and several communities, including Jacksonville, Florida. The strengths of their submission are their inside knowledge of FDOT, public engagement and road design aspects. The submission is less strong in the development of feasible alternative routes, which was a major component of the RFP. However, this was the information gleaned from the written materials only. As there was only one submission, staff had no other proposal to compare and contrast. A reissuance of the RFP may yield additional responses, but time is a major factor, as FDOT is primed to select a firm for the widening project and commence design in the first quarter of the new year. If the purpose of the RFP was to engage the public and serve as the City's official consultant for the widening project, staff would have no reservations about recommending this firm to serve in that capacity. However, that was not what was solicited and would require its own RFP. For the scope of work identified in the RFP, staff is seeking Council's input as to the next steps in the selection process. Council could request a formal presentation from the sole applicant to be made at the Executive Committee on Monday, December 5, wherein the applicant can present their qualifications and directly address their ability to provide the services required and any questions and concerns could be addressed. This would also allow the Council and public to weigh in on the company's response to the RFP and presentation. Council could reject the submission and reissue the RFP hoping for more competition. Geo One Tech, LLC would be eligible to resubmit. Council could also issue a new or additional RFP for assistance in public input and design for the FDOT Design Process.

SUMMARY

RECOMMENDATION

Staff is requesting Council provide direction.

ATTACHMENTS

1. 2022.09 Geo One Tech proposal
2. 2022.09 Bid Tab

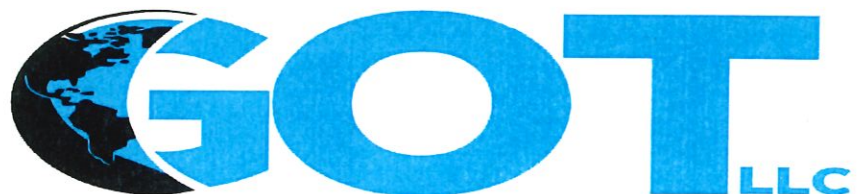
RESPONSE TO

PROPOSAL RFP 2022.09

Historic Milton Highway
90 Transportation
Solutions

Submitted by
GEO ONE TECH LLC
A TRANSPORTATION PLANNING FIRM

CERTIFIED DBE, MBE, WOSB



ENGINEERING YOUR SOLUTIONS



TABLE OF

CONTENTS

1. COVER LETTER
2. OUTLINE AND APPROACH
- FIRM(S) EXPERIENCE & PRIOR WORK
3. LICENSES
4. TEAM EXPERIENCE
5. REFERENCES - PROJECT LIST
6. ABILITY TO COMMENCE WORK
7. RESUMES
8. PROJECT MANAGER
9. MINORITY FIRM PROOF
10. APPENDICES (W9s, Insurances)



City of Milton

P.O. Box 909, MILTON, FL 32572

Phone: (850) 983-5438 ∞ Fax: (850) 983-5415

MEMORANDUM

TO: Interested Parties
FROM: Diane Ebentheuer, Purchasing Officer
RE: RFP- 2022.09 Historic Milton Highway 90 Transportation Solutions
DATE: August 18, 2022

Notice is hereby given that the City of Milton will receive sealed proposals for **RFP- 2022.09 Historic Milton Highway 90 Transportation Solutions**. The documents contain the necessary information for preparing and submitting your proposal for this effort.

Information is available on the City's web page at <https://MiltonFL.org/322/Purchasing>. There you may also register thru VendorRegistry.com (there is no charge to join); and/or thru BidNetDirect.com/florida/city-of-milton (there is no charge to join); and/or thru [DemandStar](https://DemandStar.com) (there is no charge to join); and/or Office of Supplier Diversity.

All must review the Scope of Services and Project Description as described in this document to ensure their ability to perform as indicated.

The deadline for submitting your sealed bid is:

Wednesday, October 19, 2022 at 2:00 p.m., (CST)

Delivered: City of Milton, 6738 Dixon Street, Milton, Florida, 32570

Mailed: City of Milton, P.O. Box 909, Milton, FL 32572

A PRE-BID MEETING (non-mandatory) will be held on Monday, October 3, 2022 at 9:00 a.m. at City Hall, 6738 Dixon Street, Milton, FL 32570: Contact Diane Ebentheuer by phone at 850-983-5438 or email at DEbentheuer@miltonFL.org.

Questions should be submitted in writing and directed to the Purchasing Department at (850) 983-5438; or by e-mail to DEbentheuer@miltonFL.org by Friday, October 7, 2022 at 2:00 p.m. Answers will be posted by Tuesday, October 11, 2022 at 2:00 p.m. (CST).

Interpretations, clarification of specifications, and requirement or changes to the documents which have a material effect will be documented and communicated only by written addendum posted on the City web page, Vendor Registry, Bid Net Direct, and DemandStar. All are responsible for checking for any addendums that may be issued, and to obtain such addendums.

Diane Ebentheuer

Diane Ebentheuer, Purchasing Officer

INSTRUCTIONS

RFP 2022.09 Historic Milton Highway 90 Transportation Solutions

I. Deadlines/Dates:

- Request for Proposal Published: 08/18/2022
- Pre-Bid Meeting (NonMandatory) Monday, 10/03/2022 @ 9:00 a.m. (CST)
- Questions Deadline: Friday, 10/07/2022 @ 2:00 p.m. (CST)
- Answers Posted by: Tuesday, 10/11/2022 @ 2:00 p.m. (CST)
- **Proposals Due:** **Wednesday, 10/19/2022 @ 2:00 p.m. (CST)**

II. Contact Information:

Contact: Diane Ebentheuer, Purchasing Officer
Phone: (850) 983-5438
Email: DEbentheuer@miltonFL.org

III. Proposals Must be Complete and Include:

1. Required Contents for Proposal (page 9 – Letter H)
2. Bidder's/Proposer's Declaration (page 3-5)
3. Public Entity Crime Form F.S. 287.133(3)(A) (*City Website*)
4. Drug-Free Workplace Form F.S. 287.087 (*City Website*)
5. Non-Collusion Affidavit (*City Website*)
6. Conflict of Interest Disclosure Form (*City Website*)
7. E-Verify Statement of Compliance (*City Website*)

City Website address: <https://MiltonFL.org/322/Purchasing>

IV. **Copies:** Please provide one (1) electronic copy, one (1) original, and four (4) copies of your bid/proposal.

V. **Faxed or emailed submittals are not accepted.**

Sealed bids can be mailed to:

City of Milton
Purchasing Department
P. O. Box 909
Milton, FL 32572

or delivered to:

City of Milton
Purchasing Department
6738 Dixon Street
Milton, FL 32570

Submittals must be sealed and marked:

To: CITY OF MILTON

VENDOR Name: Geo ONE TECH

SEALED Proposal * DO NOT OPEN

Sealed RFP#: 2022.09

RFP Title: Historic Milton Highway 90 Transportation Solutions

DUE DATE/TIME: October 19, 2022/ 2:00 p.m. (CST)





City of Milton

Purchasing Department

RFP 2022.09 Historic Milton Hwy 90 Transportation Solutions ***ADDENDUM #1 – Prebid (non-mandatory and Answers to Questions)*** ***October 3, 2022***

PRE-Bid 10/03/2022 – Non Mandatory:

Attended by City Staff only. No interested parties attended.

Answers to 10 Questions as of 10/03/2022:

1. Does it have to be 50% for one person or can it be divided up into two people? **The City of Milton is not indicating whether an individual or a group of individuals are to be involved to meet the scope of work.**
2. Will there be a need for meetings in person or will video calls be acceptable? **Meetings are in person.**
3. Do the staff for the project need to be located in Florida? **The geographic of the consultant selected need not be in Florida.**
If staff are needed in FL what level is Milton looking for (Junior staff, Mid-Level, Management, Professional Engineer)? **The skill sets of the individual presenting materials need be determined by the selected respondent. They do however need to be capable of presenting material in a professional fashion and to answer questions in the same manner.**
4. What is the budget for this project? **\$100,000.**
5. Can the City provide a copy of the PD&E that was completed in 2019 for US Highway 90? **PD&E was conducted by FDOT, it is available from FDOT.**
6. Page 9, Section H.2.c. states that we can include a minimum of 3 and maximum of 5 project references. Can we include more than 5 *project sheets* in addition to the 5 *project references*? **We require your proposal to have only 3 to 5 project references.**
7. Page 9, Section H.4 states that we should provide resumes for the principals of the firm. Can the City clarify what “principals of the firm” means? Can additional resumes be provided for key staff? **Yes, you may include other resumes for key staff.**
8. Page 9, Section H.6 asks to include certifications for Certified Minority Firms. What entities of minority certification is required? Please list all that qualify. **MBE Certification.**
9. Will subconsultants satisfy the minority requirements under the evaluation criteria? **No- the firm submitting the proposal must be a Certified Minority Firm (with proof attached) in order to qualify for the “Certified Minority Firm - 5 points.”**

10. Can we mail proposals to the “delivered” address instead of the “mailed” PO Box address? **No—Mailed proposals thru the United States Postal Service must use our P.O. Box 909 address. Our street address is for deliveries only.**

End of Addendum #1

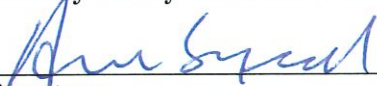
The information given in this addendum is in addition to or supersedes conflicting information in the invitation to bid and is hereby made a part of the request.

Bidders are hereby notified that they shall make any necessary adjustments in their estimates as a result of this Amendment. It will be construed that each bidder's proposal is submitted with full knowledge of all modifications and supplemental data specified herein.

BIDDERS MUST SIGN THE AMENDMENT AND SUBMIT IT WITH THEIR BID.

ACKNOWLEDGEMENT:

I hereby certify that I have received the above addendum:



Signature

OCT 17 2022
Date

**THIS ACKNOWLEDGEMENT MUST BE RETURNED
WITH BID/PROPOSAL PACKAGE.**



PRIORITY

Cover Letter



October 17, 2022

Diane Ebentheuer,
Purchasing Officer
City of Milton City
6738 Dixon Street
Milton FL, 32570

Dear Ms. Ebentheuer,

The Geo One Tech team is pleased to collaborate with the City of Milton to identify context-driven Complete Streets concepts recently adopted in the state as a trending option for consideration. In some instances, a context-driven solution may meet the needs of all downtowns and those areas for transportation users that address transportation connectivity and network deficiencies. The Geo One Tech team brings together several specific fields of expertise to support the Historic Milton Highway 90 Transportation Solutions project:

- ◆ Safety Planning
- ◆ Access Management Planning
- ◆ Concept Typical Sections
- ◆ PD&E Quality Assurance
- ◆ FDOT Complete Streets Policy
- ◆ Traffic Forecasting & Modeling
- ◆ Land Use and Comprehensive Planning
- ◆ GIS and Locational Intelligence/Spatial Solutions
- ◆ Stakeholder Engagement
- ◆ Cultural Resources and 4(f)
- ◆ Sociocultural Effects

City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



Outline and Approach



Geo One Tech is pleased to present the following response to the City of Milton's RFP 2022.09, Historic Milton Highway 90 Transportation Solution.

Our values are deep-rooted in being a minority and woman-owned transportation planning firm. Stemmed from this value we embed empowering communities to improve and change, especially those overshadowed by the limelight of neighboring cities within Florida that dominate the prominence.

Our team's goals are to problem solve as a partner, to hear and listen to City staff needs, and then provide technical assistance.

We have two transportation planners and one transportation engineer all of whom have expertise in:

- **PD&E**
- **Complete Streets**
- **Safety planning**
- **Access management**
- **Traffic forecasting**
- **Multimodal planning**
- **Cost estimation concepts/preliminary engineering**

We will achieve completion of this project through the key staff because:

- **Our stellar team is 100% Florida based, accessible within driving distance**
- **This team brings knowledge from both the public and private transportation planning sectors**
- **Experience in liaising with FDOT and local governments**
- **Deep understanding and practical project experience of both PD&Es and Complete Streets**
- **Local government strategic project and policy counsel**

The following RFP response document has been organized to follow the required contents of the proposal outlined on pages 9 section H. Each signed page of the required bidder's forms for eligibility is also included.

The Team can complete the project within 180 days and for an estimated Total Fee (not to exceed) amount of \$100,053.72 (*see page 3 item 9*)



City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



Firm Experience & Prior Work

The following section contain pages addressing page 9 Section H (2) through (6)



City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



Licences

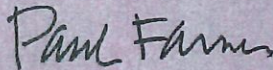
H.2.g

This certificate hereby qualifies

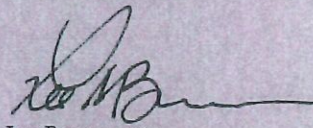
Ameera F. Sayeed, AICP

as a member with all the benefits of a Certified Planner
and a commitment to the AICP Code of Ethics and Professional Conduct.

Certified Planner Number 026301



Paul Farmer, FAICP
Chief Executive Officer



Lee Brown, FAICP
President



The American Planning Association's
Professional Institute
**American Institute
of Certified Planners**

Making Great Communities Happen

AICP

The American Institute of Certified Planners

The Professional Institute of the American Planning Association

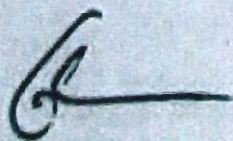
hereby qualifies

Ann Marie Longstreet

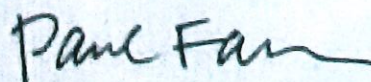
as a member
with all the benefits
of a Certified Planner and
responsibility to the
AICP Code of Ethics
and Professional Conduct.

Certified Planner Number: 022473

February 29, 2008



PRESIDENT



EXECUTIVE DIRECTOR



City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



Team Experience

OUR TEAM EXPERIENCE

Our TEAM has over **80 years of combined project experience** and over 42 years of direct transportation project management.



Ameera

We have **listed over 70 projects** related to multi-modal, safety, traffic, Complete Streets and PD&E work, combined.



Amie

✓ This team is **exceptional** given the level of expertise we offer in response to this RFP.



Monty

**100% woman owned and
operated firm and 100%
minority**

TEAM EXPERIENCE

Continued

Ameera Sayeed, AICP – Geo One Tech LLC

ROLE: Project Manager and Complete Streets

Ms. Sayeed has over 20 years' experience in multi modal transportation planning and project management for infrastructure for mobility and transportation. She has been serving on the City of Jacksonville Context Sensitive Standards Committee for over three years. Ms. Sayeed has written policies for complete streets, traffic calming and safety as well as transit-oriented development. Her solutions-oriented mind set has led her to be a lead regulatory and policy advisor for several local municipalities. Ms. Sayeed initiated the FDOT District 2 Complete Streets Bicycle and Pedestrian Tool that was launched prior to her leaving FDOT. She has developed performance measures and criteria for implementing mobility for all users for several transportation agencies statewide and for FDOT Central Office. Currently her executive roles allow her to champion collaboration and multi modal solutions into every project and program she consults on.

Monty Selim– Selim Consulting

ROLE: Transportation Engineer/Planning and Complete Streets

Mr. Selim has over 40 years' experience in multi modal transportation planning and program management of Public Infrastructure projects. Mr. Selim currently serves as the Vice Chair of the City of Jacksonville Context Sensitive Standards Committee and Member of Renew Arlington CRA. He is a subject matter expert and has updated or provided input to City of Jacksonville and several local jurisdictions their typical sections required to implement Complete Streets in land development codes. Additionally, Mr. Selim was also consulted on Nassau County project complete street typical sections.

Amie Longstreet, AICP Longstreet & Leonard Consulting Services

ROLE: PD&E

With over 21 years of experience delivering strategic transportation and environmental planning projects for county and state entities. Amie's focus on details and big picture issues driving difficult project problems provides a solid approach to delivering consistent, on-time and defensible deliverables. Areas of expertise include Sociocultural effects analysis, public involvement, complete Streets, Planning policy development Cultural resource documentation and 4(f).



City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



References - Project List

H.2.c

1 Transit Planning Consultant Florida Department of Transportation

Specialty Consultant to FDOT's Transit Office Screening Process for adopting mobility choices and partnerships. The evaluation has included assessing land-use, context, access, safety, and transportation context including freight truck accommodations, compatible land uses, traffic volumes and capacity, crashes that involved pedestrians, or bicyclists as well as fatal accidents.

2 Bicycle & Pedestrian LOS tool, and the Bicycle & Gap Study

Assessed existing conditions of bicycle and pedestrian systems as part of FDOT's Complete Street Policy.

3 Florida Department of Transportation District 2, Complete Streets

Used Return on Investment methods for the FDOT's Complete Streets policy as well as reviewing existing corridors that meet the Policy definition. The project identified economic development and redevelopment within the Complete Streets corridor. The results were incorporated into the land use redevelopment tool.

4 Systems Planning Consultant Florida Department of Transportation

Evaluated the impacts of the FDOT's Complete Streets Policy on SIS Facilities as it pertains to small cities and towns in Florida. This project screened SIS facilities in several FDOT districts to identify candidate corridors to implement FDOT's Complete Streets Implementation Guidance.

5 FDOT Access and Design for Complete Streets Document

Developed scaled integration guidance of best practice safety design approaches, design elements, and strategy considerations for all tiers of Complete Streets projects. Additional products included corresponding Power Points and webinars.

City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions



Ability to Commence Work

H.3

- ❖ The City of Milton Purchasing Department has requested that the Historic Milton Highway 90 Transportation Solutions project be completed ***within*** 180 days.
- ❖ Approximately 523 hours will be needed by the project team to complete the RFP tasks. The tasks are split with a 40% -60% split of the total hours that have been allocated within the project schedule for the team to perform technical tasks involving reviewing and evaluating the previous PD&E study.
- ❖ An additional 193 hours have been allotted for documentation, screening, and collaboration tasks related to safety, economics, and complete streets typical sections, per the goals and scope of the RFP advertising documents.

Suggested Project Timeline

A suggested timeline before contract negotiation is shown below based on the estimation of the RFP advertising documents' goals and scope of work.



Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
F 1 Review and Evaluation	Contract negotiation	96.5				Project closeout
F 2.1 and F 2.4 Technical - Documentation, Screening			75	65	53	
F 2.3 and F 2.5 City Council - Consultation & Engagement			77	76	75	



The Geo One Tech team is comprised of the following staff who have the described availability to support project completion within 180 days:

- Ameera Sayed, AICP – Project Manager with 50% availability
- Amie Longstreet, AICP – Chief Planner with 100% availability
- Monty Selim, PE -Project Engineer with 50% availability

Technical tasks involving the review and evaluation of the previous PD&E study and the assignment of team member tasks are outlined as follows:

- Evaluating the Existing and Future Traffic
 - All team members
- Review Existing Documents and Alternative
 - All team members
- Screening a Range of New, Reasonable Alternatives
 - All team members
- Development of Cost Estimates
 - Project Engineer
- Document Compilation
 - Project Manager and Chief Planner

Documentation, screening, and engagement tasks include:

- City Council Engagement Document development
 - Project Manager and Chief Planner
- Project Kick-off Meeting
 - All team members
- City Council Presentation
 - All team members
- City Council Presentation and document approval
 - All team members
- Comment and Coordination Report development
 - Project Manager and Chief Planner



City of Milton **RFP-2022.09** Historic Milton Highway 90 Transportation Solutions



Resumes & Experience

Contact

904 868 3381 (Mobile)
ameera@geonotech.com

www.linkedin.com/in/ameera-sayeed (LinkedIn)

Top Skills

Strategic Partnerships

Transportation Plans

Land Use

Transit

Rail & Freight

Comprehensive Plans

Community Outreach

Certifications

American Institute of Certified Planners

SDG & ESG

NCI - Charette

Pursuing PMP

Publications

Television-- Presentation to St Johns County Board of County Commissioners and Local Planning Board

Multimodal Transportation Best Practices and Model Element

"PAB Subcommittee hears traffic concerns over Port Master Plan update"

Television ---- State impacts to future roadway - St Johns County Government TV

Department of Economic Opportunity Planning contacts

Ameera Sayeed, AICP

Founder and CEO- Geo One Tech

Jacksonville, Florida, United States

Summary

An entrepreneurial and data-driven visionary with success in strengthening transportation businesses and public agencies by architecting strategic plans, cross-disciplinary collaboration, comprehensive and sustainable transportation planning, implementing transportation technology solutions, mentoring future transportation planning leaders, and applying vast backgrounds across the transportation industry.

Collaborative leader and results-driven with a keen ability to drive operational excellence leading multimillion-dollar transit, rail, land use, real estate planning, and programs. A driven and motivated leader using a rare blend of creative problem-solving talents, technical knowledge, and perseverance. ESG and SDG setting targets and measures. Strategic collaboration and cost-benefit analysis for sustainable and resiliency goals and measures. Applying converting raw data to spatial data, implementation of locational analysis for decision making, and process automation using GIS and software programming languages.

Industrious powerhouse and trusted business partner with subject matter expertise across regulatory, policy, and governance in transportation and transit planning, complete streets, transportation inventory asset management, real estate, and land development, freight planning, and large-scale transportation project management, DOTs, MPOs, and local governments.

AREAS OF EXPERTISE

- Transportation Planning
- Sustainable and Resilient Planning
- Data Analysis & Management
- GIS and Locational Intelligence/Spatial Solutions
- Strategic and Comprehensive Transportation Planning
- Stakeholder Engagement
- Speaker Engagements (schedule)

- Traffic Studies & Master Planning
- Program and Project Management
- Traffic Forecasting & Modeling
- Bicycle & Pedestrian Planning
- Land Development & Real Estate
- Rail Planning
- Transit Planning
- Policy Planning and Implementation
- Complete Streets Planning

Experience

Geo One Tech LLC (GOT LLC) www.geoonetech.com

Chief Executive Officer

August 2018 - Present (4 years 1 month)

United States

Geo One Tech and Equus Innovative Solutions merged in January 2022. We are now doing business as GOT LLC.

Leveraging my entrepreneurial spirit and executive leadership skills, I'm responsible for developing and marketing proprietary software, the Go-Tech Portal, SRM, and Prioritizer to municipalities and clients in the transportation industry. My job is to build long-term relationships and consensus with customers by offering data-driven, innovative, future-oriented, and effective solutions for transit planning, freight planning, highway planning, and land planning. Our clients rely on my expert advice, technical expertise, and strategic guidance. Our clients are DOTs, MPOs, local governments, private transportation, transit authorities, land developers, legal firms, investment/finance institutions, and management consultants.

Key Achievements:

- Attract new clientele by sharing unique perspectives on land use planning for all modes of transportation, including trains, freight, automobiles, bicycle, and pedestrian.
- Drive business development by performing traffic and transportation analysis for local government and land developers.
- GIS and Geospatial solutions within private and public sectors involving data from mobility, asset management, travel demand modeling, public utilities, local capital improvement projects, land use, and codes, permitting, and environmental studies.

- Develop custom infrastructure Metrics, Performance Measures, Goals, and Standards for SDG or ESG.

We also consult and develop custom software solutions for the transportation industry. Concept design, software development, and deployment. Product launch, Strategic partnerships, Solution design, Proof of Concept, and System Integration for AEC+P for both public and private agencies.

REINS app

Founder

2020 - Present (2 years)

United States

REINS is a FREE question-and-answer application designed specifically for the Architecture, Engineering, Construction, and Planning industries. The application provides direct access to certified Infrastructure Experts and Mentors. REINS' Users can ask unlimited questions, anytime and anonymously. Anonymity allows the freedom to ask any question that may be technical, professional, or project related. Post your question privately or publicly on REINS. As a REINS User, you choose your Expert/Mentor to answer your questions based on the Expert/Mentor About section.

REINS is another way for you to improve your current project, solve your problem, or confirm your solution. REINS provides the support, advice, and feedback you may need from our industry experts who are proven, subject matter experts, and leaders.

Florida East Coast Industries

Brightline & FECI Management Consultant and Advisor

November 2018 - November 2019 (1 year 1 month)

While completing various consulting engagements, I relied on my industry expertise to complete \$2B worth of enterprise-wide projects. I supervised concurrent projects that included investment-grade loans and grants. I also collaborated with our clients and in-house accounting staff to maintain budgets and project viability.

Key Achievements:

- Achieved company's first-ever CRISI grant for Ohio Rail Development Commission upon applying with only 12 hours of lead time.
- Spearheaded the entire project team during the full lifecycle, including the project for Brightline passenger rail while consistently meeting master plan, quality, and budget goals.

- Consulted on engagement to receive a \$1.7M RRIF loan and project for FDOT to resurface a 12-mile stretch of road by acquiring \$8M in funding.

Florida Department of Transportation

Transportation Planning Manager

November 2013 - November 2017 (4 years 1 month)

United States

During my time with FDOT, I oversaw day-to-day and long-term program operations covering 18 regional counties and 60+ municipalities. My main duty was to manage transportation planning support activities for public entities and associated county/city commissions. My scope of responsibility included reviews of Comprehensive Plan Amendments, Master Plans, and Planned Unit Developments, along with asset management and traffic modeling. I created the development of traffic forecasts for Planning and Design along with fund sourcing and tracking for mobility planning. I also authored and edited the Growth & Development Handbook.

Key Achievements:

- Successfully preserved and effectively managed SIS/non-SIS highway system while owning responsibility for policy and regulatory decision-making for resources, rights of way, safety, and crash analyses.
- Enhanced overall operations at National Center for Transit Research by creating and establishing multimodal planning best practices.
- Simplified land use and socioeconomic data changes, enhanced data management, and visualization, improved results accuracy, and maximize efficiency and return on investment by architecting NERPM AB Land Use Editing Tool.

Northeast Florida Regional Council

Senior Transportation Planner

January 2007 - November 2013 (6 years 11 months)

United States

I directed transportation services in coordination with the State of Florida Division of Emergency Management, NEFRC, and ten Regional Planning Councils. It was on me to deliver population projections and economic indicators, including economic impact analyses. I also created and continuously improved several Post-Disaster Redevelopment plans for multiple jurisdictions and a Local Mitigation Strategy for Nassau County.

Key Achievements:

- Played a key role in enabling the council to win National Planning Excellence Award for Hazard Mitigation & Disaster Planning for Florida Statewide Regional Evacuation Study.
- Hand-selected to serve as statewide Instructor for Transportation Interface for Modeling Evacuation (TIME); delivered technical support to NEFRC, including governments from seven counties and 20+ municipalities.

RS&H

Project Manager

May 1996 - May 2002 (6 years 1 month)

United States

Education

Arizona State University

Bachelor of Arts - BA, Geography - Planning, and Economics

Appointments / Member Organization

- Urban Land Institute
- American Planning Association
- American Institute of Certified Planners
- Project Management Institute
- ISSP – International Society of Sustainability Professionals
- [Mayoral Appointee – City of Jacksonville Context Sensitive Solutions Committee \(CSSC\) 2019 – present](#)
- RCI – Regional Community Institute, NEFRC 2022- present
- RLA – Regional Leadership Academy, NEFRC
- [Complete Streets Policy – FDOT Statewide Task Force](#)
- Multimodal Guidelines – FDOT Statewide
- Statewide TIME – Hurricane Evacuation Modeling
- Statewide Freight Task Force – FDOT
- District 2 – Travel Demand Model FDOT
- ROI Statewide Task Force – FDOT
- Northeast Florida GIS User Group
- Florida Statewide Growth Management Policy and Guidelines Handbook

MONTY SELIM

**Transportation Civil Engineer
Complete Streets Subject Matter
Expert**



Mr. Selim has over 40 years' experience in multi modal transportation planning and program management of Public Infrastructure projects. Mr. Selim currently serves as the Vice Chair of the City of Jacksonville Context Sensitive Standards Committee and Member of Renew Arlington CRA.

Project Experience:

Groundwork Jacksonville, Mr. Selim is currently serving as project manager for the Emerald Trail in Jacksonville Urban core. This a 30 miles multi-phase bicycle-pedestrian trail serving as an urban trail network. Mr. Selim was involved in the consultant's contract scope and fee negotiations, the review of preliminary plans for the initial project segment from Stonewall Street to S-line intersection with State Street, this initial segment includes a Road-Diet segment between Water Street and Forsyth Street along Lee Street with a lane-elimination in each direction and the addition of raised landscape median. The Hogan Street Segment is one mile requires the elimination of one-vehicular lane and replacing it with wider sidewalk and a cycle track, separate bicycle signalization and detection is included in this project.

City of Jacksonville Context Sensitive Standards Committee for the past 6 years Mr. Selim served as the Urban planner on this committee developing the City's roadway standards for truck routes and roadways that meets the needs of all users including bicyclists and pedestrians as well as wheelchair users. This is a collaborative effort between business stakeholders, transportation professionals and City of Jacksonville Public Works and Planning Staff to increase public safety and reduce injuries and fatalities on City's streets.

Renew Arlington CRA Board for over a year Mr. Selim has served as the Urban Planner Board Member, in this capacity working with the City of Jacksonville staff to improve the Arlington Area, most recently is the development of a Road-Diet project along Arlington Road from University Boulevard to Cesery Boulevard to eliminate one-through lane in each direction adding parallel parking and bike-lanes and a median.

Systems Planning Consultant Florida Department of Transportation Central Office. Mr. Selim served as a Specialty Consultant to FDOT's SIS Connectors Screening Process for adopting Complete Streets Policy. After the initial screening 14 SIS Connectors were selected for further evaluation to include freight trucks, land-uses, traffic volumes, capacity, crashes involving pedestrians, or bicyclists as well as fatal accidents.

Systems Planning Consultant Florida Department of Transportation Central Office. Mr. Selim served as a Specialty Consultant to FDOT's Systems Planning office under CDM Smith, Inc. In this capacity Mr. Selim has been involved as part of the FDOT Core Team for the development of FDOT's Complete Streets Implementation Guidance.

Florida Department of Transportation District 2, General Planning Consultant. As part of URS/HDR team; Complete Streets Return on Investment review FDOT's Complete Streets policy as well as reviewing existing corridors that meets the Policy definition. Study goal is to identify Complete Streets corridor physical requirements for economic development and redevelopment. FDOT to incorporate the results in a land-use redevelopment tool.

Systems Planning Consultant Florida Department of Transportation Central Office. As part of the CDM Smith team. Mr. Selim served as a Specialty Consultant to FDOT's Systems Planning office in this capacity Mr. Selim has been involved in evaluating the impact of the FDOT's Complete Streets Policy on SIS Facilities as pertains to small cities and towns in Florida. This project screened SIS facilities in several FDOT District's to identify candidate corridors to implement **FDOT's Complete Streets Implementation Guidance.**

Education Bachelor of Science in Civil Engineering

Professional Credentials

Mayoral Appointee to the City of Jacksonville Renew Arlington CRA Board (2019 – Present)

North Florida Transportation Planning Organization 2045 Long Range Transportation Plan Technical Steering Committee Member (2018 -2019)

Mayoral Appointee to the City of Jacksonville Context Sensitive Design Committee (2013-Present)

Mayoral Appointee to the City of Jacksonville Downtown Development Review Board (2007-2013)

Mayor Peyton representative on JaxPort Transportation Infrastructure Needs Task Force (2007)

Member, American Society of Civil Engineers

ANN MARIE (AMIE) LONGSTREET, AICP | PRESIDENT

Amie Longstreet, AICP, is an expert Transportation Planner with over 21 years of experience delivering strategic transportation and environmental planning projects for county and state entities. Amie's focus on details and big picture issues driving difficult project problems provides a solid approach to delivering consistent, on-time and defensible deliverables. Areas of expertise include:

- PD&E and NEPA documentation
- Sociocultural effects analysis
- Public involvement
- Land use
- Rail and freight planning
- Complete Streets
- Planning policy development
- Efficient Transportation Decision Making (ETDM) application
- Strategic Intermodal System (SIS) policy
- Cultural resource documentation
- 4(f)

PROJECT EXPERIENCE

General Engineering Contract | FDOT District Three

Planning provided under this contract included: quality control for District Three PD&E engineering documents.

I-10 from West of Log Lake Road to East of SR 85 in Okaloosa County | FDOT District Three

Provided sociocultural analysis and public involvement plan development and material coordination. Other support included conducting Type II CE section research, text development and document compilation.

Weight-in-Motion and Vehicle Classification Strategic Plan | Texas Department of Transportation, Austin, TX

Managed all planning tasks and developed the WIM and VC Strategic Statewide Plan literature review, the strategic plan goals and objectives, survey, data analysis, and implementation activities. Other deliverables completed in this role included the development of one-pager information sheets and PowerPoint presentations.

I-75 at CR 514 Interchange PD&E Study | FDOT District Five

Developed the public involvement plan update and Sociocultural Effects analysis supporting the Type II CE PD&E study. Additional responsibilities included public involvement and technical research for Type II CE document.

Freight Logistics and Passenger Operations Support Services Consultant Contract, Freight and Multimodal Operations Office (FMO) On-Site Support | FDOT Central Office

Provided FDOT FMO Office staff support, which included providing SharePoint assistance, and procedure and technical document development, and data analysis.

Freight Roadway Design Considerations Guidelines (for Complete Streets) Document, Freight Logistics and Passenger Operations Support Services Consultant Contract | FDOT Central Office

Developed statewide freight roadway guidance for FDOT engineers, planners, and consultants during Complete Streets implementation. Products included text and decision process graphics facilitating identification of FRDC quadrants, context-based design strategies, and elements.

FDOT Access and Design for Complete Streets Document Systems Implementation Office Support Services Consultant Contract | FDOT Central Office

Developed scaled integration guidance of best practice safety design approaches, design elements, and strategy considerations for all tiers of Complete Streets projects. Additional products included corresponding PowerPoints and webinars.



EDUCATION

B.A., Anthropology,
University of Colorado, 1992

CERTIFICATIONS

American Institute of Certified
Planners (AICP)
Archaeological Resource Monitor

PROFESSIONAL AFFILIATIONS

American Planning Association
(APA)
Institute of Transportation Engineers
(ITE), Big Bend Chapter
Women's Transportation Seminar
(WTS) Capital Region Chapter

PROFESSIONAL DEVELOPMENT

Section 4(f) Compliance for
Transportation Projects Training
for Environmental Staff - GDOT
PD&E Manual Process Training—
Florida Department of
Transportation
Linking Planning and NEPA –
National Highway Institute
Manager's Workshop

Longstreet & Leonard
CONSULTING SERVICES

Office of Policy Planning, Planning Assistance Contract | FDOT Central Office

On-site deliverables included: policy development for the Strategic Intermodal System (SIS), and public involvement and growth management policy reviews. Other assigned tasks included the development of an ArcGIS transportation systems application and corresponding training materials, training sessions and SIS Performance Measure Report development (2023-2015).

Cumulative Effects Evaluation Guidelines Document, Central Environmental Management Office, Environmental Program Performance Management Contract | FDOT Central Office

Conducted data analysis, research, and text to develop the Florida Department of Transportation PD&E Cumulative Effects Evaluation Guidelines Document.

Department of Economic Opportunity (FDEO) Inter-agency Agreement, Florida Department of Community Affairs (Department of Economic Opportunity) ETDM Coordinator/ETAT Representative | FDOT Central Office

Responsibilities included using the ETDM Environmental Screening Tool application to develop land use and socio-cultural impact analysis comments for major transportation projects. Also, reviewed local government Long Range Plans for Goals, Objectives and Policy planning consistency analysis comment development. Analysis comments were utilized to facilitate scoping, project development, and NEPA Class of Action determinations.

General Engineering Contract, Planning and Environmental Management Office Support | FDOT District One

Tasks assigned under this contract include technical staff coordination for NEPA documentation, NEPA engineering plan reviews, development of environmental determination worksheets, and PD&E reevaluations. Additional responsibilities included utilizing the ETDM EST application for project analysis.

Ann Maria Island Bridge Rehabilitation PD&E Study | FDOT District One

Tasks developed while working on this project included providing PD&E technical research and text development for the following document sections: land use, mobility, transit, and sociocultural effects.

Central Polk Parkway – Corridor Analysis | FDOT District One

Tasks developed for this project included providing research for the Purpose and Need and technical research and text for the following document sections: land use, mobility, transit, and sociocultural effects.

Polk County Bartow Northern Connector Environmental Study | Polk County Florida, Bartow FL

Responsibilities assigned under this project included providing PD&E technical research and SEIR text development for the following document sections: land use, mobility, transit, and sociocultural effects.

Gulf Regional Planning Commission's Public Involvement Program and Policies Document | Gulf Regional Planning Commission, Gulfport, MS

Tasks required to develop this document included creating a planning policy for public outreach, Long-Range Transportation Plan survey development, data analysis, and environmental justice GIS methodology development. Additional tasks supporting the Coast Transit Authority at this position included: developing the National Transit Database Survey and providing transit planning and analysis.

US 61 Four-Lane Project, Port Gibson, Claiborne County (EIS) | Mississippi Department of Transportation, Jackson, MS

EIS document development support included: client coordination, stakeholder coordination, public involvement, and support for the socio-economic and cultural resource impact analysis.

Madison-Ridgeland Connector/I-55 Interchange, Madison County (EA) | Mississippi Department of Transportation, Jackson, MS

EA document development support included: public involvement, client coordination, and stakeholder coordination.

PUBLICATIONS

Florida Department of Transportation SIS Designation Handbook

Florida Department of Transportation Cumulative Effects Evaluation Guidelines

Mississippi Gulf Coast Metropolitan Planning Organization Public Involvement Program and Policies (2005)

PRESENTATIONS

Texas Department of Transportation Weigh-in-Motion and Vehicle Classification Statewide Plan Working Group One

Transportation Site Impact and Access Management Webinar Series, Access Management Design and Complete Streets Webinar – Florida Department of Transportation

Institute of Transportation Engineers, Big Bend Chapter – SIS Policy and Designation



City of Milton RFP-2022.09
Historic Milton Highway 90
Transportation Solutions



Project Manager

PROJECT MANAGER: Ameera Sayeed, AICP CEO of Geo One Tech, LLC.



Ameera brings over 25 years of land use and transportation planning. Her combined business and technical skills are unique with a proven record of collaboration, innovation, and client-driven solutions.

Project Management *(see project listing following pages)*

Ameera Sayeed will serve as Project Manager and will ensure the team delivers **QUALITY** documents and solutions. Her focus will be to provide the team resources to ensure **RESPONSIVENESS** to the City's feedback. Her leadership skills will optimize the risk response and accounting for previous studies and project area history of 4 lane widening. **SAFETY**, adaptability and resiliency will be built into the team's processes. At all stage of project implementation, the team's review of the FDOT PD&E and providing an incorporation of possible Complete Streets solutions in the **historic** district will be at the forefront. She is currently pursuing her PMP to qualify for managing mega projects.

Statewide Influence and Complete Streets: In her regulatory roles, she worked on state-wide and regional policies, transit planning, strategic planning, traffic, assessed land development plans, and major master plans for transportation projects. Ameera was appointed as a member of the City of Jacksonville's Context Sensitive Streets Standards Committee (CSSC) by Mayor Lenny Curry (2019).

Prior to starting her own consultation firm she was at the Florida Department of Transportation (FDOT). During her tenure at the FDOT District 2, she was instrumental in the state wide Complete Streets Policy update, guidelines, workshops and a task force member. She also is a contributing team member for the Growth Management Policy Handbook , the Multi modal Guidelines and Access Management Handbooks.

Stakeholder Engagement: Ms. Sayeed is often called in for her strategic counsel both in public forums as well as in brainstorming and brain writing sessions. Her competency includes prioritizing key stakeholders, developing focus, facilitating consensus. She is known for seamlessly engaging partners and stakeholders in a collaborative, interactive fluid manner. She continues to provide strategic counsel and fostering collaborative partnerships across stakeholder groups and earning high-profile clients and well-reputed projects. Through research and analysis, her collaborative leadership, purposeful initiative-taker, and operational excellence she leads and has consulted and supported a cumulative investment portfolio of over \$1.9 Billion in the State of Florida.

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She continues to provide strategic counsel and foster collaborative partnerships across stakeholder groups and earn high-profile clients and well-reputed projects. Through research and analysis, her collaborative leadership, purposeful initiative-taker, and operational excellence she leads and has consulted and supported a cumulative investment portfolio of over \$1.9 Billion in the State of Florida.

City of Jacksonville Context Sensitive Standards Committee for the past 3 years, Ameera served as the Transportation planner on this committee developing the city roadway standards for truck routes and roadways that meet the needs of all users including bicyclists and pedestrians as well as wheelchair users. This is a collaborative effort between business stakeholders,

transportation professionals, and the City of Jacksonville Public Works and Planning Staff.

OTHER RELEVANT PROJECTS

- **Transit Planning Consultant Florida Department of Transportation Central Office** Currently serving as a Specialty Consultant to FDOT's Transit Office Screening Process for adopting mobility choices and partnerships. The evaluation has included assessing the land-use context, access, safety, and transportation context including freight truck accommodations, compatible land uses, traffic volumes and capacity, crashes that involved pedestrians, or bicyclists as well as fatal accidents.
- **Nassau County General Planning Consultant** Developed traffic impact study guidelines and assisted with the development of the Countywide Mobility Fee and Plan. Created a prioritization and list of criteria for capital improvement projects. Special consultant for large development and special district projects, mediate and re-structure the East Nassau County Planning Area sector plan, William Burgess overlay district, and West Nassau Transportation Network for the future. This network will leverage technologies such as autonomous technologies like autonomous and connected vehicles, broadband, mobile application, and mobility for all with complete streets integration to create a smart area. Also provided peer review and due diligence for transportation analysis and levels of service. Successfully adopted several transit, complete streets, and policy guidance into the overall County transportation and complete streets vision document.
- **City of Fernandina Beach-** Transportation Consulting and due diligence review. Completion of the Mobility Plan review and recommendations.
- **Jacksonville Transportation Authority** – Designed and developed the Bus Rapid Transit system guidelines a criterion for integration of the JTA Operations, fleet, and safety. Developed a comprehensive database and integrated it into GIS for automated prioritization of the systems. Shared by the Planning, sustainability, and Operations departments. Recommended micro-mobility option for the transit-oriented development areas of downtown Jacksonville and the Regional Transportation Center.
 - State of Good Repair – Hart Expressway and Bay Street Innovation Corridor projects as a smart corridor for a downtown connected system.
 - Subject matter expert to a management consulting firm as-needed basis.
 - Designed and edited the Growth & Development Handbook.
 - Preserved and managed the SIS/non-SIS highway system through policy and regulatory decision-making for resources, rights of way, safety, and crash analyses.

- Managed and oversaw the development of traffic forecasts for Planning and Design.
 - Oversaw the Bicycle & Pedestrian LOS tool, and the Bicycle & Pedestrian Gap Study, assessing existing conditions of bicycle and pedestrian systems **as part of FDOT's Complete Street Policy.**
 - Served as Statewide Instructor for the Transportation Interface for Modeling Evacuation (TIME). Provided technical support for the evacuation planning tool, TIME, while working for NEFRC, a council of Governments of seven counties and 20+ municipalities.
 - Coordinated with the State of Florida Division of Emergency Management, the NEFRC (the lead agency), and a team of ten other Regional Planning Councils (Councils of Government entities).
 - Conducted population projections and economic indicators, including economic impact analyses using REMI modeling software and RIMS.
 - Completed Post-Disaster Redevelopment plans for multiple jurisdictions and Local Mitigation Strategy for Nassau County.
 - National Planning Excellence Award for Hazard Mitigation & Disaster Planning for the Florida Statewide Regional Evacuation Study.
 - **FDOT's SIS Connectors Screening Process** for adopting Complete Streets Policy. The evaluation included assessing the land use context and the transportation context where SIS Connectors traverse. After the initial screening, 14 SIS Connectors, were screened for further evaluation including freight truck accommodations, compatible land uses, traffic volumes and capacity, facilities typical sections, speed limits, crashes that involved pedestrians, or bicyclists as well as fatal accidents.
 - Downtown BRT
 - I95 Master Plan
 - Transit Socioeconomic Data for Travel Demand Modeling
 - Transit-Oriented Development along US 17 and I95 corridors.
 - J. Turner Butler Master Plan, (JTA) Jacksonville, Florida. Task Manager and provided AADTs, intersection analyses, and LOS along the corridor.
 - Mathews Bridge Moveable Barrier Study (JTA GEC), Jacksonville, Florida. Provided benefit-cost analyses, and project traffic, and created microsimulations and output of alternatives using CORSIM analyses.
 - J. Turner Butler Corridor Study (JTA GEC), Jacksonville, Florida. Assisted in the traffic model for the corridor. Assisted in determining areas of the problem with the corridor and specific peak periods.
 - Branan Field Chaffee Interchange Justification Report, Jacksonville, Florida -Project Manager. Monitored and reviewed technical reports and data analyses.
- Supervised a staff of six (6) associates.
- Project Coordinator and Planner for the I-95/Oslo Road Interchange Justification Report, Indian River County, Florida. Produced necessary analysis and technical documents for all stages outlined in the 1998 IMR/IJR Manual.

- Rail Loop Traffic Study for USMC, Blount Island Command, Jacksonville, Florida. Developed Project Traffic and Intersection Signal Timing and recommended improvements.
- Project Traffic for the I-95/I-595 Master Plan, Florida. Reviewed the No-Build and As-Planned model networks to develop design hour volumes.
- Cecil Field Reuse Plan. Created visual database projects in GIS, which included attaching an extensive database for spatial map documentation.
- The Systems Planning office in the development of the Statewide Decision Support System (DSS), was a screening tool, to evaluate the Strategic Intermodal System network of capacity projects and identify cost-feasible projects. The tool included evaluation criteria cost per mile, capacity, level of service, and service area population.



City of Milton **RFP-2022.09** Historic Milton Highway 90 Transportation Solutions



Minority Firm Proof

H 6

State of Florida

Woman & Minority Business Certification

Geo One Tech, LLC

Is certified under the provisions of
287 and 295.187, Florida Statutes, for a period from:
June 10, 2021 to June 10, 2023



J. Todd Inman
Florida Department of Management Services

Office of Supplier Diversity
4050 Esplanade Way, Suite 380
Tallahassee, FL 32399
850-487-0915
www.dms.myflorida.com/osd





Florida Unified Certification Program

Disadvantaged Business Enterprise (DBE) Certificate of Eligibility

GEO ONE TECH LLC

*MEETS THE REQUIREMENTS OF 49 CFR, PART 26
APPROVED NAICS CODES:
541320, 541611, 541690*

*Dwayne Moore
DBE & Small Business Development Manager
Florida Department of Transportation*





Florida Unified Certification Program

Disadvantaged Business Enterprise (DBE) Certificate of Eligibility

LONGSTREET AND LEONARD CONSULTING SERVICES

MEETS THE REQUIREMENTS OF 49 CFR, PART 26

APPROVED NAICS CODES:

541618, 541720, 541820, 541990

Dwayne Moore

*DBE & Small Business Development Manager
Florida Department of Transportation*



BIDDER'S/PROPOSER'S DECLARATION
RFP 2022.09 Historic Milton Highway 90 Transportation Solutions

The bidder/proposer understands, agrees, and warrants:

1. These items apply to and become a part of the terms and conditions of the bid/proposal submitted. Any exceptions must be in writing.
2. All bids submitted shall be subject to acceptance or rejection. The City of Milton specifically reserves the right to accept or reject any or all bids, to waive any technicalities and formalities in the bid process, and to award the bid in part or in any manner deemed to be in the best interest of the City.
3. All proposals submitted shall be subject to acceptance or rejection. The City of Milton specifically reserves the right to accept or reject any or all proposals, to waive any technicalities and formalities in the proposal process, and to award the proposal in part or in any manner deemed to be in the best interest of the City.
4. The City of Milton is exempt from sales tax.
5. Contractors are responsible for any sales tax on purchases for the project.
6. The City of Milton will receive sealed bids/proposals from interested parties at its offices located at City Hall, Milton, Florida. Any submittal received after the deadline will **not** be considered.
7. Bids/proposals will be publicly opened and read at the City of Milton, City Hall on the day and at the hour specified.
8. The City of Milton may consider as non-responsive, any bid/proposal in which there is an alteration of, or departure from the bid/proposal form hereto attached.
9. The bid/proposal will be awarded to the lowest most responsive reliable firm complying with the conditions of the bid/proposal. The firm to whom award is made will be notified as soon as possible. The City of Milton reserves the right to reject the bid/proposal of a firm who has previously failed to perform properly or complete on time, contracts of a similar nature, or the bid/proposals of a firm who, in the sole opinion and discretion of the City of Milton is not in a position to perform the contract, or whose name appears on the United States Comptroller General's list of ineligible contractors.
10. The City of Milton reserves the right to award to multiple vendors.
11. Interested Parties shall submit all required forms and information simultaneously with their sealed bid/proposal. Forms and information become a part of the property of the City of Milton and will not be returned to the firm unless a written request to withdraw is received prior to opening of bids/proposals.
12. For Bids-Additional Quantities: For a period not exceeding twelve (12) months from the day of the solicitation opening, the right is reserved to purchase any number of additional items at the prices offered in this solicitation. If additional quantities are not acceptable, the bid form shall be noted "offer is for specified quantity only."
13. **For Bids/NOTE:** Unless stated on the bid form, the bid submitted will assume all specifications will be met. Please note all exceptions on the bid form.
14. The successful bidder/proposer will be required to submit additional forms, which are available on the City's website at <https://MiltonFL.org/322/Purchasing> at the bottom of the page.
 - Certificate of Non-Discrimination
 - W-9 Taxpayer Identification Number

- Vendor Application
 - Certificates for Liability, Vehicle, and Worker's Comp Insurance.
(City is to be named as additional insured.) Limitations are listed online.
 - Prompt Payment Affidavit
15. That they have carefully read and fully understand the full scope of the specifications.
 16. That they have the capability to successfully undertake and complete the responsibilities and obligations in said specifications.
 17. All bidders/proposers are responsible for checking for any addendums that may be issued. Addendums are posted on the City web page, Bid Net Direct, and Vendor Registry.
 18. If required- That they have Liability Insurance, and/or Vehicle and Workers Comp Insurance. (A declaration of insurance form must be provided before any work will begin.)
 19. (Service Contracts Only) Pursuant to Florida Statute 119, the contractor must follow all public records law. **IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (850)983-5402, CityClerk@MiltonFL.org OR P.O. BOX 909, MILTON, FL 32572.** A contractor who fails to provide the public records to the City within a reasonable time may also be subject to penalties under Florida Statute 119.10.
 20. Sealed bids or proposals >\$250,000 have special requirements for procurement and must comply with the below:
 - a. **Compliance Supplement - President's executive Order Numbers 11246 and 11375** which prohibit discrimination in employment regarding race, creed, color, sex, or national origin. (2 CFR 200 Appendix XI whitehouse.gov)
 - Inclusion of goals for minority participation in construction are 6.9% for women.
 - % for minorities as prescribed by appendix B-80, Federal Register, volume 45, No. 194, October 3, 1980.
 - b. **Title VI of the Civil Rights Act of 1964** (Department of Labor dol.gov)
 - c. **Title 45 CFR Required Items (govinfo.gov):**
 - **Anti-Kickback Act** (title 45 CFR 2543.82)
 - **Davis Bacon Act** (title 45 CFR 2543.83)
 - **Contract Work Hours and Safety Standards Act** (title 45 CFR 2543.84)
 - **Byrd Anti-Lobbying Amendment** (45 CFR 2543.87)
 21. Federal Award Contracts - Selected Contractor must comply with:
 - **Termination for Cause and Convenience** - All contracts or purchase orders in excess of \$10,000 must address by the non-Federal entity including the manner by which it will be affected and the basis for settlement, (Appendix II Part 200 of 2 CFR 200 (B) gov.info)
 - **Contract Clauses for Contract Provisions for Non-Federal Entity Contracts Under Federal Awards** (2 CFR 200 Uniform Guidance Appendix II gov.info)
 22. **For all Contracts - Contractors should take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.** (Appendix II Part 200 of 2 CFR 200 (B) gov.info)

23. That this bid/proposal may be withdrawn by requesting such withdrawal in writing at any time prior to opening date, but may not be withdrawn after such date and time.
24. That by submission of this bid/proposal the firm acknowledges that the City of Milton has the right to make any inquiry or investigation it deems appropriate to substantiate or supplement information supplied by the firm.
25. If a partnership, a general partner must sign. If a corporation, the authorized corporate officer(s) must sign, and the corporate seal must be affixed to this bid/proposal.
26. Recommendations are posted on city web page via agendas prior to award.
27. Any protests are handled per the City's Purchasing Policy and F.S. 120.57(3).

BIDDER: GEO ONE TECH
Company Name
5357 WINROSE FALLS DR JACKSONVILLE FL 32258
Address/City/Zip
904 868 3381 ameera@geonetech.com
Phone Email
AMEERA SAYEED CEO
Contact Name Title
Am Syed OCT 17 2022
Company Representative Signature Date

PURPOSE, SCOPE OF WORK, AND QUALIFICATIONS
RFP 2022.09 Historic Milton Highway 90 Transportation Solutions

A. PROJECT BACKGROUND:

The City of Milton and Santa Rosa County have experienced tremendous growth rates since the year 2000. This growth pattern has continued to the present day, and has caused increasing traffic congestion issues along Highway 90 in multiple areas of Santa Rosa County, including through Downtown Milton. The Florida Department of Transportation (FDOT) has selected a preferred alternative to ease traffic congestion on US Highway 90. The Project Development and Environment Study (PD&E) was initiated in 2014 and concluded in 2019. The process utilized by FDOT focused on engineering solutions, environmental impacts, and public involvement. Upon completion, the PD&E study resulted in the identification of the widening of the existing Highway 90 corridor through downtown Milton to 4 lanes. In response to the results of the PD&E, and this preferred alternative identified by FDOT, the Milton City Council voted to oppose the preferred FDOT alternative, and has officially communicated its opposition to FDOT. Reasons for the City Council's opposition to the preferred alternative include, but are not limited to, adverse impacts to the Milton Historic District, traffic and pedestrian safety concerns, and adverse impacts on the redevelopment of the central business district and its growing tourism market.

B. PURPOSE:

The Milton City Council voted on July 12, 2022 to allocate funds to the review of the Highway 90 corridor through downtown Milton for the purpose of exploring additional alternatives that will address the traffic congestion issues along Highway 90 within and east of the Downtown Milton area, while promoting the redevelopment efforts and economic growth found within the central business district. The City's overall transportation issues are a product of its location within the region and along the Blackwater River with significant east-west and north-south through transportation movement on regional arterial facilities such as US Highway 90, State Road 87 North, Avalon Boulevard, and State Road 87. In addition to serving regional travel, these same facilities serve as the major travel routes for trips traveling in and around the City. There is a lack of a significant transportation network and associated connectivity thus causing local and regional trips to travel on the same roadways. Other facets of the transportation system including transit, pedestrian and bicycles are also key elements on the overall transportation system that must be examined and evaluated at a community level scale. Any study of the transportation network and an associated planning effort must take into consideration planning to accommodate or reroute traffic related to growth both inside and outside of the City borders. Currently, thousands of homes are planned for greenfield areas east of the City limits. Additionally, significant commercial and industrial development is proposed for the area, creating a further opportunity to explore ways to help the downtown Milton area become a destination community. The City Council feels that the issues found within the PD&E study must be resolved to guide growth most effectively within the community and better serve new residents and businesses outside the community. These new county residents and businesses will drive a demand for new educational, recreational, healthcare, retail and other urban uses.

C. TRAFFIC SAFETY:

Due to increased traffic congestion issues, the segment of Highway 90 under review in this scope of work has experienced an increase in traffic crashes, causing traffic safety to become a concern.

This study should include cutting edge concepts to reduce traffic speeds within the downtown community, while most efficiently moving traffic through Downtown Milton. The selected firm should have and employ a knowledge of future transportation trends and alternative travel methods to apply to the safety issues present.

D. COMPLETE STREETS IMPLEMENTATION:

As a part of the aforementioned PD&E document, FDOT has indicated that the alternatives studied should incorporate multi-modal design aspects, such as sidewalk and bike lane connectivity, and should incorporate elements from the Complete Streets Policy. More specifically, in 2014 FDOT adopted the "Complete Streets Policy" and in December 2015 initiated the "Complete Streets Implementation Plan".

FDOT's Complete Streets website states, "we have to put the right street in the right place. The days of "one size fits all" design are over." However, projects that were already in progress prior to the implementation of the new guidelines, such as the Highway 90 PD&E, were stuck in the "one size fits all" methodology. This was simply a matter of bad timing. As resources were committed and projects programmed, they have to follow the parameters which were in place at the time.

The new design methodology is not just bike lanes, sidewalks, and period lighting. Complete Streets Design methodology is a structure where in Land Use considerations come first; transportation considerations come second. FDOT's Complete Streets Philosophy: "Our comprehensive, 360° approach to transportation planning, design, construction, and operations focuses on identifying the right solutions for communities based on the needs and desires of all roadway users who live there. This context-sensitive approach is standard across all FDOT districts and results in streets that ensure the mobility of people and goods, support economic development, and preserve the quality of our environment and communities across the Sunshine State."

"In Florida, Complete Streets are not a specific type of project. Instead, the Department utilizes a 360° approach to ensure that all roadway projects are context-sensitive and consider the needs of all users, regardless of age and ability. This means that everything the Department undertakes – whether developing an entirely new corridor or resurfacing, restoring, or rehabilitating an existing road – is done to help promote safety, enhance mobility, improve quality of life, and promote economic development."

In 2018, FDOT published a new Design Manual that has helped provide more context-sensitive roads. These actions underscored Florida's commitment to improving safety for all users by making the principles of Complete Streets the foundation of all roadway planning, design, construction, and operations in the state. (<http://flcompletestreets.com/>)

While the science and engineering based on the previous FDOT methodology reached the logical and technically correct conclusion based on the rules and regulations at the time, FDOT has recognized that approach is no longer consistent with the goals and objectives of the department. The City of Milton believes that if the new Complete Streets Philosophy had been utilized, a different outcome may have been reached. Further, we believe that thriving live, work, play

urban areas that bring citizens together and drive the economy are incompatible with high-speed, high-volume highways. We believe that the safety of our citizens, traveling in vehicles and walking or cycling, must be the highest priority, closely followed by the health of our economy and preservation of our history.

E. GOALS:

The City of Milton is seeking an experienced traffic engineering, consulting planning and/or design firm to provide professional planning services to achieve the overall goals of this project, which are:

1. Evaluate the current Preferred Option, utilizing the latest means and methods, including "Complete Streets" principles, to provide factual and scientific data to demonstrate whether this option is or is not in keeping with the context of the current and future direction of the Milton downtown urban core community, and,
2. Identify other innovative and cutting-edge alternatives that achieve the desired objectives of all parties to move traffic, pedestrians and cyclists safely, effectively and efficiently through, in and around the downtown urban core of the City of Milton while enhancing our economy and preserving our history and,
3. Review a "Take No Action" alternative to identify the potential consequences of maintaining the status quo.

F. SCOPE OF WORK:

The selected consultant will allocate 40-50% of the time for this project:

1. Evaluating the existing and future operating conditions and features of the US Highway 90 corridor from State Road 87 North (Stewart Street) to Ward Basin Road.
2. Evaluating the impacts of 4-lane widening projects through the central business districts of regional communities to identify threats to the Downtown Milton area not considered by the PD&E study.
3. Reviewing the City's Comprehensive Plan and Riverfront Master Plan to identify growth trends within and surrounding the Downtown Milton area.
4. Reviewing the FDOT PD&E Study and Finding of No Significant Impact Report
5. Reviewing the Preferred Alternative and demonstrate if it meets FDOT's current planning guidelines and other transportation planning best practices.
6. Reviewing the other Non-Preferred alternatives developed by FDOT for feasibility based on the new FDOT Complete Streets Policy, Implementation Plan, and Design Manual.
7. Reviewing the "Take No Action" alternative.

The selected consultant will allocate 50-60% of the time for this project:

1. Documenting the specific purpose and need for improvements.
2. Developing and screening a range of new, reasonable alternatives for the City of Milton to present to FDOT, the TPO and the public that meets the above stated goals.
3. Consulting and collaborating with City Council, City staff, community stakeholders, the general public, FDOT, TPO and other interested parties on the project.

4. Developing conceptual cost estimates for the new alternatives for ROW, design and construction.
5. Providing educational materials in support of the research methodology and results.

The study area for this project shall be from State Road 87 North (Stewart Street) in the west, to Ward Basin Road in the east, to Munson Highway in the North, to Old Bagdad Highway in the south.

G. CONTRACT TIME COMPLETION:

The above tasks must be completed within 180 days from the execution of a contract for services with the selected consultant.

H. REQUIRED CONTENTS/SECTIONS FOR PROPOSAL:

1. Responsiveness to submission requirements.
 - a. Provide a cover letter and an outline of project understanding.
 - b. Additionally, all required forms as listed on page 2 of this document.
2. Firm Experience & Relevance of Prior Work.
 - a. Licenses- Provide a copy of your firm's professional license with your proposal. (Professional Engineer, AIA, AICP, or any applicable licenses)
 - b. Experience- Describe relevant experience of the firm or firms and total years of experience.
 - c. References- List work which best illustrates current qualifications relevant to this solicitation which will be performed by personnel assigned to this project. List at least three but no more than five (5) projects.
3. Ability to commence services and complete services within a timely manner. Describe.
4. Overall project team experience- provide Resumes for principals of the firm and experience.
5. Project Manager experience- provide Resume and experience.
6. Certified Minority Firm. Yes or No. If yes, enclose proof of certification.

I. RANKING EVALUATION CRITERIA/FACTORS FOR RFP's:

EVALUATION CRITERIA/FACTORS:

CRITERIA	POINTS AVAILABLE
Responsiveness to submission requirements	20
Firm Experience & relevance of prior work	20
Ability to commence services and complete services within a timely manner.	20
Overall Project Team experience	20
Project Manager Experience.	15

Certified Minority Firm. (Yes =5 pts. / No = 0 pts.)	5
TOTAL =	100

Selection and Contract:

Upon review of all responsive proposals using the criteria outlined above, the City shall determine a short list.

Step one: An evaluation committee will evaluate all responsive proposals based upon the information and references contained in the proposals. The committee shall score/rank each RFP, and determine a minimum of three (3), if more than three (3) proposals are qualified, to be finalists for further consideration. In the event there are less than three (3) qualified, the committee will give further consideration to all responsive proposals received.

The City reserves the right to request additional clarifying information and request an oral presentation from any and all Proposers prior to determination of award.

Step two: The committee may then conduct discussions (oral presentations), for clarification purposes only, with the finalists and re-score and re-rank the finalists' proposals. The evaluation committee may then make a recommendation, for award of a contract. The City may require visits to customer installations or demonstrations of product by contractors, as part of the evaluation process.

J. INSURANCE REQUIREMENTS:

Contractor shall obtain and maintain the minimum insurance coverage set forth below. By requiring such minimum insurance, the City of Milton shall not be deemed or construed to have assessed the risk that may be applicable to the Contractor. Contractor shall assess its own risks and if it deems appropriate and/or prudent, maintain higher limits and/or broader coverage. Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration, or types.

Contractor shall carry the following limits of liability as required below: Dollar amounts may change in accordance with the event or project. Events may include Food and liquor liability.

1. Commercial General Liability - ISO CG 001 Form or equivalent.

General Aggregate	\$1,000,000
Products/Completed Operations Aggregate	\$1,000,000
Each Occurrence Limit	\$1,000,000
Personal/advertising Injury	\$1,000,000
Fire Damage (Any One Fire)	\$50,000

Medical Payments (Any One Person) \$5,000

2. Automobile Liability

Bodily Injury/Property Damage \$1,000,000 each accident

Personal Injury Protection (PIP) Statutory

3. Workers' Compensation

Coverage A (Workers' Compensation) Statutory

Coverage B (Employers Liability):

➤ Each Accident \$100,000

➤ Disease-Each Employee \$500,000

➤ Disease-Policy Limit \$100,000

K. FORCE MAJEURE:

Neither party shall be liable for loss or damage suffered as a result of any delay or failure in performance under this Contract or interruption of performance resulting directly or indirectly from acts of God, civil, or military authority, acts of public enemy, war, riots, civil disturbances, insurrections, accidents, fire, explosions, earthquakes, floods, water, wind, lightning, strikes, labor disputes, shortages of suitable parts, materials, labor, or transportation to the extent such events are beyond the reasonable control of the party claiming excuse from liability resulting there from.

L. MODIFICATIONS:

Modifications to provisions of this contract shall only be valid when they have been rendered in writing and duly signed by both parties. The Parties agree to negotiate this contract if stated revisions of any applicable laws, regulations or increases/decreases in allocations make changes to this contract necessary.

M. TERMINATION:

This contract may be terminated by either party upon no less than thirty (30) calendar days' notice, without cause, unless a lesser time is mutually agreed upon by both parties. Said notice shall be delivered by certified mail (return receipt requested), by other method of delivery whereby an original signature is obtained, or in-person with proof of delivery. In the event of termination, the vendor will be paid for all costs incurred and hours worked up to the time of termination.

SWORN STATEMENT PURSUANT TO SECTION 287.133(3)(A).
FLORIDA STATUTES ON PUBLIC ENTITY CRIME

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to CITY OF MILTON

By AMEELIA SAYEED CEO

(print this individual's name and title)

for GRO ONE TECH LLC
(print name of entity submitting statements)

whose business address is 5357 WINROSE FALLS DR

and if applicable whose Federal Employer Identification Number (FEIN) is 83-1438415

If the entity has no FEIN, include the Social Security Number of the individual signing this sworn Statement:

2. I understand that a "public entity crime" as defined in paragraph 287.133(1)(a), Florida Statutes, mean a violation of any state or federal law by a person with respect to and directly related to the transactions of business with any public entity or with an agency or political subdivision of any other state or with the United States including, but not limited to any bid or contract for goods or services to be provided to any public entity or any agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes means a finding of guilt or a conviction of a public entity crime, with or without adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a Jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in paragraph 287.133(1)(a), Florida Statutes, means:

1. A predecessor or successor of a person convicted of public entity crime; or
2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in a relation to the entity submitting this sworn statement. (Please indicate which statement applies).

☒ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or any affiliate of the entity has been charged with and convicted of a public entity crime within the past 36 months.

☒ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime within the past 36 months. AND (Please indicate which additional statement applies).

☒ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime within the past 36 months. However, there has been a subsequent proceeding before a Hearing Officers of the State of Florida, Division of Administrative Hearings and the Final Order by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. (Attached is a copy of the final order).

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THE PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED AND FOR THE PERIOD OF THE CONTRACT ENTERED INTO, WHICHEVER PERIOD IS LONGER. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES, FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

Am Syed
(Signature)

City of Jacksonville

STATE OF FLORIDA

Sworn and subscribed before me this 17 day of October, 20022 by

Ameera Farhatullah Syed who is Personally known to me _____

Or who produced identification - Florida driver license
(Type of Identification)

Helbert E. Ingram
(Signature) (Notary Public—State of Florida)

Helbert E. Ingram
(Printed, typed or stamped commissioned name of notary public)

My commission expires August 16, 2024 (SEAL)





City of Milton

DRUG-FREE WORKPLACE (F.S. 287.087)

Preference to businesses with drug-free workplace programs.—Whenever two or more bids, proposals, or replies that are equal with respect to price, quality, and service are received by the state or by any political subdivision for the procurement of commodities or contractual services, a bid, proposal, or reply received from a business that certifies that it has implemented a drug-free workplace program shall be given preference in the award process.

In order to have a drug-free workplace program, a business shall:

- (1) Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
- (2) Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
- (3) Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).
- (4) In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than 5 days after such conviction.
- (5) Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community by, any employee who is so convicted.
- (6) Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

Vendor Name Geo ONE TECH Date: OCT 17 2022

We have a drug-free workplace program. ☒ yes; or ☐ no (check one)

Vendor's Signature *Ann Sykes*



City of Milton

NON-COLLUSION AFFIDAVIT

STATE OF FLORIDA

COUNTY OF DUVAL

AMKERA SAMEED, CEO
Owner, Partner or Officer of Firm

GEO ONE TECH, 5357 WINKROSE FALLS DR JAX FL 32258
Company Name, Address, City and State

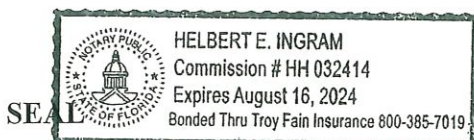
Being of lawful age, being first duly sworn, on oath says that he/she is the agent authorized by the bidder to submit the attached bid. Affidavit further states as proposer, that they have not been a party to any collusion among bidders in restraint of competition by agreement to bid at a fixed price or to refrain from bidding; or with any officer of the City of Milton or any of their employees as to quantity, quality or price in the prospective contract; or any discussion between bidders and any official of the City of Milton or any of their employees concerning exchange of money or other things of value for special consideration in submitting a sealed bid for:

FIRM NAME: GEO ONE TECH LLC

SIGNATURE: Am Sameed

TITLE: CEO

The foregoing instrument was acknowledged before me this 17 day of October, 2022 by the above signed acting on behalf of the organization/company. He/she is personally known to me or has produced Florida Driver license as identification and did (did not) take an oath.



Helbert E. Ingram
Signature of Notary



City of Milton

E-VERIFY STATEMENT OF COMPLIANCE

Contractor hereby certifies compliance with the following:

Pursuant to § 448.095(2) Florida Statutes (2020), Contractor shall register with and use the E-Verify system operated by the United States Department of Homeland Security to verify the work authorization status of all new employees hired by Contractor while performing work or providing services for the City of Milton. Contractor shall also include in any related subcontracts a requirement that subcontractors performing work or providing services for the City of Milton on its behalf register with and use the E-Verify system to verify the work authorization status of all new employees hired by the subcontractor while performing work or providing services for the City of Milton. Additionally, Contractor shall include in any related subcontracts a requirement that subcontractors performing work or providing services for the City of Milton on its behalf provide Contractor with an affidavit stating that the subcontractor does not employ, contract with, or subcontract with any unauthorized alien as defined in 8 U.S.C. § 1324a(h)(3). Contractor shall maintain a copy of such affidavit for the duration of its contract with the City of Milton.

Geo ONE TECH

FIRM NAME

Amr Syed

SIGNATURE

CEO

TITLE

P.O. Box 909 • 6738 Dixon Street • Milton, Florida 32572
Phone (850) 983-5400 • Fax (850) 983-5415
Established 1844



City of Milton

Prompt Payment Affidavit

THIS AFFIDAVIT IS TO ACCOMPANY THE PROPOSAL, when specified.

Florida Statutes (218.735) requires:

When a Contractor receives payment from a local government entity for labor, services, or materials furnished by subcontractors and suppliers hired by the Contractor, the Contractor shall remit payment due to those subcontractors and suppliers within 10 days after the contractor's receipt of payment. When a subcontractor receives payment from a Contractor for labor, services, or materials furnished by the subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors and suppliers within 7 days after the subcontractor's receipt of payment. Notherin herein shall prohibit a Contractor or subcontractor from disputing, pursuant to the terms of the relevant contract, all or any portion of a payment alleged to be due to another party if the Contractor or subcontractor notifies the party whose payment is disputed, in writing, of the amount in dispute and the actions required to cure the dispute. The Contractor or subcontractor must pay all undisputed amounts due within the time limits imposed by this section.

Firm Name: GEO ONE TRCIT

Signature: Ann Syant

Title: CEO

P.O. Box 909 • 6738 Dixon Street • Milton, Florida 32572 • (850) 983-5400 • Fax (850) 983-5415
~Established 18 44~



City of Milton

CONFLICT OF INTEREST DISCLOSURE FORM

For purposes of determining any possible conflict of interest, all bidders/proposers, must disclose if any City of Milton, employee(s), elected officials(s), or if any of its agencies is also an owner, corporate officer, agency, employee, etc., of their business.

Indicate either "yes" (a City employee, elected official, or agency is also associated with your business), or "no". If yes, give person(s) name(s) and position(s) with your business.

YES

NO

NAME(S)

POSITION(S)

CEO ONE TECH

Firm Name

Ameera Saeed

By (Signature):

5357 WINNORSE FALLS DR
Address JACKSONVILLE FL 32256

E-Mail: ameera@geonotech.com

AMEERA SAEED

By (Printed):

CEO

Title

904 868 3381
Phone No.



GIVE PREFERENCE TO WALKING,
CYCLING, AND TRANSIT OVER
PRIVATE CARS

W9s

Request for Taxpayer Identification Number and Certification

► Go to www.irs.gov/FormW9 for instructions and the latest information.

Give Form to the
requester. Do not
send to the IRS.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
Geo One Tech LLC

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☒ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► **C**

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ►

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.
5357 Winrose Falls Dr

6 City, state, and ZIP code
Jacksonville FL 32258

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number									
			-						

or

Employer identification number									
8	3	-	1	4	3	8	4	1	5

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign
Here

Signature of
U.S. person ►

Date ► **Sept 22 2022**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

Request for Taxpayer Identification Number and Certification

Give Form to the
requester. Do not
send to the IRS.

► Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type.
See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

Ann Marie Longstreet

2 Business name/disregarded entity name, if different from above

Longstreet and Leonard Consulting Services

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☒ Individual/sole proprietor or single-member LLC

☐ C Corporation

☐ S Corporation

☐ Partnership

☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ►

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ►

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

324 Gathering Oaks Drive

6 City, state, and ZIP code

Tallahassee, FL 32308

7 List account number(s) here (optional)

Requester's name and address (optional)

**City of Milton Florida PO Box 909 Dixon St.
Milton, FL 32572**

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

____ - ____ - ____

or

Employer identification number

8 6 - 3 5 7 4 8 9 2

Part II Certification

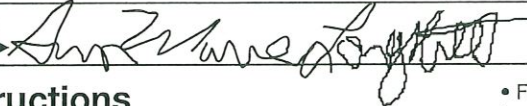
Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign
Here

Signature of
U.S. person



Date

10-17-22

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

**Request for Taxpayer
Identification Number and Certification**

Give form to the
requester. Do not
send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

CITY OF MILTON, FL

Business name, if different from above

Check appropriate box: ☐ Individual/Sole proprietor ☐ Corporation ☐ Partnership

☐ Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶

☒ Other (see instructions) ▶ Govt

☐ Exempt
payee

Address (number, street, and apt. or suite no.)

PO Box 909 6738 DIXON ST

City, state, and ZIP code

MILTON, FL 32572

Requester's name and address (optional)

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number

OR

Employer identification number

5916000377

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

Sign
Here

Signature of
U.S. person ▶

Dewitt Proke

Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,

City of Milton RFP-2022.09 Historic Milton Highway 90 Transportation Solutions

A MIX OF INFRASTRUCTURE, ACTIVITY, AND PRIORITY



INFRASTRUCTURE

ENSURE A PHYSICAL SPACE AND DESIGN THAT PROMOTES WALKING

ACTIVITY

BRING PEOPLE AND ACTIVITIES CLOSE ENOUGH TO WALK IN SAFE AND LIVELY ENVIRONMENTS

PRIORITY

GIVE PREFERENCE TO WALKING, CYCLING, AND TRANSIT OVER PRIVATE CARS

Insurance



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

07/07/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Hiscox Inc. 520 Madison Avenue 32nd Floor New York, New York 10022	CONTACT NAME: PHONE (A/C, No, Ext): (888) 202-3007 E-MAIL ADDRESS: contact@hiscox.com FAX (A/C, No): INSURER(S) AFFORDING COVERAGE INSURER A: Hiscox Insurance Company Inc INSURER B: INSURER C: INSURER D: INSURER E: INSURER F:	NAIC # 10200
--	--	------------------------

INSURED
Geo One Tech LLC
5357 Winrose Falls Dr
Jacksonville, FL 32258

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☒ POLICY ☐ PRO-JECT ☐ LOC OTHER:			P100.175.834.3	03/27/2022	03/27/2023	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ S/T Gen. Agg. \$
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ HIRED AUTOS ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	☐ UMBRELLA LIAB ☐ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE ☐ DED ☐ RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below Y / N ☐ N / A						PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
A	Professional Liability			P100.175.281.3	03/27/2022	03/27/2023	Each Claim: \$ 1,000,000 Aggregate: \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

11/10/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Chip Minick
Brad Burns Insurance	PHONE (A/C, No, Ext): (850) 385-6500
2108 Delta Way	FAX (A/C, No): (850) 385-0810
	E-MAIL ADDRESS: info@BradBurnsIns.com
	INSURER(S) AFFORDING COVERAGE
Tallahassee FL 32303	INSURER A: LLOYDS OF LONDON
	INSURER B:
	INSURER C:
	INSURER D:
	INSURER E:
	INSURER F:
INSURED	NAIC #
Longstreet & Leonard Consulting Services LLC	
324 Gathering Oaks Dr	
Tallahassee FL 32308	

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☒ POLICY ☐ PRO-JECT ☐ LOC OTHER:			PSK0033986306	10/21/2021	10/21/2022	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 250,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 1,000,000 \$
A	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ONLY ☒ NON-OWNED AUTOS ONLY			PSK00339863306	10/21/2021	10/21/2022	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	UMBRELLA LIAB ☐ OCCUR EXCESS LIAB ☐ CLAIMS-MADE DED ☐ RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N ☐	N/A				PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
A	Professional Liability			PSK00339863306	10/21/2021	10/21/2022	General Aggregate 1,000,000 Each Claim 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

CANCELLATION

FDOT

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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BID TABULATION

10/19/2022 2:00 p.m.

Present for the City of Milton:

Diane Ebentheuer
Michele Williams
Curtis Krebs
Joe Cook

Purchasing Officer
Purchasing Assistant
Chief Financial Officer
Public Works Director

Others in attendance:

None-

Opening was held at 2:00 p.m. The purpose of the meeting was to receive submittals for the following solicitation:

RFP 2022.09 Historic Milton Hwy 90 Transportation Solutions

1 GEO One Tech, LLC

Proposal



Agenda Item # 2022-986

Police Pension Board Application

MEETING DATE

November 17, 2022

PREPARED BY

Melissa Short, Admin
Assistant/Permit Clerk/Assistant
City Clerk

BACKGROUND

There is one Police Pension Board vacancy; Marc Casteooaneta applied for this vacancy on November 9, 2022.

SUMMARY

RECOMMENDATION

Staff awaits direction

ATTACHMENTS

1. Marc Castellaneta Board Application

**CITY OF MILTON
BOARD APPOINTMENT SURVEY/INFORMATION**

Date: 11-9-22

Name Marc Castellana Phone (hm) 754-332-6058

E-mail address mcastellana@miltonfl.org Phone (wk/cell) 850 393 1045

Address 6529. Magnolia St. City Ward 3

Education GED

Work Experience: Security, Private Investigation,

Corrections and Police

Community Service Community Policing

Awards _____

Hobbies, Travel, etc House work, Visiting family
in UT and NC

Other comments that would be helpful in determining appropriate appointment _____

Please attach a brief resume.

Please check the Boards that you are interested in.

☐ Milton Housing Authority

☐ Milton Planning Board

☐ Historic Preservation Board

☐ Community Improvement Board

☐ Civil Service Board

☐ General Employees Pension Board

☐ Board of Adjustments

☐ Firefighters Pension Board

☒ Police Pension Board



Agenda Item # 2022-483

Business Improvement Program FY 2023 Cycle 2

MEETING DATE

November 17, 2022

PREPARED BY

Ed Spears, Director of
Economic Development

BACKGROUND

With the approval of the FY 2023 budget and the start of the new fiscal year, the City's Business Improvement Program has funds available for allocation. The program is available to businesses city-wide, on a first come, first serve, which can accept applications at any time. Grants are available to assist with business signage, the purchase of business equipment to allow necessary to allow a business to grow and add employees and for the improvement to the exterior of buildings.

Since inception in 2018, the Business Improvement program has provided 37 grants to 29 different businesses totaling \$143,642.68. The program has generated a match from the private sector totaling \$709,258.03. For every \$1 invested by the City, businesses have invested \$4.94. The program is advertised on a continuous basis.

At this time, one application has been received from Oh Sugar, LLC, DBA The Sweet Greek. They are requesting \$1,000 for exterior signage. The sign great does not require a match. However, the applicant has indicated a \$1,000 match will be provided to fund the total cost of the new signs. If approved, \$33,000 will remain in FY 2023 grant funding for additional grants, which will be forwarded to Council as received.

SUMMARY

Staff received one eligible grant application totalling \$1,000. \$34,000 is available for new applications. If awarded, \$33,000 will be available for additional grants.

RECOMMENDATION

Staff recommends approval of one grant in the amount of \$1,000.

ATTACHMENTS

1. The Sweet Greek BIP Application FY 2023 Cycle 2
2. 2023 Cycle 2 Business Improvement Program Spreadsheet
3. Business Improvement Program Report - All Time



City of Milton
Office of Economic
Development

Business Improvement Program

DATE OF APPLICATION: 11/4/2022
NAME OF BUSINESS (Legal and DBA, if Different): Oh Sugar Milton FL DBA The Sweet Greek Milton FL
BUSINESS OWNER(S): Melissa Glyptis Simpson
PROPERTY OWNER(S) (IF DIFFERENT): Margaret Reis for Milton Revival LLC

GRANT CATEGORY: Business Expansion Grant
TOTAL AMOUNT REQUESTED (MAXIMUM \$5,000): \$ 1,000.00
TOTAL AMOUNT OF MATCH (MINIMUM 100%): \$ 100%
TOTAL AMOUNT OF PROJECT (ALL ASPECTS): \$ 2,000.00

ADDRESS OF PROJECT: 5237 Willing St Milton FL 32570
PROJECT NAME: Sweet Greek Signage

ATTACH REQUIRED ADDITIONAL INFORMATION:

- Complete application form
- Detailed project narrative
- Legal description of property
- Proof of property ownership or letter from owner consenting to the project
- Proof of property insurance
- Certification of sign ordinance, zoning, and future land use compliance
- Scaled drawing of improvements involving building changes
- Accurate color mock-ups and/or paint chips
- Original color photographs of existing property conditions
- Three cost estimates from qualified contractors (labor and materials for entire project).
- Final cost estimate including name of licensed contractor chosen to perform work
- Copy of the chosen contractor's license (if licensure is required for the work)
- Copy of City of Milton Business License.

NAME & MAILING ADDRESS OF OWNER/APPLICANT (PLEASE PRINT):

Melissa Glyptis Simpson
5568 Woodbine Rd Suite 500
Pace FL 32571

SIGNATURE(S) OF BUSINESS AND PROPERTY OWNER(S) (IF DIFFERENT)

Melissa Glyptis Simpson
dotloop verified
11/03/22 6:00 PM CDT
X8T5-4FBN-MT-BKVG

Margaret Reis
dotloop verified
11/03/22 7:58 PM CDT
IW07-QVMS-MA0Z-BXLO

TELEPHONE # (850) _____ CELL # 919-402-3295 EMAIL thesweetgreekmiltonfl@gmail.com

For official use only:

DATE & TIME APPLICATION RECEIVED: _____ RECEIVED BY: _____



City of Milton
Office of Economic Development

Page 2 of 2

2022 Business Improvement Program

Memorandum of Understanding

I, the grantee, understand that work cannot commence on any portion of the Business Improvement Project prior to receiving approval of the grant funds by the City of Milton. A written notification to proceed will be provided. I, the grantee, have read, understand, and accept the terms and conditions of the grant. I have read and understand the actions which will trigger a default. In the event of a default, I, the grantee, do hereby guarantee the repayment of the principal amount of the grant in accordance with the terms of the Commercial Façade Program application and guidelines. If the grantee is not the property owner, as shown in the Santa Rosa County Property Appraiser's Database, the property owner must also execute this Memorandum of Understanding.

Melissa Glyptis Simpson for the Sweet Greek Milton FL

Grantee Name (Please Print)

Melissa Glyptis Simpson

dotloop verified
11/03/22 6:00 PM CDT
Z9P6-LVO8-CUTP-9NSV

Grantee Signature

Date

Margaret Ries for Milton Revival LLC

Property Owner Name (Please Print)

Margaret Ries

dotloop verified
11/03/22 7:58 PM CDT
G8VB-6CYW-TUBA-QMGG

Property Owner Signature

Date

City of Milton (Please Print)

City Manager Signature

Date

**Signs Galore, Inc.**

111 Hammock Rd.
Crestview, FL 32536
Ph: (850) 683-8010
FAX: (850) 689-0225
Email: billing@signsgaloreinc.com
Web: <http://www.signsgaloreinc.com>

Estimate #: 6148

Page 1 of 1

Created Date:	10/7/2022 3:00:00PM	Prepared For:	The Sweet Greek
Salesperson:	House Account	Contact:	Melissa Simpson, Owner
Email:		Cell Phone:	(850) 733-6532
Not Specified:	N/A	Email:	thesweetgreekmiltonfl@gmail.com
Entered by:	Madison Rutledge	Address:	5240 Willing Street Milton, FL 32570

Description: Wood/Polymetal Hanging Sign

Quantity	
1	Product: Dimensional Signs (Flat Cut) 1 Description: Flat Cut Dimensional Signs • 1- 36 in (H) x 27 in (W) Dimensional Sign(s) made from Wood-Cedar 2" Board stock material • Painting Face: Paint Types Pittsburg Stain,
Quantity	
2	Product: Misc 1 Description: Misc • 1 Ea., 1/2 In. Aluminum Bracketing
Quantity	
3	Product: Wide Format Prints 2 Description: Wide Format Prints • 2- 36 in (H) x 27 in (W) Single Sided Print(s) made from 3MJ3554150 Gloss stock material • Mounted on: 3mm polymetal white • Laminated with Clearlam54100 on face
Quantity	
4	Product: Installation of Non-Electric Signs 1 Description: Installations - Non-Electric Signs • 2 hr of Install Time. • Using a Crew of 1 Personnel. • 0.3 hr of Travel Time. • Install height is 10 ft above ground.

Subtotal:	\$1,310.71
Taxes:	\$91.75
Total:	\$1,402.46
Deposit Required:	\$701.23

Client Reply Request☐ Estimate Accepted "As Is". Please proceed with Order.☐ Changes required, please contact me.☐ Other: _____

SIGN: _____ Date: ____/____/____

Print Date: 11/3/2022 10:35:36AM

Custom Sign Specialist

Page 85 of 633

ARTWORK APPROVAL

Blue will be "Salty Dog" with SW
heritage collection



**SIGNS WILL COMPLY TO
FLORIDA BUILDING CODE
2020 (7TH EDITION)**
PRIMARY ELECTRICAL POWER TO SIGN
TO BE BY OTHERS. ALL POWER TO BE
120 VOLT UNLESS OTHERWISE STATED.
ELECTRICAL TO USE
U.L. LISTED COMPONENTS
AND SHALL MEET ALL
N.E.C. STANDARDS
2017
SIGN MUST BE GROUNDED IN COMPLIANCE WITH
ARTICLE 600 OF THE NATIONAL ELECTRIC CODE.

SIGNS GALORE INC., hereby expressly reserves the common
lay copyright and other property right in these drawings. These
drawings are not to be reproduced, changed or copied in any
form or manner whatsoever without first obtaining the written
permission and consent of SIGNS GALORE INC., nor are they
to be assigned to any party without first obtaining said written
permission and consent.

_____ read and understood this _____ day of _____ 20 ____

DRAWN BY: mr	APPROVED BY:
DATE: 11/3/22	CLIENT:
WO# or EST#	DATE:



MIX AND MATCH YOUR COLORS

MEZCLE Y COMBINE LOS COLORES

Use your Collection as a design guide. Select colors for your walls, another for your trim, and use the rest to shop for furniture and accents.

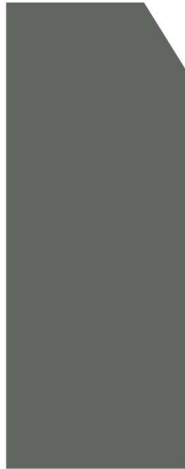
Utilice su colección como una guía de diseño. Seleccione los colores para las paredes, otro para el reborde y utilice el resto para buscar muebles y toques de decoración.



AH 01 Dark Night HGSW6237



AH 02 Svelte Sage HGSW6164



AH 03 Grizzle Gray HGSW7068



AH 04 Nomadic Desert HGSW6107



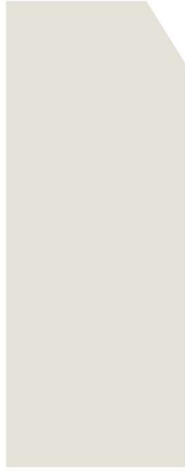
AH 05 Resolute Blue HGSW6507



AH 06 Fireweed HGSW6328



AH 07 Camelback HGSW6122



AH 08 Origami White HGSW7636



AH 09 Red Barn HGSW7591



AH 10 Navajo White HGSW6126



AH 11 Macadamia HGSW6142



AH 12 Tiki Hut HGSW7509



AH 13 Salty Dog HGSW9177



AH 14 Relaxed Khaki HGSW6149



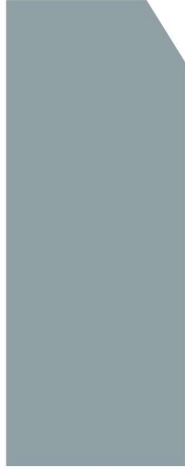
AH 15 Rural Green HGSW6418



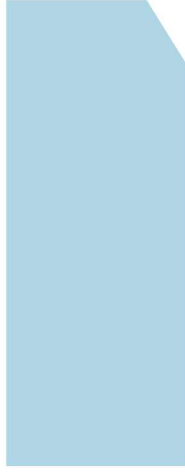
AH 16 Jasper HGSW6216



AH 17 Totally Tan HGSW6115



AH 18 Debonair HGSW9139



AH 19 Something Blue HGSW6800



AH 20 Tricorn Black HGSW6258



City of Milton
2023 Business Improvement Program
Cycle 2 Application

11/10/2022

	NAME	ADDRESS	REQUEST	MATCH	PROJECT	FIRST TIME APPLICANT	TARGET LOCATION	HISTORIC STRUCTURE
	CYCLE 2 Applicant							
1	The Sweet Greek	5237 Willing Street	\$ 1,000.00	\$ 1,000.00	Signage	No	Yes	Yes
	TOTAL REQUEST		\$ 1,000.00	\$ 1,000.00	Match Ratio	\$ 1.00		
			Total Budget	Awarded to Date	Available Balance			
	AVAILABLE FUNDING	CRA	\$ 20,000.00	\$ 5,000.00	\$ 15,000.00			
		General Revenue	\$ 20,000.00	\$ 1,000.00	\$ 19,000.00			
		TOTAL	\$ 40,000.00	\$ 6,000.00	\$ 34,000.00			
	<u>FY 2023 To Date</u>							
1	Lindsay & Andrews, PA	5218 Willing Street	\$ 5,000.00	\$ 5,009.00	Business Equipment	No	Yes	Yes
2	Yamato's Japanese Steakhouse	6550 Caroline Street	\$ 1,000.00	\$ 3,800.00	Signage	Yes	No	No
	TOTAL		\$ 6,000.00	\$ 8,809.00				
				Match Ratio	\$ 1.47			

MAIN STREET MILTON
BUSINESS IMPROVEMENT PROGRAM
FINANCIAL STATEMENT

	GRANTEE	PROJECT	FIRST TIME	TARGET	HISTORIC	DATE	PAYEE	AWARD	REQUIRED	EST. TOTAL	PAYMENT	NOTES
			APPLICANT	LOCATION	STRUCTURE				MATCH	MATCH		
REVENUE						3/29/2018	CRA Payment	\$ 10,000.00				
						8/20/2018	CRA Payment	\$ 10,000.00				
						12/12/2018	City of Milton	\$ 20,000.00				50% CRA/50% GR
						4/9/2019	City of Milton	\$ 20,000.00				50% CRA/50% GR
							TOTAL REVENUE	\$ 60,000.00				
EXPENSES												
2018 Cycle 1	Visible Changes Barber Shop	Code required upgrades, signage, painting	Yes	No	No	7/12/2018	Mooneyham Heating & Air				\$ 775.00	Ventilation/Make-Up Air Instillation
						7/12/2018	Marie Earnest				\$ 450.00	Plumbing - Backflow Preventer
						7/12/2018	Goodyear Electric				\$ 225.00	Installation of Code Required Exhaust Fan
						7/12/2018	Lonnie Bennett				\$ 185.00	Reimbursement - Sink Instillation
						7/12/2018	Randall McElwain				\$ 425.00	Exterior Signage
						7/23/2018	Marvin Whigum				\$ 250.00	Barber Shop Work Stations Electrical Work
						7/23/2018	Lonnie Bennett				\$ 190.00	Reimbursement - Painting Supplies
							SUBTOTAL	\$ 2,500.00	\$ 2,500.00	\$ 7,500.00	\$ 2,500.00	100% Expended - Project Completed
	LilPax's Boat Rental	Business Signage	Yes	Yes	No	7/12/2018	James Hudson				\$ 369.82	Reimbursement - Pensacola Signs
							SUBTOTAL	\$ 500.00	\$ -	\$ 2,500.00	\$ 369.82	74% Expended - Project Completed
	Man Cave Barber Shop	Signage, exterior awning	Yes	No	No	7/23/2018	Sign Crafters				\$ 51.36	Exterior Signage
						9/20/2018	Oliver Sledge				\$ 448.64	Reimbursement - Stripped Window Awnings
							SUBTOTAL	\$ 500.00	\$ -	\$ -	\$ 500.00	100% Expended - Project Completed
	Beardless Brewhaus	Roll-up garage door	Yes	Yes	Yes	8/13/2018	Specialty Products, Inc.				\$ 5,000.00	Garage Roll-Up Door
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00	\$ 5,000.00	100% Expended - Project Completed
	Corner Shack	Business equipment, fire suppression, painting, doors	Yes	No	No	8/20/2018	Evan Mitchell				\$ 2,373.10	Reimburse expenses for Exterior Signage, Exterior Doors, Seating, Painting
						9/5/2018	Evan Mitchell				\$ 876.90	Reimburse expenses for Fire Safety Service, and Business Licensing
							SUBTOTAL	\$ 3,250.00	\$ 3,250.00	\$ 12,500.00	\$ 3,250.00	100% Expended - Project Completed
	Boomerang Pizza	Exterior Painting & Lighting	Yes	Yes	Yes	9/28/2018	David Tedder Painting				\$ 4,200.00	Exterior Painting
						11/19/2018	Live Wire Electric				\$ 800.00	Exterior Lighting
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00	\$ 5,000.00	100% Expended - Project Completed
	Bagdad Lumber Company	Exterior Awning	Yes	Yes	Yes							\$0 Expenses to Date
							SUBTOTAL	\$ -			\$ -	Grantee returned award
2018 Cycle 1							TOTALS	\$ 16,750.00	\$ 15,750.00	\$ 52,500.00	\$ 16,619.82	
							BALANCE				\$ 130.18	

MAIN STREET MILTON
BUSINESS IMPROVEMENT PROGRAM
FINANCIAL STATEMENT

	GRANTEE	PROJECT	FIRST TIME APPLICANT	TARGET LOCATION	HISTORIC STRUCTURE	DATE	PAYEE	AWARD	REQUIRED MATCH	EST. TOTAL MATCH	PAYMENT	NOTES
2019 Cycle 1	Elliott & Cunningham Office	Exterior Façade, interior ceiling replacement, painting	Yes	Yes	Yes							\$0 Expenses to Date Sent award letter & promissory note 12/10/18
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 50,000.00	\$ -	
	Mama Latte's Coffee Shop	Exterior playground and seating	Yes	No	No							\$0 Expenses to Date
							SUBTOTAL				\$ -	Grantee returned award
	Simply Southern Bed & Breakfast	ADA ramp and sidewalk replacement	Yes	No	Yes							\$0 Expenses to Date
							SUBTOTAL				\$ -	Grantee returned award
	CD Properties	Repair Historic Windows and surrounds	Yes	Yes	Yes							\$0 Expenses to Date Sent award letter & promissory note 12/10/18
							SUBTOTAL	\$ 4,450.00	\$ 4,450.00	\$ 5,000.00		
	Brew Angels Brewery	Equipment Upgrade	Yes	Yes	Yes	2/25/2019	Brew Angels Brewery				\$ 5,000.00	Purchase of Brewing Equipment
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 35,000.00	\$ 5,000.00	100% Expended - Project Completed
	Brew Angels Brewery	New business sign	Yes	Yes	Yes	5/8/2019	A+ Sign Station				\$ 500.00	Payment to sign company
							SUBTOTAL	\$ 500.00	\$ -	\$ 1,153.15	\$ 500.00	100% Expended - Project Completed
	Janet Coulter Realty Office	Exterior awning and painting	Yes	Yes	No	5/23/2019 10/17/2019	Pensacola Paints LLC Markham & Sons Signs				\$ 2,868.12 \$ 2,075.00	99% Expended - Project Completed
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00	\$ 4,943.12	\$ 56.88
	Milton Revival, LLC	Exterior awning, painting and drainage system	Yes	Yes	No	2/13/2019 2/13/2019 7/29/2019	Markham & Sons Signs Pensacola Paints LLC Markham & Sons Signs				\$ 2,500.00 \$ 986.91 \$ 1,513.09	Awning Deposit Exterior Painting Awning Final Payment
							SUBTOTAL	\$ 5,000.00	\$ 5,000.00	\$ 20,000.00	\$ 5,000.00	100% Expended - Project Completed
2019 Cycle 1							TOTALS	\$ 24,950.00	\$ 24,450.00	\$ 126,153.15	\$ 15,443.12	
							BALANCE				\$ 9,506.88	

MAIN STREET MILTON BUSINESS IMPROVEMENT PROGRAM FINANCIAL STATEMENT

	GRANTEE	PROJECT	FIRST TIME APPLICANT	TARGET LOCATION	HISTORIC STRUCTURE	DATE	PAYEE	AWARD	REQUIRED MATCH	EST. TOTAL MATCH	PAYMENT	NOTES
2019 Cycle 2	Blackwater Bistro	ADA Ramp, Painting, Siding	Yes	No	Yes	10/28/2019	Milton Life Restaurant Group				\$ 2,125.00	85% Expended - Project Completed
	SUBTOTAL							\$ 2,500.00	\$ 2,500.00	\$ 5,000.00	\$ 2,125.00	\$ 375.00
	Brooks, Warrick & Assoc.	Roof	Yes	No	Yes		Terry Sowell Roofing	\$ 5,000.00	\$ 5,000.00	\$ 16,210.00	\$ 5,000.00	100% Expended - Project Completed
	SUBTOTAL							\$ 5,000.00	\$ 5,000.00	\$ 7,500.00	\$ 5,000.00	
	Brooks, Warrick & Assoc.	Sign	Yes	No	Yes	7/30/2019	Signcrafters	\$ 500.00	N/A	\$ 485.78	97% Expended - Project Completed	
	SUBTOTAL							\$ 500.00		\$ 1,000.00	\$ 485.78	
	Boomerang Pizza	Exterior Painting	No	Yes	Yes	8/9/2019	Five Star Painting			\$ 4,876.20	98% Expended - Project Completed	
	SUBTOTAL							\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 4,876.20	
	Beardless Brewhaus	Equipment Upgrade	No	Yes	Yes	6/24/2019	Beardless Brewhaus	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	100% Expended - Project Completed	
	SUBTOTAL							\$ 5,000.00	\$ 5,000.00	\$ 7,000.00	\$ 5,000.00	
***	Wacked Out Weiner	Doors and Code Required Plumbing	Yes	Yes	No					\$ 5,000.00	100% Expended - Project Completed	
SUBTOTAL							\$ 5,000.00	\$ 5,000.00	\$ 104,270.00	\$ 5,000.00	Paid by City	
***	Spencer's Second Hand Shop	Window Replacement	Yes	Yes	No					\$ -	\$0 Expenses to Date	
SUBTOTAL							\$ 668.89	\$ 668.88	\$ 668.88	\$ -		
2019 Cycle 2	TOTALS							\$ 23,668.89	\$ 23,168.88	\$ 130,438.88	\$ 22,486.98	
	BALANCE										\$ 1,181.91	
	GRAND TOTAL							\$ 65,368.89	\$ 63,368.88	\$ 309,092.03	\$ 54,549.92	

MAIN STREET MILTON BUSINESS IMPROVEMENT PROGRAM FINANCIAL STATEMENT

[illegible]

City of Milton
Business Improvement Program
Complete History

CYCLE	PROJECTS	BUSINESSES	GRANTEE	ADDRESS	PROJECT	REQUEST	AWARD	REQUIRED MATCH	EST. TOTAL MATCH	CRA	CITY	PAYMENT	NOTES
2018 Cycle 1	1	1	Visible Changes Barber Shop	5154 Santa Rosa Street	Code required upgrades, signage, painting	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 7,500.00		\$ 2,500.00	\$ 2,500.00	Completed
	2	2	LilPax's Boat Rental	5142 Willing Street	Business Signage	\$ 500.00	\$ 500.00	\$ -	\$ 2,500.00	\$ 369.82		\$ 369.82	Completed
	3	3	Man Cave Barber Shop	5176 Stewart Street	Signage, exterior awning	\$ 500.00	\$ 500.00	\$ -	\$ -		\$ 500.00	\$ 500.00	Completed
	4	4	Beardless Brewhaus	6820 Caroline Street	Roll-up garage door	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00	\$ 5,000.00		\$ 5,000.00	Completed
	5	5	Corner Shack	5168 Stewart Street	Business equipment, fire suppression, painting, doors	\$ 3,250.00	\$ 3,250.00	\$ 3,250.00	\$ 12,500.00		\$ 3,250.00	\$ 3,250.00	Completed
	6	6	Boomerang Pizza	5227 Willing Street	Exterior Painting & Lighting	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00	\$ 5,000.00		\$ 5,000.00	Completed
2019 Cycle 1	7	7	Elliott & Cunningham Office	5235 Willing Street	Exterior Façade, interior ceiling replacement, painting	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 50,000.00	\$ 5,000.00		\$ -	Awarded
	8	8	CD Properties	6821 Caroline Street	Repair Historic Windows and surrounds	\$ 5,000.00	\$ 4,450.00	\$ 4,450.00	\$ 5,000.00	\$ 4,450.00		\$ 4,351.06	Underway
	9	9	Brew Angels Brewery	6821 Caroline Street	Equipment Upgrade	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 35,000.00		\$ 5,000.00	\$ 5,000.00	Completed
	10		Brew Angels Brewery	6821 Caroline Street	New business sign	\$ 500.00	\$ 500.00	\$ -	\$ 1,153.15	\$ 500.00		\$ 500.00	Completed
	11	10	Janet Coulter Realty Office	5241 Willing Street	Exterior awning and painting	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 15,000.00		\$ 4,943.12	\$ 4,943.12	Completed
	12	11	Milton Revival, LLC	5237 Willing Street	Exterior awning, painting and drainage system	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 20,000.00	\$ 5,000.00		\$ 5,000.00	Completed
2019 Cycle 2	13	12	Blackwater Bistro	5147 Elmira Street	ADA Ramp, Painting, Siding	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 5,000.00	\$ 2,125.00		\$ 2,125.00	Completed
	14	13	Brooks, Warrick & Assoc.	6867 Oak Street	Sign	\$ 500.00	\$ 500.00	\$ -	\$ 1,000.00	\$ 485.78		\$ 485.78	Completed
	15		Boomerang Pizza	5227 Willing Street	Exterior Painting	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 4,876.20		\$ 4,876.20	Completed
	16		Beardless Brewhaus	6820 Caroline Street	Equipment Upgrade	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 7,000.00		\$ 5,000.00	\$ 5,000.00	Completed
	17	14	Wacked Out Weiner	5271 Stewart Street	Doors and Code Required Plumbing	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 104,270.00		\$ 5,000.00	\$ 5,000.00	Completed
	18	15	Spencer's Second Hand Shop	5707 Stewart Street	Window Replacement	\$ 668.89	\$ 668.89	\$ 668.88	\$ 668.88	\$ 668.88		\$ 668.88	Completed
2020 Cycle	19		Brooks, Warrick & Assoc.	6867 Oak Street	Roof	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 16,210.00		\$ 5,000.00	\$ 5,000.00	Completed
	20	16	Sport & Wheat, CPA	5247 Stewart Street	Exterior Doors, Windows & Painting	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 10,000.00		\$ 5,000.00	\$ 5,000.00	Completed
	21	17	Saver Self Storage	6586 Caroline Street	Painting	\$ 4,750.00	\$ 4,750.00	\$ 4,750.00	\$ 4,750.00		\$ 4,750.00	\$ 4,750.00	Completed
2021 Cycle	22	18	Cohen Innovation, LLC	5739 Stewart Street	New Roof	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00		\$ 5,000.00	\$ 5,000.00	Completed
	23	19	Lindsay & Andrews	5218 Willing Street	New Signage, Front Door Replacement, Railing, Stairs	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 7,575.00	\$ 5,000.00		\$ 4,566.54	Completed
	24	20	RaeJean, LLC, DBA Mason's	5141 Dogwood Drive	New Road Sign	\$ 530.00	\$ 530.00	\$ 530.00	\$ 530.00		\$ 530.00	\$ 530.00	Completed
	25		Boomerang USA, Inc.	5227 Willing Street	Paint and Awning	\$ 1,999.00	\$ 1,999.00	\$ 1,999.00	\$ 1,999.00		\$ 1,999.00	\$ 1,999.00	Completed
	26	21	John C. Allen	6825 Oak Street	Windows and Shutters	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00		\$ 5,000.00	Completed
	27	23	Resource Real Estate (Scoops Ice Cream)	6835 Caroline Street	Paint, Awning, Signage & Doors	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00		\$ 5,000.00	Completed
2022 Cycle 1	28		Cohen Innovation, LLC	5739 Stewart Street	Facia and Soffet Replacement	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 20,000.00		\$ 10,000.00	\$ -	Awarded
	29		CD Properties	6821 Caroline Street	Window and Door Wood Rot Replacement/Repair	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 20,000.00	\$ 10,000.00		\$ -	Awarded
	30	24	Santa Rosa Historical Society - Imogene	6866 Caroline Street	Window Wood Rot Replacement/Repair	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	\$ 2,802.00	\$ 2,500.00		\$ 2,500.00	Completed
2022 Cycle 2	31	25	Bar Strength & Conditioning, LLC	5436 Dogwood Drive	Signage & Building Renovations for new location	\$ 6,000.00	\$ 6,000.00	\$ 5,000.00	\$ 150,000.00		\$ 6,000.00	\$ 6,000.00	Completed
	32	26	Oh Sugar, LLC, DBA The Sweet Greek	5237 Willing Street	Restaurant Equipment, Building Improvements	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 50,000.00	\$ 5,000.00		\$ 5,000.00	Completed
2022 Cycle 3	33	27	Just Two Guys, LLC DBA The Country Gym	5198 Willing Street	Kitchen Hood	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 100,000.00	\$ 2,500.00	\$ 2,500.00	\$ 5,000.00	Completed
	34		Man Cave Barber Shop	5438 Dgwood Drive	Signage	\$ 617.39	\$ 617.39	\$ -	\$ -		\$ 617.39	\$ 617.39	Completed
	35	28	Primerica	5205 Dogwood Drive	Signage	\$ 877.40	\$ 877.40	\$ -	\$ -		\$ 877.40	\$ 877.40	Completed
2023 Cycle 1	36		Lindsay & Andrews	5218 Willing Street	New Business Equipment - Technology	\$ 5,000.00	\$ 5,000.00	\$ 5,009.00	\$ 5,000.00	\$ 5,000.00			Awarded
	37	29	Yamato Japanese Steakhouse	6550 Caroline Street	Signage	\$ 1,000.00	\$ 1,000.00	\$ 3,800.00	\$ 3,800.00		\$ 1,000.00		Awarded
	38		Oh Sugar, LLC, DBA The Sweet Greek	5237 Willing Street	Signage	\$ 1,000.00		\$ -	\$ 1,000.00		\$ 1,000.00		
					TOTALS	\$ 145,192.68	\$ 143,642.68	\$ 141,956.88	\$ 710,258.03	\$ 73,475.68	\$ 70,466.91	\$ 111,410.19	
Budget	\$ 10,000.00	FY 2018	3/29/2018										
	\$ 10,000.00	FY 2018	8/20/2018			ROI Ratio	\$ 4.94						
	\$ 20,000.00	FY 2019	12/12/2018	50% CRA/50% GR									
	\$ 20,000.00	FY 2019	4/9/2019	50% CRA/50% GR									
	\$ 40,000.00	FY2020	Program Returned to City - In City Budget	\$15,414.50 Refund from MSM									
	\$ 30,000.00	FY 2021	In City Budget										
	\$ 40,000.00	FY 2022	In City Budget										
	\$ 40,000.00	FY 2023	In City Budget										
Total	\$ 210,000.00												
Allocated	\$ 143,642.68												
Expended	\$ 111,410.19												
Open Projects	\$ 35,450.00												



Agenda Item # 2022-721

Blackwater River Water Quality and Solutions to Closure of Oyster Harvest Area

MEETING DATE

November 17, 2022

PREPARED BY

Dawn Molinero, City Clerk

BACKGROUND

Organizations and businesses call on local and state officials to identify solutions to increased bacterial contamination causing the State of Florida to close additional areas of the Pensacola Bay system to the harvest of oysters. These new closed areas are triggering the relocation of an existing oyster farm in East Bay, significantly reducing the areas available for the harvest of oysters and come as millions of dollars are being spent to restore oyster reefs and establish shellfish aquaculture in local bays.

SUMMARY

Organizations and businesses call on local and state officials to identify solutions to increased bacterial contamination causing the State of Florida to close additional areas of the Pensacola Bay system to the harvest of oysters. These new closed areas are triggering the relocation of an existing oyster farm in East Bay, significantly reducing the areas available for the harvest of oysters and come as millions of dollars are being spent to restore oyster reefs and establish shellfish aquaculture in local bays.

Christian Wagley
P. O. Box 13412
Pensacola, FL 32591
healthygulf.org

RECOMMENDATION

Discussion item

ATTACHMENTS

1. 2017 swim plan
2. oyster slides for Milton City Council 10-20-22
3. Comprehensive Conservation and Management Plan Completed
4. PPBEP Policy Board Meeting Overview 102622
5. statement on new closed areas in bays Aug. 2022

Pensacola Bay System Surface Water Improvement and Management Plan



October 2017

Program Development Series 17-06

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

GOVERNING BOARD

George Roberts
Chair, Panama City

Jerry Pate
Vice Chair, Pensacola

John Alter
Secretary-Treasurer, Malone

Gus Andrews
DeFuniak Springs

Jon Costello
Tallahassee

Marc Dunbar
Tallahassee

Ted Everett
Chipley

Nick Patronis
Panama City Beach

Bo Spring
Port St. Joe

Brett J. Cyphers
Executive Director



Headquarters

81 Water Management Drive
Havana, Florida 32333-4712
(850) 539-5999
www.nfwwater.com

Crestview
180 E. Redstone Avenue
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Executive Summary

The Pensacola Bay system covers over 6,800 square miles of northwest Florida and southern Alabama. This system includes the combined drainage areas of the Escambia, Blackwater, and Yellow river watersheds together with those of Escambia, Pensacola, East, and Blackwater bays and Santa Rosa Sound. The overall watershed includes the Florida Panhandle's largest metropolitan area, a number of other inland and coastal communities, and conservation lands that protect and sustain natural resources. Ecologically diverse, this watershed includes alluvial and blackwater rivers, floodplain swamps, tidal marshes, seagrasses, and oyster beds, among other types of natural communities. The water resources that comprise the Pensacola Bay system provide numerous functions critical to human quality of life. The watershed's wetlands and floodplains store and regulate stormwater runoff, protecting water quality, protecting against floodwaters, and recharging aquifers and potable water supplies. Its rivers, streams, and coastal waters sustain numerous species of fish, shellfish, and wildlife, and its wetlands and coastal barriers provide resiliency against storms and coastal change.

This is the third update to the Pensacola Bay system Surface Water Improvement and Management (SWIM) plan. The purpose of the plan is to provide a framework for surface water resource management, protection, and restoration using a watershed approach. Protecting and restoring watershed resources are shared responsibilities of numerous stakeholders, including local governments, state and federal agencies, private businesses, and the public. They require building upon past accomplishments to encompass a range of management approaches.

Since 1997, when the Pensacola Bay system SWIM plan was last updated, significant progress and noteworthy accomplishments have been achieved. Cooperative efforts have included multiple stormwater retrofit projects to reduce nonpoint source pollution. Project Greenshores, northwest Florida's largest estuarine restoration project, was constructed in Pensacola Bay, and public and private initiatives have spearheaded efforts to raise awareness of resources and challenges and to expand access to data and information about resource quality. Additionally, the Emerald Coast Utilities Authority replaced the Main Street Wastewater Treatment Plant with the new Central Water Reclamation Facility, eliminating a 20 million gallon per day discharge into Pensacola Bay.

Nevertheless, significant challenges continue to affect water quality, natural systems, and public benefits provided by the Pensacola Bay system and the individual waterbodies within it. Historical point source and nonpoint source pollution, for example, have degraded benthic habitat conditions and caused seagrasses within the main body of the estuary to be substantially lost. Population in the Florida portion of the watershed has steadily increased over the last several decades: from 311,720 in 1990 to 424,486 in 2010, a 36 percent increase over 20 years. Population over the next twenty years (2010-2030) is projected to increase by perhaps 22 percent, with continuing changes in land use and increasing demands on wastewater and stormwater management systems.

Addressing such challenges requires a wide range of strategies. Among these are additional improvements in the treatment and management of stormwater runoff; implementation of best management practices for agriculture, silviculture, and construction activities; and continued advances in wastewater treatment and management. To complement these efforts, long-term protection of critical habitats and associated buffer areas is needed. Public outreach and education, monitoring, and analysis are needed in support of all of these. Management options and strategies are described in Chapter four of the plan, and projects identified are listed in the table below:

Recommended Projects: Pensacola Bay System SWIM Plan

Stormwater Planning and Retrofit
Septic Tank Abatement
Advanced Onsite Treatment Systems
Agriculture and Silviculture BMPs
Basinwide Sedimentation Abatement
Riparian Buffer Zones
Aquatic, Hydrologic and Wetland Restoration
Estuarine Habitat Restoration
Strategic Land Conservation
Watershed Stewardship Initiative
Sub-basin Restoration Plans
Wastewater Treatment and Management Improvements
Interstate Coordination
Analytical Program Support
Comprehensive Monitoring Program

To further implementation of priority projects, the plan outlines a range of available funding resources. Because these change over time, the plan is intended to be adaptable to evolving programs and resources.

Addressing the issues outlined in this plan and implementation of the strategies described requires a long-term, comprehensive approach with continuing collaboration between state and federal agencies, local governments, nonprofit initiatives, regional agencies, private businesses, and members of the public. In August 2017, the U.S. Environmental Protection Agency announced that Escambia County's proposal for the Pensacola and Perdido Bays Estuary Program was selected for funding from the RESTORE program. This program may build upon past efforts to engage stakeholders across the region and further advance both the protection and restoration of the Pensacola Bay system and its public benefits.

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction.....	1
1.1 Purpose and Scope	1
1.2 SWIM Program Background, Goals, and Objectives.....	2
2.0 Watershed Description	4
2.1 Geographic and Geological Characteristics	4
2.2 Hydrologic Characteristics	6
2.2.1 Major Streams and Tributaries.....	6
2.2.2 Floodplains and Wetlands.....	8
2.2.3 Coastal Waterbodies	8
2.3 Land Use and Population	9
2.4 Natural Communities	12
2.4.1 Terrestrial Communities	12
2.4.2 Major Rivers	12
2.4.3 Riparian, Palustrine, and Floodplain Habitats.....	13
2.4.4 Emergent Marsh.....	14
2.4.5 Estuarine Habitat.....	14
2.4.6 Coastal Barrier System.....	15
3.0 Watershed Assessment and Water Resource Issues	16
3.1 Water Quality	16
3.1.1 Impaired Waters	16
3.1.2 Pollution Sources	18
3.2 Natural Systems.....	23
3.3 Floodplains and Floodplain Management	25
4.0 Watershed Protection and Restoration.....	26
4.1 Management Practices.....	26
4.1.1 Nonpoint Source Pollution Abatement	26
4.1.2 Ecological Restoration	30
4.1.3 Wastewater Management and Treatment Improvements.....	32
4.1.4 Land Conservation	33
4.1.5 Public Awareness and Education	33
4.1.6 Options for Further Study and Analysis.....	34
4.2 Implementation.....	35
4.3 Priority Projects.....	39
4.4 Project Criteria and Guidelines	59
4.5 Funding Sources	60
5.0 References.....	65

List of Tables

<u>Table</u>		<u>Page</u>
Table 2-1	Average Annual Flow of the Major Rivers.....	7
Table 2-2	2012-2013 Land Use and Land Cover in the Pensacola Bay System Watershed (within Florida).....	10
Table 2-3	Watershed Population Estimates: 2010-2030	11
Table 3-1	Adopted TMDLs ¹	17
Table 3-2	Domestic Wastewater Facilities.....	21
Table 4-1	Generalized Buffer Zone Dimensions	29
Table 4-2	Watershed Priorities, Objectives, and Management Options	36
Table 4-3	Recommended Projects: Pensacola Bay System SWIM Plan.....	39
Table 4-4	Funding Sources and Eligibility.....	60

List of Figures

<u>Figure</u>		<u>Page</u>
Figure 2-1	Proportion of the Pensacola Bay Watershed by State and Florida Counties	4
Figure 2-2	Features of the Pensacola Bay Watershed	5
Figure 2-3	Topography and Major Waterbodies	7
Figure 2-4	Floodplains and Wetlands.....	8
Figure 2-5	Interstate Land Cover: Pensacola Bay Watershed	9
Figure 2-6	2012-2013 Land Use and Land Cover	10
Figure 2-7	Conservation Lands in the Pensacola Bay System Watershed	11
Figure 2-8	Coastal Natural Features in the Watershed	15
Figure 3-1	Impaired Waters and TMDLs	18
Figure 3-2	Septic Tank Locations in the Pensacola Bay Watershed	20
Figure 3-3	Permitted Wastewater Facilities within the Pensacola Bay Watershed	21

Appendices

<u>Appendix</u>		<u>Page</u>
Appendix A	Implementation and Achievements of the Previous SWIM Plan.....	A-1
Appendix B	Related Resource Management Activities	B-1
Appendix C	Geographic and Physical Characteristics.....	C-1
Appendix D	Threatened and Endangered Species within the Watershed	D-1
Appendix E	Habitats and Natural Communities.....	E-1
Appendix F	Impaired Waterbody Segments in the Pensacola Bay Watershed	F-1
Appendix G	Conservation Lands within the Pensacola Bay Watershed	G-1

Abbreviations and Acronyms

AFB	Air Force Base	NPS	nonpoint source (pollution)
BARC	Bay Area Resource Council	NRC	National Research Council
BFA	Bream Fishermen Association	NRCS	Natural Resources Conservation Service
BMAP	Basin Management Action Plan	NOAA	National Oceanic and Atmospheric Administration
BMP	best management practice	NPDES	National Pollutant Discharge Elimination System
cfs	cubic feet per second	NRDA	Natural Resource Damage Assessment
CWA	Clean Water Act	NWFWMD	Northwest Florida Water Management District
DO	dissolved oxygen	OFWs	Outstanding Florida Waters
ECUA	Emerald Coast Utilities Authority	OSTDS	onsite sewage treatment and disposal systems
EECT	Environmental Education Coordination Team	PERCH	Partnership for Environmental Research and Community Environmental Health
EPA	U.S. Environmental Protection Agency	RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (Act)
ERP	Environmental Resource Permitting	SAV	submerged aquatic vegetation
ESA	Endangered Species Act	SEAS	Shellfish Environmental Assessment Section
°F	Degree Fahrenheit (temperature)	SHCA	Strategic Habitat Conservation Area
F.A.C.	Florida Administrative Code	SIMM	Seagrass Integrated Mapping and Monitoring
FDACS	Florida Department of Agriculture and Consumer Services	SMZs	Special Management Zones
FDEP	Florida Department of Environmental Protection	SWIM	Surface Water Improvement and Management
FDOH	Florida Department of Health	SWTV	Surface Water Temporal Variability
FDOT	Florida Department of Transportation	TMDL	total maximum daily load
FEMA	Federal Emergency Management Agency	TNC	The Nature Conservancy
FGS	Florida Geological Survey	UF-IFAS	University of Florida Institute of Food and Agricultural Sciences
FNAI	Florida Natural Areas Inventory	USACE	U.S. Army Corps of Engineers
F.S.	Florida Statutes	USDA	U.S. Department of Agriculture
FWC	Florida Fish and Wildlife Conservation Commission	USFWS	U.S. Fish and Wildlife Service
FWRI	Fish and Wildlife Research Institute	USGS	U.S. Geological Survey
GEBF	Gulf Environmental Benefit Fund	WBID	Waterbody identification number
GEMS	Gulf Ecological Management Site	WFRPC	West Florida Regional Planning Council
GIS	Geographic Information Systems	WMA	water management area
GSA	Geological Survey of Alabama	WWTF	wastewater treatment facility
I-10	Interstate 10	WWTP	wastewater treatment plant
INRMP	Integrated Natural Resources Management Plan		
IWR	Impaired Surface Waters Rule		
LOST	local option sales tax		
MFLs	minimum flows and minimum water levels		
mgd	million gallons per day		
MS4s	municipal separate storm sewer systems		
NAS	Naval Air Station		
NFWF	National Fish and Wildlife Foundation		

1.0 Introduction

The Pensacola Bay system is inclusive of the interconnected estuarine waterbodies of Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay and Santa Rosa Sound; the Escambia, Blackwater, East Bay Yellow, and Shoal rivers; and the greater contributing watershed. The watershed extends from southern Alabama south to the Gulf of Mexico. Within Florida, it includes portions of Escambia, Santa Rosa, Okaloosa, and Walton counties. Although about two-thirds of the contributing watershed is within Alabama, the scope of this plan for implementation purposes is limited to the Florida portion.

The Pensacola Bay system provides important environmental functions with numerous benefits and services for surrounding communities. Among watershed services are water storage and flood attenuation, groundwater recharge, regulation of discharge to receiving waters, water quality protection, cycling of energy and nutrients, erosion control, and stream bank stabilization. Additional human benefits are usable surface and ground waters, fish and wildlife resources, recreational opportunities, aesthetic characteristics, and associated economic benefits.

1.1 Purpose and Scope

The Surface Water Improvement and Management (SWIM) plan for the Pensacola Bay system is intended to provide a framework for resource management, protection, and restoration using a watershed approach. The SWIM Program is administered through the Northwest Florida Water Management District (NFWFMD or District) and includes management actions to address water quality, natural systems, and watershed functions and benefits. This plan is an update to the original plan developed in 1990 and updated in 1997.

Development of the 2017 Pensacola Bay System SWIM Plan update (hereafter the 2017 SWIM Plan) is funded by a grant from the National Fish and Wildlife Foundation's (NFWF) Gulf Environmental Benefit Fund (GEBF), with the intent to further the purpose of the GEBF to remedy harm and eliminate or reduce the risk to Gulf resources affected by the Deepwater Horizon oil spill.

In the Pensacola Bay system, major stakeholders include:

- Northwest Florida Water Management District
- Florida Department of Environmental Protection
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Agriculture and Consumer Services
- Florida Department of Economic Opportunity
- West Florida Regional Planning Council
- The Bay Area Resource Council
- Escambia, Santa Rosa, Okaloosa, and Walton counties
- Municipalities including Pensacola, Jay, Gulf Breeze, Milton, Paxton, Mary Esther, Laurel Hill, Century, and Crestview
- Emerald Coast Utilities Authority
- Unincorporated communities, including Pace, Ferry Pass, Bagdad, Holley, Navarre, Holt, and Allentown
- The Bream Fisherman Association
- The Bayou Chico Association
- U.S. Environmental Protection Agency
- U. S. Department of Agriculture
- U.S. Department of the Interior
- U.S. Fish and Wildlife Service
- The Nature Conservancy
- The National Fish and Wildlife Foundation
- National Wildlife Federation
- And many others within Florida and Alabama

The 1997 Pensacola Bay System SWIM identified four objectives to improve watershed conditions:

- Water and Sediment Quality Program, to reduce nonpoint source (NPS) pollution and point source pollution, and to mitigate impacts from contaminated sediments;
- Habitat Quality Program, to protect and restore aquatic and wetland habitats, facilitate restoration of seagrasses and fisheries, and research biological status and trends for the system;
- Administration, Planning and Coordination Program, to coordinate long-range planning, provide technical information, participate in management efforts and measure successes; and
- Public Education and Awareness Program, to promote understanding and awareness of issues, watershed management concepts, and remedies to educators and the public Program.

This 2017 SWIM Plan continues support for actions identified in the 1997 Plan, while also addressing new issues, ongoing challenges, and opportunities for achieving watershed protection and restoration. Further, the 2017 SWIM Plan describes the watershed's physical characteristics and natural resources, provides an assessment of the watershed's current condition, and identifies priority challenges affecting watershed resources and functions. The 2017 SWIM Plan also prescribes a set of management actions and projects to meet those challenges and needs. Management actions are generally limited to those within the mission and scope of the NFWFMD SWIM program, recognizing the ongoing initiatives and needs of local communities and other agencies. The projects outlined are intended to leverage funding from many sources; integrating the efforts of local governments, state and federal agencies, and private entities to achieve mutual objectives and goals; and to present innovative solutions to watershed issues.

1.2 SWIM Program Background, Goals, and Objectives

Surface Water Improvement and Management plans have been developed pursuant to the SWIM Act, enacted by the Florida Legislature in 1987 and amended in 1989 through sections 373.451-373.459, Florida Statutes (F.S.). Through this Act, the Legislature recognized threats to the quality and function of the state's surface water resources. The Act authorized the state's five water management districts to

- Develop plans and programs to improve management of surface waters and associated resources;
- Identify current conditions and processes affecting the quality of surface waters;
- Develop strategies and management actions to restore and protect waterbodies; and
- Conduct research to improve scientific understanding of the causes and effects of the degradation of surface waters and associated natural systems.

In addition to the SWIM Act of 1987, the following Florida Statutes and administrative codes support and complement the SWIM program:

- Chapter 259, F.S.: Florida Forever Act: Land Acquisitions and Capital Improvements for Conservation or Recreation
- Chapter 375, F.S.: Land Acquisition Trust Fund
- Section 403.067(7)(A)4, F.S.: Total Maximum Daily Loads (TMDLs)
- Section 373.042, F.S.: Minimum Flows and Minimum Water Levels
- Chapter 62-43, Florida Administrative Code (F.A.C.): Surface Water Improvement and Management Act
- Chapter 62-302, F.A.C.: Surface Water Quality Standards
- Chapter 62-303, F.A.C.: Identification of Impaired Surface Waters
- Chapter 62-304, F.A.C.: TMDLs

For the purposes of SWIM, watersheds are the hydrological, ecological, and geographical units for planning and managing restoration efforts along Florida's Gulf Coast. Successful watershed management

requires coordination and implementation of complementary programs and projects with jurisdictions, agencies, and other stakeholders across the watershed. Among these are local, state, and federal agencies; conservation land management organizations; non-governmental organizations; and other interested stakeholders.

The SWIM program addresses watershed priorities by identifying management options and supporting cooperative project implementation. Projects may include stormwater retrofits for water quality improvement, wetland and aquatic habitat restoration, resource assessments, and wastewater management improvements, among others.

Surface Water Improvement and Management plans integrate complementary programs and activities to protect and restore watershed resources and functions. They are also designed to address water quality and natural systems challenges to achieve the District's goal and strategic priorities outlined in the District's strategic plan.

2.0 Watershed Description

2.1 Geographic and Geological Characteristics

The contributing watershed of the Pensacola Bay system covers approximately 4,371,534 acres extending from southern Alabama through the western Florida Panhandle. The watershed includes three major rivers: the Escambia, Blackwater, and Yellow rivers, as well as the smaller East Bay River. These, in turn, discharge into the estuarine component of the watershed, which includes Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and Santa Rosa Sound. The Escambia River, the largest in the watershed, begins as the Conecuh River in Alabama. The Blackwater and Yellow rivers also have their origins in southern Alabama.

Within Florida, the watershed encompasses the majority of Escambia, Santa Rosa, and Okaloosa counties and the northwest quadrant of Walton County (Figure 2-1). In Alabama, the watershed is mostly located in Covington, Escambia, and Conecuh counties; with smaller areas in Butler, Crenshaw, Pike, Montgomery, and Bullock counties.

Florida municipalities in the watershed include the cities of Pensacola, Gulf Breeze, Milton, Crestview, Century, Jay, Paxton, Laurel Hill, and Mary Esther. Unincorporated communities include Pensacola Beach, Warrington, Pace, Navarre, Navarre Beach, and Holt. The watershed also includes Naval Air Station (NAS) Pensacola and NAS Whiting Field, and a portion of the Eglin Air Force Base (AFB) reservation.

Pensacola Bay system watershed attributes:

- Two states: Alabama and Florida
- Four Florida counties
- Three major river systems
- Five interconnected estuarine waterbodies
- 31 distinct natural communities
- 6,831 square miles

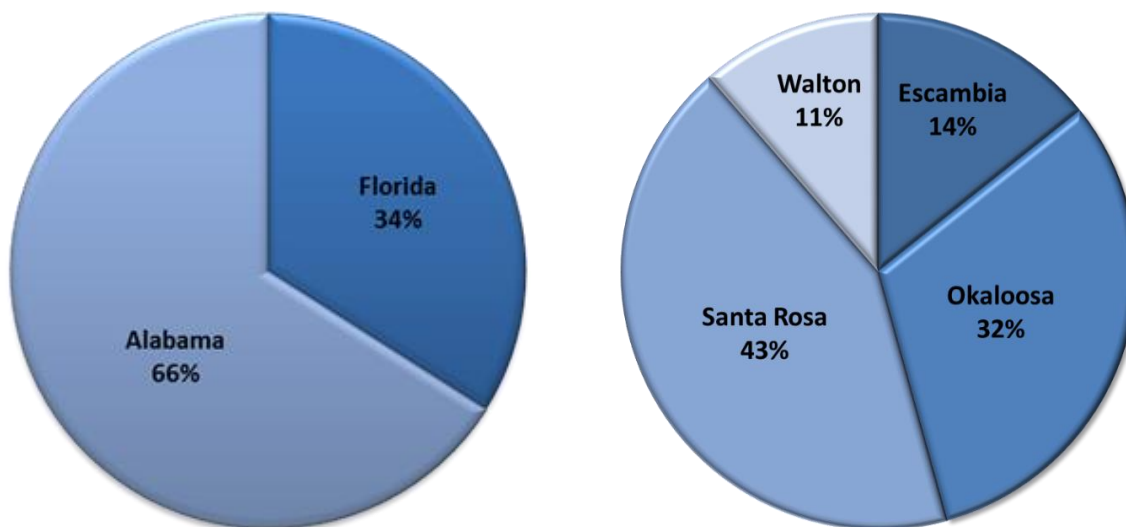


Figure 2-1 Proportion of the Pensacola Bay Watershed by State and Florida Counties

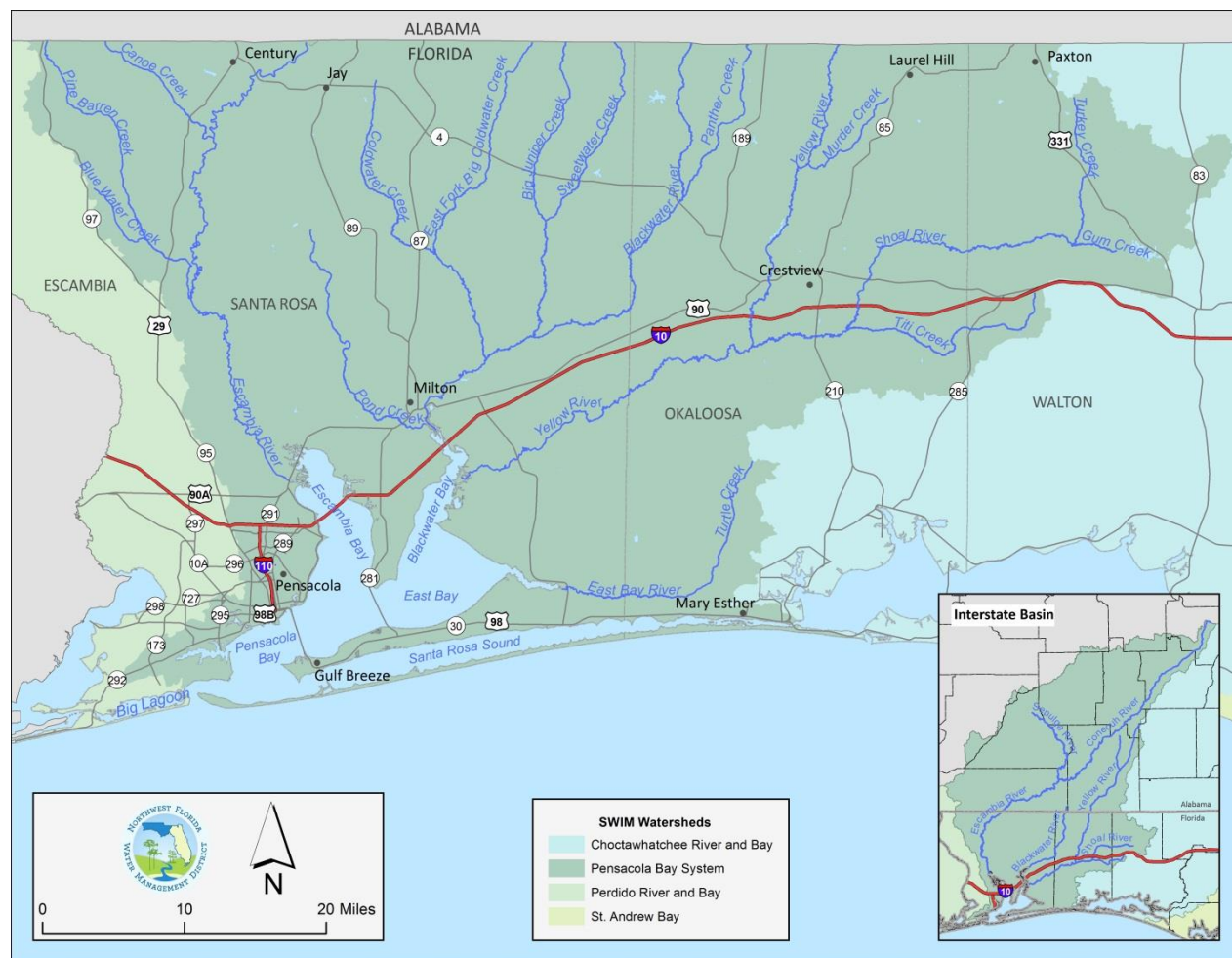


Figure 2-2 Features of the Pensacola Bay Watershed

The overall watershed, including Alabama's portion, lies within the Gulf Coastal Plain physiographic region, which is characterized by gently rolling hills, sharp ridges, prairies, and alluvial floodplains underlain by sediments of sand, gravel, porous limestone, chalk, marl, and clay. Within this greater physiographic region, the Florida portion of the watershed contains two localized physiographic regions: the Western Highlands and the Gulf Coastal Lowlands (USGS 2013).

The Escambia, Blackwater, and Yellow river basins are within the Western Highlands subsection of the Northern Highlands, which spans the northern Panhandle. The Northern Highlands region is characterized by greater topographic relief than the Gulf Coastal Lowlands and contains extensive clay deposits overlying limestone bedrock of the Citronelle formations, ancient delta deposits of clays, clayey sands, and gravel. The Western Highlands extend from 378 feet in elevation in Alabama down to a relict marine terrace of approximately 100 feet (Rupert 1993). The rolling hills of the Western Highlands have sandy soils and generally dry conditions, with groundwater emerging from lower slopes to create hillside seepage bogs (Wolfe *et al.* 1988).

The estuarine embayments are within the Gulf Coastal Lowlands; a region of successively higher, parallel terraces rising from the coast. Terraces of the Gulf Coastal Lowlands formed during the Pleistocene Epoch when fluctuating sea levels were associated with the growth and melting of ice caps. Dunes, barrier islands, beach ridges, and other topographical features were stranded inland as seas receded. Land surfaces are generally level and less than 100 feet above sea level. Substantial areas are less than 30 feet

above sea level and are characterized by extensive wetlands. Higher elevations are present in the general area of Pensacola, on the west side of Escambia Bay and the north side of Pensacola Bay.

The watershed of the Pensacola Bay system follows much of the general stratigraphy of the western Florida Panhandle. Many of the watershed's geologic features are a product of prehistoric marine deposition during periods when sea level was higher than the present. Near-surface formations within Florida's portion of the watershed include dolomitic limestones, sandy clayey limestones, shell beds, clayey sands, and sands (Scott 2001). Overlying most geologic formations are unconsolidated Holocene (11,700 years ago to the present) siliciclastic sediments (nearly pure quartz sands with minor heavy mineral sands) (Scott 2001). These were deposited during sea level fluctuations and are presently found on the barrier islands.

In the upper portion of the watershed, the Citronelle Formation forms the stream-incised hills of the Western Highlands and forms a distinct bluff at Bay Bluff, along the western shore of Escambia Bay (USDA 2004). Additionally, the Miocene (origins 23.3 to 5.3 million years before present) Alum Bluff Group is found along the upper reaches of the Yellow and Shoal rivers.

Most of the southern boundary of Escambia and East bays is formed by the Fairpoint Peninsula, a sandy coastal barrier feature. The southern boundary of the system is formed by Santa Rosa Island, which is approximately 50 miles long and varying between approximately 1,000-1,500 feet wide (Morang 1992). The island is made up of Holocene quartz sands, between 15 and 30 feet thick, overlying a Pleistocene (2.6 million years to 11,000 years before present) core.

Soils in the southern portion of the watershed, in the vicinity of the estuary are predominantly of sandy composition. Soils in the northern reaches typically contain more organic matter and are of moderate permeability. Hydric soils are predominantly found along the floodplains of the major rivers and tributaries and other wetland systems. Detailed information about the watershed's physiography, geology, and soils is provided in Appendix C.

2.2 Hydrologic Characteristics

2.2.1 Major Streams and Tributaries

The three major river systems of the watershed begin as blackwater streams in southern Alabama. Of these, the Escambia River is the largest, extending 240 miles from Escambia Bay to Pike County, Alabama, draining over 4,200 square miles across both states (90 percent within Alabama). The Yellow River extends approximately 110 miles from the eastern shore of Blackwater Bay to a point northeast of Andalusia, Alabama. The Yellow River is joined by its major tributary, the 33-mile Shoal River, near the City of Crestview. The Yellow River drainage basin covers 1,365 square miles, with 64 percent within Florida. The Blackwater River flows approximately 60 miles and drains 860 square miles, of which 81 percent is in Santa Rosa and Okaloosa counties. East Bay River, a smaller 15-mile river located in coastal Santa Rosa and Okaloosa counties, enters East Bay near Navarre and Eglin AFB. Average annual flows of the major river systems discharging into the Pensacola Bay system are listed in Table 2-1. Surface water features are shown in Figure 2-3.

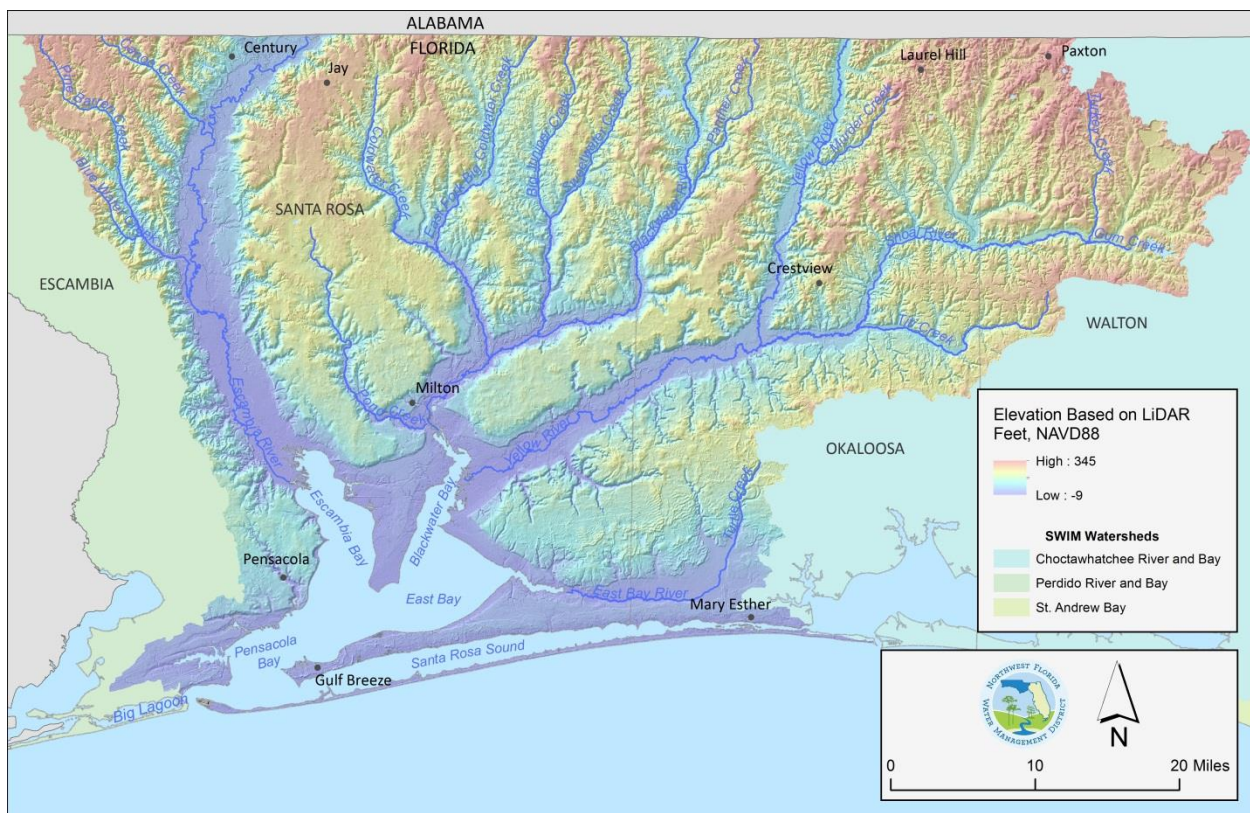
Table 2-1 Average Annual Flow of the Major Rivers

River	Period of Record	Average Annual Discharge*
Escambia River near Century	1935-2016	6,070
Yellow River near Milligan	1938-2016	1,147
Shoal River near Crestview	1938-2017	1,094
Blackwater River near Baker	1950-2016	348

* Cubic feet per second

Source: U.S. Geological Survey, National Water Information System

In addition to the major rivers, there are numerous smaller tributaries of the rivers and estuary. Among these are Carpenter Creek, Pond Creek, Big Coldwater Creek, Pine Barren Creek, and Titi Creek, as well as drainages through numerous smaller embayments (bayous) along Pensacola, Escambia, East, and Blackwater bays.

**Figure 2-3 Topography and Major Waterbodies**

The hydrogeology of the Pensacola Bay system watershed is characterized by considerable interaction between surface water and groundwater. The surficial aquifer, locally referred to as the sand-and-gravel aquifer, is the primary source of potable water in the region and is primarily recharged by localized rainfall. Water in the sand-and-gravel aquifer is recharged through direct infiltration of rainwater and therefore fluctuates in elevation reflecting seasonal differences in rainfall (NFWMD 2014). Groundwater from this aquifer discharges to the Escambia River and other major tributaries, as well as to smaller inland streams within the watershed.

2.2.2 Floodplains and Wetlands

As illustrated by Figure 2-4, extensive floodplains encompass the lengths of the Escambia and Yellow Rivers. Major wetland systems are also within the Garcon Point and Fairpoint peninsulas, and within the headwaters of the East Bay River. Most of the floodplains within the watershed correspond with wetlands. Wetland communities are described further in Section 2.4.

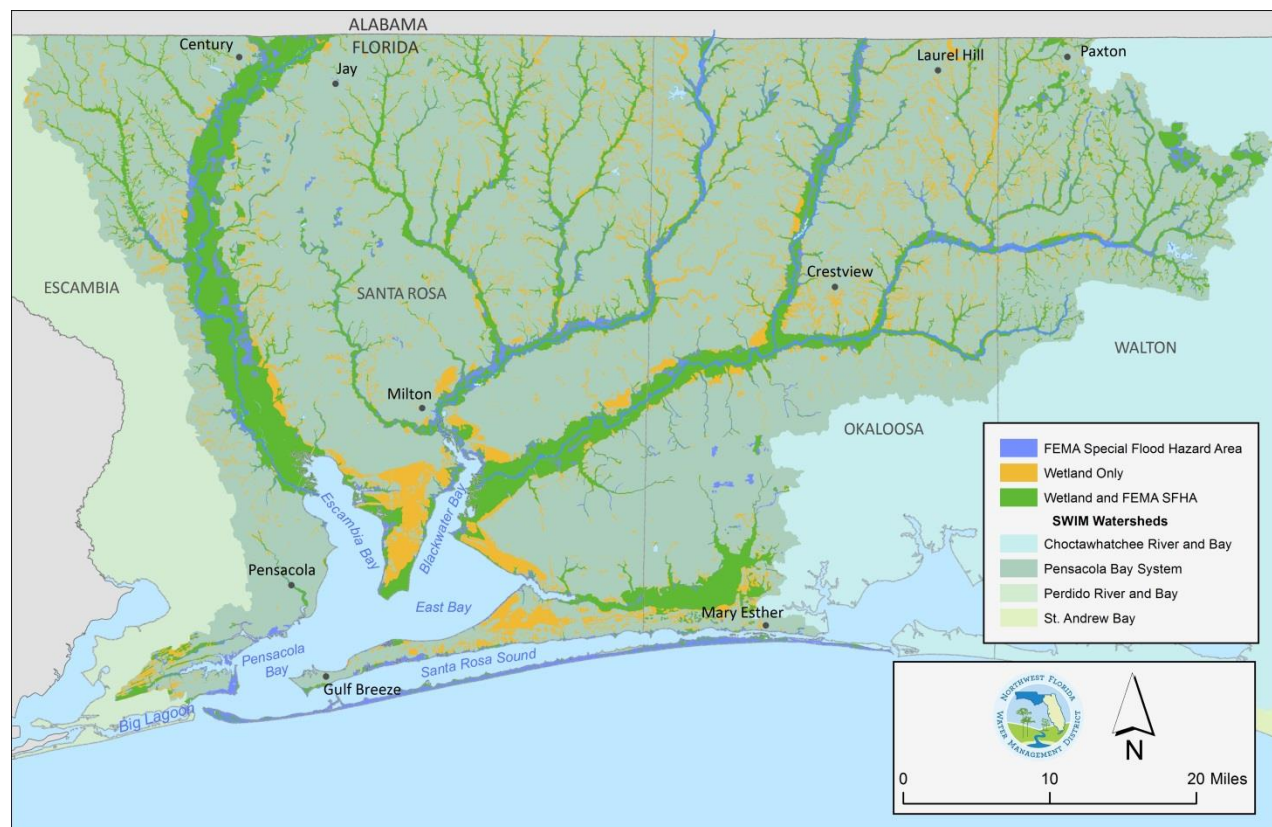


Figure 2-4 Floodplains and Wetlands

2.2.3 Coastal Waterbodies

Estuarine waters of the Pensacola Bay system, including Pensacola Bay, Escambia Bay, Blackwater Bay, East Bay, and Santa Rosa Sound, encompass approximately 187 square miles. The estuary exhibits a low tidal range with limited flushing and circulation and vertical salinity stratification (Olinger *et al.* 1975). Conditions in Escambia, Pensacola, Blackwater, and East bays are heavily influenced by riverine inflow.

Pensacola Bay is located in Escambia and Santa Rosa counties and has an approximately one-half mile wide pass to the Gulf of Mexico. Escambia and East Bays adjoin Pensacola Bay, along with bayous Texar, Chico, and Grande. Escambia Bay is immediately north of Pensacola Bay and covers roughly 36 square miles between Garcon Point on the east and Magnolia Point to the west. The primary source of fresh water inflow to Escambia and Pensacola bays is the Escambia River. Additional freshwater sources are Pace Mill Creek, Carpenter Creek, and Jones Creek, as well as the contributing basins of several bayous.

Located at the mouth of the Blackwater River, Blackwater Bay covers approximately 10 square miles and is influenced by inflow from the Blackwater and Yellow rivers. East Bay adjoins Blackwater Bay at

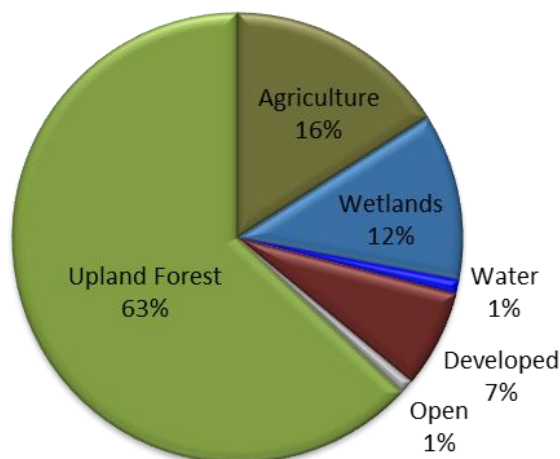
Escribano Point and Pensacola Bay between Garcon Point and Redfish Cove. The shoreline along Escribano Point and areas of Garcon Point are largely undeveloped.

Santa Rosa Sound is a 42-square-mile lagoon extending from Pensacola Bay and Gulf Breeze in the west to its confluence with Choctawhatchee Bay. The Sound is bordered to the north by the Fairpoint Peninsula and Santa Rosa Island to the south.

A prominent characteristic of the Pensacola Bay system estuary is a series of bayous that define much of the littoral zone. Bayous Grande, Chico, and Texar intersect with the City of Pensacola and NAS Pensacola. The drainage basins contributing to these bayous include Jones Swamp and Creek and Carpenter Creek. Major bayous on Escambia Bay in Santa Rosa County are Mulatto Bayou and Indian Bayou. The City of Gulf Breeze also has large bayous on the south shore of Pensacola Bay.

2.3 Land Use and Population

Land use and land cover across the greater Pensacola Bay system watershed, including Alabama, is predominantly upland forest, with substantial portions also consisting of wetlands, agricultural lands, and developed areas (Figure 2-5).



Source: FDEP 2015a, USGS 2011

Figure 2-5 Interstate Land Cover: Pensacola Bay Watershed

Within Florida, upland forest encompasses nearly half of the watershed. Wetlands encompass nearly 20 percent of the watershed, with agricultural and developed lands each comprising approximately 14 percent of the watershed (Table 2-2).

Table 2-2 2012-2013 Land Use and Land Cover in the Pensacola Bay System Watershed (within Florida)

General Land Use Category	Approximate Area ¹	Percent of Basin
Agriculture	330.5	14.2
Developed	315.4	13.5
Open Land	38.1	1.6
Upland Forests	1161.0	49.7
Water	27.3	1.2
Wetlands	462.5	19.8

Source: FDEP 2015a

¹Square miles

Urban development is concentrated in the southern and southwestern portion of the watershed, mostly within the Pensacola metropolitan area. This development extends south and east from the City of Pensacola to include Navarre, Pace, Pensacola Beach, Milton, and Gulf Breeze. Urban development in the northern portion of the watershed is mostly localized around the City of Crestview in Okaloosa County. Agricultural lands are concentrated in northern Escambia County, central and northern Santa Rosa and Okaloosa counties, and northern Walton County. Floodplains and wetlands are concentrated along the Escambia and Yellow Rivers, Garcon Point, and the East Bay River and Jones Creek basins. Generalized land use and land cover within Florida are presented in Figure 2-6.

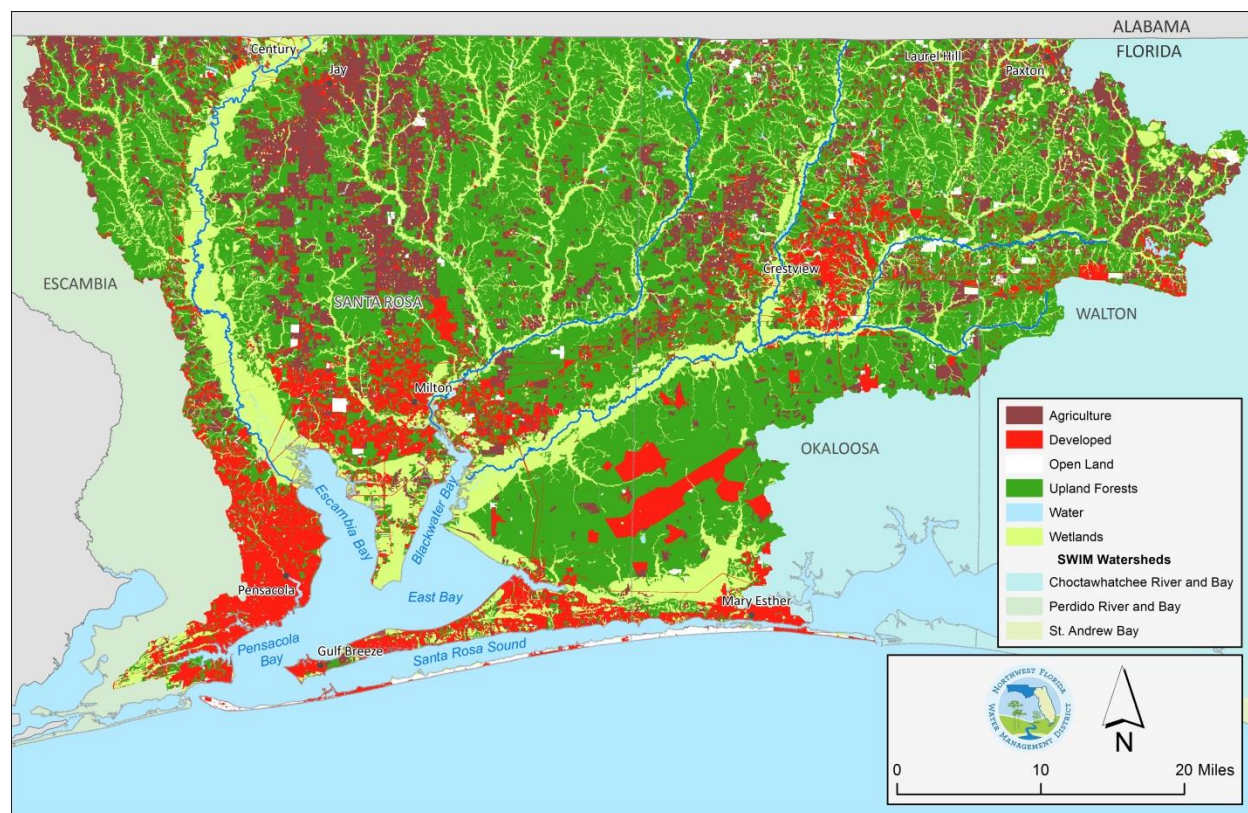


Figure 2-6 2012-2013 Land Use and Land Cover

Public lands in the watershed include the Blackwater, Escambia, and Yellow River water management areas (WMAs), Gulf Islands National Seashore, Blackwater River State Forest, several state parks, and

U.S. Department of Defense lands (Figure 2-7). These lands provide a buffer system that helps protect water quality, provide flood protection, and sustain integrated terrestrial and aquatic ecosystems. The District's WMA lands cover approximately 55,592 acres along the Escambia, Blackwater, and Yellow rivers and the Garcon Point peninsula. Gulf Islands National Seashore encompasses approximately 3,000 acres on Santa Rosa Island. Among state lands in the watershed are the Escibano Point Wildlife Management Area, Blackwater River State Forest, and the Blackwater River and Yellow River Marsh Preserve state parks. Public and conservation lands are discussed in more detail in Appendix G.



Figure 2-7 Conservation Lands in the Pensacola Bay System Watershed

The largest concentrations of population in the watershed are within Escambia and Santa Rosa counties. Table 2-3 displays population estimates for the watershed, based on spatial analysis of 2010 U.S. Census data, together with projections to 2030 calculated based on countywide population growth projections from the University of Florida's Bureau of Economic and Business Research (UF BEBR 2016).

Table 2-3 Watershed Population Estimates: 2010-2030

County	2010	2020	2030
Escambia	178,766	188,743	196,279
Santa Rosa	151,372	178,731	205,142
Okaloosa	84,867	94,431	100,580
Walton	9,481	11,937	14,538
Total	424,486	473,842	516,538

2.4 Natural Communities

This section provides a summary of habitats and natural communities found in the watershed, particularly those most-influenced by surface water management activities, as well as information about some of the more important biological resources associated with them. More detailed information on the habitats and natural communities observed in the Pensacola Bay watershed, as well as the species those habitats support, are described in Appendices D and E.

Lewis *et al.* (2016) estimate that the Pensacola Bay system supports at least 1,400 estuarine plant and animal species, in addition to migratory species. Aquatic habitats within the watershed include salt marshes, seagrass beds, and oyster reefs. These habitats support wintering migratory waterfowl and many marine organisms, including juvenile sea turtles and commercially and recreationally important fish and shellfish. More than 200 species of fish and shellfish have been reported in the waters of the Pensacola Bay system, including five diadromous species: Alabama shad (*Alosa alabamae*), skipjack herring (*Alosa chrysochloris*), hogchoker (*Trinectes maculatus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), and American eel (*Anguilla rostrata*) (FDACS 2013b).

2.4.1 Terrestrial Communities

Terrestrial habitats within the Pensacola Bay watershed include bluffs, longleaf pine-wiregrass forests, mesic flatwoods, sandhill and scrub communities, scrubby flatwoods, slope forests, upland hardwood forests, wet flatwoods, and xeric hammock. The conditions of these habitats vary widely across the watershed, depending on land use, land management, and other factors.

Many of the native pine forests have been cut for timber, cleared for agriculture, or intensively managed for silviculture. As a result, the watershed's uplands are now a mosaic of natural regeneration forests, pine plantations, agricultural lands, and developed areas (NFWFMD 1990). Terrestrial communities also support a number of threatened and endangered species. Listed species within the watershed include the gopher tortoise (*Gopherus polyphemus*), gopher frogs (*Rana capito*), the reticulated flatwoods salamander (*Ambystoma bishopi*), the eastern indigo snake (*Drymarchon corais couperi*), and the red-cockaded woodpecker (*Picoides borealis*). All have been documented on the watershed's conservation lands including the Blackwater River State Park (FDEP 2016a). The Blackwater River State Forest is part of a series of contiguous conservation lands, including the Conecuh National Forest and Eglin AFB. Together, these lands constitute the largest remaining contiguous area of the mature longleaf pine forest ecosystem in the world and support one of the largest populations of red-cockaded woodpecker habitat on public lands (FDACS 2013b).

2.4.2 Major Rivers

The Escambia River is a large alluvial river that carries a heavy sediment load and has substantial variation in flows and a diversity of aquatic and wetland habitat types. The upper river (within Florida) is sand-bottomed, with sand bars and beaches forming along the inside arcs of river bends. According to Bass (1990), in-stream vegetation tends to be lacking, with habitat primarily provided by snags, exposed tree roots, and undercut banks. Bottomland hardwood forest and oxbow lakes border the main river, and pine forest occupies much of the riparian zone.

The Blackwater River and its tributaries are relatively shallow sand-bottomed streams. The lower river is tidally influenced, with large basins that provide additional habitat diversity. The Yellow River intersects the Western Highlands Region, creating substantial bluffs, prior to discharging into Blackwater Bay from the east. The Yellow River is described as a sand bottom river and is characterized by shallow clear-tan

waters. Its primary tributary, the Shoal River, originates in Walton County. Titi Creek is the major tributary of the Shoal River.

The Escambia and Conecuh rivers, as well as several tributaries, are designated as critical habitat for the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*). Additional critical habitat area is within the lower Blackwater River, the Yellow River, and the Shoal River from its confluence with the Yellow River to the U.S. Highway 85 overpass. Within the critical habitat are discrete areas that serve as potential spawning locations during the spring high flow events, and as summertime holding areas. These summertime holding areas are extremely important to the survival of the sturgeon, since the fish do not migrate to the estuary and gulf until the fall. The quality of the holding areas is also thought to be a significant factor in the reproductive health of the female sturgeon.

The main channel holding areas are often moderately deep to deep (~3-7 meters) runs, glides, gradual bends, or pool tail-outs. Main channel areas occurring immediately downstream of springs, tributaries, or distributary confluences are sometimes selected as holding areas, perhaps due to the water depth, water velocity, cool water influences of the tributary, or water chemistry. The second primary river habitat where sturgeon can be found are off-channel areas that are sheltered from the primary current of the main channel. These mesohabitats are often described as sloughs, bowls, or basins and typically have a deep and open connection to the main channel (Kaesler, 2016). Estuarine waters within the Pensacola Bay system are also designated critical habitat for the Gulf sturgeon, providing important winter habitat.

The Escambia, Yellow, and Shoal rivers provide critical habitat for several species of threatened and endangered freshwater mussels. The Escambia River includes critical habitat for the Round ebonyshell (*Fusconaia rotulata*), Choctaw bean (*Villosa choctawensis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranhus jonesi*), southern sandshell (*Hamiota australis*), and narrow pigtoe (*Fusconaia burkei*). The Escambia River in Alabama also includes critical habitat for the Alabama Pearlshell (*Margaritifera marrianae*). The Yellow River system includes critical habitat for the Choctaw bean, narrow pigtoe, southern sandshell, and fuzzy pigtoe.

2.4.3 Riparian, Palustrine, and Floodplain Habitats

Riparian habitats include those areas along waterbodies that serve as an interface between terrestrial and aquatic ecosystems. Riparian areas are important fish and wildlife habitats that promote ecological diversity and assist in mitigating or controlling NPS pollution. Riparian vegetation can be effective in removing excess nutrients and sediment from surface runoff and shallow groundwater and in shading streams to optimize light and temperature conditions for aquatic plants and animals. Riparian vegetation, especially trees, is also effective in stabilizing streambanks and slowing flood flows, resulting in reduced downstream flood peaks. Major floodplains within the watershed are found along the Escambia, Yellow, Shoal, and Blackwater rivers.

Pitcher plant bogs can be found scattered throughout the Blackwater River State Forest, Yellow River Marsh Preserve State Park, and Garcon Point Water Management Area (FDACS 2013b; Florida Division of Recreation and Parks 2016c; FNAI 2010). They occur in isolated depressions of somewhat poorly drained soils and contain a high diversity of rare plants. American chaffseed (*Schwalbaea americana*), a federally endangered species, has been documented at one of the seepage slopes in the Blackwater State River Forest (FDACS 2013b).

The Yellow River Marsh Preserve State Park includes tracts of wet prairie classified by the FNAI as imperiled habitats in the State of Florida because of their rarity (Florida Division of Recreation and Parks 2016c; FNAI 2010). Nearly 20 rare and endangered species of plants and animals make their homes in the wet prairies, dome swamps, and flatwoods of the park. Wet prairies support some of the most diverse

plant communities in the southeast including a population of unique carnivorous plants (Florida Division of Recreation and Parks 2016c).

2.4.4 Emergent Marsh

In the salt marshes and nearshore tidal areas, species are adapted to the highly variable temperatures and salinities. Some species migrate in and out as necessary to take advantage of the food and shelter derived from the primary coastal habitats such as oyster reefs, marshes, and seagrasses (Lewis *et al.* 2016). Salt marsh communities within the Pensacola Bay watershed include both tidal marsh and floodplain marsh. Marsh species composition is influenced by a combination of salinity tolerance and differences in soil type, elevations, and competitive interactions. Salt marshes are similar to brackish marshes in that they serve as a transition between terrestrial and marine systems. Generally, salt marshes are intertidal and develop along relatively low energy shorelines. Unlike brackish marshes, they may be found under significantly more saline conditions. Salt marshes in the Florida Panhandle are usually characterized by large, fairly homogeneous expanses of dense black needlerush (*Juncus roemerianus*). Often, they are accompanied on the water-ward side by smooth cordgrass (*Spartina alterniflora*). The *Juncus* and *Spartina* zones are distinctive and can be separated easily by elevation.

Salt marshes are among the most productive plant communities on Earth (Fernald and Purdum 1998). Among the species found in salt marshes are mussels, oysters, fiddler crabs (*Uca sp.*), marsh periwinkles (*Littoraria irrorata*), crown conchs (*Melogenia corona*), mullet, and blue crabs. Emergent freshwater and brackish marshes are dominated by sawgrass (*Cladium jamaicense*), maidencane (*Panicum hemitomon*), giant cutgrass (*Zizaniopsis miliacea*), and cattails (*Typha spp.*), but may contain large interspersed patches of black needlerush. In contrast with more coastal salt marshes, these sites lack the extensive salt flats of saltgrass (*Distichlis spicata*), glasswort (*Salicornia spp.*), and salt barrens. Thirteen species of common waterfowl also winter in Pensacola Bay salt marshes (Lewis 1986).

Floodplain marsh occurs in the floodplains of the watershed's major river systems. These marshes are seasonally inundated and are dominated by maidencane, pickerelweed (*Pontederia cordata*), sagittaria, buttonbush (*Cephalanthus occidentalis*), wax myrtle (*Myrica spp.*), and other mixed emergent vegetation. Floodplain marsh covers approximately 2,400 acres at the mouth of the Yellow River. In addition to the marsh species, patchy stands of hardwoods and water tolerant pine trees have become established on small "islands" of higher elevation in the marsh (Gardner 1991).

2.4.5 Estuarine Habitat

Seagrass beds in the Pensacola Bay watershed (Figure 2-8) provide protective and foraging habitat for many marine species and are critical to the spawning cycle of many fish and invertebrate species, some of which are of great commercial and recreational significance. Among these are shrimp, spotted seatrout, Gulf menhaden, red drum or redfish, blue crab, Gulf flounder (*Paralichthys albigutta*), striped mullet (*Mugil cephalus*), and white mullet (Lewis *et al.* 2016). Seagrass meadows are largely limited to Santa Rosa Sound (Lewis *et al.* 2016). Seagrass beds are a protected habitat recognized by both the state and federal agencies. Five species of submerged aquatic vegetation have been found in Pensacola Bay and include: widgeon grass (*Ruppia maritima*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*), star grass (*Halophila engelmannii*), and turtle grass (*Thalassia testudinum*) (Schwenning *et al.* 2002).

The availability of hard substrate for colonization is a determining factor for the establishment of oyster reefs. Although hard substrate is not particularly common in the Pensacola Bay system, East Bay has historically supported healthy oyster populations. Oyster reefs have been widely demonstrated to improve water quality, protect shorelines by abating wave energy, stabilize bottom sediments, and provide habitat

for fish, crab, and other invertebrates (Lewis *et al.* 2016). The most current assessments report approximately 235 to 245 acres of oyster reef habitat within the Pensacola Bay system, including reefs that are closed for harvesting. Of this total area, it is estimated that approximately 75 percent of oyster reefs occur in East Bay (Lewis *et al.* 2016).



Figure 2-8 Coastal Natural Features in the Watershed

2.4.6 Coastal Barrier System

The Pensacola Bay watershed has a coastal barrier system consisting of Santa Rosa Island. The barrier system consists of many unique habitats and natural systems including beaches, foredune and relic dunes habitat, tidal marsh, brackish ponds and lagoons, coastal grasslands, and upland forest and scrub communities (National Park Service 2014). Barrier islands and peninsulas buffer adjacent bays and coastal areas from storm impacts and create calm saline conditions in landward waters, which promotes seagrass establishment. The majority of Santa Rosa Island is managed by the National Park Service as part of the Gulf Islands National Seashore. Pensacola Beach and Navarre Beach divide tracts of National Park Service land on the island.

3.0 Watershed Assessment and Water Resource Issues

3.1 Water Quality

The Pensacola Bay System experiences water quality challenges across both Alabama and Florida. Surface water quality varies by stream reach. Tributaries in both states are affected by NPS pollution and alterations associated with land use practices, including urban land uses including construction sites, silviculture, agriculture, landscape erosion, mining activities, and unpaved roads.

3.1.1 Impaired Waters

The FDEP has identified 23 segments within the Pensacola Bay watershed as impaired (Figure 3-1). Nearly all segments are impaired for bacteria (five for fecal coliforms, six for beach advisories, seven for shellfish harvesting classification, two for enterococci, one for *Escherichia coli*, and one for bacteria in shellfish), two segments for nutrients, and two segments for metals (FDEP 2017). Most estuarine waters have been listed as impaired for bacteria and Escambia Bay has been listed for nutrients. Additional bacteria impairments are concentrated in the Yellow River and Blackwater River basins. The overall list of impaired waters may be found in Appendix F.

The FDEP identified seven waterbody segments as impaired for bacteria in the Pensacola Bay watershed, based on shellfish classifications issued by the FDACS (FDEP 2017):

- Escambia Bay North (waterbody identification number [WBID] 548AC;
- Escambia Bay (South Segment) (WBID 548B;
- Pensacola Bay (North Segment) (WBID 548C);
- Blackwater Bay (South Segment) (WBID 548GB);
- East Bay (WBID 548H);
- East Bay River (Marine Portion) (WBID 701A);
- Tom King Bayou (WBID 833A); and

County health departments monitor recreational beaches for bacterial contamination and issue health advisories closing beaches when bacterial counts are too high. Beaches with more than 21 closures in a year are identified as impaired by FDEP. Beach segments identified as impaired for bacteria in the Pensacola Bay system, based on closures by local health departments (FDEP 2014a), include the following:

- Navy Point (WBID 548FB)
- Bayview Park Pier (WBID 738AB)
- Emerald Promenade Beachwalk (WBID 8007A)
- Navarre Park Highway 98 (WBID 915B)
- Liza Jackson Park (WBIB 915C);

Total Maximum Daily Loads (TMDLs) adopted by FDEP for the Pensacola Bay system include 12 for fecal coliform, four for nutrients, one for DO, and 81 for mercury (Figure 3-1; Table 3-1) (FDEP 2016b). A TMDL represents the maximum amount of a given pollutant a waterbody can assimilate and still meet water quality standards, including applicable water quality criteria and designated uses. Established TMDLs identify specific reductions in pollutant loading required to restore water quality and meet restoration goals. A full list of EPA established TMDLs can be found in Appendix F.

Table 3-1 Adopted TMDLs¹

Waterbody	WBID(s) ²	Waterbody	WBID(s)
Bacteria		Nutrients	
Bayou Chico	846	North Escambia Bay	548AA
Jones Creek	846A	Judges Bayou	493B
Jackson Creek	846B	Bayou Chico	846
Bayou Chico Beach	846CB	Bayou Chico	846C
Sanders Beach	848DA	Dissolved Oxygen	
Escambia River	10F	Judges Bayou	493A
Texar Bayou	738		
Carpenter Creek	676		
Blackwater River (Tidal)	24AB		
Yellow River	30		
Turkey Creek	117		
East Bay River (Marine)	701A		

¹Not including mercury²Waterbody Identification Number

Total Maximum Daily Loads are implemented through Basin Management Action Plans (BMAPs), which identify specific management actions necessary to accomplish required pollutant reductions. Basin Management Action Plans are developed by local stakeholders (public and private) in close coordination with FDEP. A BMAP was adopted by FDEP in 2011 to implement five fecal coliform TMDLs and restore water quality in Bayou Chico located in the southern end of Escambia County (FDEP 2011a, 2016d). The waterbodies addressed by the BMAP include Bayou Chico, which adjoins Pensacola Bay, and five additional waterbody segments that drain to Bayou Chico and the bay: Jones Creek, Jackson Creek, Bayou Chico Drain, Bayou Chico Beach (at Lakewood Park), and Sanders Beach (FDEP 2008, 2011b).

The BMAP was developed by FDEP in partnership with the City of Pensacola, Escambia County; the Escambia County Health Department, the Emerald Coast Utilities Authority (ECUA); the Florida Department of Transportation (FDOT); the Bayou Chico Association; the U.S. Navy, and the Bay Area Resource Council.

The FDEP has adopted a statewide TMDL for reducing human health risks associated with consuming fish taken from waters impaired for mercury. Mercury impairments are based on potential human health risks, not exceedances of water quality criteria. The primary source of mercury depositions in the environment is atmospheric deposition. It is estimated that about 70 percent of deposited mercury comes from anthropogenic sources (FDEP 2013). Approximately 0.5 percent of the mercury load in Florida waters has been identified as being discharged directly to surface waters by permitted industrial and domestic wastewater facilities (FDEP 2013). Only a small part of mercury in the environment is in the form of methylated mercury, which is biologically available to the food chain. The statewide TMDL for mercury includes a reduction target for fish consumption by humans and by wildlife and an 86 percent reduction in mercury from mercury sources in Florida by humans and by wildlife (FDEP 2013).

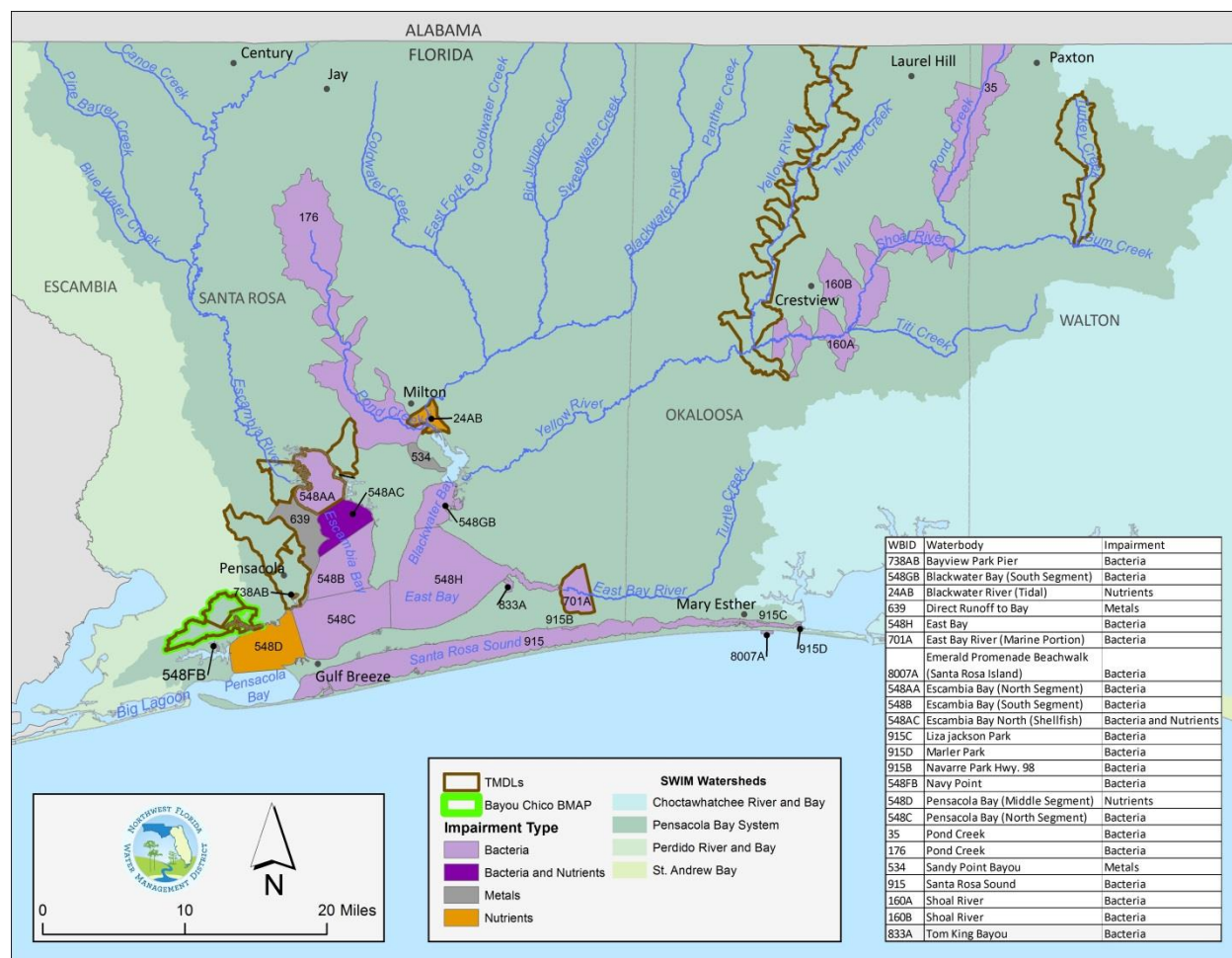


Figure 3-1 Impaired Waters and TMDLs

In addition to State-listed impaired waters, TMDLs established by the U.S. EPA are listed in Appendix F.

3.1.2 Pollution Sources

Nonpoint source (NPS) pollution is generated when stormwater runoff collects pollutants from across the landscape (lawns, pavement, highways, dirt roads, buildings, farms, forestry operations, and construction sites, etc.) and carries them into receiving waters. Pollutants entering the water in this way include nutrients, microbial pathogens, sediment, petroleum products, metals, pesticides, and other contaminants. Typical sources of NPS pollution include stormwater runoff from urban and agricultural lands and erosion and sedimentation from construction sites, unpaved roads, and destabilized stream banks. Atmospheric deposition of nitrogen, sulfur, mercury, and other substances via fossil fuel combustion also contribute to NPS pollution.

Stormwater runoff is the primary source of NPS pollution, and it is closely associated with land use. Urban land use, especially medium- to high-density residential, commercial, and industrial, generates the greatest NPS pollution per acre due to impervious surfaces that increase runoff. In urban areas, lawns, roadways, buildings, parking lots, and commercial and institutional properties all contribute to NPS pollution. Urban areas are largely concentrated within the coastal area, including the Pensacola metropolitan area, as well as the vicinity of Milton, the Fairpoint peninsula, portions of Santa Rosa Island, and nearby unincorporated communities. In addition to these established areas, the urban-rural fringe

hosts new development and construction sites, introducing new NPS pollution sources impervious surface area within the watershed.

In the Pensacola Bay system watershed, a number of entities currently hold Municipal Separate Storm Sewer System ([MS4] NPDES Stormwater) permits for stormwater conveyances that discharge to waters of the state. These include the following:

- Hurlburt Field
- Eglin AFB
- University of West Florida
- NAS Pensacola
- City of Ft. Walton Beach
- Santa Rosa County
- Okaloosa County
- City of Mary Esther
- Walton County
- City of Gulf Breeze
- City of Milton
- Escambia County
- City of Pensacola
- Town of Century

Escambia County, the City of Pensacola, the Town of Century, and FDOT are co-permittees under the NPDES program.

In 1991, Escambia County established a Stormwater Master Plan Program to reduce the frequency and severity of flooding and to improve water quality in receiving surface waters (Curb 2011). Among the project needs identified were road paving, restoring streams, and installing stormwater retrofits in established neighborhoods. Projects have been funded primarily through the county's local option sales tax (LOST). The City of Pensacola has also prioritized needed stormwater improvements, including within such areas as Piedmont Road area, Aragon Court, downtown Pensacola, Long Hollow Basin, and others.

Fertilizer application, ditching, road construction, and harvesting associated with agriculture and silviculture can also cause NPS pollution, erosion, sedimentation, and physical impacts to streams and lakes (Stanhope *et al.* 2008). Within the watershed, agricultural lands are concentrated most prominently in northern Escambia County, central and northern Santa Rosa and Okaloosa counties, and northern Walton County (Figure 2-6). Silviculture is widespread across all non-urban areas of the watershed.

Erosion and sedimentation are natural phenomena that can be accelerated by human activities, with resulting water quality impacts, including habitat smothering, elevated turbidity and suspended solids, and hydrologic impacts. Factors such as highly erodible soils, steep unstable slopes, and high rainfall intensities, are important factors in erosion and sedimentation (Reckendorf 1995).

Onsite sewage treatment and disposal systems are widespread sources of nutrients and other pollutants. Concentrations of OSTDS can degrade the quality of groundwater and proximate surface waters. While conventional OSTDS can control pathogens, surfactants, metals, and phosphorus, mobility in the soil prevents complete treatment and removal of nitrogen. Dissolved nitrogen is frequently exported from drainfields through the groundwater (NRC 2000). Additionally, OSTDS in areas with high water tables or soil limitations may not effectively treat other pollutants. Pollutants can enter surface waters as seepage into drainage ditches, streams, lakes, and estuaries (EPA 2015d; NRC 2000).

In the Pensacola Bay watershed, most rural and unincorporated communities and a number of suburban communities rely on OSTDS for wastewater treatment. Florida Water Management Inventory data indicate approximately 54,000 known or likely septic systems in the watershed (FDOH 2016). Known septic is based on permit data combined with inspection records. Likely septic is based on results of the review of nine criteria, but without inspection verification. Figure 3-2 shows the approximate locations of septic tanks as of 2015 (FDOH 2015b).

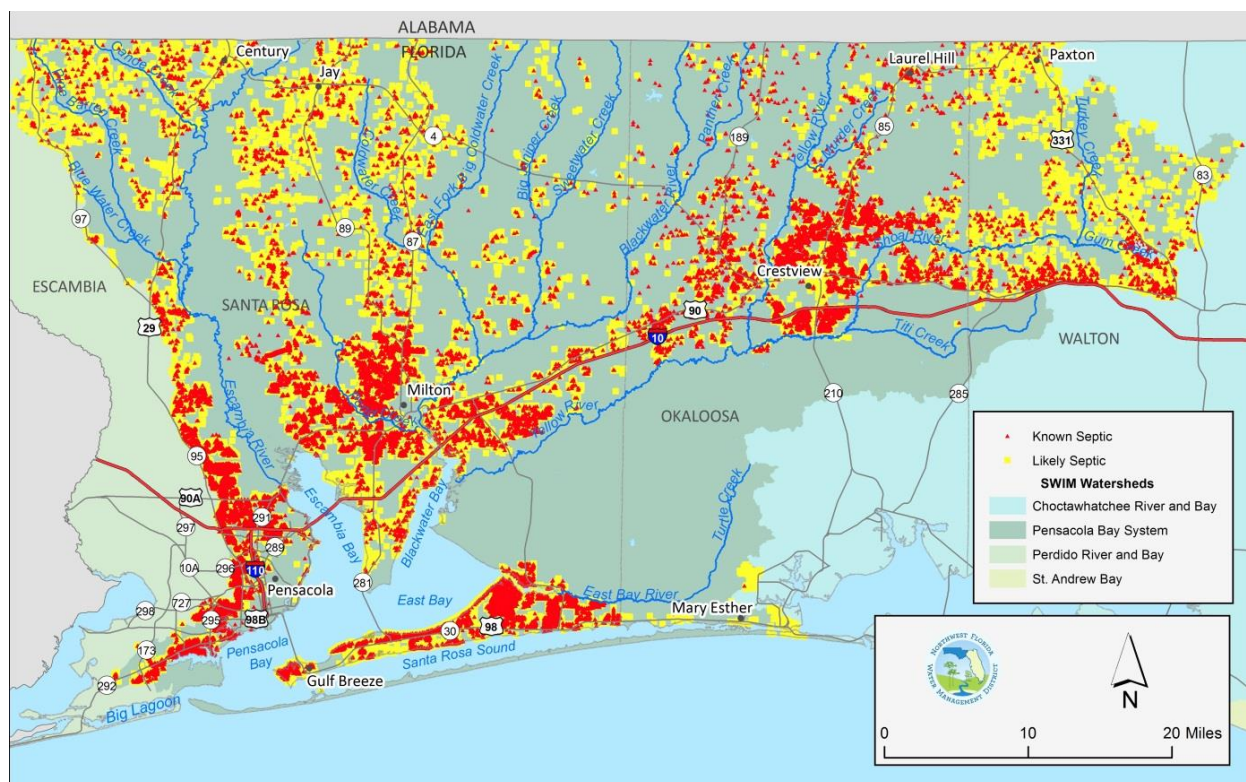


Figure 3-2 Septic Tank Locations in the Pensacola Bay Watershed

Marinas may be a source of NPS pollution from typical activities, such as boat maintenance, fueling, and marine sewage discharge, and due to runoff from parking lots. Pollution from marinas can depend on the availability of pump-out facilities and the level and consistency of marina BMP implementation. As of 2017, there are nine FDEP-certified Clean Marinas in the watershed.

Some pollutants, such as nitrogen and mercury, are also contributed to the landscape and waterbodies by atmospheric deposition. Most oxidized-nitrogen emissions are deposited close to the emission source and can especially impact surface water proximate to urban areas (Howarth *et al.* 2002a, 2002b, 2002c; NRC 2000).

There are 26 permitted domestic wastewater facilities and 33 industrial wastewater facilities within the watershed, as well as one power plant (Figure 3-3). Since completion of the previous SWIM plan update, a major accomplishment has been the relocation of the ECUA's Main Street WWTF in downtown Pensacola to its current location as the Central Water Reclamation Facility, located near Cantonment. The previous facility had a permitted surface water discharge of 20 million gallons per day. With the new facility, all surface water discharge into the bay has been eliminated, and 100% water reclamation is being achieved. The majority of the reclaimed water is being reused for beneficial purposes. Domestic wastewater facilities in the Pensacola Bay system watershed are listed in Table 3-2.

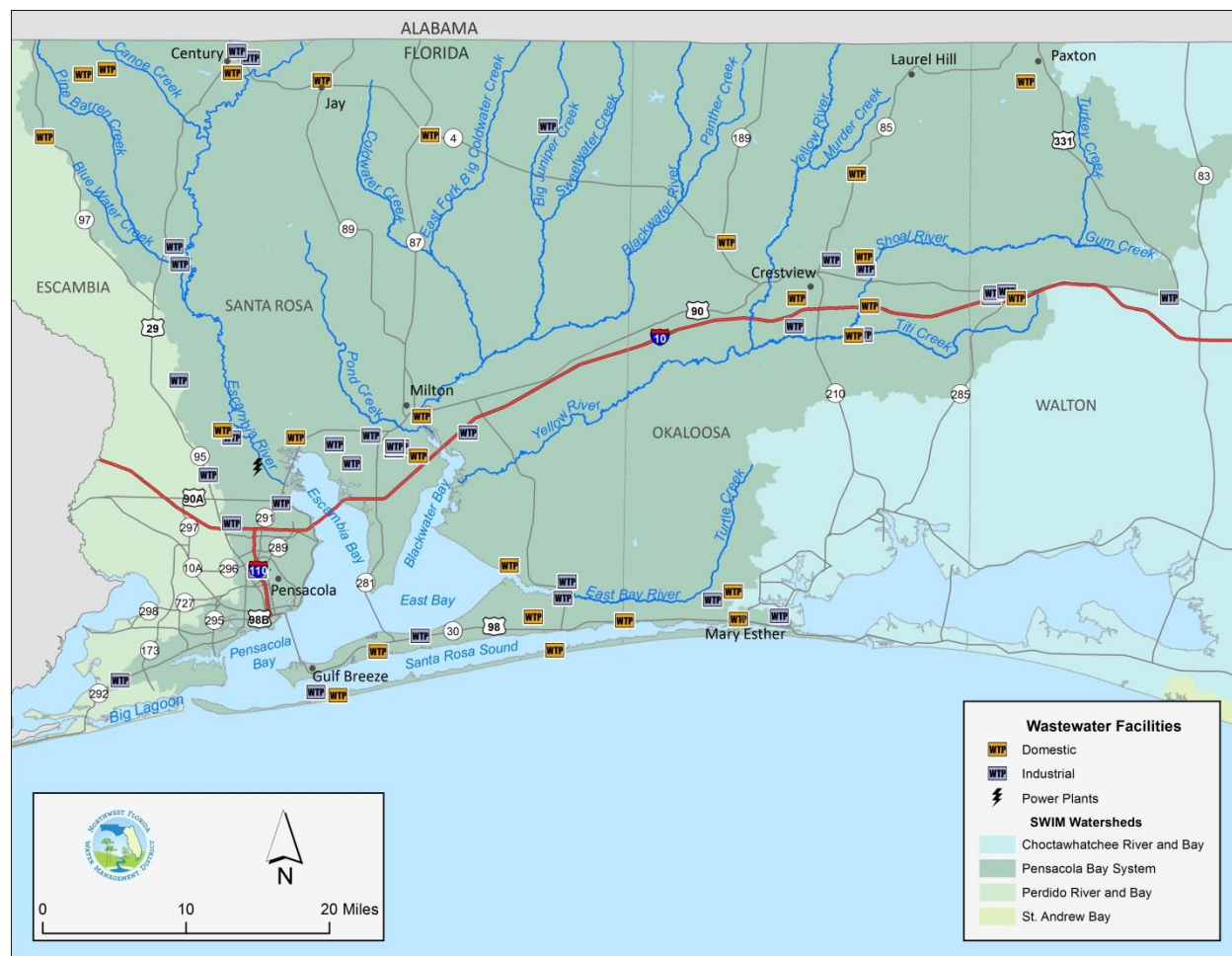


Figure 3-3 Permitted Wastewater Facilities within the Pensacola Bay Watershed

Table 3-2 Domestic Wastewater Facilities

Facility Name	County	Permitted Flow (mgd)	2015 Flow (mgd)	Discharge Type*
Bratt Elementary School WWTP	Escambia	0.01	0.002	Rapid Infiltration Basin (RIB)
Century WWTF	Escambia	0.68	0.44	Surface Water
ECUA Central WRF	Escambia	22.5	14.351	Sprayfield; industrial reuse; reuse at WRF
ECUA Pensacola Beach WWTP	Escambia	2.40	0.88	Surface water; landscape irrigation; reuse at WWTP
Ernest Ward Middle School WWTP	Escambia	0.01	0.002	RIB
Northview High School WWTP	Escambia	0.03	0.005	RIB
Berrydale Forest Camp WWTF	Santa Rosa	0.05	0.02	Sprayfield
Holley WRF	Santa Rosa	0.25	0.08	RIB
Holley-Navarre WWTF	Santa Rosa	2.99	1.11	Golf course irrigation; other landscape irrigation
Jay WWTP	Santa Rosa	0.12	0.06	RIB

Facility Name	County	Permitted Flow (mgd)	2015 Flow (mgd)	Discharge Type*
Navarre Beach WWTP	Santa Rosa	0.93	0.29	Surface water; reuse at WWTP
Milton WWTF	Santa Rosa	2.50	1.62	Surface water
Pace Water System, Inc. WWTP	Santa Rosa	2.00	1.49	Wetlands; residential and other landscape irrigation
South Santa Rosa Utilities System WWTF	Santa Rosa	2.00	1.49	Sprayfield; golf course, residential, other landscape irrigation; reuse at WWTF
Sundial Utilities WWTP	Santa Rosa	0.25	0.08	RIB
Baker High School WWTP	Okaloosa	0.02	0.005	RIB
Bob Sikes WRF	Okaloosa	1.00	0.09	RIB
Crestview WWTF	Okaloosa	2.75	1.48	Sprayfield; RIB; reuse at WWTF
FDOT Okaloosa I-10 Rest Area WWTP	Okaloosa	0.20	0.03	RIB
Hurlburt Field AWTP	Okaloosa	1.00	0.59	Wetlands; residential and other landscape irrigation; reuse at AWTP
Mary Esther WWTP	Okaloosa	1.10	0.40	Sprayfield
North Okaloosa WRF	Okaloosa	0.03	**	RIB
Okaloosa Correctional Institution WWTF	Okaloosa	0.23	0.17	RIB
Russell F.W. Stephenson WWTF	Okaloosa	0.98	0.39	RIB
Paxton WWTP	Walton	0.08	0.02	Sprayfield
Walton County Commerce Park at Mossy Head WWTF	Walton	0.02	**	Absorption fields

Mining and extraction activities near waterbodies have the potential to cause turbidity, sedimentation, and smothering. Mining activities within the watershed are concentrated in the vicinity of the Town of Century, in the Pensacola metropolitan area, and south of Milton. The USGS recognizes nine major mining operations within the watershed, including one perlite mine, two sulfur mines, and six sand and gravel mines. FDEP identifies 59 mines and borrow pits within the watershed; many are located near streams, creeks, tributaries, and other waterbodies (FDEP 2014d, 2015c). Of these, there are 42 sand mines, four clay mines, and 13 sand and clay mines.

The extensive and historical industrial and manufacturing facilities in the Pensacola urban area have had a profound effect on the bay system. Degradation of water and/or sediment by toxic chemicals, such as those used in industrial and manufacturing processes, can impact surface water quality and the health of associated upland and aquatic habitats and generate contaminated food chains in which top predators are most significantly harmed. Chemical contaminants can also be harmful to humans, particularly through consumption of seafood containing elevated quantities of mercury, polychlorinated biphenyls, dioxin, and other harmful chemicals.

There are currently five U.S. EPA National Priority List (NPL) Superfund sites within the Pensacola Bay watershed:

- Agrico Chemical Co.;
- American Creosote Works, Inc.;
- Escambia Treating Co.;
- NAS Pensacola; and
- NAS Whiting Field.

The Agrico Chemical Company and Escambia Wood-Pensacola sites are about one mile west of Bayou Texar. Contaminated groundwater from these sites appears to be migrating into Bayou Texar (Mohrher *et al.* 2005). The American Creosote Works site covers 1.5 acres in Pensacola, Florida, about 0.3 miles north of where Bayou Chico joins with Pensacola Bay. The USGS identified phenols in groundwater associated with American Creosote Works (USGS 1986). Efforts to identify, evaluate, and clean up contaminant sites at NAS Pensacola and NAS Whiting field are outlined by EPA (2016d).

In Florida's portion of the watershed, there are 28 hazardous waste facilities registered as EPA Biennial Reporter facilities. Of these, 14 are in Pensacola. Biennial Reporter facilities handle hazardous waste and are required to report to the EPA at least once every two years (EPA 2016c). Additionally, 757 active petroleum contamination tracking sites within the watershed are registered with the state's Storage Tank and Petroleum Contamination Monitoring (STCM) database. There are 34 contaminated dry cleaning sites within the basin eligible for the state-funded Dry Cleaning Solvent Cleanup Program. The majority of STCM and dry cleaning sites are located in historically developed areas in Pensacola and Milton, with additional sites in other developed areas, including Crestview, Jay, Gulf Breeze, Baker, and other unincorporated communities.

There are also 19 non-NPL Superfund sites located within the basin, 14 are located in Pensacola. A non-NPL site is a Superfund site that has not been placed on the NPL list through the EPA's formal process for assessing hazardous waste sites; however, the EPA can take short-term cleanup actions on non-NPL sites under the emergency removal program.

3.2 Natural Systems

Eutrophication has been documented in several waterbodies across the Pensacola Bay watershed, primarily in the bays and estuaries of the watershed. Compared to other eutrophic estuaries, concentrations of nutrients within Pensacola Bay are relatively low (Bricker *et al.* 1999). Some nutrient concentrations have been declining within the Pensacola Bay system, reaching levels below the concentrations of concern for aquatic vegetation (FDEP 2012). The State of Florida water quality criterion for chlorophyll-*a* and aquatic life designated use is ≤ 20 micrograms per liter, which is well above most measured concentrations for the Pensacola Bay system (FDEP 2010). However, despite relatively low nutrient concentrations, Pensacola Bay exhibits some classic eutrophication symptoms, including summer hypoxia, significant loss of sea grass habitat, and phytoplankton dynamics indicative of variations in freshwater flows (Caffrey and Murrell 2015).

Hypoxia commonly occurs within the Pensacola Bay estuarine system, particularly in stratified waters in Escambia and East bays (Hagy and Murrell 2007). The extent of this condition, at times affecting up to 30% of the estuary, suggests it could be a significant factor structuring biological communities and habitat. Contributing factors may include salinity stratification associated with tidal and freshwater inflow and nutrient enrichment of plankton and sediments (Murrell *et al.* 2009).

Chemical contaminants within the sediments have been observed in many areas of the estuary, particularly within bayous Chico and Texar and in Escambia Bay. DeBusk, *et al.* (2002) details compiled monitoring results, describing fairly consistent patterns of contaminant distribution. Shuba (2012) describes monitoring and recommendations related to polychlorinated biphenyl (PCB) enrichment. Metals, polycyclic aromatic hydrocarbons (PAHs), and dichlorodiphenyltrichloroethane (DDT)-related compounds were consistently found to be elevated in bayous Chico and Texar and in Escambia Bay, and to a lesser extent in Bayou Grande and East Bay. Polychlorinated biphenyls, which entered the system apparently through a spill in 1969 (NFWMD 1997), have continued to be found in the sediments of the lower Escambia River and Escambia Bay. Lewis *et al.* (2016) and U.S. EPA (1993), further describe sediment contaminants and toxicity in bayous Texar and Chico, Escambia Bay, and elsewhere within the Pensacola Bay estuary. Pensacola's urbanized bayous have long been subject to extensive stormwater runoff and NPS pollution, as well as historical point source discharges and industrial development. As a result, water and sediment quality in these areas have been significantly impacted. These contaminants, substantially representing historical pollutant discharges, represent a source of legacy pollutants that may continue to degrade benthic habitats and be subject to resuspension with availability to the water column.

In 2010, portions of Pensacola Bay, particularly near Pensacola Pass and proximate locations in Santa Rosa Sound and Big Lagoon, were repeatedly exposed to crude oil and weathered residue from the Deepwater Horizon oil spill.

Sedimentation more broadly affects benthic habitats in portions of the watershed due to poor flushing and the input of large sediment loads from the river basins and from stormwater runoff. George (1988) concluded that the percentage of fine-grained sediments (clays and silts) increased since the 1960s, with the percentage of fine-grained sediments in East Bay doubling between 1968 and 1988. Another example is Carpenter Creek, which suffers from streambank erosion and channelization, thus impact in receiving waters in Bayou Texar.

Between 1950 and 1980, about 95 percent of seagrass habitat disappeared from the Pensacola Bay system (Yarbro and Carlson 2016). Recognizing the importance of seagrasses for fisheries and for human benefits, Lewis *et al.* (2016) estimated that losses in seagrass habitat from 1960-2010 equate to an economic loss of approximately \$104 million per year (1991 dollars) in ecosystem services.

Yarbro and Carlson (2016) report that from 2003 to 2010 and found that coverage in Pensacola Bay in 2010 was approximately 1,053 acres, an increase of approximately 51 percent from 2003. An increase was noted in Pensacola Bay, in particular. Losses of about five percent, however, were reported from Santa Rosa Sound. Ongoing stressors of seagrasses in the Pensacola Bay system may include effects of hypoxia, salinity changes, and burial from sediments (Yarbro and Carlson 2016).

Central and southern East Bay and shoreline areas of Escambia Bay suffered nearly complete losses of seagrasses since the 1940s (Olinger *et al.* 1975; Yarbro and 2016). In some areas, water quality may have recovered sufficiently to support seagrasses; thus, additional efforts to identify barriers and strategies for recovery are warranted.

Estimates of recent oyster reef coverage (approximately 245 acres) in the Pensacola Bay system are lower than published estimates from the 1970s-1990s, which report coverage of several thousands of acres (Lewis *et al.* 2016). From the 1960s-1980s, shellfish (primarily oysters) reportedly experienced significant declines, attributed to fungal parasites, poor water quality, heavy rainfall, and dredging. The Florida Department of Natural Resources, now FDEP, reported periodic crashes in oyster populations within the Yellow River Marsh Aquatic Preserve, with near 100 percent mortality rate (Gardner 1991).

Lewis *et al.* (2016) estimated 2014 salt marsh area at 6,697 acres. Portions of the bay system have experienced increases in salt marsh coverage. Salt marsh coverage increased from 1,400 to 1,794 acres in Blackwater Bay, 3,750 to 4,519 acres in Escambia Bay and from 59 to 103 acres in Pensacola Bay. Coverage has remained relatively stable for East Bay. Total salt marsh coverage across the basin has increased 19 percent (1995-2010) and is expected to further increase due to sea level rise if not restricted by anthropogenic barriers such as roadways, and armored shorelines (Lewis *et al.* 2016).

In rural areas, land clearing associated with agriculture, silviculture, and recreation, as well as dirt road erosion, have increased sedimentation in the Blackwater River basin. The heavy use of vehicles on unpaved roads in Blackwater River State Forest has increased soil erosion, leading to higher turbidity in streams and smothered aquatic habitat (FDACS 2013b). Agricultural land use, unpaved roads, and heavy rain events have also caused turbidity in Yellow river (FDEP 2016d).

3.3 Floodplains and Floodplain Management

Floodplains protect water quality by allowing storage of floodwaters, reducing runoff velocity and preventing erosion and sedimentation. Floodplains in their natural state also attenuate potential flood effects while providing an ecological link between aquatic and upland ecosystems and habitat for many terrestrial and aquatic species. Development of and encroachment into floodplains can reduce water storage capacity, increases flood heights and velocities, and degrades natural systems in areas beyond the encroachment itself.

Flood protection needs are closely related with stormwater management, as well as land use planning and land development regulation. Riparian wetlands, marshes, and floodplain forests help to slow stormwater runoff, protecting water quality and regulating the release of water into streams and aquifers. Optimally, stormwater management systems provide both flood protection and water quality treatment.

Riverine floods are common along the watershed's major rivers and tributaries. Wetlands, low-lying areas, and coastal areas are also subject to significant flooding. Federal Emergency Management Agency flood maps delineate 269,577 acres (approximately 18 percent) of the Pensacola Bay watershed as Special Flood Hazard Area (Figure 2-4). Lands most prone to flooding are predominantly on Santa Rosa Island, Garcon Point, Escribano Point, and along the major rivers.

The coastline within the Pensacola Bay watershed is protected by offshore barrier islands and peninsulas; however, the coastal areas of Santa Rosa, Escambia, and Okaloosa counties are subject to flooding from coastal surges associated with hurricanes (FEMA 2006). Another flooding source is the East Bay River. Flooding in the Blackwater River Basin is caused by stream overbank flow and hurricane storm surges, and sometimes a combination of both. Riverine flooding occurs frequently and is prevalent throughout the reach of the river where the riverbanks are low and the floodplain is wide. The coastline in Santa Rosa County is subject to widespread flooding resulting from storm surges that accompany hurricanes and other severe storms from one or more of the following flooding sources: the Gulf of Mexico, East Bay, Escambia Bay, Pensacola Bay, Blackwater Bay, and Santa Rosa Sound (FEMA 2014).

4.0 Watershed Protection and Restoration

4.1 Management Practices

Watershed protection and restoration is inherently a collaborative effort on the part of state, regional, and federal agencies; local governments; nongovernment organizations; the business community; and the public. Implementation is conducted at the watershed, sub-watershed, and local scale. Recommended management strategies are described below.

4.1.1 Nonpoint Source Pollution Abatement

Addressing NPS pollution is a vital part of watershed management in the Pensacola Bay system. As described above, stormwater runoff carries pollutants from the landscape that diminish water quality, and it can physically impact streams and aquatic habitats. Multiple strategies can be employed to collectively reduce NPS pollution and protect and improve water quality and watershed resources.

Stormwater Retrofit

Among the most effective means of reducing NPS pollution is to retrofit existing stormwater management systems to add treatment and restore or approximate natural hydrology. In addition to improving water quality, appropriately designed retrofit projects improve flood protection, reduce physical disturbance from erosion and sedimentation, and provide aesthetic and recreational use benefits.

Implementation may include a mixture of traditional and nonstructural approaches. There are numerous methods of stormwater management and treatment, among which are wet and dry detention ponds, infiltration systems, stormwater harvesting, wetland treatment systems, stormwater separator units, vegetated swales and buffers, pervious pavement, bioretention, ditch blocks, green roofs, and chemical (alum) treatment. Specific measures employed depend on site conditions, including soils, water table conditions, flow, intended uses, and available land area. Optimally, a treatment train approach is employed, addressing hydrology and water quality treatment across a basin. Implementation is best accomplished within a wider, watershed context that incorporates initiatives such as Florida Friendly Landscaping (section 373.185, F.S.) and public outreach and awareness.

Within the Pensacola Bay watershed, the greatest need and potential for stormwater retrofit efforts is within municipal and fringe areas with relatively dense development and significant areas of impervious surface. Examples include the Pensacola metropolitan area, Gulf Breeze, Navarre, Mary Esther, Milton, and Crestview. Local governments normally take the lead in implementing stormwater retrofit projects, as they most commonly own, operate, and maintain stormwater management systems.

Agricultural Best Management Practices

Best management practices are individual or combined practices determined through research, field-testing, and expert review to be effective and practicable means for improving water quality, considering economic and technological constraints. Such measures can promote water use efficiency and protect fish and wildlife habitat. Such practices were pioneered for agriculture but have also been developed and effectively applied to silvicultural and urban land uses. Best management practices reduce soil loss, nutrient enrichment, sedimentation, discharge of chemical pollutants, and other adverse impacts (see, for example, Wallace *et al.* 2017, among many others). Implementation also often provides benefits for stream bank stability and fish and wildlife habitat. In addition to protecting water and habitat quality and

conserving water, BMPs may reduce costs to producers by increasing operational efficiency and effectiveness.

Agricultural BMPs generally fall into two categories – structural and management. Structural BMPs, e.g., water-control structures and fencing, involve the installation of structures or changes to the land and are usually costlier than management BMPs. Management BMPs, such as nutrient and irrigation management, comprise the majority of the practices but may not be readily observable. Nutrient management addresses fertilizer type, amount, placement, and application timing, and it includes practices such as soil and tissue testing, application methods and rates, correct fertilizer formulations, and setbacks from water resources. Irrigation management addresses system maintenance, scheduling, and other measures that improve the overall efficiency of irrigation systems.

The Florida Department of Agriculture and Consumer Services has developed, evaluated, and approved BMPs that are specific to individual agricultural operations within Florida watersheds. As of August 2017, the DACS has adopted manuals for cow/calf, statewide citrus, vegetable and agronomic crops, nurseries, equine operations, specialty fruit and nut, sod, dairy, and poultry operations. A small farms manual is under development and adoption is expected in 2017. The sod and cow/calf manuals are currently under review and revision. Guidance for and assistance in enrolling in approved BMPs are provided by FDACS. Cost share programs are also conducted both by FDACS and the District. Additionally, FWC provides technical assistance to private landowners through its Landowner Assistance Program.

Implementation of approved BMPs or water quality monitoring is required in basins with adopted BMPs. Whether required or not, however, implementation of BMPs are effective means of protecting and restoring watershed resources and functions and are recommended land use practices for implementation of this plan.

Within the Pensacola Bay watershed, the most extensive and concentrated areas of agricultural land use are within northern Escambia and Santa Rosa counties, notably including the Pine Barren Creek, Moore Creek, and Coldwater Creek sub-basins (Figure 2-6). Within these areas in particular, application of agricultural BMPs have significant potential to further protect and improve water quality and aquatic habitat conditions.

Silviculture Best Management Practices

The Florida Forest Service (FDACS 2008) defines silviculture BMPs as “the minimum standards necessary for protecting and maintaining the State’s water quality as well as certain wildlife habitat values, during forestry activities.” These practices are protective of water resources, including streams, downstream receiving waters, sinkholes, lakes, and wetlands. The FFS provides specific guidance on BMPs and has established compliance monitoring requirements and procedures. FDEP (1997) evaluated the effectiveness of silviculture BMPs and concluded that forestry operations conducted in accordance with the BMP manual resulted in no major adverse habitat alterations.

The primary BMPs established for forestry are special management zones (SMZs). These zones provide buffering, shade, bank stability and erosion-control, as well as detritus and woody debris. They are intended to protect water quality by reducing or eliminating sediment, nutrients, logging debris, chemicals, and water temperature fluctuations. They also maintain forest attributes that provide wildlife habitat. Widths of SMZs vary depending on the type and size of the waterbody, soils, and slope. Specific SMZs are described as follows.

- 1) The **Primary Zone** varies between 35 and 200 feet and applies to perennial streams, lakes, and sinkholes, OFWs, Outstanding Natural Resource Waters (ONRW), Class I Waters, and, in some

cases, wetlands. A primary zone generally prohibits clear-cut harvesting within 35 feet of perennial waters and within 50 feet of waters designated OFW, ONRW, or Class I. Other operational prescriptions also apply to forestry practices to protect water and natural resources.

- 2) The **Secondary Zone** applies to intermittent streams, lakes, and sinkholes. Unrestricted selective and clear-cut harvesting is allowable, but mechanical site preparation, operational fertilization, and aerial application or mist blowing of pesticide, are not. Loading decks or landings, log bunching points, road construction other than to cross a waterbody, and site preparation burning on slopes exceeding 18 percent are also prohibited. These zones vary in width between 0 and 300 feet.
- 3) The **Stringer** provides for trees to be left on or near both banks of intermittent streams, lakes, and sinkholes to provide food, cover, nesting, and travel corridors for wildlife.

Other BMPs detailed in the Florida silviculture BMP manual include practices for forest road planning, construction, drainage, and maintenance; stream crossings; timber harvesting; site preparation and planting; fire line construction and use; pesticide and fertilizer use; waste disposal; and wet weather operations. The BMP manual further includes specific provisions to protect wetlands, sinkholes, and canals. Associated with the BMP manual are separate forestry wildlife best management practices for state imperiled species (FDACS 2014).

Given that the Pensacola Bay watershed is substantially forested, silviculture BMPs are some of the most important tools for protecting water quality and wetland and aquatic habitat quality within the watershed. The significant relief that exists within the upper watershed (Figure 2-3) suggests application of SMZs may be particularly useful for protecting downstream aquatic habitats from further impacts.

Low Impact Development

Inclusive of green infrastructure, urban best management practices, and Florida Friendly landscaping, low impact development represents a framework for implementing innovative stormwater management, water use efficiency, and other conservation practices during site planning and development. Benefits include reduced runoff and NPS pollution, improved flood protection, and reduced erosion and sedimentation. Some specific practices include the following.

- Minimized effective impervious area
- Vegetated swales and buffers
- Bioretention cells
- Rain gardens
- Infiltration and exfiltration systems
- Community greenways
- Green roofs
- Certification programs, such as Florida Water StarSM, and the Florida Green Building Coalition

For transportation infrastructure, practices recommended to protect water quality and floodplain and wetland functions include incorporating bridge spans that accommodate bank-full stream flows while maintaining intact floodplain, wetland, and wildlife passage functions. Minimizing structural alteration of low-lying, flood-prone lands is also an important strategy for protecting water quality and providing flood protection. Such properties can be used for other purposes, such as passive parks and other public use areas.

Riparian Buffers

A riparian buffer zone is an overlay that protects an adjoining waterbody from effects of adjacent development, such as runoff, NPS pollution, erosion, and sedimentation. A buffer zone in this context refers to an area along the shoreline that is maintained in or restored to generally natural vegetation and habitat. In this condition, an intact buffer zone helps to simultaneously achieve three important goals:

water quality protection, shoreline stability, and fish and wildlife habitat. Associated with these are other benefits, including aesthetic improvements and public access and recreation. These benefits are achievable for riparian areas along all types of waterbodies: stream/riverine, estuarine, lacustrine, and wetland.

In general, the wider the buffer zone, the better these goals may be achieved, although specific requirements are defined based on community goals. Limited areas, for example, might be developed into recreational sites, trails, or other access points. Table 4-1 is a representation of generalized buffer zones, adapted from USFWS documentation, listing benefits provided by buffers of successively larger widths. Complicating buffer zone design is the fact that different sites have different ecological and physical characteristics. These characteristics (type of vegetation, slope, soils, etc.), when accounted for, would lead to different buffer widths for any given purpose. Alternatives to fixed-width buffer policies include tiered systems that can be adapted to multiple goals and site-specific characteristics and uses. Wenger (1999) and Wenger and Fowler (2000) provide additional background, detail, and guidance for the design of buffer zone systems and policies.

Table 4-1 Generalized Buffer Zone Dimensions

Benefit Provided:	Buffer Width:					
	30 ft	50 ft	100 ft	300 ft	1,000 ft	1,500 ft
Sediment Removal - Minimum						
Maintain Stream Temperature						
Nitrogen Removal - Minimum						
Contaminant Removal						
Large Woody Debris for Stream Habitat						
Effective Sediment Removal						
Short-Term Phosphorus Control						
Effective Nitrogen Removal						
Maintain Diverse Stream Invertebrates						
Bird Corridors						
Reptile and Amphibian Habitat						
Habitat for Interior Forest Species						
Flatwoods Salamander Habitat – Protected Species						
Key Water quality protection  Terrestrial riparian habitat  Aquatic habitat enhancement  Vulnerable species protection 						

Adapted from USFWS 2001.

Basinwide Sedimentation Abatement

Unpaved roads frequently intersect and interact with streams, creating erosion and runoff conditions that transport roadway materials directly into streams, smothering habitats and impacting water quality and the physical structure of the waterbodies. Borrow pits have also caused progressive erosion conditions that

smother streams, severely damaging or destroying habitats and diminishing water quality. Existing impacts and future risks are most pronounced in the upper portion of the Pensacola Bay watershed, given the slopes and prevalent soils.

Given the site specific and physical nature of the impacts, efforts taken at the local and regional level can lead to significant restoration of aquatic habitat conditions and improved water quality. Corrective actions may include replacing inadequate culverts with bridge spans maintain floodplains and flows, hilltop-to-hilltop paving, use of pervious pavement, establishment of catch basins to treat and manage stormwater, and establishment of vegetated or terraced basins to eliminate gulley erosion.

In addition to addressing unpaved roads and gully erosion sites, application of construction BMPs, to include sediment and erosion controls, protects water and habitat quality, as well as the physical structure of streams and other waterbodies. Extremely heavy and sustained precipitation events are common in northwest Florida; thus, for large-scale construction and transportation projects, protective BMPs are ideally capable of accommodating and preventing erosion and sedimentation during large storm systems, which frequently overwhelm conventional erosion controls.

4.1.2 Ecological Restoration

A wide array of measures may be employed to restore natural and historic functions to former or degraded wetland, aquatic, stream, riparian, and estuarine habitats. Enhancement actions, such as improving vegetation conditions, invasive exotic plant removal, and prescribed fire, are also often discussed in the context of restoration. Wetland, hydrologic, floodplain, shoreline, and stream restoration are discussed further below.

Wetland, Hydrologic and Floodplain Restoration

Wetland restoration includes actions to reestablish wetland habitats, functions, and hydrology. It frequently involves substrate composition and profile restoration and vegetation community reestablishment, including shrub reduction, exotic species removal, application of prescribed fire, and replanting.

Hydrologic and floodplain restoration include actions to reestablish pathways and the timing of surface water flow. Actions include removing fill, replacing bridges and culverts with appropriate designs, establishing low-water crossings, restoring pre-impact topography and vegetation, and abandoning unneeded roads through fill removal and replanting. Restoration activities can have broad water resource benefits, including improved water quality, enhanced fish and wildlife habitat, and other restored wetland functions.

Hydrologic restoration is important for altered wetlands and waterbodies in urbanized areas, as well as for riverine systems and for larger wetland systems. Wetland restoration, including habitat enhancements and vegetation restoration, is broadly applicable at both large and smaller scales throughout the watershed.

Shoreline Restoration

Shoreline restoration refers to measures taken to restore previously altered shorelines and to protect eroding or threatened shorelines. Such restoration is accomplished using “living shorelines” techniques, which are a set of evolving practices that incorporate intertidal and shoreline habitats to protect shorelines while also enhancing or restoring natural communities, processes, and productivity. When planned and implemented appropriately, such efforts result in direct and tangible benefits for residents and the larger community, including fish and wildlife, improved water quality, shoreline protection, and aesthetic

improvements. Including biodiversity-building habitats and incorporating adjacent transitional and floodplain areas within restoration planning can increase resiliency and adaptability to anticipated changes in climate, sea levels, and shoreline configuration, as well as potential future occurrences of impacts from invasive species.

Shoreline restoration in this context is particularly applicable as a strategy along altered and/or eroding estuarine shorelines along Pensacola Bay, Escambia Bay, and East Bay. Some of the urbanized bayous may offer restoration opportunities along relatively low-energy shorelines.

Stream Restoration

Stream restoration includes actions to restore the hydrology and aquatic and riparian habitat that may have been impacted by inadequate culverts, road crossings, instream impoundments, erosion and sedimentation, runoff or other hydrologic effects of adjacent or upstream developments. This may also include developing more natural hydrology, wetlands, storage/treatment, and riparian vegetation along stormwater conveyances. In-stream restoration may include efforts to reestablish natural channel and floodplain process and should accompany efforts to address offsite processes (erosion, sedimentation, etc.) that created the original impacts.

The topographic relief within the upper watershed, as well as surrounding land uses, suggests that stream restoration may be a particularly appropriate strategy within this area. Additionally the Carpenter Creek basin and other urban drainages offer opportunities for stream restoration, often in association with stormwater retrofit and other actions.

Estuarine Habitat Restoration

Implementation of wetland and shoreline restoration, as described above, as well as aquatic habitat restoration and enhancement can be implemented in a complementary manner to improve and restore estuarine habitat and productivity. Well-established, contiguous marshes; seagrass beds; and oyster reefs provide habitat for a wide range of marine species, including recreational and commercially valuable seafood species.

Emergent marshes and oyster reefs serve as an important buffer between uplands and estuaries, filtering pollutants and consuming nutrients before they enter the water and reducing waves before they reach land. These communities promote sediment accumulation and shoreline stabilization, attenuate wave energy, protect marsh habitat, and buffer upland areas against wind and wave activity that expedite erosion. Each oyster can filter vast quantities of water, removing suspended particles that would otherwise reduce sunlight penetration needed for healthy seagrass beds.

While some recovery of seagrasses in Pensacola Bay have been observed, extensive areas of East Bay and Escambia Bay, which formerly supported seagrass, have had no recovery. Approaches to restoring seagrass habitat in the Pensacola Bay system, as identified by Yarbro and Carlson (2016), include restoration of shoreline vegetation on Santa Rosa Sound to prevent further burial of vegetation, as well as investigating the extent and effects of hypoxia in the estuary and evaluating long-term effects of salinity changes on submerged aquatic vegetation in the upper reaches of the estuarine system. Results of the ongoing Roadblocks to Seagrass Recovery project may help identify strategies to facilitate recovery in these areas.

4.1.3 Wastewater Management and Treatment Improvements

Septic to Sewer Connections

Among the promising approaches for correcting impacts and impairments are actions to improve the management and treatment of domestic wastewater. While expensive and engineering-intensive, such actions are technically feasible, proven approaches to improving water quality and aquatic habitat conditions, as well as public uses and benefits.

Extending sewer service to areas that currently rely on conventional onsite treatment and disposal systems for wastewater treatment and disposal is effective in reducing nutrient loading to ground and surface water source. As outlined above, there are over 54,000 known or likely conventional septic systems in the Pensacola Bay watershed. As illustrated by Figure 3-4, these are particularly concentrated around Pensacola Bay and Santa Rosa Sound, and within their contributing basins; within the vicinities of the Blackwater, Yellow, Shoal, and Escambia Rivers; and within the Bayou Chico BMAP area. Connecting residences and businesses in these areas to centralized wastewater treatment systems has the potential to substantially improve wastewater treatment and reduce loading of nutrients and other pollutants to these waterbodies and to downstream receiving waters.

Advanced Onsite Systems

Where extension of sewer service is not economically feasible due to the spatial distribution of rural populations, there is potential for installation of advanced onsite systems that achieve water quality treatment that exceeds that provided by conventional systems. In particular, advanced passive systems are being developed to provide cost-effective and practical systems for reducing nitrogen and other pollutants from onsite sewage systems (FDOH 2015b). Pilot projects are underway in different regions of the state.

Water Reclamation and Reuse

For the purposes of this plan, water reuse refers to the application of reclaimed water for a beneficial purpose, with reclaimed water receiving at least secondary treatment and basic disinfection (Chapter 62-10, F.A.C.; Section 373.019, F.S.). Beneficial purposes include reusing reclaimed water to offset a current or known future potable water demand or other documented watershed and water resource challenges. Specific purposes include landscape and golf course irrigation, industrial uses, and other applications (FDEP 2015f). Water reuse can be a key strategy in reducing or eliminating wastewater discharges and associated pollution of surface waters.

Centralized Wastewater Treatment Upgrade and Retrofit

For centralized wastewater treatment systems, conversion to advanced wastewater treatment has proven to be an effective means of reducing the discharge of nutrients and other pollutants into surface and ground waters. Specific treatment or process upgrades may also help improve treatment of contaminants of emerging concern, such as pharmaceuticals, surfactants, and unregulated trace chemicals. Additionally, in many areas there is a need to rehabilitate existing sewer systems, including to correct inflow and infiltration problems and to reduce the number and severity of sanitary sewer overflow incidents. Accomplishing these actions can be expensive, given the need to retrofit existing systems in often highly developed areas. Upon completion, however, notable improvements can be achieved for water quality, public recreational uses, and fisheries.

4.1.4 Land Conservation

As demonstrated through the Florida Forever program and other state, federal, local, and private initiatives, preserving sensitive lands can be an effective part of protecting water quality and habitat, as well as preserving floodplain and wetland functions. Where land is acquired fee simple by public agencies, other benefits, such as public access and recreation, are also achieved. Conservation can be achieved through less than fee, as well as fee simple acquisition. In addition to land acquisition programs, local planning initiatives, such as overlay zones and transfer of development rights programs, can further protect sensitive resources while maintaining private ownership and compatible development.

While the Pensacola Bay watershed benefits from extensive public land areas that protect water quality and wetland and aquatic habitats and provide for public access and use, there are still opportunities to further protect water resources through the conservation of sensitive areas, including riverine, stream-front, and estuarine shorelines.

Additionally resource conservation can be accomplished at a sub-basin or project-level scale to augment other strategies, including stormwater retrofit and hydrologic restoration, and to provide for compatible public access and recreation.

4.1.5 Public Awareness and Education

Public awareness and education efforts span multiple purposes and are an essential component of many of the other actions described here. Among the purposes of awareness and education efforts are:

- Technical outreach to assist in implementing specific programs (for example, best management practices);
- Informing members of the public about the purpose and progress of implementation efforts;
- Providing opportunities for public engagement and participation, as well as public feedback and program accountability; and
- Providing broad-based educational efforts to inform members of the public and specific user groups about watershed resources, their benefits, and personal practices to ensure their protection.

Examples of educational activities include technical training for BMPs, school programs (e.g., Grasses in Classes), public events, citizen science and volunteer programs, and project site visits.

Watershed stewardship initiatives can bring together multiple partners such as federal, state, and local agencies; non-profit groups; and citizen volunteers by identifying common program goals and intended outcomes. Having a variety of participants may offer important insight and expertise, shared experiences through lessons learned, and pooling of available resources to implement projects. Specific program examples include, but are not limited to: Walk the WBIDs; Grasses in Classes; homeowner oyster gardening program; rain garden/rain barrel workshops; storm drain labeling; marina BMPs; landowner cost-share assistance programs for living shorelines; elected official information and training sessions; spring break restoration projects; and messaging through outlets such as public service announcements, social media, events, and festivals.

4.1.6 Options for Further Study and Analysis

Additional work is needed to further advance the scientific understanding of resource conditions and restoration needs and opportunities. Additional analytical work can also support improved project planning and application of innovative methods for improved resource management.

- Develop improved and more detailed assessments of environmental conditions and trends, to include water quality, biology, and habitat.
- Develop a watershed-wide NPS pollution potential assessment at the 12-digit HUC level, to include analysis of land uses, applied loading rates, and potential BMP application.
- Evaluate altered shorelines across the estuarine system; identify opportunities for habitat restoration.
- Conduct an analysis of stream buffer conditions and restoration options.
- Conduct a long-term assessment of streamflow trends to better inform and identify options for water quality and aquatic habitat protection and restoration.
- Identify estuarine sites with the potential for seagrass or other benthic habitat restoration through improved water quality treatment and water management within specific contributing basins.
- Complete a current, basin-wide analysis and prioritization of sedimentation sources and sites, to include unpaved road stream crossings, borrow pits, gulley erosion sites, and other erosion and sedimentation sources.
- Develop a spatial analysis of OSTDS, to include pollutant loading estimates and estimates of potential pollutant load reduction and average receiving waterbody pollutant concentrations following connection to central sewer and/or conversion to advanced onsite systems. Delineate target areas for central sewer connections and for advanced onsite systems.
- Develop a hydrodynamic model to improve the understanding of estuarine circulation, with application for estuarine and littoral restoration planning.
- Evaluate planning models (e.g., Goldstein et al. n.d.) to inform comprehensive and coordinated project and implementation planning.
- Develop updated, regionally specific storm surge, floodplain, and sea level rise models to support project planning, floodplain protection, and adaptation planning, and to further the understanding of drivers of coastal habitat change.
- Evaluate the feasibility and potential benefits of proposed innovative and large-scale projects. Also identify and evaluate the potential for unintended adverse effects. Examples of such projects may include, but are not limited to:
 - Pumped and tidal flow-through circulation systems
 - Regional-scale shoreline habitat development proposals
 - Stream channel reconfiguration
 - Dredged material removal and disposal
 - Benthic dredging
- Develop improved metrics for monitoring and evaluating projects, programs, and environmental conditions and trends.
- Develop proposed scope of work, for multi-agency and peer evaluation, to address PCB contamination within Escambia Bay.

- Evaluate integrated water resource management approaches with application to specific water resource challenges in northwest Florida, potentially further developing plans for the reuse of reclaimed water and stormwater harvesting.
- Evaluate the extent and effects of seasonal hypoxia and the long-term effects of salinity change on submersed aquatic vegetation in the upper portions of the estuary.
- Develop analysis of oyster/shellfish habitat, conditions, and trends.
- Establish a framework for detecting the effects of climate change and ocean acidification on coastal marine resources in the region.
- Conduct monitoring and evaluate potential effects of herbicides, pharmaceuticals, endocrine disruptors, and other contaminants that have received relatively little historical attention in the Pensacola Bay system.
- Review past projects completed, identifying specific outcomes and lessons learned.
- Identify locally sensitive indicators of biological condition (biocriteria) for dominant diversity-building habitats (tidal wetlands, oyster reefs, and seagrass).
- Conduct future analysis within areas of the bay system with more limited environmental databases, such as East and Blackwater bays and Bayou Grande.
- Develop updated baseline study of current environmental conditions by conducting a one-time, multi-seasonal, multi-metric, and system-wide environmental analysis.
- Develop online consolidation of past and present environmental information, including natural resource coverages, research activities, restoration progress, monitoring results, TMDL updates, and regulatory actions.

4.2 Implementation

Table 4-2 outlines the planning progression of priorities, objectives, and selected management options and approaches for the Pensacola Bay system. These, in turn, inform and guide specific SWIM projects listed in Section 4.3. Following the discussion of watershed issues provided above, priorities and objectives are organized by major priority areas: water quality, floodplain functions, and natural systems. Education and outreach is included as well, since it is applicable to all priority areas.

Table 4-2 Watershed Priorities, Objectives, and Management Options

Watershed Priorities		Objectives	Management Options
Water Quality			
Degraded Water Quality			
Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria	Restore water quality in impaired riverine, stream, and estuarine waters.		• Stormwater retrofit projects • Comprehensive and integrated stormwater management plans • Conversion of septic systems to central sewer • Evaluation and deployment of advanced passive onsite systems • Upgrades to wastewater infrastructure • Agricultural and silvicultural BMPs • Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands • Floodplain and wetland restoration • Riparian buffer zones • Water reclamation and reuse • Urban BMPs, including limiting new effective impervious surface area and implementing other LID practices in developing and redeveloping areas • Evaluate, prioritize, and address unpaved roads and associated erosion at stream crossings. • Evaluate and address other erosion sites, such as borrow pits and gullies • Continued monitoring and analytical efforts to further establish conditions and trends
Long-term degradation of water quality in urban bayous and Escambia Bay	Protect and, as needed, restore water quality in impacted or designated priority areas: - Urban bayous - Escambia Bay - OFWs		
Vulnerability of seagrasses, bayous, and other estuarine habitats	Develop updated analyses of conditions and trends in East Bay and Blackwater Bay.		
Historic losses of seagrass and oyster beds			
Wastewater Management			
Needs and opportunities for improved wastewater collection and treatment	Restore water quality in impaired riverine, stream, and estuarine waters.		
Point source discharges	Reduce loading of nutrients and other pollutants from OSTDS.		
Inadequate treatment from conventional OSTDS			
Aging infrastructure (leaky pipes, inflow and infiltration, etc.)			
Nonpoint Source Pollution			
Stormwater runoff	Improve treatment of urban stormwater, including from: - Urban bayou basins - Carpenter Creek and Jones Creek basins - Pensacola metropolitan area - Municipalities and fringe areas		
Sedimentation and turbidity from unpaved roads and other erosion sources	Reduce basinwide NPS pollution from agricultural areas and erosion sites.		
	Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion, and construction sites.		

Watershed Priorities	Objectives	Management Options
Natural Systems		
Wetland Systems		
Wetland loss and degradation	Protect and as necessary restore major wetlands and floodplains, including: - Major river floodplains - Littoral marsh habitat - Jones Swamp and Jones Creek basin - Garcon and Fairpoint peninsulas - Carpenter Creek Protect and restore riparian and littoral habitats along rivers, streams, and estuaries. Where needed, restore wetland and stream hydrology.	• Restoration of wetland hydrology and vegetation • Restoration of riparian habitats • Shoreline habitat restoration, integrated across multiple habitats where possible • Restoration of impacted seagrasses and tidal marsh areas • Oyster reef restoration • Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands • Development of modeling tools (such as suitability models for estuarine habitat restoration and enhancement)
Estuarine and Coastal Habitat		
Vulnerability of estuarine habitats Legacy pollutants within estuarine substrate Shoreline destabilization and erosion Need for improved understanding of current and potential effects of sea level rise Saltwater intrusion that could alter brackish and freshwater habitats	Protect and restore riparian and littoral habitats along streams and estuarine shorelines. Restore and enhance estuarine benthic habitats. Restore seagrass beds, including through water quality improvement. Ensure restoration projects are compatible with coastal change.	• Coastal infrastructure retrofits to enhance adaptation capacity and habitat resiliency • Development and dissemination of detailed elevation (LiDAR) data • Coastal adaptation and land use planning • Water quality improvement actions described above • Agricultural, forestry, and construction best management practices • Enhanced monitoring of hydrologic and water quality data
Riverine and Stream Habitats		
Physically altered and impacted tributary streams	Evaluate and correct hydrological alterations as necessary. Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion. Protect and restore riparian habitats. Restore tributary stream channels and floodplain connection, including bayou drainages, tidal creeks, and tributaries in agricultural areas	• Prioritization and abatement of sedimentation from unpaved road stream crossings and other sources

Watershed Priorities	Objectives	Management Options
Floodplain Functions		
Impacts to Floodplains Headwater degradation and channelization Diminished or disconnected floodplain area Riparian buffer loss	Protect and reestablish functional floodplain area. Evaluate and correct hydrological alterations where necessary. Continue to make publicly available data and information to enable communities to reduce flood risk.	• Natural channel stream restoration • Fee simple and less-than-fee protection of floodplains, riparian habitats, and other sensitive lands • Protection and enhancement of riparian buffer zones • Development and dissemination of detailed elevation (LiDAR) data • Stormwater retrofit • Continued flood map updates and detailed flood risk studies • Hydrologic restoration
Education and Outreach		
Public Education and Outreach Expanded public understanding of practices to protect water resources Expanded opportunities for public participation Enhanced BMP technical support opportunities	Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation. Expand education and outreach about watershed resources and personal practices to protect water and habitat quality. Build the capacity of landowners, agricultural producers, and others to protect watershed resources, functions, and benefits. Support agricultural, silvicultural, and urban BMPs. Continue to make publicly available data and information to enable communities to reduce flood risk.	• Disseminate information about watershed resources and benefits via multiple approaches – Internet, publications, school programs, and workshops • Disseminate information about resource programs, outcomes, and opportunities for participation • Demonstration projects • Opportunities for volunteer participation in data collection and project implementation • Technical BMP education and training • Collaborative community initiatives, with opportunities for business participation and sponsorship • Internet applications for public participation and to make program information and resource data continually available • Classroom programs, including hands-on restoration activities • Community awareness and education events and programs • Hands-on, citizen science, including volunteer participation monitoring and restoration programs • Education and technical training workshops and resources for local government officials

4.3 Priority Projects

Projects proposed to address above-described priorities and objectives are listed below and described in more detail on the following pages. Priority projects, as described herein, comprise strategies intended to address identified issues that affect watershed resources, functions, and benefits. These are intended to support numerous site-specific tasks and activities, implemented by governmental and nongovernmental stakeholders for years to come. Most address multiple priorities, as indicated in Table 4-3. The projects included are generally limited to those within the scope and purview of the SWIM program. With each project, conceptual scopes of work are presented, as are planning level cost estimates. Specific details, tasks, and costs will be developed and additional actions may be defined to achieve intended outcomes as projects are implemented. No prioritization or ranking is implied by the order of listing. Project evaluation and ranking will occur in multiple iterations in the future and will vary based on funding availability, specific funding source eligibility criteria, and cooperative participation.

Table 4-3 Recommended Projects: Pensacola Bay System SWIM Plan

PROJECT	WATERSHED PRIORITIES			
	WQ	FLO	NS	EDU
Stormwater Planning and Retrofit	✓	✓	✓	
Septic Tank Abatement	✓			
Advanced Onsite Treatment Systems	✓			
Agriculture and Silviculture BMPs	✓	✓	✓	✓
Basinwide Sedimentation Abatement	✓	✓	✓	
Riparian Buffer Zones	✓	✓	✓	✓
Aquatic, Hydrologic and Wetland Restoration	✓	✓	✓	
Estuarine Habitat Restoration	✓		✓	✓
Strategic Land Conservation	✓	✓	✓	✓
Watershed Stewardship Initiative	✓	✓	✓	✓
Sub-basin Restoration Plans	✓	✓	✓	✓
Wastewater Treatment and Management Improvements	✓		✓	
Interstate Coordination	✓			
Analytical Program Support	✓	✓	✓	✓
Comprehensive Monitoring Program	✓	✓	✓	✓
WQ – Water Quality FLO – Floodplain Functions	NS – Natural Systems EDU – Education and Outreach			

Stormwater Planning and Retrofit

Description:

This strategy consists of planning and retrofitting stormwater management systems to improve water quality, as well as to improve flood protection and accomplish other associated benefits. In addition to constructing new facilities, the project includes evaluation and improvement of existing systems and adding additional BMPs within a treatment train to improve overall performance within a given basin.

Scope of Work:

1. Prioritize basins and sites based on water quality, hydrologic, and land use data, together with consideration of local priorities, opportunities for partnerships, and other factors.
2. Support stormwater master planning at the local and regional level.
3. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
4. Develop a public outreach and involvement plan to engage citizens in the project's purposes, designs, and intended outcomes. The plan should include immediate neighbors that would be affected by the proposed project and other interested citizens and organizations.
5. Develop detailed engineering designs, with consideration of regional and multipurpose facilities, innovative treatment systems where applicable, and treatment train approaches for basin-level stormwater management and treatment.
6. Install/construct individual retrofit facilities.
7. Monitor local water quality, including upstream/downstream and/or before and after implementation, as well as trends in receiving waters.
8. Analyze data to identify water quality trends in receiving waters.

Outcomes/Products:

1. Comprehensive stormwater management plans
2. Completed stormwater retrofit facilities
3. Improved water quality and flood protection
4. Data evaluation and system validation, with lessons applicable to future projects

Strategic Priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Water quality impairments for listed stream and estuarine waters
- ✓ Vulnerability of estuarine habitats

Objectives:

- ✓ Improve treatment of urban stormwater.
- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.

Lead Entities:

- ✓ Local governments
- ✓ Estuary Program

Geographic Focus Areas:

veloped areas of the watershed, including but not limited to:

- ✓ Basins of urbanized and developing bayous
- ✓ Escambia, Pensacola, Blackwater, and East bays
- ✓ Carpenter Creek
- ✓ Santa Rosa Sound

Planning Level Cost Estimate:

>\$50,000,000

Septic Tank Abatement

Description:

This strategy consists of converting OSTDS to central sewer to reduce pollutant export and improve surface and ground water quality. To facilitate accomplishment, among the project goals is to reduce or eliminate connection costs to homeowners.

Scope of Work:

1. Prioritize areas of need through spatial analysis of OSTDS distribution, proximity to other sensitive resources, proximity to existing infrastructure, and resource monitoring data.
2. In cooperation with local governments and utilities, complete alternatives analysis, considering sewer extension, advanced onsite systems, and other approaches as appropriate.
3. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
4. Initiate a public outreach and involvement plan to engage the public in the project's purposes, designs, and intended outcomes.
5. Work with directly affected residents throughout the project; coordinate with neighborhoods and individual homeowners.
6. Install sewer line extensions, connect residences and businesses, and abandon septic tanks.
7. Monitor bacteria, nutrients, and other parameters in nearby groundwater and surface waterbodies.
8. Analyze data to identify changes in trends of target pollutants.

Outcomes/Products:

1. Completed implementation plans, prioritizing areas for septic-to-sewer conversion
2. Improved surface and groundwater quality

Strategic priority:

- ✓ Water Quality
- ✓ Natural Systems

Supporting Priorities:

- ✓ Inadequate treatment from conventional OSTDS
- ✓ Aging infrastructure
- ✓ Needs and opportunities for improved wastewater collection and treatment
- ✓ Water quality impairments for listed stream and estuarine waters
- ✓ Vulnerability of estuarine habitats

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
- ✓ Reduce loading of nutrients and other pollutants from OSTDS.
- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.
- ✓ Reduce pollutant loading from aging infrastructure.

Lead Entities:

- ✓ Utilities, local governments

Geographic Focus Areas:

- ✓ Bayou Grande basin
- ✓ City of Pensacola fringe areas
- ✓ Santa Rosa Sound
- ✓ Fairpoint Peninsula
- ✓ Yellow River basin
- ✓ Residential lands widely distributed across the northern watershed

Planning Level Cost Estimate:

>\$20,000,000

Advanced Onsite OSTDS*Description:*

This strategy consists of installation of advanced OSTDS to reduce pollutant loading. This approach is most appropriate in areas remote from existing central sewer infrastructure or likely extensions. It may be considered an adjunct to the Septic Tank Abatement project.

Scope of Work:

1. Prioritize areas of need through spatial analysis of OSTDS distribution, proximity to sensitive resources, proximity to existing infrastructure, and resource monitoring data.
2. In cooperation with FDOH and FDEP, evaluate passive technology onsite systems.
3. In cooperation with local governments, conduct outreach to property owners to facilitate installation of advanced onsite systems as an alternative to conventional OSTDS.
4. Develop project-specific implementation targets and criteria, to include pollutant load reductions, success criteria, and measurable milestones.
5. Install/construct advanced OSTDS based on prioritization of sites and funding availability.
6. Monitor bacteria, nutrients, and other parameters in nearby groundwater and surface waterbodies.
7. Analyze data to identify changes in trends of target pollutants.

Outcomes/Products:

1. Improved surface and groundwater quality

Strategic priority:

- ✓ Water Quality
- ✓ Natural Systems

Supporting Priorities:

- ✓ Inadequate treatment from conventional OSTDS
- ✓ Needs and opportunities for improved wastewater collection and treatment
- ✓ Water quality impairments for listed stream and estuarine waters
- ✓ Vulnerability of estuarine habitats

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
- ✓ Reduce loading of nutrients and other pollutants from OSTDS.
- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.
- ✓ Reduce pollutant loading from aging infrastructure

Lead Entities:

- ✓ Utilities, local governments

Geographic Focus Areas:

- ✓ Escambia River Basin
- ✓ Blackwater River Basin
- ✓ Yellow River basin
- ✓ Residential lands widely distributed across the northern watershed

Planning Level Cost Estimate:

\$15,000,000 (initial implementation)

Agriculture and Silviculture BMPs

Description:

This strategy consists of development and implementation of agriculture and silviculture BMPs to reduce basinwide NPS pollution, protect habitat, and promote water use efficiency.

Scope of Work:

1. In consultation with FDACS, FWC, and NRCS, develop a comprehensive inventory of employed agriculture and silviculture BMPs and identify potential gaps and/or potential improvements for implementation in the watershed.
2. In cooperation with FDACS FFS, evaluate relationships between forest management practices and hydrologic and water quality effects.
3. Based on funding resources, develop plans for cost-share or other assistance for implementation.
4. Develop an outreach plan to engage agricultural producers and forestry practitioners; supporting technical training and participation in developing implementation strategies.
5. Conduct program outreach to support implementation of property-specific approved BMPs, potentially including annual cost-share grant cycles as defined by funding sources.
6. Work with FDACS to offer free technical assistance in the design and implementation of property- and resource-specific BMPs.
7. Monitor local water quality, including upstream/downstream and/or before and after project implementation, as well as trends in receiving waters. Additionally, conduct monitoring of participant experiences, encouraging feedback throughout and following implementation.
8. Analyze data to identify water quality trends.

Outcomes/Products:

1. Improved water quality
2. Improved capacity on the part of landowners to implement practices protective of water quality and watershed resources

Strategic Priorities:

- ✓ All identified program priorities

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
- ✓ Headwater degradation and channelization
- ✓ Riparian buffer loss

Objectives:

- ✓ Protect and, as needed, restore water quality in priority areas.
- ✓ Restore water quality in impaired waters.
- ✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.
- ✓ Protect and restore riparian habitats.

Lead Entities:

- | | |
|---------|----------------------|
| ✓ FDACS | ✓ Private landowners |
| ✓ NRCS | ✓ IFAS Extension |
| ✓ FWC | ✓ NWFWMMD |

Geographic Focus Areas:

For agriculture, the primary focus is within the northern watershed. For silviculture BMPs, the focus is basinwide.

Planning Level Cost Estimate:

\$1,000,000 annually

Basinwide Sediment Abatement

Description:

This strategy consists of development and implementation of activities related to sedimentation abatement to improve surface water quality and aquatic habitat quality. It may include any or all activities aimed at preventing and mitigating sedimentation and restoring impacted sites.

Scope of Work:

1. Review inventories of sedimentation sites, including the Yellow River Threats Assessment and subsequent evaluations, and identify gaps.
2. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other resource data, severity of impacts, and cumulative sub-basin effects.
3. Consider annual grant program for local governments to address high priority sites.
4. Develop individual site plans; detail proposed improvements and cost estimates.
5. Execute on-the-ground construction projects.
6. Implement complementary initiatives that may include education and outreach, development of new/improved BMPs, inspection programs, cost-share programs, training, demonstration projects, and maintenance.
7. Incorporate individual site improvements within geodatabase.
8. Monitor local water quality and habitat quality, including upstream/downstream and/or before and after implementation.
9. Analyze data to identify water quality trends.

Outcomes/Products:

1. Improved water quality, both onsite and in receiving riverine and estuarine waters
2. Improved aquatic habitat quality, including for sensitive species such as Gulf Sturgeon and freshwater mussels

Strategic Priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas
- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.
- ✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites basin-wide.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.

Lead Entities:

- ✓ Local governments
- ✓ State and federal agencies
- ✓ Estuary Program

Geographic Focus Areas:

- ✓ Watershed-wide, particularly within rural areas
- ✓ Major erosion sites, including:
 - Julian Mill Creek
 - Clear Creek
 - Ferry Pass Bayou

Planning Level Cost Estimate:

\$3,000,000 annual cost

Riparian Buffer Zones

Description:

This strategy consists of protection and restoration of riparian buffers to protect or improve water quality, habitat, and shoreline stability.

Scope of Work:

1. Coordinate planning and implementation with other projects to achieve overarching objectives.
2. Conduct screening evaluation of riparian areas; classify sites based on character and function and geomorphologic stresses.
3. Prioritize sites based on potential for protection or restoration of riparian habitat and function. Also consider such factors as geomorphologic stresses, land use objectives, habitat fragmentation risk, and documented occurrence of listed species.
4. Conduct outreach to local governments and private landowners to identify sites for implementation. Develop site specific implementation options, including streamside enhancements, overlay zones and vegetation restoration.
5. Develop individual site plans, which detail proposed improvements and cost estimates.
6. Coordinate and support implementation by property owners and local governments.
7. Implement complementary initiatives that may include education and outreach, inspection programs, training, demonstration projects, and maintenance.
8. Conduct outreach by providing signage, tours, public access amenities, or similar for specific sites.
9. Monitor local water quality and habitat quality, including upstream/downstream and/or before and after project implementation.
10. Analyze data to identify water quality trends.

Strategic Priorities

- ✓ All identified program priorities

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Sedimentation and turbidity of unpaved roads and other erosion sources
- ✓ Headwater degradation and channelization
- ✓ Riparian buffer loss
- ✓ Vulnerability of estuarine habitats
- ✓ Shoreline destabilization and erosion

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas
- ✓ Protect and if necessary restore major wetlands and floodplains.
- ✓ Protect and restore riparian and littoral habitats along streams and estuarine shorelines.
- ✓ Support agricultural, silvicultural, and urban BMPs.
- ✓ Ensure restoration projects are compatible with coastal change.
- ✓ Restore and enhance estuarine benthic habitats.

Lead Entities:

- ✓ Private landowners
- ✓ Local governments
- ✓ USFWS (Partners for Fish and Wildlife)
- ✓ FWC
- ✓ Southeast Aquatic Resources Partnership
- ✓ Estuary Program
- ✓ Bay Area Resource Council

Geographic Focus Areas:

- ✓ Moore Creek basin
- ✓ Bayou Grande
- ✓ Santa Rosa Sound
- ✓ Carpenter Creek
- ✓ Headwater streams
- ✓ Shoal River basin
- ✓ Holding/staging areas or spawning areas for Gulf sturgeon

Planning Level Cost Estimate:

TBD*

*Variable; includes passive implementation by property owners.

Outcomes/Products:

1. Improved protection of water quality, habitat, and shoreline stability
2. Establishment of demonstration sites to promote additional implementation of buffer zone concepts by private landowners, local governments, and state and federal agencies

Aquatic, Hydrologic and Wetland Restoration

Description:

This strategy consists of implementation of a broad array of hydrologic and wetland protection and restoration measures to improve and protect surface water quality and to restore aquatic and wetland habitats. Such measures include but are not limited to vegetation reestablishment, restoration and enhancement of hydrologic connectivity, stream channel restoration, and floodplain reconnection and restoration.

Target areas include sites where floodplain storage has been diminished or where wetland hydrology has been disrupted. Additional focus areas include sites containing impediments to hydrological function such as culverts, dikes, levees, barriers to tidal flow, and barriers to freshwater exchange.

Scope of Work:

1. Conduct a site inventory and evaluation, to include channelized streams, drained/filled wetlands, road fill, and other areas conveying water. Evaluate freshwater and tidal drainage patterns and any restrictions in tidal flow.
2. Identify restoration options, to include hydrologic reconnection (e.g., fill removal, low water crossings), tidal creek restoration, natural channel stream restoration, floodplain reestablishment, vegetation community reestablishment, tidal and riparian marsh restoration, and other options based on site characteristics and historic habitats.
3. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other site and resource data (e.g., listed species occurrence, potential functional lift), severity of impacts, cumulative effects, land ownership, and accessibility.
4. Conduct public outreach adaptable to specific project sites. Characterize individual projects with a list of stakeholders for each site. For project sites adjacent to communities or private property, as well as those with significant public visibility, consider demonstration sites, public meetings, site visits, project website, and other forms of engagement.

Strategic Priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
- ✓ Headwater degradation and channelization
- ✓ Diminished or disconnected floodplain area
- ✓ Wetland loss and degradation
- ✓ Physically altered and impacted tributary streams

Objectives:

- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.
- ✓ Protect and reestablish functional floodplain area.
- ✓ Prioritize and correct hydrological alterations, including channelized streams.
- ✓ Protect and if necessary restore major wetlands and floodplains.
- ✓ Ensure restoration projects are compatible with coastal change.

Lead Entities:

- | | |
|----------|-------------------|
| ✓ FWC | ✓ USFWS |
| ✓ NFWFMD | ✓ Estuary Program |
| ✓ FDEP | |

Geographic Focus Areas:

- ✓ Jones Swamp
- ✓ Bayou Chico basin
- ✓ Bayou Texar basin
- ✓ Carpenter Creek
- ✓ Tributary streams affected by road crossings and channelization
- ✓ Urbanized drainage basins
- ✓ Major erosion sites (e.g., Julian Mill Creek, Clear Creek, and Ferry Pass Bayou)
- ✓ Holding/staging areas or spawning areas for Gulf sturgeon

Planning Level Cost Estimate:

TBD*

*Costs variable depending on specific sites.

5. Develop detailed site restoration designs for priority sites, taking into account public input and preferences.
6. Execute on-the-ground restoration projects.
7. Monitor local water quality and physical and biological site characteristics, including before and after implementation.
8. Analyze data to identify water quality trends.
9. Communicate results to watershed stakeholders and participating agencies.

Outcomes/Products:

1. Restored wetland, aquatic, and floodplain habitats and functions
2. Improved protection of water quality and natural systems
3. Established demonstration sites to promote additional implementation by private landowners and local governments

Estuarine Habitat Restoration

Description:

This strategy consists of activities related to estuarine habitat restoration to improve surface water quality, aquatic habitats, and coastal resiliency. Implementation should be coordinated with other project options, to include stormwater retrofits and other NPS pollution abatement, and upstream wetland and hydrologic restoration.

Scope of Work:

1. Conduct a site inventory and evaluation, to include evaluation of such factors as need for stabilization, habitat stability, stressors impacting shorelines, projected sea level rise, shoreline profile, ecosystem benefits, property ownership, public acceptance, and feasibility.
2. Identify project options, which may include, but are not limited to:
 - a) Restoration/establishment of riparian and littoral vegetation communities
 - b) On previously altered shorelines, establishment of integrated living shorelines and estuarine habitats;
 - c) Restoration/reconnection of tidal marsh;
 - d) Integrated restoration of multiple shoreline/estuarine habitats;
 - e) Restoration of seagrass beds;
 - f) Restoration/creation of oyster reefs or other benthic habitats.
 - g) Develop and implement system-wide oyster management plans that address sustained provision of historic ecological services.
3. Prioritize sites based on inventory and site evaluation, as well as consideration of water quality, other site and resource data, modeling tools, habitat requirements for fish and wildlife, listed species occurrences, severity of impacts, cumulative effects, land ownership, and accessibility. Coordinate directly with riparian landowners.
4. Develop of demonstration projects on public lands.
5. Conduct public outreach adaptable to specific project sites. For project sites adjacent to communities or private property, as well as those with significant public visibility, consider

Strategic priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Inadequate treatment from conventional OSTDS
- ✓ Needs and opportunities for improved wastewater collection and treatment
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Historic losses of seagrass and oyster beds
- ✓ Vulnerability of seagrasses, bayous, and other estuarine habitats

Objectives:

- ✓ Protect and restore water quality in impacted or designated priority areas.
- ✓ Improve treatment of urban stormwater.
- ✓ Ensure restoration projects are compatible with coastal change.
- ✓ Restore and enhance estuarine benthic habitats.
- ✓ Protect and restore riparian and littoral habitats along streams and estuarine shorelines.
- ✓ Restore seagrass beds, including through water quality improvement.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.

Lead Entities:

- ✓ FWC
- ✓ FDEP
- ✓ USFWS
- ✓ Estuary Program

Geographic Focus Areas:

- ✓ Pensacola Bay system and tidal tributaries
- ✓ Bayou Chico
- ✓ East Bay
- ✓ Bayou Texar
- ✓ Escambia Bay

Planning Level Cost Estimate:

TBD*

*Cost estimates will await completion of site inventory and evaluation.

demonstration sites, public meetings, site visits, volunteer participation, project website, and other forms of engagement. Extend opportunities for participation to property owners, local governments, and other stakeholders.

6. Develop detailed site restoration designs for priority sites, taking into account public input and preferences.
7. Execute on-the-ground restoration projects as identified under Paragraph 2 above.
8. Monitor and evaluate habitat coverage, water quality, and habitat conditions before and after implementation
9. Compile and evaluate data to determine trends and to objectively measure project benefits and outcomes.
10. Communicate results to watershed stakeholders and participating agencies.

Outcomes/Products:

1. Restored wetland and estuarine habitats and functions
2. Improved protection of water quality and natural systems
3. Increased resiliency of estuarine habitats to anticipated sea level rise and extreme weather events
4. Establishment of demonstration sites to promote additional implementation by private landowners and local governments

Strategic Land Conservation

Description:

This strategy supports protection of floodplains, riparian areas, and other lands with water resource value to protect and improve surface water quality, with additional benefits for floodplain function and fish and wildlife habitat.

Scope of Work:

1. Use approved management plans and lists (such as the Florida Forever Work Plan) to complete an inventory of potential acquisition projects.
2. Evaluate whether potential sites augment other projects.
3. Evaluate resource benefits, including potential for restoration, listed species, other fish and wildlife resources, aquifer recharge, buffer zone functions, etc.
4. Identify potential funding sources that allow land acquisition as a component of achieving stated goals.
5. Where landowners have expressed interest, conduct a site analysis to include potential for achieving intended outcomes and potential for augmenting other projects.
6. Accomplish acquisition in accordance with statutory requirements.
7. Develop and implement restoration/enhancement plans if appropriate.
8. Implement long-term monitoring program for conservation easements.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions

Strategic priorities:

- ✓ Water Quality
- ✓ Floodplain Functions
- ✓ Natural Systems

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Water quality impairments for listed stream and estuarine waters, to include nutrients, dissolved oxygen, and bacteria
- ✓ Headwater degradation and channelization
- ✓ Diminished or disconnected floodplain
- ✓ Riparian buffer loss
- ✓ Wetland loss and degradation
- ✓ Vulnerability of estuarine habitats
- ✓ Shoreline destabilization and erosion

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
- ✓ Protect and if necessary restore major wetlands and floodplains.
- ✓ Protect and restore riparian and littoral habitats along streams and estuarine shorelines.

Lead Entities:

- ✓ FDEP
- ✓ Private landowners and working forests
- ✓ Local governments

Geographic Focus Areas:

- ✓ Jones Swamp/Perdido Pitcher Plant Prairie
- ✓ Coastal Headwaters Longleaf Forest
- ✓ Clear Creek – Whiting Field
- ✓ Upper Shoal River
- ✓ Garcon Ecosystem
- ✓ Wolfe Creek Forest
- ✓ Holding/staging areas or spawning areas for Gulf sturgeon
- ✓ Priority recharge areas for the sand-and-gravel aquifer

Planning Level Cost Estimate:

\$33,000,000 (Generally 50% of DEP-estimated land value for designated projects)

Watershed Stewardship Initiative

Description:

The purpose of the watershed stewardship initiative is to create experiences that result in action-oriented tasks leading to improvements in water quality, habitat quality, and public knowledge of and appreciation of watershed resources and functions. Outreach activities should be well structured, project-oriented, and include hands-on activities, as well as education about personal practices to protect watershed resources.

Scope of Work:

1. Develop a comprehensive inventory of current watershed stewardship and education efforts underway within the watershed, including funding sources for each.
2. Evaluate initiatives ongoing elsewhere within the state and the country.
3. Analyze the feasibility of combining efforts and resources, where practical and beneficial, with existing community-based initiatives.
4. Identify potential gaps and/or additional areas of focus.
5. Continue existing programs and implement new individual programs based on availability of funding.
6. Include hands-on activities, such as vegetation planting, invasive species removal, site tours, project demonstrations, and monitoring.
7. Implement technical training for landowners, including for implementation of agricultural and silvicultural BMPs, as well as urban BMPs and pollution prevention practices.
8. Monitor program accomplishments and outcomes, including through feedback from participant and citizen surveys.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions
2. Improved capability on the part of property owners to implement BMPs
3. Improved public understanding of watershed resources, functions, and public benefits
4. Improved public understanding of, and participation in, resource programs and projects

Strategic priorities:

- ✓ All identified program priorities

Supporting Priorities:

- ✓ Water quality impairments for listed stream and estuarine waters
- ✓ Vulnerability of estuarine habitats
- ✓ Needs for improved public understanding and participation; as well as for improved BMP technical support
- ✓ Expanded opportunities for public participation
- ✓ Enhanced BMP technical support opportunities

Objectives:

- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.
- ✓ Expand education and outreach about watershed resources and personal practices to protect water and habitat quality
- ✓ Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation.
- ✓ Build the capacity of landowners, agricultural producers, and others to protect watershed resources, functions, and benefits.
- ✓ Continue to make publicly available data and information to enable communities to reduce flood risk.

Lead Entities:

- | | |
|---------------------|----------|
| ✓ Estuary Program | ✓ FDACS |
| ✓ Local governments | ✓ NFWFMD |
| ✓ FDEP | ✓ FWC |
| ✓ BARC | ✓ IFAS |
| ✓ USFWS | |

Geographic Focus Areas:

- ✓ Watershed-wide

Planning Level Cost Estimate:

\$200,000 annually

Sub-basin Restoration Plans

Description:

This strategy consists of development of comprehensive restoration plans for discrete sub-basins or waterbodies. This work should incorporate aspects of other separate strategies described herein.

Scope of Work:

1. Evaluate and identify priority sub-basins in cooperation with local initiatives, state and federal agencies, and local governments.
2. Develop a scoping document outlining actions to be undertaken, customized for specific areas and needs.
3. Develop a public outreach and engagement plan to facilitate participation by affected neighborhoods and stakeholders.
4. With public and agency participation, identify specific goals for waterbody protection and restoration.
5. Incorporate separate strategies, including stormwater retrofit planning; OSTDS abatement; floodplain, wetland and hydrologic restoration; monitoring; and public outreach and engagement.
6. Identify separate actions and project types that can cumulatively achieve identified goals.
7. Implement public outreach and engagement by conducting field visits, public meetings, and providing innovative hands-on engagement opportunities. Coordinate with established watershed groups.
8. Implement selected actions.
9. Monitor program accomplishments and outcomes, including through feedback from participants and surveys of affected residents. Conduct monitoring pre- and post-implementation and of environmental trends within affected waterbodies.

Outcomes/Products:

1. Focused restoration plans, specific to priority waterbodies and basins
2. Improved water quality and aquatic and wetland habitat quality

Strategic priorities:

- ✓ All identified program priorities

Supporting Priorities:

- ✓ All supporting priorities

Objectives:

- ✓ All identified objectives

Lead Entities:

- ✓ Local governments
- ✓ Estuary Program
- ✓ Bay Area Resource Council
- ✓ FDEP
- ✓ FWC
- ✓ NFWFMD

Geographic Focus Areas:

Targeted sub-basins within the watershed, including, but not limited to:

- ✓ Bayou Chico/Jones Creek
- ✓ Bayou Texar/Carpenter Creek
- ✓ All urban bayou sub-basins
- ✓ Santa Rosa Sound
- ✓ Shoal River
- ✓ Blackwater River

Planning Level Cost Estimate:

TBD*

*Costs depend on specific projects included

Wastewater Treatment and Management Improvements

Description:

This strategy consists of development and implementation of upgrades to centralized wastewater treatment collection systems to reduce pollutant loading within the watershed. Additional opportunities exist for water reclamation and reuse.

Scope of Work:

1. In cooperation with utilities and local governments, evaluate existing wastewater systems to identify areas and components with upgrade opportunities, as well as sewer service extension needs.
2. Prioritize systems based on factors such as age, pollutant discharge, apparent leakage, capacity, and access.
3. Develop detailed cost estimates. Show cost estimates for areas with outdated sewer systems that need to be upgraded, areas with a high density of septic tanks that can connect to a central water system, and areas where upgrades are needed, but are determined to be lower in priority.
4. Implement/construct enhanced wastewater treatment and water reclamation and reuse systems.
5. In accordance with wastewater permits, monitor water quality in proximate surface and ground waters.
6. Evaluate data to identify trends of target pollutants.

Outcomes/Products:

1. Improved water and aquatic habitat quality
2. Reduced wastewater discharges into the environment, coupled with improved conservation of potable water resources

Strategic priorities:

- ✓ Water Quality

Supporting Priorities:

- ✓ Inadequate treatment from conventional OSTDS
- ✓ Point source discharges
- ✓ Needs and opportunities for improved wastewater collection and treatment

Objectives:

- ✓ Protect and, as needed, restore water quality in impacted or designated priority areas.
- ✓ Restore water quality in impaired riverine, stream, and estuarine waters.

Lead Entities:

- ✓ Local governments
- ✓ Utilities

Geographic Focus Areas:

- ✓ Watershed-wide
- ✓ Wastewater utilities with opportunities for water reclamation and reuse and integrated water resource management Systems proximate to coastal drainages
- ✓ Pensacola metropolitan area
- ✓ Milton area
- ✓ Pensacola Beach
- ✓ Santa Rosa Sound

Planning Level Cost Estimate:

>\$100,000,000

Interstate Coordination

Description:

This strategy consists of activities related to interstate coordination to improve and protect surface water quality in the basin

Scope of Work:

1. Develop a comprehensive plan for coordination between interstate agencies within the watershed. Evaluate case studies of successful interstate programs.
2. Develop a comprehensive list that contains contact information for the various jurisdictions within the watershed. Develop an email distribution list, SharePoint group, and/or website to foster easy file and information sharing. Agencies should include USDA, Alabama Department of Economic and Community Affairs Office of Water Resources, other federal and state agencies, local governments (counties and cities), and non-profit organizations.
3. Compare areas of study and possible gaps in information.
4. Coordinate with Covington, Escambia, and Conecuh counties in Alabama on development of sub-basin plans, agricultural/silvicultural BMPs, and sediment abatement issues.
5. Continually inform and engage all stakeholders during progress or discussions of watershed issues. Hold regular open joint meetings between stakeholders from both states.
6. Coordinate closely on all implementation projects for stormwater management, hydrologic alteration/restoration, sedimentation, agricultural BMPs, etc. Utilize a publicly shared file and discussion tool (such as a website) to house the status and outcome(s) of all implementation projects within the watershed (within both states).

Outcomes/Products:

1. Progress toward basin approach to watershed protection
2. Expanded public participation and knowledge of watershed resources and management needs

Strategic priorities:

- ✓ Water Quality
- ✓ Natural Systems
- ✓ Education and Outreach

Supporting Priorities:

- ✓ Stormwater runoff and NPS pollution
- ✓ Sedimentation and turbidity from unpaved roads and other erosion sources
- ✓ Needs for improved BMP technical support, opportunities for public participation, and public understanding of practices to protect water resources

Objectives:

- ✓ Reduce basinwide NPS pollution from agricultural areas and erosion sites basin-wide.
- ✓ Reduce sedimentation from unpaved roads, borrow pits, and landscape erosion.
- ✓ Create long-term partnerships among stakeholders, including government, academic institutions, non-governmental organizations, businesses, residents, and others, to maximize effectiveness of project implementation.

Lead Entities:

- ✓ NFWFMD
- ✓ FDEP
- ✓ Estuary Program

Geographic Focus Areas:

Watershed-wide with focus on northern extents of the watershed where Florida and Alabama interface

Planning Level Cost Estimate:

\$25,000 annually

Analytical Program Support

Description:

This strategy is intended to support dedicated scientific assessment and analysis to improve watershed management, protection, and restoration. The tasks involved are inherently progressive and will therefore change and be redefined as information is developed and in response to ongoing and future conditions and management actions.

Scope of Work:

Integral components of this strategy include but are not limited to the actions presented below.

1. For specific resource functions and at the sub-basin level, develop and refine metrics for evaluating conditions and guiding implementation.
2. In support of Urban Stormwater Retrofits, develop a stormwater pollutant loading analysis to include NPS pollutant loading estimates at the sub-basin level and pollutant load reduction estimates based on proposed or potential BMPs and facilities. Develop planning level estimates of potential water quality effects (pollutant concentrations) for receiving waterbodies.
3. Also in support of Urban Stormwater Retrofits, evaluate existing stormwater management systems to identify potential or needed improvements.
4. Evaluate innovative methods and designs to improve stormwater treatment, wastewater treatment and management, and ecological restoration.
5. In support of Septic Tank Abatement and implementation of Advanced Onsite Systems, develop a spatial analysis of OSTDS to include pollutant loading estimates and estimates of potential pollutant load reduction following connection to central sewer and/or conversion to advanced onsite systems. In cooperation with local governments and utilities, delineate proposed target areas for central sewer connections and for advanced onsite systems.
6. In support of Agricultural and Silvicultural BMPs, develop an agricultural NPS pollution abatement plan. For this purpose, develop nonpoint source pollutant loading estimates at the sub-basin level for watershed areas that are substantially agricultural in land use, and develop pollutant load reduction estimates and targets based on application of proposed or potential BMPs. Develop planning level estimates of water quality effects (pollutant concentrations) for receiving waterbodies.
7. Identify research needs that would quantify the water quality benefits of BMP implementation, provide outreach and training, and strategies for implementing BMPs.
8. Inventory, evaluate, and prioritize unpaved road stream crossings and other sedimentation sites in support of Basinwide Sedimentation Abatement.
9. Evaluate the site-specific feasibility and potential benefits and impacts of proposed innovative and/or large-scale projects, which may include but are not necessarily limited to:
 - a. Regional-scale shoreline habitat development proposals
 - b. Passive and/or pumped estuarine flushing systems

Strategic Priorities:

- ✓ All identified program priorities

Supporting Priorities:

- ✓ All identified program priorities

Objectives Addressed:

- ✓ All watershed objectives

Lead Entities:

- ✓ FWC
- ✓ FDEP
- ✓ US EPA
- ✓ USFWS
- ✓ NFWFMD
- ✓ Educational and research institutions
- ✓ Estuary Program

Geographic Focus Areas:

Watershed-wide, including across jurisdictional boundaries

Planning Level Cost Estimate:

TBD*

*Costs highly variable

- c. Proposals for major hydrologic alterations, such as causeway alterations, locks and dams, and barrier island pass alteration and maintenance
 - d. Stream channel reconfiguration
 - e. Benthic dredging
 - f. Dredged material removal and disposal
10. Identify estuarine sites with the potential for seagrass or other benthic habitat restoration through improved water quality treatment and water management within specific contributing basins.
11. Identify and describe the conditions, status, and trends of oyster and shellfish habitat within the bay.
12. Develop proposed scope of work, for multi-agency and peer evaluation, to address PCB contamination within Escambia Bay
13. Develop and refine hydrodynamic and water quality modeling tools. Develop specific management applications in cooperation with resource agencies and other public and nonprofit initiatives.
14. Evaluate effects of land use and management, to include forest management practices, on water quality. Identify and/or refine management options to protect and improve water quality.
15. Identify and describe long-term trends with respect to wetland and aquatic habitats, aquatic plants, and water chemistry. Identify management implications and recommendations.
16. Develop improved quantitative and qualitative metrics, to include biocriteria, for evaluating conditions and guiding program and project implementation.
17. Conduct a review of past projects completed, identifying specific project outcomes and lessons learned.
18. Develop an updated baseline study of current environmental conditions by conducting a one-time, multi-seasonal, multi-metric, and system-wide environmental analysis. Include evaluation of areas and metrics for which current information is lacking, inadequate or outdated.
19. Establish a research and monitoring framework for detecting the effects of climate change and ocean acidification on coastal marine resources in the region.

Outcomes/Products:

1. Improved understanding of watershed challenges and opportunities
2. Updated project priorities
3. Innovative project planning
4. Improvement in scientific basis for management strategies and actions
5. Improved understanding of quantitative potential of and expectations for environmental change in response to resource management
6. Improved metrics for evaluating conditions and guiding and tracking program implementation
7. Reduced risks of unintended adverse environmental or economic effects

Comprehensive Monitoring Program

Description:

This strategy provides for monitoring of program and project implementation, project outcomes, water quality, and habitat quality.

Scope of Work:

1. Identify appropriate parameters, to include environmental conditions and trends, and program parameters.
2. Establish a comprehensive and cumulative geodatabase of projects.
3. Further clarify and incorporate indicators at the watershed and subwatershed level.
4. Delineate sensitive/priority areas.
5. Develop public outreach application/website to communicate program implementation, outcomes, and trend data.
6. Develop updated inventory of organizations (and associated contacts) that currently or previously conducted field monitoring within the watershed, including funding sources for each. Evaluate the feasibility of combining efforts and resources, where practical and beneficial.
7. Identify potential gaps and/or additional areas of focus.
8. Develop core sampling designs for field monitoring. Determine optimal site distribution.
9. If appropriate, develop and implement a volunteer pool and volunteer training program.
10. Establish cooperative efforts with existing community initiatives and state and local agencies.
11. Support equipment acquisition where needed.
12. Where existing initiatives are not in place, consider developing a citizen water quality monitoring volunteer pool for target areas within the watershed.
13. Periodically conduct a comprehensive evaluation, at the watershed level, of program implementation, outcomes, and resource trends.

Outcomes/Products:

1. Improved long-term protection of water quality, habitat, and floodplain functions
2. Evaluations of project and program effectiveness, facilitating feedback and adaptive management
3. Improved public understanding of watershed resources, functions, and public benefits
4. Communication of program accomplishments to the public, elected officials, and stakeholders
5. Improved program accountability to the public and stakeholders
6. Improved public understanding of, and participation in, resource programs and projects

Strategic priorities:

- ✓ All identified program priorities

Supporting Priorities:

- ✓ All identified program priorities

Objectives:

- ✓ All watershed objectives

Lead Entities:

- ✓ State resource agencies
- ✓ NFWFMD
- ✓ Federal resource agencies
- ✓ Local governments
- ✓ Bream Fishermen Association and other Community-based watershed monitoring initiatives
- ✓ Estuary Program or other cooperative, public-private initiatives
- ✓ Institutions of higher education; other environmental and watershed organizations

Geographic Focus Areas:

- ✓ Watershed-wide

Planning Level Cost Estimate:

\$300,000 annually

4.4 Project Criteria and Guidelines

This section outlines recommended guidelines to be applied to project development and prioritization. These items are not intended to be pass-fail for projects, but rather identify provisions that should receive consideration in project development and evaluation. Criteria specific to any given prioritization or funding decision are often defined, at least in part, by the funding resources under consideration. Individual sources of funding often are guided by criteria and guidelines established by statute or program documentation.

Generally suggested criteria include the following:

1. Projects with responsible parties that will implement, operate, and maintain the completed facilities;
2. Projects that achieve multiple, complementary objectives;
3. Restoration that is substantially self-sustaining;
4. Responsible parties that support long-term monitoring to facilitate verification, lessons learned, and adaptive management;
5. Sites and systems that reflect and are adaptable to natural variability; and
6. Cost effectiveness, technical feasibility, and regulatory factors are criteria to be considered in prioritization and funding.

Natural variability, for example, would apply to habitat restoration projects to ensure adaptability to cyclic climatic conditions (e.g., seasonal, hydrologic), discrete events (e.g., coastal storms), and long-term changes in the environment (e.g., climate change and sea level rise).

4.5 Funding Sources

Funding sources change over time. An outline of current funding sources, including descriptions of eligibility and project types contemplated, is provided in Table 4-4. These include Deepwater Horizon related sources and state, federal, and local government programs. Private funding sources, including from nonprofit organizations and private grant programs, may also be available.

Table 4-4 Funding Sources and Eligibility

Funding Source	Eligibility	Project Types
RESTORE Act		
Equal State Allocation (also known as Direct Component or Bucket/Pot 1)	75% of funds allocated to the eight disproportionately affected Panhandle coastal counties: Bay, Escambia, Franklin, Gulf, Okaloosa, Santa Rosa, Wakulla, and Walton. Remainder of funds allocated to the 15 non-disproportionately affected Gulf Coast counties, including Jefferson County in northwest Florida.	- Restoration and protection of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches and coastal wetlands; - Mitigation of damage to fish, wildlife and natural resources; - Implementation of a federally-approved conservation management plan; - Workforce development and job creation; - Improvements to state parks located in coastal areas affected by the <i>Deepwater Horizon</i> oil spill; - Infrastructure projects benefitting the economy or ecological resources; including port infrastructure; - Coastal flood protection and related infrastructure; - Promotion of tourism and Gulf seafood consumption; or - Administrative costs and planning assistance.
Gulf Coast Ecosystem Restoration Council (also known as The RESTORE Council or Bucket/Pot 2)	Project selection based on Comprehensive Plan developed by the RESTORE Council with input from the public.	The Initial Comprehensive Plan adopts five goals: - Restore and Conserve Habitat; - Restore Water Quality; - Replenish and Protect Living Coastal and Marine Resources; - Enhance Community Resilience; or - Restore and Revitalize the Gulf Economy.
Oil Spill Restoration Impact Allocation (also known as The Gulf Consortium, or Bucket/Pot 3)	The Gulf Consortium, consisting of 23 Gulf Coast counties, is developing the State Expenditure Plan for Florida that must be submitted by the Governor to the RESTORE Council for its review and approval.	All projects, programs, and activities in the State Expenditure Plan that contribute to the overall ecological and economic recovery of the Gulf Coast (same project types as listed under the Equal State Allocation above).
NOAA RESTORE Act Science Program (also known as Bucket/Pot 4)	- Institutions of higher education - Non-profit organizations - Federal, state, local and tribal governments - Commercial organizations; - U.S. territories.	Research, observation, and monitoring to support the long-term sustainability of the ecosystem, fish stocks; fish habitat; and the recreational, commercial, and charter fishing industry in the Gulf of Mexico, including: - Marine and estuarine research; - Marine and estuarine ecosystem monitoring and ocean observation; - Data collection and stock assessments; - Pilot programs for fishery independent data and reduction of exploitation of spawning aggregations; - Cooperative research; or - Administrative costs.

Funding Source	Eligibility	Project Types
Centers of Excellence (also known as Bucket/Pot 5)	University of South Florida, Florida Institute of Oceanography is administering Florida's Centers of Excellence Program.	- Coastal and deltaic sustainability, restoration, and protection, including solutions and technology that allow citizens to live in a safe and sustainable manner in a coastal delta in the Gulf Coast Region; - Coastal fisheries and wildlife ecosystem research and monitoring in the Gulf Coast Region; - Offshore energy development, including research and technology to improve the sustainable and safe development of energy resources in the Gulf of Mexico; - Sustainable and resilient growth, economic and commercial development in the Gulf Coast Region; and - Comprehensive observation, monitoring, and mapping of the Gulf of Mexico.
Other Deepwater Horizon Funding		
Natural Resource Damage Assessment (NRDA)	Trustee Implementation Groups develop restoration projects guided by the programmatic restoration plan finalized in 2016. Public may submit project ideas & comment on plans.	The final plan takes a comprehensive and integrated ecosystem-level approach to restoring the Gulf of Mexico: - Restore and Conserve Habitat - Restore Water Quality - Replenish and Protect Living Coastal and Marine Resources - Provide and Enhance Recreational Opportunities
National Fish and Wildlife Foundation (NFWF)	NFWF manages the Gulf Environmental Benefit (GEBF) fund established in 2013. In consultation with FWC and FDEP, NFWF identifies priority restoration and conservation projects for GEBF funding.	Projects that: - Restore and maintain the ecological functions of landscape-scale coastal habitats, including barrier islands, beaches & coastal marshes; - Restore and maintain the ecological integrity of priority coastal bays and estuaries; and - Replenish and protect living resources including oysters, red snapper and other reef fish, Gulf Coast bird populations, sea turtles and marine mammals.
Federal Sources		
NOAA Coastal Resilience Grants	- Non-profit organizations - Institutions of higher education - Regional organizations - Private entities - States, territories and federally recognized Indian tribes - Local governments	- Strengthening Coastal Communities: activities that improve capacity of coastal jurisdictions (states, counties, municipalities, territories, and tribes) to prepare and plan for, absorb impacts of, recover from, and/or adapt to extreme weather events and climate-related hazards. - Habitat Restoration: activities that restore habitat to strengthen the resilience of coastal ecosystems and decrease the vulnerability of coastal communities to extreme weather events and climate-related hazards.
NOAA Office of Education Grants	Educational institutions and organizations for education projects and programs	- Environmental Literacy Program provides grants and in-kind support for programs that educate and inspire people to use Earth systems science to improve ecosystem stewardship and increase resilience to environmental hazards. - Bay Watershed Education and Training (B-WET) provides competitive funding to support meaningful watershed educational experiences for K-12 audiences - Cooperative Science Centers provide awards to educate and graduate students who pursue degree programs with applied research in NOAA mission-related scientific fields.

Funding Source	Eligibility	Project Types
US EPA Environmental Education Grants	- Local education agencies - State education or environmental agencies - Colleges or universities - Non-profit organizations - Noncommercial educational broadcasting entities - Tribal education agencies	Environmental education projects that promote environmental awareness and stewardship and help provide people with the skills to take responsible actions to protect the environment. This grant program provides financial support for projects that design, demonstrate, and/or disseminate environmental education practices, methods, or techniques.
US EPA – Exchange Network Grant Program	States, territories and federally recognized Indian tribes	Promotes improved access to, and exchange of, high-quality environmental data from public and private sector sources.
US EPA - Water Infrastructure Finance and Innovation Act (WIFIA) Program	- States, territories and federally recognized Indian tribes - Partnerships and joint ventures - Corporations and trusts - Clean Water and Drinking Water State Revolving Fund (SRF) programs	Accelerates investment in water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.
State Sources		
FDEP (WMDs) Spring Restoration Program	- Local governments - Public and non-profit utilities - Private landowners	State Spring Restoration funding efforts include land acquisition and restoration, septic to sewer conversion, and other projects that protect or restore the quality or quantity of water flowing from Florida's springs.
FDEP Special Management Area Grants	State agencies and water management districts	Research or coordination efforts in areas of special management. Examples of areas of special management would include, but not be limited to Areas of Critical State Concern, Critical Wildlife Areas, Aquatic Preserves, National Estuary Programs, and Surface Water Improvement and Management waterbodies
FDEP Coastal Partnership Initiative	Coastal counties and municipalities within their boundaries required to include a coastal element in the local comprehensive plan	Coastal resource stewardship and working waterfronts projects.
FDEP Beach Management Funding Assistance (BMFA) Program	- Local governments - Community development districts - Special taxing districts	Beach restoration and nourishment activities, project design and engineering studies, environmental studies and monitoring, inlet management planning, inlet sand transfer, dune restoration and protection activities, and other beach erosion prevention related activities consistent with the adopted Strategic Beach Management Plan.
FDEP Florida Communities Trust	Local governments and eligible non-profit organizations	Acquisition of land for parks, open space, greenways and projects supporting Florida's seafood harvesting and aquaculture industries.
Florida Forever	Funding is appropriated by the legislature distributed by the FDEP to state agencies	Acquisition of public lands in the form of parks, trails, forests, wildlife management areas, and more.
FDEP Coastal and Estuarine Land Conservation Program	States that have a coastal zone management program approved by NOAA or a National Estuarine Research Reserve (NERR)	Acquisition of property in coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from a natural or recreational state to other uses.
FDEP Clean Vessel Act Grants	Facilities that provide public access to pump-out equipment	Construction, renovation or installation of pump out equipment or pump out vessels.

Funding Source	Eligibility	Project Types
FDEP Clean Water State Revolving Fund Loan Program (CWSRF)	Project sponsors	Planning, designing, and constructing water pollution control facilities.
FDEP Clean Water State Revolving Fund Program Small Community Wastewater Construction Grants	Small communities and wastewater authorities	This grant program assists in planning, designing, and constructing wastewater management facilities. An eligible small community must be a municipality, county, or authority with a total population of 10,000 or less, and have a per capita income (PCI) less than the State of Florida average of \$26,503.
FDEP 319 grants	• State and local governments • Special districts, including water management districts • Nonprofit public universities and colleges • National Estuary Programs	Projects or programs that reduce NPS pollution. Projects or programs must be conducted within the state's NPS priority watersheds, including SWIM watersheds and National Estuary Program waters. All projects should include at least a 40% nonfederal match.
FDEP 319 Education Grants	Local governments in Florida	For projects that provide education and outreach about nonpoint source pollution in the adopted Basin Management Action Plan (BMAP) areas.
FDEP TMDL Water Quality Restoration Grants	Local governments and water management districts	Projects that: • Reduce NPS loadings from urban areas affecting verified impaired waters. • Are at least the 60% design phase. • Have permits issued or pending. • Include storm monitoring to verify load reduction. • Will be completed within three years of appropriation. • Include a minimum of 50% match with at least 25% provided by the local government. • Allocate grant funds to construction of BMPs, monitoring, or related public education.
FDACS Rural and Family Lands Protection Program	Agricultural landowners	State conservation easements that: • Protect valuable agricultural lands. • Ensure sustainable agricultural practices and reasonable protection of the environment. • Protect natural resources in conjunction with economically viable agricultural operations.
FDACS Forest Stewardship Program	Private forest landowners with at least 20 acres of forest land	Cost-share grants for implementation of stewardship to improve and maintain timber, wildlife, water, recreation, aesthetics, and forage resources.
FDACS Endangered and Threatened Plant Conservation Program	Private individuals and non-federal government entities	Actions that restore and maintain populations of listed plants on public land and on private lands managed for conservation purposes.

Funding Source	Eligibility	Project Types
Natural Resources Conservation Service	Private agricultural producers, landowners, and local governments	- Conservation Innovation Grants (CIG) stimulate development and adoption of innovative conservation approaches and technologies. - The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers that address natural resource concerns and improve water and air quality, conserve ground and surface water, reduce soil erosion and sedimentation, or improve or create wildlife habitat - Emergency Watershed Protection Program includes assistance to remove debris from streams, protect streambanks, establish cover on critically eroding lands, repair conservation practices, and purchase of floodplain easements.
Florida Fish and Wildlife Conservation Commission Wildlife Grants Program	State fish and wildlife agencies	Projects identified within State Wildlife Action Plan, including fish and wildlife surveys, species restoration, habitat management, and monitoring.
Florida Fish and Wildlife Conservation Commission Landowner Assistance Program	Private landowners	Cooperative and voluntary effort between landowners and the FWC to improve habitat conditions for fish and wildlife.
Florida Fish and Wildlife Conservation Commission, Partners for Fish and Wildlife	Private landowners	Cooperative and voluntary efforts between landowners, the FWC, and the USFWS to improve habitat conditions for fish and wildlife
Local Governments		
Local Government General Revenue	Defined by local statute. Generally local projects as approved by elected body, frequently leveraging state, federal, and other funding sources.	Defined by local statute and elected board.
Utility Funds – Stormwater and Wastewater	Utility projects benefiting rate payers. May leverage other local, state, and federal funding.	Stormwater and wastewater capital improvement and maintenance projects.

5.0 References

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Appendix A Implementation and Achievements of the Previous SWIM Plan

Previous SWIM Plan Issues and Priorities

The NFWFMD developed a SWIM Plan for the Pensacola Bay in 1988 and updated the plan in 1990 and 1997. The priority issues identified in the plan include the following (NFWFMD 1997):

- Water and Sediment Quality
- Habitat Quality
- Administration, Planning, and Coordination
- Public Education and Awareness

The 1997 SWIM plan identified 20 projects and proposed a spending plan to address these issues (see Table A-1.). The spending plan was provided for planning purposes only, and the actual spending varied, depending on available funding.

Table A-1 1997 SWIM Plan Projects

ID	Projects	FY 1998-2000
Nonpoint source Program		
WSQ 1.0	Tributary monitoring	\$172,000
WSQ 2.0	Land use/loading rate analysis	\$80,000
WSQ 3.0	Bayou Chico restoration	\$258,000
WSQ 4.0	Septic tank impact assessment	\$20,000
WSQ 5.0	Bayou Texar retrofit	\$75,400
WSQ 6.0	Gulf Breeze Bayous	\$100,000
WSQ 7.0	Palafox/Cole restoration	\$55,400
WSQ 8.0	Role of bay sediments	\$92,100
WSQ 9.0	Pollutant load reduction goals	\$100,000
Habitat Program		
HAB 1.0	Tidal marsh preservation	\$60,000
HAB 2.0	Bottomland hardwood preservation	\$82,200
HAB 3.0	Biological Monitoring	\$67,300
HAB 4.0	Circulation study	\$0
Coordinating Program		
APC 1.0	Administration and planning	\$56,400
APC 2.0	Institutional and regulatory assessment	\$7,000
APC 3.0	Interstate coordination	\$87,600
APC 4.0	GIMS integration and coordination	\$94,000
Public Education and Awareness Program		
ED 1.0	Strategy development	\$10,000
ED 2.0	Media and community relations	\$30,000
ED 3.0	WaterWays video	\$54,250

Source: NFWFMD 1997

Progress toward Meeting Plan Goals and Objectives

Specific SWIM projects and related cooperative projects previously implemented or ongoing in the watershed are listed in Table A-2. The District's Consolidated Annual Reports (<http://www.nwfwater.com/Data-Publications/Reports-Plans/Consolidated-Annual-Reports>) provide listings and descriptions of specific projects that have been completed under the auspices of the SWIM and Florida Forever programs.

Table A-2 Project Implementation

Project	General Description	Lead Entity	Corresponding SWIM Project ¹	Status ²
Sediment Quality in the Pensacola Bay System	Compilation and analysis of sediment monitoring data for the Pensacola Bay system, detailed in DeBusk <i>et al.</i> 2002	NFWFMD	Role of Bay Sediments	Complete 2002
Biological Monitoring in the Pensacola Bay System: 1990-2000	Compilation and analysis of biological data for the Pensacola Bay system, detailed in Von Appen and Winter 2000; provides an update to Collard 1991	NFWFMD	Biological Monitoring	Complete 2000
Clear Creek Restoration	Stabilization of 45 acres of eroding gully	Blackwater SWCD	Basinwide Sedimentation Abatement (2017 plan update)	Complete 2004
Carpenter Creek Basin Stormwater Retrofit Project	Installation of stormwater treatment vault and three stormwater treatment units to reduce sediment entering Carpenter Creek and Bayou Texar	City of Pensacola	Bayou Texar Retrofit	Complete 2005
Big Escambia Creek Restoration	Restoration of stream to original channel	Three Rivers RC&D	Hydrologic and Wetland Restoration (2017 plan update)	Complete 2004
Palafox Basin Alum Injection System	Retrofit of "L" Street Pond with installation of alum injection system	City of Pensacola	Palafox/Coyle Restoration	Complete 2001
Bayou Chico Restoration	Maggie's Ditch stormwater retrofit project	NFWFMD	Bayou Chico Restoration	Complete 1999
Main Street WWTP Relocation	Major state-local-federal WWTP relocation project to move the main plant in Pensacola outside of the floodplain/hurricane zone	ECUA	Wastewater Treatment and Management Improvements (2017 plan update)	Complete 2010
Project Greenshores Phase I	Restoration of 15-20 acres of saltmarsh along Pensacola Bay shoreline	FDEP	Estuarine Habitat Restoration (2017 plan update)	Complete 2003
17th Avenue Stormwater Pond	Construction of a stormwater treatment system, to reduce pollutant loading to Bayou Texar	City of Pensacola	Bayou Texar Retrofit	Complete 2003
Bayou Chico Restoration	Removal of sediment (187,000 cubic yards) from Bayou Chico	NFWFMD	Bayou Chico Restoration	Complete 2004
19th Avenue and Brainerd Street Stormwater Retrofit	Installation of stormwater treatment facilities for 160 acre drainage basin discharging into Pensacola Bay	City Of Pensacola	Bayou Texar Retrofit	Complete 2004

Project	General Description	Lead Entity	Corresponding SWIM Project ¹	Status ²
Bayou Texar Retrofit	Stormwater retrofit of I-110 Pond	City of Pensacola	Bayou Texar Retrofit	Complete 2001
Stormwater Drainage Improvement (Gulf Breeze)	Construction of an exfiltration system and other stormwater improvements at five sites to reduce runoff and nonpoint surface water discharge to Santa Rosa Sound	City of Gulf Breeze	Gulf Breeze Bayous	Complete 2006
Second and Sunset Wetland Water Quality Improvement	Stormwater retrofit urbanized 33 acre contributing basin to Davenport Bayou/Pensacola Bay. Project will create a wetland treatment system, including planting of vegetation and installation of dissipation structures	Escambia County	Stormwater Planning and Retrofit (2017 plan update)	Complete 2008
Holley-Navarre Water System Golf Course Re-Use Line Replacement	Replace an existing 13,000 LF of 10" reclaimed water line with a 12" line, serving the Hidden Creek Golf Course and surrounding residential neighborhood	Holley-Navarre Water System, Inc.	Wastewater Treatment and Management Improvements (2017 plan update)	Complete 2015
South Santa Rosa Utility System Reclaimed Water Elevated Storage Tank	Construction of elevated reclaimed water storage tank for an existing system	City of Gulf Breeze	Wastewater Treatment and Management Improvements (2017 plan update)	Complete 2014
ECUA Pensacola Beach Reclaimed Water System Expansion	Planning, design and construction of a ground storage tank; pump station; and associated piping, valves, and other system components to expand the Pensacola Beach reclaimed water system	ECUA	Wastewater Treatment and Management Improvements (2017 plan update)	In progress
City of Mary Esther Reclaimed Water Feasibility	Planning and evaluation for reclaimed water reuse program	City of Mary Esther	Wastewater Treatment and Management Improvements (2017 plan update)	In Progress

¹1997 plan projects unless otherwise indicated

²As of July 2017

In addition to the projects listed above, local governments and state and regional agencies have completed a number of initiatives and projects that directly correspond to and advance SWIM plan implementation. Several of the more prominent efforts are described below. Other related resource management activities are described in Appendix B.

Escambia County Dirt Road Project – With U.S. EPA 319(h) program funding, Escambia County evaluated alternative pavements for unpaved roads and implemented paving projects to reduce sediment erosion and runoff to streams. Work was completed in 2011 (Fabre Engineering and Surveying 2016).

Big Escambia Creek Restoration – About 40 years ago, a major storm rerouted the Big Escambia Creek from its original braided streams and floodplain through a series of sandpits. The new channel lacked a floodplain and stable riparian areas, thus, allowing increased velocity and sedimentation. The sedimentation impacts reached several miles downstream into the Escambia River. The USACE, in

partnership with the states of Alabama and Florida, the NFWFMD, Three Rivers Resource Conservation and Development Council, and the Alabama Rural Development Council, completed a large-scale project that restored the creek back to its natural channel within the wetland floodplain (FDEP 2009).

Project Greenshores – Two habitat restoration projects on the north shore of Pensacola Bay created salt marsh, seagrass, and oyster reef habitat along the shoreline. It is a partnership between the FDEP’s Northwest District Office Ecosystem Restoration Section, the City of Pensacola, the Ecosystem Restoration Support Organization, federal and local agencies, businesses, and community volunteers. The first habitat restoration site (Site I) provides eight acres of salt marsh habitat and seven acres of oyster reef. The second site (Site II), when completed, will provide an additional 14 acres of salt marsh and 13 acres of oyster reef habitat. Project Greenshores received the Coastal America Partnership Award for its extensive community involvement (FDEP 2016g).

City of Pensacola Transportation/Stormwater Plan Projects – Numerous stormwater retrofits, reconstruction, drainage improvements, and other projects have been completed, as follows (City of Pensacola 2016):

- Government Street Regional Stormwater Pond;
- Guillemard Street Storm Sewer Reconstruction
- Long Hollow/Cervantes Street Stormwater Pond
- Carpenter Creek Retrofit
- 17th Avenue Park and Drainage Improvement
- Sewell Street Stormwater Drainage Easement Acquisition
- Chipley Street Drainage Improvement
- L and Zarrogossa Street Drainage Improvement
- Government Street/Jones Park Drainage Improvement
- Zarrogossa and C Street Drainage Improvement
- 9th Avenue Baars Drainage Improvement
- Sanders Beach Storm Sewer Reconstruction
- Longhollow Pond Reconstruction
- 9th Avenue and Texar Drainage Improvement
- Burgess Road and Sanders Drainage Improvement
- Carpenter Creek/Bayou Texar stormwater management assessment
- East Hill Drainage Improvement

Bayou Chico Restoration Projects – Over the past 20 years, several water quality improvement projects have been undertaken by the FDEP’s Northwest District Ecosystem Restoration Section, Escambia County, NFWFMD, and Bayou Chico Association. Projects include the removal of the old Barrancas Street drawbridge, removal of the old CSX train trestle, construction of a sediment basin at W Street, construction of the Maggie’s Ditch stream restoration, and several emergent marsh restoration projects along the bayou’s shoreline.

Wayside Park Restoration Project – The City of Gulf Breeze, FDEP, and the USACE constructed an offshore rock breakwater and seagrass/emergent marsh at the south end of Three Mile Bridge (FDEP 2007).

Deadman’s Island Restoration Project – With funding assistance from the U.S. Army Corps of Engineers, the City of Gulf Breeze completed restoration of approximately 13 acres of littoral habitat, including an oyster reef breakwater and salt marsh (Reed 2017). The project included demonstration and evaluation of alternative restoration techniques and accomplished protection of habitats affected by historical bridge construction, dredging, and shoreline armoring.

Appendix B Related Resource Management Activities

Much of the progress to date is attributable to cooperative efforts made on the part of local governments; state, federal, and regional agencies; and private initiatives. Many programs and projects share common goals, and their implementation is most frequently accomplished through coordinated planning, funding, management, and execution. This section describes historical and ongoing activities and programs to address resource issues within the watershed.

Minimum Flows and Minimum Water Levels

Section 373.042, F.S., requires each water management district to develop minimum flows and minimum water levels (MFLs) for specific surface and groundwaters within their jurisdiction. A minimum flow or minimum water level for a given waterbody is the limit below which further withdrawals would be significantly harmful to the water resources or ecology of the area. Minimum flows and minimum water levels are calculated using best available data and consider natural seasonal fluctuations; non-consumptive uses; and environmental values associated with coastal, estuarine, riverine, spring, aquatic, and wetlands ecology as specified in Section 62-40.473, F.A.C.

The process of establishing MFLs involves a series of steps including identification of priority waterbodies, data collection, technical assessments, peer review, rule-making and rule adoption. Adopted MFLs are considered when reviewing consumptive use permit applications. A recovery or prevention strategy must be developed for any waterbody where consumptive uses are currently or anticipated to result in flows or water levels below adopted MFLs.

A technical assessment for an MFL for the Floridan aquifer, Coastal Region II, in Santa Rosa, Okaloosa, and Walton counties was initiated in 2014. The Shoal River system MFL technical assessment was initiated in 2017. The current status of planning and development of MFLs in northwest Florida may be found at <http://www.nwfwater.com/Water-Resources/Minimum-Flows-Levels>.

Special Resource Management Designations

Outstanding Florida Waters

The FDEP designates Outstanding Florida Waters (OWFs) under section 403.061(27), F.S., which are then approved by the Environmental Regulation Commission. An OFW is defined by FDEP as a waterbody "...worthy of special protection because of its natural attributes." A number of waterbodies and segments in the watershed have been recognized and receive additional regulatory protection through designation as OFWs, per Section 62-302.700, F.A.C. Designated OFWs include:

- Yellow River Marsh Aquatic Preserve
- Fort Pickens Aquatic Preserve
- Gulf Islands National Seashore
- Escambia Bay Bluffs
- Blackwater River State Park
- Yellow River Marsh Preserve State Park
- Clear Creek between Milton and Whiting Field

Aquatic Preserves

Florida currently has 41 aquatic preserves, encompassing approximately 2.2 million acres of submerged lands protected for their biological, aesthetic, and scientific value. As described in Chapter 18-20, F.A.C., aquatic preserves were established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological, and scientific values may endure for the enjoyment of future

generations. The Pensacola Bay system includes two aquatic preserves: the Yellow River Marsh Aquatic Preserve, and the Fort Pickens Aquatic Preserve.

The Yellow River Marsh Aquatic Preserve encompasses approximately 11,000 acres of the Yellow River, Blackwater Bay, and East Bay. The aquatic preserve is among the watershed's least impacted natural areas and includes more than 3,000 acres of salt and freshwater marshes and approximately 5,000 acres of forested wetlands. The remainder of the preserve is open water. Eglin AFB and the NFWFMD manage almost half of the uplands adjacent to the preserve, which further protects water quality (FDEP 2016f).

Fort Pickens Aquatic Preserve includes 34,000 acres of submerged lands adjacent to Gulf Islands National Seashore. The preserve includes sandy bottom and seagrass bed habitats that are for numerous species, including the loggerhead turtle (*Caretta caretta*), the southeastern snowy plover (*Charadrius nivosus*), the least tern, and the black skimmer (*Rynchops niger*). Fort Pickens Aquatic Preserve includes portions of Santa Rosa Sound, Pensacola Bay, and Big Lagoon, extending northward to the Gulf Intracoastal Waterway. The preserve also includes submerged lands in the Gulf of Mexico up to three miles south of the coastline (FDNR 1992).

Conservation Lands

Approximately 520,000 acres, or 35 percent, of the watershed in Florida consists of public and conservation lands. These are listed with short descriptions in Appendix G.

The NFWFMD owns and manages over 55,000 acres within the watershed. The Yellow River, Escambia River, Blackwater River, and Garcon Point WMAs are public lands that provide joint conservation and recreational use. The District also manages 19 acres in the watershed as conservation easements, maintaining private ownership while protecting water resources. The Yellow, Blackwater, and Escambia River WMA tracts are also managed by FWC as Wildlife Management Areas. These areas are managed to protect and restore wildlife habitat, while also providing a resource for compatible public recreation. Land-management activities include prescribed burning, timber management, groundcover restoration, reforestation, and other activities (FWC 2016d, NFWFMD 2016). The FWC also manages the Lake Stone Fish Management Area in Escambia County.

The National Park Service owns and manages the Gulf Islands National Seashore, established in 1971. The seashore supports an abundance of natural habitats, including coastal dunes, scrub, and estuarine marsh ecosystems. Portions of the military lands within the watershed are managed as conservation areas, including 10,738 acres owned and managed by the U.S. Navy and 229,743 acres owned and managed by the U.S. Air Force (FNAI 2010).

State lands in the watershed include the Blackwater River State Forest, Fort Pickens State Park, and Blackwater River State Park. The Blackwater River State Forest covers over 210,000 acres in northern Santa Rosa and Okaloosa counties, including significant portions of the Blackwater River and Yellow River watersheds. These park and forest lands protect water and other natural resources, while also providing important opportunities for public use and recreation. The state forest is also a resource for timber production, with harvesting following silvicultural BMPs.

Garcon Peninsula Mitigation Bank and Pensacola Bay Mitigation Bank are privately owned wetland mitigation banks within the Pensacola watershed. The Pensacola Bay Mitigation bank consists primarily of mixed hardwood and pine flatwoods and hosts a healthy population of carnivorous pitcher plants, while Garcon Peninsula Mitigation Bank consists primarily of pitcher plant prairie (Garcon Peninsula Mitigation Bank, LLC 2001; Westervelt Ecological Services 2016). The Garcon Peninsula Mitigation

Bank is northwest Florida's first wetlands mitigation bank and includes over 330 acres within the watershed (FNAI 2010, 2016a).

Jones Swamp Preserve was purchased by Escambia County in 1996 as part of Bayou Chico restoration efforts to provide buffering and protection of water quality in the Pensacola Bay area. The Jones Swamp Wetland Preserve consists of over 580 acres within the Jones Creek watershed, at the urban interface within the Bayou Chico drainage (Escambia County 2016a). More than 60 percent of the Jones Swamp Preserve is covered by forested wetlands, including hardwood swamp, bay swamp, cypress swamp, and mixed wetland forest communities. The Preserve is managed for wetland, groundwater, and surface water quality protection and restoration; hydrological restoration, including floodplain restoration; preservation and conservation of natural resources; environmental education; and outdoor recreation.

Critical Habitat and Strategic Habitat Conservation Areas

The Pensacola Bay system sustains numerous listed species, as designated under the Endangered Species Act (ESA). The ESA also provides special protection for Critical Habitat of certain species, which may include an area that is not currently occupied by the species, but that will be needed for its recovery.

As described above, the Pensacola Bay system includes federally designated critical habitat for the threatened Gulf sturgeon and several species of freshwater mussels. The watershed also supports the threatened piping plover, the endangered reticulated flatwoods salamander, and the blackmouth shiner, which is considered endangered by the state of Florida (FNAI 2001).

Certain natural areas within the watershed have been identified by the FWC as Strategic Habitat Conservation Areas (SHCAs). SHCAs are important habitats in Florida that do not have conservation protection, which would increase the security of rare and imperiled species if they were protected. Within the Pensacola Bay watershed, SHCAs have been identified for several species, including the Florida black bear (*Ursus americanus floridanus*), pine barrens tree frog (*Hyla andersonii*), seal salamander (*Desmognathus monticola*), and others (Endries *et al.* 2009)

Portions of the estuary adjacent to the Gulf of Mexico also provide habitat for three species of threatened and endangered sea turtles, and beach and dune communities also provide habitat for the endangered Santa Rosa Beach mouse (*Peromyscus polionotus leucocephalus*) (USFWS 2016a).

The FDACS publishes a list of the protected plants of Florida, including those species listed as federally threatened and endangered by the USFWS (Weaver and Anderson 2010). The table in Appendix D provides a list of species that are protected for the watershed, as well as their habitat requirements.

Gulf Ecological Management Sites

The watershed includes two Gulf Ecological Management sites (GEMS), the Yellow River Marsh Fort Pickens aquatic preserves. The GEMS Program is an initiative of the Gulf of Mexico Foundation, the EPA Gulf of Mexico Program, and the five Gulf of Mexico states (Gulf of Mexico Foundation 2015). Designated GEMS are considered high priority for protection, restoration, and conservation by state and federal authorities due to unique ecological qualities such as habitats significant to fish, wildlife, or other natural resources (Gulf of Mexico Foundation 2015).

Deepwater Horizon: RESTORE Act, Natural Resource Damage Assessment (NRDA), and NFWF Projects

The FDEP and the FWC are the lead state agencies in Florida for responding to the impacts of the Deepwater Horizon oil spill and the resulting restoration process. Restoration projects submitted through the FDEP are considered for funding under the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast Act (RESTORE Act) Comprehensive Plan Component, the NRDA, and the NFWF's GEBF.

RESTORE

The RESTORE Act of 2012 allocates to the Gulf Coast Restoration Trust Fund 80 percent of the CWA administrative and civil penalties resulting from the oil spill. The major means of allocation under the RESTORE Act are as follows:

Direct Component Funds ("Bucket 1"): Seven percent of these funds will be directly allocated to counties affected in Florida (5.25 percent to the eight disproportionately affected counties in the Panhandle from Escambia to Wakulla counties; and 1.75 percent to the non-disproportionately impacted Gulf Coastal counties). To receive funds under the Direct Component, each county is required to submit a Multiyear Implementation Plan, subject to review by the U.S. Department of the Treasury, detailing the county's plan to expend funds for a set of publically vetted projects and goals (FDEP 2016h).

Comprehensive Plan Component ("Bucket 2"): A portion of RESTORE funds will go toward projects with a wider geographic benefit (multiple states). These projects are selected by the Gulf Coast Ecosystem Restoration Council, which includes the five Gulf States and six federal agencies. Projects can be submitted by the Council members and federally recognized Native American tribes.

In August 2017, the U.S. Environmental Protection Agency announced that Escambia County's proposal on behalf of the Bay Area Resource Council for the Pensacola and Perdido Bays Estuary Program was selected for funding through the RESTORE Council. Near term component of program development will include establishing an independent estuary program office, hiring a program director and staff, developing a Management Conference to include a Policy Board and Technical, Community, Education, and Economic advisory committees; identifying stressors; conducting initial outreach; and develop and adopting a Comprehensive Conservation and Management Plan (CCMP).

Spill Impact Component ("Bucket 3"): Each of the five Gulf states will receive these funds to implement a State Expenditure Plan. In Florida, this plan is being developed through the Gulf Consortium, which was created by inter-local agreement among Florida's 23 Gulf Coast counties. Projects will be submitted by each of the 23 counties on Florida's Gulf Coast.

National Resource Damage Assessment (NRDA)

The Oil Pollution Act of 1990 authorizes certain state and federal agencies to evaluate the impacts of the Deepwater Horizon oil spill. This legal process, known as NRDA, determines the type and amount of restoration needed to compensate the public for damages caused by the oil spill. The FDEP, along with the FWC, are co-trustees on the Deepwater Horizon Trustee Council.

National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation (NFWF) established the GEBF to administer funds arising from plea agreements that resolve the criminal cases against BP and Transocean. The purpose of the

GEBF, as set forth in the plea agreements, is to remedy harm and eliminate or reduce the risk of future harm to Gulf Coast natural resources. The plea agreements require NFWF to consult with state and federal resource agencies in identifying projects. The FWC and the FDEP work directly with the NFWF to identify projects for the state of Florida, in consultation with the USFWS and the NOAA. From 2013 to 2018, the GEBF will receive a total of \$356 million for natural resource projects in Florida. However, the allocation of funds is not limited to five years. NFWF funded the development of the 2017 SWIM plan updates through the GEBF. Additional projects currently funded that will benefit watershed resources in the Pensacola Bay System are Government Street Stormwater, Bayou Chico Restoration, Eastern Pensacola Bay Oyster Habitat Restoration- Phase I, and Escribano Point Phases I & II.

The Nature Conservancy (TNC): Watershed Management Planning

To achieve comprehensive and long-term success for Gulf restoration, TNC facilitated a community-based watershed management planning process in 2014 and 2015 along Florida's Gulf Coast for the following six watersheds: Perdido Bay, Pensacola Bay, Choctawhatchee Bay, St. Andrew and St. Joseph bays, Apalachicola to St. Marks, and the Springs Coast. The process was designed to develop watershed-based plans that identify environmental issues affecting each watershed and solutions that address the issues. The process was also intended to create long-term partnerships among stakeholders in each watershed and across the regions to maximize effectiveness of project implementation and funding efforts and to provide a screening tool to evaluate priorities for potential funding (TNC 2014).

The TNC Plan developed for the Pensacola Bay system identifies 43 separate projects to address seven major actions (TNC 2014):

- Protect, restore, create and/or manage natural habitat and resources and increase buffer areas;
- Increase cooperation and coordination for management, monitoring, funding, implementation, outreach, and enforcement;
- Reduce impacts to groundwater and ensure adequate fresh water availability;
- Reduce and treat stormwater;
- Reduce nutrient loading;
- Reduce sedimentation; and
- Increase economic diversification.

To complete the planning process and ensure that all of the priority issues are identified and addressed, the plan recommended updating the 1997 Pensacola Bay System SWIM Plan (TNC 2014).

Monitoring Programs

The majority of the monitoring data in the Pensacola Bay system, including chemical and biological data, has been collected by the FDEP Northwest District staff and the Bream Fishermen Association (BFA) (FDEP 2007). Data-gathering activities include working with environmental monitoring staff in the NFWFMD and local and county governments to obtain applicable monitoring data from their routine monitoring programs and special water quality projects in the basin. All of the data collected by the FDEP and its partners is uploaded to the statewide water quality database for assessment.

Several water quality monitoring programs are ongoing in the watershed. These include the FDEP Trend and Status Networks; FDACS Shellfish Environmental Assessment Section (SEAS); the FDOH Florida Healthy Beaches monitoring program; and the BFA.

The following subsections provide an overview of these programs and some of their relevant findings.

FDEP/NFWFMD

Long-term trends in water quality are monitored by FDEP's Surface Water Temporal Variability (SWTV) and Groundwater Temporal Variability (GWTV) monitoring networks. These are statewide networks of fixed sites selected to reflect the water quality impacts across the state. The SWTV network includes data collection at 78 fixed sites, including seven sites in the Pensacola Bay system (FDEP 2016j, 2016k):

- Escambia River – two sites: one in Century, near the Alabama-Florida state line, and one downstream at a site that is representative of the watershed's land use activities.
- Blackwater River – two sites: one in the upstream, undeveloped portions of the river. And one on Big Coldwater Creek, a tributary of the Blackwater River.
- Yellow River – two sites: one near the Alabama-Florida state line, and one downstream, near East Bay, at a site that is representative of the watershed's land use activities.
- East Bay River – one site near East Bay that is representative of the watershed's land use activities.

Parameters monitored include color alkalinity, turbidity, suspended and dissolved solids, nutrients, total organic carbon, chlorides, sulfate, metals (calcium, potassium, sodium, magnesium), pH, conductivity, temperature, DO, total coliform bacteria, fecal coliform bacteria, enterococci bacteria, and Escherichia bacteria (FDEP 016i, 2016j).

The GWTV network includes data collection at 49 fixed stations statewide (24 unconfined aquifer wells, 23 confined aquifer wells, and two spring vents), including one unconfined aquifer well sampled monthly, located north of Bayou Grande and the Pensacola NAS.

Water quality data are maintained and made available through the Storage and Retrieval (STORET) database.

FDEP Northwest District

The FDEP's Northwest District has collected considerable biological data and conducted biological evaluations of numerous stream and other aquatic habitat sites throughout the watershed (FDEP 2007). The biological data collected by the FDEP Northwest District includes Stream Condition Index, Stream Habitat Assessment, Stream Linear Vegetation Index, Stream Rapid Periphyton Survey, Wetland Condition Index, and Bioassessment data, all are reported and accessible via STORET.

Florida Department of Agriculture and Consumer Services

To minimize the risk of shellfish-borne illness, FDACS continually monitors and evaluates shellfish harvesting areas and classifies them accordingly. It also ensures the proper handling of shellfish sold to the public. Under the SEAS program, FDACS collects and analyzes data from 1,200 bacteriological sampling stations in 39 shellfish harvesting areas encompassing 1.4 million acres in Florida, including five shellfish harvesting areas in the Pensacola Bay system. The FDACS monitors bottom and surface temperature, salinity, DO, surface pH, turbidity, fecal coliform bacteria, water depth, and wind direction and speed at monitoring stations in Pensacola Bay, Escambia Bay, East Bay, East Bay River, and Blackwater Bay. The dataset begins in 1985 and continues to the present. These stations are monitored at least monthly and often more frequently (FDACS 2016b).

The FDEP identified eight waterbody segments as verified impaired for bacteria in the Pensacola Bay watershed, based on shell fish classifications issued by the FDACS (see Section 3.2).

Florida Department of Health

The Florida Healthy Beaches Program was initiated by the FDOH as a pilot beach monitoring program in 1998 with expansion to include all the state's coastal counties in August 2000 (FDOH 2005). The Escambia County and Santa Rosa County health departments participate in the program with weekly monitoring of beaches for enterococcus and fecal coliform bacteria at 14 local beaches. County health departments issue health advisories or warnings when bacterial counts are excessive (FDEP 2007). Beaches with more than 21 closures in a year are identified as impaired by FDEP.

Bream Fishermen Association

The Bream Fishermen Association (BFA) is an organization of local fishermen and residents that assists the city, county, state, and region as an environmental steward in protecting northwest Florida and south Alabama waters by performing regular water quality monitoring. The BFA was established in the mid-1960s and was chartered as a non-profit organization in 1970. Today, the BFA collects samples at 48 quarterly stations in Escambia, Santa Rosa, and Okaloosa counties (BFA 2016).

Submerged Aquatic Vegetation Monitoring

In the late 1990s, FDEP Northwest District's Ecosystem Restoration Section conducted a study to monitor the health of seagrasses in Big Lagoon and Santa Rosa Sound. The study concluded with a management plan, which included recommendations for improving the health of SAVs in the study area (FDEP 2001). The USGS published a report on the status and trends of seagrasses along the Gulf Coast, including the Pensacola Bay system (USGS 2006). The FWC's FWRI currently evaluates changes in the extent, density, and quality of seagrasses in Pensacola Bay, Big Lagoon, and Santa Rosa Sound as part of the statewide SIMM program. The maps are generated through photointerpretation of high-resolution imagery. The general status of seagrasses for the bays is discussed in Section 3.3.1 (FWC 2015c).

Environmental Restoration and Protection Programs

Water quality in the Pensacola Bay watershed is protected through several programs working together to restore water quality and prevent degradation. These programs include FDEP's adopted TMDLs; BMPs for silviculture, agriculture, construction, and other activities related to land use and development; regulatory programs including NPDES, domestic and industrial wastewater permits, stormwater permits, and ERP; and local efforts to retrofit stormwater infrastructure to add or improve water quality treatment. Additionally, water quality is protected through a number of conservation, mitigation, and management programs that protect water resources, aquifer recharge areas, floodplains, and other natural systems within the watershed. These programs include Florida Forever Work Plan, regional mitigation for state transportation projects, and spring protection and restoration. The following section provides an overview of these programs and their contribution to water quality restoration and protection.

Total Maximum Daily Loads

As described above, TMDLs are developed for waterbodies that are verified as not meeting adopted water quality standards to support their designated use. They provide important water quality restoration goals to guide restoration activities. They identify the reductions in pollutant loading required to restore water quality. Total daily maximum loads are implemented through the development and adoption of BMAPs that identify the management actions necessary to reduce the pollutant loads. Basin Management Action Plans are developed by local stakeholders (public and private) in close coordination with FDEP. Although water segments with adopted TMDLs are removed from the state's impaired waters list, they remain a

high priority for restoration. Impaired waters and TMDLs are described in greater detail in Chapter 3 and Appendix F.

National Pollutant Discharge Elimination System Permitting

Point sources that discharge to surface waterbodies require a National Pollutant Discharge Elimination System (NPDES) permit. These permits can be classified into two types: domestic or industrial wastewater discharge permits, and stormwater permits. An NPDES permit includes limits on the composition and quantity of a discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not pose a threat to human health or water quality. All NPDES permits include “reopener clauses” that allow the FDEP to incorporate new discharge limits when a TMDL is established. These new limitations may be incorporated into a permit when a TMDL is implemented or at the next permit renewal, depending on the timing of the permit renewal and workload. For NPDES municipal stormwater permits, the FDEP will insert the following statement once a BMAP is completed (FDEP 2007):

The permittee shall undertake those activities specified in the (Name of Waterbody) BMAP in accordance with the approved schedule set forth in the BMAP.

The FDEP implements the NPDES stormwater program in Florida under delegation from the EPA. The program requires the regulation of stormwater runoff from MS4s generally serving populations of more than 10,000 and denser than 1,000 per square mile, construction activity disturbing more than one acre of land, and ten categories of industrial activity. An MS4 can include roads with drainage systems, gutters, and ditches, as well as underground drainage, operated by local jurisdictions, the FDOT, universities, local sewer districts, hospitals, military bases, and prisons. Escambia County, Pensacola, and Century are Phase 1 co-permittees with the FDOT District 3. Stormwater management for other local governments, military bases, and educational institutes within the Pensacola Bay system is covered under Phase 2 MS4 permits. Phase 2 permits are general permits and are not written for a specific local government. Phase 2 permit holders in the Pensacola Bay system include: Pensacola NAS, Eglin AFB, Hulbert Field (U.S. Air Force), University of West Florida, Okaloosa and Santa Rosa counties, and the cities of Niceville, Gulf Breeze, and Milton (FDEP 2007).

As part of the MS4 program, Escambia County’s Stormwater Program has delineated the county into 41 drainage basins. The basins have been numerically ranked based on the severity of water quality and drainage issues to establish an order of priority for remediation. A countywide Stormwater Master Plan has been completed (Hatch Mott MacDonald 2004). Countywide drainage plans have either been completed or are under way for 23 individual drainage basins. Each plan describes current stormwater structural controls and identifies and recommends water quality and drainage improvement projects. Funding for stormwater retrofits is provided by a local option sales tax, which was approved by Escambia County voters in 1992. The intent of the tax is to help pay for capital improvement projects that address flooding, improve access to residential and commercial properties (improve transportation), and improve stormwater quality. It became effective June 1, 1992, and was renewed by a voter referendum in 1999. It was reapproved by voters in 2008 and will be in effect until December 31, 2017. Revenue generated by the tax has provided money to pave dirt roads and improve drainage and transportation. As of February 2003, \$37.3 million had been spent for projects to primarily improve drainage, \$28.4 million to primarily improve transportation, and \$16.2 million to pave dirt roads (Hatch Mott MacDonald 2004).

Domestic and Industrial Wastewater Permits

In addition to NPDES-permitted facilities, all discharge to surface waters, Florida also regulates domestic and industrial wastewater discharges to groundwater via land application. Since groundwater and surface water are so intimately linked in much of the state, reductions in loadings from these facilities may be

needed to meet TMDL limitations for pollutants in surface waters. If such reductions are identified in the BMAP, they would be implemented through modifications of existing state permits.

Best Management Practices

Best management practices may include structural controls (such as retention areas or detention ponds) or non-structural controls (such as street sweeping or public education). Many BMPs have been developed for urban stormwater to reduce pollutant loadings and peak flows. These BMPs accommodate site-specific conditions, including soil type, slope, depth to groundwater, and the use designation of receiving waters (such as drinking water, recreation, or shellfish harvesting).

The passage of the 1999 Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida) increased the emphasis on implementing BMPs to reduce NPS pollutant discharges from agricultural operations. It authorized the FDEP and the FDACS to develop interim measures and agricultural BMPs. While BMPs are adopted by rule, they are voluntary if not covered by regulatory programs. If they are adopted by rule and the FDEP verifies their effectiveness, then implementation provides a presumption of compliance with water quality standards, similar to that granted a developer who obtains ERP (FDACS 2016c).

Over the last several years, the FDACS has worked with farmers, soil and water conservation entities, the University of Florida's Institute of Food and Agricultural Sciences, and other interests to improve product marketability and operational efficiency of agricultural BMPs, while at the same time promoting water quality and water conservation objectives. In addition, programs have been established and are being developed to create a network of state, local, federal, and private sources of funds for developing and implementing BMPs. BMPs have been adopted by rule for silviculture, row crops, container plants, cow calf, and dairies. The BMP manuals can be accessed on the FDACS website (FDACS 2016c).

Florida Environmental Resource Permitting Program

Florida established the Environmental Resource Permitting (ERP) program to prevent stormwater pollution of Florida's rivers, lakes, and streams, and to protect wetland functions and provide flood protection. The ERP program regulates the management and storage of surface waters and provides protection for the vital functions of wetlands and other surface waters. Environmental resource permits are designed to obtain 80 percent average annual load reduction of total suspended solids. In northwest Florida, the ERP program is jointly implemented by the NFWFMD and the FDEP.

Regional Mitigation for State Transportation Projects

Under Section 373.4137, F.S., the NFWFMD offers mitigation services, as an option, to the FDOT for transportation projects with unavoidable wetland impacts when the use of private **mitigation banks** is not feasible. As required by this statute, a regional mitigation plan has been developed and is updated annually to address FDOT mitigation needs submitted to the NFWFMD. Components of the Umbrella Plan include the federally permitted "In-Lieu Fee Program" instrument and other mitigation projects (NFWFMD 2016). The District does not compete with private mitigation banks. The District's mitigation plan is developed and implemented in consultation with the FDOT, the FDEP, the USACE, the EPA, the USFWS, the U.S. National Marine Fisheries Service, and the FWC and is maintained and available for review at <http://www.nwfwmdwetlands.com/>.

Since 1997, the NFWFMD has implemented mitigation at seven sites in the Pensacola Bay system: Bluff Springs, Brewer, Cotton Creek Road, Jones Swamp, Mystic Springs, Rogers, and Yellow River Ranch (NFWFMD 2016).

FDEP Ecosystem Restoration Section

The FDEP (through funding from the USFWS Coastal Program and other sources) has established living shoreline restoration sites within the Pensacola Bay system to aid in shoreline stabilization, biodiversity, and water quality (FDEP 2015e). Living shorelines are constructed of oyster shells, limestone rock, or other substrate conductive to the natural environment. These created shorelines provide a physical barrier for the mainland during storms, and aid in sediment stabilization through the use of planted native vegetation (FDEP 2015e).

Florida Forever

Florida Forever is Florida's conservation and recreation lands acquisition program. Under section 373.199, F.S., and the NFWMD Florida Forever 2016 Five Year Work Plan, a variety of projects may be implemented, including capital projects, land acquisition, and other environmental projects. Since its inception, the District's land acquisition program has sought to bring as much floodplain as possible of the major rivers and creeks under public ownership and protection. The District's Florida Forever Five Year Plan identifies land acquisition priorities along the Escambia River, Garcon Point Peninsula, the Blackwater River, and the Yellow River. Additional information is available at <http://www.nfwmd.com/Lands/Land-Acquisition/Forever-Florida-Land-Acquisition-Work-Plans>.

EPA Gulf Ecology Division

The EPA, Gulf Ecology Division Laboratory in Gulf Breeze, Florida, is a primary research facility of the EPA's Office of Research and Development National Health and Environmental Effects Research Laboratory. The lab assesses the ecological condition, ecological services and values of estuaries, coastal wetlands, seagrass, and coral ecosystems of the Gulf of Mexico and the southeastern U.S.; determines causes of ecological impairment; predicts future risk to populations, communities and ecosystems from multiple aquatic stressors; supports the development of criteria to protect coastal environments; and transfers scientific technology to federal and state agencies, industry, and the public (EPA 2016f).

Natural Resource Management on Department of Defense Lands

The U.S. military, represented by the Air Force at Eglin AFB and Hurlburt Field, and the Navy at NAS Pensacola and NAS Whiting Field, occupies about 241,000 acres in the Pensacola Bay system. Eglin AFB is the largest forested military reservation in the U.S. and provides habitat for numerous rare and endangered species, including the red-cockaded woodpecker and reticulated flatwoods salamanders. The AFB spans 20 miles of the Gulf of Mexico shoreline, and includes 55 acres of lakes and 186 miles of streams. The property also hosts 34 of the FNAI recognized natural communities (FWC 2016e; Secretary of Defense 2011). Consequently, management actions on Air Force property have the potential to substantially influence water and habitat quality at the scale of the drainage basin.

Large tracts of Eglin AFB are managed for habitat conservation and the protection of endangered species. Extensive tracts of mature longleaf pine (*Pinus palustris*) forest are still present, particularly in the Conecuh National Forest–Blackwater River State Forest–Eglin AFB corridor (FDEP 2007).

Since 2009, TNC and Eglin AFB, with support from NAS Pensacola and NAS Whiting Field and with funding from the Legacy Program, have worked with military bases in Florida to establish the Six Rivers Cooperative Invasive Species Management Areas (CISMAs). These CISMAs are designed to help to decrease re-infestation of invasive species at six Florida bases (U.S. Department of Defense [DOD] 2011). As a result of this initiative, a report called *Utilizing Cooperative Invasive Species Management Areas (CISMAs) to Effectively Reduce Re-infestation of Invaders on Six (6) Military Bases and Adjacent Lands in Florida* was developed. The report details the development of the CISMAs, their

accomplishments, project monitoring, and strategic plans. Locally, the Six Rivers Cisma was organized, and Eglin AFB and NAS Pensacola representatives serve as committee chairpersons."

About 404,000 acres of Eglin AFB are managed under the Integrated Natural Resources Management Plan, which is updated every five years and is signed by Eglin, the FWC, and the USFWS. Additionally, Eglin AFB's Jackson Guard maintains an interactive web-based Integrated Natural Resources Management Plan that functions as an adaptive management tool (Secretary of Defense 2011). In 2013, Eglin's Natural Resources Team exceeded the goal of rehabilitating wetland riparian and 20 threatened and endangered species sites as specified in the Integrated Natural Resources Management Plan Erosion Control Component Plan. Other ongoing initiatives at the AFB include fish and wildlife management, invasive species control and pest management, and forest management using prescribed fires and other BMPs (Secretary of Defense 2011). The Navy also has INRMP Management Programs for conservation of natural resources similar to the Eglin AFB initiatives that extend the Department of Defense influence westward to the extent of the Florida Panhandle.

Bay Area Resource Council

The Bay Area Resource Council (BARC) was created from the Escambia/Santa Rosa Coast Resource Planning and Management Committee in 1985 by then Governor Bob Graham. An interlocal agreement between Escambia and Santa Rosa counties and the cities of Pensacola and Gulf Breeze was established in May 1987 to establish an entity that could accept funding and promote the goals of the committee. The City of Milton has since joined the BARC. Advisory committees for citizens and scientists were established to begin the development of a management plan for the Pensacola Bay system. The Pensacola Bay Watershed Management Guide, completed in 1998, contained 50 action plans. The BARC Technical Advisory Committee completed an update of the plan in late 2004 (Pensacola Bay Watershed Partnership and BARC 2005). The BARC's goal is improving the area's quality of life and the waters of the Pensacola Bay basin through community participation and coordination with local governments, citizens, academia, and the private sector. The WFRPC serves as staff to the BARC (WFRPC 2016b).

University of Florida Institute of Food and Agricultural Sciences Extension (UF-IFAS)

The UF/IFAS is a federal-state-county partnership that focuses on research, teaching, and extension to *"develop knowledge in agriculture, human and natural resources, and the life sciences, and enhance and sustain the quality of human life by making that information accessible."*

Many UF/IFAS programs and partnerships help protect water resources across the Pensacola Bay watershed and the state of Florida. Such programs and partnerships include the Fisheries and Aquatic Sciences and Marine Sciences Program, the Aquatic and Invasive Plants Center, the Florida Cooperative Fish and Wildlife Research Unit, the Florida Partnership for Water, Agriculture and Community Sustainability, the Natural Resources Leadership Institute, the Wetland Biogeochemistry Laboratory, and the Shellfish Aquaculture Extension among others.

To promote environmentally sound forestry practices, the UF/IFAS offers the voluntary Forest Stewardship Program, which seeks to help private landowners develop a plan to increase the economic value of their forestland while maintaining its environmental integrity (UF-IFAS 2016b). The Extension also works with farmers and property owners across the state to minimize the need for commercial pesticides and fertilizers, through environmentally friendly BMPs.

Local Government Planning Initiatives

Escambia County Land Development Code and Comprehensive Plan for Wetlands and Environmentally Sensitive Lands – Escambia County’s land development regulations limit adverse impacts and discourage development that may adversely affect wetlands and other sensitive areas. The county implemented a wetland ordinance in 2001 that provides protection standards, presents local permitting and mitigation programs, and establishes an environmental lands trust fund (Escambia County 2014).

Santa Rosa County Land Development Code for Environmentally Sensitive Lands – The County’s land development regulations add protection of environmentally sensitive lands. Sensitive lands recognized include aquatic preserves, OFWs, functioning wetlands, fish and marine habitats, habitats of threatened or endangered plants and animals, and potable wells (Santa Rosa County 2016).

Escambia County Wellhead Protection Ordinance – Escambia County’s wellhead protection zone ordinance restricts or prohibits certain land use activities within buffers around protected wells or within the seven- or 20-year time of travel contours around protected wells (FDEP 2007).

Okaloosa County Wellhead Protection Ordinance – Okaloosa County’s wellhead protection ordinance prohibits certain land use activities within a 200-foot radius buffer of public supply water wells with a permitted capacity of 100,000 gallons or more per day (FDEP 2007).

Walton County Wellhead Protection – Walton County’s wellhead protection zone limits land uses in wellhead protection zones and/or aquifer recharge areas, to include protection of a 400-foot radius around public potable water wells (FDEP 2007).

Santa Rosa County Wellhead Protection – Santa Rosa County wellhead protection zones were established for public supply wells, consisting of a 200-foot radius Floridan aquifer wells and a 500-foot radius for sand-and-gravel aquifer wells (FDEP 2007).

East Milton Wellfield Protection Area Zoning Overlay District – Santa Rosa County established an overlay district encompassing almost 51 square miles in the inland sand-and-gravel aquifer wellfield area (Santa Rosa County 2013).

Other Programs and Initiatives

As described in the preceding section, local governments and organizations are active participants in the restoration projects being or expected to be funded through the RESTORE Act, the NRDA, and the NFWF. These organizations have been longstanding partners in monitoring water quality and environmental health throughout the watershed. They have also been key partners in developing stormwater master plans and retrofit projects to reduce and treat stormwater, as well as building community support for watershed protection through the creation of citizen advisory councils and volunteer organizations.

Numerous citizen or citizen-government groups with a primary interest in protecting or enhancing water resources are active in the Pensacola Bay system. Most organizations have a specific geographic focus at either the watershed or waterbody level. Among local and regional organizations and initiatives are the following:

Bayou Chico Association – The Bayou Chico Association is involved in educating the public, seeking grants, and initiating various projects to promote the restoration and preservation of Bayou Chico. The

Association has worked for many years in partnership with local governments and the District to advance efforts to protect and restore Bayou Chico.

Bayou Texar Foundation – The mission of the Bayou Texar Foundation is to protect and improve the bayou. Its members have worked with the City of Pensacola to implement a stormwater utility to fund stormwater retrofits. The Foundation has educated its members and other area residents about stormwater runoff and what each citizen can do to improve the water quality of this urban bayou (BTF 2016).

Environmental Education Coordination Team (EECT) – A partnership of representatives of more than 20 public and private organizations, as well as individual community members, the EECT was formed to consolidate the efforts of members' environmental education activities in the community. In 2002, the EECT became a subcommittee on the BARC Technical Advisory Committee (WFRPC 2016b).

Pensacola Environmental Advisory Board (EAB) – The Pensacola City Council created this group of appointed citizen volunteers in November 2001 to provide policy advice and recommendations on environmental matters to the City Council and city staff (Pensacola EAB 2016).

Escambia County Citizens Environmental Committee – The Escambia County Citizens Environmental Committee provides professional advice, based on citizen input, to Escambia County through its Board of County Commissioners on matters of environmental concern (land, air, and water). The County Administrator appoints one member and each commissioner appoints two members, with their terms running concurrently with that of the commissioner who appointed them. Monthly meetings are open to the public (FDEP 2007).

Escambia County Storm-Water Advisory Team – In response to the large flooding event in April 2014, the Storm-Water Advisory Team was created to identify conditions associated with the April 2014 flooding and to assist Escambia County staff. The rainfall caused damage to both public and private stormwater facilities across the county, but mostly in the southern area. A needs assessment and a county-wide stormwater recommendation report were drafted to rank priority drainage projects and provide recommendations for stormwater within Escambia County (Escambia County 2016b).

Emerald Coastkeeper – The Emerald Coastkeeper is a part of the Waterkeeper Alliance, working to protect and restore area waterbodies. The Emerald Coastkeeper has participated in efforts to restore Carpenter Creek and Bayou Texar, among other activities.

Partnership for Environmental Research and Community Environmental Health (PERCH) – This group, funded by federal appropriation grants, was formed to provide input to the University of West Florida regarding environmental health studies, and investigate questions pertaining to environmental pollution and how it may affect human health (University of West Florida PERCH 2016).

Gulf Coastal Plain Ecosystem Partnership – Formed in 1996, this is a cooperative environmental management partnership between the NFWFMD, Blackwater River State Forest, Conecuh National Forest, Nokuse Plantation, Eglin AFB, International Paper, FDEP, and TNC. The Partnership's initial focus was to restore and protect longleaf pine habitat. The partners currently manage more than 950,000 acres in northwest Florida and southern Alabama, including the Pensacola Bay system. The partnership provides a collaborative approach to preservation and management of natural lands through a set of land management principles directed at ecosystem preservation including prescribed burning, recovering listed species, restoring aquatic habitat, providing public outreach, and sharing and exchanging relevant information and technology on new land management and protection techniques. Through collaboration and the pooling of resources, the partners are able to leverage the purchase of additional conservation lands (The Longleaf Alliance 2016).

Ecosystem Restoration Support Organization, Inc. – Formed in 1998, this 501(c)(3) citizen support organization provides financial and volunteer support for the FDEP's Northwest District Ecosystem Restoration Section. Fundraising and grant-writing efforts have provided over \$1 million to Project GreenShores and the FDEP's seagrass tissue culture lab and greenhouses (FDEP 2016f).

Appendix C Geographic and Physical Characteristics

Overview

The greater Pensacola Bay watershed covers approximately 6,831 square miles of Florida and Alabama. About 34 percent of this area is within Florida (Figure C-1). There is distinct topographical variation, with the highest elevations and most significant slopes within the northern extent of the watershed (Figure C-2). The majority of the Florida portion of the watershed is primarily defined by western highlands with coastal plains in the southern extent of the watershed.

Generalized land cover (Figure C-3) reflects major urban development associated with the City of Pensacola in the southwestern portion of the watershed, with other areas of development associated with the cities of Milton, Crestview, and Gulf Breeze. Extensive coverage of upland forests exists throughout the watershed planning area.

The following three figures depict the interstate basin, topography, and generalized land use and land cover.

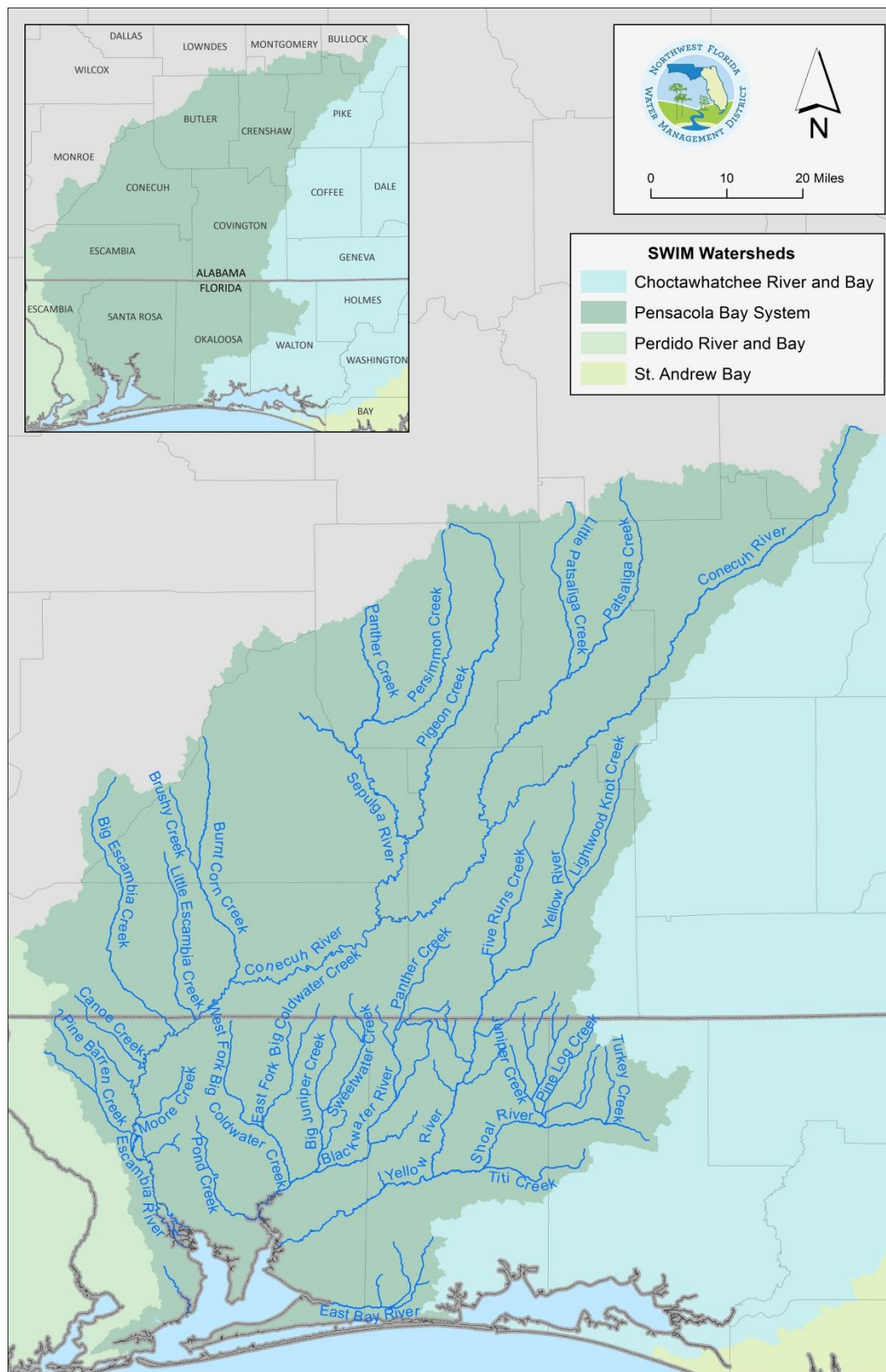


Figure C-1 Greater Pensacola Bay System Watershed

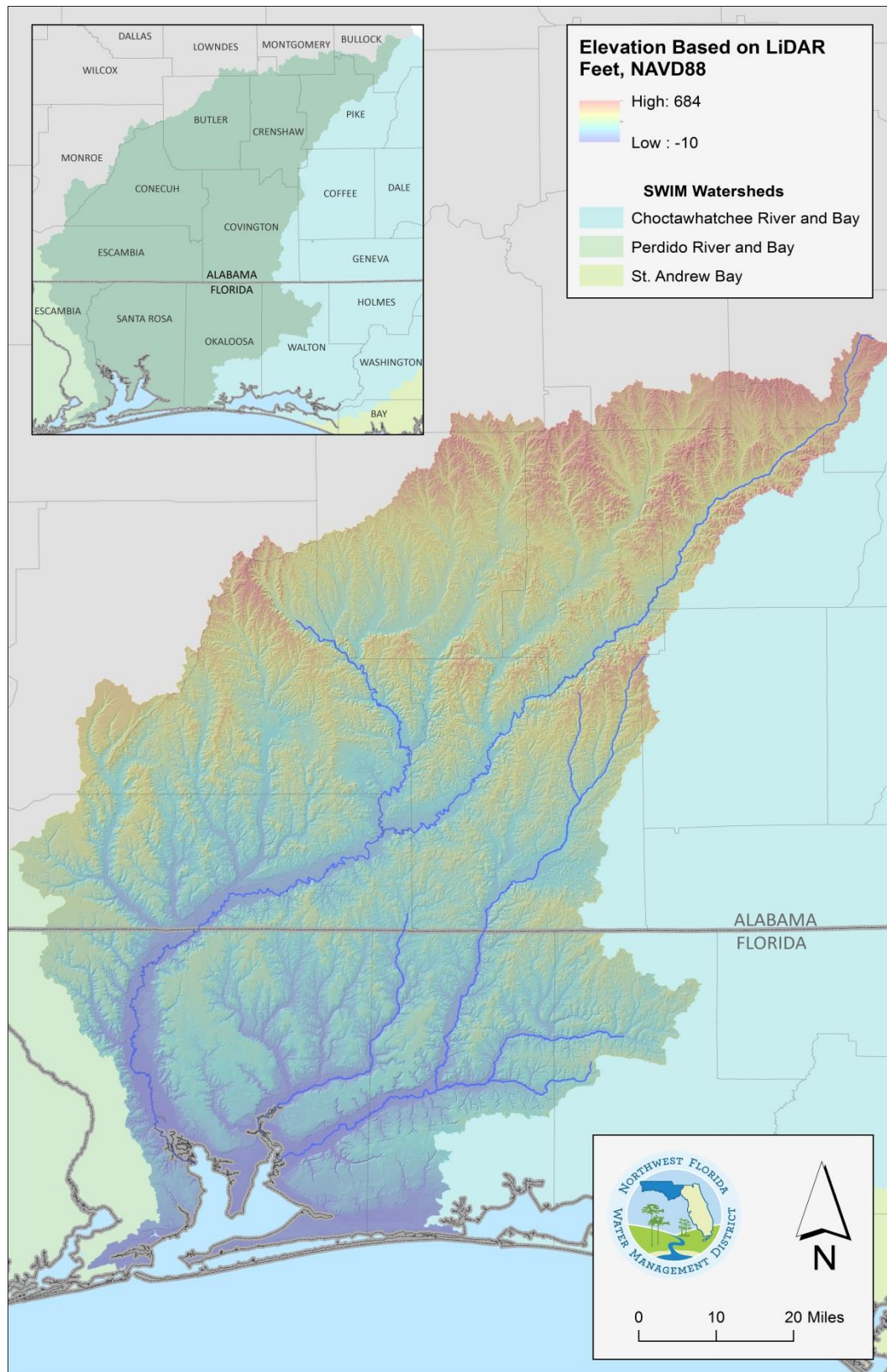


Figure C-2 Greater Pensacola Bay System Watershed Topography

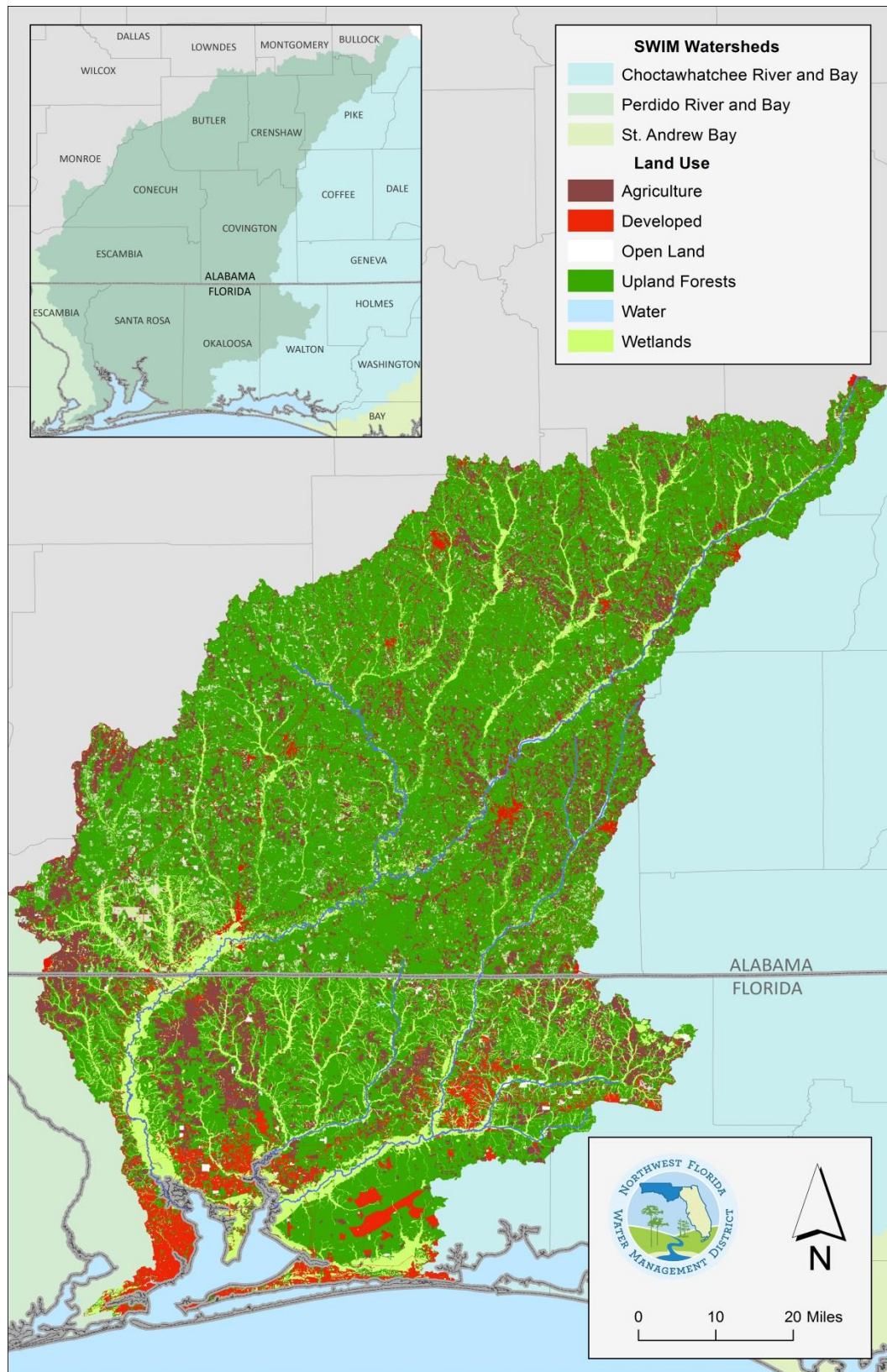


Figure C-3 Greater Pensacola Bay System Watershed Land Use and Land Cover

Aquifer Vulnerability Assessment

In 2017, the Florida Geological Survey released the Floridan Aquifer System Contamination Potential (FAVA II) dataset, which examines the sand-and-gravel aquifer as well as the Floridan and surficial aquifers (Figures C-4 and C-5). This dataset was calculated through the application of the weights of evidence method. This method examines different data layers including point and area data to determine relative vulnerability. These maps were developed to provide FDEP with a ground-water resource management and protection tool to carry out agency responsibilities related to natural resource management and protection regarding the Floridan aquifer system. The maps are not appropriate for site specific analysis.

Potable water sources within the Pensacola Bay System come primarily from the sand-and-gravel aquifer system (Figure C-5). As depicted in the figure, the sand-and-gravel aquifer system is most vulnerable to contamination along the extent of coastline within the watershed planning area. The Floridan aquifer system is most vulnerable in the northeastern most portion of the watershed planning area.

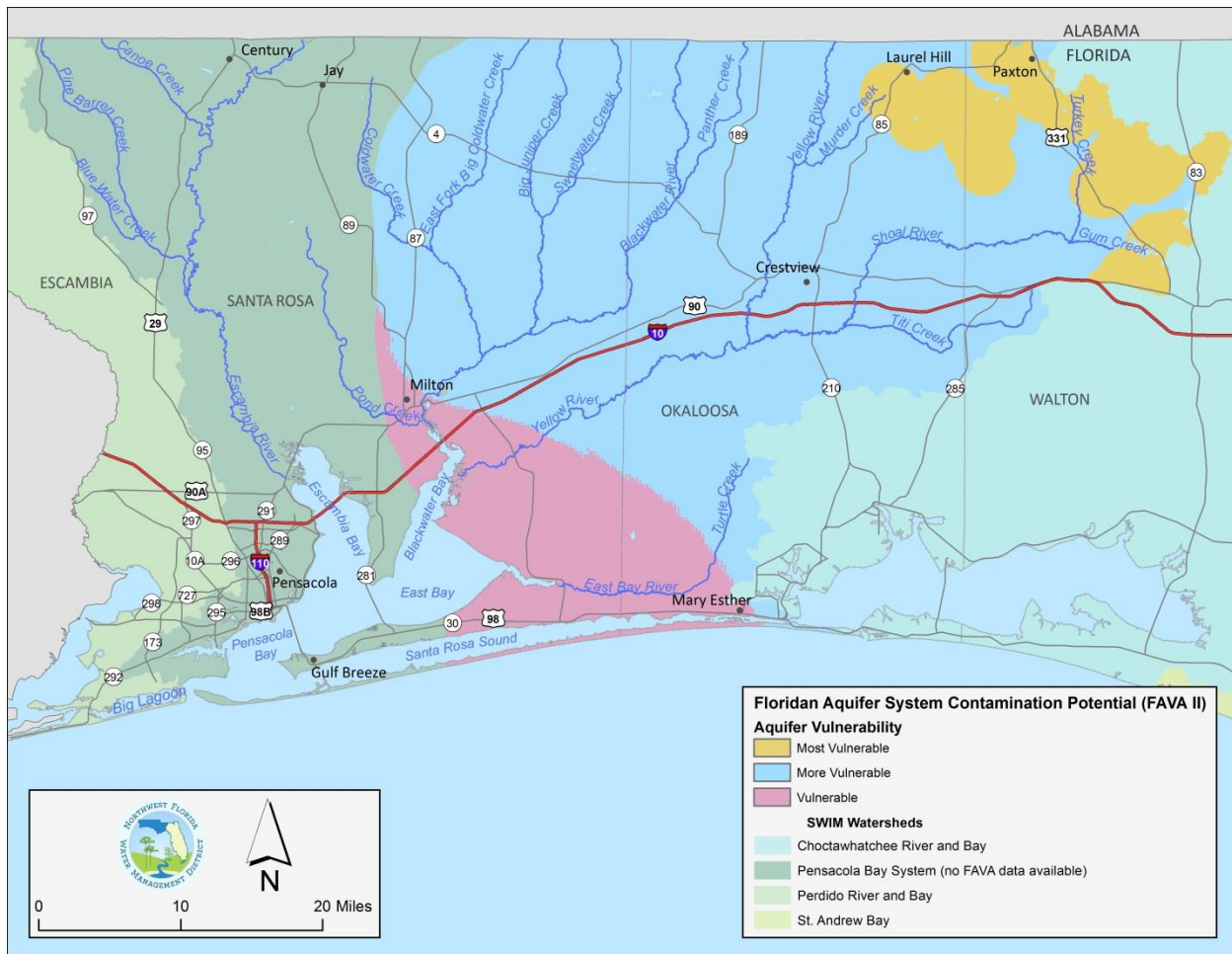


Figure C-4 Floridan Aquifer System Contamination Potential

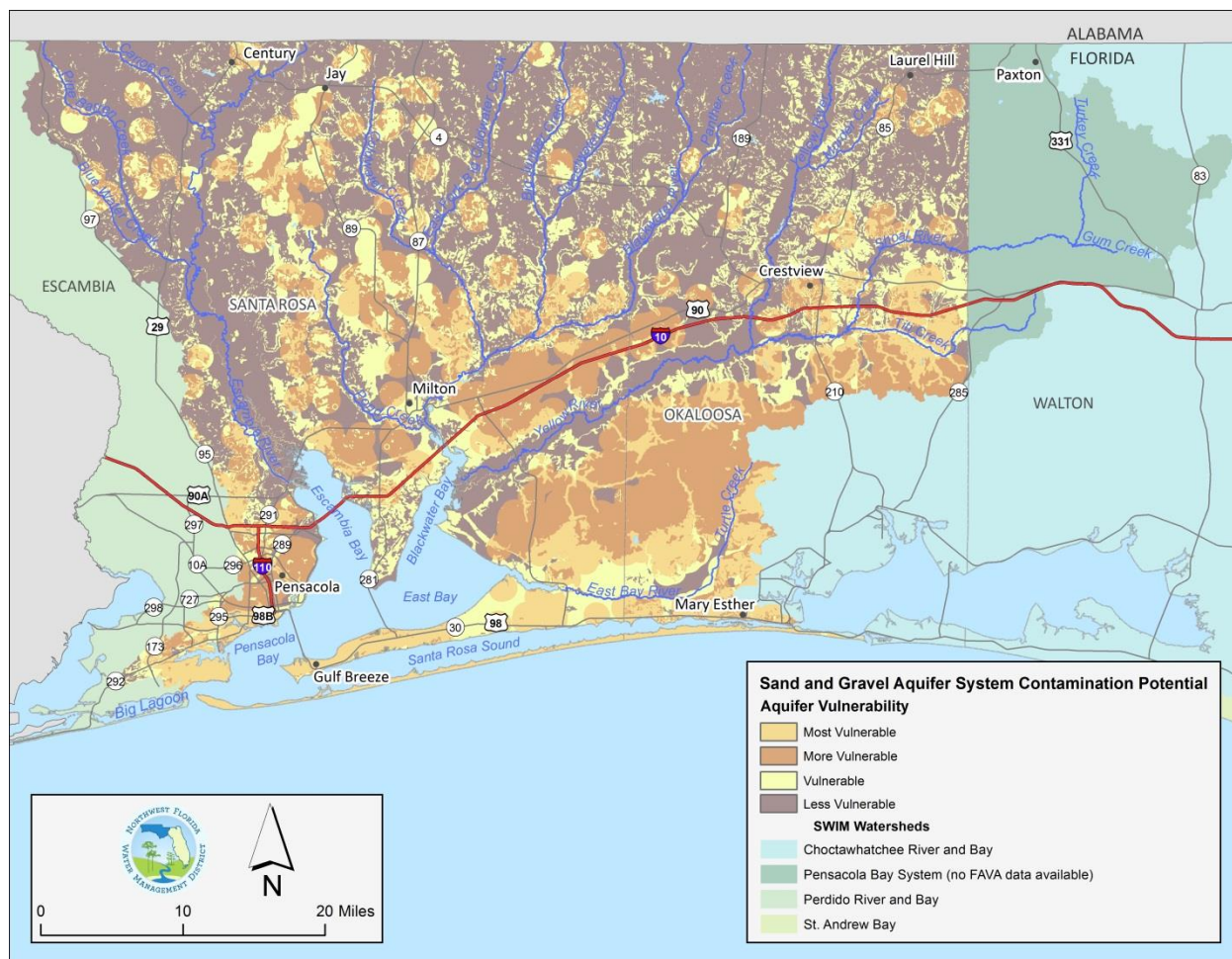


Figure C-5 Sand-and-Gravel Aquifer System Contamination Potential

Geologic Units

The Pensacola Bay system encompasses two localized physiographic regions in Florida: the Western Highlands subdivision of the Northern Highlands and the Gulf Coastal Lowlands. Both physiographic regions exhibit unique geology and soils. The Northern Highlands are underlain by the Citronelle formation, ancient delta deposits of clays, clayey sands, and gravel, deposited on limestone bedrock. The Coastal Lowlands are described as a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, that were later exposed by sea level subsidence. In the Coastal Lowlands, ancient marine geomorphic features including beach ridges, spits, bars, dunes, and terraces make up the modern topography. Terraces represent wave-cut platforms and depositional features that formed during still sands of the sea.

The area surrounding the Pensacola Bay system is underlain by thin undifferentiated alluvium and Pleistocene terrace deposits that dip southwestward at 30 to 40 feet per mile (Marsh 1966). Stratigraphically, these sediments are underlain by the Pliocene Citronelle Formation and Tertiary beds of sand, silt, and limestone. Three Pleistocene-age marine terraces can be recognized in the area: the Pamlico terrace at 30 feet, the Penholoway terrace at 70 feet, and a seaward sloping upland surface with elevations ranging from 60 to 200 feet. Remnants of these terraces are preserved as upland plateaus, flat-topped hills, and low coastal plains (Marsh 1966).

Santa Rosa Island is a bay barrier bar with a straight seaward margin. The island is approximately half a mile wide with sand dunes that reach elevations of 50 feet above sea level. Santa Rosa Island also has two backshore terraces likely formed during storm events.

The mineralogy of sediments within Pensacola Bay is controlled by erosion throughout the watershed, which has taken place since the Pleistocene Epoch. During the Pleistocene, the Citronelle deposits were reworked and intermixed with marine terrace deposits (Marsh 1966). These marine deposits, as well as Miocene and Pleistocene terrace deposits, are now actively eroding. Because the watershed's streams pass largely through Neogene Coastal Plain formations, the bay's sediments consist almost entirely of sand, silt, and clay eroded from these older units (George 1988).

The mineral suite for the Pensacola Bay system is made up of largely reworked, stable, heavy minerals dominated by zircon, tourmaline, staurolite, and kyanite. Unstable heavy minerals, such as hornblende, garnet, pyroxene, and epidote are lacking. Clay mineral analyses indicate that the Escambia River carries mainly kaolinite, with lesser amounts of montmorillonite, vermiculite, illite, and gibbsite (Isphording *et al.* 1989). The deposition of sediments in the Pensacola Bay system has significantly changed over recent time. Borings collected during construction of local bridges generally indicate a vegetative "muck" layer in places as deep as 60 feet with cleaner fine to coarse sands below. These deposits are evidence of plant growth at a lower stand of sea level (approximately 6,000 years ago).

The changes in the sedimentary regime of the system are primarily due to the geologically recent rise in sea level. The presence of silty clays, similar to the central bay floor sediment today, suggests that the present sediments were deposited on bay-lagoon deposits behind late Pleistocene barrier islands further offshore.

Soils

Soils within the watershed have been used extensively for crop production, silviculture, and pastureland. Along with being a valuable agricultural resource, soils also protect water quality by absorbing runoff, store soil organic carbon, and help mitigate flooding. The following soils are found in the Florida portion of the watershed:

Ultisols – Ultisols are intensely-weathered soils of warm and humid climates, and are usually formed on older geologic formations in parent material that is already extensively weathered (i.e., upland areas of the watershed). They are generally low in natural fertility and high in soil acidity, but contain subsurface clay accumulations that give them a high nutrient retention capacity. In the Pensacola Bay watershed, ultisols form in the majority of non-coastal, interior locations where the landscape has been relatively stable over recent geologic time (Collins 2010). Ultisols are the primary agricultural and silvicultural soils of the watershed, as their high clay content contributes to nutrient and water retention, when properly managed and are found extensively in the northern reaches of the entire watershed.

Entisols – Entisols are young soils that show little development, have no diagnostic horizons, and are largely unaltered from their parent material, which can be unconsolidated sediment or rock (USDA 2014). Entisols are found in the floodplain of the Escambia River and on Santa Rosa Sound where surficial processes are active (Collins 2010).

Spodosols – Spodosols are sandy, acidic soils, often found in cool, moist climates such as coastal conifer forests (USDA 2014). They are easily identified by their strikingly-colored horizons, which form as a result of leaching and accumulation processes. Spodosols can be found throughout the coastal portion of the watershed, particularly on the Fairpoint Peninsula, along the Blackwater and Yellow rivers near Blackwater Bay, and throughout the Garcon Point WMA (Collins 2010). The presence of spodosols usually indicates an area that was historically dominated by a pine over-story.

Inceptisols – Inceptisols are described as soils in the beginning stages of soil profile development, as the differences between soil horizons are just beginning to appear in the form of color variation due to accumulations of small amounts of clay, salts, and organic material. Inceptisols occur predominantly along the floodplains of the watershed's various rivers and tributaries, as well as on Santa Rosa Sound and the tip of Garcon Point (Collins 2010).

Histosols – Histosols are described as soils without permafrost and predominantly composed of organic material in various stages of decomposition. These soils are usually saturated, resulting in anaerobic conditions, slower rates of decomposition, and increased organic matter accumulation. Histosols generally consist of at least half organic materials and are common in wetlands (USDA 2014). Histosols in the watershed occur along the eastern coast of East Bay, along the Escambia River, and along East River near Holley (Collins 2010; USDA 2014). Histosols cover approximately 6,155 square miles in the state of Florida and store more organic carbon than any other soil type (Kolka *et al.* 2016; Vasques *et al.* 2010). Drainage of wetland areas and the associated decomposition of organic matter stored in histosols is a well-documented source of atmospheric carbon dioxide and methane.

Appendix D Listed Species within the Watershed

The Pensacola Bay system supports a wide array of biological resources and habitats and; therefore, many species of flora and fauna. This Appendix provides a list of species that are protected and tracked for the watershed, as well as their habitat requirements (FNAI 2010; FWC 2016f; USFWS 2016a).

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Plants					
<i>Agrimonia incisa</i>	Incised Groove-bur	S2	T	N	Terrestrial Habitat(s): Forest/Woodland, Woodland - Conifer, Woodland - Mixed
<i>Andropogon arctatus</i>	Pine-woods Bluestem	S3	T	N	Lacustrine: wet pine flatwoods, seepage wetlands, bogs, wet pine savannas
<i>Asclepias viridula</i>	Southern Milkweed	S2	T	N	Estuarine Habitat(s): Bay/sound Terrestrial Habitat(s): Savanna
<i>Baptisia calycosa</i> <i>var. villosa</i>	Hairy Wild Indigo	S3	T	N	N/A
<i>Calamintha dentata</i>	Toothed Savory	S3	T	N	Terrestrial: longleaf pine-deciduous oak sandhills, planted pine plantations, sand, open and abandoned fields, and roadsides
<i>Calamovilfa curtissii</i>	Curtiss' Sandgrass	S3	T	N	Palustrine: mesic and wet flatwoods, wet prairie, depression marsh Terrestrial: mesic flatwoods
<i>Calopogon multiflorus</i>	Many-flowered Grass-pink	S2S3	T	N	Palustrine Habitat(s): Bog/fen, forested wetland, herbaceous wetland Terrestrial Habitat(s): Forest Edge, Forest/Woodland, Grassland/herbaceous, Savanna, Woodland - Conifer
<i>Carex baltzellii</i>	Baltzell's Sedge	S3	T	N	Terrestrial Habitat(s): Forest/Woodland, Woodland - Mixed
<i>Carex tenax</i>	Sandhill Sedge	S3	N	N	Dry sandy sites in turkey oak/bluejack oak woods; Longleaf pine/turkey oak sandhills; ruderal in sandy fields and roadsides; Dry, coarse soils
<i>Cladium mariscoides</i>	Pond Rush	S1	N	N	Occurs in open, sunny, wet areas dominated by sedges. Its habitats include the following: calcareous and saline marshes and swamps; patterned water tracks, spring fens, and calcareous fens; and wetlands and swales of the Atlantic coastal plain and the Great Lakes
<i>Cladonia perforata</i>	Perforate Reindeer Lichen	S1	E	E	Terrestrial Habitat(s): Sand/dune, Shrubland/chaparral
<i>Epigaea repens</i>	Trailing Arbutus	S2	E	N	N/A
<i>Fothergilla gardenii</i>	Dwarf Witch-alder	S1	E	N	Wet edges of baygalls, shrub swamps, pocosins, Carolina bays, Atlantic white cedar forests, pitcher plant bogs, and wet savannas and flatwoods

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Hexastylis arifolia</i>	Heartleaf	S3	T	N	N/A
<i>Hymenocallis henryae</i>	Panhandle Spiderlily	S2	E	N	Palustrine Habitat(s): Bog/fen, herbaceous wetland Terrestrial Habitat(s): Forest/Woodland
<i>Ilex amelanchier</i>	Serviceberry Holly	S2	T	N	N/A
<i>Lachnocaulon digynum</i>	Bog Button	S3	T	N	Riverine Habitat(s): Pool Palustrine Habitat(s): Bog/fen, forested wetland
<i>Lilium iridollae</i>	Panhandle Lily	S2	E	N	Palustrine Habitat(s): Bog/fen, herbaceous wetland, Riparian, scrub-shrub wetland
<i>Linum westii</i>	West's Flax	S1	E	N	Palustrine Habitat(s): Bog/fen, forested wetland, herbaceous wetland Terrestrial Habitat(s): Forest/Woodland, Woodland - Mixed
<i>Litsea aestivalis</i>	Pondspice	S2	E	N	Palustrine Habitat(s): Bog/fen
<i>Lobelia boykinii</i>	Boykin's Lobelia	S1	E	N	Palustrine Habitat(s): Forested wetland, herbaceous wetland, scrub-shrub wetland Terrestrial Habitat(s): Forest/Woodland, Savanna, Woodland - Conifer
<i>Lupinus westianus</i>	Gulf Coast Lupine	S3	T	N	Terrestrial: beach dune, scrub, disturbed areas, roadsides, blowouts in dunes
<i>Macranthera flammea</i>	Hummingbird Flower	S2	E	N	Palustrine: seepage slope, dome swamp edges, floodplain swamps Riverine: seepage stream banks Terrestrial: seepage slopes
<i>Magnolia ashei</i>	Ashe's Magnolia	S2	E	N	Terrestrial: slope and upland hardwood forest, ravines
<i>Matelea alabamensis</i>	Alabama Spiny-pod	S2	E	N	Terrestrial Habitat(s): Cliff, Forest - Hardwood, Forest - Mixed, Forest Edge, Forest/Woodland, Woodland - Hardwood, Woodland - Mixed
<i>Nuphar advena ssp. ulvacea</i>	West Florida Cowlily	S2	N	N	Riverine Habitat(s): Medium river, spring/spring brook
<i>Nyctiophylax morsei</i>	Morse's Dinky Light Summer Sedge	S2	N	N	Riverine Habitat(s): creek, Moderate gradient
<i>Oxypolis greenmanii</i>	Giant Water-dropwort	S3	E	N	Palustrine: dome swamp, wet flatwoods, ditches: in water
<i>Panicum nudicaule</i>	Naked-stemmed Panicgrass	S3	T	N	N/A
<i>Myriophyllum laxum</i>	Piedmont Water Milfoil	S3	N	N	Riverine Habitat(s): Creek, pool, spring/spring brook Palustrine Habitat(s): Riparian, temporary pool

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Pinguicula primuliflora</i>	Primrose-flowered Butterwort	S3	E	N	Palustrine: bogs, pond margins, margins of spring runs
<i>Platanthera integrata</i>	Yellow Fringeless Orchid	S3	E	N	Palustrine: bogs, wet flatwoods Terrestrial: bluff
<i>Polygonella macrophylla</i>	Large-leaved Jointweed	S3	T	N	Terrestrial: scrub, sand pine/oak scrub ridges
<i>Potamogeton floridanus</i>	Florida Pondweed	S1	E	N	Riverine Habitat(s): Low gradient, spring/spring brook
<i>Pteroglossaspis ecristata</i>	Giant Orchid	S2	T	N	Terrestrial Habitat(s): Forest Edge, Forest/Woodland, Old field, Savanna, Shrubland/chaparral, Woodland - Conifer
<i>Quercus arkansana</i>	Arkansas Oak	S3	T	N	Sandy or sandy clay uplands or upper ravine slopes near heads of streams in deciduous woods
<i>Rhexia parviflora</i>	Small-flowered Meadow-beauty	S2	E	N	Palustrine Habitat(s): Bog/fen, forested wetland, scrub-shrub wetland
<i>Rhexia salicifolia</i>	Panhandle Meadow-beauty	S2	T	N	Lacustrine: full sun in wet sandy or sandy-peaty areas of sinkhole pond shores, interdunal swales, margins of depression, marshes, flatwoods, ponds and sandhill upland lakes
<i>Rhododendron austrinum</i>	Florida Flame Azalea	S3	E	N	Lacustrine: shaded ravines & in wet bottomlands on rises of sandy alluvium or older terraces
<i>Rhynchospora crinipes</i>	Hairy-peduncled Beaksedge	S2	E	N	Palustrine Habitat(s): Riparian
<i>Ruellia noctiflora</i>	Nightflowering Wild Petunia	S2	E	N	Lacustrine: moist to wet coastal pinelands, bogs, low meadows, open pine savannahs
<i>Sarracenia leucophylla</i>	White-top Pitcherplant	S3	E	N	Palustrine: wet prairie, seepage slope, baygall edges, ditches
<i>Sarracenia rubra</i>	Sweet Pitcherplant	S3	T	N	Palustrine: bog, wet prairie, seepage slope, wet flatwoods Riverine: seepage stream banks
<i>Stewartia malacodendron</i>	Silky Camellia	S3	E	N	Palustrine: baygall Terrestrial: slope forest, upland mixed forest; acid soils
<i>Tephrosia mohrii</i>	Pineland Hoary-pea	S3	T	N	Longleaf pine-turkey oak sandhills; driest sites
<i>Xyris scabrifolia</i>	Harper's Yellow-eyed Grass	S3	T	N	Palustrine: seepage slope, wet prairie, bogs
<i>Xyris stricta</i> var. <i>obscura</i>	Kral's Yellow-eyed Grass	S1	N	N	Lacustrine: sandhill upland lake margins

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Animals					
<i>Attenella attenuata</i>	Hirsute Mayfly	S1S2	N	N	N/A
<i>Baetisca becki</i>	A Mayfly	S2	N	N	Riverine Habitat(s): medium river
<i>Baetisca gibbera</i>	A Mayfly	S1S2	N	N	Freshwater
<i>Dolania americana</i>	American Sand-burrowing Mayfly	S2	N	N	Riverine Habitat(s): big river, creek, High gradient, medium river
<i>Homoeoneuria dolani</i>	Blue Sand-river Mayfly	S1S2	N	N	Riverine Habitat(s): big river, High gradient, medium river
<i>Stenacron floridense</i>	A Mayfly	S3S4	N	N	Freshwater
<i>Hetaerina americana</i>	American Rubyspot	S2	N	N	N/A
<i>Acroneuria evoluta</i>	A Stonefly	S1S2	N	N	N/A
<i>Hydroperla phormidia</i>	A Stonefly	S2	N	N	N/A
<i>Helopicus subvarians</i>	A Stonefly	S1S2	N	N	N/A
<i>Phyllophaga elongata</i>	Elongate June Beetle	S3	N	N	N/A
<i>Selonodon santarosae</i>	Santa Rosa Cebrionid Beetle	S1	N	N	Terrestrial
<i>Agarodes ziczac</i>	Zigzag Blackwater River Caddisfly	S2	N	N	Riverine Habitat(s): creek, medium river, spring/spring brook
<i>Cheumatopsyche gordonae</i>	Gordon's Little Sister Sedge Caddisfly	S1S2	N	N	Presumably, small clear streams with moderate stream flow in wooded areas or below a small impoundment
<i>Cheumatopsyche petersi</i>	Peters' Cheumatopsychhe Caddisfly	S2	N	N	Small, clear lower coastal plain streams with moderate flow
<i>Oxyethira elerobi</i>	Elerob's Microcaddisfly	S2S3	N	N	Riverine Habitat(s): creek, medium river, spring/spring brook

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Amblyscirtes alternata</i>	Dusky Roadside-Skipper	S2	N	N	Habitat seems to always be open grassy pine woods but may range from moist to dry, includes moist flatwoods, savannas, and sandhill ridges
<i>Amblyscirtes reversa</i>	Reversed Roadside-Skipper	S1	N	N	Palustrine Habitat(s): forested wetland, Riparian Terrestrial Habitat(s): Forest - Mixed, Woodland - Mixed
<i>Callophrys hesseli</i>	Hessel's Hairstreak	S2	N	N	Palustrine Habitat(s): Bog/fen, forested wetland, Riparian
<i>Cupido comyntas</i>	Eastern Tailed Blue	S2	N	N	Palustrine Habitat(s): Riparian Terrestrial Habitat(s): Cropland/hedgerow, Grassland/herbaceous, Old field, Savanna, Shrubland/chaparral, Suburban/orchard, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed
<i>Erynnis martialis</i>	Mottled Duskywing	S1	N	N	Terrestrial Habitat(s): Grassland/herbaceous, Shrubland/chaparral, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed
<i>Hesperia meskei straton</i>	Eastern Meske's Skipper	S2S3	N	N	N/A
Invertebrates					
<i>Amblyma plicata</i>	Threeridge	S1	N	N	Riverine Habitat(s): big river, creek, High gradient, Low gradient, medium river, Moderate gradient, Pool, Riffle Lacustrine Habitat(s): Deep water, Shallow water
<i>Fusconaia escambia</i>	Narrow Pigtoe	S1S2	FT	T(CH)	Riverine Habitat(s): big river, creek, Low gradient, medium river, Pool, Riffle
<i>Villosa choctawensis</i>	Choctaw Bean		E	E(CH)	Riverine Habitat
<i>Pleurobema strodeanum</i>	Fuzzy Pigtoe		E	T(CH)	Riverine Habitat
<i>Hamiota australis</i>	Southern Sandshell		E	T(CH)	Riverine Habitat

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
Fish					
<i>Acipenser oxyrinchus desotoi</i>	Gulf Sturgeon	S2	FT	T(CH)	Estuarine: various Marine: various habitats Riverine: alluvial and blackwater streams
<i>Atractosteus spatula</i>	Alligator Gar	S3	N	N	Riverine: sluggish pools of large rivers and their bayous, oxbow lakes, swamps, and backwaters, rarely brackish or marine waters along the coast
<i>Crystallaria asprella</i>	Crystal Darter	S1	ST	N	Riverine Habitat(s): creek, medium river, Moderate gradient
<i>Etheostoma histrio</i>	Harlequin Darter		SSC		Riverine Habitat(s): creek, medium river, Moderate gradient
<i>Etheostoma okaloosae</i>	Okaloosa Darter	S1	ST	T	Riverine Habitat(s): creek, medium river, Moderate gradient
<i>Etheostoma proeliare</i>	Cypress Darter	S2	N	N	Riverine Habitat(s): creek, Low gradient, medium river, Pool Lacustrine Habitat(s): Shallow water Palustrine Habitat(s): forested wetland
<i>Hybognathus hayi</i>	Cypress Minnow	S1S2	N	N	Riverine Habitat(s): creek, Low gradient, medium river, Pool Lacustrine Habitat(s): Shallow water Palustrine Habitat(s): forested wetland
<i>Fundulus jenkinsi</i>	Saltmarsh Topminnow	S2	ST	SC	Estuarine Habitat(s): Herbaceous wetland, Lagoon, Tidal flat/shore Palustrine Habitat(s): herbaceous wetland
<i>Moxostoma carinatum</i>	River Redhorse	S1S2	N	N	Riverine Habitat(s): creek, High gradient, medium river, Moderate gradient, Pool
<i>Macrhybopsis sp. 2</i>	Florida Chub	S2	N	N	N/A
<i>Notropis melanostomus</i>	Blackmouth Shiner	S1	ST	N	Riverine Habitat(s): creek, Low gradient, medium river, Pool Lacustrine Habitat(s): Shallow water Palustrine Habitat(s): forested wetland
<i>Percina austroperca</i>	Southern Logperch	S2	N	N	Riverine Habitat(s): creek, Low gradient, medium river, Moderate gradient
<i>Pteronotropis welaka</i>	Bluenose Shiner	S3S4	ST	N	Riverine Habitat(s): creek, Low gradient, medium river, Pool
Amphibians					
<i>Ambystoma bishopi</i>	Reticulated Flatwoods Salamander	S2	FE	E(CH)	Terrestrial: slash and longleaf pine flatwoods that have a wiregrass floor and scattered wetlands
<i>Amphiuma pholeter</i>	One-toed Amphiuma	S3	N	N	Riverine Habitat(s): creek, Low gradient, spring/spring brook Palustrine Habitat(s): forested wetland, Riparian, scrub-shrub wetland, temporary pool

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Hyla andersonii</i>	Pine Barrens Treefrog	S3	ST	N	Riverine Habitat(s): Low gradient, Pool Palustrine Habitat(s): Bog/fen, forested wetland, herbaceous wetland, riparian, scrub-shrub wetland Terrestrial Habitat(s): Woodland - Mixed
<i>Lithobates capito</i>	Gopher Frog	S3	N	N	Palustrine Habitat(s): herbaceous wetland, Riparian, temporary pool Terrestrial Habitat(s): Forest - Mixed, Savanna, Woodland - Hardwood, Woodland - Mixed
Reptiles					
<i>Alligator mississippiensis</i>	American Alligator	S4	FT (S/A)	SAT	Estuarine: herbaceous wetland Riverine: big river, creek, low gradient, medium river, pool, spring/spring brook Lacustrine: shallow water Palustrine: forested wetland, herbaceous wetland, riparian, scrub-shrub wetland
<i>Caretta caretta</i>	Loggerhead Sea Turtle	S3	FT	T(CH)	Terrestrial: sandy beaches; nesting
<i>Chelonia mydas</i>	Green Sea Turtle	S2	FE	E	Terrestrial: sandy beaches; nesting
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake	S3	N	N	Palustrine: riparian Terrestrial: grassland/herbaceous, old field, savanna, shrubland/chaparral, woodland - conifer, woodland - hardwood, woodland - mixed
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	S2	FT	E	Terrestrial: sandy beaches; nesting
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	S3	FT	T	Estuarine: tidal swamp Palustrine: hydric hammock, wet flatwoods Terrestrial: mesic flatwoods, upland pine forest, sandhills, scrub, scrubby flatwoods, rockland hammock, ruderal
<i>Gopherus polyphemus</i>	Gopher Tortoise	S3	ST	C	Terrestrial: sandhills, scrub, scrubby flatwoods, xeric hammocks, coastal strand, ruderal
<i>Graptemys ernsti</i>	Escambia Map Turtle	S2	N	N	Riverine Habitat(s): big river, Low gradient, medium river, Pool Palustrine Habitat(s): Riparian Terrestrial Habitat(s): Sand/dune
<i>Heterodon simus</i>	Southern Hognose Snake	S2	N	N	Palustrine Habitat(s): Riparian Terrestrial Habitat(s): Grassland/herbaceous, Old field, Savanna, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed
<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	S1	E	E	Terrestrial: sandy beaches; nesting

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	S3	SSC	N	Estuarine: tidal marsh Lacustrine: river floodplain lake, swamp lake Riverine: alluvial stream, blackwater stream
<i>Nerodiaclarkii clarkii</i>	Gulf Salt Marsh Snake	S3	N	N	Estuarine: herbaceous wetland, scrub-shrub wetland
<i>Pituophis melanoleucas mugitus</i>	Florida Pine Snake	S3	ST	N	Lacustrine: ruderal, sandhill upland lake Terrestrial: sandhill, scrubby flatwoods, xeric hammock, ruderal
Birds					
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	S3	ST	N	Terrestrial Habitat(s): Grassland/herbaceous, Sand/dune
<i>Calidris canutus rufa</i>	Red knot	S2	N	T	Estuarine: bays, tidal flats, salt marshes Terrestrial: sandy beaches Marine: aerial, near shore
<i>Charadrius alexandrius</i>	Snowy Plover	S2	ST	N	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas.
<i>Charadrius melodus</i>	Piping Plover	S2	T	T(CH)	Estuarine: exposed unconsolidated substrate Marine: exposed unconsolidated substrate Terrestrial: dunes, sandy beaches, and inlet areas. Mostly wintering and migrants
<i>Cistothorus Palustris marianae</i>	Marian's Marsh Wren	S3	ST	N	N/A
<i>Haliaeetus leucocephala</i>	Bald Eagle	S3	T	BGEPA	Estuarine: marsh edges, tidal swamp, open water Lacustrine: swamp lakes, edges Palustrine: swamp, floodplain Riverine: shoreline, open water Terrestrial: pine and hardwood forests
<i>Mycteria americana</i>	Wood Stork	S2	E	E	Estuarine: marshes Lacustrine: floodplain lakes, marshes (feeding), various Palustrine: marshes, swamps, various
<i>Peucaea aestivalis</i>	Bachman's Sparrow	S3	N	N	Terrestrial Habitat(s): Old field, Savanna, Woodland - Conifer, Woodland - Hardwood
<i>Picoides borealis</i>	Red-cockaded Woodpecker	S2	FE	E	Terrestrial Habitat(s): Woodland - Conifer
Mammals					

Scientific Name	Common Name	Regulatory Designation			Natural Communities
		FNAI	State	Federal	
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	S2	N	N	Palustrine Habitat(s): Riparian Terrestrial Habitat(s): Forest - Hardwood, Suburban/orchard, Urban/edificarian, Woodland – Hardwood Subterranean Habitat(s): Subterrestrial
<i>Mustela frenata olivacea</i>	Southeastern Weasel	S3	N	N	Palustrine: forested wetland, riparian Terrestrial: forest - hardwood, old field, woodland - conifer, woodland - hardwood, woodland - mixed
<i>Myotis austroriparius</i>	Southeastern Bat	S3	N	N	Riverine Habitat(s): Aerial Palustrine Habitat(s): Aerial, forested wetland, Riparian Terrestrial Habitat(s): Forest - Conifer, Forest - Hardwood, Forest - Mixed, Forest Edge, Forest/Woodland, Suburban/orchard, Urban/edificarian, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed Subterranean Habitat(s): Subterrestrial
<i>Neofiber alleni</i>	Round-tailed Muskrat	S3	N	N	Estuarine Habitat(s): Herbaceous wetland Lacustrine Habitat(s): Shallow water Palustrine Habitat(s): Bog/fen, herbaceous wetland
<i>Peromyscus polionotus leucocephalus</i>	Santa Rosa Beach Mouse	S1	N	N	Terrestrial Habitat(s): Grassland/herbaceous, Sand/dune
<i>Peromyscus polionotus trissyllepsis</i>	Perdido Key Beach Mouse	S1	FE	E(CH)	Terrestrial Habitat(s): Grassland/herbaceous, Sand/dune
<i>Trichechus manatus latirostris</i>	West Indian Manatee	S2	E	E	Estuarine: submerged vegetation, open water Marine: open water, submerged vegetation
<i>Ursus americanus floridanus</i>	Florida Black Bear	S2	N	N	Palustrine: forested wetland, riparian Terrestrial: forest - hardwood, forest - mixed

Sources: FNAI 2010; FWC 2016f; USFWS 2016a.

Key:

FNAI STATE ELEMENT RANK

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.

S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.

S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.

S4 = Apparently secure in Florida (may be rare in parts of range).

S5 = Demonstrably secure in Florida.

SH = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).

SX = Believed to be extirpated throughout Florida.

SU = Unrankable; due to a lack of information no rank or range can be assigned.

SNA = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).

SNR = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS

BGEPA = Protected by Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

E(CH) = Endangered critical habitat

E = Endangered: species in danger of extinction throughout all or a significant portion of its range.

E, T = Species currently listed endangered in a portion of its range but only listed as threatened in other areas

E, PDL = Species currently listed endangered but has been proposed for delisting.

E, PT = Species currently listed endangered but has been proposed for listing as threatened.

E, XN = Species currently listed endangered but tracked population is a non-essential experimental population.

N = None

T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

T(CH) = Threatened critical habitat

PE = Species proposed for listing as endangered

PS = Partial status: some but not all of the species' infraspecific taxa have federal status

PT = Species proposed for listing as threatened

SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS

C = Candidate for listing at the Federal level by the U. S. Fish and Wildlife Service

FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service

FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service

FXN = Federal listed as an experimental population in Florida

FT(S/A) = Federal Threatened due to similarity of appearance

ST = State population listed as Threatened by the FWC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.

SSC = Listed as Species of Special Concern by the FWC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species. (SSC* for *Pandion haliaetus* (Osprey) indicates that this status applies in Monroe county only.)

N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: <http://www.doacs.state.fl.us/pi/>.

E = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.

T = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.

N = Not currently listed, nor currently being considered for listing.

Appendix E Habitats and Natural Communities

The FNAI defines a natural community as a distinct and recurring assemblage of populations of plants, animals, fungi, and microorganisms naturally associated with each other and their physical environment. Based on GIS analysis, there are 31 unique natural communities recognized by the FNAI within the Pensacola Bay watershed (FNAI 2010). Habitats and Natural Communities were identified using the 2010 Florida Land Use, Cover and Forms Classification System (FLUCFS) data from the NFWFMD as well as the 2004-2013 Statewide Land Use Land Cover datasets created by the five (5) Water Management Districts in Florida. Data were modified and refined based on aerial photograph signatures and field observations. Below are community descriptions (excerpts from FNAI 2010) with site-specific information about many of the communities in the watershed.

Upland Communities	
Bluff	Bluff is a habitat characterized as a steep slope with rock, sand, and/or clay substrate that supports sparse grasses, herbs, and shrubs. This community type can be found along the watersheds' major rivers. In Okaloosa County, the Yellow River cuts through the Western Highlands province, characterized in some areas by bluffs as high as 40 feet (Gardner 1991).
Mesic Flatwoods	Mesic flatwoods can be found on the flat sandy terraces left behind by Plio-Pleistocene high sea level stands. Mesic flatwoods consist of an open canopy of tall pines (commonly longleaf pine or slash pine) and a dense, low ground layer of shrubs, grasses (commonly wiregrass), and forbs. The most widespread natural community in Florida, mesic flatwoods are home to many rare plants and animals such as the frosted flatwoods salamander (<i>Ambystoma cingulatum</i>), the reticulated flatwoods salamander (<i>Ambystoma bishop</i>) the Red-cockaded woodpecker (<i>Leuconotopicus borealis</i>) and many others. Mesic flatwoods require frequent fire (two to four years) and all of its constituent plant species recover rapidly from fire, including many rare and endemic plants. In the Panhandle north of the Cody Scarp, mesic flatwoods occupy relatively small, low-lying areas (FNAI 2010). Within the Pensacola Bay watershed, healthy mesic flatwoods occur in the Elevenmile Creek watershed and Escribano Point.
Sandhill	Sandhill communities are characterized by broadly-spaced pine trees with a deciduous oak understory, sparse midstory of deciduous oaks, and a moderate to dense groundcover of grasses, herbs, and low shrubs. Species typical of sandhill communities include longleaf pine (<i>Pinus palustris</i>), turkey oak (<i>Quercus laevis</i>), and wiregrass (<i>Aristida stricta</i> var. <i>beyrichiana</i>). Sandhill is observed on crests and slopes of rolling hills and ridges with steep or gentle topography. Sandhill communities are important for aquifer recharge, as sandy soils allow water to infiltrate rapidly, resulting in sandy, dry soil, with little runoff evaporation. Fire is a dominant environmental factor in sandhill ecology and is essential for the conservation of native sandhill flora and fauna (FNAI 2010). Within the Pensacola Bay watershed, exemplary sandhill communities can be found on Eglin AFB.
Scrub	Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on well-drained, infertile, narrow sandy ridges distributed parallel to the coastline. Signature scrub species include three species of shrubby oaks, Florida rosemary (<i>Ceratiola ericoides</i>), and sand pine (<i>Pinus clausa</i>), which may occur with or without a canopy of pines. Scrub is characterized by burn intervals of five to 40 years, depending on the dominant vegetation. This community type can be found in the Gulf Islands National Seashore.

Scrubby Flatwoods	Scrubby flatwoods have an open canopy of widely-spaced pine trees (commonly longleaf or slash pines) and a low, shrubby understory which differ structurally from scrub communities in the respect that scrub flatwoods lack continuous shrubby oak cover. Understory vegetation consists largely of scrub oaks and saw palmetto, often interspersed with barren areas of exposed sand. Scrubby flatwoods occur on slight rises within mesic flatwoods and in transitional areas between scrub and mesic flatwoods. Scrubby flatwoods are inhabited by several rare plant and animal species including the Florida mouse (<i>Peromyscus floridanus</i>), Florida scrub-jay (<i>Aphelocoma coerulescens</i>) (Peninsular Florida only), gopher tortoise (<i>Gopherus polyphemus</i>), the Florida gopher frog (<i>Rana capito</i>), goldenaster (<i>Chrysopsis floridana</i>), and large-plumed beaksedge (<i>Rhynchospora megaplumosa</i>) (FNAI 2010). Within the Pensacola Bay watershed, scrubby flatwood communities can be found in the Gulf Islands National Seashore.
Slope Forest	Slope forest is a well-developed, highly diverse, dense canopy forest of upland hardwoods that occurs on steep slopes, bluffs, and in sheltered ravines. In slope forests, high density and diversity is driven by competition for space, water, sunlight, and nutrients. The combination of densely shaded slopes and cool, moist microclimates produces conditions that are conducive for the growth of many plant species that are more typical of the Piedmont and Southern Appalachian Mountains (FNAI 2010).
Terrestrial Caves	Terrestrial caves are cavities below the surface that lack standing water. These caves develop in areas of karst topography; water moves through underlying limestone, dissolving it and creating fissures and caverns. Most caves have stable internal environments with temperature and humidity levels remaining fairly constant. In areas where light is present, some plants may exist, although these are mostly limited to mosses, liverworts, ferns, and algae. Subterranean natural communities such as terrestrial caves are extremely fragile because the fauna they support are adapted to stable environments and do not tolerate environmental changes (FNAI 2010).
Upland Hardwood Forests	Upland hardwood forests are described as having a well-developed, closed-canopy dominated by deciduous hardwood trees such as southern magnolia (<i>Magnolia grandiflora</i>), pignut hickory (<i>Carya glabra</i>), sweetgum (<i>Liquidambar styraciflua</i>), Florida maple (<i>Acer saccharum ssp. floridanum</i>), live oak (<i>Quercus virginiana</i>), American beech (<i>Fagus grandifolia</i>), white oak (<i>Q. alba</i>), and spruce pine (<i>Pinus glabra</i>), and others. This community occurs on mesic soils in areas sheltered from fire, on slopes above river floodplains, in smaller areas on the sides of sinkholes, and occasionally on rises within floodplains. It typically supports a diversity of shade-tolerant shrubs, and a sparse groundcover. Upland hardwoods occur throughout the Florida Panhandle and can be found in upper portions of the watershed.
Wet Flatwoods	Wet flatwoods are pine forests with a sparse or absent midstory. The typically dense groundcover of hydrophytic grasses, herbs, and low shrubs occurring in wet flatwoods can vary depending on the fire history of the system. Wet flatwoods occur in the ecotones between mesic flatwoods and shrub bogs, wet prairies, dome swamps, or strand swamps and are common throughout most of Florida. Wet flatwoods also occur in broad, low flatlands, frequently within a mosaic of other communities. Wet Flatwoods often occupy large areas of relatively inaccessible land, providing suitable habitat for the Florida black bear (<i>Ursus americanus floridanus</i>) as well as a host of rare and endemic plant species (FNAI 2010). This community type is found throughout Eglin AFB.
Xeric Hammock	Xeric hammock is an evergreen forest typically dominated by sand live oak (<i>Quercus geminata</i>), found on deep, fine sand substrate, where fire exclusion allows for the establishment of an oak canopy. In these areas, xeric hammock can form extensive stands or as small patches within or near sandhill or scrub. These forests are also found on high islands within flatwoods or less commonly on a high, well-drained ridge within a floodplain where fire-exclusion allows for the establishment of an oak canopy. Xeric hammocks are inhabited by several rare animals including the gopher frog (<i>Rana capito</i>), gopher tortoise (<i>Gopherus polyphemus</i>), eastern diamondback rattlesnake (<i>Crotalus adamanteus</i>), and the Florida pine snake (<i>Pituophis melanoleucus mugitus</i>). Xeric hammock is most common in the central peninsula of Florida and is less common north of the Cody Scarp where clay-rich soils create mesic conditions (FNAI 2010). This community type can be found throughout Eglin AFB.

Coastal Communities	
Beach	The beach is the immediate shoreline area of the Gulf of Mexico and consists of white quartz sand. It has few plants, except along the extreme inner edge at the base of the dunes. Organic marine debris, including seaweed and driftwood, typically form a wrack line on the shore. The upper beach area at the base of the foredune is an unstable habitat and is continually re-colonized by annuals, trailing species, and salt-tolerant grasses (FNAI 2010). Beach habitat is found along the entire Gulf front, especially at tidal passes, and some bay front shorelines in the watershed.
Beach Dune	The beach dune community includes seaward dunes that have been shaped by wind and water movement. This community is composed primarily of herbaceous plants such as pioneer grasses and forbs, many are coastal specialists. The vegetated upper beach and foredune are often sparsely covered by plants adapted to withstand the stresses of wind, water, and salt spray, or to rapidly recolonize after destruction. Many rare shorebirds use the Florida Panhandle's beach dunes for nesting. This community is also a major nesting area for loggerhead, green, Kemp's Ridley, and leatherback sea turtles. Beach dune habitat can be found south of the Santa Rosa Sound and the Gulf Islands National Seashore.
Coastal Grasslands	Coastal grassland, found primarily on broad barrier islands and capes, is a predominantly herbaceous community found in the drier portion of the transition zone between the beach dune and coastal strand or maritime hammock communities. Several rare animals use coastal grasslands for foraging and nesting, including neo-tropical migratory birds and the Santa Rosa beach mouse (<i>Peromyscus polionotus leucocephalus</i>), one of four rare subspecies of beach mouse along the Florida Panhandle coast. Coastal grassland can form from two major processes: the seaward build-up of a barrier island, which protects inland ridges from sand burial and salt spray, or the development of a new foredune ridge, which protects the previously overwashed area behind it (FNAI 2010). This community type can be found throughout Eglin AFB and the Gulf Islands National Seashore.
Coastal Strand	Coastal strand is an evergreen shrub community growing on stabilized coastal dunes, often with a smooth canopy due to pruning by wind and salt spray. It usually develops as a band between dunes dominated by sea oats along the immediate coast, and maritime hammock, scrub, or mangrove swamp (in peninsular Florida) communities further inland. This community is very rare on the Florida Panhandle coast where the transition zone is occupied by scrub or coastal grassland communities (FNAI 2010). This community type can be found in the Gulf Islands National Seashore.
Maritime Hammock	Maritime hammock is a predominantly evergreen hardwood forest that occurs on deep well-drained sandy soils or sandy soils mixed with shell fragments. Maritime hammock forests grow on stabilized coastal dunes at various distances from the shoreline. Maritime hammocks provide migrating songbirds with crucial resting and foraging areas on their fall and spring migrations to and from the tropics. On the Florida Panhandle coast, maritime hammock is found only in isolated pockets where shell is mixed with sandy substrate (FNAI 2010). Within the Pensacola Bay watershed, this community type can be found in the Pensacola NAS.
Transitional and Wetland Communities	
Basin Marsh	Basin marshes, unlike depression marshes, are marshes that lack a fire-maintained matrix community and rather occur in relative isolation as larger landscape features. Basin marshes are regularly inundated freshwater from local rainfall, as they occur around fluctuating shorelines, on former "disappearing" lake bottoms, and at the head of broad, low basins marking former embayments of the last high-sea level stand. Species composition is heterogeneous both within and between marshes and generally includes submerged, floating, and emergent vegetation with intermittent shrubby patches. Common species include maidencane (<i>Panicum hemitomon</i>), sawgrass (<i>Cladium sp.</i>), bulltongue arrowhead (<i>Sagittaria lancifolia</i>), pickerelweed (<i>Pontederia cordata</i>), and cordgrass (<i>Spartina sp.</i>) (FNAI 2010).

Basin Swamp	Basin swamp is a wetland vegetated with hydrophytic trees, commonly including pond cypress (<i>Taxodium ascendens</i>) and swamp tupelo (<i>Nyssa sylvatica</i> var. <i>biflora</i>) and shrubs that can withstand an extended hydro-period. Basin swamps are characterized by highly variable species composition and are expressed in a variety of shapes and sizes due to their occurrence in a variety of landscape positions including old lake beds or river basins, or ancient coastal swales and lagoons that existed during higher sea levels. Basin swamps can also exist around lakes and are sometimes headwater sources for major rivers. Many basin swamps have been heavily harvested and undergone significant hydrological changes due to the conversion of adjacent uplands to agricultural and silvicultural lands (FNAI 2010). An exemplary basin swamp community is located in the Blackwater River State Park near the entrance station (FDEP 2016a).
Baygall	Baygall is an evergreen-forested wetland dominated by bay species including loblolly bay (<i>Gordonia lasianthus</i>), sweetbay (<i>Magnolia virginiana</i>), and/or swamp bay (<i>Persea palustris</i>). This community can be found on wet soils at the base of slopes or in depressions; on the edges of floodplains; and in stagnant drainages. Baygalls are not generally influenced by flowing water, but may be drained by small blackwater streams. Most baygalls are small; however, some form large, mature forests, called “bay swamps.” The dominance of evergreen bay trees rather than a mixture of deciduous and evergreen species can be used to distinguish baygall from other forested wetlands (FNAI 2010). An exemplary baygall community is located in the Blackwater River State Park.
Bog	Bog habitat typically includes areas of saturated substrates, often deep peat, and acidic conditions, with the dominant vegetation consisting of sedges and grasses. Bog habitat is often surrounded by a transition zone of trees and shrubs between the bog and upland area (FNAI 2010). In the Pensacola Bay watershed, this community type can be found along many of the watersheds’ major rivers.
Coastal Interdunal Swales	Coastal interdunal swales are marshes, moist grasslands, dense shrublands, or damp flats in linear depressions that occur between successive dune ridges as sandy barrier islands, capes, or beach plains. Dominant species tend to vary based on local hydrology, substrate, and the age of the swale, but common species include sawgrass (<i>Cladium</i> sp.), hairawn muhly (<i>Muhlenbergia capillaris</i>), broomsedge (<i>Andropogon virginicus</i>), seashore paspalum (<i>Paspalum vaginatum</i>), sand cordgrass (<i>Spartina bakeri</i>), and saltmeadow cordgrass (<i>Spartina patens</i>). For example, hurricanes and large storm events can flood swales with saltwater, after which they become colonized, often temporarily, by more salt-tolerant species. Saltwater intrusion and increased sand movement after storm events can reset successional processes of interdunal swale communities (FNAI 2010). This community type can be found in the Gulf Islands National Seashore.
Dome Swamp	Dome swamp is an isolated, forested, and usually small depression wetland consisting of predominantly pond cypress (<i>Taxodium ascendens</i>) and/or swamp tupelo (<i>Nyssa sylvatica</i> var. <i>biflora</i>). This community occurs within a fire-maintained community such as mesic flatwoods and commonly occupies depressions over a perched water table. Smaller trees grow on the outer edge of the swamp where the water is shallow, while taller trees grow deeper in the swamp interior creating the characteristic dome shape. Shrubs are typically sparse to moderate, but dome swamps with high fire frequencies or fire exclusion, the shrub layer may be absent. Many dome swamps form when poor surface drainage causes the dissolution of limestone bedrock, creating depressions which fill in with peat or marl. Surficial runoff from the surrounding uplands supplies much of the water within dome swamps. Consequently, water levels in these communities fluctuate naturally with seasonal rainfall changes. Dome swamps may also be connected directly to the aquifer, where groundwater influences the hydrological regime. Thus, dome swamps can function as reservoirs that recharge the aquifer. Logging, nutrient enrichment, pollution from agricultural runoff, ditching, impoundment, and invasive exotic species invasion have degraded dome swamps. Some dome swamps have been used as treatment areas for secondarily-treated wastewater (FNAI 2010).

Hydric Hammock	Hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns. This community occurs on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed-canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. Hydric hammock occurs on low, flat, wet sites where limestone may be near the surface and soil moisture is kept high mainly by rainfall accumulation on poorly-drained soils. During heavy rains, sheet flow is slowed across the forested-floor of a hammock, resulting in greater absorption into the soil. Hammocks adjacent to salt marshes protect inland areas from damage during hurricanes and major storms (FNAI 2010). This community type is found on in the Pensacola NAS.
Floodplain Swamp	Floodplain swamp is a closed-canopy forest community of hydrophytic trees such as bald cypress (<i>Taxodium distichum</i>), water tupelo (<i>Nyssa aquatica</i>), swamp tupelo (<i>N. sylvatica</i> var. <i>biflora</i>), or ogeechee tupelo (<i>N. ogeche</i>). Floodplain swamp occurs on frequently- or permanently-flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within the floodplain. The understory and groundcover are sparse in floodplain swamps, which can also occur within a complex mosaic of communities including alluvial forest, bottomland forest, and baygall. As rivers meander, they create oxbows and back swamps that are important breeding grounds for fish when high water connects them to the river. Floodplain swamp communities provide important wildlife habitat, contribute to flood attenuation, and help protect the overall water quality of streams and rivers. These communities may also transform nutrients or act as a nutrient sink depending on local conditions. This makes floodplain swamps useful for the disposal of partially-treated wastewater. Artificial impoundments on rivers can severely limit the seasonal flooding effects that maintain healthy floodplain systems; particularly, the stabilization of alluvial deposits and the flushing of detritus (FNAI 2010). Floodplain swamp communities are distributed along most creeks and streams within the watershed, particularly along the Yellow, Blackwater, and Escambia rivers. Exemplary sites include the floodplain swamps within the Yellow River Marsh Aquatic Preserve (Gardner 1991). Floodplain swamp occurs along both sides of the Backwater River in the Blackwater River State Park from the edge of the river to about 40 feet in elevation (FDEP 2016a).
Seepage Slope	Seepage slope is an open, grass sedge-dominated community consisting of wiregrass (<i>Aristida stricta</i>), toothache grass (<i>Ctenium aromaticum</i>), pitcher plants, plumed beaksedge (<i>Rhynchospora plumose</i>), flattened pipewort (<i>Eriocaulon compressum</i>), and woolly huckleberry (<i>Gaylussacia mosieri</i>). Seepage slopes are kept continuously moist by groundwater seepage. This community occurs in topographically variable areas, with 30- to 50-foot elevational gradients, frequently bordered by well-drained sandhill or upland pine communities. The soil is often soft and mucky underfoot, in contrast to the firm texture of the bordering sandhill and upland pine soils. Seepage slopes range from the Alabama border eastward to Calhoun County in the inland portions of the Florida Panhandle. Within the Pensacola Bay watershed, seepage slopes can be found throughout Eglin AFB.
Wet Prairie	Wet prairie is an herbaceous community usually occurring on acidic, continuously wet, but not inundated, soils. This community can be found on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps or on slightly higher wet or mesic flatwoods. Wet prairies in northern Florida are some of the most diverse communities in the U.S., with an average of over 20 species per square meter in some places and over 100 total species in any given stand. The Panhandle is a hotspot for rare plants of the wet prairie community with 25 out of the 30 rare species found in this community; 12 of these are endemic to the Panhandle (FNAI 2010). This community type is found along the watershed's major rivers and Eglin AFB.

Aquatic Communities	
Blackwater Streams	Blackwater streams are perennial or intermittent seasonal watercourses laden with tannins (natural organic chemicals), particulates, and dissolved organic matter and iron. These dissolved materials result from the streams' origins in extensive wetlands with organic soils that collect rainfall and discharge it slowly to the stream. The dark-colored water reduces light penetration, inhibits photosynthesis, and prevents the growth of submerged aquatic plants. Blackwater streams are frequently underlain by limestones and have sandy bottoms overlain by organics that have settled out of suspension. Blackwater streams are the most widely distributed and numerous riverine systems in the southeast Coastal Plain (FNAI 2010) and found draining into most creeks, streams and bayous in the watershed. Many of the watershed's smaller tributaries are true blackwater streams, including several streams that traverse the Blackwater River State Park.
Seepage Streams	Seepage streams may be perennial or intermittent seasonal as they originate from shallow groundwater percolating through sandy upland soils. Seepage streams are small magnitude features, and unlike other stream communities in Florida, they lack a deep aquifer water source and extensive swamp lowlands surrounding their head waters. Seepage streams are generally sheltered by a dense overstory of broad-leaved hardwoods which block out most sunlight. Filamentous green algae occur sporadically within the stream, while vegetation at the water's edge may include mosses, ferns and liverworts. Seepage streams are often associated with seepage slope and slope forest communities near their head waters, and bottomland forest, alluvial forest and floodplain swamp communities near their mouths. The waters of seepage streams is filtered by percolation through deep soils which slows the release of rainwater and buffers temperature extremes, creating low flow rates of clear, cool, unpolluted water. Seepage streams are generally confined to areas where topographic relief is pronounced such as northern Florida (FNAI 2010). Within the Pensacola Bay watershed, seepage streams are found along the watersheds' major rivers and Eglin AFB. Seepage streams run throughout the Blackwater River State Park. The Hynote Branch is one example of a seepage stream in the park that is good to excellent condition (FDEP 2016a).
Estuarine and Marine Communities	
Salt Marsh	Salt marsh is a largely herbaceous tidal zone community commonly consisting of saltmarsh cordgrass (<i>Spartina alterniflora</i>), which dominates the seaward edge, and needle rush (<i>Juncus roemerianus</i>), which dominates higher, less frequently flooded areas. Salt marshes form where the coastal zone is protected from large waves, either by the topography of the shoreline, a barrier island, or by location along a bay or estuary. Salt marshes support a number of rare animals and plants, and provide nesting habitat for migratory and endemic bird species. Many of Florida's extensive salt marshes are protected in aquatic preserves, but the loss of marshes and adjacent seagrass beds due to human impacts such as shoreline development, ditching, and pollution and natural stressors, such as sea level rise, have vastly reduced their numbers. Salt marshes are instrumental in attenuating wave energy and protecting shorelines from erosion (FNAI 2010) and are found in the coastal/ estuarine portion of the watershed. Salt marsh communities are common throughout the Pensacola Bay watershed and are particularly extensive at the Yellow River Marsh Aquatic Preserve (Gardner 1991).

Seagrass Beds	Seagrass beds consist of expansive stands of submerged aquatic vascular plants including turtlegrass (<i>Thalassia testudinum</i>), manateegrass (<i>Syringodium filiforme</i>), and shoalgrass (<i>Halodule wrightii</i>), which occur predominantly in subtidal zones in clear low-energy coastal waters. Seagrass beds occur on unconsolidated substrates and are highly susceptible to changes in water temperature, salinity, wave-energy, tidal activity, and available light. This natural community supports a wide variety of animal life including manatees, marine turtles, and many fish, particularly spotted sea trout (<i>Cynoscion nebulosus</i>), spot (<i>Micropogonias undulates</i>), sheepshead, (<i>Archosargus probatocephalus</i>), and redfish (<i>Sciaenops ocellatus</i>). Pollution, particularly sedimentation and wastewater/sewage, have led to the widespread loss of seagrasses in nearly every bay in the Florida Panhandle (FNAI 2010). Seagrass beds have historically been widespread throughout the Pensacola Bay system, but declined substantially in the mid-1900s due to poor water quality.
Oyster/Mollusk Reef	Oyster/mollusk reef consists of expansive concentrations of sessile mollusks, which settle and develop on consolidated substrates including rock, limestone, wood, and other mollusk shells. These communities occur in both the intertidal and subtidal zones to a depth of 40 feet. In Florida, the American oyster (<i>Crassostrea virginica</i>) dominates mollusk reef communities, but other organisms including species of sponge, anemones, mussels, the burrowing sponge anemones, mussels, clams, barnacles, crabs, amphipods, and starfish live among or within the reef itself. Mollusks are filter-feeders that remove toxins from polluted waters and improve overall water quality (FNAI 2010).
Unconsolidated (Marine) Substrate	Unconsolidated (marine) substrate consists of coralgall, marl, mud, mud/sand, sand or shell deposited in expansive, open areas of subtidal, intertidal, and supratidal zones. Unconsolidated substrates support large populations of tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs, but lack dense populations of sessile plant and animal species. Unconsolidated substrates are an important feeding ground for bottom-feeding fish, shorebirds, and invertebrates. These areas also grade into a variety of other natural communities, making them the foundation for the development of other marine and estuarine habitats. Unconsolidated substrate communities are found throughout the estuarine and riverine portions of the watershed. They are susceptible to many types of disturbances including vehicle traffic, low DO levels, as well as the accumulation of metals, oils, and pesticides in the sediment (FNAI 2010). Unconsolidated (marine) substrate can be found throughout Escambia Bay, Pensacola Bay, and Big Lagoon.

Source: FNAI 2010.

Appendix F Impaired Waterbody Segments in the Pensacola Bay Watershed

All states are required to submit lists of impaired waters that are too polluted or degraded to meet water quality standards and their designated use (potable, recreational, shellfish harvesting) to the EPA under section 303(d) of the CWA (EPA 2016b). The following table provides a list of impaired waters in the Pensacola Bay system. The list is based on data current through June 2012 (FDEP 2017).

Waterbody Segment ID	Water Segment Name	County	Waterbody Class ¹	Parameters Assessed Using the Impaired Waters Rule (IWR)
738AB	Bayview Park Pier	Escambia	3M	Bacteria (Beach Advisories)
548GB	Blackwater Bay (South Segment)	Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
548GB	Blackwater Bay (South Segment)	Santa Rosa	2	Fecal Coliform
24AB	Blackwater River (Tidal)	Santa Rosa	3M	Nutrients (Total Nitrogen)
639	Direct Runoff to Bay	Escambia	3F	Fecal Coliform
639	Direct Runoff to Bay	Escambia	3F	Lead
548H	East Bay	Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
701A	East Bay River (Marine Portion)	Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
701A	East Bay River (Marine Portion)	Santa Rosa	2	Enterococci
8007A	Emerald Promenade Beachwalk (Santa Rosa Island)	Okaloosa	3M	Bacteria (Beach Advisories)
548AA	Escambia Bay (North Segment)	Escambia, Santa Rosa	3M	Enterococci
548B	Escambia Bay (South Segment)	Escambia, Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
548AC	Escambia Bay North (Shellfish)	Escambia, Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
915C	Liza Jackson Park	Okaloosa	3M	Bacteria (Beach Advisories)
915D	Marler Park	Okaloosa	3M	Bacteria (Beach Advisories)
915B	Navarre Park Hwy. 98	Santa Rosa	3M	Bacteria (Beach Advisories)
548FB	Navy Point	Escambia	3M	Bacteria (Beach Advisories)
548D	Pensacola Bay (Middle Segment)	Escambia, Santa Rosa	3M	Nutrients (Chlorophyll-a)
548C	Pensacola Bay (North Segment)	Escambia, Santa Rosa	2	Bacteria (Shellfish Harvesting Classification)
176	Pond Creek	Santa Rosa	3F	Fecal Coliform
35	Pond Creek	Okaloosa, Walton	3F	Fecal Coliform
534	Sandy Point Bayou	Santa Rosa	3F	Iron
915	Santa Rosa Sound	Escambia, Okaloosa, Santa Rosa	2	Bacteria (in Shellfish)
160A	Shoal River	Okaloosa	3F	Escherichia coli
160B	Shoal River	Okaloosa	3F	Fecal Coliform
833A	Tom King Bayou	Santa Rosa	3M	Nutrients (Historic Chlorophyll-a)

Source: FDEP 2017

Notes:

* = new Florida listings since 2003

Footnote 1 - Florida's waterbody classifications:

1 - Potable water supplies

2 - Shellfish propagation or harvesting

3F - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in fresh water

3M - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water

4 - Agricultural water supplies

5 - Navigation, utility, and industrial use

Footnote 2 - TSI = trophic state index

The following table provides a list of EPA established TMDLs in the Pensacola Bay System watershed.

Waterbody Segment ID	Water Segment Name	County	Waterbody Class ¹	Pollutant
18	Big Coldwater Creek	Santa Rosa	3F	Fecal Coliform
18A	Big Coldwater Creek (East Fork)	Santa Rosa	3F	Fecal Coliform
19	Big Juniper Creek	Santa Rosa	3F	Fecal Coliform
24A	Blackwater River	Santa Rosa	3F	Fecal Coliform
24D	Blackwater River	Okaloosa	3F	Fecal Coliform
548A	Escambia Bay (North Segment)	Escambia, Santa Rosa	3M	Fecal Coliform
548B	Escambia Bay (South Segment)	Escambia, Santa Rosa	2	Fecal Coliform
846A	Jones Creek	Escambia	3F	Phosphorus, Total
846A	Jones Creek	Escambia	3F	Nitrogen, Total
846A	Jones Creek	Escambia	3F	Biochemical Oxygen Demand
127	Manning Creek	Santa Rosa	3F	Fecal Coliform
420	Pace Mill Creek	Santa Rosa	3F	Phosphorus, Total
420	Pace Mill Creek	Santa Rosa	3F	Nitrogen, Total
420	Pace Mill Creek	Santa Rosa	3F	Biochemical Oxygen Demand
548C	Pensacola Bay (North Segment)	Escambia, Santa Rosa	2	Fecal Coliform
11A	West Fork	Santa Rosa	3F	Fecal Coliform

Source: EPA 2016g

Footnote 1 – see Footnote 1 above.

Appendix G Conservation Lands within the Pensacola Bay Watershed

Within the Pensacola Bay watershed, there are approximately 519,702 acres of conservation lands including 245,154 acres of federally managed lands; 269,585 acres of state-managed lands; 1,218 acres of locally managed lands; and 3,158 acres of privately managed lands. Six conservation lands within the Pensacola Bay watershed span multiple counties and several extend into other watersheds. The details of these conservation lands are presented in the following table (FNAI 2016a):

Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
Federally Managed					
Air Force Special Operations Command, Hurlburt Field	U.S. Dept. of Defense, Air Force	Okaloosa	This facility is dominated by mesic flatwoods and floodplain swamp; it supports a large population of reticulated flatwoods salamanders.	http://www.hurlburt.af.mil/	6,165.83
Choctawhatchee National Forest	U.S. Dept. of Agriculture, Forest Service	Okaloosa Santa Rosa	Several small parcels of nationally protected forest located north of Choctawhatchee Bay and Pensacola Beach, east of Pensacola Bay, and south of Interstate 10.	http://www.fs.fed.us	139.02
Eglin Air Force Base	U.S. Dept. of Defense, Air Force	Escambia Okaloosa Santa Rosa Walton	Largest forested military reservation in the free world. Extends 51 miles east-west and 19 miles north-south. 86% is forested, 81% of that is sandhill, 15% is forested wetlands, flatwoods, or baygall. Contains 35 natural communities and 64 rare plant species	http://www.eglin.af.mil/	229,743
Gulf Islands National Seashore	U.S. Dept. of the Interior, National Park Service	Escambia Okaloosa Santa Rosa	This national seashore stretches 150 miles from Mississippi into Florida. In Florida, it extends from the eastern end of Perdido Key, across the mouth of Choctawhatchee Bay, to the east end of Santa Rosa Island. It also includes other barrier islands, historic sites on the Florida mainland, as well as the waters in between. Florida acreage within the national seashore boundary includes 28,893.68 acres of federal land and 37,655.56 acres of other public land.	http://www.nps.gov	4,531.32

Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
Harold Outlying Landing Field	U.S. Dept. of Defense, Navy	Santa Rosa	Naval reservation with grassy airfield surrounded by high quality old-growth longleaf pine, supporting a diverse sandhill ecosystem. Includes gopher tortoise and foraging habitat for red cockaded woodpecker. A small steephead ravine occurs in the northwest corner. Included in the Naval Air Station (NAS) Whiting Field Integrated Natural Resources Management Plan (INRMP).	http://www.cnric.navy.mil/regions/cnrse/installations/nas_whiting_field.html	582.21
Holley Outlying Landing Field	U.S. Dept. of Defense, Navy	Santa Rosa	Naval reservation with a solar array facility on the former airfield, surrounded by a sandhill ecosystem with a gopher tortoise population. A large wet prairie/wet flatwoods mosaic in the southern portion contains many rare plants and animals including flatwoods salamander, Chapman's butterwort, white-topped pitcher plant, and Florida black bear. Included in the NAS Whiting Field INRMP.	http://www.cnric.navy.mil/regions/cnrse/installations/nas_whiting_field.html	661.44
NAS Pensacola	U.S. Dept. of Defense, Navy	Escambia	This facility is located at the mouth of Pensacola Bay on a peninsula formed by Bayou Grande and the bay. Although most of the site has been developed for mission-related activities, a wide variety of habitats remain. Natural communities include beach dune, maritime hammock, sand pine scrub, mesic flatwoods, and sandhill. Correy Station, Saufley Field, Bronson Outlying Landing Field, and Blue Angel Recreation Park are included in the NAS Pensacola INRMP.	http://www.cnric.navy.mil/regions/cnrse/installations/nas_pensacola.html	4,769.05

Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
NAS Whiting Field	U.S. Dept. of Defense, Navy	Santa Rosa	Most of this facility has been developed for mission-related activities but significant natural features remain. These include over 900 acres of managed forests, a thriving gopher tortoise population, and critical watershed buffers. An interpretive boardwalk is located within a large beaver-impounded wetland on the western boundary. The facility includes the main base plus six outlying landing fields (Harold, Holley, Pace, Santa Rosa, Site 8A, and Spencer) and Whiting Park.	http://www.cnric.navy.mil/regions/cnrse/installations/nas_whiting_field.html	3,461.43
Information Warfare Training Center Corry Station	U.S. Dept. of Defense, Navy	Escambia	Former naval airfield that has been converted to a Department of Defense Training Center. Has approximately 72 acre of planted second-growth slash pine and 0.5 acres of wetlands. The property also has a U.S. Naval Hospital, Veterans' Administration Joint Ambulatory Care Center, Navy Commissary and Exchange and Housing. Included in the NAS Pensacola INRMP and part of the Bayou Chico BMAP	http://www.netc.navy.mil/centers/ceninfodom/corry/	565.53
Patterson Natural Area	U.S. Dept. of Defense, Air Force	Okaloosa	150-200 year old longleaf pine stand. The natural area is part of Eglin Air Force Base.	http://www.eglin.af.mil/	290.51
Santa Rosa Outlying Landing Field	U.S. Dept. of Defense, Navy	Santa Rosa	A naval reservation that is primarily a single airfield, but does contain large forested areas in the northeast and southeast corners. Gopher frog and Florida pine snake occur here. Included in the NAS Whiting Field INRMP.	http://www.cnric.navy.mil/regions/cnrse/installations/nas_whiting_field.html	693.26
Whiting Park	U.S. Dept. of Defense, Navy	Santa Rosa	Naval recreation area along Blackwater River with boat launch and picnic facilities. Included in the NAS Whiting Field INRMP.	http://www.cnric.navy.mil/regions/cnrse/installations/nas_whiting_field/ffr/things_to_do/recreation/parks_and_picnic_areas.html	5.47

Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
State Managed					
Blackwater Heritage State Trail	FDEP Division of Recreation and Parks	Santa Rosa	This is an 8.1-mile long paved recreational trail located along a former railroad corridor. It is the westernmost rail-trail in Florida and part of an integrated statewide network of trails and ecological greenways.	http://www.floridastateparks.org/	586.08
Blackwater River State Forest	FDACS Florida Forest Service	Okaloosa Santa Rosa	This is the largest expanse of sandhills, longleaf pine upland forests, and seepage slopes in state ownership.	http://www.floridaforestservice.com/index.html	635.83
Blackwater River State Park	FDEP Division of Recreation and Parks	Santa Rosa	Ponds, swamps, scrubby ridges; high pineland and pine flatwoods; Atlantic white cedars; on the Blackwater River.	http://www.floridastateparks.org/	635.11
Blackwater River Water Management Area	NFWMD	Santa Rosa	Primarily cut-over paper lands in the uplands, but nice areas of floodplain forest and bottomland forest along the river. Rare plants include Florida flame azalea.	http://www.nfwwater.com/	386.46
Cottage Hill State Forest	FDACS Florida Forest Service	Escambia	A small tract of state forest land managed through the Blackwater Forestry Center Field Unit, south of McKenzie Road, west of Chavers Road, and east of Gainey Lane.	http://www.floridaforestservice.com/index.html	30.83
Escribano Point Wildlife Management Area	FWC	Santa Rosa	Southern region has large expanses of wet flatwoods with lots of pitcher plants grading into baygall. Northern region is an impenetrable thicket of titi that has regenerated after the site was logged in the 1990s.	http://myfwc.com	3,924.52
FWC Mitigation Parcel	FWC	Okaloosa	Mitigation parcel surrounded by Blackwater River State Forest.	http://myfwc.com	110.37
Garcon Point Water Management Area	NFWMD	Santa Rosa	This is a peninsula separating East Bay and Escambia Bay. It is an example of high quality wet prairie habitat that contains several very rare species, as well as carnivorous pitcher plants. Includes 78 acres less-than-fee.	http://www.nfwwater.com/	3,222.80

October 5, 2017

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Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
Gillis Road Tract	Undesignated State Land (not currently assigned to a managing agency)	Santa Rosa	Land formerly managed by FDACS, Division of Forestry, north of Old Hickory Hammock Road, west of Black Oak Road, and southeast of Interstate 10.	http://data.labins.org/mapping/FNAI/identify_list2.cfm?MA_ID=1188	19.97
Lake Stone Fish Management Area	FWC	Escambia	A 130-acre lake surrounded by 119 acres of uplands with a mixture of upland mixed forest and baygall. This lake is intensively managed for fish production. Jointly managed by FWC and Escambia County.	http://myfwc.com	248.02
Lower Escambia River Water Management Area	NFWMD	Escambia Santa Rosa	Floodplain forest, bottomland forest, and some uplands along almost the entire length of the Escambia River near Pensacola. Several rare fish, reptiles, and amphibians have been documented here.	http://www.nfwwater.com/	36,666.89
Watson Conservation Easement	NFWMD	Escambia	A conservation easement with no public access and all less-than-fee. Easement is located immediately west of the Lower Escambia River Water Management Area, east of North Century Boulevard/U.S.-29, north of Milstead Road, south of Brown Road.	http://www.nfwwater.com/	15.81
Yellow River Marsh Preserve State Park	FDEP Division of Recreation and Parks	Santa Rosa	Also known as Garcon Point Prairie, this is perhaps the largest intact wet prairie (pitcher plant prairie) in northwest Florida. The preserve adjoins Northwest Florida Water Management District lands. Hydrologic restoration is planned to offset impacts of past ditching and drainage.	http://www.floridastateparks.org/	832.14
Yellow River Water Management Area	NFWMD/FWC	Okaloosa Santa Rosa	A tremendously diverse tract of land with upland pine forest, upland hardwood forest, seepage slopes, floodplain marsh, tidal marsh, streams, and lakes.	http://www.nfwwater.com/	16,643.05
Locally Managed					
Bay Bluffs Park	City of Pensacola	Escambia	Located on the west shore of Escambia Bay, this park is bordered on the north and south by Escambia Bay Bluffs.	http://cityofpensacola.com/Facilities/Facility/Details/Bay-Bluffs-Preserve-18	19.79

October 5, 2017

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Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
Baycliff Preserve	City of Gulf Breeze	Santa Rosa	This site is a natural wetlands area with a nature trail and public beach access.	http://cityofgulfbreeze.us/	6.81
Escambia Bay Bluffs	City of Pensacola	Escambia	Three parcels on west shore of Escambia Bay.	http://pensacolascenicbluffs.org/	41.73
Jones Swamp Wetland Preserve and Escambia County Southwest Greenway	Escambia County Community and Environment Department	Escambia	This preserve and greenway is located in a 1,300-acre watershed targeted for acquisition to provide wetland buffering and protection for the Pensacola Bay area. The greenway is available for passive use recreation and has several miles of boardwalk and hiking trails.	http://www.myesambia.com/government/departments/ce	581.90
Mallory Heights Park #3	City of Pensacola	Escambia	Located on the west shore of Escambia Bay, this park is bordered on the north and south by Escambia Bay Bluffs.	http://cityofpensacola.com/132/Parks-Recreation?parkID=13246	7.01
Navarre Beach Park	Santa Rosa County	Santa Rosa	Restored coastal dunes located within the Gulf Islands National Seashore, south of Navarre Parkway, west of the Navarre Beach Pier and east of Bahia Drive.	http://www.santarosaf.l.gov/	136.90
Shoal River Land Acquisition	Okaloosa County	Okaloosa	Restrictive use easement purchased by Okaloosa County Water and Sewer located north of the Eglin Air Force Base Conservation Land, intersected in its northern portion by Interstate 10, east of Balboa Road and south of James Kennedy Road.	http://www.co.okaloosa.fl.us/ws/home	321.18
Shoreline Park South	City of Gulf Breeze	Santa Rosa	This park is a mostly wooded area that extends from Shoreline Drive south to the edge of Santa Rosa Sound. An open area near the water contains a boat ramp, picnic tables, fishing pier, swimming area, and a large gazebo. A nature trail winds through the property.	http://cityofgulfbreeze.us/parks-and-recreation-department/	103.24

Conservation Land	Managing Agency	County(ies)	Description	Website	Acres Within Watershed
Privately Managed					
Camp Kolomoki	Girl Scouts of America	Walton	This site is used as a Girl Scout Camp. It contains a pitcher plant prairie.	http://www.gscfp.org/camps.html	1,635.26
Garcon Peninsula Mitigation Bank	Garcon Peninsula Mitigation Bank, LLC	Santa Rosa	Mitigation bank land owned by private individuals, located west of Blackwater Bay, north and west of Robinson Point Road (which runs east/west then turns and runs north/south), south of Trease Road, and east of Garcon Point Road.	http://www.garconmitigationbank.com/	334.70
Pensacola Bay Mitigation Bank	Westervelt Ecological Services	Santa Rosa	Mitigation bank. The site is in the Pensacola Bay Basin in a flat, near-coastal landscape adjacent to low-density residential and preservation lands with a major highway dividing two parcels. The site consisted of fire-suppressed, overgrown, but intact (with wiregrass) wet prairie and wet flatwoods, with some ORV-damaged areas. Also contains cypress dome/stringer depressions and a titi-baygall area isolated from fire.	http://www.wesmitigation.com/mitigation-conservation-projects/pensacola-bay-mitigation-bank.cfm#page=general	1188.73

Source: FNAI 2016c

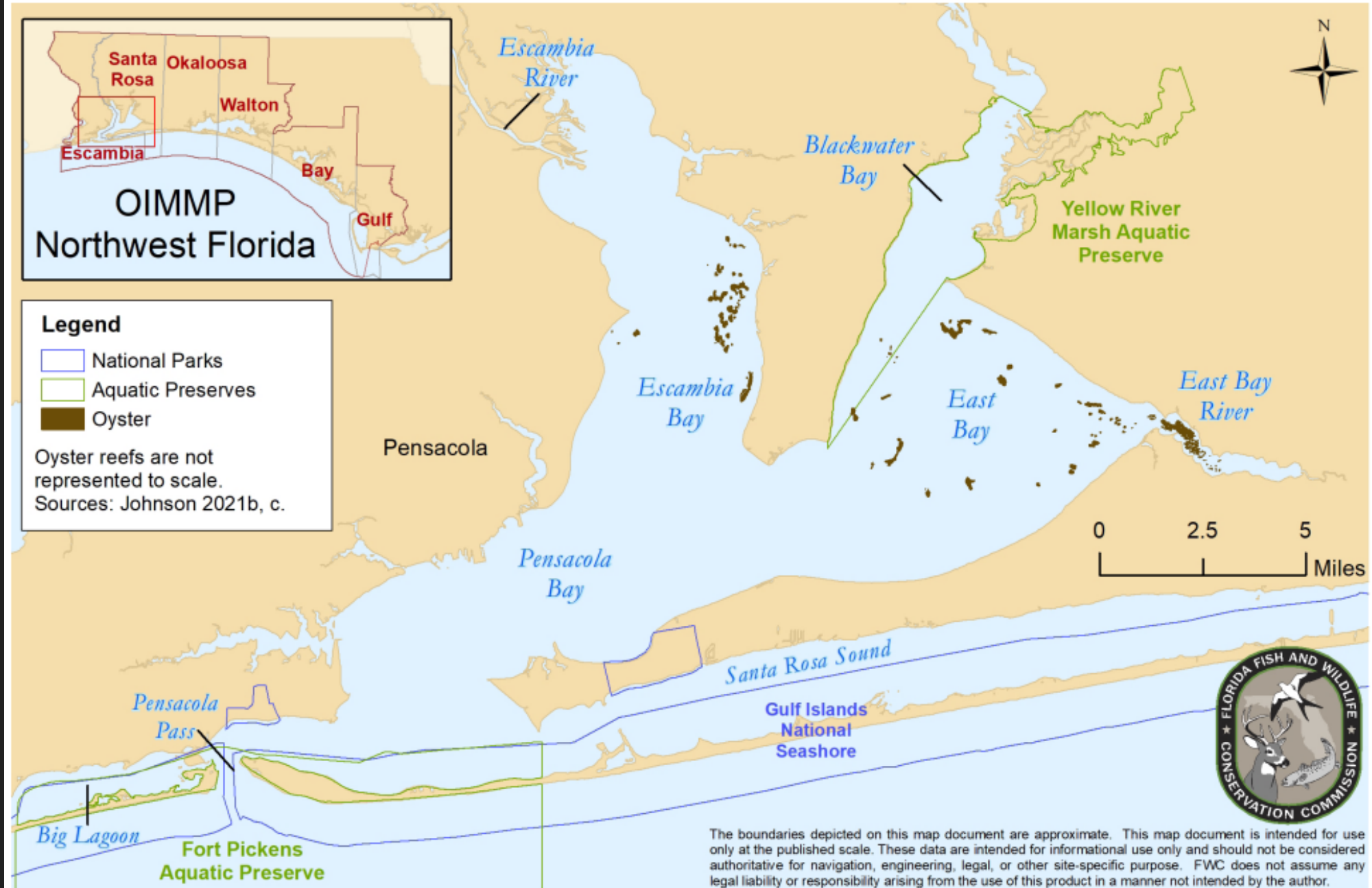
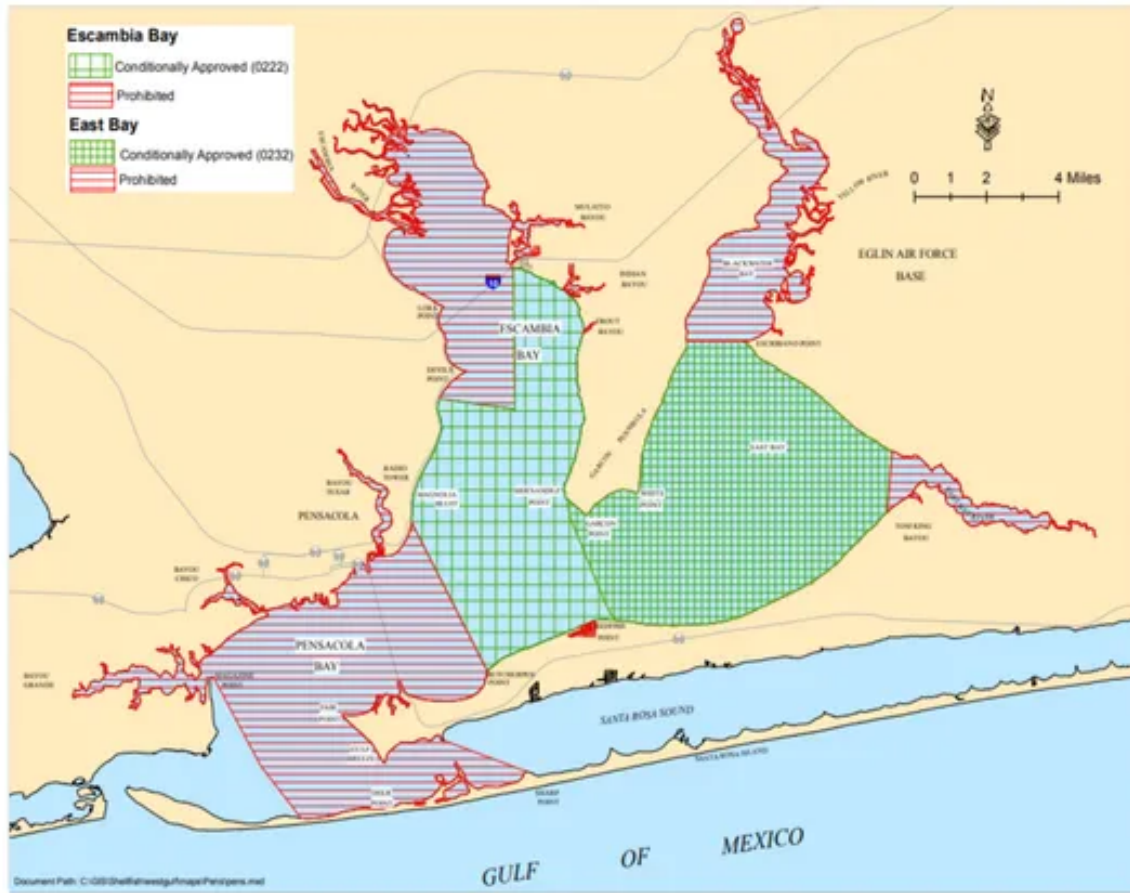
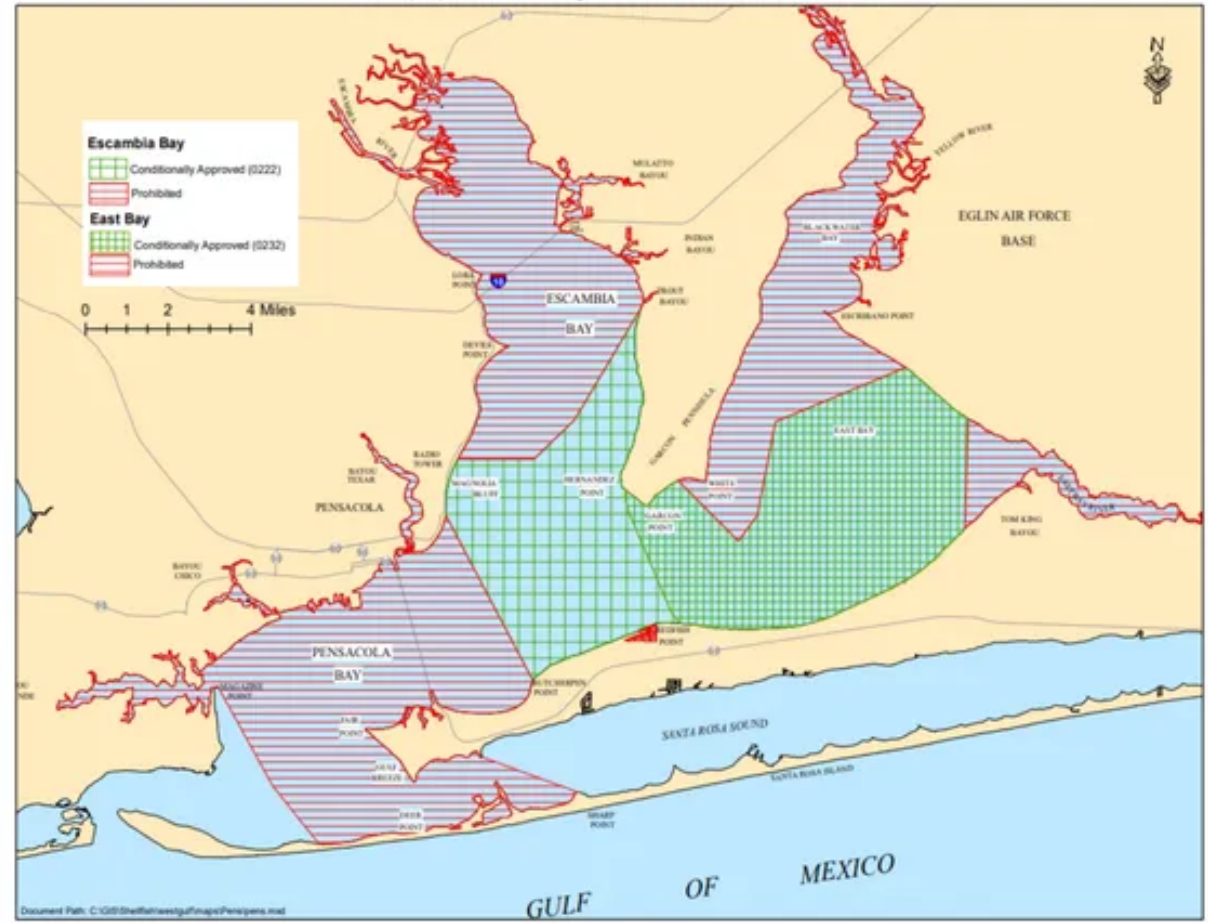


Figure 2.5. Bays and mapped oyster extent in the Pensacola Bay System. Oyster mapping sources: Johnson (2021b, c), mapped from side-scan sonar in 2020–2021.

SHELLFISH HARVESTING AREA CLASSIFICATION MAP #02 (Survey: July 22, 2016)
Pensacola (#02) Shellfish Harvesting Area in Escambia and Santa Rosa Counties



PROPOSED SHELLFISH HARVESTING AREA CLASSIFICATION MAP
Pensacola (#02) Shellfish Harvesting Area in Escambia and Santa Rosa Counties



COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN COMPLETED

The Pensacola & Perdido Bays Estuary Program (PPBEP) is pleased to announce the completion of the first ever Comprehensive Conservation and Management Plan (CCMP) for the Pensacola and Perdido Bay Watersheds, including a target of restoring 1400 acres of oyster habitat in the Pensacola Bay System by 2032.

The PPBEP Policy Board approved the CCMP at the Program's Policy Board Meeting on Wednesday, October 26th in the City of Pensacola Council Chambers. The CCMP is available on the Estuary Program website at <https://www.ppbep.org/the-plan/ccmp>.

PPBEP's CCMP – A Prescription for Healthy Bays, is intended to serve as a guide for implementing monitoring, research, reporting, restoration, education and outreach, and policy priorities that enhance the community's quality of life and economic prosperity, while improving the health and sustainability of the Pensacola and Perdido Bay Watersheds. The CCMP recommends priority actions developed in partnership with community stakeholders to address stressors that impair our waters. The identified actions are important steps to restoring our land and water, while maintaining a balance between humans and nature.

This ten-year science-based, community-driven guiding document allows stakeholders to work collectively, across jurisdictional boundaries, toward a shared vision for the recovery of our waters. The completion of the CCMP allows PPBEP and its partners to leverage resources and funding opportunities to make this vision a reality.

"Environmental stewardship is critical to our quality of life and economy along the Gulf Coast. Having the CCMP in place establishes a blueprint for forming partnerships and leveraging resources to create long-lasting improvements to the health and resilience of our estuaries and communities," said Robert Bender, Chairman of the Pensacola & Perdido Bays Estuary Program Policy Board.

"On behalf of the Estuary Program, we wish to thank all of our stakeholders and staff who have put in an incredible amount of work to produce this CCMP. Having the CCMP in place positions our communities to take advantage of unprecedented funding opportunities to address long standing water quality impairments and habitat degradation. The work is just beginning, but we have a bright future ahead," said Matt Posner, Executive Director of the Pensacola & Perdido Bays Estuary Program.

Recap of the October 26 Policy Board Meeting

Matt Posner, Executive Director

Pensacola & Perdido Bay Estuary Program

- FY22-23 Operating Budget: fully funded for FY22-23
- Local Government Contributions: commitments from Santa Rosa at \$60,000; Pensacola at \$30,000; Escambia at \$25,000 (working to get up to \$50,000); and Orange Beach at \$10,000.
- State of the Bays Report Card will be published first of the year
- Board voted unanimously to approve the Comprehensive Conservation and Management Plan (CCMP)! We will ask each Council and Commission to adopt a resolution of support (non-binding). I will be circulating this request in the coming weeks.
- Board voted to establish an Environmental Justice Committee
- Board approved a DEP grant award in the amount of \$495,000 to fund the PPBEP Community Grant Program and fund the planning of a large-scale oyster restoration in the Pensacola Bay System
- Board approved a scope of work for a DEP Resilient Florida grant to produce a compound-flood model and adaptation plan for the Pensacola and Perdido watersheds. This will directly benefit Milton. Milton staff will be engaged once the project gets underway
- Board approved a subaward with FSU to complete the compound flood model component of the above project
- Board approved issuing a PO to Background Stories to develop the website to host the State of the Bays Report Card
- Board approved a minor budget modification to the PPBEP EPA grant to reallocate unspent funds to fund water quality monitoring equipment and supplies, and education and outreach materials

August 30, 2022

FOR IMMEDIATE RELEASE

Contact: Christian Wagley, christian@healthygulf.org (850) 687-9968

******MEDIA ADVISORY******

Local organizations call for solutions to closure of oyster harvest areas

The undersigned organizations and businesses call on local and state officials to identify solutions to increased bacterial contamination causing the State of Florida to close additional areas of the Pensacola Bay system to the harvest of oysters. These new closed areas are triggering the relocation of an existing oyster farm in East Bay, significantly reducing the areas available for the harvest of oysters, and come as millions of dollars are being spent to restore oyster reefs and establish shellfish aquaculture in local bays.

The Florida Department of Agriculture and Consumer Services (FDACS) recently announced that water quality monitoring indicates that bacterial contamination in areas of Escambia and East Bays requires the expansion of prohibited areas where the harvest of oysters and other shellfish is no longer allowed. As elevated levels of certain bacteria can indicate the presence of disease-causing organisms, this action is being taken in order to “protect the health of shellfish consumers,” according to FDACS. The Department is currently undergoing the state rulemaking process to expand these prohibited areas, with the designation made final this fall.

We call on Santa Rosa and Escambia Counties, the State of Florida and the local community to take the following steps to help remedy this issue:

- 1) To fund and initiate additional research to pinpoint the specific sources of elevated bacteria levels in these areas;
- 2) To dedicate staff and other resources toward identifying the most cost-effective solutions for reducing bacteria levels. That could include the expansion of sewer service to low-lying and waterfront areas and better stormwater controls, among other solutions;
- 3) FDACS should continue to monitor bacteria levels inside the new prohibited areas. Such monitoring could reveal future improvements in water quality that could allow these areas to reopen to shellfish harvest.

In the spirit of finding solutions, our respective organizations pledge to convene a meeting this fall to bring together stakeholders to identify the best ways to reduce bacterial contamination in local bays and to eventually allow these newly-closed areas to reopen to oyster harvest.

We've asked a few stakeholders to share their thoughts on the expansion of prohibited shellfish harvest areas and its impact on our waterways and the oyster industry:

"In my educated/experienced opinion this new closure is due to the increased population density along and near our miles of pristine coast with no infrastructure to support the growth (sewer systems). The mound system septic systems that have been used and are still being permitted today are only leaching sewage into our rivers and bays.

Our bays have been on the decline for several years now and now we are seeing a reduction not only with oyster harvest but finfish harvest in recent years has been decreasing, as evidenced by FWC trip reports.

If action to correct this problem is not taken immediately, we stand to lose a great ecological asset that this county has been blessed with."

--Capt. Pasco Gibson, lifelong waterman, Santa Rosa County

"As a small business owner and a first-year start-up, in the already difficult oyster aquaculture industry, the closing of historic oyster harvest area has affected me adversely not only from a monetary standpoint (having to come up with startup cost a second time) but as an environmentalist. Watching my home and what was once considered pristine turn into dead and barren waterways is heart wrenching. We should be looking at unorthodox, natural solutions to water quality issues such as living shorelines, wetland filtration for sewage plants and stormwater runoff, and buffer zones and ordinances for preserving existing vegetation in subdivisions/developments. The continued degradation of the bays and estuaries will only continue to harm all who live, work and recreate here for generations. If something isn't done on a bigger scale to improve the damage or stop the progression of pollution, the area will close permanently to harvest and what was the second largest producing area of oyster (next to Apalachicola Bay) will no longer be harvestable at all."

--Shana Alford, Founder and Owner, Avalon Aquaculture

"Save our Soundside, Inc., started as a grass-roots organization whose goal was to prevent the clear cutting of large tracts of land on the peninsula due to the results we observed first hand, including the degradation of our land and waterways. The official position of the FDACS is that they have no role in managing coastal natural resources with respect to upland development. Nor do our local leaders have the political will to increase buffers or decrease clear cutting for fear of hampering development. While we are convinced that leaching septic tanks are contributing to higher bacterial counts in our waterways, SOS also believes that stormwater and sediment runoff, clear cutting, destruction of wetlands, and run-away development causes collateral damage that degrades the overall health of our waterways. Thus, we need research to pinpoint sources of bacterial contamination and other factors that contribute to the deterioration of our waterways."

--Dara Lynn Hartigan, President, Save our Soundside, Inc.

We are:

Shana Alford, Owner, Avalon Aquaculture, shanaalford850@gmail.com

Pasco Gibson, commercial fisherman, pgibs10@yahoo.com

Dara Hartigan, President, Save Our Soundside, dara.hartigan@gmail.com

Doug Lasater, President, Bagdad Waterfronts Florida Partnership, Inc., lasatde@gmail.com

Ken Ponsell, Owner, Blackwater Bay Tours, blackwaterbaytours@gmail.com

Mack Thetford, President, Blackwater River Foundation, blackwaterriverfoundation@gmail.org

Christian Wagley, Healthy Gulf, christian@healthygulf.org

and

Santa Rosa County Watershed Protection Committee

Santa Rosa County Citizens Coalition

Alliance 4 Healthy Beaches and Clean Drinking Water

Coalition 4 Santa Rosa's Water Future

Navarre Residents for Reasonable Development

Additional information to include official FDACS rulemaking documents and a map of the proposed prohibited harvest areas are attached. Questions for FDACS should be directed to the Department's Communications point of contact--Erin Moffet--erin.moffet@fdacs.gov (850) 766-7358



Comprehensive Management Plan

MEETING DATE	PREPARED BY
November 17, 2022	Clerk's Office Dawn Molinero, City Clerk



PENSACOLA & PERDIDO BAYS ESTUARY PROGRAM

2022 COMPREHENSIVE CONSERVATION & MANAGEMENT PLAN

A Prescription for Healthy Bays





Deployment of Oyster Spat
Monitoring Arrays

PPBEP

Contents

Preface	4	Stakeholder Participatory Process and Evaluation	32
Acknowledgements	5	Regional and Gulf-Wide Management Plans	35
CCMP Purpose	6		
Executive Summary	7		
Introduction	9	Watersheds 101	37
History of the Program	10	Gulf Coastal Plain	39
Vision Statement	13	Perdido Bay Watershed	42
Mission Statement	14	Pensacola Bay Watershed	48
Management Conference	15	Habitats and Communities	55
PPBEP Staff	19	Legacy Watershed Issues	62
Partnerships	20	Chronic Watershed Issues	67
The Watersheds	21	Restoring What Was Lost	78
History of the Pensacola and Perdido Bays Watersheds	22		
Voices of the Bays	25	Action Plan	85
Engaging the Community:		Action Plan Summary	87
The Road to Completing the CCMP	26	Education and Outreach Strategy Summary	95
Community Values Survey	28	Goal 1: Source of Watershed-Related Information	98
Core Dialogue Sessions and Branding	30	Goal 2: Strengthen Community Resilience	110
		Goal 3: Improve Water Quality	134
		Goal 4: Reduce Sedimentation	145

Cover Image: Escribano Point (Darryl Boudreau, NFWFMD)

Goal 5: Conserve and Restore Critical Habitat 156

Goal 6: Restore and Conserve Fish and Wildlife 179

Accomplishments 187

National Aquatic Resource Surveys 188

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System 190

Oyster Mapping and Condition Assessment 192

Oyster Documentary 193

Upper Watershed Streams Assessment 194

Trawling Survey 195

Living Shoreline Suitability Model 196

Seagrass Extent Mapping 197

Seagrass Monitoring 198

Building Resilience into Seagrass Bed Restoration 199

Community Grant Program 200

Resilience in Sea-Level Rise Education 203

Resilience Readiness 204

Trash Free Waters 206

Storm Drain Marking Program 208

Appendices 209

Appendix 1. University of West Florida Haas Center Community Values Survey 209

Appendix 2. Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System 209

Appendix 3. Education and Outreach Strategy 209

Appendix 4. Comprehensive Monitoring Strategy 209

Appendix 5. Financial Strategy 209

Appendix 6. CCMP Public Comment Summary 209

References 210

List of Figures 219

List of Tables 219

Acronyms 220

Suggested citation: Pensacola & Perdido Bays Estuary Program. 2022. Comprehensive Conservation and Management Plan: A Prescription for Healthy Bays.



Tarkiln Bayou
PPBEP

Preface

Executive Director's Message

On behalf of the Pensacola & Perdido Bays Estuary Program (PPBEP), we are pleased to release our first Comprehensive Conservation and Management Plan (CCMP) for the Pensacola and Perdido Bays watersheds – A Prescription for Healthy Bays.

Following the Deepwater Horizon Oil Spill in 2010, community leaders convened to identify actions that could have a transformational impact on our environment, economy, and community.

Seeing successes of environmental stewardship and economic development in other communities across the country, and wanting to build on a foundation laid by numerous organizations and individuals, it was apparent a stakeholder-driven, science-based organization was needed to help coordinate identification of environmental stressors, form partnerships, leverage resources, implement priority actions, and monitor the health of our watersheds.

Eight years later, that idea turned into reality. In 2018, the then Bay Area Resource Council (BARC) transitioned into the PPBEP thanks to the dedication of BARC members to secure Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) funds from the U.S. Environmental Protection Agency Gulf of Mexico Division and the Gulf Coast Ecosystem Restoration Council.

Since then, the PPBEP Management Conference and staff have worked diligently to produce this road map for improving the health and resilience of our bays, watersheds, and communities. Great care has been taken to ensure

recommended actions are based on community values and driven by the best available science. The resulting plan has prescribed 6 goals, 23 objectives, and 51 actions that are necessary steps toward attaining a future with clean waters, thriving habitats, and resilient communities for all.

To all PPBEP Management Conference stakeholders that have participated in this nearly three-year planning effort – thank you for your unwavering dedication to this process and the Program.

Like never before, we have an opportunity in front of us to make historic investments in our communities. It will take a collective effort to secure financial resources and political support to attain the goals and implement the actions identified in this CCMP. By working together, we can demonstrate to the community, the region, and the Nation that environmental stewardship and economic development go hand-in-hand, allowing us to improve our environment and quality of life for generations to come.

We look forward to working with all of our partners to protect what matters most. We dedicate this CCMP to our beloved friend and colleague, Jessica Bibza.

Sincerely,



Matt J. Posner
Executive Director

Upper Perdido Bay

Darryl Boudreau, NWFWMMD

Acknowledgements

The Pensacola & Perdido Bays Estuary Program (PPBEP) would like to thank all the individuals and organizations that contributed to the development of PPBEP's first Comprehensive Conservation and Management Plan (CCMP) – A Prescription for Healthy Bays.

Your dedication to this process and value to the community cannot be overstated and has resulted in the Plan that follows, setting the stage for continued successful collaboration to protect and restore the Pensacola and Perdido Bays watersheds. PPBEP's Management Conference and staff express their gratitude for the hard work and dedication of all who participated in the CCMP development process.

Funding for the 2022 PPBEP CCMP and establishment of the Program was made possible by the Gulf Coast Ecosystem Restoration Council and the U.S. Environmental Protection Agency (EPA) Gulf of Mexico Division through Cooperative Agreement Number 00D81118.

PPBEP would like to offer special thanks to:

- ➔ The EPA Gulf of Mexico Division and Gulf Coast Ecosystem Restoration Council staff for consistent leadership and support throughout the process: Amy Newbold, Marc Wyatt, John Bowie, and Ben Scaggs
- ➔ The Bay Area Resource Council's Board and Technical Advisory Committee for countless hours of in-kind support to develop the proposal to establish the Estuary Program
- ➔ Jessica Bibza, Darryl Boudreau, Jane Caffrey, Amanda Croteau, Matt Deitch, Haley Gancel, Tesfay Gebremicael, Holly Greening, Ken Heck, Chasidy Hobbs, Mike Murrell, Amy Newbold, and Carrie Stevenson for technical, stakeholder, and editorial assistance
- ➔ Senator Broxson, Representative Andrade, Representative Williamson, and Representative Salzman for their support of PPBEP's FL State Appropriations, which has made it possible to fund many of the accomplishments included in the CCMP

- ➔ The Nature Conservancy and members of the Stakeholder Work Group for their dedication to producing the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System, which has been incorporated into the CCMP
- ➔ The Coastal and Heartland, Choctawhatchee Bay, Indian River Lagoon, Mobile Bay, Tampa Bay, Sarasota Bay, and St. Andrew and St. Joseph Bays Estuary Programs that offered invaluable support, encouragement, and lessons learned

Finally, PPBEP would like to thank all members of the PPBEP Management Conference – Policy Board, Technical Committee, Education and Outreach Committee, Oyster Sub-Committee, Finance Sub-Committee, and Business Partnership Program – for their immeasurable contributions.



Annual Management
Conference Meeting
PPBEP

CCMP Purpose

The Pensacola & Perdido Bays Estuary Program (PPBEP) Comprehensive Conservation and Management Plan (CCMP) – A Prescription for Healthy Bays – is intended to serve as a guide for implementing monitoring, research, reporting, restoration, education and outreach, and policy priorities that enhance the community's quality of life and economic prosperity, while improving the health and sustainability of the Pensacola and Perdido Bays watersheds.*

The CCMP recommends priority actions developed in partnership with community stakeholders to address stressors that impair our waters. The identified actions are important steps to restoring the land and water, while maintaining a balance between humans and nature.

This guiding document allows stakeholders to work collectively, across jurisdictional boundaries, toward a shared vision for the recovery of our waters. The CCMP also allows PPBEP and its partners to leverage funding opportunities to make this vision a reality.

* Pensacola and Perdido Bays watersheds refers to land or water within the watershed boundary. Pensacola and Perdido Bays systems refers to coastal and estuarine waterbodies.

How the CCMP Influences Change



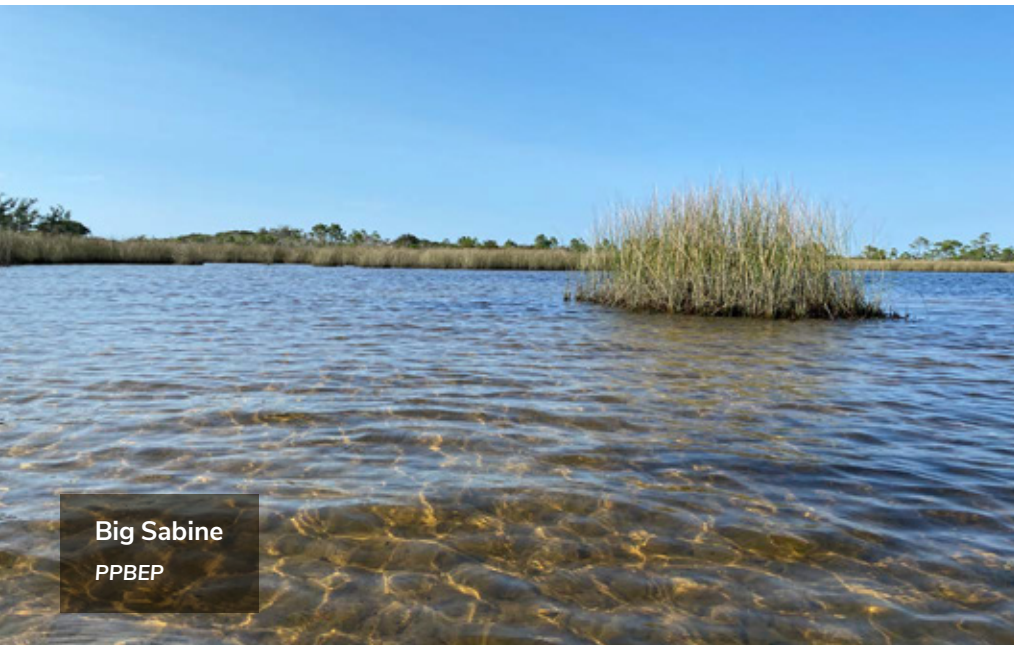
Investing in Our Future

An investment in the implementation of the CCMP is an investment in a future with clean water, healthy habitats, resilient communities, and a thriving economy.

Executive Summary

The Pensacola & Perdido Bays Estuary Program (PPBEP) Comprehensive Conservation and Management Plan (CCMP) – A Prescription for Healthy Bays – serves as a ten-year action plan for improving the health and resilience of the Pensacola and Perdido Bays watersheds. The PPBEP CCMP is a living document, with a five-year update planned in 2027 and a ten-year full revision planned in 2032.

The 6 goals, 23 objectives, and 51 actions prescribed in this CCMP are the culmination of a three-year planning process in which PPBEP engaged hundreds of stakeholders to identify community values and uses of the bay systems and watersheds; prioritize environmental stressors of importance to stakeholders; identify associated root causes through a thorough review of the best available science; establish comprehensive goals for environmental indicator improvements; and prioritize implementable actions to be undertaken by the PPBEP Management Conference.



Big Sabine
PPBEP

This CCMP is broken into four primary sections:

Voices of the Bays

The Estuary Program worked with the University of West Florida (UWF) Haas Center to administer a community values and uses survey between 2020 to 2021 that was completed by over 750 respondents. Natural beauty, ecosystem services, and fishable waters were the most valued aspects of the Pensacola and Perdido Bays watersheds.

Trash free land and water, healthy habitats, wildlife abundance, wildlife diversity, and natural riverbanks and shorelines were perceived as very important for healthy watersheds. Industrial discharges, coastal development, sewage treatment discharges, population increases, and upstream development were perceived as the greatest environmental challenges. Water quality improvements, natural habitat restoration, resilience, green infrastructure, and community outreach and education initiatives were the top investment priorities ranked by survey respondents.

Watersheds 101

During the review of available science and associated Technical Committee workshop series completed between 2020 and 2021, four focus areas emerged: water quality and quantity; habitat; sediment quality and quantity; and fish and wildlife.

Prioritized stressors include water quality degradation attributed to sediment, pathogen, and nutrient loading from stormwater runoff and failing and inadequate wastewater infrastructure; habitat fragmentation and degradation from land use conversion and inadequate land development practices; increased sedimentation from stormwater runoff; eroding stream banks from inadequate buffering and land management best management practice standards; and degraded sediment quality and fish and wildlife abundance from legacy impairments that have decreased the resilience of ecosystem function.

Action Plan

As a result of stakeholder engagement and identified environmental stressors, the PPBEP Management Conference has established the following six goals of this CCMP:

1. PPBEP should be an unbiased, trusted, centralized source of watershed-related information for the community
2. Strengthen community resilience to quickly recover from shocks and stressors impacting the Pensacola and Perdido Bays watersheds
3. Improve water quality in the Pensacola and Perdido Bays watersheds to support economically and ecologically important and resilient ecosystems and communities
4. Reduce sedimentation in the Pensacola and Perdido Bays watersheds by identifying sediment sources and assessing impacts on our waterways and critically important habitats
5. Conserve and restore critical habitat extent and condition to support wildlife across the Pensacola and Perdido Bays watersheds
6. Restore and conserve fish and wildlife by coordinating monitoring and conservation efforts across the Pensacola and Perdido Bays watersheds

In addition to the six main goal areas, PPBEP also developed an Education and Outreach Strategy that includes goals, objectives, and actions that aim to increase public understanding and environmental stewardship.

Implementation of each action identified in the Action Plan will be further defined during development of the Program's Annual Workplans, and CCMP progress will be tracked and reported in the Program's Annual Reports.

Accomplishments

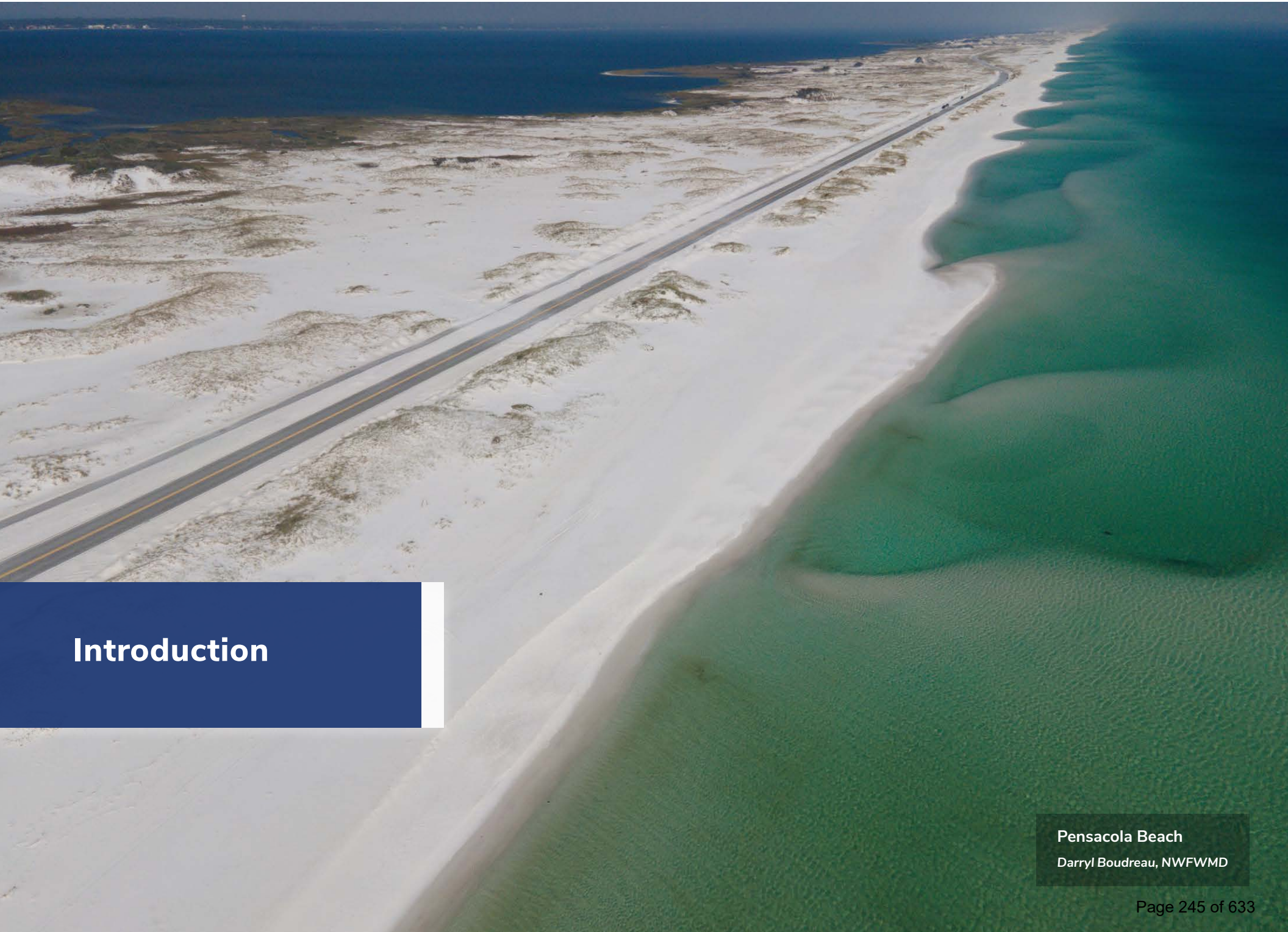
In conjunction with the development of the CCMP, PPBEP and its partners have been working to implement priority actions, fill data gaps, and engage the community. Since 2020, PPBEP has capitalized on partnership opportunities to implement monitoring, develop strategic plans for restoring oysters and seagrasses, engage our communities, and initiate a Community

Grant Program. In addition to projects that have already been completed, this section highlights several efforts underway that focus on priorities identified in the Action Plan.

While robust water quality improvements have been realized in the Pensacola and Perdido Bays watersheds, additional work remains. It will take the collective effort of Management Conference partners to assist in accomplishing these needed and time-sensitive actions. Fortunately, great strides are already underway to protect what matters most. Let's get to work!



**Cast Net Fishing, Escambia
County Snorkel Reef**
PPBEP



Introduction

Pensacola Beach
Darryl Boudreau, NFWMD

History of the Program

The value of working across jurisdictional boundaries to identify and address environmental needs of local waters has been recognized for decades. In 1985, the Governor's Escambia/Santa Rosa Coast Resource Planning and Management Committee recognized the need for a comprehensive inventory of the characteristics of the area bay systems. The Bay Area Resource Inventory Program was established to provide a unified, standard set of data to be updated on a regular basis, that would aid in the evaluation, maintenance, and enhancement of the physical, chemical, biological, economic, and aesthetic qualities that comprise the diverse character and value of the bay system (DEP 1998).

Bay Area Resource Council

Recognizing the need for a local, independent, science-based organization charged with coordinating monitoring and restoration across the Pensacola Bay system, Santa Rosa County and the Cities of Gulf Breeze and Pensacola formed the Bay Area Resource Council (BARC) through the adoption of an Interlocal Agreement on 18 May 1987. The Interlocal Agreement was amended on 22 July 1997 to expand membership to include Escambia County and the City of Milton.

BARC served as a monthly forum for elected officials, natural resource managers, academia,

industry, and concerned citizens to share information and resources to better local decision making to improve the health of Santa Rosa Sound, East Bay, Blackwater Bay, Escambia Bay, and Pensacola Bay.

While BARC had limited dedicated funding and staff, it thrived under the leadership and passion of dedicated public servants and community volunteers who recognized that by working together, the community could accomplish so much more.

BARC Educational Initiatives

In 2001, under the leadership of former Florida House Rep. Holly Benson, "Bay Day" was founded to provide local fifth graders an opportunity to experience hands-on environmental science and water quality lessons to empower the next generation of bay ambassadors. The Florida Department of Environmental Protection Northwest District brought together partners from various local and regional agencies to establish the Environmental Education Coordination Team (EECT) that would eventually be transferred to BARC leadership. In 2005, BARC EECT took charge of Bay Day's annual organization, expanding the reach to both Escambia and Santa Rosa Counties. Between 2001 and 2019, over 16 Bay Day events were held, reaching over 9,300 students.



Bay Day 2022
PPBEP



Bay Day 2018
Carrie Stevenson

In 2004, the BARC EECT's Resource Rangers video series went live. This 11-part series, hosted by Resource Ranger Glenn Griffith, covered a range of important environmental topics targeted for ages 8 to 14. A team of environmental educators produced the video script and associated lesson plans, while a professional production company produced the series for distribution. The series was aired on local public broadcasting stations and was distributed to local schools for viewing with an accompanying visit from the Resource Ranger himself to lead hands-on environmental science lessons. The Resource Rangers video series was popular and successful, winning at least ten awards between 2004 and 2007.

Between 2009 and 2015, EECT and the Resource Rangers expanded their outreach by hosting field trips with local school groups across the watershed to provide hands-on education. Field trips included seining, dip netting,

seagrass identification, water quality and stormwater demonstrations, and more. Over its nearly seven-year run, EECT hosted 45 field trips reaching nearly 2,000 students.

Watershed Planning

In 2004, the BARC Technical Advisory Committee (TAC) obtained grant funding from the U.S. Environmental Protection Agency (EPA) and the Florida Coastal Management Program to produce and publish the Pensacola Bay Watershed Management Plan, an update to the original plan released in 1998. Released in 2005, the Pensacola Bay Watershed Management Plan focused on six action areas – air quality, database management, land management, waste management, water quality, and public education. These six action areas were intended to align closely with the EPA's Clean Water Action Policy framework and BARC's own goals to restore and maintain water resources, promote watershed awareness, develop partnerships, promote economic prosperity and quality of life, and advocate for action to preserve and restore the bay.

However, with Hurricane Ivan devastating the area in September 2004, the Great Recession rippling across the Nation in 2008, and the BP Deepwater Horizon Oil Spill impacting the entire Gulf Coast in 2010, understandably, few resources were allocated to implementing the 2005 Watershed Management Plan.

Establishing an Estuary Program

On the heels of the Deepwater Horizon disaster, local community leaders, resource managers, and academics convened in the early days following the oil spill to strategize how best to allocate penalty funds, assuming they would eventually make their way back to the Gulf Coast. While various strategies and projects were proposed, one underlying theme was clear – no one wanted to look back 30 years post Deepwater Horizon and ask, “what did we accomplish with these once in a generation resources?” without having substantial success to point to.

Seeing the success of the EPA National Estuary Programs across the country, it became apparent that an independent, science-based, stakeholder-driven organization could provide oversight and coordination of monitoring, reporting, restoration, outreach and education, and policy initiatives at the watershed scale. Thanks to the advocacy of various local and regional groups, the EPA allocated two million dollars in the Gulf Coast Ecosystem Restoration Council's first Funded Priorities List in 2015 to establish a new Estuary Program.

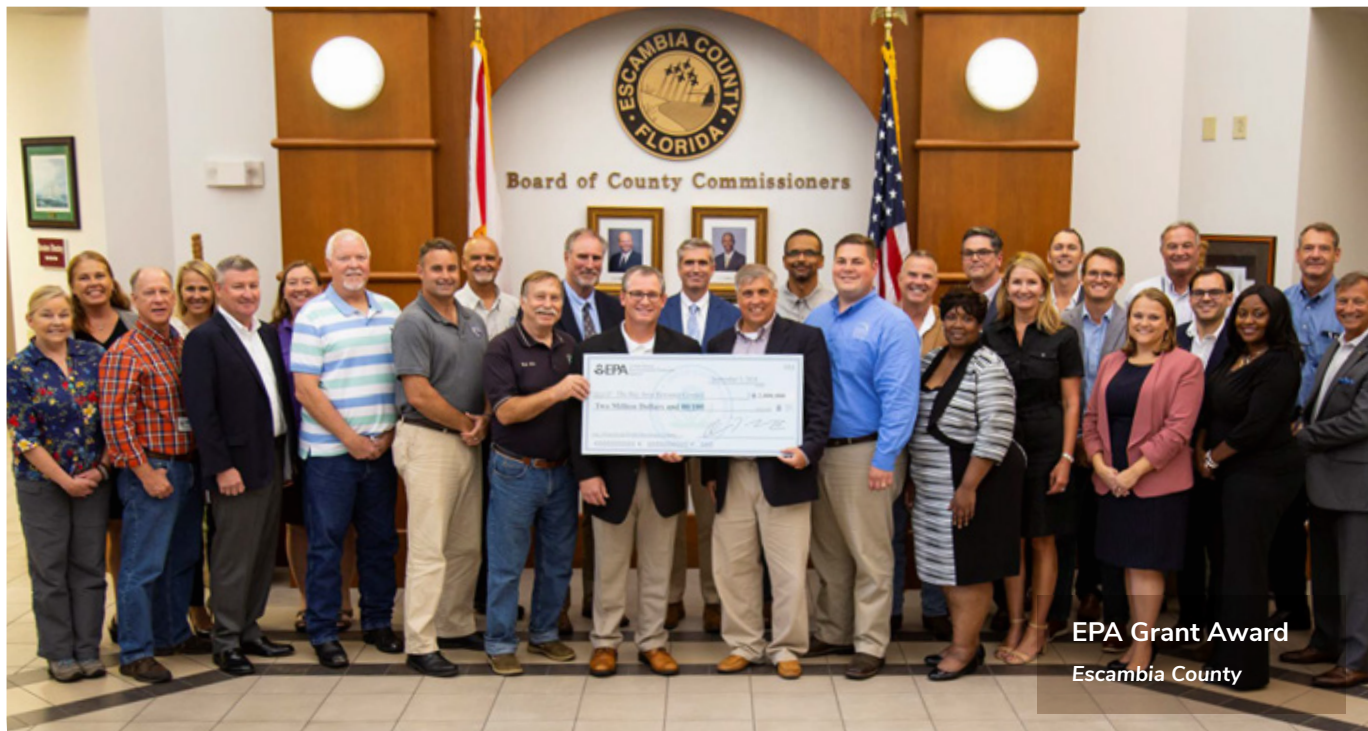
As prospects to establish a new Estuary Program materialized, a renewed sense of energy filled BARC TAC post oil spill. In 2017, the EPA Gulf

of Mexico Program (GMP) issued its Request for Proposals, targeting watersheds between Perdido Bay in the west and Apalachicola Bay in the east. In the summer of 2017, over 15 members of BARC TAC dedicated hundreds of hours to prepare a proposal to transition BARC into the Pensacola & Perdido Bays Estuary Program (PPBEP). In August 2017, the EPA GMP announced BARC's proposal was successful and two million dollars would be awarded to establish PPBEP and produce the Program's first CCMP.

On September 5th, 2018, BARC officially transitioned into PPBEP, expanding membership to include Baldwin County, AL; Okaloosa County,

FL; the City of Orange Beach, AL; and the Town of Century, FL.

Since then, the Estuary Program Management Conference, comprised of the Policy Board, Technical Committee, Education and Outreach Committee, and Business Partnership Program, has been established. In 2023, the Environmental Justice Work Group will transition into the Environmental Justice Committee. The Program team has been established and staff, including the Executive Director, Senior Scientist, Environmental Scientist, Community Outreach Coordinator, Community Outreach Assistant, and Volunteer Coordinator, were hired to prepare the Plan before you – A Prescription for Healthy Bays.



EPA Grant Award
Escambia County

Vision Statement

PPBEP is a national leader and expert in estuarine science and rehabilitation and restoration. We have significantly improved the environmental quality of our watersheds through proactive education, partnerships, and funding of impactful water recovery and shoreline resilience projects. As a result of our work, we have sustained measurable and impactful positive change for our environment and community that has led to a significant increase in the health, wellbeing, and vitality of our communities.

DIVERSITY, EQUITY, AND INCLUSION STATEMENT

To achieve our vision, PPBEP strives to cultivate inclusive partnerships that reflect the diverse character of the communities we engage and seek to engage through equitable outcomes in all our operations, programs, and projects.

Pensacola Bay
Lee Anne Winchester

Mission Statement

PPBEP serves as a trusted source for residents, businesses, industry, and the community on issues relating to preserving, restoring, improving, and maintaining the natural habitat and ecosystem of the bays, estuaries, and watersheds of Pensacola and Perdido Bays. PPBEP strives to achieve a healthy and collaborative environment by:



Elevating and increasing the importance, awareness, and understanding of environmental quality



Employing rigorous and unbiased science to inform and guide decisions, policies, and initiatives



Funding programs and projects that protect the environment and increase ecological resilience



Building a network of inclusive, multi-stakeholder partnerships that takes into account factors affecting the environment, the economy, and the community-at-large for the benefit of improving the quality of life for all

Pensacola Bay

Lee Anne Winchester

Management Conference

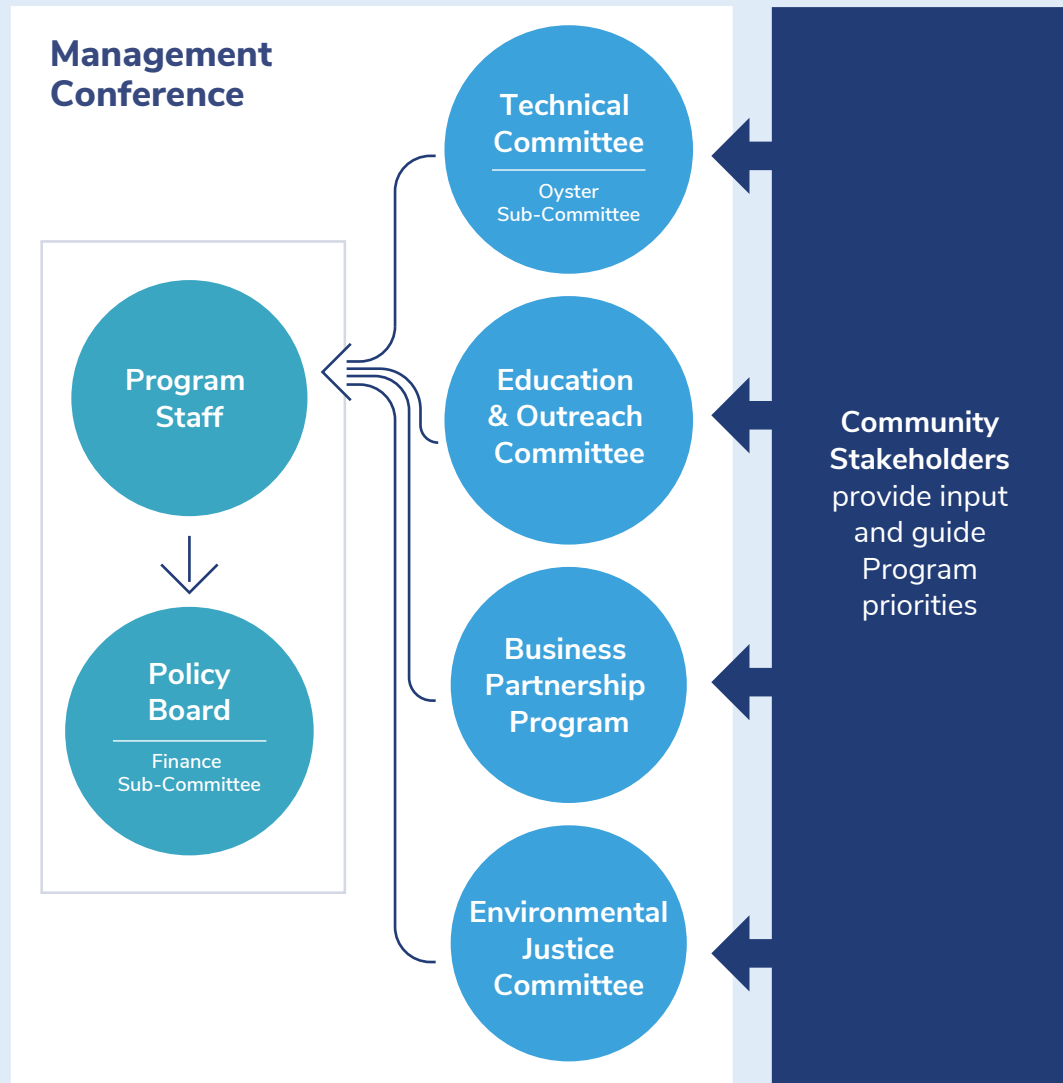
PPBEP was formed through the adoption of an Interlocal Agreement in 2018 by Escambia, Okaloosa, and Santa Rosa Counties, FL; Baldwin County, AL; the Cities of Gulf Breeze, Milton, and Pensacola, and the Town of Century, FL; and the City of Orange Beach, AL.

At the core of PPBEP is a Management Conference comprised of a collective group of dedicated elected officials, resource managers, academics, educators, business representatives, and interested stakeholders which guides the strategic direction of the Program. While Escambia County has served as host agency to stand up PPBEP, the Policy Board has authorized transition of the Program to an independent organization. Transition is expected to be completed in 2023.

Policy Board

The Policy Board serves as the governing body, establishing Program policy, overseeing Program administration, and setting budget priorities. The Policy Board is comprised of eleven members representing the nine local

PPBEP Organizational Structure



PPBEP Organizational Structure Displaying the Interconnection Among the Community Stakeholders, Committees, Policy Board, and Program Staff

governments and municipalities party to the Program's Interlocal Agreement.

FINANCE SUB-COMMITTEE

The Finance Sub-Committee is charged with reviewing Program expenditures, providing direction on annual budget preparation, reviewing the annual Program audit, and assisting staff with establishing fundraising targets. The Finance Sub-Committee is comprised of five members of the Policy Board or their designees.

Technical Committee

The Technical Committee provides technical and scientific guidance to the Policy Board, staff, and Management Conference as a whole. The Committee supports staff in identifying priority issues, root causes, and actions, while also assisting in restoration target setting and CCMP implementation. The Technical Committee is led by a Chair and Vice Chair, and membership is open to any interested stakeholder. Participants represent many sectors of the community including academic institutions, natural resource management agencies, community organizations, state and federal governments, non-governmental organizations (NGOs), local municipalities, and industry.

POLICY BOARD MEMBERS (2018 – 2022)

Baldwin County

Dan Dealy representing:
 Commissioner Billie Jo Underwood
 Commissioner Skip Gruber
 Commissioner Joe Davis
 Ashley Campbell representing:
 Commissioner Jeb Ball

City of Gulf Breeze

Councilmember Renee Bookout*
 Councilmember J.B. Schluter
 Mayor Cherry Fitch

City of Milton

Councilmember Alan Lowry
 Councilmember Peggi Smith
 Councilmember Shannon Rice

City of Orange Beach

Woody Speed*

City of Pensacola

Councilmember Jewel Cannada-Wynn
 Councilmember Ann Hill

* Served as Chair and/or Vice Chair

Escambia County

Commissioner Grover Robinson*
 Commissioner Douglas Underhill*
 Commissioner Robert Bender*
 Commissioner Jeff Bergosh

Okaloosa County

Commissioner Nathan Boyles
 Alex Fogg
 Michael Norberg

Santa Rosa County

Commissioner Sam Parker
 Commissioner Bob Cole*
 Commissioner Dave Piech*

Town of Century

Mayor Henry Hawkins
 Mayor Benjamin Boutwell

COMMITTEE CHAIRS (2018 – 2022)

Technical Committee

Chips Kirschenfeld (2018 Chair)
 Tim Haag (2018 Vice Chair)
 Jessica Bibza (2019 – 2021 Chair)
 Ken Heck, Jr. (2019 – 2021 Vice Chair)
 Paul Looney (2022 Chair)
 Casey Fulford (2022 Vice Chair)

Education and Outreach Committee

Carrie Stevenson (2019 – 2022 Co-chair)
 Rick O'Connor (2019 Co-chair)
 Chris Verlinde (2019 – 2021 Co-chair)
 Chasidy Hobbs (2021 – 2022 Co-chair)

OYSTER SUB-COMMITTEE

The Oyster Sub-Committee provides technical guidance to staff on the implementation of the Oyster Habitat and Fisheries Management Plan for the Pensacola Bay System. The Sub-Committee is a continuation of a stakeholder working group that was established by The Nature Conservancy in 2019 to develop the first Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System. The Sub-Committee is comprised of representatives from the aquaculture and fishing industries, watermen, regulatory agencies, resource managers, academia, and NGOs. Findings from the Sub-Committee are reported out to the Technical Committee and Policy Board.

Education and Outreach Committee

The Education and Outreach Committee provides guidance on community outreach initiatives to the Policy Board, staff, and the Management Conference as a whole. The Committee assists staff with educational initiative development, event planning and management, and curriculum development and implementation. It is led by a Chair and Vice Chair and membership is open to any interested stakeholder. The Committee is comprised of representatives from local universities and school districts, hospitality and tourism development organizations, local municipalities, county extensions, state and federal agencies, local government, and community organizations.



Annual Management
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PPBEP

Business Partnership Program

The Business Partnership Program engages a broad spectrum of industries that support environmental stewardship, economic development, and quality of life improvement. This Committee aids staff in educating business leaders, leveraging financial and in-kind donations to implement transformational projects, informing decision makers, catalyzing actions that improve environmental health and quality of life, and supporting all business sectors that rely on a healthy environment and thriving economy. The Business Partnership Program is led by a Chair and Vice Chair, and membership is open to any interested business stakeholder.

Environmental Justice Committee

The Environmental Justice Working Group was established in 2022 to incorporate environmental justice principles throughout PPBEP operations, programs, and projects. The Working Group is comprised of representatives from healthcare fields, religious institutions, neighborhood organizations, universities, businesses, NGOs, and government. In 2023, PPBEP will transition the Working Group to the Environmental Justice Committee. This Committee will allow PPBEP to meet the needs of those who live in the watersheds, ensuring that they have equal access to the benefits of a healthy environment as well as protection from various environmental hazards.

Community Stakeholders

Stakeholders represent many sectors of the community, including residents, property owners, visitors, public officials, government, and agency representatives. This diverse group provides insight into the valued aspects of the watersheds and the natural resources, perceptions of environmental challenges, and what is required to maintain or elevate their quality of life. This information feeds into the Program's priority actions to restore and protect the watersheds and their systems.



PPBEP Staff

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Volunteer Coordinator

From left to right: Haley Gancel, Madi Ross, Matt Posner, Whitney Scheffel, Logan McDonald, Emerson Cheney

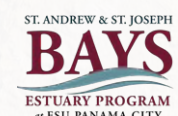
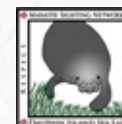
Partnerships



Interlocal Agreement Parties



AUBURN UNIVERSITY
College of Forestry, Wildlife and Environment



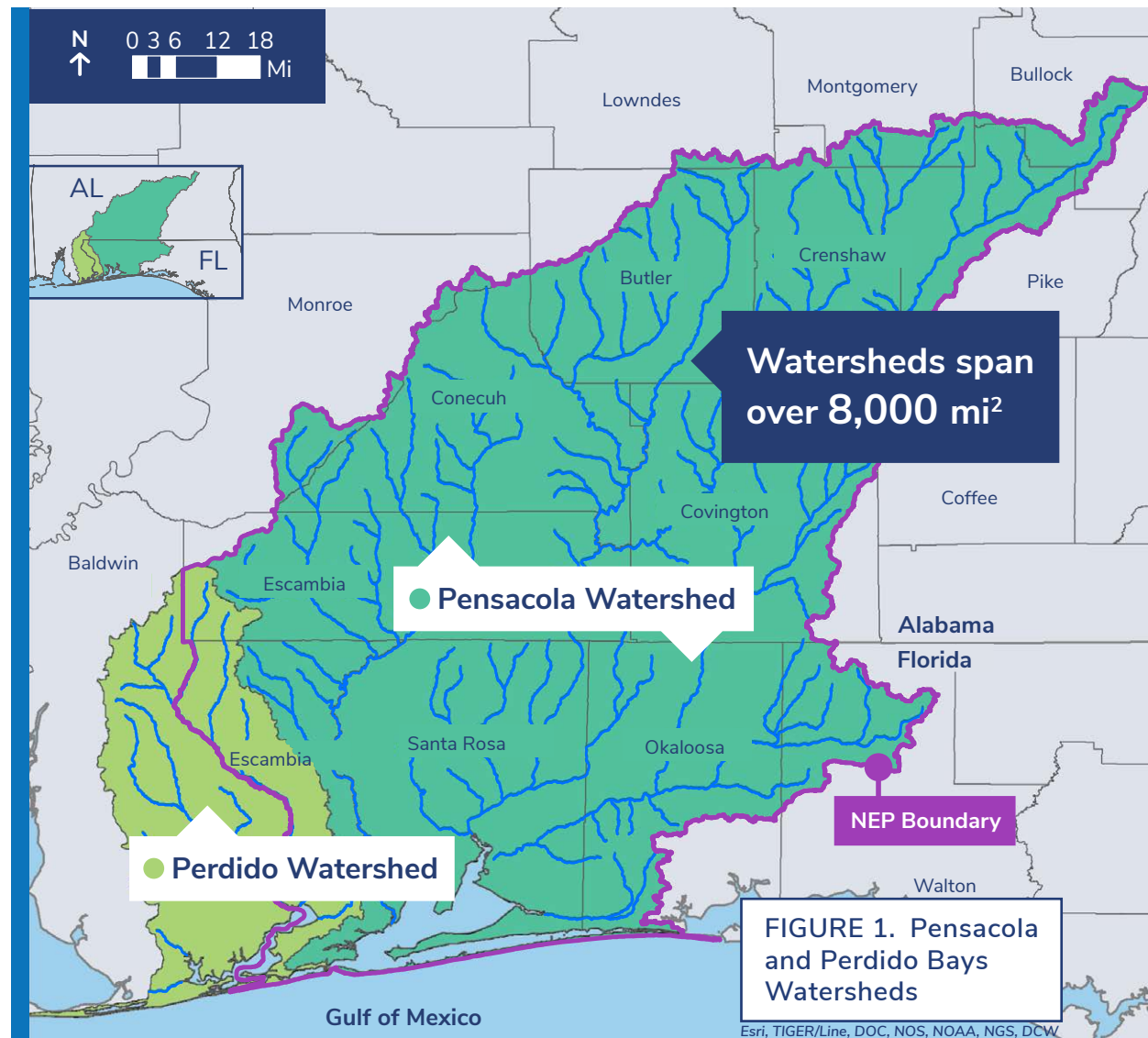


Big Lagoon State Park
PPBEP

The Watersheds

The Pensacola and Perdido Bays watersheds span over 8,000 mi², encompassing large portions of southern AL and the FL Panhandle. These watersheds, equipped with their longleaf pine forests, numerous rivers, expansive wetlands, seagrass beds, oyster reefs, bays, bayous, sounds, and beaches, are home to countless ecologically important species of birds, fish, mammals, and invertebrates. These watersheds also provide valuable ecosystem services to the millions of residents and visitors that frequent this area including buffering intense storms, stabilizing shorelines, trapping sediments, filtering nutrients, storing carbon, and providing nursery and foraging grounds for recreationally important species of fish and shellfish. Because these coastal areas are highly desirable to live, recreate, and work in, the stressors that humans impose upon these natural resources are significant.

The EPA National Estuary Program (NEP) was established in Section 320 of the Clean Water Act. Each of the existing 28 NEPs have established study areas approved by the EPA. To be consistent with the NEPs, PPBEP has established the study area depicted in Figure 1 for purposes of NEP designation. PPBEP's study area will be contiguous with the existing Mobile Bay National Estuary Program (MBNEP) study area. As PPBEP uses a watershed-based approach to address natural resource management issues, PPBEP will collaborate with MBNEP and other partners on activities of mutual importance for the restoration and preservation of the Perdido Bay system.



History of the Pensacola and Perdido Bays Watersheds

P Pensacola Bay Watershed

PB Perdido Bay Watershed

Pre 1500s

P PB

Native Americans hunted, fished, and raised crops along the coast

Native Americans have lived off the land for generations. Creek Indians living on Escribano Point and East Bay traded fresh oysters in Pensacola up until the time they were forced to leave their homeland in the 1830s.

1559

P

America's first settlement

Don Tristan de Luna and Spanish settlers established the first European settlement in the present-day United States along Pensacola Bay.

1960s

P PB

Environmental degradation

Chemicals from industrial wastewater impacted waterways, causing seagrass and oyster declines.

1693

PB

Spanish settlers discover the "Lost" Key and Bay

Carlos de Sigüenza y Góngora was sent by the Spanish to locate the entrance to Perdido "Lost" Bay.

1865 - 1883

P

Booming Red Snapper fishery

In 1872, the first fish house was constructed in Pensacola, where fish were processed, packaged, and shipped by rail or boat.

1881

P PB

Pensacola and Atlantic Railroad

Railroad freight transportation led to the expansion of the timber industry.

1940s - 1950s

P PB

Industrialization and urbanization

The region experienced an expansion of military presence and degradation from timber treatment operations, power and chemical plants, paper mills, and urban sprawl post WWII.

1906

PB

First man-made Perdido Pass dug

A cut, known as Perdido Pass, was made to make navigation into Perdido Bay easier. Perdido Pass has shifted locations many times throughout history. Prior to the pass, Perdido Bay was predominantly a freshwater system.

April 10, 2010

Deepwater Horizon Oil Spill

The Deepwater Horizon oil rig exploded, dumping over four million barrels of crude oil into the Gulf of Mexico off the coast of Louisiana, making it the largest spill in the history of marine oil drilling operations.

1971

P

Escambia Bay declared dead

A local community organization, The Bream Fishermen Association, "drafted a declaration" to bring awareness to the impacts.

1970s

P

PB

Fish kills and shellfish harvest declines

Numerous fish kills were reported in Pensacola and Perdido Bays systems due to industrial discharges. **Community took action.**

1972

Clean Water Act

A milestone in American environmental policy, this act regulated pollutant discharges and set standards to water quality.

1987

PB

Bay Area Resource Council (BARC) established

BARC, PPBEP's predecessor, was made up of local stakeholders and representatives from five local governments (City of Pensacola, Escambia County, Santa Rosa County, City of Gulf Breeze, and City of Milton) to improve local waters.

2018

P

PB

PPBEP established

BARC transitioned to PPBEP.

2022

P

PB

CCMP approved

PPBEP's first Comprehensive Conservation and Management Plan (CCMP) is developed for the Pensacola and Perdido Bays watersheds.

2012

RESTORE Act passed

The RESTORE Act passed, allocating 80% of penalties from Deepwater Horizon Oil Spill impacts back to the Gulf Coast.

Some local species illustrations provided by and modified from: Integration and Application Network (ian.umces.edu/media-library).



Perdido Key State Park
Darryl Boudreau, NFWMD

Voices of the Bays

Perdido Key Demonstration Garden
Escambia County

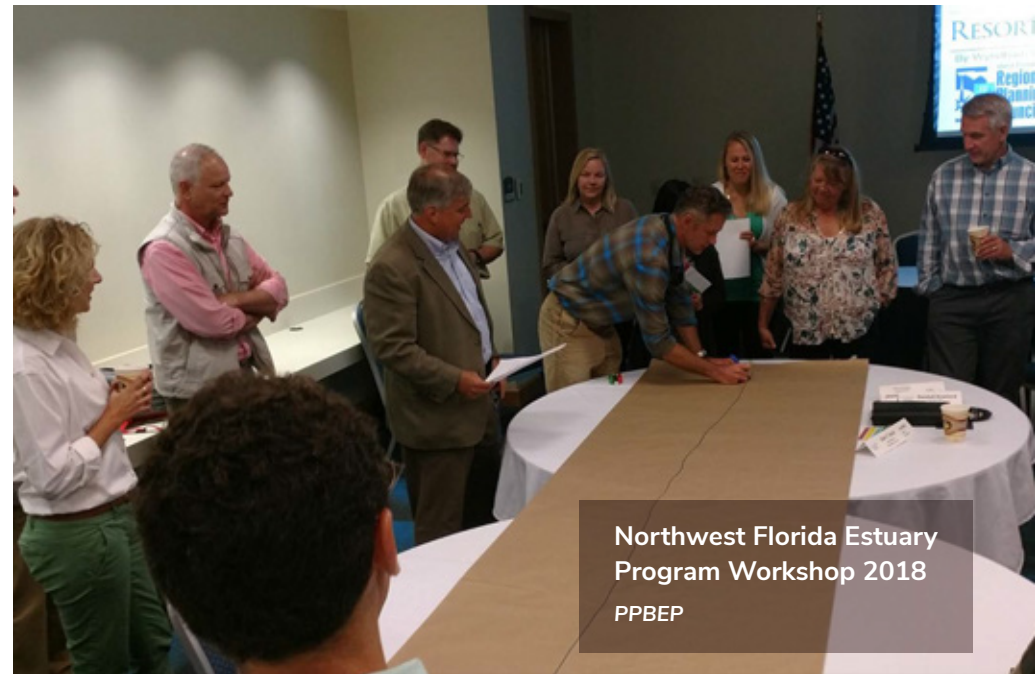
Engaging the Community: The Road to Completing the CCMP

In April 2018, over 60 stakeholders representing state and federal agencies, local governments, academia, non-governmental organizations (NGOs), and other local organizations across the Pensacola and Perdido Bays, Choctawhatchee Bay, and St. Andrew Bay watersheds attended the Northwest Florida Estuary Program workshop led by former Tampa Bay Estuary Program (TBEP) Executive Director and Senior Scientist, Holly Greening.

The purpose of the workshop was to collectively brainstorm water quality issues and potential solutions and to learn valuable lessons on the benefits and challenges surrounding collaborative planning and adaptive management from the TBEP. Stakeholders from each watershed participated in a group activity involving the co-development of a timeline for each of their estuaries, including historic events, severe storms, changes to the landscape, restoration projects, and other impactful events. The latter half of the workshop focused on key issues and root causes across the watershed and lessons learned from the TBEP. To conclude, the Estuary Programs were advised to engage stakeholders throughout the entire process of Comprehensive Conservation and Management Plan (CCMP) development including data compilation, goal and target setting, and project planning and implementation to maximize success and to ensure the Plan encompasses diverse perspectives. The timeline of impactful events for the Pensacola and Perdido Bays watersheds that was developed as a part of this workshop was incorporated into the historical overview of the Pensacola & Perdido Bays Estuary Program (PPBEP) (See page 22 — History of the Pensacola and Perdido Bays Watersheds).



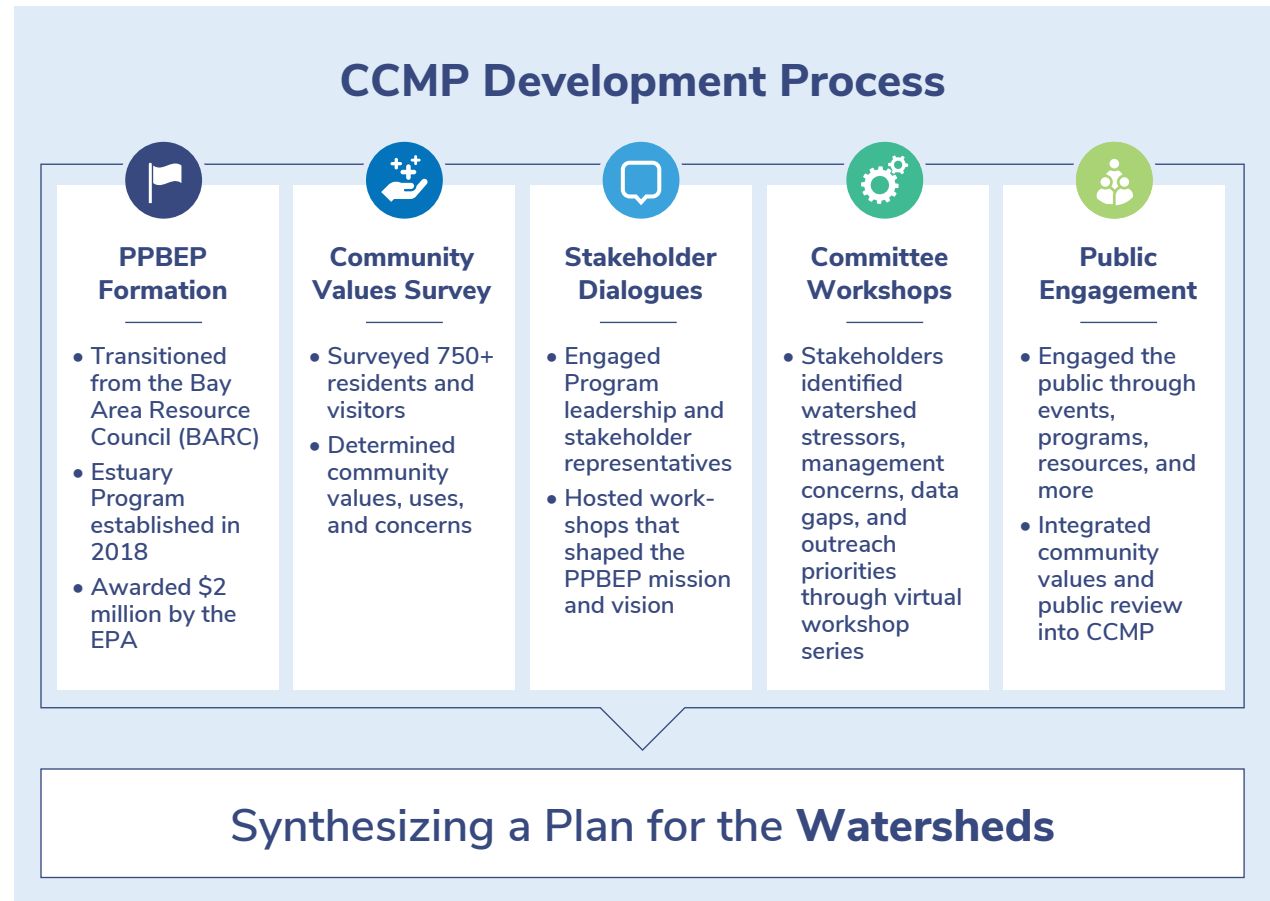
Stakeholder
Dialogue Session
PPBEP



Northwest Florida Estuary
Program Workshop 2018
PPBEP

Following establishment of the PPBEP Management Conference in September 2018, the Policy Board, Technical Committee, and Education and Outreach Committee began meeting monthly to discuss the CCMP development process and timeline. In February 2019, the Technical Committee hosted a workshop to gather stakeholder input on the compilation of relevant resources and identify key priorities, issues, and overarching goals and objectives to include in the CCMP. The workshop outputs resulted in the adoption of the CCMP Developmental Workplan, which served as a scope of work for completing the various elements of the CCMP and supporting strategic plans.

In July 2020, PPBEP expanded its public community engagement via a virtual impact event which was organized and hosted by CivicCon. CivicCon is a program that aims to inform and empower communities through civic conversations to drive progress and change. During the event, Estuary Program staff introduced the Program and the purpose of the CCMP and encouraged community participation to help PPBEP achieve its mission of protecting and restoring the watersheds. Just prior to the PPBEP impact event, CivicCon hosted an event where the U.S. Environmental Protection Agency (EPA) provided an overview of the history and benefits of the National Estuary Program (NEP) highlighting effective, collaborative, multi-stakeholder led projects across the Nation. Additionally, a panel of local experts discussed the current challenges facing local waterways and how the newly established Estuary Program could contribute to



long-term change. This event provided a critical insight into the importance and value of creating an Estuary Program. PPBEP highlighted the history of the Pensacola and Perdido Bays watersheds, the stressors impacting the ecological health and human health implications of these systems, and the status and trends of oyster reef and seagrass

extent. In addition, PPBEP staff gave an overview of the Program's purpose, mission, and overarching goals as well as current projects and opportunities for community members to get involved. The Program reached over 150 people through this event to share the vision for the future of Pensacola and Perdido Bays and their watersheds.



Fishing at Sunset on Escambia Bay

Darryl Boudreau, NFWFMD

Community Values Survey

To develop a successful stakeholder-driven CCMP, public input and engagement are key processes to understand and incorporate community environmental concerns.

PPBEP partnered with the University of West Florida (UWF) Haas Center to survey residents and visitors regarding their use and valued attributes of the watersheds, perceived environmental challenges, and appropriate funding sources to support the recovery of the watersheds. From October 2020–January 2021, participants were recruited via three main methods: 1) email list-serves provided by fishing licenses and registered voter databases, 2) social media broadcasting, and 3) flyer distribution. The online survey was completed by 754 participants.

Participants were asked to rate the current environmental condition of each watershed and to identify the activities that they participate in within each watershed. Most participants rated the environmental condition of both watersheds as average or better. Respondents identified waterfront dining, wildlife viewing, and beaching as the activities they engage in at least monthly in the Pensacola and Perdido Bays watersheds.

Participants were given a list of watershed attributes and were asked to select those that were important to them. Participants consistently ranked natural beauty, ecosystem services (e.g., flood and erosion control, water, and air filtration), and fishable water as their top three most valued aspects of both watersheds. They were also asked to identify attributes of a healthy

watershed. While all items tested were selected by respondents as important, healthy habitats (e.g., wetlands, seagrass beds, oysters, and upland forests) and trash free land and water were selected most frequently.

Respondents were also asked to identify environmental concerns for each watershed, priorities for financial investment, and appropriate sources of funding for those investments. Industrial discharges, coastal development, and municipal sewage treatment discharges were the most cited environmental concerns for the Pensacola Bay watershed. Industrial discharges, coastal development, and agriculture activities within the watershed were the most cited environmental concerns for the Perdido Bay watershed. Water quality improvements and natural habitat restoration (e.g., seagrass, oysters) were both identified as important priorities for financial investments. State government, tourist development tax, and local government were selected as appropriate sources of funding for watershed projects.

Overall, the survey informed CCMP development by providing information on community values and concerns. It also provided a baseline of community opinions of watershed health that can be used to support the success of PPBEP's efforts to communicate the status of the watersheds and efforts to improve them. See Appendix 1 for the full UWF Haas Center Community Values Report findings.

Community Values and Concerns

PPBEP partnered with the University of West Florida (UWF) Haas Center to survey residents and visitors about watershed use, values, challenges, and funding.

754
participants
completed the
online survey.

Most valued aspects of the watersheds:

-  Natural Beauty
-  Ecosystem Services
-  Fishable Water

Most popular activities:

-  Waterfront Dining
-  Wildlife Viewing
-  Beaching

TOP 5 Very Important Aspects of Healthy Watersheds:

- Trash Free Land and Water
- Healthy Habitats
- Wildlife Abundance
- Wildlife Diversity
- Natural Riverbanks and Shorelines

TOP 5 Environmental Challenges:

- Industrial Discharges
- Coastal Development
- Municipal Sewage Treatment Discharges
- Population Increase
- Upstream Development

TOP 5 Investment Priorities:

- Water Quality Improvements
- Natural Habitat Restoration
- Resilience
- Green Infrastructure
- Community Outreach and Education

Core Dialogue Sessions and Branding

PPBEP partnered with idgroup, a local Certified B Corporation specializing in integrated brand communications and change management, to ignite the support of key stakeholders in moving the Program's mission forward.

A series of community dialogue sessions engaged Program leadership, staff, and stakeholders – including educators, residents, and representatives from state and federal agencies, local governments, community organizations, industry, and local businesses – in discussions regarding the Program's mission, future goals and aspirations, as well as opportunities for improvement. Participants contributed their

perspectives on ways PPBEP could better connect the story of the organization to the people and communities it serves.

Insights from the Core Dialogue Sessions and the Community Values Survey informed the development of a brand platform and logo that represent the shared vision of stakeholders. The brand promise, “protecting what matters,” and the key messages are directly connected to the Program's mission. The visual brand, or logo, is comprised of three elements to represent 1) the estuarine system, 2) the effect water has on the ecosystem, and 3) a commitment to protecting the watersheds and their communities. The

co-developed brand platform serves as a guide to effectively communicate PPBEP's role and mission to the public and builds a foundation for future action campaigns and community buy-in.

The community's values live at the core of PPBEP's culture and direct the decisions and behaviors of its members, which, in turn, influences the experience people have with the Program. Core strengths are characteristics PPBEP's leadership will build upon and leverage to maximize community engagement to ensure the Program is identifying and addressing the most important issues in the watershed.



Three Elements That Comprise PPBEP's Visual Logo



BRACKISH WATER

To represent the estuary system where salt and freshwater converge



PELICAN

To represent the delicate effect the water has on the wildlife and ecosystem of the Pensacola and Perdido Bays area



SHIELD*

To convey a commitment to protecting the estuary ecosystem

*Not in the sense of enforcement

Core Values and Strengths

These core values and strengths were identified as part of the stakeholder dialogue sessions:

CORE VALUES



Creating Impact

Strong desire to create a sustainable, meaningful impact for all living creatures affected by the ecosystem and working to find the balance between environmental and societal needs



Proven Science

Employing trusted, reputable scientific processes to restore and maintain environmental quality



Community Inclusion

Working to ensure all voices and perspectives from the local community are included



Mutual Health, Vitality, and Collaboration

Creating a network of collaborative partnerships across diverse groups, communities, and public, private, and non-profit sectors to share resources and knowledge to serve a bigger purpose for the health and wellbeing of all



Resiliency and Sustainability

Possessing the fortitude to persevere in the face of mounting obstacles and challenging circumstances to overcome against the odds

CORE STRENGTHS



Foundation of Science

Due diligence through the application of rigorous research, knowledge, and best practices in environmental and ecological science to guide decisions and policies



Inclusive, Multi-Stakeholder Collaboration

Bringing diverse perspectives and people together to contribute to the process in a meaningful and impactful way



Effective Resource Management

Managing resources effectively and adequately to ensure adherence to the mission and vision of the organization



Quality of Life

Strong focus on quality-of-life measures that impact overall health, vitality, and well-being for all who call this area home (from residents, to businesses, to all living creatures in the habitat)



Non-Partisan

The issue of protecting and preserving our natural resources goes beyond party affiliations to achieve innovative solutions that balance smart growth with conservation



Stakeholder Dialogue Sessions
PPBEP

Stakeholder Participatory Process and Evaluation

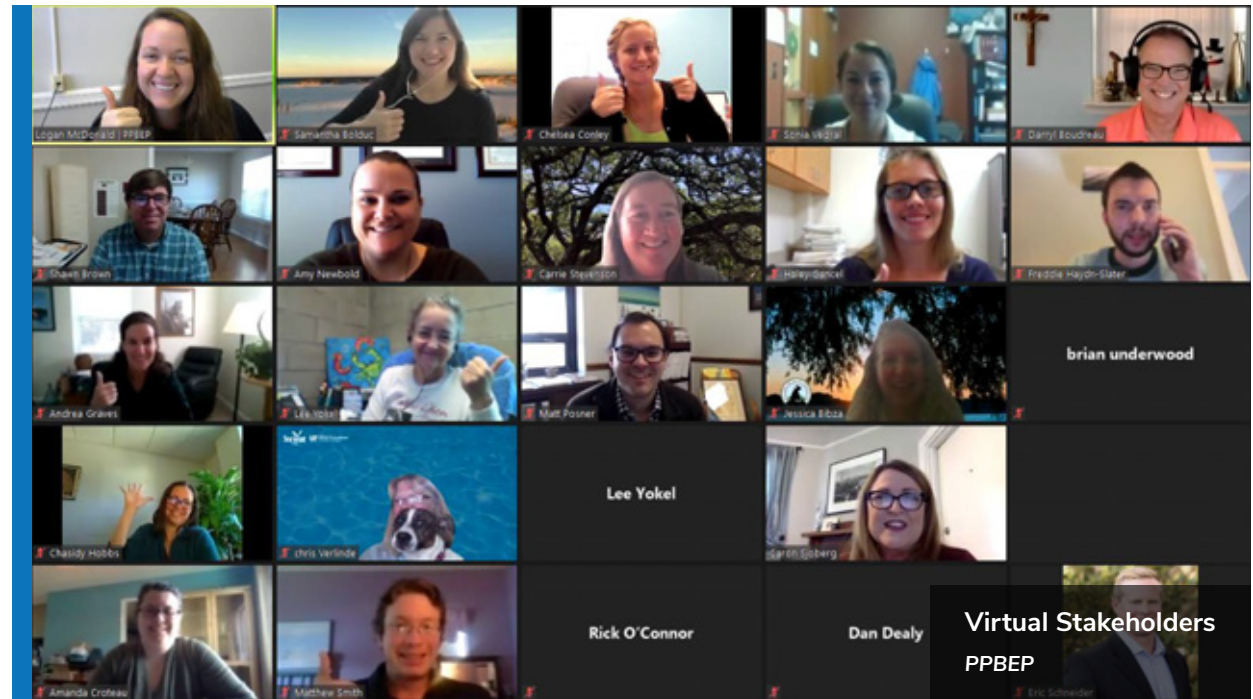
Integrating participatory frameworks into an adaptive management strategy provides an opportunity for increased community engagement and support. The EPA NEP has shown great success in collaborative science-based decision-making efforts that have led to the implementation of actions to improve water quality, restore habitats, and elevate the quality of life in their respective communities. PPBEP was built upon an existing network of local stakeholders from its predecessor, the Bay Area Resource Council (BARC), providing a strong stakeholder base at the inception of PPBEP's development.

Amongst the many challenges a new program may face in the early stages of establishment, the global COVID-19 pandemic was one that was unexpected. PPBEP had to pivot away from more traditional in-person committee meetings and community engagements to solely virtual platforms (e.g., Zoom, GoTo Meeting, Google Meet). Despite this hurdle, staff turned to innovative virtual whiteboard tools (e.g., MURAL, Google Jamboard, Miro) to design activities and collect stakeholder feedback from various sectors of the community (e.g., state and federal agencies, NGOs, local community organizations, academia, citizens).

Beginning in fall 2020, PPBEP staff and partners at the University of Florida (UF) and UWF

hosted a virtual workshop series to gather feedback from stakeholders to help guide CCMP development and future Program actions. Support was provided by a Florida RESTORE Act Centers of Excellence Program (FLRACEP) grant awarded to UF/UWF to assist three Panhandle Estuary Programs (Pensacola and Perdido Bays, Choctawhatchee Bay, St. Andrew and St. Joseph Bays) with CCMP development.

The goal of the workshop series was to identify specific stakeholder concerns and devise actions to improve the health and resilience of natural systems and the economy of the Pensacola and Perdido Bays watersheds. Additionally, workshop outputs helped identify gaps in knowledge and data needed to effectively assess and ultimately improve environmental issues within the watersheds.



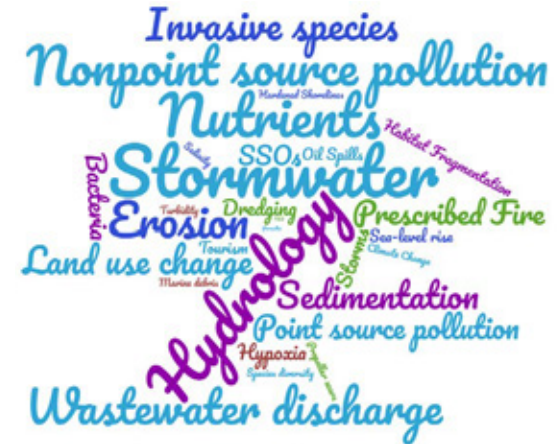
Environmental Stressors Identified during the Workshop Series

Focus Areas Prioritized Stressors

Water Quality and Quantity	Pathogens
	Nutrients; Eutrophication
Habitat	Land-use change
	→ Flooding
	→ Urbanization
	→ Construction
Sediment Quality and Quantity	→ Impervious surfaces
	Water quality
	Altered hydrology
	Development
Fish and Wildlife	→ Land-use change
	→ Shoreline hardening
	Improper habitat management
	→ Boating practices
Fish and Wildlife	→ Old growth forest loss
	Land-use change
	→ Impervious surfaces
	→ Agriculture
Fish and Wildlife	Sedimentation
	Contaminants
	→ Polychlorinated biphenyls (PCBs)
	→ Heavy metals
Fish and Wildlife	→ Industrial Discharge
	Erosion
	→ Sea-level rise
	Water quality and quantity
Fish and Wildlife	→ Turbidity
	→ Stormwater
	→ Salinity
	→ Pollutants
Fish and Wildlife	Invasive species
	Urbanization
	Habitat
	→ Fragmentation
Fish and Wildlife	→ Conversion

The initial workshop in the series was a stressors assessment to identify and prioritize environmental stressors and management concerns within the watersheds. Prior to the workshop, the UF/UWF (FLRACEP) team compiled a list of key stressors that had been previously identified in local watershed management plans. The stressors and management concerns were compiled into a word cloud which was used to initiate discussion of current and ongoing stressors. Workshop participants self-selected into small breakout groups by each focus area topic based on their expertise and interests. Participants brainstormed stressors for four different focus areas: water quality and quantity, habitat, sediment quality and quantity, and fish and wildlife. Stressors were prioritized based on urgency and impact, and measurable indicators (i.e., what needs to be measured to effectively assess the stressor or its impacts) were identified for each prioritized stressor. Participants provided spatial information for identified stressors such as areas of historical concern and current hotspots.

In preparation for each subsequent workshop, data and information on the indicators identified in the stressors assessment were consolidated from multiple open-source databases (e.g., EPA Water Quality Portal, Florida Department of Environmental Protection Watershed Information Network, U.S. Fish and Wildlife Service [USFWS] National Wetlands Inventory), reports, literature, and management plans, or provided directly by partner agencies and organizations including: The Bream Fishermen Association (BFA), Friends of Perdido Bay, Alabama Water Watch, Alabama Department of Environmental Management



Habitat Concerns Word Cloud

(ADEM), Northwest Florida Water Management District (NFWFMD), Florida Fish and Wildlife Conservation Commission (FWC), USFWS, U.S. Geological Survey (USGS), and EPA. Data and information were then synthesized to provide a baseline or update for stakeholders on the status and trends across the watersheds.

Information was presented as a series of watershed-scale maps indicating historical and current sampling efforts, indicator means, habitat extent, and additional figures and tables displaying other pertinent information. This information not only provided a summary for workshop participants but also provided the technical foundation for evaluating gaps and resource assessments needed for CCMP development and baseline data for a future State of the Bays report development.

Indicators selected for the workshop series included:

WATER QUALITY

Dissolved Oxygen
Salinity
Pathogens: *E. coli* and *Enterococcus*
Chlorophyll-a
Nutrients: Total Nitrogen (TN),
Dissolved Inorganic Nitrogen, Total
Phosphorus (TP), TN:TP

SEDIMENTS

Sediment in Water Column: Total
Suspended Solids, Turbidity,
Secchi Depth
Sediment as Substrate: Grain
Size, Toxins (e.g., mercury, dioxins,
and PCBs)

HABITATS

Seagrass and Submerged Aquatic
Vegetation (SAV)
Freshwater Wetlands and
Floodplains
Coastal and Estuarine Wetlands
Forested Uplands

FISH AND WILDLIFE

Coastal and Estuarine Fauna
Marine Mammals
Fish and Fisheries
Upland and Freshwater Fauna

A virtual stakeholder workshop was conducted for each of the four focus areas: water quality and quantity, habitat, sediment quality and quantity, and fish and wildlife. During each workshop, participants identified and prioritized knowledge gaps, root causes and barriers, and CCMP actions. Each

workshop included self-selected breakout rooms where participants focused their discussion on concerns relating to a particular watershed (water and sediment workshops) or resource category (habitat and fish and wildlife workshops) related to their expertise or interest. Prior to the participatory activities, attendees were given a summary of the stressors assessment discussion and an overview of indicator data that was compiled.

Following each workshop, participants were asked to complete an evaluation. The evaluation tool was developed by UWF to assess participants' satisfaction with the workshop format, content, expectations, participation (including equity and representation), and outcomes. Response feedback from each workshop was considered and incorporated into the planning of the subsequent workshops and informed the format of future CCMP development engagements.

In spring 2021, once the workshop series had concluded, PPBEP staff and the UF/UWF (FLRACEP) project team synthesized workshop outputs and feedback to develop a framework for the draft Action Plan of the CCMP, which included relevant goals, objectives, actions, implementation strategies, partners, PPBEP role, funding sources, expected deliverables, and performance metrics for tracking success for top priority needs and issues across the Pensacola and Perdido Bays watersheds. To ensure that the Action Plan aligned with the needs of stakeholders, the Technical Committee was asked to provide comments and edits to the draft. Feedback was compiled by the UF/UWF (FLRACEP) team (an unbiased party) and evaluated by PPBEP, and feasible and relevant recommendations were incorporated into the draft. Comments that were not incorporated were edits such as including more actions that were not prioritized by the larger stakeholder group in the workshop series. Gaining feedback at each step of the Action Plan development process (e.g., prioritization during the workshops and Technical Committee edits) provided invaluable stakeholder guidance in the development of PPBEP's first CCMP.

Regional and Gulf-Wide Management Plans

Numerous local, regional, and Gulf-wide management plans have previously been developed which include the Pensacola and Perdido Bays watersheds. While elements of some of these plans are still timely and relevant, many others are dated. Nonetheless, information within these plans provided a solid foundation for development of the PPBEP CCMP.

Alabama Department of Conservation and Natural Resources (ADCNR); Alabama Department of Environmental Management (ADEM)

- ▶ 2013–2018 Alabama Coastal Area Management Program Strategic Plan

Baldwin County

- ▶ 2013 Baldwin County Master Plan

Bay Area Resource Council

- ▶ 2005 Pensacola Bay Watershed Management Plan

Deepwater Horizon Oil Spill Natural Resource Damage Assessment (NRDA)

- ▶ 2017 Strategic Framework for Oyster Restoration Activities

Escambia County

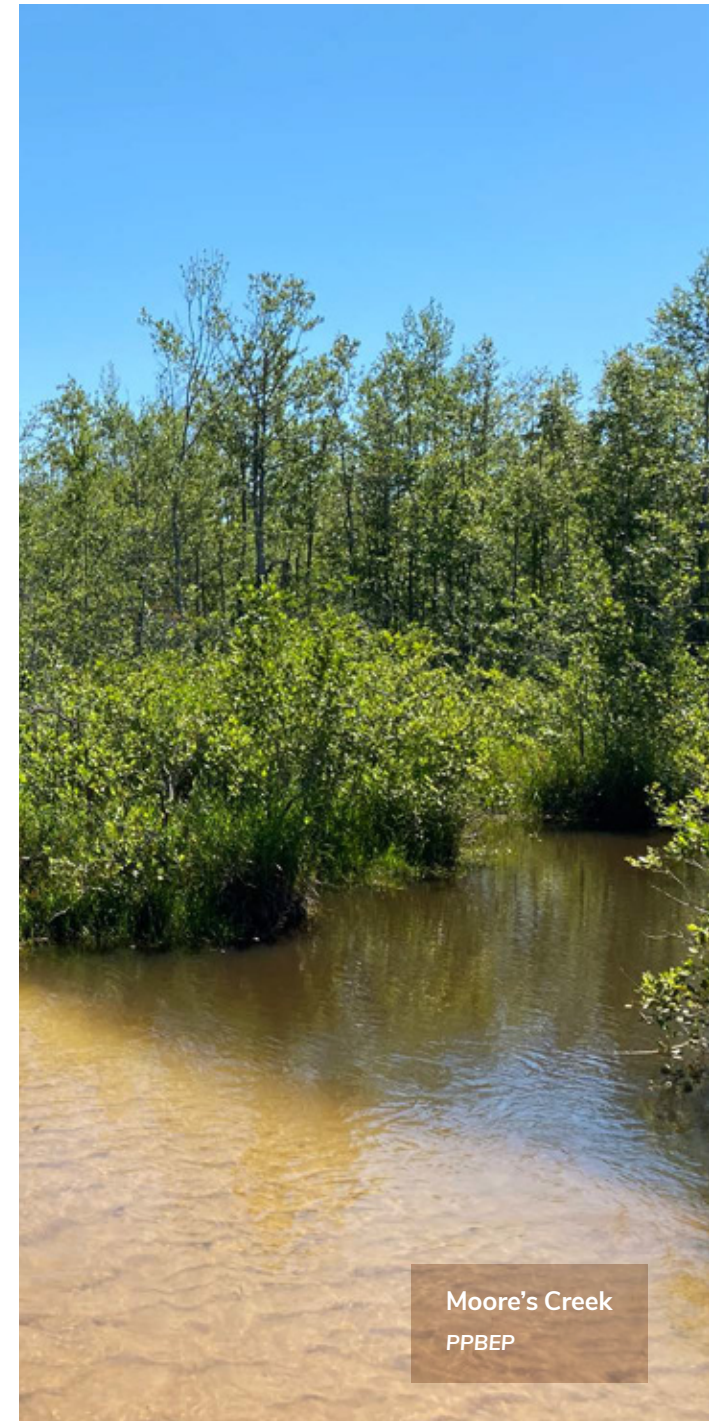
- ▶ 2022 Carpenter Creek/Bayou Texar Watershed Management Plan
- ▶ 2015–2030 Comprehensive Plan

Florida Department of Agriculture and Consumer Services (FDACS); Florida Forest Service

- ▶ 2013 Ten-Year Resource Management Plan for the Blackwater River State Forest (Santa Rosa and Okaloosa Counties)

Florida Department of Environmental Protection (DEP)

- ▶ 2022 Yellow River Marsh Preserve State Park Approved Unit Management Plan
- ▶ 2020 Fort Pickens Aquatic Preserve Management Plan
- ▶ 2018 Big Lagoon State Park, Tarkiln Bayou Preserve State Park, and Perdido Key State Park Multi-Unit Management Plan
- ▶ 2016 Blackwater River State Park Unit Management Plan
- ▶ 2011 Bayou Chico Basin Management Action Plan



Moore's Creek
PPBEP

Florida Fish and Wildlife Conservation Commission (FWC)

- ▶ 2020 A GIS Assessment of Florida's Aquatic Resources: A Framework for Restoration and Management
- ▶ 2018 Florida's Freshwater Priority Resources: A Guide for Future Management

Gulf Coast Ecosystem Restoration Council (RESTORE Council)

- ▶ 2022 Comprehensive Plan
- ▶ 2019 Planning Framework

Gulf of Mexico Alliance (GOMA)

- ▶ 2021–2026 Governor's Action Plan IV for Healthy and Resilient Coasts

Longleaf Alliance

- ▶ 2018–2022 SoLo-ACE Longleaf Partnership Conservation Plan
- ▶ 2009 Range-Wide Conservation Plan for Longleaf Pine

Mobile Bay NEP

- ▶ 2022 Gulf Frontal Watershed Management Plan (lower Perdido Bay)
- ▶ 2020 Wolf Bay Watershed Management Plan

National Oceanic and Atmospheric Administration (NOAA)

- ▶ National Coastal Zone Management Program Strategic Plan 2018–2023

National Park Service (NPS); U.S. Department of the Interior

- ▶ 2014 Gulf Islands National Seashore (Florida and Mississippi) General Management Plan

National Wildlife Federation (NWF)

- ▶ 2020–2025 Gulf Program Strategic Plan

Northwest Florida Water Management District (NFWFMD)

- ▶ 2019 Region II Regional Water Supply Plan
- ▶ 2019 Strategic Water Management Plan
- ▶ 2018 Districtwide Water Supply Assessment
- ▶ 2017 Pensacola Bay System Surface Water Improvement and Management (SWIM) Plan
- ▶ 2017 Perdido River and Bay SWIM Plan

The Nature Conservancy (TNC)

- ▶ 2021 Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System
- ▶ 2014 Pensacola Bay Community-Based Watershed Plan
- ▶ 2014 Perdido Bay Community-Based Watershed Plan

Santa Rosa County

- ▶ 2040 Comprehensive Plan

U.S. Environmental Protection Agency (EPA)

- ▶ 2020 National Water Reuse Action Plan: Collaborative Implementation



Fundy Bayou
PPBEP

Watersheds 101

Everyone lives in a watershed. A watershed acts as a funnel collecting all the water from a specific area of land and draining into the nearest body of water. Water in the form of rainfall or snow melt is guided by gravity and channeled into the soil, groundwater, streams, creeks, lakes, and rivers making its way to the bays and out to the Gulf of Mexico. The Pensacola and Perdido Bays watersheds are ecologically diverse (having a variety of features and species) and include longleaf pine forests, blackwater rivers, floodplains, wetlands, seagrasses, and oyster beds. The water resources that comprise the watersheds provide numerous functions that are critical to quality of life. The rivers, streams, and coastal waters sustain numerous species of fish and wildlife, and their wetlands and coastal barriers provide protection against storms and coastal change. The environment, economy, and society depend on healthy watersheds.

Escambia River

Darryl Boudreau, NFWMD

Key Elements of Our Watersheds



Wetlands:

These important barriers retain excess nutrients and pollutants, trap sediment, and protect us from flooding and wave energy.



Longleaf Pine Forest:

Upland habitats are home to many species of plants and animals and play a critical role in water infiltration.

How Water Flows:

Gravity guides water across our watersheds. Water that isn't absorbed into the soil makes its way across land into streams, rivers, and bays, then ultimately, to the Gulf of Mexico.



Seagrass Beds:

Submerged grasses filter water, provide nursery and foraging grounds for wildlife, store carbon, and stabilize sediments.



Oyster Reefs:

These ecosystem engineers provide habitat to fish and shellfish, protect shorelines, and filter water for particles and nutrients.

Gulf Coastal Plain

General Characteristics

The Gulf of Mexico (GoM) combines rich ecological communities, economic value, and a physical location that makes it unique amongst other oceans and waterbodies. The habitats of the Gulf Coastal Plain watersheds support many endemic species of plants and animals. The estuaries that contain inputs from these watersheds support many ecologically, recreationally, and commercially important species, including oysters, seagrasses, and fish.

The East Gulf Coastal Plain encompasses more than 65,600 mi² and extends from southwestern GA across the FL Panhandle to southeastern LA (TNC 2001). The East Gulf Coastal Plain has a wide variety of landscapes characterized by flat physiography with longleaf pine-dominated uplands, seepage bogs, wetlands, alluvial plains, salt marshes, estuaries, and barrier islands. The watersheds cover two physiographic regions, the Western Highlands to the north and the Gulf Coastal Lowlands to the south (Williams 2004). The two regions are separated by a relict marine escarpment. The Western Highlands have greater relief (375 ft above sea level) than the Gulf Coastal Lowlands (30 ft above sea level) and are dominated by limestone bedrock of the Citronelle Formation, ancient delta deposits of clays, clayey sands, and gravels that form stream-incised hills (e.g., Bay Bluff along Escambia Bay) (Rupert 1993, Williams 2004, NFWFMD 2017b). The Western Highlands have gently rolling hills with seepage bogs, and the Gulf Coastal Lowlands have sloping marine terraces (Wolfe et al. 1988, Rupert 1993), while the coastlines are comprised of sand dunes and beaches.

Geologic features of the watersheds follow the stratigraphy of the western FL Panhandle, characterized by prehistoric marine deposition when sea level was higher than present, leading to dolomitic and sandy clayey limestones, shell beds, and sands (Williams 2004). Overlying sediments are composed of siliciclastic sediments composed of mainly quartz sand weathered from the Appalachian Mountains with sand, gravel, limestone, chalk, marl, and clay (Omernik 1995). There are two aquifers present in the system for water storage: the sand-and-gravel aquifer and the Floridan aquifer system. The



sand-and-gravel aquifer is the surficial aquifer (about 400 ft deep; Richards 2001), recharged via rainfall, that provides fresh drinking water to much of the watershed, including Baldwin and Escambia Counties in AL and Escambia and Santa Rosa Counties in FL (NFWFMD 2013). The Floridan aquifer (about 1,000 ft deep; Pratt 2001), largely composed of carbonate sediments, is beneath the sand-and-gravel aquifer and provides fresh drinking water for Walton, Okaloosa, and Santa Rosa Counties, FL (NFWFMD 2014).

This region is a North American hotspot for biodiversity and endemism (i.e., species being found in a single defined geographic location) in terrestrial, freshwater, and other aquatic systems due to the lack of glaciation which allowed organisms to persist while other areas of the continent experienced organism die-offs (Thorne 1993, Sorrie and Weakley 2001). For example, these freshwater aquatic systems include diverse fish and mussel species with many species being endemic to single rivers or tributaries (Master et al. 1998, TNC 2001). Therefore, these ecosystems are at high risk for biodiversity loss and are threatened by hydrologic alterations (including water quantity), pollution, and invasive species introductions (TNC 2001). Additionally, longleaf pine uplands make up a significant portion of the Gulf Coastal Plain, and in recent years this ecosystem has been threatened due to development, habitat fragmentation, and a lack of natural and prescribed fire, which is needed to maintain a healthy longleaf pine ecosystem (TNC 2001). Without healthy uplands and longleaf pine lands, water quantity, storage, and quality is affected, influencing downstream ecosystems.

Climate Characteristics

The Gulf Coastal Plain has a warm, humid maritime climate. Average temperature ranges from 55–71°F across the Gulf Coastal Plain (USDA 2022; [MLRAs 152A and 133A](#)). Rainfall in the eastern Gulf Coastal Plain is bimodal, with higher rainfall in summer and winter and lower rainfall in spring and fall. Annual average rainfall over the region is high compared to other regions in the U.S., with an annual average precipitation of 67 in (data from 1991–2020) recorded in Pensacola, FL (NOAA 2022a).

The Pensacola and Perdido Bays watersheds are subtropical (30°N) in the northeastern GoM. The proximity to the coast reduces temperature

variability compared to inland areas. Average annual temperature and precipitation (between 1981–2010) was 64°F and 64 in, respectively (GSA 2009, University of Florida Conservation Clinic 2010). Almost half the annual precipitation falls during the summer months, and the least amount of rainfall is during the fall (USDA 1995).

Winds are generally from the north during winter and the southwest during summer. The watersheds experience tropical storms and hurricanes during summer and fall. The occurrence of hurricanes and tropical storms in recent years has an average of two storms per year (Knight and Davis 2009). Heavy rain events not associated with tropical development are also common (Yu et al. 2016). During April 2014, a 500-year rainfall event dropped 20.5 inches over a two-day period and destroyed homes, wiped out roads, and washed away bridges in the Pensacola metropolitan area (NOAA 2014, Kim et al. 2020). High annual rainfall generates high surface runoff which transports nutrients, organic matter, pollutants, and sediments to the waterways, which in turn can degrade water quality.

Population Characteristics

Population growth and suburban development are expected to increase, altering the landscape and potentially threatening natural resources and quality of life (Handley et al. 2007). To ensure a sustainable environment and thriving economy in the face of population growth, smart growth practices should be used (Downs 2005). The general trend of land conversion in the watersheds is loss of forested and agricultural lands to urban and suburban development (Yang and Liu 2005). Such land conversions can increase urban and stormwater runoff, fragment habitats, and degrade natural resources overall.

Areas with the largest population growth are Escambia and Santa Rosa Counties (coastal FL) and the AL coastal cities (NFWFMD 2017a, 2017b). Populations of Escambia, Santa Rosa, and Okaloosa Counties, FL, have increased by 220% since 1960 (Handley et al. 2007). According to the U.S. Census Bureau (2020), Escambia County's population increased 8%, Santa Rosa County's population increased 24%, Okaloosa County's population increased 17%, and the population of the AL coastal counties of Orange

Beach, Gulf Shores, and Foley increased by about 50% between 2010 and 2020. As of 2020, Escambia County's population is 321,905, Santa Rosa County's population is 188,000, Okaloosa County's population is 211,668, the City of Orange Beach's population is 8,095, the City of Gulf Shore's population is 15,014, and the City of Foley's population is 20,335 (U.S. Census Bureau 2020).

Population growth across the watersheds is disproportionate, with the FL portion (particularly the coastal areas) of the watersheds expected to increase in population and the AL portion of the watersheds expected to decrease in population (U.S. Census Bureau 2020). For example, the population of the southern AL city of Bay Minette increased by 12%, but that of other AL counties in the northern portions of the watersheds, such as Escambia, Covington, Conecuh, Butler, and Crenshaw, decreased about 6% between 2010 and 2020 (U.S. Census Bureau 2020). Population size is also smaller in the northern AL counties compared to FL coastal counties (FL populations reported above): Escambia County's population is 36,757, Covington County's population is 37,570, Conecuh County's population is 11,597, Butler County's population is 19,051, and Crenshaw County's population is 13,906.

Navarre Beach PPBEP



Perdido Bay Watershed

Geographic Characteristics

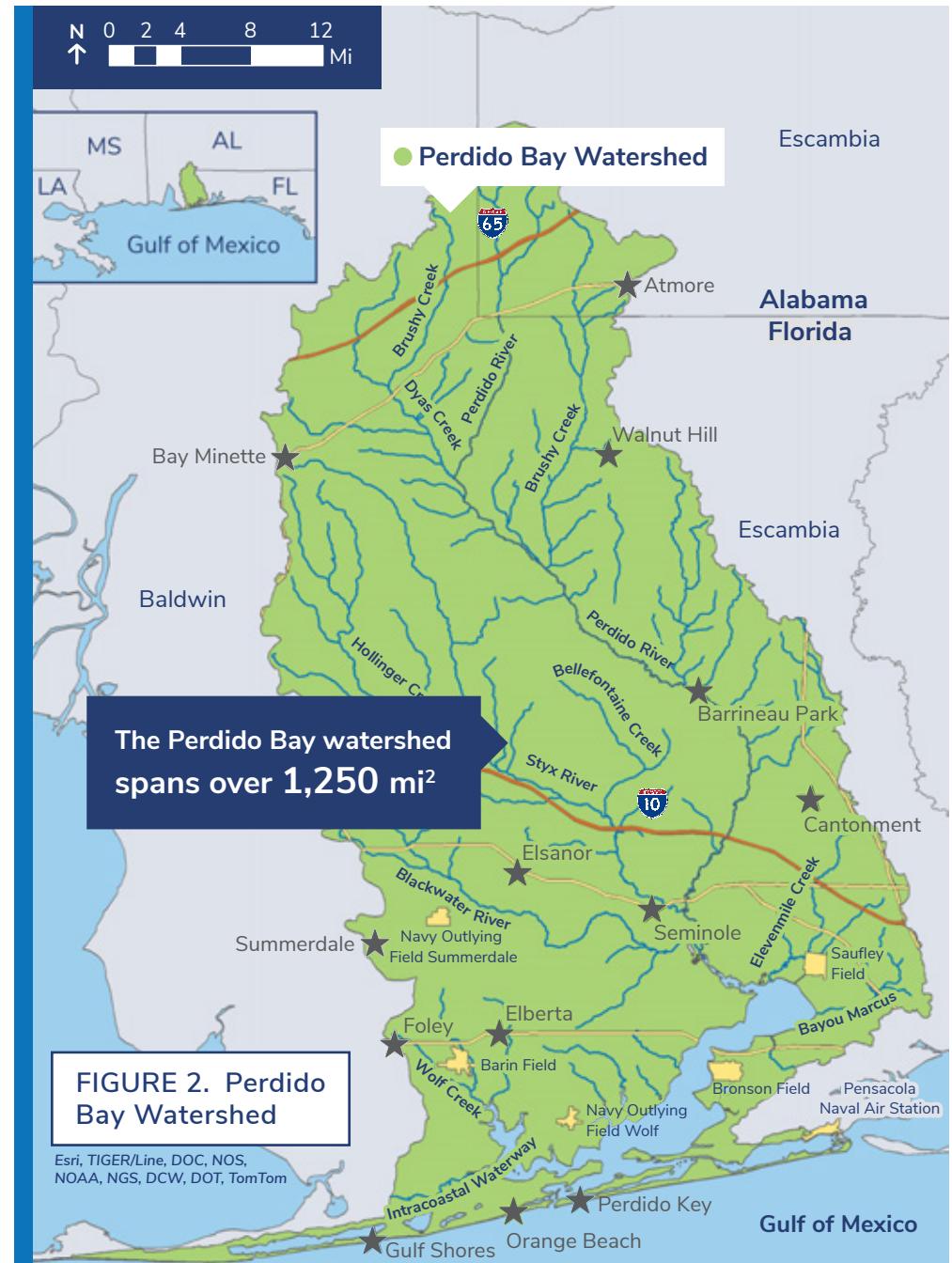
The Perdido Bay watershed covers approximately 1,250 mi² (not including Perdido Bay) extending across FL and into southern AL, draining into the GoM through Perdido Pass (Figure 2). A portion (30%) of the watershed is in Escambia County, FL, while the other 70% is located in Baldwin and Escambia Counties, AL (NFWFMD 2017a).

Hydrologic Characteristics

Perdido Bay

Perdido Bay is a small (50 mi²), shallow (mean depth: 6.5 ft) estuary that includes Wolf Bay, Bay La Launch, Arnica Bay, Bayou St. John, Cotton Bayou, and Big Lagoon (Figure 3). The bay is bisected by Highway 98, with the lower bay being more open with marine influence and the upper bay being more freshwater influenced. Perdido Bay discharges into the GoM through Perdido Pass and connects to Pensacola Bay via Big Lagoon. Old River is situated between Ono Island to the north and Perdido Key to the south. Big Lagoon is bordered by Big Lagoon State Park and the Pensacola Naval Air Station to the north and Perdido Key in the south.

Notorious for being difficult to find, the Spanish named the bay “Perdido”, which translates to “lost”. The original pass shifted many times and had dangerous currents that made navigating Perdido Pass treacherous for early explorers (Sunshine 1880). The channelization of a permanent pass (Mullen 2020) and the construction of railroads in the late 1800s and early 1900s led to a population boom in the area (Hildreth 1959). Currently, the southern portion of the bay is a tourist destination with heavy development and a large population. Additionally, the northern reaches of the bay have been impacted by industry since the 1950s (Florida State Board of Health 1958, 1967).



River Systems

Perdido River

The Perdido River is the main source of freshwater to Perdido Bay and is designated by the State of Florida as an Outstanding Florida Water, with a large portion of the area protected by conservation lands. This river is a hotspot for recreational activity including fishing and canoeing, and marks the boundary line between FL and AL. The Perdido River is formed at the Fletcher and Perdido Creeks confluence. Near the mouth of the Perdido River, the Styx and Blackwater Rivers merge with the Perdido River. Other freshwater inputs include Elevenmile Creek, Wolf Creek, Sandy Creek, Miflin Creek, Brushy Creek, Boggy Creek, McDavid Creek, and Jacks Branch.

Elevenmile Creek

Elevenmile Creek discharges into Perdido Bay near the mouth of the Perdido River. The creek receives 68% of its flow from groundwater. International Paper (IP), a pulp and paper mill situated on Elevenmile Creek, is the largest industrial point source in the watershed. Until 2013, IP directly discharged effluent into Elevenmile Creek. Subsequently, IP relocated its discharge to a 2.2 mi² effluent distribution system, or treatment wetland, to treat 25.9 million gallons per day (MGD) (Nutter and Associates 2015). While water quality improvements following the construction of the treatment wetland have been observed, particularly regarding nutrient removal, IP effluent may still affect water quality, and Elevenmile Creek remains listed as an impaired waterbody (DEP 2008, NFWFMD 2017a).



Wolf Creek

Wolf Creek flows into Wolf Bay. This creek along with Miflin and Hammock Creeks drain 47 mi² (Lusk 2017). Wolf Creek is an urbanized creek that flows through the center of Foley, AL, and is crossed by many city roads.

Coastal Waterbodies

Gulf Intracoastal Waterway

The Gulf Intracoastal Waterway (GIWW) is a man-made channel that runs from Brownsville, TX, to St. Marks, FL, and was constructed to create quick and easy shipping routes to transport goods. The section within the Perdido



Intracoastal Waterway
Near Galvez Landing

Darryl Boudreau, NFWMD

Bay watershed was completed in 1934 and is approximately 13 ft deep by 130 ft wide (Alperin 1983). Land cuts were made between Bon Secour Bay in Mobile Bay and Perdido Bay, and between Perdido Bay and Big Lagoon.

Big Lagoon

Big Lagoon is a small sound at the base of Perdido Bay that connects Perdido Bay on the west to Pensacola Bay on the east via the GIWW. This lagoon has extensive seagrass beds of Turtlegrass (*Thalassia testudinum*) and Shoalgrass (*Halodule wrightii*) along the shorelines (Bryon et al. 2018). Big Lagoon is a highly trafficked area during the summer months, and thus there are concerns for prop scarring of seagrasses. Big Lagoon State Park encompasses land bordering Big Lagoon and a portion of the watershed. This park is home to many important species of plants and birds and is a stopover point for many migratory birds. Fort Pickens Aquatic Preserve, an Outstanding Florida Water, also encompasses a large portion of Big Lagoon.

Bayou Garcon

Bayou Garcon is an inlet north of Innerarity Point on the east side of lower Perdido Bay. Bayou Garcon is surrounded by extensive wetlands. Garcon Bayou Nature Park is a 0.4 mi² protected area near Bayou Garcon.

Tarkiln Bayou and Weekley Bayou

Weekley and Tarkiln Bayous empty into lower Perdido Bay north of Bayou Garcon. Tarkiln Bayou is the largest bayou in Perdido Bay and is surrounded by tidal marsh and pine flatwoods. The bayou is shallow (3–7 ft), and depths at the narrow mouth are shallow enough to walk across during low tides (NFWMD 2017a). Tarkiln Bayou is considered to be one of the

last remaining pristine bayous in Northwest FL (Kirschenfeld et al. 2006) and is surrounded by the Tarkiln Bayou State Preserve and Perdido Pitcher Plant Prairie, home to many species of concern.

Bayou Marcus, Heron Bayou, and Alligator Bayou

Bayou Marcus, Heron Bayou, and Alligator Bayou are located north of Tarkiln Bayou. Surrounding Bayou Marcus are Bayou Marcus Wetlands and Emerald Coast Utilities Authority's (ECUA's) Bayou Marcus Water Reclamation Facility (BMWRF), which discharges 6.5 MGD of treated wastewater effluent into the wetlands. BMWRF treats domestic and industrial waste and some leachate from the Perdido Landfill (ECUA 2021). After IP, BMWRF is the next largest potential pollution source to Perdido Bay. While BMWRF does operate within its National Pollutant Discharge Elimination System (NPDES) permit, sewage overflows and leaks due to heavy rain events and aging infrastructure result in periodic health advisories for Bayou Marcus (e.g., Reynolds 2021). The BMWRF has a boardwalk through Bayou Marcus Wetlands and is a part of the Great Florida Birding and Wildlife Trail. Bayou Marcus Wetlands has endangered, threatened, and species of special concern within its wetlands, including the American Alligator (*Alligator mississippiensis*), Gopher Tortoise (*Gopherus polyphemus*), and various pitcher plant species.

Graham Bayou

Graham Bayou is connected to Perdido Bay via Wolf Bay in AL. The Graham Creek Nature Preserve conserves more than 0.7 mi² of

wetlands and natural habitat near Graham Bayou that are home to rare plant and animal species.

Wolf Bay

Wolf Bay is designated as an Outstanding Alabama Water that sustains diverse plant and animal life, such as the American Alligator (*Alligator mississippiensis*), the Alabama Red-Bellied Turtle (*Pseudemys alabamensis*), and the West Indian Manatee (*Trichechus manatus*). Located in Baldwin County, AL, it is the westernmost embayment in the Perdido Bay basin. Wolf Bay has a long history of water quality stewards, the Wolf Bay Watershed Watch, who have been collecting water quality data since 1998.

Lakes

Lakes within the Perdido Bay watershed are important areas for recreation. Many of the lakes are used for camping, hiking, fishing, and boating.

Shelby Lakes

Shelby Lakes are coastal lakes located within the Gulf State Park near Gulf Shores, AL. Shelby Lakes are comprised of Shelby, Middle, and Little Lakes and cover 1.4 mi². Shelby Lakes are primarily freshwater lakes, separated from the GoM by dunes, that have intermittent saltwater intrusion during storm events, creating a unique environment with freshwater and saltwater fish species (Liu et al. 2008). The lakes are surrounded by pine-hardwood forests and salt marshes and are primarily used for recreation.

Tee and Wicker Lakes

Tee and Wicker Lakes (0.08 mi²) are shallow (1–3 ft) man-made lakes located at the head of

Perdido Bay just west of Elevenmile Creek. These lakes are at the end of the IP wetland distribution system and receive treated effluent. These lakes are impaired for dissolved oxygen (DEP 2020b).

Floodplains and Wetlands

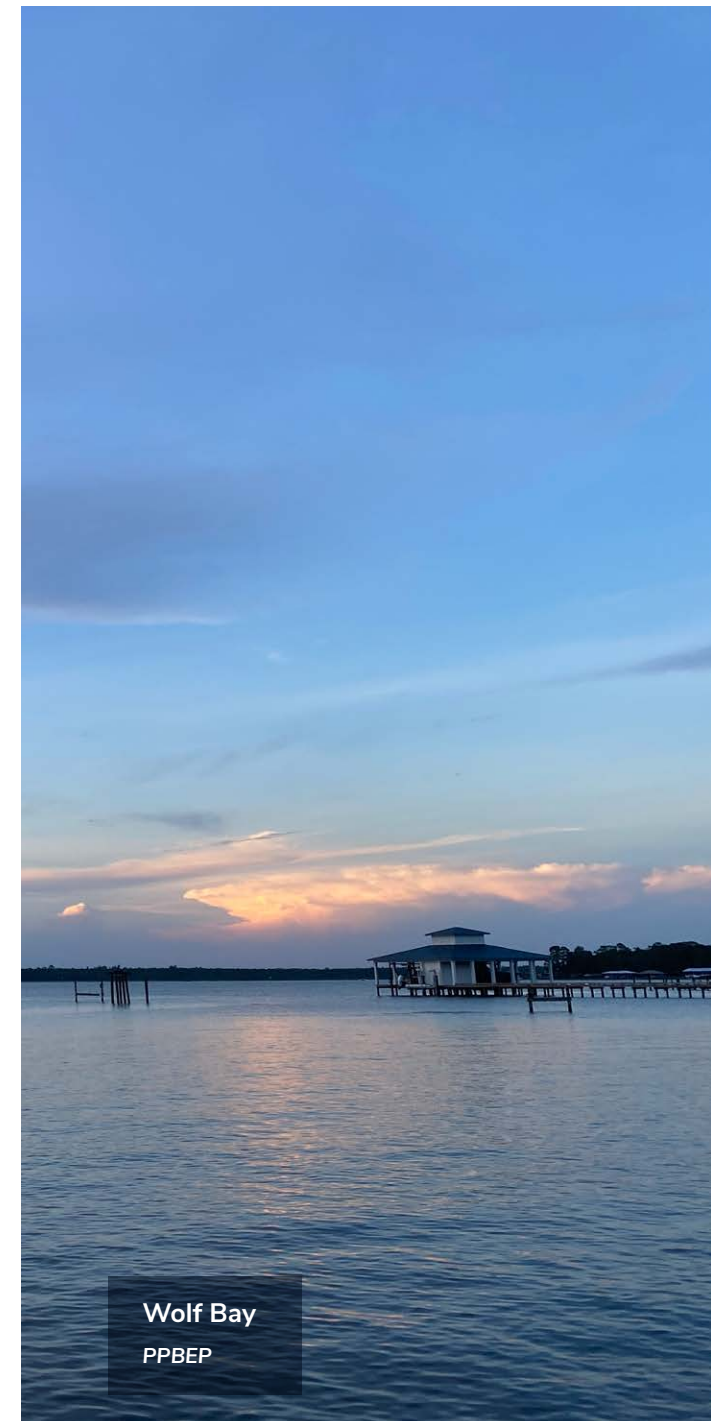
Floodplains and wetlands are at the interface of terrestrial and aquatic environments and act as buffers for pollution runoff, stabilize shorelines, and provide habitat for many species. Floodplains are largely concentrated around the Perdido River and other major tributaries and include palustrine and tidal wetlands. Large floodplains are found near the lower Perdido River near northern Perdido Bay and the northeastern side of Perdido Bay where Garcon Swamp is located. Wet prairies are common in the Perdido Bay watershed and provide habitat for many plant species including endangered pitcher plant species.

Tarkiln Bayou and Perdido Pitcher Plant Prairie

Tarkiln Bayou Preserve State Park (6 mi²) is a wetland preserve home to four species of endangered pitcher plants, including the White-Topped Pitcher Plant (*Sarracenia leucophylla*) endemic to the Gulf Coast (NFWFMD 2017a). Over 100 rare animals depend on the wet-prairie habitats within the preserve. This preserve uses prescribed fire and trash cleanups to protect the wetlands (DEP 2018).

Garcon Swamp

Garcon Swamp (2.3 mi²) flows into Bayou Garcon. It is a large wetland system located southeast of Tarkiln Bayou and north of Big Lagoon. Vegetation present in Garcon Swamp includes Titi (*Cyrtilla racemiflora*), Blackgum (*Nyssa biflora*), and Pond Cypress (*Taxodium ascendens*).



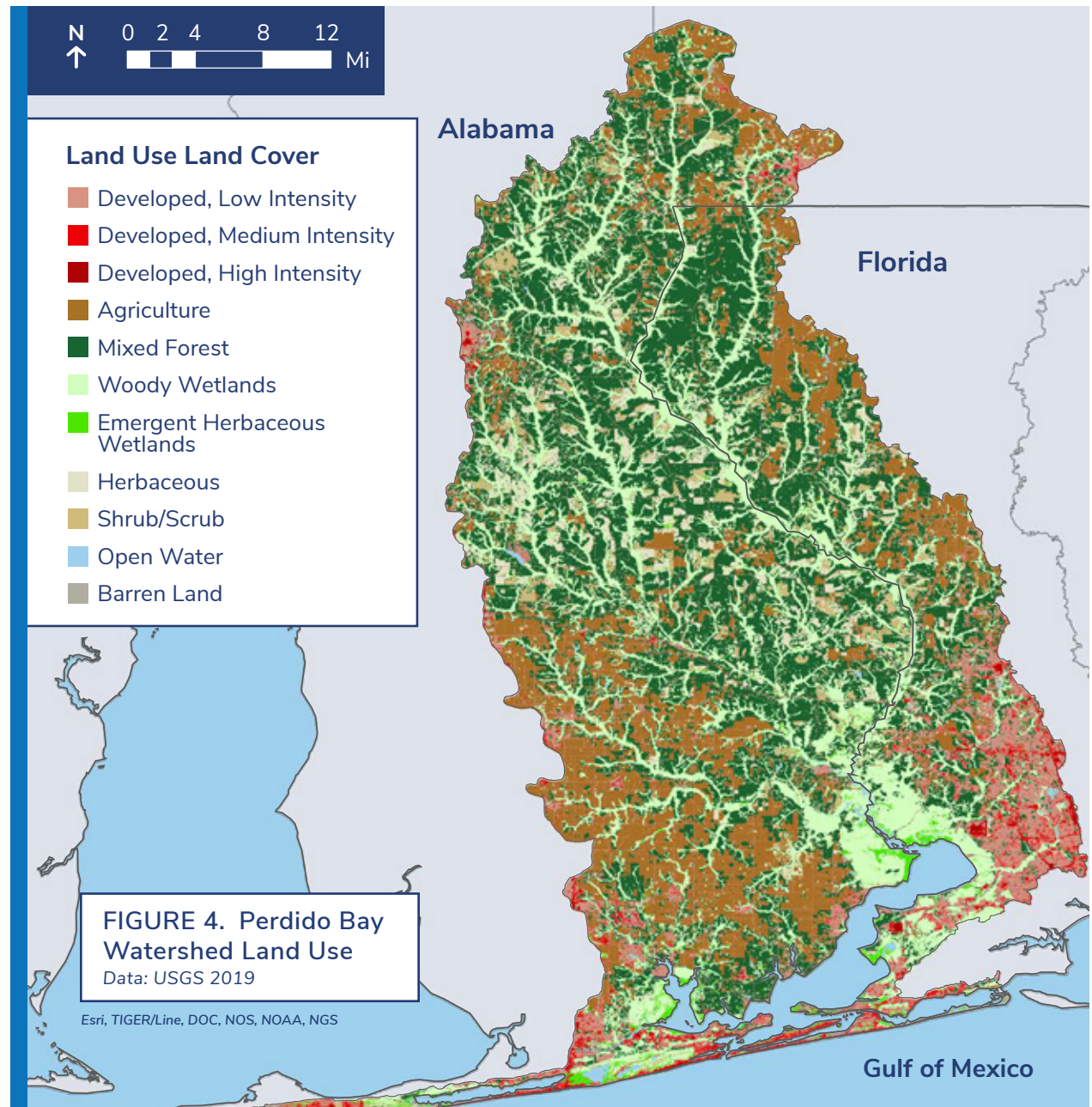
Wolf Bay
PPBEP

Land Use Characteristics

Land Use

Land use within the Perdido Bay watershed consists of mixed upland forest (36%), agricultural lands (17%), marsh and wetlands (23%), urban areas (12%), shrubland (5%), herbaceous areas (5%), open water (1%; excludes Perdido Bay), and barren land (1%) (Figure 4; USGS 2019). Urban and industrial areas are concentrated around Pensacola, Cantonment, Perdido Key, Gulf Shores, and Orange Beach. This region also has military bases within the watershed that encompass 5 mi². The FL portion of the watershed is dominated by developed and forested lands with rapid urbanization occurring in Pensacola, while the AL portion of the watershed is dominated primarily by agriculture and forested areas (Figure 4). Agricultural activities led to high nutrient concentrations in Wolf Bay (Livingston 2001).

In recent years, urban and agricultural expansion has increased within the Perdido Bay watershed (Le et al. 2015). Such changes can alter freshwater flows, water storage and quantity, and nutrient and sediment loading into waterways. In the Perdido Bay watershed, terrestrial uplands have been modified, which may impact wetland hydrology, aquifer recharge, and water quality (NFWFMD 2017a). A study by Wang and Kalin (2011) in Wolf Bay indicated a 20% increase in urban areas and a 9% reduction of forest coverage between 1992 and 2005. An expansion of urban areas occurred at the expense of evergreen forests and wetlands, potentially impacting water quality and quantity. Overall, due

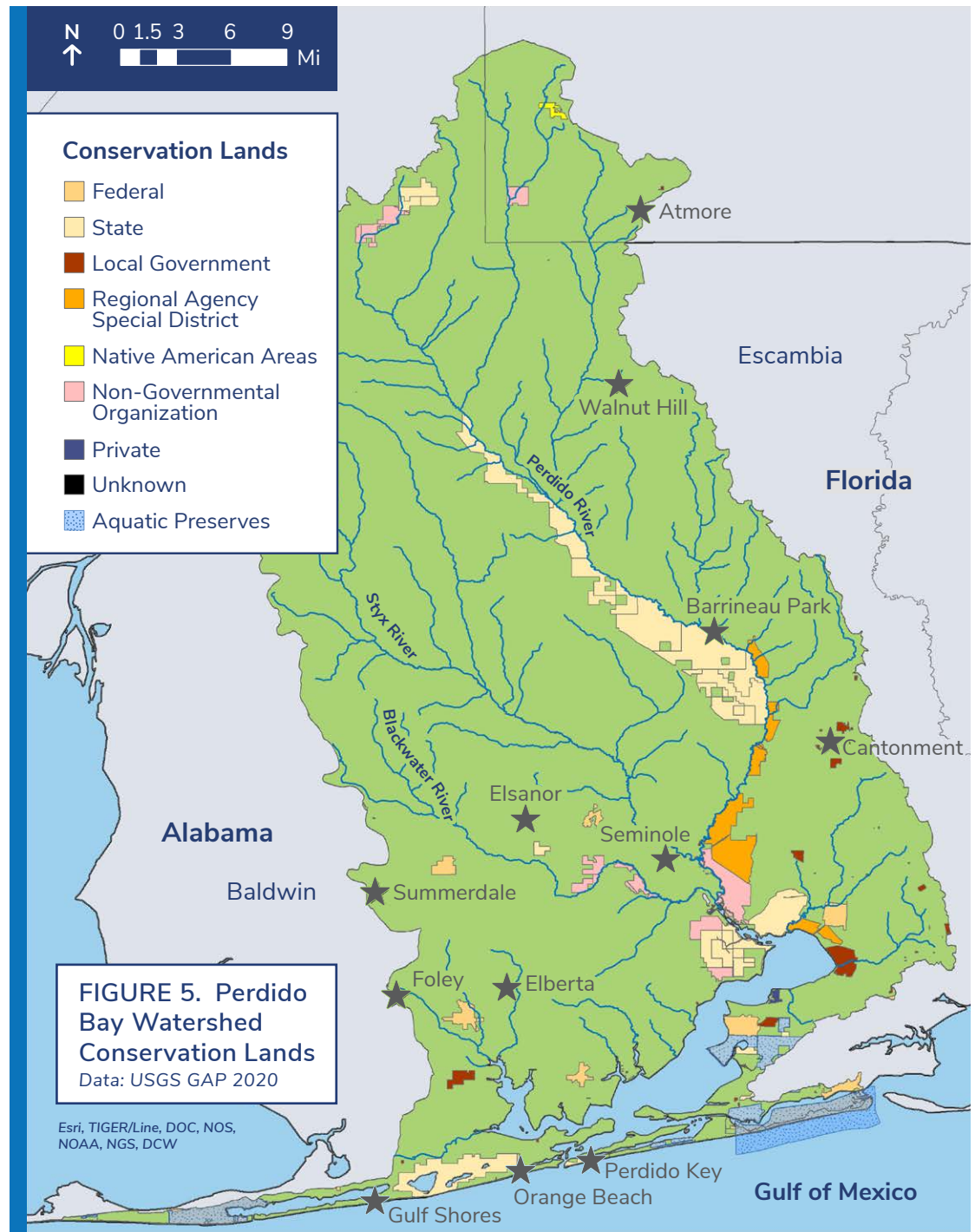


to a combination of wetland draining, conversion of agriculture, urban development, expansion of exotic species, and climate change, the natural landscape has significantly changed over the last 100 years (Volk et al. 2017).

Conservation Lands

The Perdido Bay watershed contains multiple conservation lands which are essential to protect natural resources, communities, and wildlife corridors (Figure 5). The Northwest Florida Water Management District (NFWFMD), Alabama Department of Conservation and Natural Resources (ADCNR), and The Nature Conservancy (TNC) own large tracts of land along the Perdido River including the Perdido River Water Management Area, the Perdido River Management Area, and the Perdido River Preserve, respectively. Additional conservation lands within the Perdido Bay watershed include Perdido Key State Park, Gulf Islands National Seashore (located near the barrier islands), Big Lagoon State Park, Tarkiln Bayou Preserve, Splinter Hill Bog Preserve (in the northern part of the watershed west of Atmore), Gulf State Park (near Gulf Shores), Graham Creek Nature Preserve (near Graham Bayou), and Jones Swamp Wetland Preserve (near Jones Creek in Pensacola Bay watershed).

Data retrieved from the U.S. Geological Survey (USGS) Protected Areas Databases of the U.S. Conservation lands are classified by managing entities and includes lands owned by entities or lands that are easements, designations, and proclamations.



Pensacola Bay Watershed

Geographic Characteristics

The Pensacola Bay watershed encompasses the northwestern FL Panhandle and extends to portions of southern AL (Figure 6). The watershed is approximately 6,800 mi² (NFWFWM 2016) with a portion (35%) of the watershed in the FL Panhandle (Escambia, Okaloosa, Santa Rosa, and Walton Counties) and the remainder (65%) of the watershed in AL (Covington, Escambia, Conecuh, Butler, Crenshaw, Pike, Bullock, Montgomery, and Coffee Counties).

Hydrologic Characteristics

Pensacola Bay

The Pensacola Bay system (140 mi²; Caffrey and Murrell 2016) is a shallow (11.5 ft), microtidal (average tides of 1.6 ft), coastal plain riverine-estuarine system that is partially protected by barrier islands (Figure 7). The system is a well-stratified estuary with relatively high freshwater input from the Escambia River (7,000 ft³ s⁻¹) which provides 65% of the discharge to the bay (EPA 2004), with a flushing time of 18 days (Pratt et al. 1990). As a result, Pensacola Bay experiences low dissolved oxygen events, particularly in the summertime, which have implications for benthic organisms living in these low dissolved oxygen zones (Hagy and Murrell 2007, Duvall et al. 2022). Pensacola Bay is comprised of five interconnected waterbodies: Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and Santa Rosa Sound. Water from Pensacola Bay ultimately discharges into the GoM through Main Pass of Pensacola Bay, which is 0.5 mi wide and dredged to a depth of 40–50 ft for shipping activities (Pratt et al. 1990). The pass is also scoured due to strong tidal currents.



River Systems

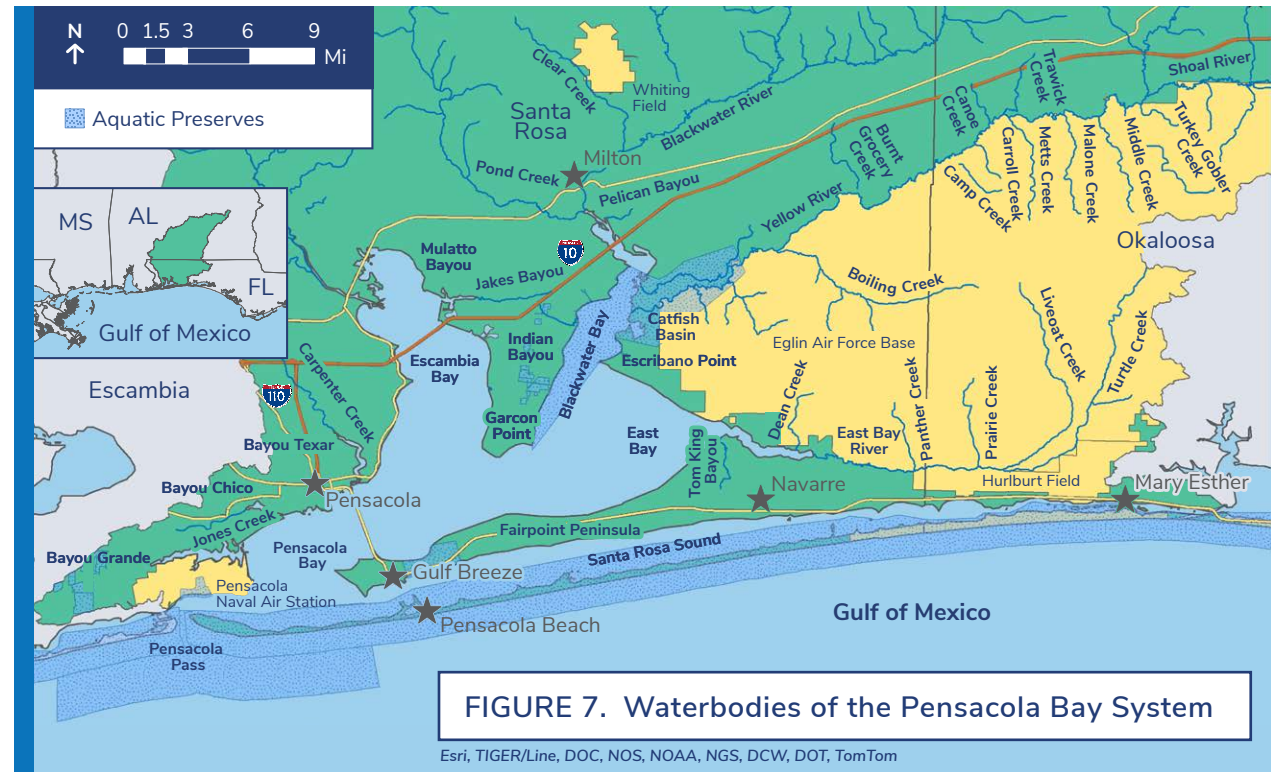
The Pensacola Bay system has four major rivers that discharge freshwater into the bay and provide nutrient inputs to support productive ecosystems: Escambia, Blackwater, Yellow, and East Bay Rivers, with the first three rivers being major river systems in the Pensacola Bay watershed. The Escambia, Blackwater, and Yellow Rivers originate in southern AL as blackwater streams, which have a high tannin (tea-colored water) content. The blackwater rivers are home to endemic and endangered species. The Blackwater River and portions of the Yellow River are designated as Outstanding Florida Waters.

Escambia River

The Conecuh River in AL forms the northern part of the Escambia River, which is the largest river in the watershed with 90% of its basin in AL. This river drains 2,600 mi² into Escambia Bay (Pratt et. al. 1990). The Escambia River provides 63% of the freshwater discharge into Pensacola Bay (EPA 2004). Tributaries of the Escambia River include Pine Barren Creek, Canoe Creek, Mitchell Creek, Little Pine Barren Creek, McDavid Creek, Bray Mill Creek, Big Escambia Creek, Holland Branch, and Blue Water Creek. This river is impacted from industrial, domestic, and nonpoint source pollution. The Pensacola Chemical Complex (previously Solutia and Monsanto Textiles Company) and Gulf Clean Energy Center (previously Gulf Power) are two historical industrial discharges in the Escambia River.

Blackwater River

The Blackwater River originates near Bradley, AL, and drains 2,700 mi² into Blackwater Bay. The Blackwater River is an Outstanding Florida Water that gets its reddish tea-colored tint from the high



tannin content from draining the surrounding flatwoods (Lewis 2010). This river receives most of its surface flow from groundwater discharge from the sand-and-gravel aquifer (Hand et al. 1996). Tributaries of the Blackwater River include Big Coldwater Creek, Pond Creek, Juniper Creek, Panther Creek, and Sweetwater Creek. While water quality in general is considered to be good, health advisories have been issued for mercury contamination in largemouth bass (Pensacola Bay Watershed Partnership and BARC 2005). Currently, concerns center on wastewater effluent (2.2 MGD from current wastewater

treatment plant [WTP]) entering the river. Large tracts of land along the Blackwater River are in conservation land in the Blackwater River State Forest. This river is an important recreational river with opportunities to rent tree houses and go glamping, zip-lining, canoeing, and tubing.

Yellow River

The Yellow River originates in Andalusia, AL, in the Conecuh National Forest and is joined by the Shoal River, an Outstanding Florida Water, in Crestview, FL. The Yellow River drains 800 mi² of wetlands into Blackwater Bay (NFWFMD 2017b). Tributaries of the Yellow River include



Yellow River
PPBEP

Murder Creek, Gum Creek, Titi Creek, and the Shoal River. The portion of the river that contains the Yellow River Marsh Aquatic Preserve is an Outstanding Florida Water.

East Bay River

East Bay River is a tannic (tea-colored) river that drains a portion of Eglin Air Force Base, Hurlburt Field, and urban areas of Santa Rosa and Okaloosa Counties. Nutrients, sedimentation, and bacterial contamination are concerns as population growth and development continue to alter the landscape that drains into the river.

Coastal Waterbodies

Bayou Texar

Bayou Texar, located in east Pensacola, has a long history of poor water quality including fish kills and bacterial contamination likely stemming from urban stormwater runoff. The headwaters of Bayou Texar, Carpenter Creek, drain urban areas in Pensacola inputting sediment and urban stormwater into the bayou. Bayou Texar is near two superfund sites: the Agrico Chemical Company (1889–1975) and Escambia Wood Treating (1942–1982). Contaminated groundwater from these superfund sites is a concern for Bayou Texar (Mohrher et al. 2005). Sediments have high levels of polycyclic aromatic hydrocarbons (PAHs), dichlorodiphenyltrichloroethane (DDT), and metals (NFWFMD 2017b). Vortechs Stormwater Treatment Units have been installed by the City of Pensacola in Carpenter Creek to capture trash, sediment, and other pollutants before entering the bayou. While water quality has improved in recent years with less suspended sediment entering the system, legacy contaminants from the sediments may continue to impact water quality for years to come. Furthermore, Carpenter Creek has been monitored (2021–2022) for trash loading through the U.S. Environmental Protection Agency (EPA) Trash Free Waters grant, and litter from urban areas and construction sites are a concern.

Carpenter Creek is also impacted by streambank erosion and channelization. Currently, the Carpenter Creek and Bayou Texar Watershed Management Plan is being developed with the goals of restoring the watershed to reduce nonpoint pollution and sedimentation and increase public access to the creek.

Bayou Chico

Bayou Chico, located near downtown Pensacola, receives fresh water from Jones and Jackson Creeks and Maggie's Ditch, which drain urban areas of

Pensacola. This bayou has had historically poor water quality due to industrial, residential, and urban activities (Lewis et al. 2016). Bayou Chico is impacted by bacterial loading, stormwater runoff, domestic and industrial wastewater discharges, shipyard operations, nutrient enrichment, and sediment contamination (DEP 2011). One of the main industrial polluters of Bayou Chico was American Creosote Works, a wood-treating facility that operated from the early 1900s to 1982 and discharged a variety of pollutants to the sediments and surface water (creosote, pentachlorophenols [PCPs], volatile organic compounds [VOCs], PAHs, polychlorinated biphenyls [PCBs], dioxins). The American Creosote Works superfund site is just north of Bayou Chico and may still be delivering phenols via groundwater (Liebens et al. 2007). Sediments have high levels of PAHs, DDT, and metals (Waller et al. 1998, NWFWM 2017b). Since the 1980s when local governments commenced remediation projects, water conditions have improved, and fish abundances have increased (Mohrherr et al. 2006).

Bayous Grande and Davenport

Bayou Grande is the southernmost bayou in Pensacola Bay with the Pensacola Naval Air Station on its southern shore, the Navy Point residential areas on its northern shore, and relatively undeveloped areas on the western shore. Other residential areas that drain into Bayou Grande are Pleasant Grove, Coral Creek, Loop Road, Beach Haven, and south Warrington. Bayou Grande is larger than the other urban bayous (Texar and Chico). Industrial waste from the Pensacola Naval Air Station was discharged directly into Bayou Grande from the 1930s–1973. Wastes introduced into the bayou included

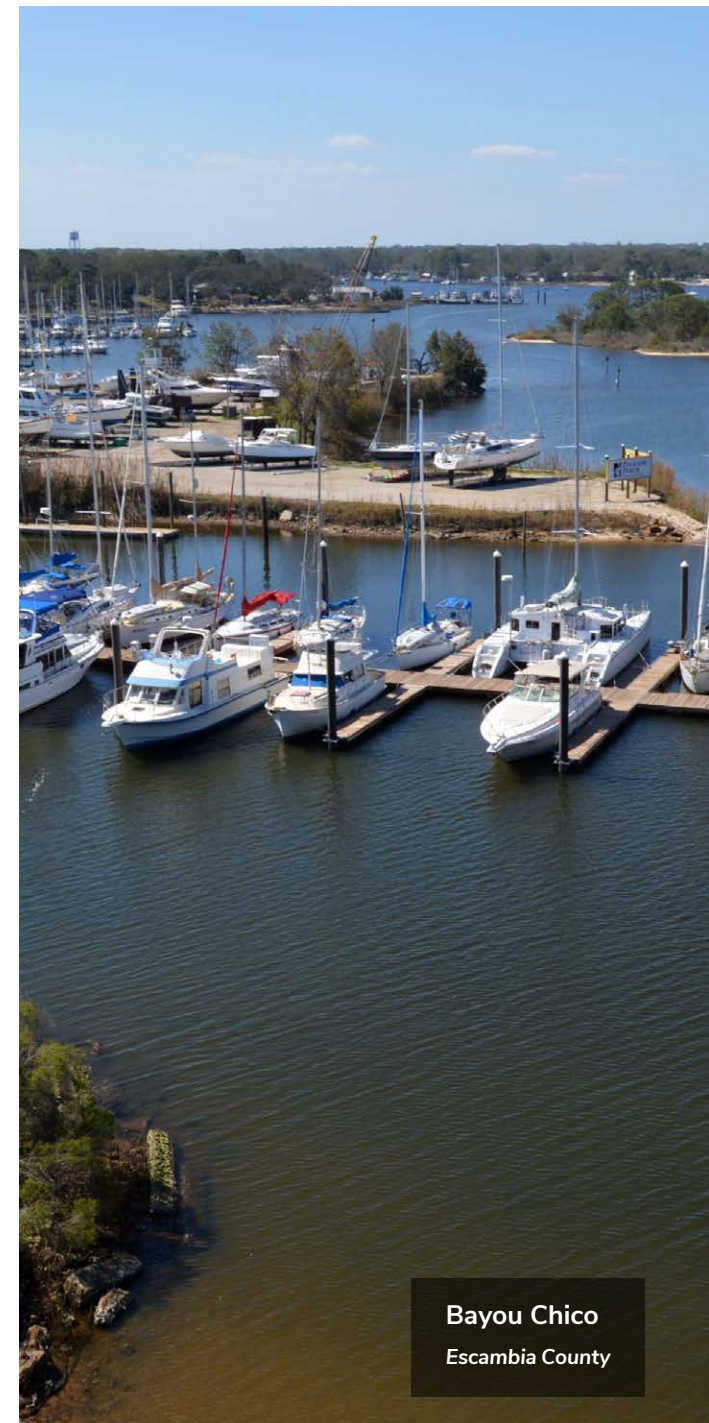
mercury, radium paint, solvents, and other heavy metals (Mohrherr et al. 2008). Other pollutants measured in Bayou Grande include PCBs and pesticides. While the Navy Base used to be a source of industrial pollution, high bacterial loads originated from Navy Point due to lift stations in close proximity to the water and a high residential population (Snyder 2006). Bacterial loading has been reduced with the conversion of septic tanks to centralized sewer and with the re-routing of the Naval Air Station's treated wastewater effluent to ECUA in 2009. Bayou Grande does have historical water quality issues like the other urban bayous, but it is less affected by urbanization than the others because much of its surrounding land is owned by the Naval Base. Additionally, Bayou Davenport is a smaller urban bayou located adjacent to Bayou Grande that drains residential portions of Warrington and has water quality concerns.

Mulatto Bayou

Mulatto Bayou is a small bayou located in Santa Rosa County on Garcon Point (eastern shore of Escambia Bay). Sediments were dredged from this bayou during the construction of the Interstate-10 Bridge in 1965. Dredging from the interstate bridge and dredging in the 1970s to make neighborhood canals covered seagrass beds with sludge deposits (Livingston et al. 1972). Mulatto Bayou currently has dense seagrass beds, suggesting seagrass recovery since the 1970s, but changes in water quality due to development in the surrounding area are concerning for seagrass persistence.

Indian and Trout Bayous

Indian Bayou is located on the northwestern side of Garcon Point. The bayou is surrounded



Bayou Chico
Escambia County



Garcon Point

Darryl Boudreau, NFWMD

by mainly natural landscape with the small neighborhood of Avalon Beach at its headwaters. Development pressures, road construction, and unpaved roads have increased sedimentation in Indian Bayou, which has seagrass beds. Trout Bayou is just south of Indian Bayou on the eastern shore of Escambia Bay.

Tom King Bayou

Tom King Bayou is on the eastern side of Pensacola Bay and drains portions of Navarre. The shoreline of the bayou has relatively healthy buffers, but stormwater runoff and septic tank leachate are potential concerns.

Lakes

Lakes within the Pensacola Bay watershed are important areas for recreation. Many of the lakes are used for camping, hiking, fishing, and boating. The FL portion of the watershed has multiple man-made impoundment lakes constructed during the 1950s–1970s that are used as Fish Management Areas. The largest man-made lakes are Hurricane Lake, Bear Lake, and Lake Karick in Blackwater River State Forest. In addition, the area has man-made lakes, such as Crescent Lake, which were built as amenities for residential subdivisions.

Floodplains and Wetlands

Floodplains and wetlands are at the interface of terrestrial and aquatic environments and act as buffers for pollution runoff, stabilize shorelines, and provide habitat for many species. Extensive floodplains exist around the major rivers of the watershed: the Escambia, Yellow, Blackwater, and Shoal Rivers. Major wetlands are located on the Garcon Point Peninsula and Fairpoint

Peninsula (southern peninsula in Pensacola Bay). Wet prairies and pitcher plant bogs are found throughout the Blackwater River State Forest, the Yellow River Marsh Preserve State Park, and the Garcon Point Water Management Area.

Jones Swamp

Jones Swamp is a wetland in the Jones Creek watershed that drains into Bayou Chico. A part of the swamp (2 mi²) is managed by Escambia County as the Jones Swamp Wetland Preserve and Nature Trail. This preserve acts as a wetland buffer that helps to improve water quality in Bayou Chico. Activities within the preserve include prescribed burning to enhance native vegetation, creek restoration, flood reduction, and stormwater education.

Gaberonne Swamp

Gaberonne Swamp is located on the western shore of Escambia Bay in the Scenic Heights area. Gaberonne Swamp has been affected by development for the past few hundred years. Historically this area was the site of a rice plantation. Currently, large residential developments surround the swamp. Due to changes in hydrology, freshwater and saltwater inputs have changed the swamp ecosystem, which has a rich animal and plant diversity. The surrounding area is impacted by stormwater and flooding. The City of Pensacola identified Gaberonne Swamp as an area in need of resilience planning due to its flooding issues, and it has undergone recent stormwater improvements ([City of Pensacola 2022](#)).

Garcon Point

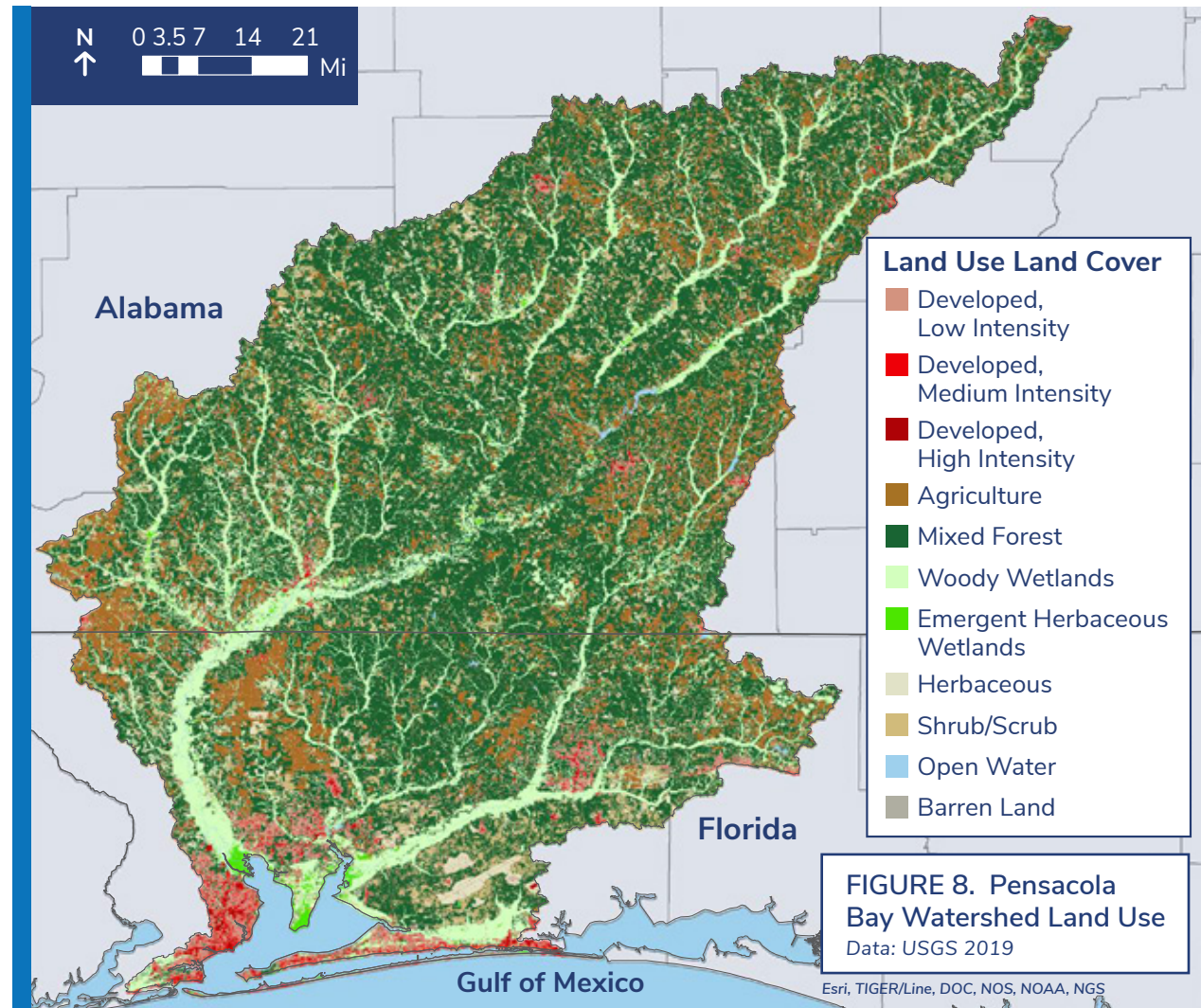
Garcon Point is the peninsula that separates Escambia and East Bays. Garcon Point consists of wet prairie wetland habitat and is home to

many rare and endangered species, including various pitcher plant species, the Panhandle Lily (*Lilium iridollae*), the Henslow Sparrow (*Centronyx henslowii*), and LeConte's Sparrow (*Ammodramus leconteii*). The Garcon Point Water Management Area is a preserve owned by the NFWFMD located in Garcon Point. This preserve protects wetlands to improve water quality in Pensacola Bay.

Land Use Characteristics

Land Use

Land use in the Pensacola Bay watershed consists of mixed upland forest (51%), agricultural lands (12%), marsh and wetlands (15%), urban areas (8%), shrubland (8%), herbaceous areas (5%), open water (1%; excludes Pensacola Bay), and barren land (0.5%) (Figure 8) (USGS 2019). Land uses in the AL portion of the watershed are predominately mixed upland forest and agricultural lands. Pockets of urban development exist around the AL cities of Andalusia, Opp, Brewton, and Greenville. North of Interstate-10 in the FL portion of the watershed, land uses are predominately agriculture and silviculture (NFWFMD 2016), while land south of Interstate-10 is more developed. Urban development is concentrated in the southern coastal zone and includes the Pensacola metropolitan area, Pace, Milton, Gulf Breeze, Pensacola Beach, Navarre, and Crestview. Industrial areas are located along waterfronts, particularly Bayou Chico and the lower Escambia River. Floodplains and wetlands are concentrated around the main river stems – Escambia,



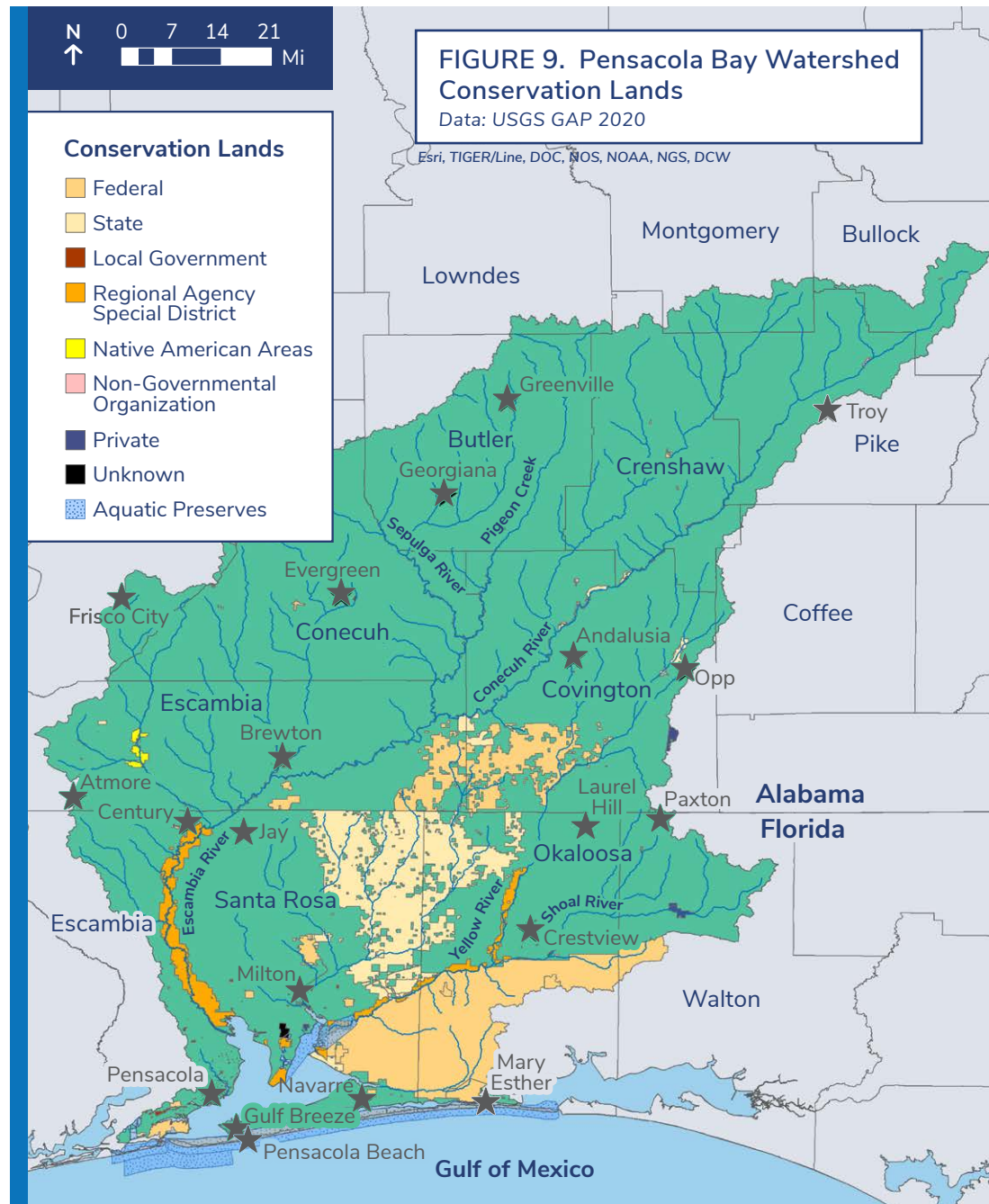
Blackwater, Yellow, Shoal, and East Bay Rivers – and Garcon Point and Jones Creek.

Large tracts of land in the Pensacola Bay watershed are military bases. For example, the Pensacola Naval Air Station covers 8.8 mi² in Escambia County, FL; Whiting Field covers 6 mi² in Santa Rosa County, FL; and Eglin Air Force Base covers 730 mi² in Santa Rosa, Okaloosa, and Walton Counties. Eglin Air Force Base also extends into the neighboring Choctawhatchee watershed (not shown on the map in Figure 8). Eglin Air Force Base Natural Resources Team has been successful in protecting endemic species and communities and providing recreational activities for the public (Natural Resources Team 2013).

Conservation Lands

The Pensacola Bay watershed contains multiple conservation lands which are essential to protect natural resources, communities, and wildlife corridors (Figure 9). Federal, state, and local government, and non-governmental organizations have jurisdiction over conservation lands within the watershed. Conservation lands include the Blackwater, Escambia, and Yellow River Water Management Areas, Gulf Islands National Seashore (near the barrier islands), Blackwater River State Forest, Conecuh National Forest, Escrimano Point Wildlife Management Area, Blackwater River and Yellow River Marsh Preserve, Eglin Air Force Base, Hurlburt Field, and the Pensacola Naval Air Station. These lands provide a buffer system for sediments, nutrients, and pollutants, protecting water quality and quantity, reducing flooding, and preserving terrestrial and aquatic ecosystems (Handley et al. 2007). The Yellow River Marsh Aquatic Preserve and the Fort Pickens Aquatic Preserve are two aquatic preserves in the Pensacola Bay watershed that together cover 80 mi².

Data retrieved from the USGS Protected Areas Databases of the U.S. Conservation lands are classified by managing entities and includes lands owned by entities or lands that are easements, designations, and proclamations.



Habitats and Communities

The Pensacola and Perdido Bays watersheds have several important habitats stretching from the headwaters down to the coast. There are terrestrial habitats which include bluffs, longleaf pine-wiregrass forests, flatwoods, and upland hardwood forests. Upland habitats support longleaf pine-dependent species, which include threatened and endangered species. Moving farther down the watershed there are riparian and floodplain habitats, including pitcher plant bogs. Near the coast, salt marshes and estuaries support juvenile fish species, oysters, clams, seagrasses, and soft bottom benthic communities. More detailed habitat and community descriptions can be found in the 2017 NFWFMD SWIM plans for the Pensacola and Perdido Bays systems and the [Florida Natural Areas Inventory \(FNAI\) website](#).

Longleaf Pine, Sandhill, and Flatwoods Forests

Longleaf pines are evergreen conifers with long needlelike leaves that can grow 70–100 ft tall. Historically, Longleaf Pine (*Pinus palustris*) ecosystems were prevalent throughout the southeastern U.S. From the early 1800s to the 1930s longleaf pines were clear-cut for the timber industry to be used in ship, railroad, and building construction (Frost 1993). Additionally, pines have been cleared for agriculture and development, intensively managed for silviculture, and tapped for turpentine and resin. Pine plantations in the area were planted for timber harvest and contain Slash Pine (*Pinus elhottii*), Sand Pine (*Pinus clausa*), and Loblolly Pines (*Pinus taeda*) (Pensacola Bay Watershed Partnership and BARC 2005). These are productive fire-adapted ecosystems that are threatened by development. Historical and current threats to longleaf pine ecosystems have altered how water is stored on land and recharged to aquifers and how nutrients flow from the landscape to the water.

Longleaf pine habitats need regular fire to maintain and rejuvenate the forests. State lands and preservation lands undergo prescribed fire to mimic the natural burning of the forest. Yet there are many stretches of longleaf forest that are not in conservation and are more vulnerable to wildfires.

Within the Pensacola and Perdido Bays watersheds there are sandhill and flatwood longleaf pine systems. Pine flatwoods are in floodplains

with sandy, well-drained soils with moderate amounts of organic matter. Flatwoods primarily surround rivers and bayous. The Blackwater River State Forest, Conecuh National Forest, and Eglin Air Force Base have the largest remaining area of mature longleaf pines in the world (NFWFMD 2017b). Sandhill longleaf pine ecosystems typically have a Wiregrass (*Aristida stricta*) understory with multiple oak species like Turkey Oak (*Quercus laevis*) and support diverse plant and animal species, such as the Red-Cockaded Woodpecker (*Picoides borealis*), Gopher Tortoise (*Gopherus polyphemus*), Gopher Frog (*Rana capito*), Eastern Indigo Snake (*Drymarchon corais couperi*), and Reticulated Flatwoods Salamander (*Ambystoma bishopi*). The red-cockaded woodpecker is a keystone species that uses living pine trees greater than 80 years old to make its cavities. Insects, birds, squirrels, and



frogs use red-cockaded woodpecker cavities. Similarly, gopher tortoises, which are a threatened species in FL, create burrows that are used by more than 350 species, including the gopher frog and the eastern indigo snake. The endangered reticulated flatwoods salamander inhabits slash and longleaf pine-wiregrass and wetland habitats. They are threatened from low population density, fragmented and restricted range due to loss of longleaf pine habitat, and inadequate fire management (FWS 2020). Tracts of Eglin Air Force Base and Hurlburt Field are critical habitat for the reticulated flatwoods salamander.

River and Stream Habitats

Rivers along the northern GoM have high biodiversity and endemism, supporting numerous freshwater fishes, mussels, clams, reptiles, and amphibians (Blaustein 2008). The watersheds have rainfall and/or groundwater fed alluvial, softwater, and blackwater streams with sand, silt, and gravel substrates (Bass and Cox 1985, FWC 2012). While all rivers are impacted by nonpoint source pollution, the Escambia River has multiple industrial point sources in the lower portion of the river near Cantonment, FL.

Gravel and pebble habitats in the upper reaches of the Escambia and Yellow Rivers are important habitats for fishes that use gravel substrates for part or all of their life history (Knight et al. 2019). Some of the fishes that use these gravel and pebble habitats for part or all of their life histories are endemic, endangered, and/or threatened fish, such as the Crystal Darter (*Crystallaria asprella*), River Redhorse (*Moxostoma carinatum*), Saddleback Darter (*Percina vigil*), Southern Logperch (*Percina austroperca*), Pallid Chub (*Macrhybopsis pallida*), and Gulf Sturgeon (*Acipenser oxyrinchus desotoi*). Sturgeon, for example, depend upon gravel habitats for their early life stages. Sturgeon inhabit most FL Panhandle rivers, but due to damming activities, only the Suwannee, Choctawhatchee, and Yellow Rivers have large sturgeon spawning grounds. Portions of the Escambia, Conecuh, Blackwater, and Shoal Rivers are designated as critical habitat for the Gulf sturgeon.

The lower reaches of the Escambia and Yellow Rivers are large alluvial systems with sandy habitats. Many endemic freshwater fishes, mussels, and clams use these habitats, including the Crystal Darter, Harlequin Darter (*Etheostoma histrio*), Cypress Minnow (*Hybognathus hayi*), River Redhorse, Saddleback Darter, Southern Logperch, and Blacktip Shiner (*Lythrurus*



Escambia River

Darryl Boudreau, NFWMD

atrapiacus). Endemic mussels and clams have narrow home ranges within the Escambia, Conecuh, and Yellow Rivers, putting these species at high risk for extinction if their habitat is lost. For example, the Choctaw Bean (*Villosa choctawensis*) is found in 13 locations and the endangered Round Ebonyshell (*Fusconaia rotulata*) is found in only 2–3 locations. Furthermore, the round ebonyshell is only endemic to a small stretch of the Conecuh River and has a historical range of 60 mi (FNAI 2022). Many of these freshwater bivalves are found in fewer locations during subsequent surveys. Threatened freshwater bivalves include the Southern Sandshell (*Hamiota australis*) and the Fuzzy Pigtoe (*Pleurobema strodeanum*). The Escambia, Yellow, and Shoal Rivers are federally designated critical habitat for several species of freshwater fishes and mussels.

Bogs and Seepage Slopes

Bogs are inundated for most of the year, creating habitat for rare and endangered plants and animals. Many types of bog-like habitats can be found in the Pensacola and Perdido Bays watersheds, including seepage slopes, swamps, and wet prairies. Seepage slopes are 30–50 ft gradient

habitats, bordered by upland pines, where groundwater percolates from the surface for most of the year creating a continually moist ground. Blackwater streams originate from swamps which provide organic and tannin (tea-colored) materials to create the “blackwaters.” Wet prairies and bogs are nutrient-poor systems that support diverse plant communities adapted to low-nutrient conditions, such as carnivorous pitcher plants (Walker 2001). Two main species found in the Pensacola and Perdido Bays watersheds are the White-Topped Pitcher Plant (*Sarracenia leucophylla*) and the Red Pitcher Plant (*Sarracenia rubra*). These plants bloom between April–May, and pitchers develop in the fall. Pitcher plants can be found at various locations throughout the watersheds and can be found on various conservation lands, including Splinter Hill Bog Preserve, Tarkiln Bayou Preserve State Park, Eglin Air Force Base, the Garcon Peninsula and Yellow River Water Management Areas, and the Blackwater River State Forest. In addition to pitcher plants, the Florida Bog Frog (*Rana okaloosae*) is a FL threatened species (and International Union for Conservation of Nature [IUCN] vulnerable species) that lives in seepage streams on Eglin Air Force Base. While the Florida bog frog does live on conservation lands, more data on bog frog abundances and better incorporation of protection of the frog into development codes are needed.

Select Rare, Endemic, and/or Endangered Species Found in Bog Habitats

Data: FNAI 2022

Species	Habitat Type	Location Found
Panhandle Lily <i>Lilium iridollae</i>	Bogs, floodplains, swamps, seepage slopes	Blackwater River State Forest, Eglin Air Force Base
Bog Spicebush <i>Lindera subcoriacea</i>	Streamsid es, seepage slopes	Eglin Air Force Base
American Chaffseed <i>Schwalbaea americana</i> ¹	Seepage slopes	Blackwater River State Forest
Seal Salamander <i>Desmognathus monticola</i>	Seepage slopes, shaded ravines	Canoe Creek (Escambia County)

¹FDACS and Florida Forest Service 2013

Floodplains and Wetlands

Freshwater Wetlands

Floodplains and wetlands provide important buffers for stormwater and other pollution, stabilize shorelines, and provide habitat for many plant and animal species. Floodplains also attenuate flood impacts, playing a vital role in ecosystem resiliency as flood impacts may increase in the future due to climate change. Large tracts of wetlands are found along the major rivers within the watersheds and in large wetland areas like Garcon and Escribano Points. Many of the historical wetlands in the lower parts of the watersheds were drained in the late 1700s and early 1900s to prevent malaria and widespread disease (Rea 1968). Wetlands were also converted to urban areas as population in the area grew. Development of wetlands reduces natural flood storage and filtration capacity, threatening water quality.



Fundy Bayou
PPBEP

Select Rare, Endemic, and/or Endangered Species Found in Freshwater Wetlands

Data: FNAI 2022

Species	Habitat Type	Location Found
Reticulated Flatwoods Salamander <i>Ambystoma bishopi</i>	Slash and longleaf pine-wiregrass, wetlands	Eglin Air Force Base
Cypress Crayfish <i>Cambarellus blacki</i>	Floodplains, cypress ponds	Escambia River Water Management Area
Escambia Crayfish <i>Procambarus escambiensis</i>	Riparian and herbaceous wetlands	Perdido River Preserve, Tarkiln Bayou State Park

Estuarine Wetlands

Tidal salt marshes are prevalent throughout the Pensacola and Perdido Bays coastal zones in low energy environments. These are important juvenile habitats for many fish and invertebrate species. Species composition is influenced by salinity tolerance, soil type, and elevation (Bertness et al. 1992). Common species of marsh grasses are Black Needlerush (*Juncus roemerianus*), Smooth Cordgrass (*Spartina alterniflora* or *Sporobolus alterniflorus*), Saltmeadow Cordgrass (*Spartina patens*), Sand Cordgrass (*Spartina bakeri*), Groundseltree (*Baccharis halimifolia*), and Bigleaf Marsh-elder (*Iva frutescens*). Other marsh grasses found are Sawgrass (*Cladium jamaicense*), Maidencane (*Panicum hemitomon*), Giant Cutgrass (*Zizaniopsis miliacea*), and Cattails (*Typha* spp.). Salt marshes provide habitat for numerous invertebrates, including Fiddler Crabs (*Uca* sp.), Marsh Periwinkles (*Littoraria irrorata*), and Mussels (*Mytilidae*). The Common Reed (*Phragmites australis*) is a prevalent invasive species that reduces the productivity and diversity of salt marshes (Meyerson et al. 2010).

Estuarine Habitats

Estuaries, located at the interface of terrestrial and ocean environments, are ecologically diverse and productive habitats. These habitats provide important juvenile and nursery habitat for many fish and shellfish species, economically and recreationally important fishing areas, and many ecosystem services such as shoreline protection and nutrient removal. Estuaries are influenced by activities in the watersheds, and healthy uplands are imperative to health of downstream estuaries. Each year estuaries in the U.S. provide millions of dollars’ worth of ecosystem services (Rouleau et al. 2021).

Estuaries include the bays, bayous, and coastal inlets. These waterbodies are important for threatened and endangered species, such as the Gulf Sturgeon (*Acipenser oxyrinchus desotoi*), which use estuaries as important winter habitats (FWS and NOAA 2003, NFWFMD 2017b). Other estuarine fish that use the coastal areas are the Red Snapper (*Lutjanus campechanus*), Alabama Shad (*Alosa alabamae*), Skipjack Herring (*Alosa chrysochloris*), Striped Bass (*Morone saxatilis*), Hogchoker (*Trinectes maculatus*), Channel Catfish (*Ichthyomyzon punctatus*), Longnose Gar (*Lepisosteus osseus*), and American Eel (*Anguilla rostrate*). Estuaries are also important for marine mammals. The West Indian Manatee (*Trichechus manatus*) is a seasonal migrant to these waters (Cloyed et al. 2021). Manatees were downlisted from endangered to threatened in 2017 and are becoming more common in this region, potentially due to population rebounds and warming waters. Bottlenose Dolphins (*Tursiops truncatus*) are also common in estuarine waters and benefit ecotourism due to many dolphin tours provided by companies in the Pensacola and Perdido Bays systems.

The Pensacola and Perdido Bays systems have been exploited by humans since colonization by Europeans. Throughout the region’s history, overuse and exploitation of natural resources have led to economic boom-and-bust cycles. For example, Pensacola Bay was the world’s largest red snapper exporter from the 1880s–1950s, with the height of production seen during 1895–1929 (McNeil 1977, Grinnan 2018). In 1902, the snapper fishery peaked as fishermen overfished the population and pushed the snapper industry into deeper waters to catch the remaining fish, decreasing local economic health (McNeil 1977). Similarly, Pensacola Bay used to have a commercial scallop

fishery, but after 1968–1969 scallop populations declined with the loss of seagrass beds (Lewis 1986). Additionally, Pensacola Bay was once known for its shrimping industry (1980s–1990s). In recent years fewer shrimping boats are seen in the bay, due potentially to declining shrimp populations as well as shifts in careers and regulation changes (O'Connor 2022). In addition to overfishing pressures, estuaries have long been used for dumping and waste disposal. In the 1880s untreated sewage was discharged directly into the bay. By the late 1960s widespread fish kills were reported due to industrial waste discharge in the Escambia River, Bayou Chico, and upper Perdido Bay (U.S. Federal Water Pollution Control Administration 1969, 1970a, 1970b). Water quality has improved with the development of sewage systems and WTPs and the creation of the Clean Water Act.



Indian Bayou
PPBEP

Submerged Habitats

Water Column Habitats

The base of the food web, such as phytoplankton and zooplankton, is important for supporting healthy ecosystems and economies, particularly through recreational and commercial fishing. Human and human-induced activities (i.e., effects of climate change) within the watersheds can influence plankton and zooplankton dynamics. For example, these dynamics can change with increased runoff (e.g., high nutrient and pollutant loads) and have cascading effects on the fish and shellfish communities that these smaller organisms support. Common species of plankton within the bay systems are Cyanobacteria (*Synechococcus*), Diatoms (*Cyclotella choctawhatcheeana*), Dinoflagellates (*Prorocentrum minimum*), and Raphidophytes (*Heterosigma akashiwo*) (Livingston 2000). Common zooplankton species within the bay systems are Calanoid Copepods (*Acartia tonsa*), Cyclopoid Copepods (*Oithona* sp.), Branchiopods (*Podon* sp.), Rotifers (*Brachionus* and *Synchaeta* sp.), and Larvaceans (*Oikopleura* sp.) (Lores et al. 2002, Livingston 2001, Murrell and Lores 2004).

Submerged Aquatic Vegetation and Seagrass Beds

The shallow coastal zones of the Pensacola and Perdido Bays systems are dominated by Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*), and less abundant species like Manatee Grass (*Syringodium filiforme*) and Widgeon Grass (*Ruppia maritima*). Seagrasses extend from the lower Perdido Islands and Big Lagoon to the Pensacola Bay system and Santa Rosa Sound. Other species of submerged aquatic vegetation (SAV) are present in the upper bays and more freshwater or brackish (freshwater mixed with saltwater) environments. Species include the most common Wild Celery or Eelgrass (*Vallisneria americana*), other species such as Carolina Fanwort (*Cabomba caroliniana*), and invasive species such as Eurasian Watermilfoil (*Myriophyllum spicatum*) and Parrot Feather (*Myriophyllum aquaticum*). These flowering plants provide many benefits to various fish, shellfish, and waterfowl species including food resources, nursery grounds, and protection from predators. Some fishes and invertebrates that use seagrass beds as nursery grounds are the Spotted Sea Trout (*Cynoscion nebulosus*), Red Drum (*Sciaenops ocellatus*), Blue Crab (*Callinectes sapidus*), and Gulf Flounder (*Paralichthys albigutta*). Seagrasses also sequester nutrients from the water

column, store carbon, trap sediments, and act as storm and wave buffers that protect shorelines from erosion, all of which are valued ecosystem services provided to the coastal communities. Seagrass declines from sedimentation are also problematic but may be recovering in recent years (Carlson and Yarbro 2020).

Oyster Reefs

The Eastern Oyster (*Crassostrea virginica*) is found in intertidal and subtidal estuarine ecosystems along the Atlantic and Gulf Coasts. Oysters are sessile, filter feeding invertebrates that create complex reef structures which provide homes for other organisms including mussels, crabs, small fish, and shrimps. Oyster reefs protect and stabilize shorelines from storms and wave action, sequester nutrients, and filter water. Pensacola Bay historically had a productive oyster fishery in Escambia, East, and Blackwater Bays, but due to decades of stressors from overharvesting, changes in salinity (i.e., low salinity from heavy rainfall), sedimentation and sediment contamination, lack of suitable substrate, Dermo (*Perkinsus marinus*) infections, disease, predation, and nonpoint and point source pollution, the oyster fishery has collapsed (EPA 2004, Lewis et al. 2016, Radabaugh et al. 2019). Remaining oysters are restricted to small sections of Escambia and Blackwater Bays. Perdido Bay currently has no known oyster reefs, and oysters are only found along pilings in the salty waters nearer the GoM. Historically, there is anecdotal evidence within newspapers and historical remembrances of oysters being present throughout Perdido Bay at different time periods starting from the 1800s. The presence and absence of oysters was likely linked to the opening and closing of Perdido Pass, which partially regulates salinity within the bay. As such, oysters in Perdido Bay are not a focus for restoration, but oysters in Pensacola Bay are a focus, and a management plan has been developed to restore these oysters (Birch et al. 2021). To restore Pensacola Bay oysters and their associated ecosystem services, tools such as the [oyster calculator](#) can be used to guide restoration targets (zu Ermgassen et al. 2016).

Soft Bottom Habitats

Large areas of the Pensacola and Perdido bays, bayous, and rivers consist of soft bottom habitats, mainly composed of sand and mud with sand present in shallow areas and channels being composed of mud. While these habitats lack the foundation for colonizing and sessile organisms, rich



Navy Point Oysters
PPBEP

communities live within these habitats. Benthic microalgae are important primary producers that support the base of the food web. Tube worms, mollusks, isopods, amphipods, crabs, and burrowing shrimp are also found in soft bottom habitats. These habitats are also important feeding areas for invertebrates, fish, and shorebirds, such as the Piping Plover (*Charadrius melodus*). Stressors to soft bottom habitats include boat propeller scarring, low dissolved oxygen, and metal and pesticide pollution.

Coastal Barrier Systems

Coastal barrier island systems at the mouth of the bays provide a protective barrier for the coastline. Barrier islands consist of white sandy quartz beaches with zones of vegetation and sand dunes. Vegetation is important for stabilizing the dune system, which provides a natural protection against storm surge. The vegetation generally changes from grassy to woody from the foredune to the backdune. Species found on the seaward side (i.e., foredune) are Sea Oats (*Unicola paniculata*), Dune Elder (*Iva imbricata*), Sea Rocket (*Cakile lanceolata*), and Sea Purslane (*Sesuvium portulacastrum*). Species

found on the backdune are Spanish Bayonet (*Yucca aloifolia*), Myrtle Oak (*Quercus myrtifolia*), Greenbriar (*Smilax auriculata*), Saltmeadow Cordgrass (*Spartina patens*), Gulf Bluestem (*Schizachyrium maritimum*), Florida Rosemary (*Ceratiola ericoides*), Sand Pine (*Pinus clausa*), Sand Live Oak (*Quercus geminata*), Groundseltree (*Baccharis halimifolia*), Seaside Goldenrod (*Solidago sempervirens*), and Yaupon (*Ilex vomitoria*).

Dunes provide important habitat for endangered beach mice. The Perdido Key Beach Mouse (*Peromyscus polionotus trissyllepsis*) and the Santa Rosa Beach Mouse (*Peromyscus polionotus leucocephalus*) prefer sand dunes with moderate vegetation cover, including Sea Oats and Beach Dropseed (*Sporobolus virginicus*). The Perdido Key beach mouse is found on Perdido Key in FL and AL, and the Santa Rosa beach mouse is found along Santa Rosa Island, FL. The Perdido Key mouse is found on conservation lands of the Gulf Islands National Seashore and the Perdido Key State Recreation Area. Escambia County has developed a Perdido Key Habitat Conservation Plan to integrate beach mice protection with compatible development options. As such, Escambia County has determined the area of habitat needed to support a healthy population of beach mice and has been working with developers to maintain

this habitat extent (PBS&J 2010). Hurricanes, which can reshape and fragment barrier islands and the dune systems, are a threat to beach mice. Other activities that disrupt the dunes, such as boardwalk construction and off-road vehicles, are also a concern for beach mice, as are feral cats (Bird et al. 2002).

Similar to the dune systems, the sandy shoreline also provides habitat for many species such as invertebrates, shorebirds, and turtles. Important shorebirds that use these habitats for nesting sites are Black Skimmers (*Rynchops niger*), Least Terns (*Sternula antillarum*), and Piping Plovers (*Charadrius melodus*). Sea turtles inhabit marine coastal and oceanic waters and use coastal beach and dune habitats for nesting during warmer months (April–September). Sea turtles found in the Pensacola and Perdido Bays systems include the threatened Loggerhead Sea Turtle (*Caretta caretta*) and the endangered Green (*Chelonia mydas*) and Leatherback (*Dermochelys coriacea*) Sea Turtles. Threats to nesting environments include development, coastal armoring, and light pollution, which can cause hatchlings to crawl away from the ocean upon hatching. Ocean threats include marine debris that entraps sea turtles and debris that is mistakenly ingested as food (e.g., plastic shopping bags mistaken for jellyfish).



Johnson's Beach, Gulf
Islands National Seashore
Darryl Boudreau, NFWMD

Legacy Watershed Issues

Pensacola and Perdido Bays watersheds have suffered from human disturbance and misuse of natural resources since industrialization. Heavy industrial presences in the early to mid-1900s led to areas with groundwater contamination and poor surface water quality (see Olinger et al. 1975 and Mohrherr et al. 2006). For example, upper Perdido Bay, Bayou Chico, and the lower Escambia River have suffered from long-term industrial discharges that caused large-scale environmental declines. At the height of industrial pollution, massive fish kills were visible, but the effects of legacy pollution are still seen in the watersheds today with issues such as contaminated sediment (e.g., Bayou Chico has PAH, PCB, dioxin, furan, and trace metal pollution; Mohrherr et al. 2006) and high mercury concentrations in fish (Karouna-Renier et al. 2011). Environmental regulations, such as the Clean Water Act, were established to remediate heavily polluted areas. Superfund sites were established in the 1980s and many of these sites are still active cleanup sites today. Five active superfund sites exist within the watersheds, all located in coastal areas, potentially still inputting contaminants into ground and surface waters. Remediation of contaminated sites is an ongoing effort and will require consistent investments to ensure clean waters for the future.

Superfund Sites

The Pensacola Bay watershed has five active EPA National Priority List (NPL) Superfund sites and one delisted Superfund site.

Active sites:

- ➔ American Creosote Works (Pensacola, FL), listed in 1983
- ➔ Agrico Chemical Company (Pensacola, FL), listed in 1989
- ➔ Pensacola Naval Air Station (Pensacola, FL), listed in 1989
- ➔ Whiting Field (Milton, FL), listed in 1994
- ➔ Escambia Wood Treating (Pensacola, FL), listed in 1994

Delisted site:

- ➔ Mowbray Engineering Company (Greenville, AL), listed from 1983–1993

Three superfund sites are located near the urban bayous of Texar and Chico, and two superfund sites are associated with Naval activity. The Agrico Chemical Company and Escambia Wood Treating are located within a mile of Bayou Texar, delivering contaminated groundwater with PCP and dioxins (Mohrherr et al. 2005). American Creosote Works delivers phenols into Bayou Chico via groundwater (USGS 1986).

There are 33 non-NPL Superfund sites located within the Pensacola Bay watershed. Seven non-NPL sites are located in AL and 26 are located within FL. A non-NPL site is a Superfund site that is not placed on the NPL list and involves short-term clean up options under the emergency removal program.

The Perdido Bay watershed has four delisted EPA NPL Superfund sites and no active sites.

Delisted sites:

- ➔ Pioneer Sand Company (Warrington, FL), listed from 1983–1993
- ➔ Dubose Oil Products Company (Cantonment, FL), listed from 1986–2004
- ➔ Beulah Landfill (Pensacola, FL), listed from 1990–1998
- ➔ Perdido Ground Water Contamination (Perdido, AL), listed from 1983–2017

There are ten non-NPL Superfund sites located within the Perdido Bay watershed. Three are in AL and seven are in FL.

Ecosystem Stressors



Habitat Fragmentation:

Small, disconnected natural areas reduce habitat for wildlife and can alter water flow.



Septic & Wastewater:

Harmful levels of nutrients and pathogens can feed algal blooms and threaten human health.



Runoff:

Water draining off the land carries nutrients, bacteria, and pollutants.



Shoreline Hardening:

Seawalls and bulkheads reduce habitat and exacerbate erosion and runoff.



Sediment Inputs:

Reduces water clarity, transports contaminants, and damages habitats.



Poor Development Practices:

Can increase sedimentation, flooding, and stress critical infrastructure.

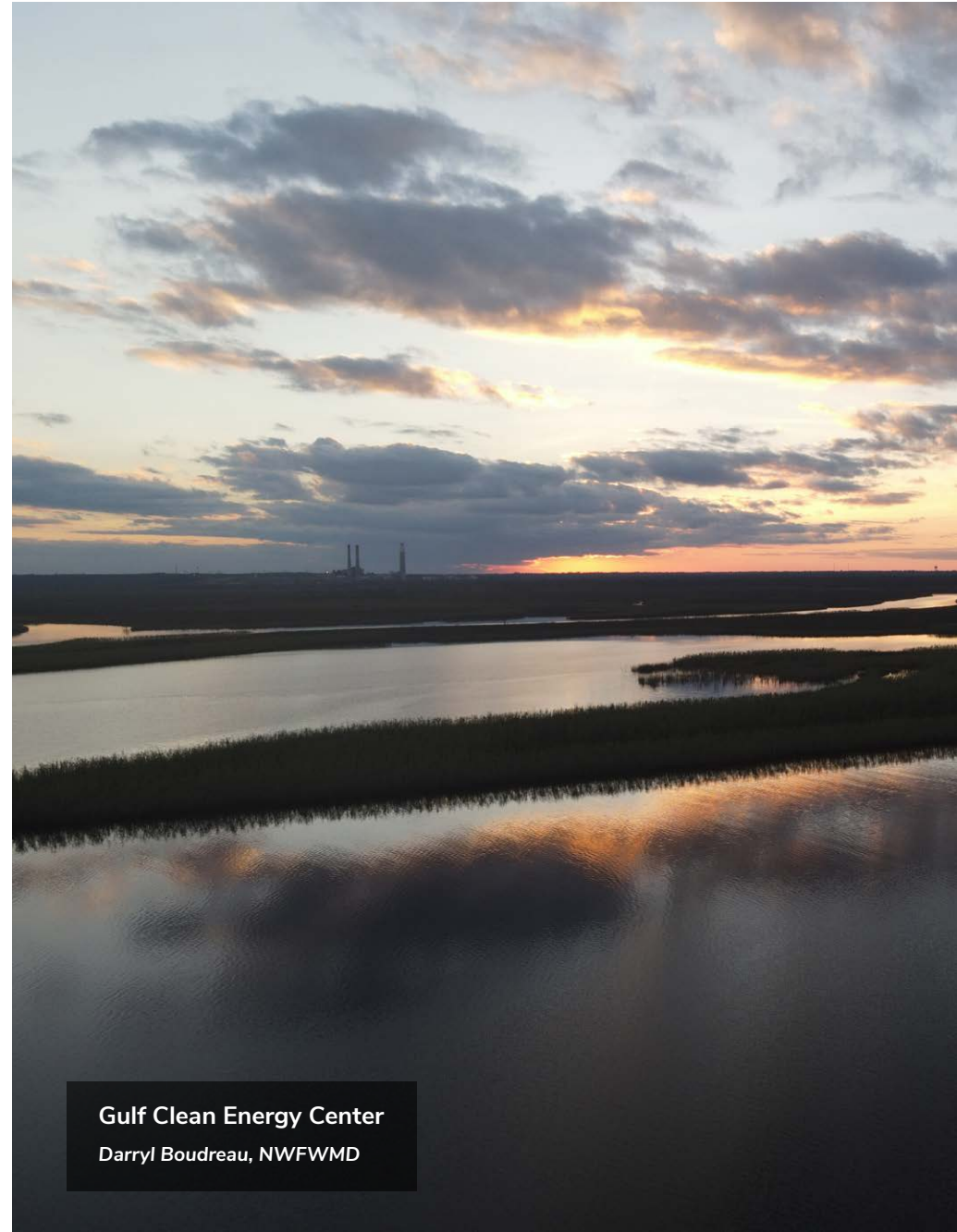
Point Source Pollution

The Pensacola and Perdido Bays watersheds, particularly the coastal areas, have suffered from long-term industrial pollution that has led to water quality degradation and sediment toxicity. Many of the facilities with historical pollution issues are located on rivers in the upper reaches of the bays, where disposal of waste and/or ease of transporting materials was desirable to these industries. For example, lumber mill operations were established in Bayou Chico because logs could be stored in the bayou and floated a short distance to the port. Additionally, Bayou Chico was once so polluted from industrial inputs that lumber mill operations chose Bayou Chico because they could float their logs in the water without getting shipworm damage (Mohrherr et al. 2006). Through the years, water quality and sediment toxicity issues stemming from industrial operations have led to findings of noncompliance and eventual improvements to discharge operations to reduce environmental impacts via local and federal efforts. A few examples of well-known industry in the watersheds are listed below:

International Paper

International Paper (IP) is a pulp and paper mill located in Cantonment, FL, near Elevenmile Creek that is one of the largest sources of wastewater in the Perdido Bay watershed. This mill was built in 1941 as the Florida Pulp and Paper Company and became a part of International Paper in 2000. Prior to 2007, the main products produced were white printing paper. After 2007, products produced shifted to containerboard grade products, linerboard, corrugating medium, and fluff pulp for use in hygiene products.

IP has a history of water quality violations (DEP 2006) that spurred the organization of environmental groups such as the Perdido Bay Environmental Association and the Friends of Perdido Bay (an offshoot of the Perdido Bay Environmental Association), which formed via concerned Perdido Bay residents. IP directly discharged industrial wastewater into Elevenmile Creek causing long-term water quality issues downstream into Perdido Bay (Livingston 2000). In 2013, IP removed direct discharge of treated wastewater effluent to Elevenmile Creek and rerouted effluent to an effluent distribution system or treatment wetland that receives 25.9 MGD (Nutter and Associates 2015). The wetland treatment system reduces nitrogen and phosphorus additions before reaching upper Perdido Bay, making IP's



Gulf Clean Energy Center

Darryl Boudreau, NWFWM



effluent nutrient concentrations compliant with its permit. Contingent upon Florida Department of Environmental Protection (DEP) approval of their 2020 Consent Order, IP is working to or has addressed its whole effluent toxicity (tested with *Ceriodaphnia dubia*), pH, and specific conductance violations (DEP 2020b). Regarding its whole effluent toxicity, IP tested its effluent without the addition of ECUA's reclaimed water to test whether the salt ion composition of the reclaimed water was causing their toxicity test failures (DEP 2020b). ECUA upgraded its treatment in response to these tests, and this resulted in passing whole effluent toxicity tests. To address pH and specific conduction violations, plans are being developed to construct a 4th berm to the treatment wetland to increase effluent treatment. Furthermore, IP is contracting the development of a 3-D hydrodynamic and water quality model for Perdido Bay to better assess water and effluent dynamics near the wetland treatment system (HDR 2020).

IP also has a history of working in partnership with local groups and state agencies to increase its environmental stewardship. During the construction of the treatment wetlands in 2013, IP restored 5 mi² of wetlands that was used for silviculture. IP also has a partnership with ECUA to use ECUA reclaimed water to reduce IP's water use and help remove direct discharge of ECUA's treated wastewater to Pensacola Bay (NorthEscambia.com 2015). While IP is still working to comply with state and federal water quality standards, it has made progress in environmental stewardship and has worked with community organizations and regional partners to improve the environment and economy.

Pensacola Chemical Complex

The Pensacola Chemical Complex is a 3 mi² petrochemical production site located on the Escambia River in Gonzalez, FL. The companies located at the Pensacola Chemical Complex include Ascend Performance Materials (nylon production) and Exxon Mobil Chemical Company (Santoprene TPV production). This complex was built in 1953 as Monsanto. The plant changed names to Solutia Inc. in 1997, and in 2009 the nylon division became Ascend Performance Materials. This plant was responsible for a PCB spill into the Escambia River in 1969 (Duke et al. 1970, Mohrherr et al. 2009), and PCB levels are still high in fish below the facility in the upper Escambia River (Snyder and Karouna-Renier 2009). Out of the top 100 industrial facilities that discharge the most amount of waste, this facility ranks 12th for on-site disposal due to its deep well injection of nitrate ([EPA's Toxic Release Inventory 2020](#)).

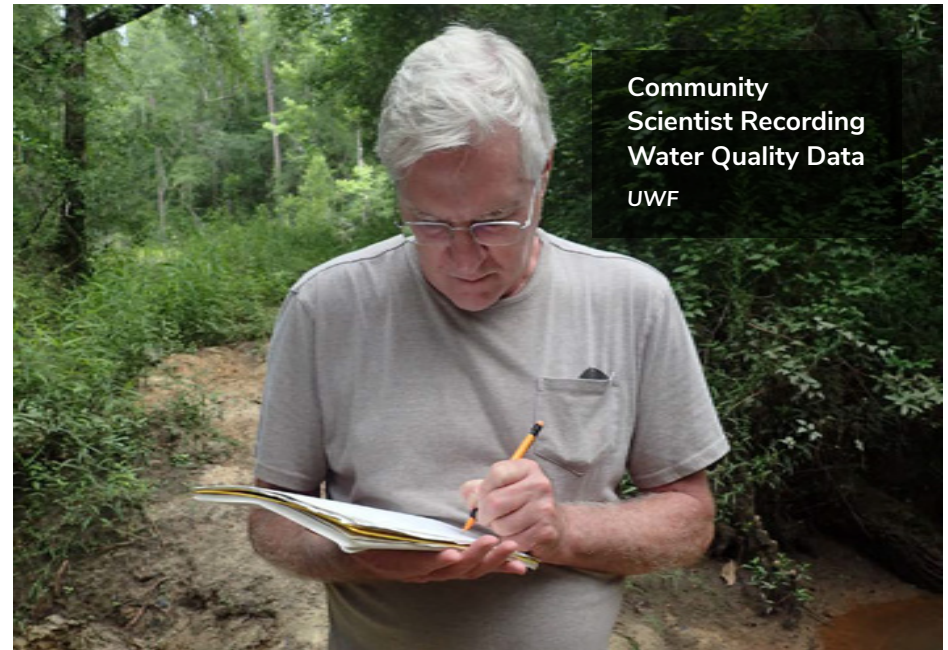
Gulf Clean Energy Center

The Gulf Clean Energy Center (owned by Florida Power and Light) was built in 1945 as the James F. Crist Generating Plant (Plant Crist) and is located at the mouth of the Escambia River on Governor's Bayou. This plant has a history of atmospheric mercury and sulfur pollution (Landing et al. 2010, Sexauer Gustin et al. 2012). In 2009, a state-of-the-art flue gas desulfurization (scrubber) system was installed to reduce sulfur dioxide, fine particulates, and mercury emissions (Sexauer Gustin et al. 2012, Gulf Power 2019). Furthermore, in 2010 this plant partnered with ECUA to use ECUA reclaimed water as a cooling agent in

their steam generating process. This eliminated the need for Plant Crist to remove water directly from the Escambia River and eliminated ECUA's need to discharge their treated wastewater effluent directly into Pensacola Bay (NorthEscambia.com 2012). Prior to 2021, this facility was a coal burning power plant transporting coal barges up the Escambia River and disposing of waste into coal ash ponds built across the bayou. In 2021, Plant Crist converted to natural gas and was renamed the Gulf Clean Energy Center. Coal ash ponds have the potential to contaminate groundwater with arsenic, cadmium, copper, manganese, and sulfate. The coal ash pond located across the Bayou from the Gulf Clean Energy Center is unlined and could impact water and sediment quality through the potential release of leachate from the coal ash pond to Escambia River (Clean Water Fund 2012) and thus needs assessment.

Industry and Citizen Action

During the mid-1900s, many industries established operations in the coastal areas of the watersheds, particularly the Escambia River, Bayou Chico, and Elevenmile Creek. For many years, unregulated industrial effluent and untreated runoff was discharged into surface waters. While the public did have concerns about water quality in the early 1900s, it was not until the pervasive fish kills of the late 1960s and early 1970s in Pensacola Bay and benthic invertebrate die-offs in the late 1980s in Perdido Bay, that large-scale community action and federal involvement were mobilized (Olinger et al. 1975, Livingston 1989). The state of the Pensacola Bay system was considered degraded near the port (Florida State Board of Health 1969), oysters were found with PCBs (Duke et al. 1970), and large fish kills were seen in Mulatto Bayou and Bayou Texar (Livingston et al. 1972, Moshiri et al. 1972). In response to poor water quality in the Pensacola Bay system, The Bream Fishermen Association (BFA) formed, and the Federal Water Pollution Control Administration held an interstate conference in 1970, 1971, and 1972. Recommendations were made to reduce the pollutant loading from Monsanto, American Cyanamid Company, and Air Products, Inc., on the Escambia River. In addition, the Clean Water Act was enacted in 1972, further promoting federal regulations to improve water quality.

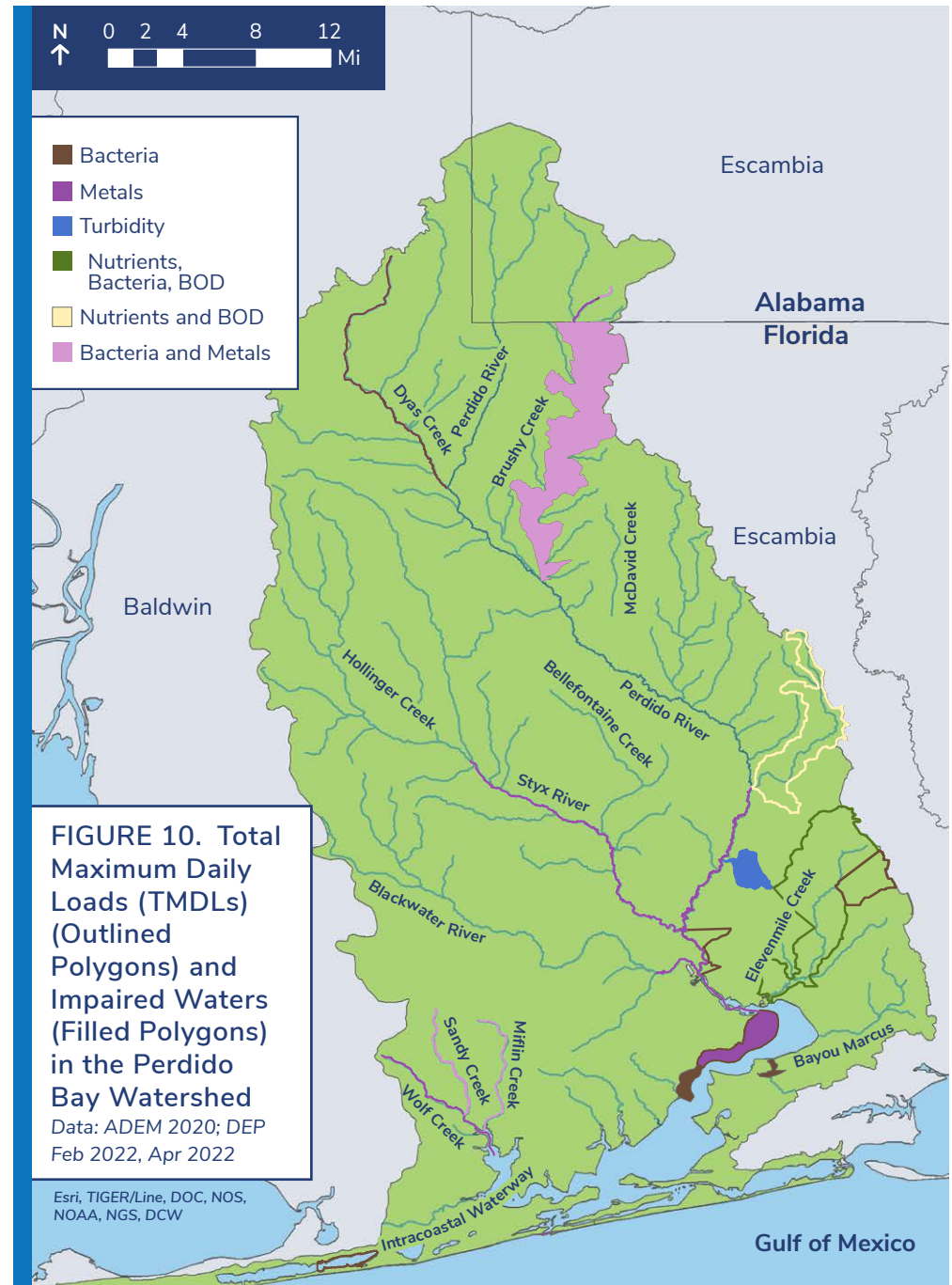


Chronic Watershed Issues

Impaired Waters

The Pensacola and Perdido Bays watersheds have water quality impairments in both FL and AL (Figure 10 and Figure 11; data available as of July 2022 from the DEP Impaired Surface Waters Rule and adopted Total Maximum Daily Loads [TMDLs], the Alabama Department of Environmental Management [ADEM] Water Quality Criteria and adopted TMDLs, and the EPA's adopted TMDLs). Causes of water quality impairments are nonpoint and point source pollution from land use practices that convert landscapes from natural, vegetated landscapes to hardened or cleared areas. DEP has identified 19 impaired waters in the FL portions of the Pensacola and Perdido Bays watersheds based on Florida's Impaired Surface Waters Rule, Chapter 62-303, Florida Administrative Code (updated July 2022) (Table 1). Of those identified, 10 segments are impaired by bacteria, 10 by metals (9 iron, 1 iron and lead), 1 by nutrients, and 1 by turbidity. ADEM has identified 38 impaired waters in the AL portions of the watersheds based on ADEM's Water Division – Water Quality Program Administrative Code, Chapter 335-6-10 (Water Quality Criteria) (Table 1). Of those identified, 14 segments are impaired by bacteria, 25 by metals (2 lead, 23 mercury), and 2 by organic enrichment (biochemical oxygen demand [BOD]). Some segments have more than one impairment, meaning there are more impairments than waterbodies impaired.

DEP identified two waterbodies impaired for bacteria in waterbodies classified for shellfish harvesting, as designated by the Shellfish Environmental Assessment Section of the Florida Department of Agriculture and Consumer Services (FDACS) (segments listed below with Water Body Identification numbers [WBIDs]). All impaired segments are found in the Pensacola Bay system. No impaired shellfish



waters are identified in the Perdido Bay system due to no known waterbodies classified for shellfish harvesting.

- ➔ East Bay River (Marine Portion)
(WBID 701C)
- ➔ Santa Rosa Sound (WBID 915)

Impaired waters undergo a course of action based on sufficient data for which a Total Maximum Daily Load (TMDL) will be developed. TMDLs indicate the maximum amount of a pollutant that can be added to a waterbody while still attaining water quality standards. Waterbodies with TMDLs have specific requirements to reduce pollutant loading to improve the water quality. TMDLs established for state-listed waters and TMDLs established by the EPA are listed in Table 2. Impairments and TMDLs within the watersheds mainly consist of bacteria (indicator for human and animal waste contamination) followed by metal and nutrient impairments. Of the TMDLs established, 28 are for bacteria, 8 for nutrients, 1 for dissolved oxygen, 4 for organic enrichment (BOD), and 2 for siltation (Table 2). Some waterbodies have more than one established TMDL. For example, Bayou Chico has two TMDLs, one for bacteria and one for nutrients.

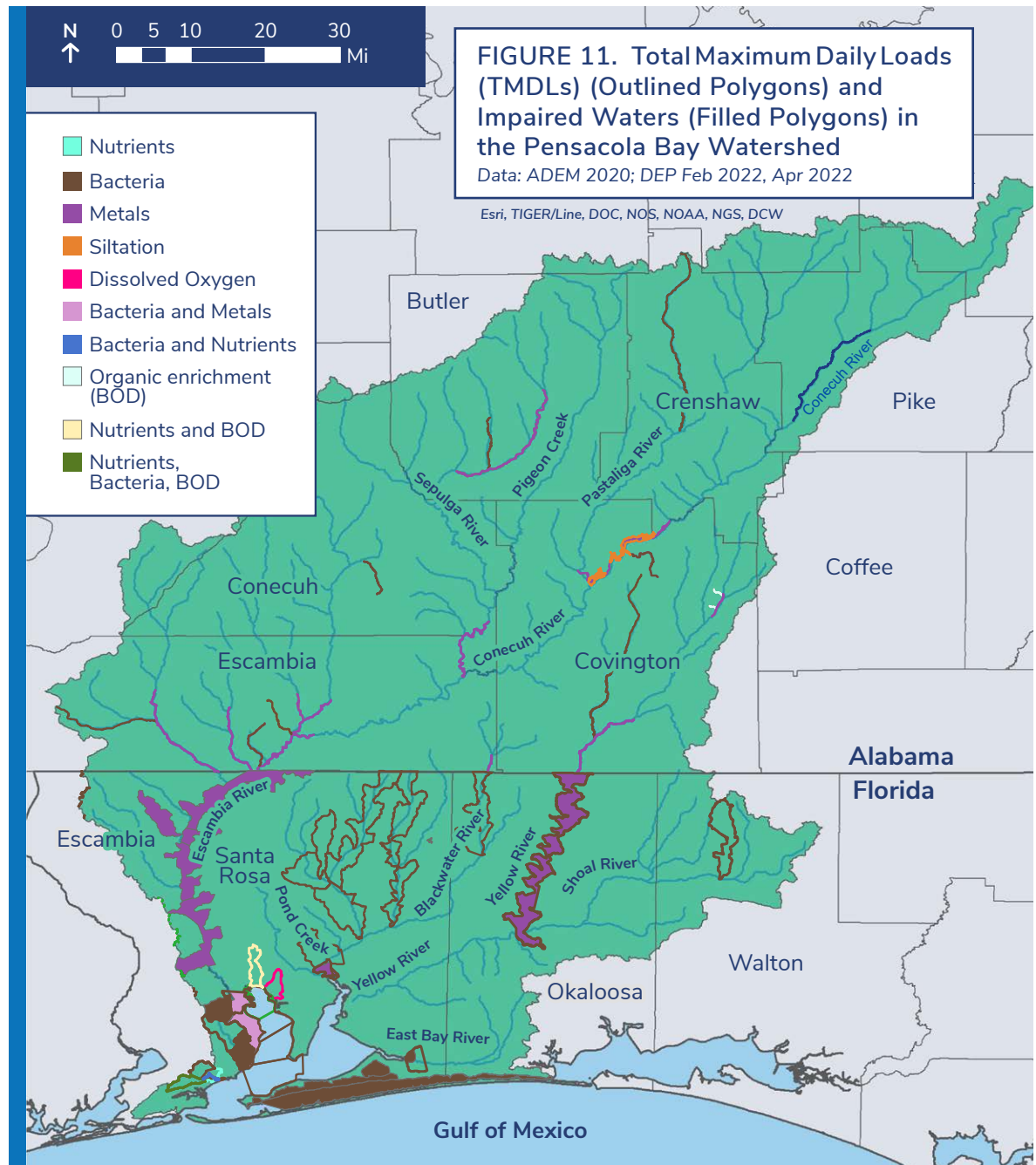


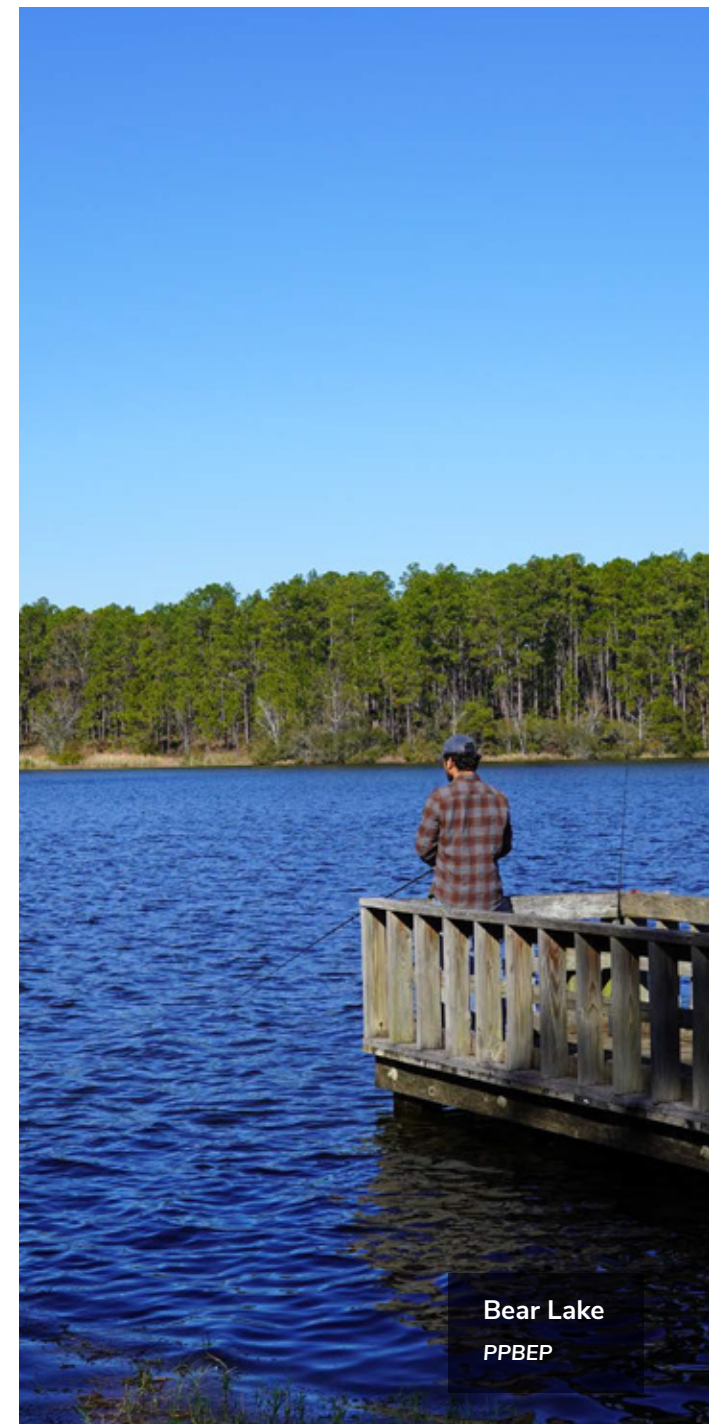
TABLE 1. Impaired Waters

Impaired waters in the Pensacola and Perdido Bays watersheds recognized by DEP (data accessed July 2022) and ADEM (data accessed February 2022).

B Bacteria **M** Metals **N** Nutrients **O** Organic Enrichment (BOD) **T** Turbidity

Metals without an asterisk are mercury, * indicates lead, ** indicates iron, *** indicates lead and iron

Location	Waterbody	Impairment	Water Body ID #
Bear Lake	Bear Lake	N	179A
Blackwater River	Blackwater River (Tidal)	M **	24AB
Blackwater River	Blackwater River	M	AL03140104-0104-100
Blackwater River	Blackwater River	M	AL03140106-0603-101
Bridge Creek (Tidal Portion)	Bridge Creek (Tidal Portion)	B	872B
Brushy Creek	Brushy Creek	B M **	4
Direct Runoff to Bay	Direct Runoff to Bay	B	893
East Bay River	East Bay River (Marine Portion)	B	701C
Escambia River	Escambia River	M **	10A
Escambia River	Escambia River	M **	10B
Escambia River	Escambia River	M ***	10C
Escambia River	Escambia River	M **	10D
Escambia River	Escambia River	B M **	10F
Escambia River	Conecuh River	M	AL03140301-0302-102
Escambia River	Feagin Creek	B	AL03140301-0403-100
Escambia River	Conecuh River (Gantt Lake)	M	AL03140301-0404-111
Escambia River	Conecuh River	M	AL03140301-0404-112
Escambia River	Conecuh River (Point A Lake)	M	AL03140301-0405-101
Escambia River	Little Patsaliga Creek	B	AL03140302-0303-100
Escambia River	Patsaliga Creek (Point A Lake)	M	AL03140302-0506-101
Escambia River	Rocky Creek	B	AL03140303-0201-101
Escambia River	Persimmon Creek	M	AL03140303-0204-102



Bear Lake
PPBEP

Location	Waterbody	Impairment	Water Body ID #
Escambia River	Sepulga River	M	AL03140303-0704-100
Escambia River	Sandy Creek	B	AL03140304-0106-200
Escambia River	Burnt Corn Creek	M	AL03140304-0305-101
Escambia River	Murder Creek	M	AL03140304-0404-101
Escambia River	Franklin Mill Creek	B	AL03140304-0404-200
Escambia River	Conecuh River	M	AL03140304-0506-100
Escambia River	Jernigan Mill Creek	B	AL03140304-0506-300
Escambia River	Little Escambia Creek	M	AL03140304-0605-100
Escambia River	Sizemore Creek	B	AL03140305-0102-100
Escambia River	Big Escambia Creek	M	AL03140305-0302-100
Graveyard Branch	Graveyard Branch	B M **	639
Mitchell Creek	Mitchell Creek	M **	71
Perdido Bay	Lillian Bridge	M	AL03140107-0103-100
Perdido Bay	Suarez Point	B	AL03140107-0204-302
Perdido River	Dyas Creek	B	AL03140106-0203-100
Perdido River	Brushy Creek	M *	AL03140106-0302-101
Perdido River	Boggy Branch	M	AL03140106-0302-201
Perdido River	Boggy Branch	B	AL03140106-0302-202
Perdido River	Boggy Branch	B M *	AL03140106-0302-203
Perdido River	Perdido River	M	AL03140106-0703-100
Rest Area Run	Rest Area Run	T	542
Santa Rosa Sound	Santa Rosa Sound	B	915
Styx River	Styx River	M	AL03140106-0507-100
Texar Bayou	Texar Bayou	B	738
Thompson Bayou	Thompson Bayou	B	586
Tom King Creek	Tom King Creek	B	833
Wolf Bay	Wolf Creek	M	AL03140107-0201-100
Wolf Bay	Sandy Creek	B M	AL03140107-0201-210



Filtering Water
Sample for Nutrients
PPBEP

Location	Waterbody	Impairment	Water Body ID #
Wolf Bay	Sandy Creek	B M	AL03140107-0201-220
Yellow River	Yellow River	M **	30
Yellow River	Lightwood Knot Creek (Lake Frank Jackson)	M	AL03140103-0102-102
Yellow River	UT 3-C to Lightwood Knot Creek (Lake Frank Jackson)	O	AL03140103-0102-700
Yellow River	UT 2-S to Lightwood Knot Creek (Lake Frank Jackson)	O	AL03140103-0102-800
Yellow River	Five Runs Creek	B	AL03140103-0203-100
Yellow River	Yellow River	M	AL03140103-0402-100

TABLE 2. Total Maximum Daily Loads

Total Maximum Daily Loads (TMDLs) in the Pensacola and Perdido Bays watersheds adopted by DEP (data accessed July 2022), ADEM (data accessed February 2022), and the EPA (data accessed July 2022).

B Bacteria D Dissolved Oxygen N Nutrients O Organic Enrichment (BOD) S Siltation

Location	Waterbody	TMDL	Water Body ID #
Blackwater River	Big Coldwater Creek	B	18
Blackwater River	Big Coldwater Creek (East Fork)	B	18A
Blackwater River	Big Juniper Creek	B	19
Blackwater River	Blackwater River	B	24A
Blackwater River	Blackwater River	B	24D
Blackwater River	Blackwater River (Tidal)	B	24AB
Blackwater River	Manning Creek	B	127
Blackwater River	West Fork	B	11A
Conecuh River	Gantt Dam	S	AL03140301-0404-111
Conecuh River	Point A Dam	S	AL03140301-0405-101



Escambia County Water Quality Lab
Escambia County

Location	Waterbody	TMDL	Water Body ID #
Escambia River	Escambia River	B	10F
Pensacola Bay	Bayou Chico	B N	846
Pensacola Bay	Bayou Chico Beach	B	846CB
Pensacola Bay	Bayou Chico Drain	N	846C
Pensacola Bay	Bayou Texar	B	738
Pensacola Bay	Carpenter Creek	B	676
Pensacola Bay	East Bay River (Marine Portion)	B	701A
Pensacola Bay	Escambia Bay (North Segment)	B	548A
Pensacola Bay	Escambia Bay (North Segment)	N	548AA
Pensacola Bay	Escambia Bay (South Segment)	B	548B
Pensacola Bay	Jackson Creek	B	846B
Pensacola Bay	Jones Creek	N B O	846A
Pensacola Bay	Judges Bayou	D	493A
Pensacola Bay	Judges Bayou (Tidal Segment)	N	493B
Pensacola Bay	Pace Mill Creek	N O	420
Pensacola Bay	Pensacola Bay (North Segment)	B	548C
Pensacola Bay	Sanders Beach	B	848DA
Perdido Bay	East of Little Lagoon Pass	B	AL03140107-0205-102
Perdido Bay	Elevenmile Creek	N B O	489
Perdido Bay	Lillian Bridge	B	AL03140107-0103-100
Perdido Bay	Tenmile Creek	B	489A
Perdido River	Brushy Creek	B	4
Perdido River	Jacks Branch	N O	291
Perdido River	Perdido River (South Fresh)	B	462B
Yellow River	Turkey Creek	B	117
Yellow River	Yellow River	B	30



Tenmile Creek Water Sampling
Escambia County

Stormwater and Wastewater

Stormwater, wastewater, and aging infrastructure are issues in the Pensacola and Perdido Bays watersheds. Stormwater runoff and wastewater discharge transport pollutants from the landscape into waterways. Stormwater is considered a nonpoint source pollutant that collects landscape pollutants, nutrients, pathogens, and sediments from impervious surfaces, lawns, and construction sites during rain events and deposits those pollutants into waterways. Stormwater runoff is one of the primary sources of nonpoint pollution in the Pensacola and Perdido Bays watersheds (NFWFMD 2017a, 2017b). Multiple entities are permitted for Municipal Separate Storm Sewer Systems (MS4), which are conveyance systems for stormwater to surface waters under the NPDES Stormwater Program.

Entities with MS4 permits within the Pensacola and Perdido Bays watersheds:

- ➔ Escambia County, FL
- ➔ Santa Rosa County, FL
- ➔ Okaloosa County, FL
- ➔ Walton County, FL
- ➔ Baldwin County, AL (Loxley)
- ➔ City of Pensacola, FL
- ➔ City of Gulf Breeze, FL
- ➔ City of Fort Walton Beach, FL
- ➔ City of Milton, FL
- ➔ Town of Mary Esther, FL
- ➔ Town of Century, FL
- ➔ University of West Florida
- ➔ Pensacola Naval Air Station
- ➔ Hurlburt Field
- ➔ Eglin Air Force Base
- ➔ Lower Perdido Bay Cities (Orange Beach)
- ➔ Middle Perdido Bay (Lillian)

Direct wastewater inputs are point source pollutants discharged from WTPs (municipal and industrial), that discharge treated wastewater effluent into the environment, releasing nutrients, pathogens, heavy metals, and emerging pollutants to surface waters. Many WTPs in the lower watersheds no longer directly discharge into surface waters; instead, effluents are distributed into a spray field system, are diverted to treatment wetlands, or are beneficially reused (e.g., partnerships with local industries such as ECUA and IP). WTPs that currently discharge directly into surface waters are in the process of converting and upgrading their technology and discharge method and location. For example, IP in Cantonment, FL, used to discharge treated industrial effluent in Elevenmile Creek. In 2013, effluent from IP was diverted to a constructed wetland treatment pond, improving nutrient concentrations in Elevenmile Creek. Another example is the relocation of the Main Street



Stormwater Outfall
Escambia County

Wastewater Treatment Plant from downtown Pensacola to the Central Water Reclamation Facility (22.5 MGD) in Cantonment, FL, in 2011. This removed treated wastewater effluent inputs from lower Pensacola Bay, and now 100% of the wastewater is being reclaimed into a spray field with no direct discharge. Currently, the City of Milton is in the process of building a new WTP (North Santa Rosa Regional Water Reclamation Facility) that will increase plant capacity from 2.5 to 4.5 MGD to accommodate population growth. The current Milton WTP is operating close to maximum capacity, averaging 2.2 MGD with treated wastewater effluent being discharged into Blackwater River. Additionally, during heavy rain events untreated effluent from the current plant can overflow into the Blackwater River. There are plans for the North Santa Rosa Regional Water Reclamation Facility to relocate the WTP to a new location, Cooper's Basin on Blackwater River, eliminating direct effluent discharge into Blackwater River and moving the facility out of the floodplain. Public concerns are evident over the chosen location for the new WTP: Cooper's Basin, which is an Outstanding Florida Waterway and a critical area for the endangered Gulf sturgeon. During the summer months, large groups of sturgeon, potentially a whole population, are known to gather in Cooper's Basin (Carr 1983, Craft et al. 2001, Sulak et al. 2016). Failure of the WTP can potentially result in water quality declines impacting the sturgeon population.

Untreated wastewater can enter surface waters when precipitation overwhelms the drainage systems during storm events, when sewer lines become blocked, when lift stations are offline, or when the WTP is operating at max capacity. All of these instances can lead to sanitary sewer overflows, which discharge nutrients and pathogens into surface waters, potentially leading to low dissolved oxygen events and eventual ecosystem decline. Additionally, the current sewer collection system in downtown Pensacola is over 100 years old and needs constant maintenance and/or retrofit to protect water quality. Lateral lines at private and commercial properties can also leak untreated wastewater into ground and surface waters. Several local utilities, including ECUA, are currently seeking opportunities to educate homeowners about the importance of lateral line inspections, which are a homeowner responsibility. Maintenance, regular upgrades, and education can help reduce wastewater loads and improve the health of the bays.

Septic systems are common in rural and unincorporated areas, and in older communities developed prior to the widespread availability of a centralized

sewer collection system. Septic tanks that are placed in improper soil, unmaintained, and/or nonfunctioning can leach nutrients, bacteria, viruses, chemicals, and other water quality pollutants associated with raw wastewater into groundwater and the surrounding waterways. Septic-to-sewer projects educate homeowners and businesses on the importance of maintaining septic systems and the benefits of tapping into the cities' centralized sewer systems. Furthermore, centralized sewer systems are more efficient than septic systems at removing nutrients, medicines, and other potentially harmful chemicals. However, some areas are too remote from centralized sewer systems, and in these areas switching to advanced on-site systems can be a good alternative to traditional septic tanks.

Development and Land Management

Coastal ecosystems globally are experiencing pressures due to high population densities and suburbanization. Coastal and upland development can change the landscape, lower biological diversity, mobilize sediment, reduce natural filtration capacity, alter water storage capacity, and decrease natural flood resilience. Development in the watersheds is primarily located in the coastal zone but is also migrating into rural areas, converting primarily agriculture and rural residential zoned areas to medium and high density suburban single-family residential zoning. Suburban sprawl leads to an increase in land use conversion, stormwater runoff, water quality decline, and car-dependent transportation. Compact, walkable development patterns, on the other hand, help preserve open space, forests, and agricultural lands and further advance water quality improvement and community resilience.

Stakeholders have expressed concern over sedimentation in upper Pensacola Bay due to surrounding development and poorly implemented infrastructure construction best management practices. New residential developments are rapidly converting stream and wetland buffer areas across the watersheds. Enhancing enforcement of existing land development code regulations and coordinating policy recommendations and incentives across the watersheds is a critical need.

As population in the region continues to rise, best management practices will be necessary to restore and protect the natural resources by establishing buffer zones and promoting trees and native species. Using smart

development practices can help manage urban sprawl while protecting the land and water for future generations.

Climate Change Impacts

The changing climate from fossil fuel burning, loss of forests, methane from agriculture, etc., is a major stressor across communities worldwide, but the GoM is experiencing these changes at accelerated rates (Williams 2013). Some of its associated stressors include relative sea-level rise, intensified and more frequent hurricanes and storm events, and rising sea surface temperatures (Holland and Bruyere 2014). According to the 2022 sea-level rise projections, portions of Baldwin, Escambia, Santa Rosa, and Okaloosa Counties will experience two feet of sea-level rise by 2060 and up to six

feet by 2100 in the intermediate-high scenario from the National Oceanic and Atmospheric Administration (NOAA) (NOAA 2022b). More severe and frequent flooding events can overwhelm wastewater infrastructure and undergrounded creeks, leading to compound flooding. Undergrounded creeks, such as those in downtown Pensacola (Washerwoman's and Cadet's Creeks) that were piped and covered over in the 1800s to accommodate urban sprawl, become overwhelmed during heavy rain events and worsen flooding conditions. Many coastal areas (e.g., Escambia County and the City of Pensacola) have incorporated resilience planning and nature-based solutions into their Stormwater Master Plans and Basin Management Plans (i.e., Bayou Chico Basin Management Action Plan) to reduce flooding and nonpoint source pollution.

With sea-level rise, low topography, and extreme weather (hurricanes and droughts), saltwater intrusion into upper estuaries and freshwater systems will alter the biogeochemistry of the system and change species and habitat distributions (Herbert et al. 2015, Fagherazzi et al. 2020). Furthermore, saltwater intrusion can salinize aquifers, threatening local drinking water. The effects of climate change and saltwater intrusion are complicated and widespread challenges that need to be at the forefront of community and restoration planning (Hynes et al. 2022).

Marine Debris and Litter

Globally, there has been increased awareness and concern for the negative impacts of marine debris and litter on the economy, the environment, and wildlife. Throughout the GoM, litter from land-based sources is scattered across the landscape into waterways causing wildlife entanglement and boating hazards. Debris can also come from ocean-based sources such as fishing vessels, offshore natural gas and oil rigs, and cargo ships. Hurricanes cause widespread litter and marine debris pollution. Marine debris is defined as “any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment” (NOAA MDP 2022). Nearly 80% of the debris in the Gulf is made up of plastics, with 50% being single use plastics (e.g., straws, food containers, soda and water bottles) (NOAA MDP 2022). In addition to plastics, larger items including abandoned and derelict vessels and fishing gear can obstruct navigational channels and harm the environment by leaking fuel, oil,

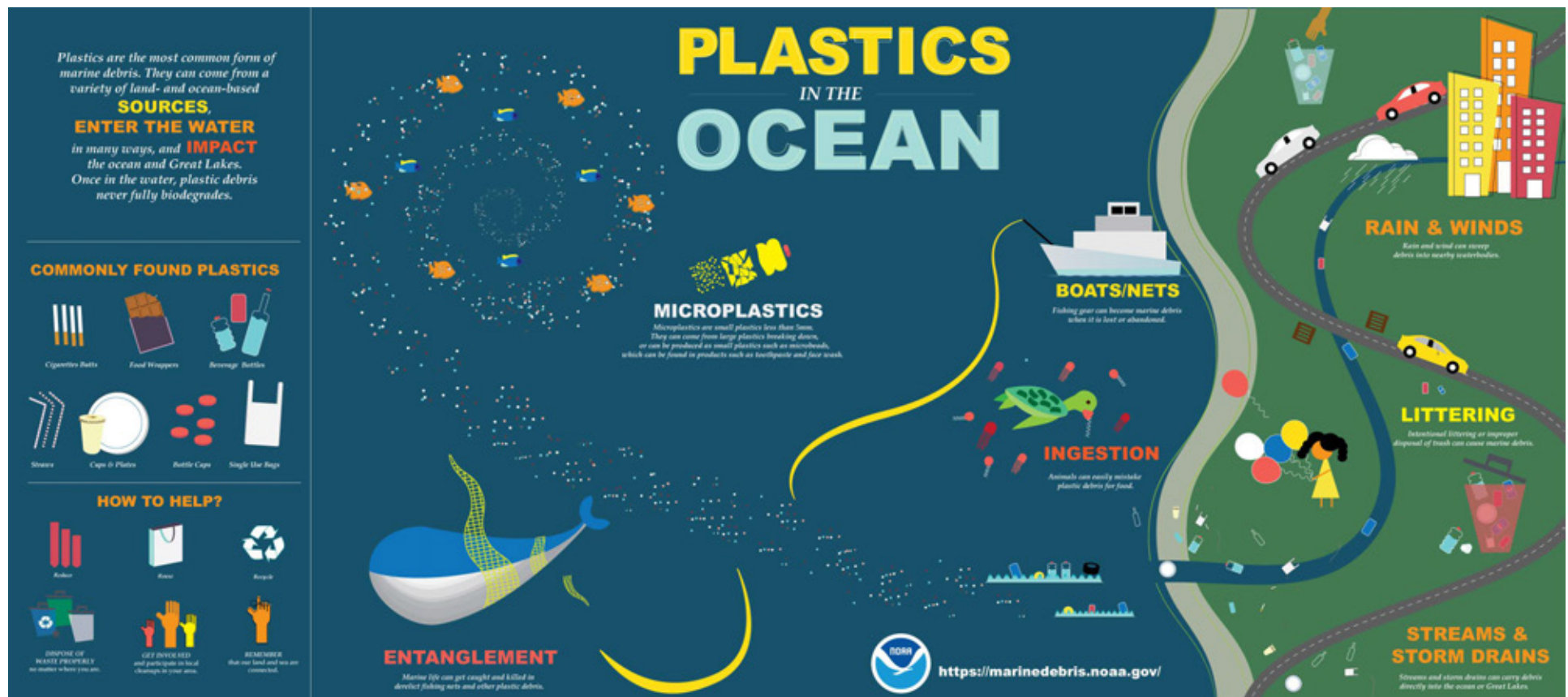


Hurricane Sally Flooding in Downtown Pensacola
PPBEP

and other harmful chemicals into surrounding waters. More recent concerns center on phthalates and other plastic chemicals that are potential endocrine disruptors (Godswill and Godspel 2019). Plastics also absorb pollutants such as PAHs, a by-product from burning fossil fuels, which can reach concentrations up to a million times greater than the levels found in marine waters. Additionally, plastics never biodegrade or leave the environment unless physically removed. Larger plastics weather and break down into smaller pieces called microplastics, small pieces of plastic or fibers that are smaller than 0.2 in. Microplastics have been found in the air, drinking water, food products, and cosmetics (Katyal et al. 2020; Yang, Rodriguez-Jorquera, et al.). The prevalence

of plastics and debris in both marine and terrestrial environments is a concern to wildlife.

To monitor and track the abundance and diversity of litter in marine environments, partners across the Gulf have established programs and conducted large-scale projects to better understand the impacts on coastal ecosystems. The Florida Microplastic Awareness Project is a state-wide community science effort led by the University of Florida Institute of Food and Agricultural Sciences (UF-IFAS) Florida Sea Grant Extension, investigating the prevalence and concentrations of microplastics in coastal waters (<https://>

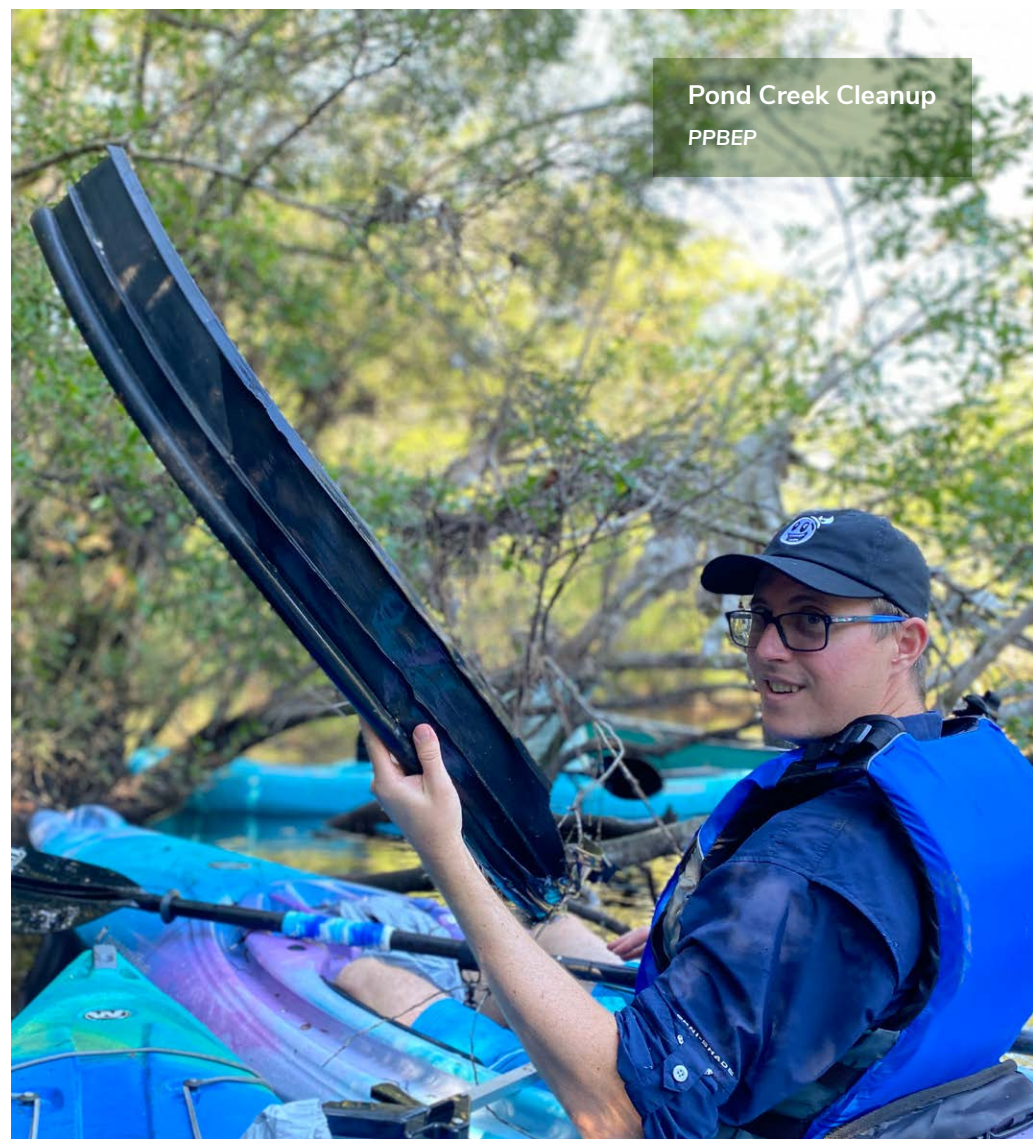


Plastics in the Ocean: Sources and Impacts

NOAA Office of Response and Restoration Marine Debris Program

flseagrant.ifas.ufl.edu/microplastics/). To monitor and track the extent of primary microplastics (i.e., nurdles or plastic pellets), the Mission-Aransas National Estuarine Research Reserve runs a community science initiative called Nurdle Patrol. Locally, PPBEP is collaborating with partners and local community science programs to conduct nurdle surveys across the Pensacola and Perdido Bays coastlines. Throughout the Pensacola and Perdido Bays watersheds, a vast and active network of organizations are focused on cleaning up trash and educating communities on the negative impacts of water-borne trash and marine debris on the estuaries. Some of those groups include Ocean Hour, Keep Pensacola Beautiful, Emerald Coast Keeper, Clean Horizons, and Osprey Initiative.

To address debris in coastal environments, municipalities and agencies have enacted policies, programs, and initiatives to reduce litter. The “Leave No Trace” and “Leave Only Footprints” ordinances implemented by many Gulf counties prohibit abandoned or unattended personal property on GoM beaches that could present obstacles to endangered and threatened wildlife (e.g., sea turtles and shorebirds). In addition, local initiatives and campaigns have been implemented throughout coastal AL and FL to raise awareness and educate the public on the hazards of litter in the environment (e.g., Clean Water Futures Campaign). On a national scale, the EPA created the Trash Free Waters Program to reduce the volume of trash entering waterways by working with local partners across the U.S. to implement collaborative solutions that target land-based sources. In 2006, Congress authorized the NOAA Marine Debris Program (MDP) as the U.S. Federal Government’s lead for addressing the issue of marine debris. The MDP works with educators, researchers, practitioners, industry representatives, federal and state governments, and non-governmental organizations to raise awareness for this issue and develop effective solutions for marine debris removal and prevention. Regionally, the Gulf of Mexico Alliance (GOMA) Marine Debris Cross Team works collaboratively with the NOAA MDP to develop and implement a Regional Action Plan to address marine debris in the GoM. PPBEP serves as a member on the Cross Team and will continue to work collaboratively with community partners across the watersheds to implement actions from the Comprehensive Conservation and Management Plan (CCMP).



Restoring What Was Lost

Despite the many environmental issues that impact the health of the Pensacola and Perdido Bays watersheds, policy changes and restoration efforts have been effective at improving the ecosystems. The Federal Pollution Control Act of 1948 was the first major U.S. law to address water pollution, which in turn increased public awareness and concern and led to additional amendments in 1972, and the law became known as the Clean Water Act. This law established a structure for regulating point source discharges into waterways across the U.S. and allowed the EPA to implement pollution control programs including setting standards for industrial wastewater. These amendments also maintained existing water quality requirements for contaminants, funded construction of sewage treatment plants, and recognized the need to address critical problems caused by nonpoint source pollution.

Deepwater Horizon Oil Spill

Escambia County



Prior to 2010, funding availability was a limiting factor in implementing large-scale restoration projects. This changed in April 2010 when the Deepwater Horizon (DWH) oil rig exploded, spilling four million barrels of oil into the GoM over 87 days, before it was capped on July 15. It was the largest spill in the history of marine oil drilling operations. Pensacola and Perdido Bays received impacts from the oil spill, including heavy to light oiling of GoM beaches (Dickey and Huettel 2016) and seafood contamination (oil elements such as vanadium and nickel were found in Pensacola Bay oysters; Apeti et al. 2013). Legal settlements from the DWH Oil Spill resulted in \$16.7 billion for economic and environmental restoration efforts to be used across the GoM. This Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) funding changed the capacity that organizations along the Gulf Coast had for implementing restoration projects. With the recent passage of the Infrastructure Investment and Jobs Act, Inflation Reduction Act, and Resilient Florida Legislation, opportunities for funding large-scale ecosystem restoration and community resilience projects are available like never before.

Pensacola and Perdido's Legacy

Like other coastal systems worldwide, the Pensacola and Perdido Bays watersheds have been influenced by anthropogenic (human-induced) activities. These areas built their economies on logging (1800s–1930s), commercial fishing (snapper, oysters, shrimp), and industry (1900s–present). Logging heavily impacted the upper watersheds when 99% of the longleaf pines were removed to build railroads, build furniture, and export timber worldwide (Frost 1993). Humans overfished snappers (1880s) and oysters (1980s) and led to the decline of other invertebrate and fish species in the rivers and bays. Industry moved into the area and contributed to water quality declines by discharging unregulated industrial effluent into the waterways. Furthermore, landscape conversion and loss of wetlands led to loss of natural flood protection, filtration capacity, and other ecosystem services. These combined long-term stressors degrade the pre-human, natural state of these systems (Florida State Board of Health 1969).

The appearance of dead fish and other declines in water quality led to the formation of local community science organizations that spearheaded the restoration of the Pensacola and Perdido Bays systems. This also brought national and federal attention to Pensacola Bay, resulting in the Federal Water Pollution Control Administration funding studies of the system in the 1970s. BFA and the Perdido Bay Environmental Association (now Friends of Perdido Bay) started advocating for the health of the bays and estuaries by encouraging management decisions to be made in sound science. To provide that sound science, BFA started a long-term monitoring program that has been tracking water quality (nutrients, chlorophyll-a, etc.) since the 1970s. These past and current efforts are invaluable to assessing the improvement of the systems as PPBEP and others continue to act as stewards of the bays. The PPBEP was formed from the Bay Area Resource Council, an organization founded 30 years before RESTORE Act funding established the Estuary Program. As funds are used from the DWH Oil Spill settlement to restore the Pensacola and Perdido Bays systems, it needs to be acknowledged that PPBEP and partners are building on the prior hard work of others, and by working together we can best protect, restore, and improve these systems for future generations.

Water Quality Restoration

Humans depend on clean waters for a healthy and thriving environment and economy. Clean waters are also necessary for abundant fish and wildlife populations, which humans depend on for their natural resources. While water quality has improved since the 1970s due to community science, local, and national action, many improvements are still needed. Stormwater and urban runoff and leaching of excess nutrients and sediments into the waterways will continue to be a challenge in these systems as precipitation becomes more frequent and intense, as the landscape continues to house more development and people, and as the wastewater infrastructure continues to age. Point source pollution from industry and WTPs continue to discharge treated effluent into the waters, adding to nutrient over-enrichment (and potential low dissolved oxygen events in the bays) and bacterial contamination. Development pressures in the coastal watersheds will continue to input sediment, nutrients, and other pollutants into the bays and estuaries, as well as influence water quantity, aquifer recharge, and water storage. Thus, supporting and implementing restoration activities that mitigate or decrease pollutant entry and protect water quantity is needed to bring back healthy waters and ecosystems.



Beach Haven Stormwater
Improvements
Escambia County

“In Native American cosmology we have always understood the Natural World and everything in it is uniquely connected. The clear-cutting of timber, pollution from industrialization, mechanization, and agriculture to satisfy the growing populations changed the Natural World drastically. The problems we are attempting to solve have had more than a 200-year head start. Science is an important part of the restoration solution. But science alone cannot solve the problem. People must return to an understanding of and respect for the Natural World. Where there is respect, there is no need for restoration.”

CHIEF DAN “SKY HORSE” HELMS
SANTA ROSA BAND OF THE LOWER MUSCOGEE

Restoring buffers and implementing restoration projects are actions needed to improve water quality and the health of organisms in the watersheds. Since Deepwater Horizon restoration funding has become available, 10 projects have leveraged Deepwater Horizon restoration funds according to the Deepwater Horizon Project Tracker. Projects range from sediment reduction activities such as paving unpaved roads to wastewater improvements and general habitat restoration to improve downstream water quality. As more funds become available and dedicated partners across the watersheds continue to leverage funds for water quality improvements, the systems should continue to see positive improvements supporting healthy and vibrant economies and ecosystems.

Deepwater Horizon Restoration Projects

- ➔ Pensacola Bay and Perdido River Watersheds – Nutrient Reduction (U.S. Department of Agriculture [USDA])
- ➔ Gulf Coast Conservation Reserve Program (Planning and Implementation) (USDA)
- ➔ Dirt Road Paving District 1, 4, 5 (Santa Rosa County)
- ➔ Carpenter Creek Headwaters Water Quality Improvements (DEP)
- ➔ Government Street Regional Stormwater Pond at Corrine Jones Park (City of Pensacola)
- ➔ Bayou Chico Sediment Remediation Design (Escambia County)
- ➔ Beach Haven – Joint Stormwater and Wastewater Improvement Project – Phase II (Implementation) (DEP)
- ➔ Pensacola Bay Unpaved Roads Initiative (DEP)
- ➔ Rattlesnake Bluff Road and Riverbank Restoration (FWS)
- ➔ Perdido Watershed Water Quality Improvements and Restoration Assessment Program (ADCNR)

Habitat Restoration and Conservation

Habitats within the Pensacola and Perdido Bays watersheds have been degraded as humans have converted the landscapes to support the growing population, which in turn has also affected aquatic habitats. For example, in the 1800s wetlands were drained for development. Currently, wetlands and riparian buffers are at risk from erosion, saltwater intrusion, and fragmentation. Fragmentation is also a concern for upland terrestrial forested habitats that provide a home for many species, including threatened and endangered species. Landscape fragmentation can impede migration and movements of animals that depend on uninterrupted landscapes for their survival. Additionally, loss of upland habitats can lead to sedimentation of river and estuarine environments, negatively affecting benthic habitats.

Acquiring lands for conservation is imperative to ensure wildlife corridors will be available to species as humans continue to convert the landscape. The Northwest Florida Sentinel Landscape was established in 2022, providing a significant commitment toward preserving lands for wildlife. The Sentinel Landscape protects portions of longleaf pine forests, rural areas, and agricultural areas to be restored, protected, and made resilient by the military bases that the Landscape runs through. Large tracts of land in the Perdido, Blackwater, and Yellow Rivers are also in conservation lands. Deepwater Horizon restoration funds have been used to purchase multiple tracts of lands to put into conservation. PPBEP and partners will continue to look for conservation opportunities to protect the landscape for future generations and wildlife.

Longleaf pine restoration is needed to ensure a healthy and productive upper watershed and preserve water quality and quantity. Overharvesting of longleaf pines and clear-cutting has resulted in sedimentation of benthic habitats, which multiple threatened and endangered species use. Northwest

Upper Perdido Bay

Darryl Boudreau, NFWFMD

FL has some of the best-managed longleaf pine ecosystems in the U.S., thanks to the hard work and dedication of the Longleaf Alliance and the Gulf Coastal Plain Ecosystem Partnership. To ensure full recovery of this ecosystem, more longleaf pine land and staff to manage the system are needed.

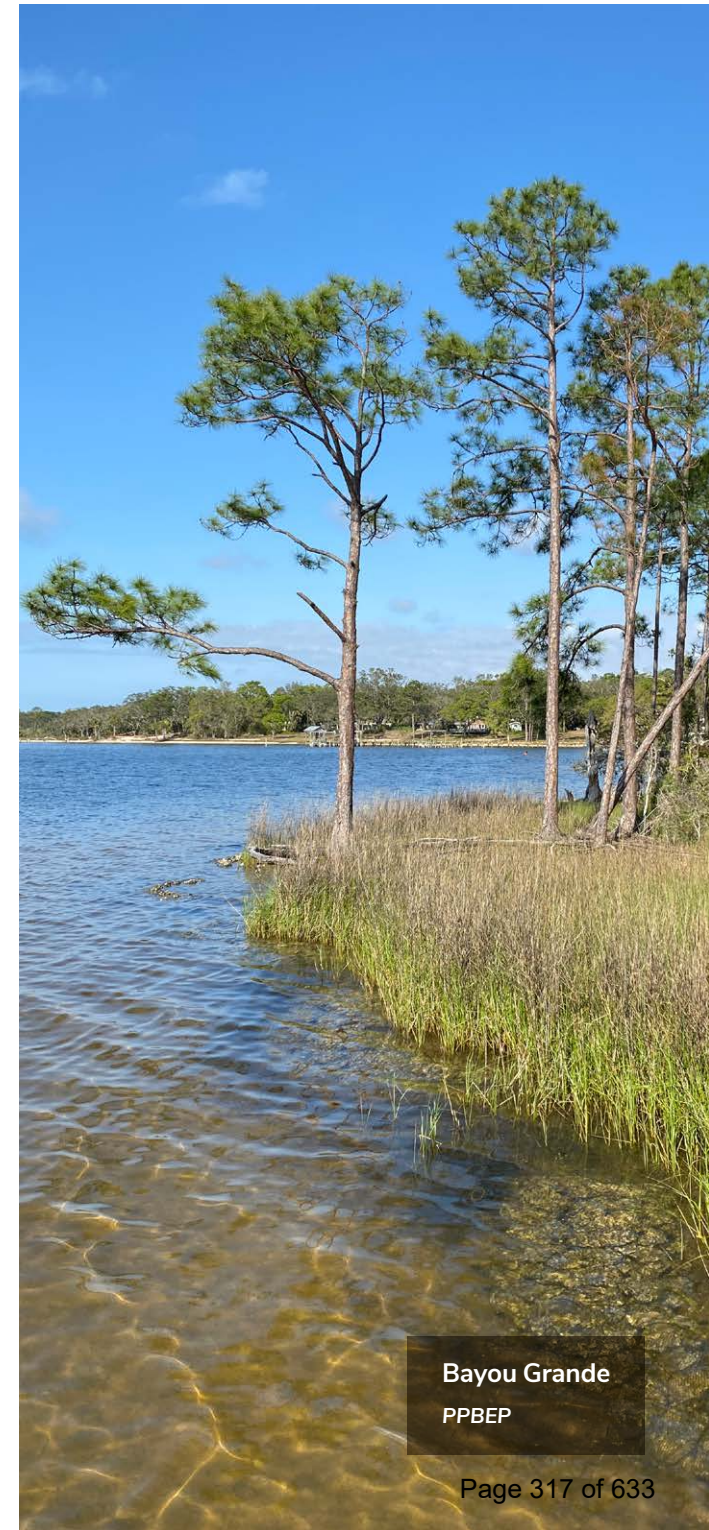
Living shorelines are alternatives to bulkheaded shorelines and can help stabilize the shore, provide habitat for organisms, increase filtration of the surrounding waters, create aesthetically pleasing scenery, and increase the value of shoreline property. These shorelines are made using native plants and often natural materials to provide wave breaks. Plants are typically placed most shoreward with the harder structures more seaward. This mimics the natural shoreline, creating a stabilizing and wave-attenuating effect that can better protect shorelines. Many living shorelines have been implemented and/or planned for the Pensacola and Perdido Bays systems. Project GreenShores Site 1 was a successful restoration project implemented in the early 2000s to restore salt marshes, seagrasses, and oysters along the shoreline of downtown Pensacola. Project GreenShores Site 2, just west of Site 1, was enhanced in spring 2022 using DWH Natural Resource Damage Assessment funds. Other completed living shorelines are Escambia County's Navy Point Living Shoreline, the City of Gulf Breeze's Deadman's Island, DEP's East Bay Project Reefs, and TNC's East Bay Oyster Habitat Restoration. A Living Shoreline Suitability Model is being completed for Pensacola and Perdido Bays systems by Troy University to find sites most suitable to construct living shorelines.

Other living shorelines in progress of construction:

- ➔ Escambia County's Pensacola Bay Living Shoreline
- ➔ Santa Rosa County's Floridatown Park Living Shoreline
- ➔ Santa Rosa County's Navarre Park Living Shoreline

Seagrasses are habitats that many fish and invertebrate species rely on for their nursery habitat. Historical declines in seagrass beds were attributed to poor water quality and sedimentation leading to shading and disease, and boat prop scarring (Bryon et al. 2018). In recent years there have been gains in seagrass beds attributed in part to improved water quality (Bryon et al. 2018). PPBEP and partners received a NOAA Actionable Science Grant to address the inclusion of seagrass genetics into restoration planning. This effort will make restored seagrasses more resilient to local environmental conditions, hopefully improving the success of future seagrass restoration.

Overall, there have been tremendous efforts across the watersheds to restore and conserve habitats to improve the ecosystems. Many Deepwater Horizon restoration projects have been funded under the categories of land acquisition and habitat restoration. More work will continue to be needed to conserve habitats to support healthy environments.



Bayou Grande
PPBEP

Deepwater Horizon Restoration Projects

- ➔ Perdido River Land Conservation and Habitat Enhancements (ADCNR)
- ➔ Perdido River Land Acquisition (Molpus Tract) (ADCNR)
- ➔ Perdido Bay/Pass Islands Acquisition – Restoration (City of Orange Beach)
- ➔ Restoration and Management of Escribano Point Coastal Habitat – Phase II (The Trust for Public Land)
- ➔ East Bay Oyster Habitat Restoration (TNC)
- ➔ Oyster Restoration in the Pensacola Bay System (Ecosystem Restoration Support Organization)
- ➔ Planning Assistance for the Elevenmile Creek Stream Restoration Design (Escambia County)
- ➔ Bayou Chico Sediment Remediation Design (Escambia County)
- ➔ Lower Perdido Islands Restoration (TNC)
- ➔ Wolf Creek Headwaters Restoration – Phase I (City of Foley; Mobile Bay National Estuary Program [MBNEP]; Wolf Bay Watershed Watch)
- ➔ Lillian Park Beach Habitat and Shoreline Protection (Baldwin County; ADCNR)
- ➔ Yellow River Aquatic Preserve Shoreline Restoration (Earth Ethics, Inc.)
- ➔ Johnson Beach Access Management and Habitat Protection (National Park Service [NPS])
- ➔ Little Lagoon Living Shoreline (FWS)
- ➔ Seagrass Recovery Project at Gulf Islands National Seashore (FWS)
- ➔ Perdido Key Dune Restoration Project (DEP)
- ➔ Beach and Dune Habitat Protection at Gulf Islands National Seashore (NPS)
- ➔ Pensacola Beach Dune Restoration Project (DEP)
- ➔ Navarre Beach Park Coastal Access and Dune Restoration (DEP)
- ➔ Panhandle Dune Restoration (Florida Fish and Wildlife Conservation Commission [FWC], FWS)
- ➔ Alabama Dune Restoration Cooperative Project (FWS)

- ➔ Invasive Plant Removal at Gulf Islands National Seashore (NPS)
- ➔ Improving Habitat Injured by Spill Response: Restoring the Night Sky (FWC)
- ➔ Coastal Habitat Restoration Planning Initiative (MBNEP)

Living Coastal and Marine Resources

Coastal and marine resources provide an array of ecosystem services that have been lost or suppressed as these resources have been degraded due to overfishing, habitat loss, and pollution. Furthermore, the loss of commercial fisheries in recent years has impacted the economic benefits that healthy fisheries could provide. The snapper and oyster industries are examples of poorly managed fisheries that collapsed due to overextraction and human pressures. The oyster fishery collapsed in Pensacola Bay after the DWH Oil Spill but had been declining since the 1980s (Radabaugh et al. 2019). There are efforts underway to bring a healthy and thriving oyster industry (wild and aquaculture harvest) back to Pensacola Bay.

TNC spearheaded the first ever oyster management plan that will tackle an estuary-scale restoration of oysters. By undergoing a bay-wide restoration plan, recovery of oysters will hopefully bring back multiple ecosystem services and provide cumulative benefits such as water quality improvements, fisheries enhancement, and shoreline stabilization. PPBEP is tasked with implementing the plan and ensuring that multiple restoration projects are implemented simultaneously to cover the necessary area to bring back oysters to harvestable levels. The Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System (Birch et al. 2021) is also focused on bringing a thriving aquaculture industry to the region. This ecosystem-based approach aims to bring back oysters to support oyster harvest and increase fisheries production to promote recreational fishing opportunities.

Deepwater Horizon Restoration Projects

- ➔ East Bay Oyster Habitat Restoration (TNC)
- ➔ Oyster Restoration in the Pensacola Bay System (Ecosystem Restoration Support Organization)

Improving the Vital Signs of the Estuaries

Since the inception of the Clean Water Act and action by local communities to improve natural resources and water quality, ecosystems throughout the U.S. have seen improvements. Now, with the availability of Deepwater Horizon funds and the available funding to support large-scale and multiple restoration projects, more organizations and projects are working to protect and enhance systems in the GoM than ever before. While there have been many restoration efforts and management plans produced within the Pensacola and Perdido Bays watersheds, projects are place-based and rarely cross state boundaries. With the development of a dedicated Estuary Program, PPBEP strives to work across state boundaries, taking a watershed approach to support collaborative efforts to restore the systems for healthy ecosystems and economies for generations to come. In addition, PPBEP is building off the work of past partners and local management plans to make the CCMP and Program actionable and implement projects to improve the watersheds. The Action Plan provides the blueprint for current and future restoration projects to be undertaken within the next 10 years.



**Project GreenShores Site 2
in Pensacola Bay**
Samantha Richardson

Ecosystem Solutions

Together we can protect our waters and invest in our future



Investments:

We can use nature-based solutions and fund critical infrastructure upgrades to protect our communities and natural areas.



Agricultural Best Management Practices:

These practices can protect soil health and reduce soil erosion and nutrient runoff.



Bay-Friendly Landscaping:

Homeowners can fertilize appropriately, water efficiently, and maintain natural waterfront buffers.



Development Best Management Practices:

Smart planning, green infrastructure, and low impact designs can reduce soil erosion and balance nature and a growing population.



Education and Outreach:

Educating the public empowers the community to make informed decisions for their future.



Living Shorelines:

Living shorelines provide habitat, filter nutrients, trap sediments, and buffer wave energy.

Action Plan

As a result of the technical characterization of the watersheds (i.e., Watersheds 101) and stakeholder engagement process, the Pensacola & Perdido Bays Estuary Program (PPBEP) developed the following Action Plan focused on six goal areas that address priority issues identified across the Pensacola and Perdido Bays watersheds. The Action Plan is based on the community's values and uses of the watersheds, incorporates best available science, and builds upon existing planning efforts in the region. In addition, the goals, objectives, and actions in the Education and Outreach Strategy were developed to increase public understanding and stewardship of the natural environment through engagement and education. Specific projects that align with CCMP priorities will be collaboratively developed as part of the annual Management Conference Meeting and engagements with the committees. This input will inform the development of PPBEP's Annual Work Plan. PPBEP and its partners will track success over time using established performance metrics.

These recommended actions will assist the Program and its partners in identifying achievable targets for the restoration and long-term protection of the watersheds while maintaining a critical balance between human use and the health and resilience of native ecosystems.

Perdido River

Darryl Boudreau, NFWMD

**GOAL 1**

**Source of Watershed-
Related Information**

**GOAL 2**

**Strengthen Community
Resilience**

**GOAL 3**

**Improve
Water Quality**

**GOAL 4**

**Reduce
Sedimentation**

**GOAL 5**

**Conserve and Restore
Critical Habitat**

**GOAL 6**

**Restore and Conserve
Fish and Wildlife**

Action Plan Summary

Objective 1.1

Become the central repository for watershed data and visualization

ACTION 1.1.1

Develop a publicly accessible bibliography of existing gray and peer-reviewed literature, reports, and oral histories for the Pensacola and Perdido Bays watersheds

ACTION 1.1.2

Create an open science digital dashboard for tools, data, and status and trend reporting that is transparent and accessible

ACTION 1.1.3

Create an accessible list of current and relevant programs, projects, and grant opportunities within the watersheds

Objective 1.2

Be a trusted and reliable source for relaying pertinent watershed-related environmental issues to the community



GOAL 1

Source of Watershed-Related Information

ACTION 1.2.1

Coordinate the communication of post pollution or post natural disaster event monitoring and use social media and other digital platforms to inform the public of current watershed-related environmental issues

ACTION 1.2.2

Strengthen media relations and feature PPBEP program activities through local and regional media outlets

ACTION 1.2.3

Participate and contribute to regional working groups and data sharing communities of practice

Objective 1.3

Provide regular reports of ongoing monitoring and restoration efforts and results to the public

ACTION 1.3.1

Develop State of the Bays report



ACTION 1.3.2

Provide Community Grant Program updates via social media platforms and annual symposium

ACTION 1.3.3

Host biennial watershed science and outreach symposium

ACTION 1.3.4

Use social media and other digital platforms to update the public on current watershed information



Permeable Paver
Parking Lot
PPBEP



GOAL 2

Strengthen Community Resilience

Objective 2.1

Inform community planning and development decisions

ACTION 2.1.1

Promote the use of smart growth and best land management practices to maximize the health and resilience of local communities in the face of natural disasters

ACTION 2.1.2

Restore watershed hydrology by prioritizing the use of nature-based solutions and removal of hardened infrastructure, where appropriate

Objective 2.2

Facilitate wastewater management improvements throughout the watersheds

ACTION 2.2.1

Extend central sewer service to priority areas near surface waters and retrofit existing failing wastewater infrastructure

ACTION 2.2.2

Educate and incentivize the community on the importance of sewer and septic system maintenance and sewer connections

Objective 2.3

Promote the use of green infrastructure or other low impact designs in community planning

ACTION 2.3.1

Enhance stormwater management by expanding the use of green infrastructure practices

ACTION 2.3.2

Promote and facilitate the development of living shorelines as a sustainable alternative to shoreline armoring to reduce erosion and sediment inputs

Objective 2.4

Identify areas within the watersheds that are at risk for current and future compound flooding (caused by interaction of multiple sources of flooding) and identify solutions to lessen impacts

ACTION 2.4.1

Identify high-risk areas using compound flood models to educate communities, aid in community planning, and improve Federal Emergency Management Agency (FEMA) Community Rating System scores

ACTION 2.4.2

Better understand hydrodynamic fluctuations and patterns in the Pensacola and Perdido Bays systems to inform restoration and ecosystem-scale improvements

ACTION 2.4.3

Participate in the U.S. Environmental Protection Agency (EPA) Climate Ready Estuaries Program and the National Oceanic and Atmospheric Administration (NOAA) Climate Smart Communities Program

Objective 2.5

Implement storm drain marking throughout the watersheds to raise awareness of stormwater runoff to waterways

ACTION 2.5.1

Partner with local schools and other partner organizations to complete storm drain marking

Objective 2.6

Assess social vulnerability of communities under a changing climate

ACTION 2.6.1

Assess social vulnerability of communities from impacts associated with climate change, and support communities in long-term resilience planning

ACTION 2.6.2

Produce an environmental justice needs assessment for the watersheds and incorporate recommendations into future community planning, project development, and education and outreach initiatives

ACTION 2.6.3

Produce a social vulnerability index and map social vulnerability across the Pensacola and Perdido Bays watersheds



2014 Flooding on Piedmont Street, Pensacola

Carrie Stevenson



Perdido Bay

Darryl Boudreau, NFWMD



GOAL 3

Improve Water Quality

Objective 3.1

Develop a comprehensive water quality watershed monitoring program throughout the Pensacola and Perdido Bays watersheds

ACTION 3.1.1

Implement the Comprehensive Monitoring Strategy by establishing a comprehensive watershed monitoring program that encompasses both watersheds across state lines

ACTION 3.1.2

Develop water quality targets for Pensacola and Perdido Bays to meet surface water classification designations

Objective 3.2

Identify root causes of water quality impairments and implement priority projects

ACTION 3.2.1

Investigate sources of microbial pollutants in the watersheds

ACTION 3.2.2

Evaluate and identify point and nonpoint source hotspots for nutrients in the watersheds

ACTION 3.2.3

Implement water quality projects to meet state designated uses

Objective 3.3

Assess water quality seasonal trends to understand impacts to natural resources, including habitats and fish and wildlife

ACTION 3.3.1

Evaluate seasonal trends of nutrients, chlorophyll-a, dissolved oxygen, and harmful algal blooms and their impacts to habitats and fish and wildlife

**GOAL 4****Reduce Sedimentation****Objective 4.1**

Develop a comprehensive watershed monitoring program throughout the Pensacola and Perdido Bays watersheds to assess sediment inputs

ACTION 4.1.1

Develop a comprehensive sediment monitoring program that encompasses both watersheds across state lines

Objective 4.2

Conduct a sediment study to assess sources of sediments and erosion in the watersheds

ACTION 4.2.1

Identify the impact of land use land cover on the rate of soil erosion and sediment loading

ACTION 4.2.2

Identify major sediment sources within the watersheds

Objective 4.3

Address sources of sedimentation

ACTION 4.3.1

Identify unpaved roads and their contributions to water quality impairments and prioritize for paving or low impact designs

ACTION 4.3.2

Collaborate with partners to prioritize, develop, design, and implement sediment reduction and remediation projects to address gully and streambank erosion

Objective 4.4

Assess the effects of sediment dynamics and resuspension on benthic habitats

ACTION 4.4.1

Conduct benthic sediment mapping and synthesize existing data to assess sediment type, grain size, transport, and contours



Marsh Periwinkle Snail
PPBEP



GOAL 5

Conserve and Restore Critical Habitat

Objective 5.1

Improve and support the health and resilience of oysters, including wild, farmed, and restored oysters, to promote a sustainable oyster fishery in the Pensacola Bay system

ACTION 5.1.1

Form and convene a sub-committee to assist in implementing the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System

ACTION 5.1.2

Create a comprehensive restoration approach for Oyster Plan implementation including an analysis for future grant funding and implementation strategies

ACTION 5.1.3

Conduct long-term monitoring to assess oyster condition and spat production and assess the effects of oysters on long-term environmental change

ACTION 5.1.4

Host and support oyster restoration projects in the Pensacola Bay system to improve native oyster populations

Objective 5.2

Assess seagrass health and distribution and develop a restoration strategy for long-term protection and recovery

ACTION 5.2.1

Conduct seagrass mapping and surveys (aerial and ground truth surveys) to assess the current extent, distribution, and condition of seagrass species in the Pensacola and Perdido Bays systems

ACTION 5.2.2

Evaluate current protection measures and develop a comprehensive restoration strategy for seagrass and submerged aquatic vegetation (SAV)

Objective 5.3

Improve and support the health and resilience of native ecosystems in the Pensacola and Perdido Bays watersheds

ACTION 5.3.1

[Wetlands] Conduct regular monitoring surveys to assess the condition of wetlands and buffer zones in the Pensacola and Perdido Bays watersheds

ACTION 5.3.2

[Shorelines] Conduct a shoreline assessment of both watersheds to assess living versus armored shorelines

ACTION 5.3.3

[Riparian] Conduct intensification for the EPA National Aquatic Resource Surveys (NARS) National Rivers and Streams Assessment (NRSA)

ACTION 5.3.4

[Mangroves] Coordinate and facilitate efforts to track expansion of mangrove species and synthesize data to communicate to the public

ACTION 5.3.5

[Invasive species] Support removal and prevention activities for invasive species

ACTION 5.3.6

Define measurable habitat restoration and conservation targets (acres and condition) to support living resources, the economy, and biodiversity

Objective 5.4

Coordinate with partners to identify and assess critical habitats of highest risk for imperiled and protected species

ACTION 5.4.1

Assess potential wildlife corridors and habitat fragmentation concerns for imperiled and protected wildlife species



Splinter Hill Bog Preserve
PPBEP

**GOAL 6****Restore and Conserve Fish and Wildlife****Objective 6.1**

Collaborate on and communicate fish and wildlife monitoring efforts

ACTION 6.1.1

Work with partners to increase the visibility of local community science initiatives and communicate volunteer opportunities and updates

Objective 6.2

Coordinate and expand fisheries monitoring capacity within the Pensacola and Perdido Bays systems

ACTION 6.2.1

Conduct seagrass trawling surveys to assess juvenile fish and shellfish communities and habitat quality

Objective 6.3

Increase regional monitoring capacity for marine mammals

ACTION 6.3.1

Increase long-term monitoring of manatee sighting coverage in Pensacola and Perdido Bays systems using PanhandleManatee.org

Pinfish in Shoal Grass

PPBEP

Education and Outreach Strategy Summary

Read the full Education and Outreach Strategy at www.ppbep.org/PDFs/EducationandOutreachStrategy.pdf.

Objective 1.1

Be a trusted and reliable source for relaying pertinent watershed-related environmental issues to the community

ACTION 1.1.1

Coordinate the communication of post pollution or post natural disaster event monitoring and use social media and other digital platforms to inform the public of current watershed-related environmental issues

ACTION 1.1.2

Strengthen media relations and feature PPBEP program activities through local and regional media outlets

Objective 1.2

Provide regular reports of ongoing monitoring and restoration efforts and results to the public

GOAL 1

Source of Watershed-Related Information

ACTION 1.2.1

Develop State of the Bays report

ACTION 1.2.2

Provide Community Grant Program updates via social media platforms and annual symposium

ACTION 1.2.3

Host biennial watershed science and outreach symposium

ACTION 1.2.4

Participate in events and support collaborative partner efforts

ACTION 1.2.5

Use social media and other digital platforms to update the public on current watershed information

ACTION 1.3.1

Compile environmental and watershed-related educational resources (e.g., curriculum guides, activities, resources for teachers)

ACTION 1.3.2

Develop a publicly accessible bibliography of existing gray and peer-reviewed literature, reports, and oral histories for the Pensacola and Perdido Bays watersheds

ACTION 1.3.3

Create an open science digital dashboard for tools, data, and status and trend reporting that is transparent and accessible

ACTION 1.3.4

Create an accessible list of current and relevant programs, projects, and grant opportunities within the watersheds

Objective 1.3

Become the central repository for watershed educational resources, data, and visualization



Autism OdysSea

Navarre Beach Marine Science Station

GOAL 2**Increase Public Understanding and Stewardship****Objective 2.1**

Develop new community science programs and support existing programs for priority program topic areas (e.g., oysters, seagrass, water quality, manatees)

ACTION 2.1.1

Develop oyster-centric monitoring programs (e.g., spat monitoring, oyster gardening, reef monitoring)

ACTION 2.1.2

Expand existing seagrass monitoring efforts

ACTION 2.1.3

Increase long-term monitoring of manatee sighting coverage in Pensacola and Perdido Bays utilizing PanhandleManatee.org

Objective 2.2

Engage the public in restoration and volunteer efforts

ACTION 2.2.1

Host oyster-centric volunteer events (e.g., shell bagging, constructing oyster spat monitoring devices)

ACTION 2.2.2

Offer opportunities for volunteers to help construct and install oyster reefs utilizing emerging methods (e.g., oyster prisms)

ACTION 2.2.3

Engage the community in trash removal and prevention to reduce waterborne trash and improve the safety, health, and beauty of local creeks

ACTION 2.2.4

Support and promote native vegetation restoration and invasive species removal on public lands

ACTION 2.2.5

Establish a paid internship program with two focus areas: Research and Outreach

Objective 2.3

Create strong partnerships with educators and educational institutions

ACTION 2.3.1

Develop and support watershed educational programs and provide related teacher development opportunities

ACTION 2.3.2

Engage area schools with watershed curriculum to reduce waterborne trash

ACTION 2.3.3

Partner with local schools to complete storm drain marking

ACTION 2.3.4

Distribute Community Grant funded videos to educators

Objective 2.4

Implement and support watershed-related educational events

ACTION 2.4.1

Promote National Estuaries Week through week-long programming (e.g., volunteer opportunities, immersive field experiences, Community Grant Symposium, etc.)

ACTION 2.4.2

Develop an Oyster Awareness Event that celebrates oysters as an important feature of the area's cultural heritage and highlights the benefits of oyster restoration

ACTION 2.4.3

Create an oyster documentary about the past, present, and future conditions of Pensacola Bay oyster fishery

ACTION 2.4.4

Lead watershed tours that highlight demonstration projects, climate adaptation and resilience planning, hazard mitigation, green infrastructure design and planning, and other related efforts

Objective 2.5

Implement and support watershed-related programs and campaigns

ACTION 2.5.1

Initiate a Bay-Friendly Landscaping campaign that emphasizes smart fertilizer use and living shoreline implementation

ACTION 2.5.2

Promote stormwater campaigns related to Fats, Oils, and Grease (FOG), lateral line connection and maintenance, and environmental benefits of septic-to-sewer conversion

ACTION 2.5.3

Continue and expand the Community Grant Program

ACTION 2.5.4

Support campaigns related to marine mammal and seagrass awareness and protection

Objective 2.6

Reach new audiences and underserved communities

ACTION 2.6.1

Develop an Environmental Justice Working Group to help determine the needs of underserved communities

ACTION 2.6.2

Reduce barriers to participation by providing free hands-on watershed experiences such as guided kayak trips and seining explorations



GOAL 1

Source of Watershed-Related Information



GOAL 1

Objective 1.1

Become the central repository for watershed data and visualization

Objectives

Serve as a central repository for estuarine and watershed data, research, and restoration projects for the Pensacola and Perdido Bays watersheds; Provide easily accessible resources for the scientific community, educators, and the public (e.g., watershed bibliography, data, data visualizations, trends, tools, etc.)

Status

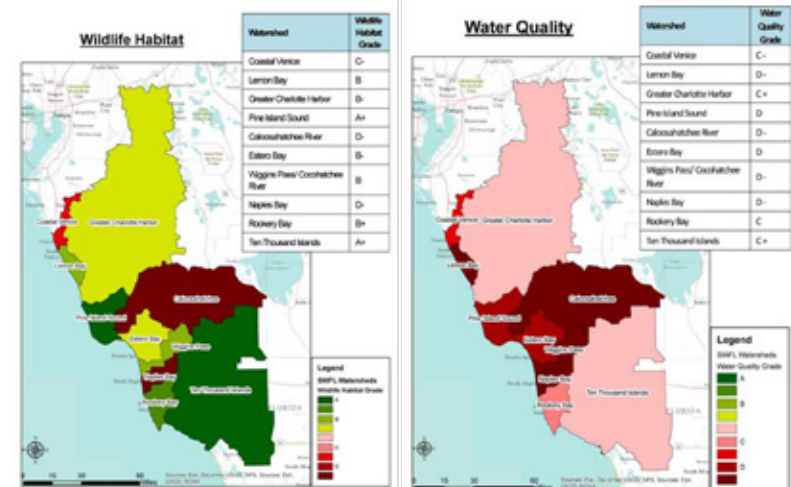
Ongoing. PPBEP and the Florida RESTORE Act Centers of Excellence Program (FLRACEP) team from University of West Florida (UWF) and University of Florida (UF) compiled a bibliography of existing peer-reviewed literature, gray literature, reports, theses and dissertations, oral histories, and relevant datasets for the Pensacola and Perdido Bays watersheds. In addition, PPBEP Senior and Environmental Scientists are working to collaborate with the Gulf of Mexico Alliance (GOMA) to contribute to their Gulf of Mexico Open Data Platform. The platform was developed to make it easier for users to discover, explore, and access data for the region. PPBEP staff have also partnered with representatives from the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS) to integrate the Council Monitoring and Assessment Program inventory of existing habitat and water quality monitoring and mapping metadata for programs into the Program's Comprehensive Monitoring Strategy and existing inventory or local monitoring efforts.

Related Actions

Water Quality Objective 3.1; Sediment Objective 4.1; Habitat Actions 5.1.3, 5.2.1; Fish and Wildlife Objective 6.1

BACKGROUND

PPBEP conducted a series of stakeholder workshop discussions on watershed-level concerns about water quality and quantity, sediment quality and quantity, habitat, and fish and wildlife. A common theme across all the topic areas was the need for a centralized source of information. This repository will contain both historical and current information on both bay and watershed research. In addition to the availability and access to research and ongoing monitoring data, stakeholders also expressed a desire to have a compilation of all past and ongoing restoration, green infrastructure, and other improvement projects. The importance of providing engaging and informative data visualizations for researchers, decision makers, educators, and the public was discussed and recommended as a lead role for PPBEP.



Examples of Estuary Report Cards from Charlotte Harbor
Conservancy of Southwest Florida



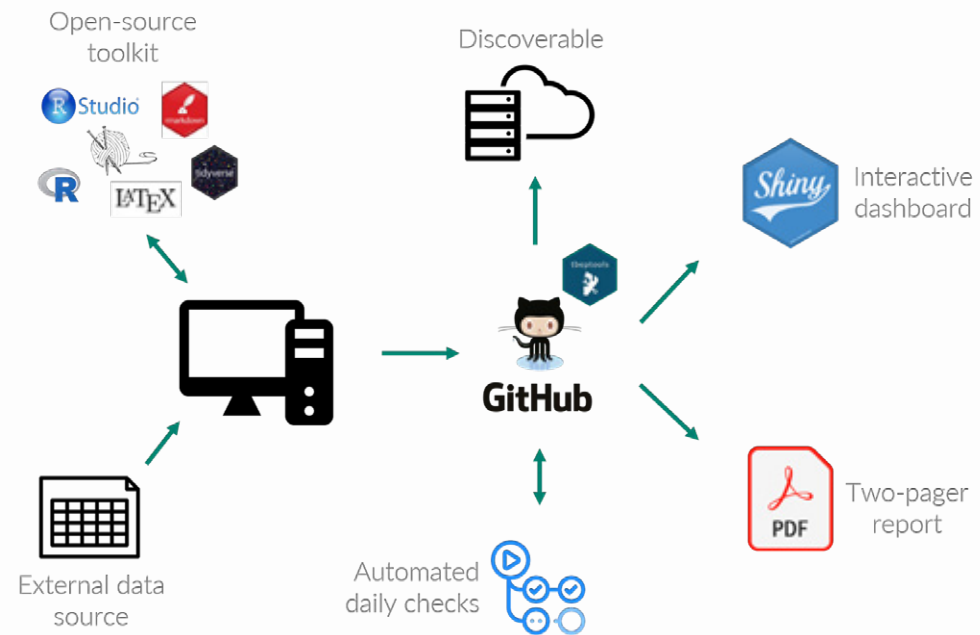
GOAL 1

Bayou Chico

Escambia County

Many National Estuary Programs (NEPs) serve as centralized data repositories for their bays and watersheds and host raw data, reports and summaries, and visualization tools on their websites. One example is the Tampa Bay Estuary Program (TBEP), which provides water quality, habitat, and biotic reports and data. TBEP also has current and archived water quality report cards, a geographic information system (GIS) library, links to other regional databases, and data visualization tools for decision makers. Their open science framework was designed to ensure that the ongoing data collection and research are transparent, reproducible, and discoverable.

Having a centralized trusted source for regional data that is easily accessible is important for management and public awareness. By having all data in one place, it can be queried by parameter, location, and year to facilitate the identification of data and monitoring gaps. Data visualizations are both a useful tool for managers and decision makers and an effective public engagement strategy to increase public awareness of research and ongoing concerns in the systems.



Generalized Open Science Workflow
TBEP



GOAL 1

ACTION 1.1.1

Develop a publicly accessible bibliography of existing gray and peer-reviewed literature, reports, and oral histories for the Pensacola and Perdido Bays watersheds

IMPLEMENTATION STRATEGY

Partner with UF/UWF (FLRACEP), GOMA, NOAA, the U.S. Environmental Protection Agency (EPA), and other partners to contribute to existing data platforms and develop and manage an open-source database of current and relevant literature for the watersheds; Work with partners to digitize pertinent historical records

-  **TIMEFRAME:** 2020 – 2022 (updated biennially)
-  **PPBEP ROLE:** Leader
-  **PARTNERS:** UF/UWF (FLRACEP)
-  **FUNDING:** Committed – EPA; FL Centers of Excellence (COE)
-  **DELIVERABLES:** Published annotated bibliography on website or alternate platform
-  **PERFORMANCE METRICS:** Number of publications and reports included in bibliography; Number of site visits and downloads

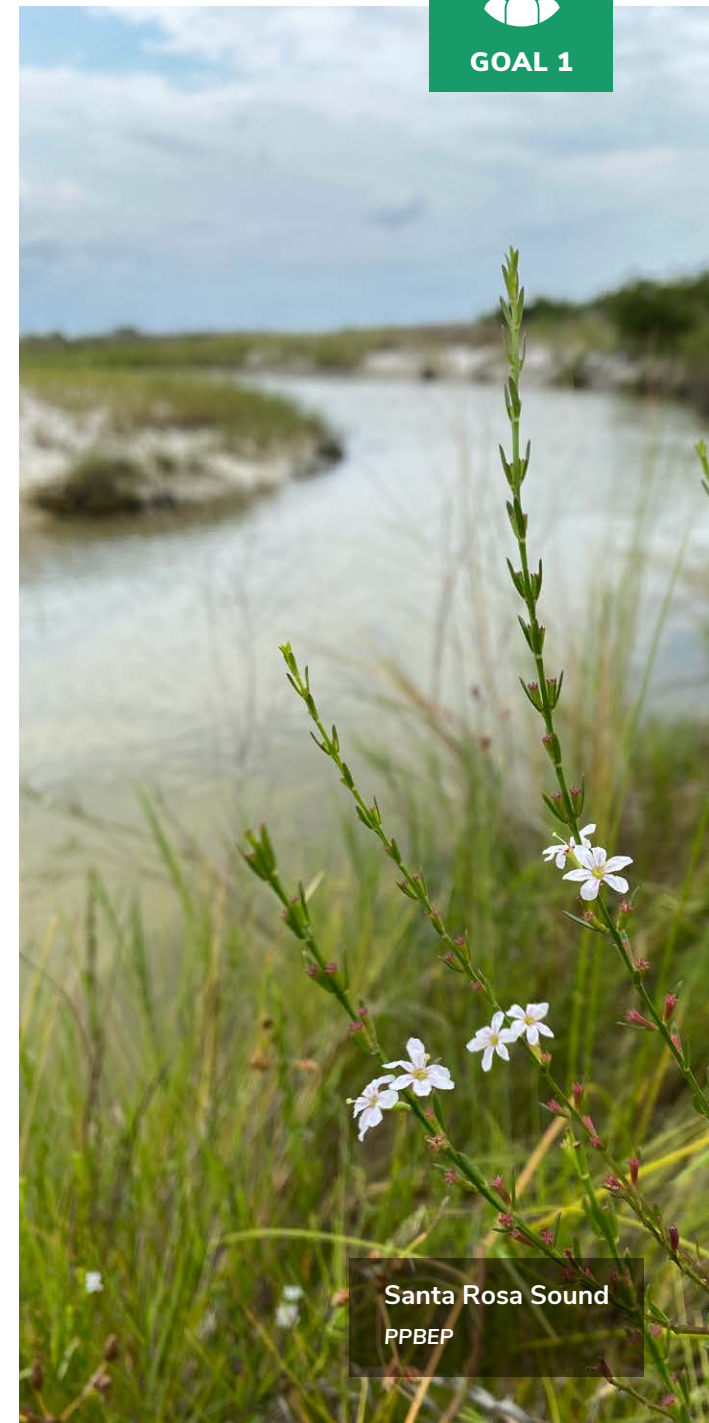
ACTION 1.1.2

Create an open science digital dashboard for tools, data, and status and trend reporting that is transparent and accessible

IMPLEMENTATION STRATEGY

Develop protocol for design, inclusion, and maintenance; Partner with TBEP and other supporting programs and organizations to assist in building an effective dashboard and relevant tools for data analysis and visualization

-  **TIMEFRAME:** 2022 – 2024
-  **PPBEP ROLE:** Leader
-  **PARTNERS:** TBEP; Florida Fish and Wildlife Conservation Commission (FWC); Mobile Bay National Estuary Program (MBNEP); Choctawhatchee Bay Estuary Program; Counties; Community of Practice (CoP) groups; Northwest Florida Water Management District (NFWFMD)
-  **FUNDING:** Pursuing
-  **DELIVERABLES:** Completed open science dashboard that provides status and trend information on priority watershed health indices
-  **PERFORMANCE METRICS:** Number of unique and repeat website visits



Santa Rosa Sound
PPBEP



GOAL 1

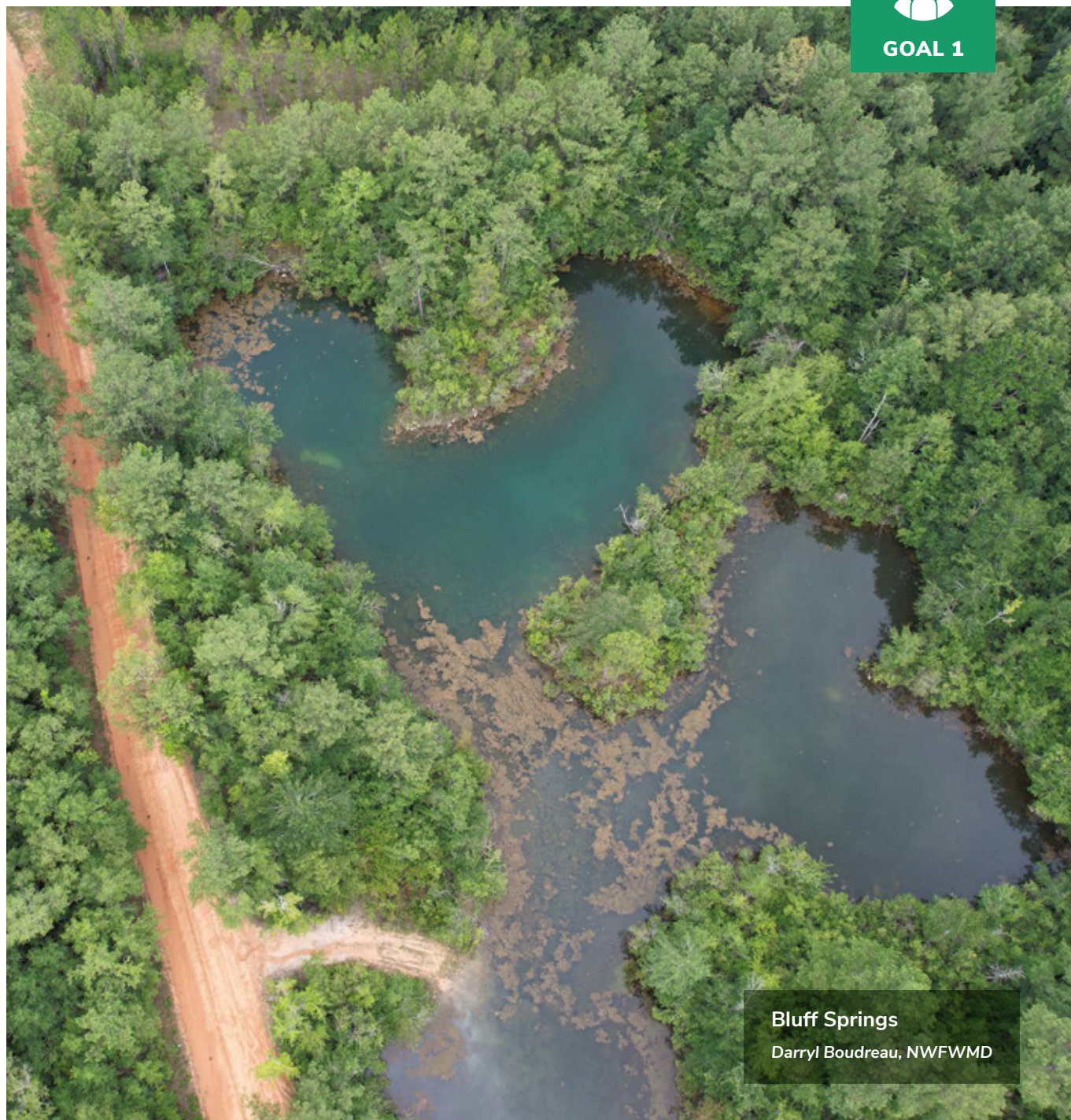
ACTION 1.1.3

Create an accessible list of current and relevant programs, projects, and grant opportunities within the watersheds

IMPLEMENTATION STRATEGY

Develop a protocol for project incorporation and maintenance; Collaborate with partners to create and maintain a list of current projects within the watersheds using ArcMap or another open-source platform to host on the PPBEP website or a stand-alone website

-  **TIMEFRAME:** 2022 – 2026
-  **PPBEP ROLE:** Leader
-  **PARTNERS:** All partners
-  **FUNDING:** Committed – FL COE
-  **DELIVERABLES:** Protocol for inclusion and maintenance of dashboard; Interactive map with project descriptions and locations hosted on PPBEP website; Inventory of grant opportunities (living document)
-  **PERFORMANCE METRICS:** Number of projects listed across watersheds available to public; Interactive map with project descriptions and locations hosted on PPBEP website; Number of unique and repeat website visits; Number and value of grants awarded; Link each project to priority issue to track funding obtained to address priority issues



Bluff Springs

Darryl Boudreau, NFWMD



GOAL 1

Objective 1.2

Be a trusted and reliable source for relaying pertinent watershed-related environmental issues to the community

Objectives

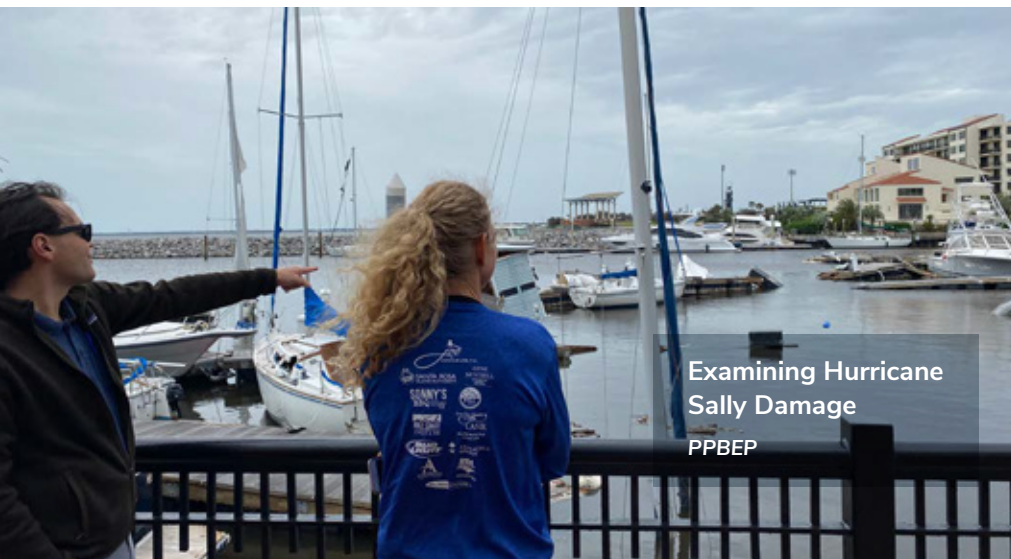
Better protect public and environmental health and increase community understanding of watershed issues by serving as a centralized and reliable source of information

Status

Ongoing. PPBEP has built partnerships with agencies, local governments, and local utilities to obtain and cross-share relevant watershed information such as sanitary sewer overflows. The Program will continue to strengthen and grow these partnerships, integrate into emergency management response networks, and disseminate information to local media.

Related Actions

Education and Outreach Strategy Objective 1.1



Examining Hurricane Sally Damage
PPBEP

BACKGROUND

PPBEP held a series of stakeholder workshops to identify and prioritize the Program's education and outreach efforts. Communication of watershed-related information was identified as a high priority, which is especially important following natural disasters or large-scale events (e.g., hurricanes, large sanitary sewer overflows, etc.). Multiple agencies and organizations are responsible for collecting and reporting pressing watershed information, but this information is rarely centralized into one location or disseminated by a single organization. The lack of centralization can make it challenging for community members to know where to look for information or how to access it. Even if community members can access the data they are looking for, data across the watersheds is not always provided in an easily digestible format.

PPBEP strives to serve as a trusted, reliable source for communicating relevant, often time-sensitive, watershed-related information that is important to public and environmental wellbeing. In addition to cross-sharing information, the Program aims to translate data into clear and understandable terms and visual figures (when appropriate). Ensuring that the public is aware of current issues in the watersheds empowers community members to make informed decisions (whether to fish, boat, swim, etc.) based on watershed conditions. Gathering this information is also a critical first step in building context and public support for initiatives, campaigns, and funding to address root causes of environmental issues impacting the watersheds.

PPBEP strives to serve as a trusted, reliable source for communicating relevant, often time-sensitive, watershed-related information that is important to public and environmental wellbeing.



GOAL 1

ACTION 1.2.1

Coordinate the communication of post pollution or post natural disaster event monitoring and use social media and other digital platforms to inform the public of current watershed-related environmental issues

IMPLEMENTATION STRATEGY

Partner with county and state representatives and subscribe to relevant list-serves to receive timely information and create visuals for sharing; Integrate into counties' emergency management response networks; Work with local utility boards, the Florida Department of Health (FDOH), the Alabama Department of Health, the Florida Department of Environmental Protection (DEP), the Alabama Department of Environmental Management (ADEM), and local governments to obtain pertinent information regarding events and health advisories

🕒 TIMEFRAME: 2022 – 2026

👤 PPBEP ROLE: Leader; Communicator

👥 PARTNERS: FDOH; DEP; Alabama Department of Public Health; ADEM; Local utilities; Counties; NFWFMD; NOAA; Federal Emergency Management Agency (FEMA); Community groups; EPA

💰 FUNDING: Committed – EPA Grant

✅ DELIVERABLES: Communication and Information Sharing Agreement among agencies, organizations, local governments, and PPBEP



Indian Bayou
PPBEP

📊 PERFORMANCE METRICS: Number of posts; Number of individuals reached by posts and engagements; Number of times PPBEP is included in emergency response briefings; Number of partner agencies and organizations to sign agreement

ACTION 1.2.2

Strengthen media relations and feature PPBEP program activities through local and regional media outlets

IMPLEMENTATION STRATEGY

Partner with communications and media departments of agencies and organizations within the community; Utilize local media outlets for the dissemination of information

🕒 TIMEFRAME: Daily

👤 PPBEP ROLE: Leader

👥 PARTNERS: All media partners (e.g., WEAR TV, Blab TV, Pensacola News Journal, Santa Rosa Press Gazette, UWF National Public Radio Station, etc.)

💰 FUNDING: Committed – EPA Grant; Local governments

✅ DELIVERABLES: Published social media posts, newsletters, press releases, and other media products

📊 PERFORMANCE METRICS: Number of press releases; Number of featured stories; Number of postings; Social media metrics (number of hits, followers, views, reached; number of shares); Number of unique partners engaged through collaboration



GOAL 1

ACTION 1.2.3

Participate and contribute to regional working groups and data sharing communities of practice

IMPLEMENTATION STRATEGY

Attend, participate, and contribute to Seagrass CoP, Oyster Data Sharing, FWC projects (Seagrass Integrated Mapping and Monitoring [SIMM], Oyster Integrated Mapping and Monitoring Program [OIMMP], Coastal Habitat Integrated Mapping and Monitoring Program [CHIMMP]), Florida Oyster Recovery Science, Panhandle Estuarine Restoration Team, Alabama Coastal Foundation Interagency Coastal Regulations work group, GOMA committees, and Manatee Sighting Network (MSN) efforts

-  **TIMEFRAME:** Quarterly
-  **PPBEP ROLE:** Collaborator
-  **PARTNERS:** FWC; GOMA; NOAA; Dauphin Island Sea Lab (DISL); EPA; Program for Local Adaptation to Climate Effects: Sea Level Rise (PLACE: SLR); NWFWMDC; DEP
-  **FUNDING:** Committed – EPA Grant; Local governments
-  **DELIVERABLES:** Participation and contribution to local, state, and regional reporting activities
-  **PERFORMANCE METRICS:** Number of working groups where PPBEP is represented; Number of relevant reports and other outputs as co-author or active partner



FWC Oyster Spat Monitoring
PPBEP



GOAL 1

Objective 1.3

Provide regular reports of ongoing monitoring and restoration efforts and results to the public

Objectives

Provide the community with current information and data from ongoing projects and monitoring efforts

Status

Ongoing. For the past two years, PPBEP has received funding from the FL State Legislature to support the Community Grant Program (est. 2020), which has provided support for partners to develop education and outreach programs, conduct monitoring and research, implement a community garden, and survey oyster reef fish communities. Updates and findings from these programs and projects are featured on a segment of the monthly newsletter, the Pelican Post, and staff also create spotlight articles featuring specific projects on the Program's website (www.ppbep.org/news). Photos and videos from project activities are also shared on PPBEP social media platforms (i.e., Facebook, Instagram) to inform and engage community members on the ongoing work throughout the watersheds and to advertise volunteer opportunities. Information from partner agencies and organizations related to sanitary sewer overflows, severe storms and hurricanes, algal blooms, oil spills, and other environmental concerns and alerts are also shared via newsletters, the website, and social media platforms. PPBEP drafts content for upcoming events including volunteer opportunities, watershed-related news, and project and program highlights for press releases to the local media (e.g., Pensacola News Journal, Santa Rosa Press Gazette) and radio (e.g., UWF National Public Radio Station) platforms.

Related Actions

Education and Outreach Strategy Action 1.2.5

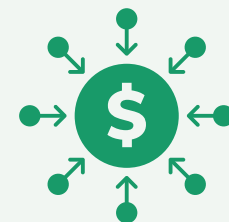
BACKGROUND

During the workshop series with the Technical and Education and Outreach Committees, stakeholders expressed the need for increased communication regarding watershed-related events, information, and data. PPBEP strives to be a trusted source of information for the public, and that starts with collaboration among key stakeholders, effective interagency communication, and data sharing. Since its inception, PPBEP has made great strides in developing curriculum and relevant outreach campaigns on various topics, hosting community events and field trips, and creating consistent messaging to help achieve this goal. PPBEP will continue to report on activities being conducted across the watersheds to ensure that community members receive the best available science and information in digestible formats to assist with their informed decision making as environmental stewards.

The Community Grant Program, established summer 2020 with support from FL State Appropriations, has funded 26 projects totaling \$700,000 that have been focused on various aspects of watershed health including monitoring, outreach, restoration, education, and research. Project leads report on their progress, project activities and deliverables, and any challenges that may have had to be overcome within that time frame. This information is synthesized and shared using the Program's social media pages, the monthly newsletter (Pelican Post), and feature articles hosted on the website.

The Community Grant Program has funded:

26 projects
 totaling
\$700,000





At the conclusion of the grant period, PPBEP hosts an annual Community Grant Symposium, normally during National Estuaries Week in September, to give current grant recipients an opportunity to present on the findings and impact of their projects and to award the next round of selected grants for the next funding cycle.

Communicating Results

In the coming years, the Program aims to host a biennial research symposium to highlight current projects and programs across the watersheds and to connect researchers, educators, natural resource managers, local government leaders, students, community organizations, and the public to celebrate successes and foster new partnerships. This will be an opportunity for increasing awareness, learning from previous efforts (i.e., successes, failures, challenges), furthering the potential for effective restoration and protection of the watersheds, and leveraging future funding opportunities. Neighboring programs that organize and host similar events, for example, MBNEP's biennial Bays and Bayous symposium, have shown success through cross-state participation.

In addition to a symposium, PPBEP plans to create an annual State of the Bays report to inform stakeholders and community members on the status and trends of key indicators across the Pensacola and Perdido Bays watersheds. Estuary programs and environmental organizations throughout the U.S. have produced State of the Bays reports in highly visual and web-based platforms (e.g., TBEP, Potomac Conservancy, Indian River Lagoon NEP) that evaluate estuaries

using a stoplight approach or grading system for various indicators, including water quality, fish, habitats, and land use. PPBEP's first State of the Bays report will be released in 2022 highlighting existing and current data and highlighting Program-led projects and assessments completed during 2020–2022. This report will present an

overview of the watersheds and their features using graphics and visuals to effectively present scientific concepts as a baseline of information for future watershed-related work and serve as a trusted source of information.



2021 Trash Free Waters Results

PPBEP



GOAL 1



Autism OdysSea 2022

Navarre Beach Marine Science Station

ACTION 1.3.1

Develop State of the Bays report

IMPLEMENTATION STRATEGY

Assess watershed data, literature, and status and trends of selected indicators

- TIMEFRAME:** Biennially
- PPBEP ROLE:** Leader
- PARTNERS:** UF/UWF (FLRACEP), EPA
- FUNDING:** Committed – EPA grant
- DELIVERABLES:** Published final State of the Bays report (interactive web-based platform)
- PERFORMANCE METRICS:** Number of unique and repeat site visits; Number of unique entities accessing report

ACTION 1.3.2

Provide Community Grant Program updates via social media platforms and annual symposium

IMPLEMENTATION STRATEGY

PPBEP staff will communicate with funded programs to create visuals for social media platforms and the newsletter; Make final reports available on the PPBEP website

- TIMEFRAME:** Annually
- PPBEP ROLE:** Leader
- PARTNERS:** Funding agencies; States; Sponsors
- FUNDING:** Committed – FL State Appropriations; Sponsorships
- DELIVERABLES:** Published social media posts; Community Grant Symposium; Articles posted on the PPBEP website
- PERFORMANCE METRICS:** Amount of funding received; Number of projects funded; Number of grant symposium attendees; Geographic spread of projects; Number of press releases covering events; Social media metrics (e.g., number of hits, number of shares, etc.); Number of issues covered; Number of demonstrable improvements to issues addressed

ACTION 1.3.3

Host biennial watershed science and outreach symposium

IMPLEMENTATION STRATEGY

Provide a venue for stakeholders and students to share information on their ongoing programs and projects within the watersheds

- TIMEFRAME:** Biennially
- PPBEP ROLE:** Leader
- PARTNERS:** All partners
- FUNDING:** Needed
- DELIVERABLES:** Biennial symposium
- PERFORMANCE METRICS:** Number of attendees; Number of agencies and organizations represented; Number of presentations (posters and oral); Geographic spread of attendees and presenters; Number of priority topics covered



GOAL 1

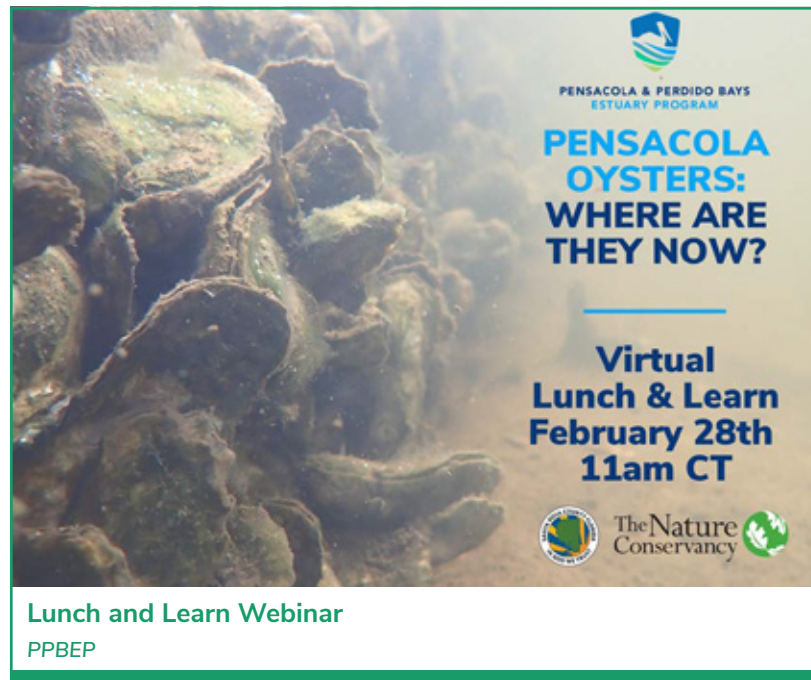
ACTION 1.3.4

Use social media and other digital platforms to update the public on current watershed information

IMPLEMENTATION STRATEGY

Communicate with the public using social media, presentations, and other digital platforms

- 🕒 TIMEFRAME:** Daily
- 👤 PPBEP ROLE:** Leader; Communicator
- 🤝 PARTNERS:** All partners
- 💰 FUNDING:** Committed – EPA grant
- ✅ DELIVERABLES:** Published social media posts, presentations, and other outreach products
- 📊 PERFORMANCE METRICS:** Number of posts and outreach campaigns; Number of topics or content presented; Number of individuals reached by posts, number of engagements, and engagement trends





GOAL 2

Strengthen Community Resilience

Admiral Mason Stormwater Park
Darryl Boudreau, NFWFMD



Objective 2.1

Inform community planning and development decisions

Objectives

Ensure that comprehensive plans and land development codes are consistent with the goals and objectives of the CCMP, and that local government staff and elected officials have the tools, training, and data necessary to support sound community planning and development decisions that support environmental stewardship and a thriving economy

Status

Not yet started

Related Actions

Resilience Action 2.4.1; Resilience Action 2.4.2; Resilience Action 2.6.1

The Pensacola and Perdido Bays watersheds are experiencing tremendous growth.

Population increase between 2010 and 2020:

Baldwin County	27%	Santa Rosa County	24%
Escambia County	8%	Okaloosa County	17%

BACKGROUND

The Pensacola and Perdido Bays watersheds are experiencing tremendous growth. Between 2010 and 2020, Baldwin County's population increased 27%, Escambia County's population increased 8%, Santa Rosa County's population increased 24%, and Okaloosa County's population increased 17%, according to the 2020 U.S. Census. Coastal AL and FL are some of the most rapidly growing areas in the U.S. For example, Baldwin County has been ranked the seventh fastest growing metropolitan area in the country and fastest growing in AL (2020 U.S. Census). With an increase in population to coastal counties, enhanced coordination with local planning officials is critical to ensure future development and long-term community planning adequately address natural resource management and community resilience concerns.

Comprehensive plans, developed and implemented by local governments, are intended to serve as a policy planning tool to allow for economic development and natural resource protection. Land development codes, also developed and implemented by local governments, serve as a regulatory enforcement tool to manage population growth and protect natural resources. Effective comprehensive plans and land development codes can often be a determining factor for attaining fishable and swimmable waters and supporting healthy communities.

PPBEP will establish partnerships with each jurisdiction in the Pensacola and Perdido Bays watersheds and complete a crosswalk of each comprehensive plan and land development code to evaluate consistency with the goals of the CCMP. Based on the findings of the crosswalk, PPBEP will recommend revisions to each comprehensive plan and land development code to ensure consistency across the watersheds in supporting stewardship of natural resources, healthy communities, and economic resilience.



GOAL 2

ACTION 2.1.1

Promote the use of smart growth and best land management practices to maximize the health and resilience of local communities in the face of natural disasters

IMPLEMENTATION STRATEGY

Partner with local governments and boards to identify needed data and studies that would be useful to help inform land development codes, planning documents, etc.

-  **TIMEFRAME:** 2023 – 2025
-  **PPBEP ROLE:** Communicator
-  **PARTNERS:** City and county governments; Municipalities
-  **FUNDING:** Needed
-  **DELIVERABLES:** Published development guidance document, data, and studies requested by local governments to help inform policies and codes
-  **PERFORMANCE METRICS:** Number of engagements with stakeholders and decision makers; Number of studies produced; Percentage of local government priorities addressed
-  **LOCATIONS:** Areas experiencing accelerated growth in the watersheds; Coastal counties; Areas with at-risk riparian zone loss



Corinne Jones Park in Downtown Pensacola

Darryl Boudreau, NFWFMD



ACTION 2.1.2

Restore watershed hydrology by prioritizing the use of nature-based solutions and removal of hardened infrastructure, where appropriate

IMPLEMENTATION STRATEGY

Partner with state, regional, and local governments to identify bridges and culverts impeding natural function of creeks and streams, and work to incorporate nature-based solutions at prioritized sites during the next available replacement and maintenance cycle

TIMEFRAME: 2024 – 2026

PPBEP ROLE: Collaborator

PARTNERS: Emerald Coast Regional Council; Florida Department of Transportation (FDOT); City and county governments

FUNDING: Needed

DELIVERABLES: Prioritized list of bridge and culvert replacements

PERFORMANCE METRICS: Number of structures identified; Number of coordination meetings held with state, regional, and local agencies; Number of projects incorporating nature-based solutions

LOCATIONS: Watershed-wide



Culvert on Negro Creek, AL
UWF



Objective 2.2

Facilitate wastewater management improvements throughout the watersheds

Objectives

Work with local domestic wastewater facilities to help identify and prioritize wastewater improvements throughout the watersheds and assist in public outreach promoting septic-to-sewer conversion and septic system maintenance to reduce public health risk to pathogen exposure; Partner with local utilities to secure funding for wastewater treatment improvements, including expanding centralized sewer to priority areas with failing septic tanks and population growth

Status

Not yet started

Related Actions

Water Quality Objective 3.2; Habitat Objective 5.2; Education and Outreach Strategy Action 2.5.2



Tampa Bay Estuary Program's Pipe Up Campaign to Educate Homeowners on Lateral Line Maintenance (www.tbep.org/pipeup)

BACKGROUND

Throughout the counties in Florida, there are about 54,000 known or likely septic tanks in the Pensacola Bay watershed and about 12,000 in the Perdido Bay watershed (Snyder 2016). Septic systems are commonly found in rural and unincorporated areas of the watersheds and in older communities developed prior to the widespread availability of a centralized sewer collection system. Septic tanks placed in improper soil, not maintained, and/or not functioning properly can leach nutrients, bacteria, viruses, chemicals, and other water quality pollutants associated with raw wastewater into groundwater and the surrounding waterways. Failed septic tanks can also be a human health risk if the wastewater makes its way to the surface of a yard. To ameliorate septic tank pollution, a more environmentally friendly alternative is to replace septic systems by connecting properties and businesses to the cities' centralized sewer systems. Centralized sewer systems are more efficient at removing nutrients, medicines, and other potentially harmful chemicals from wastewater and treat wastewater further than septic tanks do prior to discharging the wastewater. For areas where centralized sewer is not available, on-site advanced septic systems are a good option over traditional septic tanks.

Many communities around the U.S. are promoting the conversion of septic to sewer to improve local water quality, while other communities promote septic system maintenance programs. Communities such as Baldwin County have participated in incentive programs that pay for one free septic tank pump. Maintaining septic tanks, which need to be pumped every three to five years, can be costly for homeowners, and these incentive programs provide homeowners and the community with a short-term solution to alleviate water quality issues stemming from unmaintained septic tanks. Other communities provide discounts or reasonable payment plans for homeowners and businesses to tap into the centralized sewer system. PPBEP will collaborate with partners throughout the watersheds to educate the public about sewer and septic system maintenance programs, opportunities to implement septic-to-sewer conversion programs, and the benefits of proper wastewater management on human health and environmental resources.



GOAL 2

ACTION 2.2.1

Extend central sewer service to priority areas near surface waters and retrofit existing failing wastewater infrastructure

IMPLEMENTATION STRATEGY

Work with partners to complete an inventory of septic systems throughout the watersheds; Identify potential pathogen and nutrient hotspots; Partner with local utilities to prioritize areas for conversion or retrofits and identify and acquire funding sources to assist with priority projects; Identify funding sources to support wastewater treatment plant capacity and advanced treatment enhancements

TIMEFRAME: 2022 – 2025

PPBEP ROLE: Collaborator

LEAD: Local utilities; **PARTNERS:** Alabama Association of Conservation Districts; Counties; Cities; Alabama Department of Health; FDOH; EPA; NFWFMD

FUNDING: Pursuing

DELIVERABLES: Map of prioritized areas for septic-to-sewer conversions, expansions, or retrofits within the watersheds; Funded project deliverables; Assessment of number, size, age, and condition of current septic systems; Outreach materials to help inform the community of needed improvements and increase support for needed investments

**sewer
over
Septic**
A FLORIDA & TALLAHASSEE PROJECT



The City of Tallahassee's septic-to-sewer program allows eligible properties to connect to sewer at no cost

PERFORMANCE METRICS: Number of identified and/or funded projects; Amount of grant funding identified and/or acquired; Number of septic units identified to be updated or converted; Measured changes in water quality post conversions or upgrades

LOCATIONS: Beachfront communities; RV resorts; Miramar Drive (Perdido); Commercial properties (Brownsville, Paradise Beach, Navy Blvd, Innerarity Island); Areas with outdated or failing infrastructure; Highly developed neighborhoods in flood risk areas

ACTION 2.2.2

Educate and incentivize the community on the importance of sewer and septic system maintenance and sewer connections

IMPLEMENTATION STRATEGY

Implement an outreach campaign to educate communities (e.g., homeowners, decision makers,



Volusia County, FL, Educational Graphic for Their Septic-to-Sewer Program

etc.) across the watersheds on the impacts of septic tanks and failing infrastructure on water quality and the benefits of properly maintained wastewater infrastructure

TIMEFRAME: 2023 – 2025

PPBEP ROLE: Leader; Communicator

PARTNERS: Local utilities; Conservation Districts; Natural Resources Conservation Service (NRCS); Sea Grant; University of Florida Institute of Food and Agricultural Sciences (UF-IFAS); Area Cooperative Educational Services Extension; Neighborhood groups; NFWFMD

FUNDING: Needed

DELIVERABLES: Published outreach campaigns and materials (e.g., septic-to-sewer education, water quality benefits)

PERFORMANCE METRICS: Number of individuals reached by campaign(s) and engagements

LOCATIONS: Pensacola and Perdido Bays watersheds



Objective 2.3

Promote the use of green infrastructure or other low impact designs in community planning

Objectives

Build partnerships to promote green infrastructure or low impact design projects in the Pensacola and Perdido Bays watersheds as a method to improve water quality, increase resilience, improve community health, and support economic growth; Support local governments, private property owners, and other entities in the development of living shorelines in Pensacola and Perdido Bays systems; Support government entities and developers in implementing regional stormwater strategies

Status

Ongoing. Currently seeking opportunities to partner and support groups in the watersheds applying for green infrastructure and other low impact design funding. Santa Rosa County, in collaboration with PPBEP, was awarded a National Fish and Wildlife Foundation (NFWF): National Coastal Resilience Grant to develop a Living Shoreline Suitability Model (LSSM) for the Pensacola Bay system. PPBEP, through its EPA grant, funded the completion of the LSSM in the Perdido Bay system in FL, building on an LSSM previously completed in the Perdido Bay system in AL. By fall 2022, the LSSM will be complete for the entire Pensacola and Perdido Bays systems, providing a publicly available tool for use in shoreline stabilization decision making by coastal property owners.

The Emerald Coast Regional Council, in partnership with NFWFMD, secured funding from the Federal Highway Administration to develop and implement a pilot process to integrate regional stormwater management into FDOT capital improvement projects. The pilot initiative is planned to commence in 2022 focusing on two projects in Escambia and Santa Rosa Counties.

Related Actions

Sediment Objective 4.2; Habitat Action 5.3.2; Education and Outreach Strategy Action 2.4.4



Green Roof on Escambia County
Central Office Complex
Escambia County

BACKGROUND

Green infrastructure and other low impact designs are resilient approaches to dealing with stormwater. Green infrastructure can provide flood control and improve the treatment of stormwater at a lower cost than traditional man-made stormwater management practices (<https://www.epa.gov/green-infrastructure/green-infrastructure-cost-benefit-resources>). The premise of green infrastructure and low impact designs is to use the natural landscape features and hydrology to promote the infiltration, filtration, storage, evaporation, and transpiration of stormwater. When a landscape is developed, the natural vegetation and hydrology is removed from the system, soils are compacted, and impervious surfaces (e.g., roads and rooftops) are created, lowering the infiltration of stormwater. Green infrastructure reintroduces infiltration pathways for stormwater and

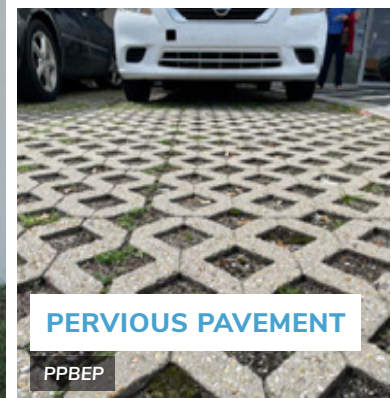
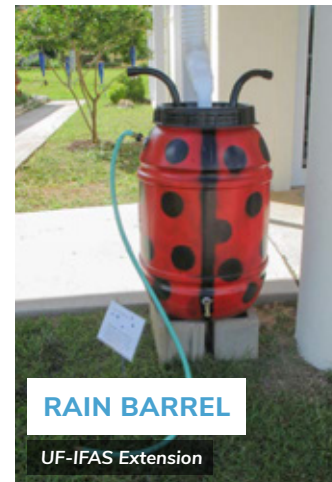
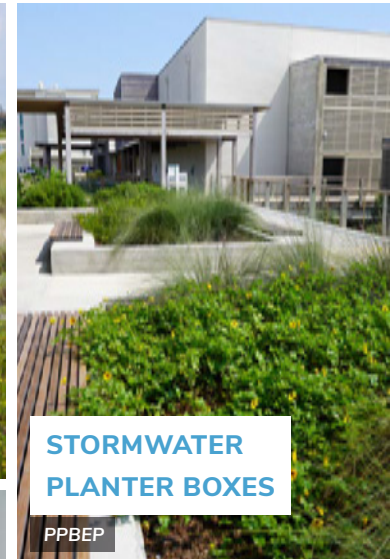


can help lessen pollutant loading to waterways and lessen the impacts of flooding events. Furthermore, green infrastructure and low impact designs can provide aesthetically pleasing green spaces for the community to enjoy.

Many counties within the PPBEP watersheds have started to incorporate green infrastructure and low impact design into their stormwater and land management plans. For example, Escambia County received a Section 319 Nonpoint Source Management Program Implementation Grant in 2016 to create the Escambia County Low Impact Design Best Management Practice (BMP) Manual to be incorporated into the Escambia County Land Development Code. This manual provides green infrastructure and low impact design solutions as options for future stormwater management. Options include incorporating green roofs and permeable pavement to ameliorate the effects of stormwater. Santa Rosa County also received a Green Infrastructure Grant in 2021 from the EPA to improve impaired waters within the Pensacola Bay Watershed. PPBEP strives to promote the use of green infrastructure practices throughout the counties and cities within the watersheds by working with partners to acquire funding to implement proposed low impact design plans and educate homeowners and businesses about the benefits of utilizing green infrastructure and low impact design practices.

Types of Green Infrastructure

- ➔ Bioretention Systems (Rain Gardens)
- ➔ Treatment Bioswales
- ➔ Vegetated Natural Buffers
- ➔ Pervious Pavement
- ➔ Green Roofs
- ➔ Rain Barrels (i.e., Rainwater Harvesting)
- ➔ Tree Boxes
- ➔ Stormwater Planter Boxes





Living shorelines as a green infrastructure alternative to hardening shorelines

Living shorelines are resilient shoreline stabilization techniques, typically placed within estuarine systems, that reduce erosion, improve water quality, provide shoreline protection, and provide habitat for other organisms. While living shorelines are not a one-size-fits-all solution, they are environmentally favorable alternatives to bulkheads and other shoreline armoring practices. Previous living shoreline projects in the Pensacola Bay system have been very successful. Project GreenShores Site 1 (completed in 2003) in Pensacola Bay is an award-winning living shoreline constructed to lessen wave energy during storms and restore oyster reefs, saltmarsh, and seagrass habitat.

Project GreenShores has become a model for living shoreline projects across the Gulf Coast and has demonstrated the effectiveness of living shorelines to improve resilience multiple times. Most notably, in 2004, less than a year after Project GreenShores was completed, Hurricane Ivan struck with minimal impacts to the project site and surrounding infrastructure. In 2020, Hurricane Sally struck with no impacts to the project site while seawalls to the west and east of the project site, including Sanders Beach and Wayside Park, were destroyed.



**Project GreenShores Site 1
in Pensacola Bay**

Darryl Boudreau, NFWMD



Current and future living shoreline projects in Pensacola and Perdido Bays systems:

Living Shoreline Suitability Model for Pensacola and Perdido Bays

- LOCATION:** Pensacola and Perdido Bays systems
- PURPOSE:** Assess Pensacola and Perdido Bays shorelines to evaluate land use, water depth, habitat type, wave dynamics, sediment transport, and the presence or absence of hardened coastal infrastructure (i.e., seawalls). Outcomes of the LSSM will help determine where to prioritize placement of living shorelines. PPBEP will fund the Perdido Bay LSSM.
- LEAD:** Santa Rosa County and PPBEP
- FUNDING SOURCE:** NFWF; EPA
- PROGRESS:** Planning

Floridatown Living Shoreline Project

- LOCATION:** Floridatown Park, Escambia Bay
- PURPOSE:** Reduce erosion into Escambia Bay
- LEAD:** Santa Rosa County
- FUNDING SOURCE:** DEP
- PROGRESS:** Permitting

Pensacola Bay Living Shorelines Project

- LOCATION:** White Island, Magazine Point, Sherman Inlet, Naval Air Station Pensacola
- PURPOSE:** Enhance resilience of Naval Air Station Pensacola and the Bayou Davenport neighborhood by stabilizing erosion and restoring shorelines, creating saltmarsh habitat, improving water quality, and creating suitable conditions for seagrass establishment
- LEAD:** Escambia County; **PARTNERS:** U.S. Department of Defense (DoD); DEP
- FUNDING SOURCE:** Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) (Pot 2); NFWF; DoD
- PROGRESS:** Permitting

Navy Point Living Shoreline

- LOCATION:** Navy Point Park, Bayou Grande
- PURPOSE:** Reduce erosion, create habitat, and improve water quality
- LEAD:** Escambia County
- FUNDING SOURCE:** NFWF
- PROGRESS:** Complete

Living Shoreline Course for Marine Contractors

- PURPOSE:** Educate marine contractors, landscapers, local governments, and coastal homeowners on living shoreline construction best practices
- LEAD:** NFWF; FWC; SeaGrant
- FUNDING SOURCE:** PPBEP
- PROGRESS:** Complete (summer 2021)

Project GreenShores Site 2

- LOCATION:** Pensacola Bay
- PURPOSE:** Lessen wave energy during storm events; restore oyster reefs, saltmarsh, and seagrass habitat
- LEAD:** DEP
- FUNDING SOURCE:** Natural Resource Damage Assessment (NRDA)
- PROGRESS:** Monitoring



Pensacola East Bay Oyster Habitat Restoration Project

- LOCATION:** East Bay, Escribano Point
- PURPOSE:** Restore oyster habitat and create habitat for other species
- LEAD:** The Nature Conservancy (TNC)
- FUNDING SOURCE:** NFWF Gulf Environmental Benefit Fund
- PROGRESS:** Construction

Living Shorelines in the FL Panhandle

- LOCATION:** Big Lagoon, Bayou Texar, Bayou Grande, Santa Rosa Sound, Yellow River Marsh Aquatic Preserve
- PURPOSE:** Restore and create habitat, attenuate waves, and stabilize shorelines on state-owned submerged lands while coordinating with homeowners
- LEAD:** DEP
- FUNDING SOURCE:** DEP; U.S. Fish and Wildlife Service (USFWS)
- PROGRESS:** Complete

LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES

Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.

Living Shorelines	Hard Shoreline Structures
One square mile of salt marsh stores the carbon equivalent of 76,000 gal of gas annually.	33% of shorelines in the U.S. will be hardened by 2100 , decreasing fisheries habitat and biodiversity.
Marshes trap sediments from tidal waters, allowing them to grow in elevation as sea level rises.	Hard shoreline structures like bulkheads prevent natural marsh migration and may create seaward erosion .
Living shorelines improve water quality , provide fisheries habitat , increase biodiversity , and promote recreation .	
Marshes and oyster reefs act as natural barriers to waves. 15 ft of marsh can absorb 50% of incoming wave energy.	
Living shorelines are more resilient against storms than bulkheads.	

Benefits of Living Shorelines
NOAA

The National Centers for Coastal Ocean Science | coastalscience.noaa.gov

Navy Point Living Shoreline

Annabelle Rose Photography



ACTION 2.3.1

Enhance stormwater management by expanding the use of green infrastructure practices

IMPLEMENTATION STRATEGY

Work with partners to prioritize areas within the watersheds that would benefit most from regional green infrastructure techniques; Develop and acquire funding to implement priority projects

- 🕒 TIMEFRAME:** 2023 – 2026
- 👤 PPBEP ROLE:** Leader; Communicator
- 🤝 PARTNERS:** Academia; Local government; Cities; Counties; Community organizations; Local utilities; NFWFMD
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Funded project deliverables; Implementation of one green infrastructure project
- 📊 PERFORMANCE METRICS:** Number of green infrastructure practices and projects implemented; Amount of funding acquired; Estimate of acres treated; Volume of stormwater captured
- 📍 LOCATIONS:** Hotspot areas with high stormwater flows (upper watersheds, cities, and impervious pavement areas in highly developed communities)



Bayview Park Living Shoreline
DEP Northwest Florida Aquatic Preserves

ACTION 2.3.2

Promote and facilitate the development of living shorelines as a sustainable alternative to shoreline armoring to reduce erosion and sediment inputs

IMPLEMENTATION STRATEGY

Work with partners to develop and acquire funding for living shoreline projects; Educate homeowners about the benefits of living shorelines versus bulkheads and further hardening; Provide living shoreline training for contractors

- 🕒 TIMEFRAME:** 2023 – 2026
- 👤 PPBEP ROLE:** Collaborator

- 🤝 PARTNERS:** Sea Grant; National Wildlife Federation (NWF); Local government; Academia; County Extensions; TNC; DEP; Community groups; Homeowners; Marine contractors; NFWFMD
- 💰 FUNDING:** Pursuing
- ✅ DELIVERABLES:** Contractor training manual; Education and outreach materials; Funded project deliverables
- 📊 PERFORMANCE METRICS:** Number of trainings offered and number of attendees; Number of outreach initiatives and campaigns; Number of living shoreline projects implemented; Miles of shoreline converted to living shorelines; Amount of funding received for public and private living shoreline projects
- 📍 LOCATIONS:** Coastal areas throughout the watersheds; High erosion areas where living shorelines could prevent further impacts



GOAL 2

Objective 2.4

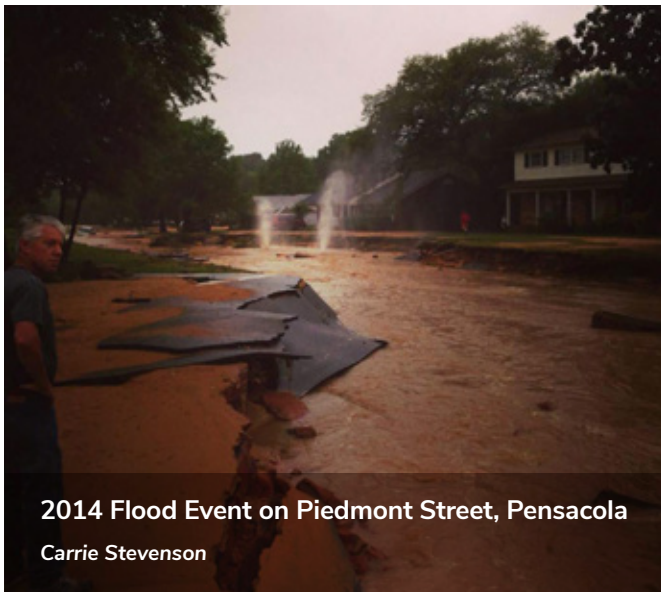
Identify areas within the watersheds that are at risk for current and future compound flooding (caused by interaction of multiple sources of flooding) and identify solutions to lessen impacts

Objectives

Identify current flooding issues and prepare future compound flooding scenarios for use in community planning to enhance FEMA Community Rating System scores and prepare and implement a unified regional adaptation plan that promotes environmental stewardship and improved quality of life for all residents

Status

Not yet started

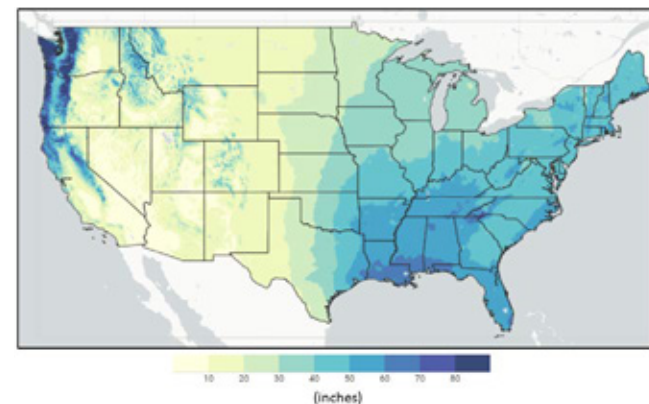


2014 Flood Event on Piedmont Street, Pensacola

Carrie Stevenson

BACKGROUND

Coastal areas along the Gulf of Mexico (GoM) are vulnerable to inland flooding caused by hurricanes, storm surges, and heavy rainfall. On average, the Pensacola Bay area receives approximately 65 inches of rainfall annually, the second highest average annual rainfall in the continental U.S. Average annual rainfall is anticipated to increase as a result of climate change (Georgescu et al. 2021). The southeastern U.S. has seen an 18% increase in heavy rain events (data from 1901–2016) and is likely to continue to see increased rain events due to emissions intensifying the hydrological cycle (Scott 2019). In recent years, historic flood events have tested the resilience of local communities and infrastructure. For example, in spring 2014, Escambia and Santa Rosa Counties received 20.5 inches of rain in a 24-hour period, destroying property, washing out roads and bridges, and causing \$56 million in damages throughout Escambia County alone (Kim et al. 2020). In September 2020, Pensacola received over 24 inches of rain over a two-day period during Hurricane Sally (NOAA National Weather Service 2020). As a result, the estimated cost of private property damages throughout the City of Pensacola was \$16 million, while the combined cost of damages to public property in the City of Pensacola and Escambia



Annual Average Rainfall (Inches) From 1991–2020

NOAA



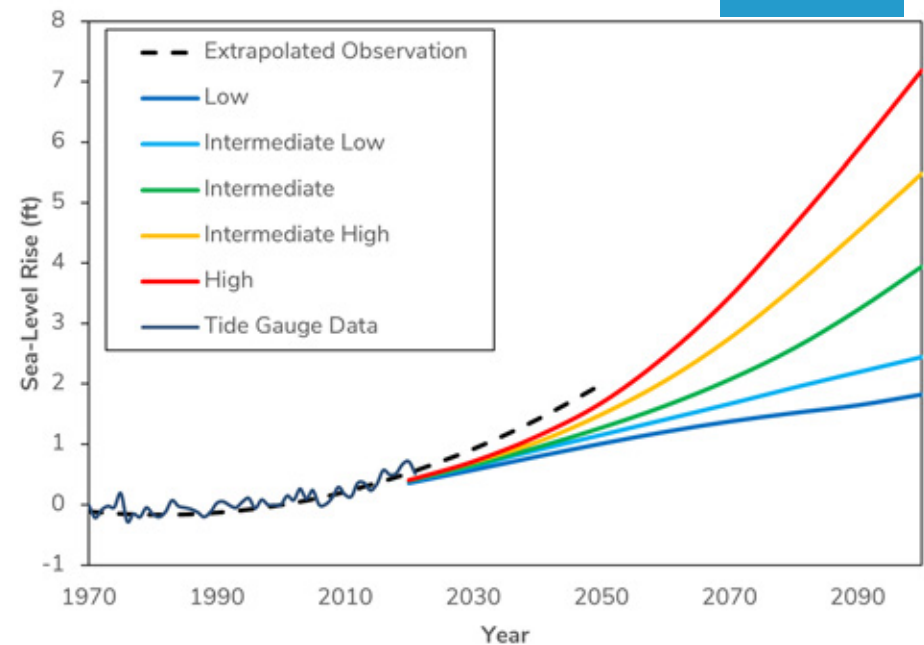
County, FL, was estimated at \$183 million (Little 2020). By the end of the century, U.S. flood costs are expected to exceed \$2 trillion per year (Hinkel et al. 2014, Strauss et al. 2012).

Climate Change Implications

Impacts from flood events can be compounded by sea-level rise, which has been consistently increasing in the GoM since 2000 (Sweet et al. 2022, NOAA 2022b: [Sea Level Rise Viewer](#)). This compound flooding scenario can reduce the capacity of existing stormwater management systems to adequately address inland and coastal flooding. Increased urban sprawl can also exacerbate the effects of flooding by reducing infiltration, increasing stormwater runoff, and enhancing flood vulnerable areas due to an increase in impervious surfaces and loss of riparian buffers. In addition, coastal wetland systems and estuaries are vulnerable to sea-level rise due to development and their low-lying nature (Bilskie and Hagen 2018). More frequent flooding events make natural resources, communities, and infrastructure more vulnerable.

Sea-level rise can not only put communities at risk for increased flooding but also put natural resources at risk. An increase in sea level will potentially change the shoreline profile, in turn changing storm surge patterns and freshwater inundation. Changes in sea level will eventually inundate low coastal areas, causing saltwater intrusion into the estuaries and rivers, potentially altering fisheries. Better knowledge of hydrodynamic patterns in Pensacola and Perdido Bays is needed to predict the effects of current and future sea-level rise scenarios and associated salinity changes. These data are crucial to understanding the future effects on fisheries and economy and to implement remediation strategies.

PPBEP is working with PLACE: SLR to educate and bring awareness to coastal communities about the effects of sea-level rise and the need for proactive community resilience planning. The staff at PLACE: SLR also developed an award winning sea-level rise focused curriculum and educational program that engages youth, educators, municipal officials, decision makers, and community members. PPBEP and its partners hope to empower residents and decision makers within at-risk communities to take adaptive action.



Observed and Extrapolated Sea-Level Rise (ft) in the Pensacola Bay System

Data source: Sweet et al. 2022



Hurricane Sally Impacts along Bayfront Parkway in Pensacola, FL
PPBEP



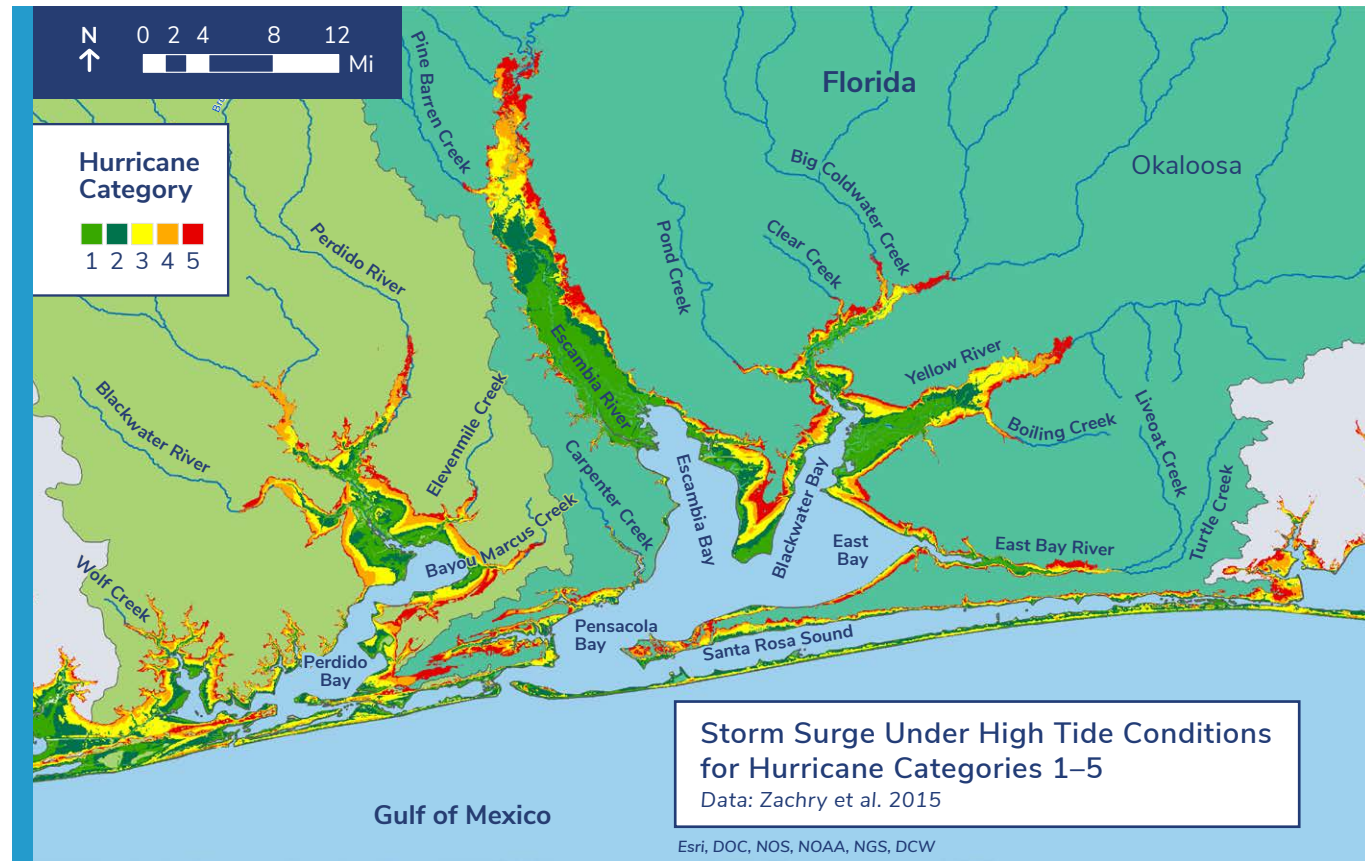
ACTION 2.4.1

Identify high-risk areas using compound flood models to educate communities, aid in community planning, and improve FEMA Community Rating System scores

IMPLEMENTATION STRATEGY

Use appropriate tools (e.g., Compound Flood Modeling) and existing assessments to identify areas vulnerable to flooding

- 🕒 TIMEFRAME:** 2022 – 2023
- 👤 PPBEP ROLE:** Leader; Collaborator
- 🤝 PARTNERS:** Academia; Local government; PLACE: SLR; University of Southern Mississippi (USM); EPA; NFWFMD; FSU RIDER Center
- 💰 FUNDING:** Committed – Resilient Florida
- ✅ DELIVERABLES:** Map of model outputs of flooding vulnerability and risk for both watersheds; Map showing high-risk areas with underlying causes and stressors; Host leader and stakeholder workshop on sea-level rise, flood, and storm surge projections
- 📊 PERFORMANCE METRICS:** Number of hosted community trainings and workshops to educate leaders and stakeholders; Number of people that participate in trainings and workshops; Number of high-risk communities or sub-watershed units identified
- 📍 LOCATIONS:** Coastal communities; Tidally influenced areas; High flood risk areas





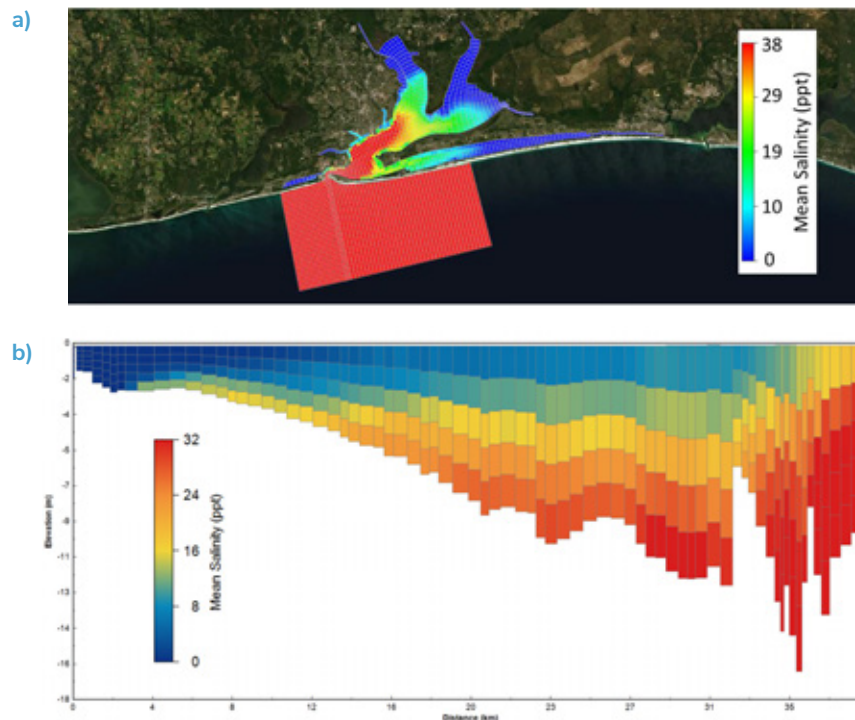
ACTION 2.4.2

Better understand hydrodynamic fluctuations and patterns in the Pensacola and Perdido Bays systems to inform restoration and ecosystem-scale improvements

IMPLEMENTATION STRATEGY

Partner with the EPA, academic institutions, and other organizations to assess and communicate outputs of current watershed hydrodynamic models

- TIMEFRAME:** 2022 – 2024
- PPBEP ROLE:** Collaborator
- PARTNERS:** Academia; Local government; Non-governmental organizations (NGOs); TNC; EPA
- FUNDING:** Needed
- DELIVERABLES:** Report on hydrodynamic model outputs (e.g., water residence time, particle tracking, salinity and temperature gradients, surface wave models, sediment transport)
- PERFORMANCE METRICS:** Number of models produced; Number of times outputs are used in reports and/or education and outreach materials
- LOCATIONS:** Pensacola and Perdido Bays



a) Mean annual surface salinity (ppt) for 2014 simulated using an Environmental Fluid Dynamics Code (EFDC) hydrodynamic model of Pensacola Bay. Model grid cells are depicted as gray boxes.

b) Snapshot (21 April 2014) of the simulated salinity profile for Pensacola Bay between the outflow of the Escambia River (Distance: 0 km) and Pensacola Pass (Distance: 39 km). Results were generated using the Environmental Fluid Dynamics Code (EFDC) hydrodynamic model. Model grid cells are depicted as gray boxes.

Brandon Jarvis, EPA Office of Research and Development, Center for Environmental Measurement and Modeling



ACTION 2.4.3

Participate in the EPA Climate Ready Estuaries Program and NOAA Climate Smart Communities Program

IMPLEMENTATION STRATEGY

Partner with the EPA and NOAA to implement best practices to assess climate vulnerability, develop adaptation strategies, engage community members, and address climate associated vulnerability root causes

-  **TIMEFRAME:** 2022 – 2025
-  **PPBEP ROLE:** Leader
-  **PARTNERS:** Academia; Local government; NGOs; TNC; EPA; NOAA
-  **FUNDING:** Pursuing
-  **DELIVERABLES:** Unified Regional Adaptation Plan
-  **PERFORMANCE METRICS:** Number of regional plans produced
-  **LOCATIONS:** Pensacola and Perdido Bays watersheds



Causes of Heavy Flooding in Coastal and Inland Areas
NOAA



Objective 2.5

Implement storm drain marking throughout the watersheds to raise awareness of stormwater runoff to waterways

Objectives

Partner with local schools and other organizations to mark storm drains in the PPBEP extent to educate communities about the linkages between storm drains and local waterways

Status

Ongoing. PPBEP is working with three local educators to install storm drain markers on public school campuses (Escambia High School, Workman Middle School, and Gulf Breeze High School). PPBEP and partners will continue to work with educators to expand storm drain marking to other schools and locations throughout local communities to educate citizens about stormwater and runoff to the bays.

Related Actions

Education and Outreach Strategy Action 2.3.3



UWF Community Engagement through Environmental Science (CEES) Storm Drain Marker Template

BACKGROUND

Organizations around the country have been successful at using storm drain marking as a tool to enhance community engagement and promote watershed awareness of stormwater issues. Storm drain marking is used to raise awareness of storm drain locations around the community and educate citizens on how items disposed of down storm drains end up in local waterways. Through increased awareness of storm drains, organizations hope to lessen illicit dumping down storm drains and improve local water quality. For example, in Volusia County, FL, the Natural Resources Department mapped high runoff areas and targeted storm drain markings within neighborhoods in high runoff zones ([Volusia County Storm Drain Curb Marking](#)). High runoff areas are susceptible to large volumes of waste materials being brought to storm drains, and therefore community members need to know the importance of properly disposing of trash. Locally, partners in AL developed a comprehensive stormwater campaign called “Create a Clean Water Future.” Through this campaign, non-profits, local governments, and businesses work together to improve public understanding of stormwater and its impacts. This program encourages individuals to promote watershed stewardship and lessen trash entering storm drains ([Clean Water Future](#)).

Storm drain marking is an easy, cost-effective way to engage citizens around stormwater and water quality issues. PPBEP worked with UWF students in the Community Engagement through Environmental Science (CEES) course in spring 2020 to develop a student-led community engagement project. Students secured funding to purchase supplies for a large-scale storm drain marking program within the PPBEP watersheds. Additionally, three K–12 educators opted to incorporate storm drain marking into their curriculum and guide students through the process of marking storm drains on their campuses. PPBEP hopes to expand storm drain marking efforts across the watersheds and include more schools and communities, particularly those in AL.



ACTION 2.5.1

Partner with local schools and other partner organizations to complete storm drain marking

IMPLEMENTATION STRATEGY

Identify schools to participate and implement storm drain marking protocol

-  **TIMEFRAME:** 2022 – 2024
-  **PPBEP ROLE:** Leader
-  **PARTNERS:** PPBEP; UWF CEES; Santa Rosa County; Escambia County; Baldwin County; Cities; High schools
-  **FUNDING:** Funded – UWF
-  **DELIVERABLES:** Map of storm drains currently marked throughout watersheds and priority areas for future marking
-  **PERFORMANCE METRICS:** Number of schools or organizations per county to complete storm drain marking; Number (and percentage) of storm drains marked throughout the watersheds
-  **LOCATIONS:** Watershed-wide; Coastal communities; School campuses



Storm Drain
Medallion
PPBEP



Objective 2.6

Assess social vulnerability of communities under a changing climate

Objectives

Characterize social vulnerability of communities throughout the watersheds and integrate best management practices to reduce social vulnerability in community planning, project development, and education and outreach initiatives

Status

Ongoing. PPBEP is currently in the planning stages of developing a community resilience readiness survey to acquire more information to add to the City of Pensacola's existing vulnerability assessment to support future resilience planning efforts in Pensacola, FL.

Additionally, PPBEP has partnered with the EPA Office of Research and Development Gulf Ecosystem Measurement and Modeling Division (GEMMD) to model community assets and vulnerabilities within the Pensacola and Perdido Bays watersheds for use in restoration and conservation decision making.

As the climate continues to change, **communities and infrastructure will be at an increasing risk during natural disasters** such as hurricanes and major flooding events.



BACKGROUND

Resilience readiness is defined as a community's acceptance and understanding of the climate change risks that it faces. As the climate continues to change, communities and infrastructure will be at an increasing risk during natural disasters such as hurricanes and major flooding events. Risks are not distributed equally across communities, as different socioeconomic areas will bounce back from disasters at different rates, with underprivileged areas recuperating more slowly. Therefore, many communities have started planning for future events associated with the effects of climate change by conducting vulnerability and resilience assessments. These projects study the ecological, social, and economic vulnerabilities of communities and help guide future planning efforts by integrating coastal adaptation measures into local planning and policy.



Floodwaters and Compromised Infrastructure after a 2014 Flood Event in Pensacola, FL

Escambia County

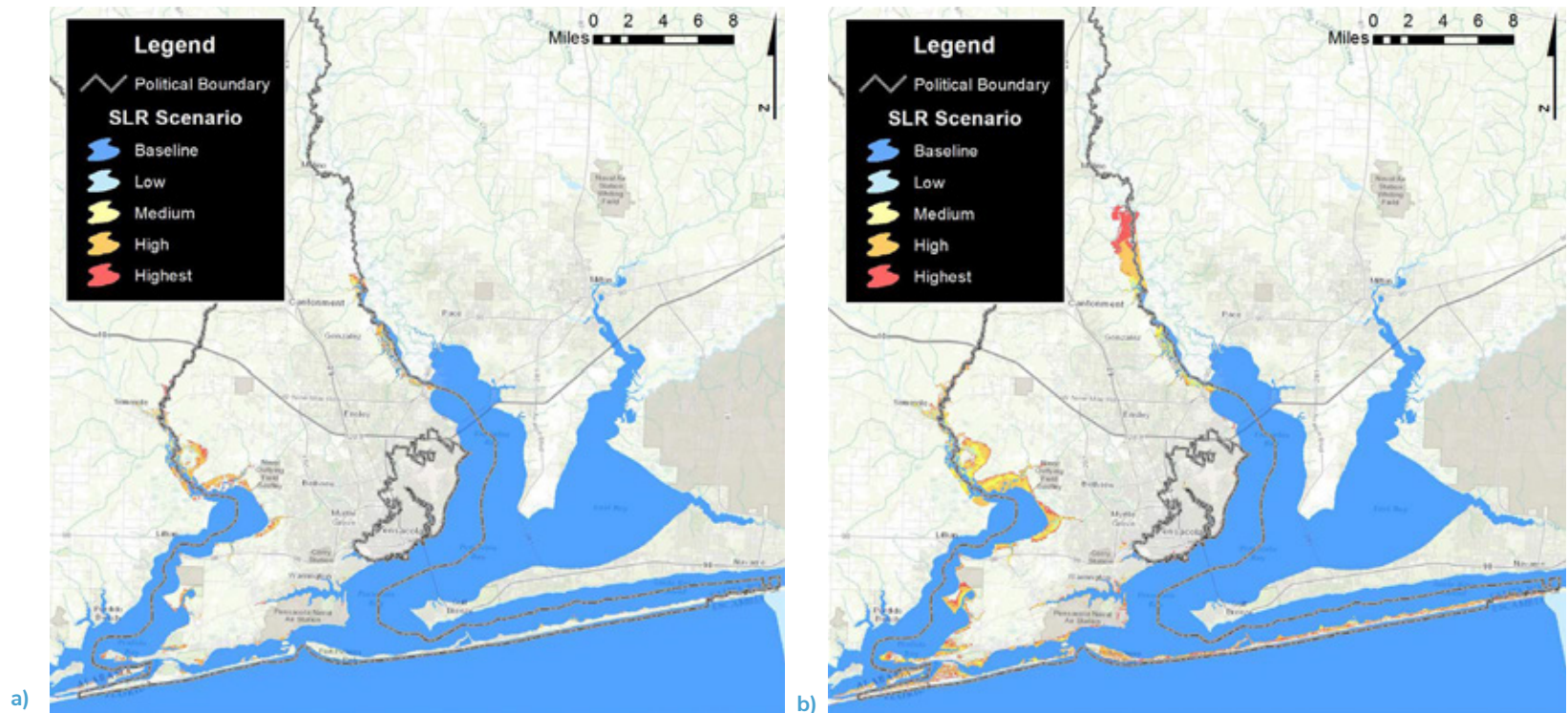


Escambia County and the City of Pensacola recently completed coastal vulnerability assessments. The City of Pensacola conducted a **Sea Level Rise Vulnerability Assessment** (2021), which took into account ecological, social, and infrastructure vulnerabilities associated with sea-level rise only; flooding caused by rainfall, storm surge, or other hydrologic processes were not considered. This Sea Level Rise Vulnerability Assessment looked at sea-level rise scenarios for 2040, 2070, and 2100, which are expected to have sea-level rises of 16, 38, and 70 inches, respectively. Five Priority Planning Areas were identified as areas in need of resilience planning especially for future infrastructure projects. Escambia County also completed a Coastal Vulnerability Assessment to improve community resilience to coastal flooding (FDEO 2016). Their scenarios were sea-level rise associated with mean higher high water, 100-year, and 500-year flood events, and they identified



FIGURE 12. Escambia County-Wide Tidal Flooding under Mean Higher High Water Conditions for Sea-Level Rise (SLR) Scenarios for a) 2045 and b) 2085

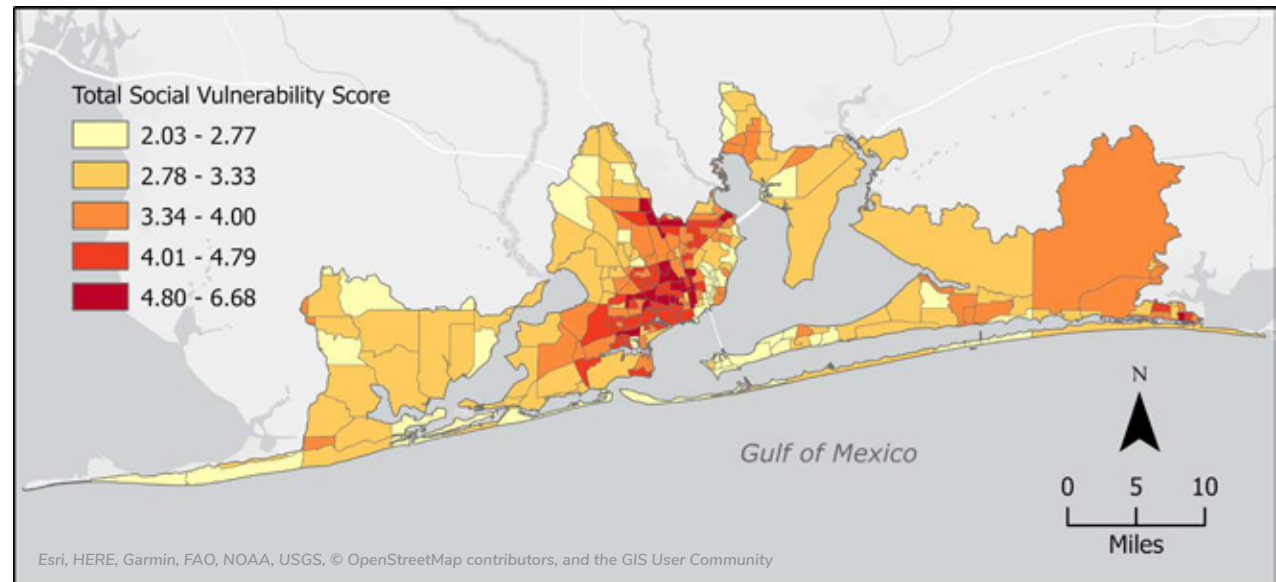
Note: Only Escambia County is represented on the maps and no data was provided for Santa Rosa or Baldwin Counties. FDEO 2016





flooding hotspots in Pensacola: Downtown Pensacola, southwest of Bayou Grande, lower Perdido Bay, Escambia River, and Santa Rosa Island (Figure 12). Additionally, under the highest sea-level rise and flooding scenarios, road infrastructure and bridges will become vulnerable. These vulnerability assessments suggest multiple strategies should be employed to reduce the socioeconomic impacts of sea-level rise and create resilient communities in these low-lying coastal areas. For effective implementation, areas with high risk of flooding should be identified and prioritized. Areas at high risk of flooding can be identified to promote infrastructure projects that incorporate low impact development and create buffer zones for flood protection.

PPBEP was awarded a CoP grant through NOAA and the Alabama-Mississippi Sea Grant Consortium to develop a community-based resilience readiness assessment for the City of Pensacola, FL. The data will feed into the City of Pensacola's Sea Level Rise Vulnerability Assessment and provide needed socioeconomic information. This project takes a novel approach to addressing local vulnerability by assessing local risk perceptions around sea-level rise to inform pilot community-based resilience action. The project will provide a methodological framework for future projects that seek to apply community-based methods to assess and address community resilience, social vulnerability, and inequity.



Social Vulnerability Calculated from 15 Variables

The map panel displays the overall social vulnerability of block groups in the Pensacola and Perdido Bays estuaries. Variables: age-dependence (<5 and >65 years old), non-white population, per capita income, population under 25 without a high school diploma or GED, household poverty, no household vehicle access, linguistic isolation, crowded housing, unemployment, rental occupancy, single-parent households, housing value, lack of complete plumbing in house, access to internet/computer, and length of residence in county. Each of the variables represent characteristics associated with increased vulnerability and are aggregated into three categories: individual vulnerabilities, family vulnerabilities, and housing vulnerabilities. Individual and family vulnerabilities represent the scale of assessment, while housing represents structural aspects of the housing units driving potential vulnerability.

Map created by Kyle Buck with the EPA

Data: U.S. Census Bureau 2010, U.S. Census Bureau 2019a, USGS 2015a



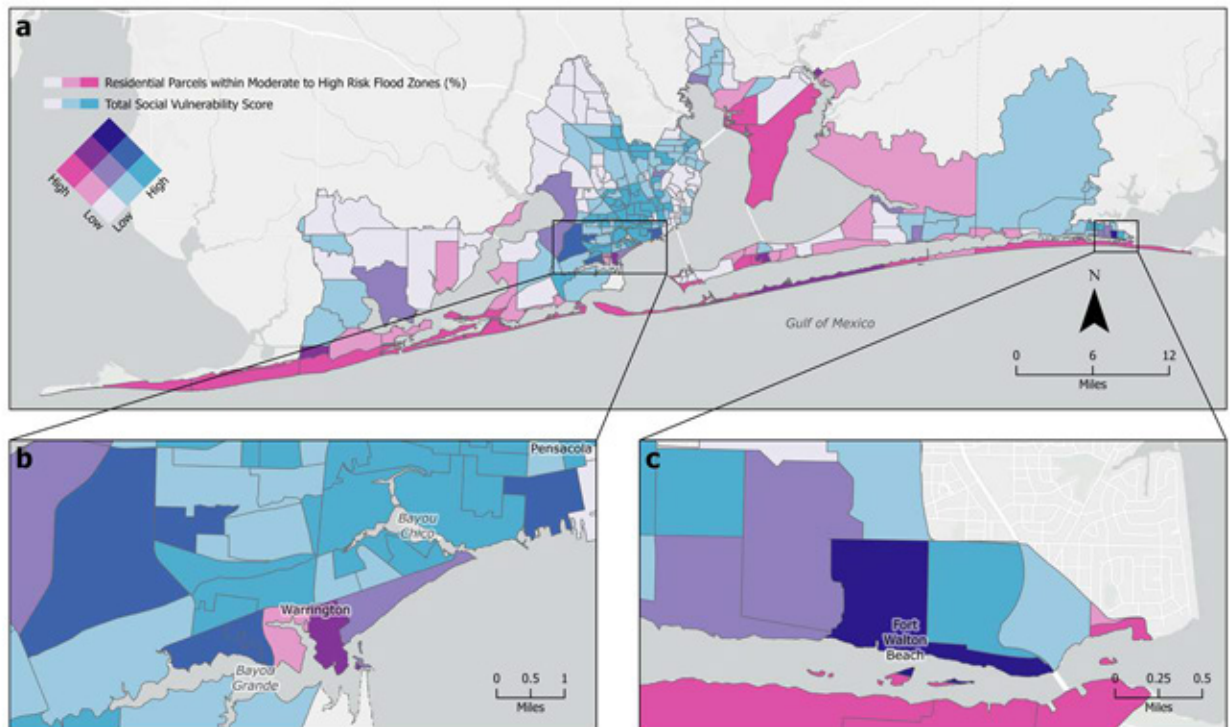
ACTION 2.6.1

Assess social vulnerability of communities from impacts associated with climate change, and support communities in long-term resilience planning

IMPLEMENTATION STRATEGY

Work with partners to conduct a survey across lower Escambia County to collect information on perceptions of climate change and sea-level rise and associated risk

- TIMEFRAME:** 2022 – 2024
- PPBEP ROLE:** Leader; Collaborator
- PARTNERS:** Academia; Local governments; PLACE: SLR; USM
- FUNDING:** Committed – NOAA CoP
- DELIVERABLES:** Report of Community Survey results; Interactive tool (integrate into City of Pensacola's Sea Level Rise Vulnerability Assessment tool)
- PERFORMANCE METRICS:** Number of communities reached; Number of people that participate in public forum
- LOCATIONS:** Pensacola Bay watershed



Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Social Vulnerability and Flood Susceptibility Map

a) Bivariate map showing the intersection of the percentage of residential non-vacant parcels within moderate to high flood risk zones and the amount of avoided runoff (m^3 /year) due to tree cover per census block group throughout the Pensacola and Perdido Bays watersheds. b) Bright pink census block groups are block groups where there are high percentages of residential parcels within moderate to high flood zones and low amounts of avoided runoff due to tree cover. c) Land Use Land Cover data can be used to identify areas with high amounts of impervious surfaces and low amounts of total greenspace.

Maps created by Kyle Buck with the EPA

Data: Dewitz 2021, FEMA 2022, i-Tree Landscape, NFWFMD 2018, OCM Partners 2022a, OCM Partners 2022b, Regrid, U.S. Census Bureau 2010, U.S. Census Bureau 2019b, USFWS 2018, USGS 2015a, USGS 2015b



ACTION 2.6.2

Produce an environmental justice needs assessment for the watersheds and incorporate recommendations into future community planning, project development, and education and outreach initiatives

IMPLEMENTATION STRATEGY

Work with partnering agencies to identify representatives of historically disadvantaged communities to serve in a working group capacity to aid in the development of an environmental justice needs assessment, identify environmental justice barriers, and, with the support of technical experts, propose project, policy, and outreach recommendations

- TIMEFRAME:** 2023 – 2026
- PPBEP ROLE:** Leader; Collaborator
- PARTNERS:** Local governments; NGOs; Religious organizations; Business groups
- FUNDING:** Needed
- DELIVERABLES:** Environmental Justice Needs Assessment
- PERFORMANCE METRICS:** Number of underserved communities reached; Number of people reached
- LOCATIONS:** Pensacola and Perdido Bays watersheds



Rolling Hills Landfill
Escambia County

ACTION 2.6.3

Produce a social vulnerability index and map social vulnerability across the Pensacola and Perdido Bays watersheds

IMPLEMENTATION STRATEGY

Work with the EPA Office of Research and Development GEMMD to evaluate and map social vulnerability and community resilience of the Pensacola and Perdido Bays watersheds

- TIMEFRAME:** 2022

- PPBEP ROLE:** Collaborator
- PARTNERS:** EPA
- FUNDING:** Committed – EPA
- DELIVERABLES:** Web-based map of social vulnerability inclusive of a suite of indices
- PERFORMANCE METRICS:** Number of underserved communities reached; Number of people engaged
- LOCATIONS:** Pensacola and Perdido Bays watersheds



GOAL 3

Improve Water Quality

Perdido Islands
City of Orange Beach



GOAL 3

Objective 3.1

Develop a comprehensive water quality watershed monitoring program throughout the Pensacola and Perdido Bays watersheds

Objectives

Increase the understanding of water quality dynamics within the Pensacola and Perdido Bays watersheds by implementing the Comprehensive Monitoring Strategy through the establishment of a collaborative comprehensive watershed monitoring program

Status

Ongoing. PPBEP has developed a Comprehensive Monitoring Strategy in parallel with CCMP development that 1) provides an inventory of ongoing monitoring programs within the watersheds, 2) identifies temporal and spatial data gaps, and 3) establishes actions to be taken to coordinate development of a Comprehensive Monitoring Program that leverages partnerships and resources across the watersheds.

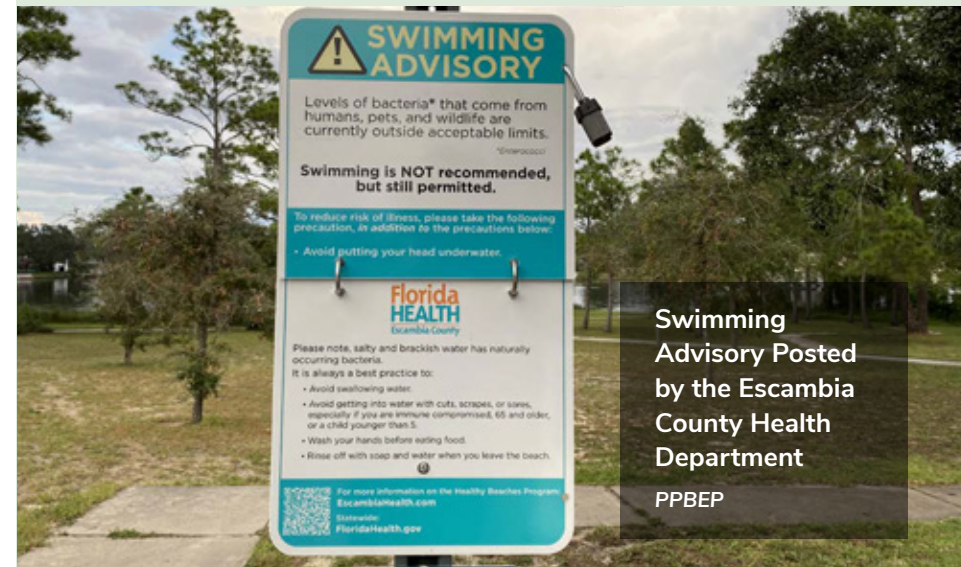
The workshop series that was conducted with the Technical and Education and Outreach Committees in partnership with UF/UWF (FLRACEP) gave staff insight into legacy and current issues across the watersheds, data needs and gaps, and actions that could assist with improvements in various areas (water quality and quantity, sediment quality and quantity, habitat, and fish and wildlife). This critical information has been used to address preliminary data gaps by building partnerships to conduct nationwide surveys (National Coastal Condition Assessment [NCCA], National Wetland Condition Assessment [NWCA]) to assess coastal and wetland condition, map and monitor oyster reefs across the bay systems, and involve community members in community science monitoring of waterfowl, microplastics, and water quality. In 2022, the Program and its partners at UWF, The Bream Fishermen Association (BFA), and Escambia County will be assessing streams across the upper watersheds to fill water quality data gaps and will conduct water quality monitoring (e.g., chemistry, fecal coliforms, nutrients) across the bays, bayous, and sounds to evaluate potential impairments.

Related Actions

Sediment Action 4.1

BACKGROUND

Good water quality is critical for fish, wildlife, habitat quality, local economy (fisheries, ecotourism), and recreation. Many regularly monitored water quality parameters, such as nutrients, chlorophyll-a, dissolved oxygen, and water clarity, are indicators of ecosystem health. Other contaminants such as pathogens, heavy metals, and toxins are of particular concern to human health and fish and wildlife. Sources of water quality degradation include urban and agricultural runoff, wastewater contamination (sanitary sewage overflow [SSO] events, septic discharge, direct effluent discharge), poor agricultural practices, and development. Water quality in the Pensacola and Perdido Bays systems gained widespread attention in the late 1960s and early 1970s when fish kills were observed in Pensacola Bay and later in the 1980s when large die-offs of benthic invertebrates were seen in Perdido Bay (Livingston 1989, Mohrher et al. 2005). Concern over these events led to the creation of local community science organizations, such as BFA and the Perdido Bay Environmental Association, and public support for water quality management and mitigation. In recent years instances of harmful algal blooms,



**Swimming
Advisory Posted
by the Escambia
County Health
Department**

PPBEP

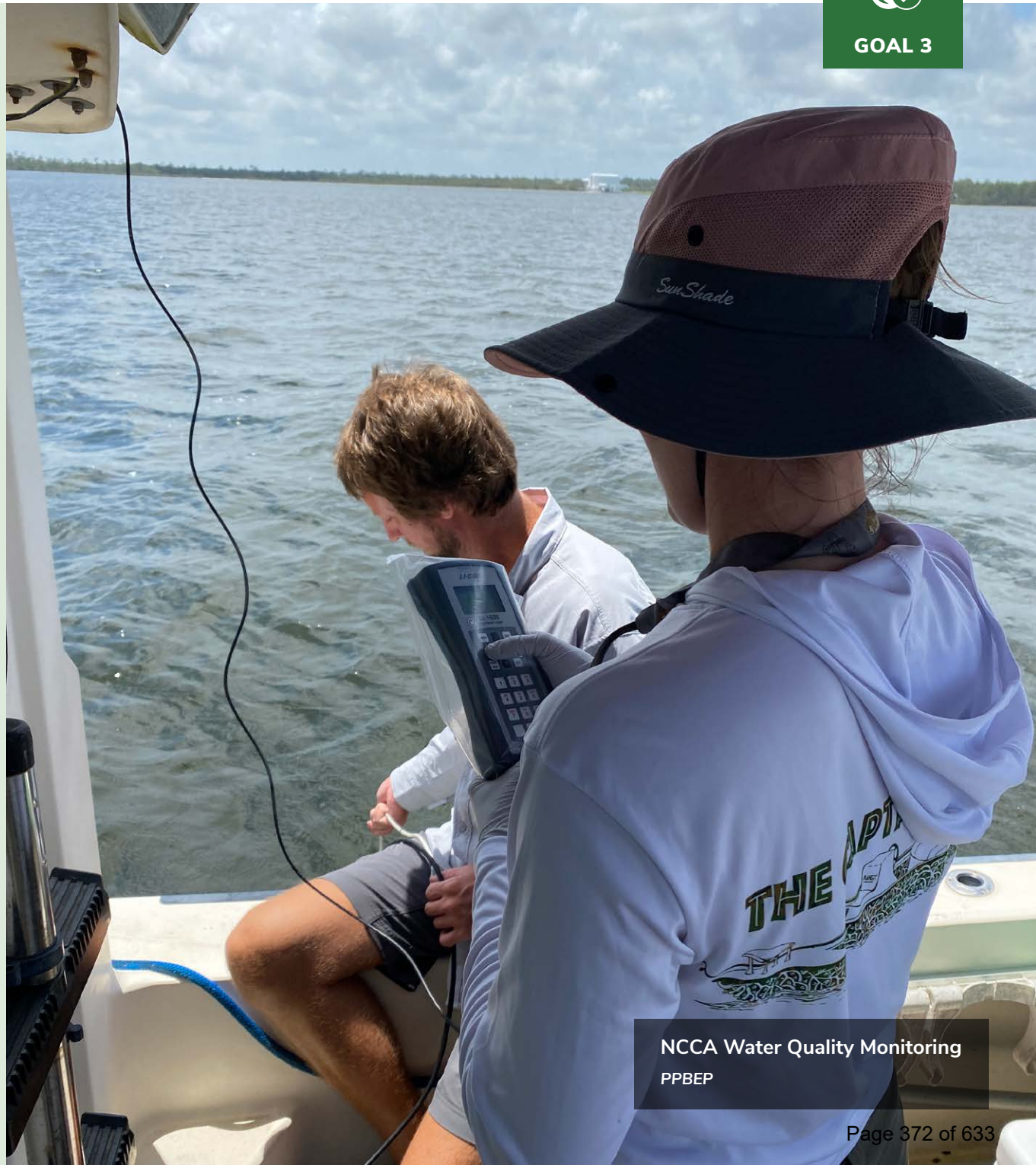


such as red tide along the FL Gulf Coast, have raised new concerns about declines in water quality.

Results from the PPBEP Community Values Survey emphasized the water quality concerns that the community has. Participants ranked fishable waters in their top three most valued aspects of both watersheds and identified healthy habitats and trash free waters as important aspects of a healthy watershed. Industrial discharge, coastal development, and municipal sewage treatment discharge were the most chosen environmental concerns for the Pensacola Bay watershed. In the Perdido Bay watershed, industrial discharges, coastal development, and agricultural activities were identified as top environmental concerns. Participants also identified that financial investments should prioritize local water quality improvement efforts.

Several local, state, and federal agencies, as well as community science groups (e.g., BFA, Florida Lake Watch, Alabama Water Watch), regularly sample various locations across the bays and watersheds. Despite ongoing monitoring efforts across the watersheds, there are spatial and temporal sampling gaps. Better communication and collaboration among monitoring groups and across jurisdictional boundaries was identified as a concern by the Technical Committee. Better communication of data and sampling efforts will help reduce unnecessary duplication of monitoring efforts.

PPBEP will work with partners to implement the Comprehensive Monitoring Strategy through the establishment of a collaborative comprehensive watershed monitoring program. The Program will standardize methods for comparable





GOAL 3

results, address existing spatial and temporal gaps, reduce duplication of efforts, increase monitoring capacity, allow for quicker detection of emerging concerns, and aid in the ability to respond and coordinate post-event sampling (e.g., post-SSO monitoring). Sampling design will incorporate stakeholder knowledge regarding historical and contemporary areas of concern, as well as target areas for data related to habitat restoration, green infrastructure projects, and other CCMP aligned priorities. PPBEP is also increasing monitoring capacity through direct partnerships. Staff from PPBEP, EPA, Escambia County Water Quality and Land Management Division, and FWC collaborated to conduct an intensification of the EPA's NCCA to collect baseline information on the water quality conditions of estuarine waters for the Bays, Bayous, and Sounds program headed by the Water Quality and Land Management Division. The intensification added 26 sites to the original NCCA sampling design of 6 sampling sites for the watersheds, allowing for more coverage of coastal waters across FL and AL. The parameters that were collected as part of the survey, normally conducted nationwide every five

years, included water chemistry, human health indicators (i.e., fecal indicator bacteria, fish tissue contaminants), benthic communities, and sediment quality. This information will feed into the Program's first State of the Bays report which will be a visual tool for communicating the current status and condition of the waterways to the public and stakeholders. The National Aquatic Resource Surveys (NARS) National Rivers and Streams Assessment (NRSA) will be conducted in 2023–2024, when PPBEP will partner with the EPA and others to design, implement, and fund an intensification to evaluate the current conditions of freshwater ecosystems across the Pensacola and Perdido Bays watersheds. Additionally, efforts are underway to address water quality monitoring gaps in the upper portions of the watersheds. This is a partnership between UWF/BFA and PPBEP that was developed from results of the Technical Committee workshop series where spatial monitoring gaps were identified. PPBEP hopes to continue expanding partnerships across the watersheds to create an effective long-term monitoring program that will help better address the water quality status and trends of the waterways.





GOAL 3

ACTION 3.1.1

Implement the Comprehensive Monitoring Strategy by establishing a comprehensive watershed monitoring program that encompasses both watersheds across state lines

IMPLEMENTATION STRATEGY

Integrate local system knowledge into sampling design; Continue to implement NARS surveys (NCCA, NRSA) and the Bays, Bayous, and Sounds program throughout watersheds and coordinate with partner agencies and community science groups to increase current monitoring coverage and parameters sampled (e.g., enterococcus sampling)

🕒 TIMEFRAME: 2022

👤 PPBEP ROLE: Leader

🤝 PARTNERS: EPA; FWC; DEP; ADEM; MBNEP; Escambia County; Santa Rosa County; Academia; Community science organizations; BFA; Friends of Perdido Bay; Alabama Water Watch

💰 FUNDING: Needed

✅ DELIVERABLES: Published Comprehensive Monitoring Strategy

📊 PERFORMANCE METRICS: Number of Water Body Identification numbers (WBIDs) and sites monitored; List of parameters monitored (in Comprehensive Monitoring Strategy); Number of partner organizations and agencies engaged; Amount of funding dedicated and leveraged for water quality monitoring

📍 LOCATIONS: Pensacola and Perdido Bays watersheds

ACTION 3.1.2

Develop water quality targets for Pensacola and Perdido Bays to meet surface water classification designations

IMPLEMENTATION STRATEGY

Engage local experts and community stakeholders from the Technical Committee and Oyster Sub-Committee to set quantitative water quality targets for key parameters based on the best available science (e.g., nutrients, fecal bacteria) to support the designated use of local waterways and the recovery and restoration of critical habitats and associated communities

🕒 TIMEFRAME: 2023 – 2026

👤 PPBEP ROLE: Leader

🤝 PARTNERS: All partners; Technical Committee

💰 FUNDING: Needed



NCCA Water Filtering for Bacteria (Enterococcus)

PPBEP

✅ DELIVERABLES: Published Comprehensive Monitoring Strategy including measurable goals and targets prioritized by stakeholders with concurrence from DEP, ADEM, and the EPA

📊 PERFORMANCE METRICS: List of measurable goals or targets for water quality parameters; Progress toward reaching targets; Amount of funding dedicated and leveraged for water quality monitoring and improvements

📍 LOCATIONS: Pensacola and Perdido Bays watersheds



GOAL 3

Objective 3.2

Identify root causes of water quality impairments and implement priority projects

Objectives

Identify hotspots of nutrient and microbial pollutants within the Pensacola and Perdido Bays watersheds, prioritize areas for future remediation projects to improve water quality, and support alternative restoration planning to achieve water quality compliance

Status

Not yet started

Related Actions

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Strategy PPBEP4; Habitat Objective 5.2; Fish and Wildlife Objective 6.3



BACKGROUND

Nutrients (nitrogen, phosphorous) and microbial loads from land-based sources (natural and human-based) can degrade water quality and in turn affect the health of natural resources and create human health implications. Excess nutrient loading to a body of water has the potential to cause algal blooms and may result in low oxygen events, fish kills, and, in extreme cases, large-scale ecosystem degradation. Furthermore, excess nutrients can lead to a change in the balance of nutrients, leading to changes in bacterial (Monchamp et al. 2018) and phytoplankton communities (Riegman 1995), changing ecosystem functioning. On the other hand, excess microbial loads to a body of water can be a human health risk and can result in shellfish, fishing, and recreational swimming closures, impacting how citizens are able to use waterways. Therefore, negative effects from nutrients and microbial loads not only have the potential to affect natural resources, but how and when humans can use those resources.

Nutrients and microbial pollutants stem from both point and nonpoint sources within the watershed. Point sources originate from an easily





GOAL 3

identifiable point of discharge, such as an outfall pipe, whereas nonpoint sources are delivered from over a larger area within the watershed. Examples of point sources include wastewater treatment plants, paper and pulp mills, and chemical and manufacturing industries. Examples of nonpoint sources include septic tanks and urban and agriculture runoff, which also conveys fertilizers, herbicides and insecticides, and other toxic contaminants.

To improve water quality, sources of pollutants need to be identified and remediated and transport pathways need to be known. Typically, point sources of pollutant loads are easier to manage than nonpoint sources. Best management practices can be beneficial to reduce nonpoint source loads. For example, limiting fertilizer and pesticide use, controlling erosion from the landscape, and reducing impervious surfaces and increasing vegetative cover are ways to manage pollutant loads and improve water quality. Restoration and other remediation projects can help control pollutant loads, improving water quality and in turn improving habitats and natural resources that communities and the economy depend upon.

PPBEP strives to identify the main pollutant loads to waterways and help conceive projects that will help remediate the effects of pollution and improve water quality and way of life. Potential projects will include source tracking studies to identify major pollutant sources to the Pensacola and Perdido Bays systems.



Farm in Jay, FL

PPBEP



GOAL 3

ACTION 3.2.1

Investigate sources of microbial pollutants in the watersheds

IMPLEMENTATION STRATEGY

Develop and implement Microbial Source Tracking studies in priority areas across the watersheds (e.g., impaired WBIDs)

TIMEFRAME: 2023 – 2026

PPBEP ROLE: Collaborator

PARTNERS: Academia; Counties; State agencies

FUNDING: Needed

DELIVERABLES: Report on microbial sources including hotspot map and list of identified sources of microbial pollutants

PERFORMANCE METRICS: Number of microbial pollutant hotspots identified; Percentage of watersheds assessed

LOCATIONS: Impaired waterways; Coastal communities; Urban watersheds; Upper reaches of watersheds (second order creeks)

ACTION 3.2.2

Evaluate and identify point and nonpoint source hotspots for nutrients in the watersheds

IMPLEMENTATION STRATEGY

Partner with DEP and ADEM to prioritize basins and parameters to monitor during annual state Strategic Monitoring Plan development; Partner with universities and other partners to synthesize existing data and conduct relevant research studies and assessments (e.g., source tracking)

TIMEFRAME: 2023 – 2026

PPBEP ROLE: Leader; Collaborator

PARTNERS: DEP; ADEM; Academia; Counties; State agencies; Community science organizations; NRCS

FUNDING: Needed

DELIVERABLES: Report on nutrient sources including hotspot map and list of identified sources of nutrients

PERFORMANCE METRICS: Number of nutrient pollutant hotspots identified; Percentage of watersheds assessed

LOCATIONS: Pensacola and Perdido Bays watersheds; Highly developed areas

ACTION 3.2.3

Implement water quality projects to meet state designated uses

IMPLEMENTATION STRATEGY

Collaborate with partners to prioritize, develop, design, and implement prioritized water quality improvement projects to achieve compliance with the state surface water designated uses

TIMEFRAME: 2024 – 2026

PPBEP ROLE: Leader; Collaborator

PARTNERS: City and county governments; Utilities; DEP; ADEM; EPA

FUNDING: Needed

DELIVERABLES: List of potential project concepts and identified funding sources

PERFORMANCE METRICS: Number of projects identified and planned; Number of priority source areas addressed; Percentage of areas attaining standards

LOCATIONS: Watershed-wide; Prioritization will focus on areas with existing Total Maximum Daily Loads and Waters Not Attaining Standards



Objective 3.3

Assess water quality seasonal trends to understand impacts to natural resources, including habitats and fish and wildlife

Objectives

Evaluate water quality trends (historical and seasonal) in the rivers, bays, and bayous of the Pensacola and Perdido Bays systems to better understand natural and human-induced effects on the natural resources and provide guidance on how to improve water quality

Status

Ongoing. UF/UWF (FLRACEP) is assessing water quality trends in the rivers and estuaries using publicly available data (historical and current data). PPBEP will also continue to partner with organizations across the watersheds to monitor water quality and provide more data for trend analysis.

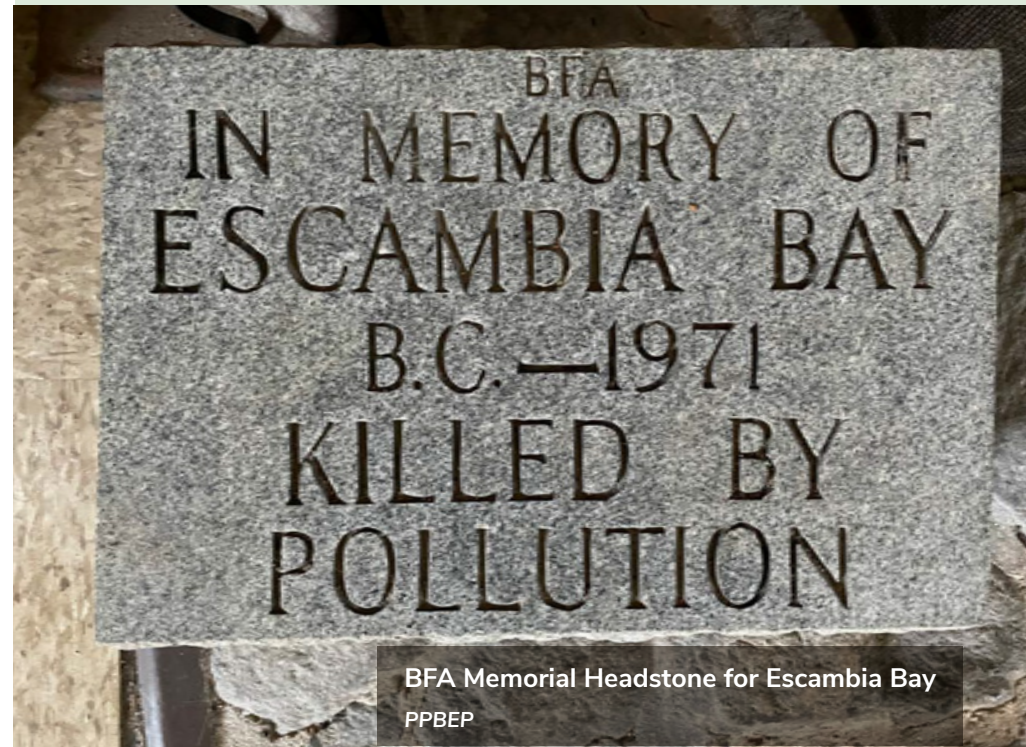
Related Actions

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Strategy PPBEP4

BACKGROUND

During the 1960s, residents were concerned with the deterioration of water quality seen throughout the Pensacola and Perdido Bays systems (particularly Escambia Bay and upper Perdido Bay where impacts from industry were prevalent). By 1971, BFA declared Escambia Bay “dead” (<http://breamfishermen.org>).

Water quality deterioration at that time was not unique to the Gulf Coast but was occurring throughout the country. In response to declines in water quality, the Clean Water Act of 1972 was enacted to restore and maintain the ecological integrity of the Nation’s waters. Through this act, pollution to waters decreased and water quality significantly improved between 1972–2001 (dates analyzed for the study; Keiser and Shapiro 2018). While water quality improvements

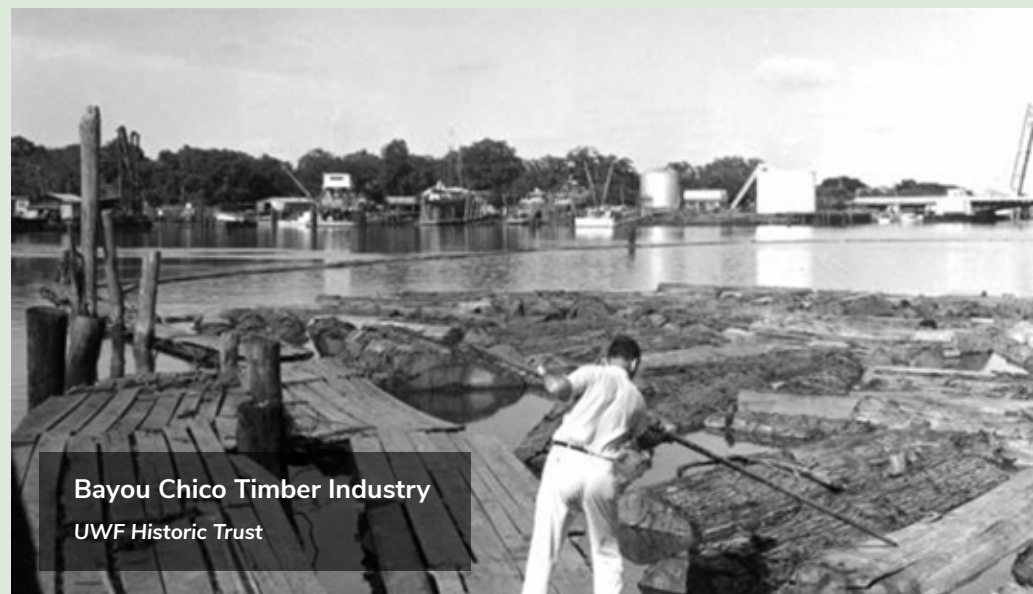




are still attributed to the Clean Water Act, declines in water quality are still a concern due to increasing urban and residential development (Atasoy et al. 2006). Many water quality concerns, such as fish kills and loss of benthic habitat (e.g., oysters and seagrasses), still plague local waters, and residents would like to see the waterways improve and natural resources return.

Historically, some bodies of water within the Pensacola and Perdido Bays watersheds have had some of the worst water quality in FL. For example, Bayou Chico has a long history of industrial pollution (Matheson 2004). Timber and wood preservative industries existed until the mid-20th century, and wastewater was directly discharged into Bayou Chico as recently as the early 1970s. Currently, shipbuilding, oil storage, marinas, and residential properties line the waterfront of Bayou Chico. Legacy contaminants still reside in the sediments of Bayou Chico, with ecological integrity remaining poor (Mohrherr et al. 2006). The Bayou Chico Basin Management Action Plan (BMAP) was adopted in 2011 to outline studies needed to improve water quality (i.e., pathogen loads) (DEP 2011). Other bayous such as Texar and Grande, also located within Pensacola Bay, also have their own historical water quality challenges. Therefore, it is important to understand historical and current water quality trends to provide continued water quality improvements.

Changes in water quality can affect the productivity and distribution of freshwater and estuarine habitats such as seagrass and oysters. Excessive nutrient inputs can enhance algal growth, obstructing sunlight needed for seagrass growth and survival, and increase turbidity, affecting oyster productivity. Furthermore, excess sediment loading can also cause high turbidity and decrease seagrass and oyster productivity. Poor water and sediment quality are potential reasons for oyster declines in Pensacola Bay (Collard 1991). Over time, continued poor water quality can reduce seagrass and oyster habitat extent within a system, potentially causing far reaching ecosystem effects. Thus, it is important to understand trends (historical and seasonal) in water quality, particularly nutrients, chlorophyll-a, dissolved oxygen, water clarity, and turbidity, and understand how those trends relate to changes in estuarine habitat health and extent. Of particular interest in the area is the need to better understand summer dissolved oxygen trends, as those can be confounded by human and natural causes and monitoring



frequency (Duvall et al. 2022). Low dissolved oxygen events can cause fish and benthic habitat kills, but these events can be spatially and temporally patchy, resulting in difficulty addressing these issues.

There is a need to understand seasonal and annual water quality trends to better understand the drivers impacting freshwater and estuarine habitats and species, so those drivers can be effectively addressed. A better understanding will result in more effective remediation measures and future projects and will help guide policy changes. PPBEP in collaboration with UF/ UWF (FLRACEP) will assess spatial and temporal water quality changes in the rivers, bayous, and estuaries of the Pensacola and Perdido Bays watersheds to better understand trends over time (circa 1970s–present) and seasonal trends. These data will provide baseline information for 1) if and where water quality is declining or improving, 2) how seasonal effects influence the trends, and 3) the effects water quality is having on natural resources.



ACTION 3.3.1

Evaluate seasonal trends of nutrients, chlorophyll-a, dissolved oxygen, and harmful algal blooms and their impacts to habitats and fish and wildlife

IMPLEMENTATION STRATEGY

Partner with universities and other partners to synthesize existing data and further investigate the seasonal trends of water quality parameters

- 🕒 TIMEFRAME:** 2022 – 2025
- 👤 PPBEP ROLE:** Collaborator
- 🤝 PARTNERS:** Academia; Counties; State agencies; Organizations; UF/UWF (FLRACEP)
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Report on seasonal trends including impacts to habitats and wildlife; Dashboard integrating water quality information; Information reported in State of the Bays report
- 📊 PERFORMANCE METRICS:** Number of sites assessed; Number of water quality parameters assessed; Spatial extent of water quality impairments identified; Percentage of watershed assessed
- 📍 LOCATIONS:** Pensacola and Perdido Bays watersheds; Effluent outfalls; Legacy issue areas; Blackwater and East Bays; Areas with socio-economic factors (lower income, new development); Focus on areas that experience seasonal hypoxia



Microcystin and Nutrient Water Samples
PPBEP



GOAL 4

Reduce Sedimentation



Objective 4.1

Develop a comprehensive watershed monitoring program throughout the Pensacola and Perdido Bays watersheds to assess sediment inputs

Objectives

Increase the understanding of sediment quality and sediment dynamics within the Pensacola and Perdido Bays watersheds through a collaborative comprehensive watershed sediment monitoring program

Status

Ongoing

Related Actions

Water Quality Action 3.1



Wetland Surface Sediment
in the Pensacola and Perdido
Bays Watersheds

UF-IFAS

BACKGROUND

Sediments serve as reservoirs of contaminants that are bound to particles. Sediment contamination threatens the condition of the benthic community, fish, wildlife, and public health. Contaminants can degrade over time producing secondary products that have their own impacts on the ecosystem and human health. Concern for sediment contamination in Pensacola and Perdido Bays systems occurred during the 1960s when industrial impacts were brought to public attention. The first extensive evaluation of sediment quality in Pensacola Bay was by Olinger et al. (1975). Waters with historical sediment contamination are Bayou Chico, upper Bayou Texar, lower Bayou Grande, mid and upper Escambia Bay, and the Pensacola Bay waterfront (i.e., the port of Pensacola). Sources of sediment contamination include direct industrial discharge (historical and current), stormwater, and wastewater discharge. For example, in the 1970s, as a result of unregulated industrial discharge, sediments of Escambia Bay and River were contaminated with dichlorodiphenyltrichloroethane (DDT), dioxins, and polychlorinated biphenyls (PCBs) (Liebens and Mohrher 2015). Sediment contamination in Bayou Chico was so widespread due to industries dumping their wastes into the bayou that homeowners filed lawsuits against the corporations in the 1950s (Mohrher et al. 2006). Legacy contamination within these systems that have been buried can be resuspended and transported by storm events, dredging, or other activities causing sediment resuspension.

Sedimentation is the process by which particles in the water column settle out, and excessive sedimentation can smother benthic habitats. Particles can be introduced into a system from runoff (urban stormwater, agricultural), erosion, development, unpaved roads, construction, and internal resuspension. Sedimentation was repeatedly identified by stakeholders during the Technical Committee workshop series as a priority concern for the health and sustainability of seagrass and oyster habitats within the bay systems and overall sediment quality was a concern for supporting fish and wildlife. There are few sedimentation studies within these systems; however, the FWC recently kicked off a Florida Trustee Implementation Group (TIG) NRDA project, which will conduct sedimentation monitoring at eight sites across the Pensacola Bay system.



Benthic organisms and other fish and wildlife are dependent on good sediment quality for their health and persistence. Friends of Perdido Bay, a community organization, have been opportunistically monitoring sediment toxicity of upper Perdido Bay since the 1980s. Other sediment toxicity studies have focused on the urban bayous of Pensacola Bay due to heavy industrial presences. Additionally, sediment characteristics such as sediment composition and grain size are important for understanding habitat distributions and associated species assemblages. During data compilation in the Technical Committee workshop series, it was highlighted that few individuals or organizations are collecting information on grain size. UWF (led by Dr. Jane Caffrey) and GEMMD (Sediment Profile Imaging network led by Dr. Janet Nestlerode) collected grain size data in the urban bayous and the middle of Pensacola Bay, respectively. Very few studies of grain size analysis were found for Perdido Bay. Stakeholders identified the need for more grain size data to effectively assess bottom type for sediment toxicity characteristics and assess future restoration projects.

PPBEP partnered with the EPA to do an intensification of NCCA and NWCA sampling in the Pensacola and Perdido Bays watersheds. The EPA's NCCA and NWCA surveys are completed every five years. In the summer of 2021, sediments at 24 sites throughout Pensacola and Perdido Bays were sampled during the NCCA for toxicity, metals, organics, total organic carbon, and grain size. The intensification added 24 sites to the original NCCA sampling design of 6 sampling sites for the watersheds, allowing for more coverage of coastal waters across FL and AL. Researchers from UF and UWF joined the



**Sampling of Wetland Sediments
for the 2021 NWCA**

UF-IFAS

EPA and PPBEP to conduct the intensification of NWCA. From May – August 2021, field crews collected data on a suite of parameters from 30 estuarine wetland sites across the Pensacola and Perdido Bays watersheds including soil composition, texture, and toxicity. This information will feed into the Program's first State of the Bays report which will be a visual tool for communicating the current status and condition of the waterways to the public and other stakeholders.

Overall, stakeholders identified the need for more frequent and widespread monitoring of sedimentation, sediment quality, and sediment

characteristics. Additionally, the standardization of monitoring methods was highlighted as a need for comparable results across organizations. Regular monitoring is important to aid in quicker detection of emerging contaminants and illicit discharges, coordinate post-event sampling, and assess the impacts of restoration or mitigation strategies. PPBEP will develop a comprehensive sediment monitoring program which will increase monitoring capacity and coverage (spatial and temporal) through collaboration and partnerships. Additionally, the monitoring program will incorporate historical and local knowledge to monitor historical hotspots and emerging areas of concern.



GOAL 4

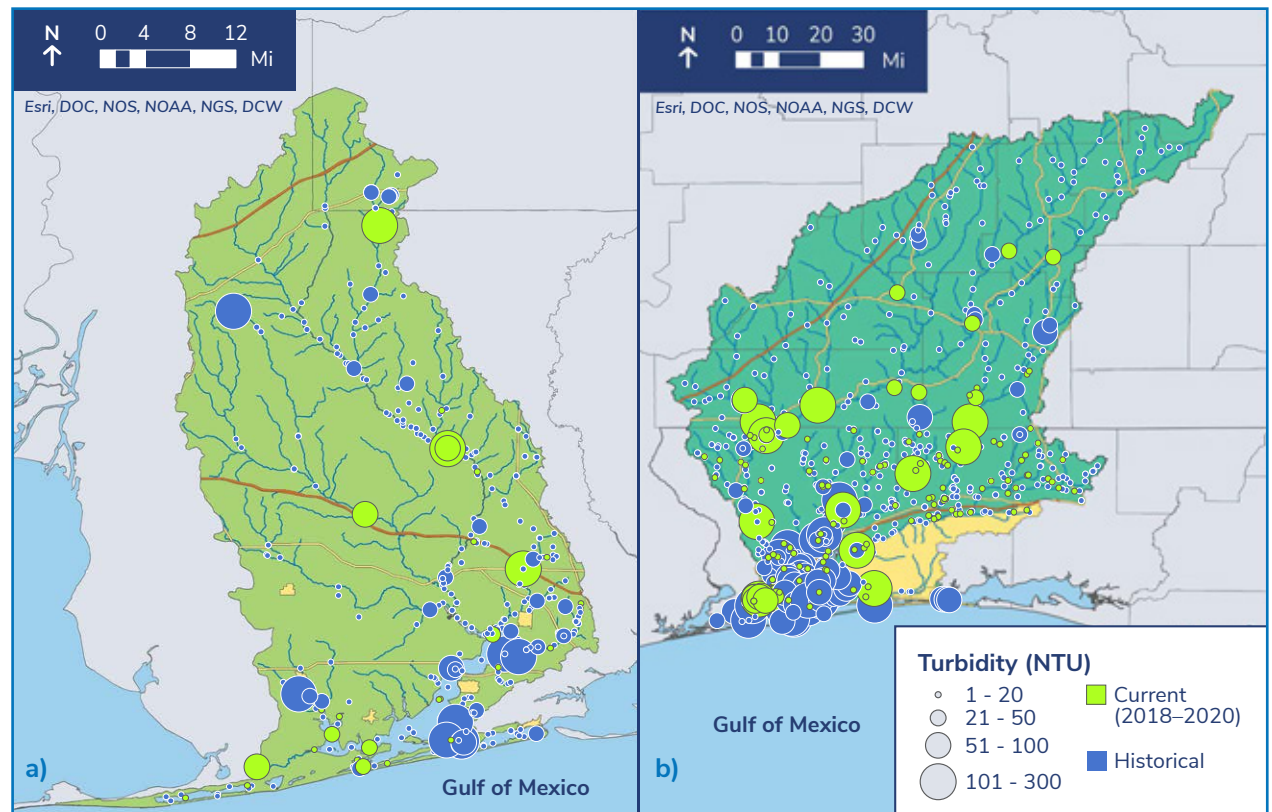
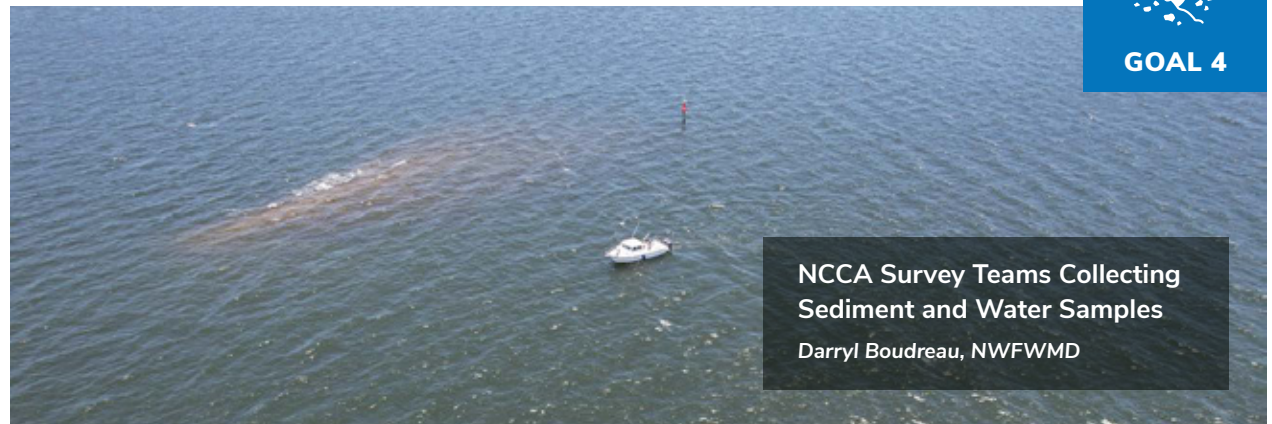
ACTION 4.1.1

Develop a comprehensive sediment monitoring program that encompasses both watersheds across state lines

IMPLEMENTATION STRATEGY

Integrate local system knowledge into future sampling design; Work with partners, including community science groups, to develop long-term sediment and benthic monitoring programs; Increase spatial coverage and parameters monitored; Investigate possible correlations between contaminants to maximize monitoring efficiency

- 🕒 TIMEFRAME:** 2022 – 2026
- 👤 PPBEP ROLE:** Leader
- 🤝 PARTNERS:** EPA; FWC; DEP; ADEM; MBNEP; Escambia County; Santa Rosa County; Academia; Community science organizations; NRCS; Friends of Perdido Bay
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Published Comprehensive Monitoring Strategy; Bayou Chico Sediment Report; NCCA and NWCA reports; State of the Bays report
- 📊 PERFORMANCE METRICS:** Number of WBIDs and sites monitored; List of parameters monitored (in Comprehensive Monitoring Strategy); Number of partner organizations and agencies engaged; Amount of funding dedicated and leveraged for sediment monitoring
- 📍 LOCATIONS:** Pensacola and Perdido Bays watersheds; Bayou Chico



Sampling Locations for Turbidity in a) Perdido Bay Watershed and b) Pensacola Bay Watershed

Blue symbols are historical sites (Perdido: 1976–2017; Pensacola: 1972–2017) and green symbols are locations that are considered current (2018–2020). Size of symbol indicates the total number of samples taken.



GOAL 4

Objective 4.2

Conduct a sediment study to assess sources of sediments and erosion in the watersheds

Objectives

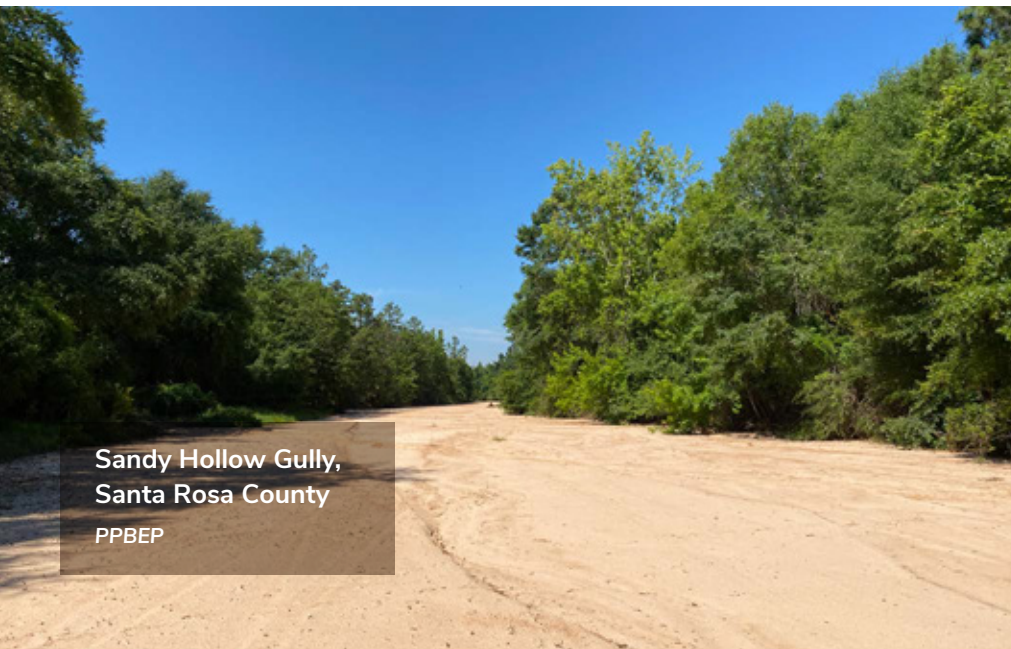
Identify major sources of sediment to the Pensacola and Perdido Bays waterways and assess the relationship between land use land cover and soil erosion and sedimentation rates of those major sources

Status

Not yet started

Related Actions

Habitat Objective 5.2; Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Strategy PPBEP4



Sandy Hollow Gully,
Santa Rosa County
PPBEP

BACKGROUND

Soil erosion from the landscape is transported via rivers and is deposited downstream contributing to the sediment accretion, pollutant transport, and sedimentation of benthic habitats. Increased sedimentation to a waterbody can degrade water quality by lowering light penetration, smothering benthic habitats, and introducing pollutants and pathogens that are attached to sediments. Rates of soil erosion and sedimentation are influenced by the land use land cover of a watershed and human activities. For example, more urbanized landscapes or landscapes in the process of changing from forested to agricultural or urban are more likely to be sources of sediment



Pensacola Bay Watershed Land Use

Data: USGS 2019



GOAL 4



Pole Measuring Visibility in High Turbidity Waters near Oyster Reefs in Pensacola Bay

The Baker Lab at the University of South Alabama/DISL

than a forested landscape (Russell et al. 2017). Forested areas also provide sediment stabilization and lessen erosion to waterbodies. As populations continue to grow, especially in coastal areas, changes in development and land use will continue to impact soil erosion and sedimentation to the waterways.

Sedimentation from human activities in the watersheds has negatively impacted seagrass and oysters in the Pensacola and Perdido Bays systems. Seagrass burial by excess sediment loading is a known stressor to seagrasses in Pensacola Bay and Santa Rosa Sound (Harvey et al. 2016). Fine-grained sediment loading has increased to East Bay since the 1960s (George 1988), where a large percentage of oyster reefs have been lost. In fact, a recent oyster mapping study done by TNC and PPBEP identified known oyster reef locations that were smothered with sediment and are no longer productive. Identification of sediment sources is an important step in restoring and improving seagrass, oyster, and other benthic habitats in the Pensacola and Perdido Bays systems.

Identifying the main sediment sources in the watersheds is imperative to mitigate, lessen, and/or reverse the effects of sedimentation on waterways and prioritize restoration funds on the biggest sources. Understanding the relationships between sediment sources and land use land cover can help pinpoint hotspots of erosion. Once sources are identified, best management practices, including restoring riparian buffer zones, better stormwater management, and lessening impacts of development and agriculture, can be used to ameliorate sedimentation and improve the water quality and the status of benthic habitats of downstream waterbodies.



Sandy Hollow Gully

Blackwater Soil and Water Conservation District



GOAL 4

ACTION 4.2.1

Identify the impact of land use land cover on the rate of soil erosion and sediment loading

IMPLEMENTATION STRATEGY

Partner with universities and other partners to understand the impact of land use land cover dynamics on soil erosion and sediment loading

- 🕒 TIMEFRAME:** 2022 – 2024
- 👤 PPBEP ROLE:** Collaborator
- 🤝 PARTNERS:** Academia; FDOT; ADEM; NFWFMD; NRCS; USGS
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Report including model outputs on the impact of land use land cover to soil erosion rates and sedimentation
- 📊 PERFORMANCE METRICS:** Areas throughout watershed represented; Quantified annual sediment load
- 📍 LOCATIONS:** Pensacola and Perdido Bays watersheds; Focus on AL coastal areas; Styx and Blackwater Rivers

ACTION 4.2.2

Identify major sediment sources within the watersheds

IMPLEMENTATION STRATEGY

Partner with universities and other partners to identify sources of sediment (e.g., aerial photography, sediment fingerprinting, modeling, sediment budgets)

- 🕒 TIMEFRAME:** 2023 – 2026
- 👤 PPBEP ROLE:** Collaborator
- 🤝 PARTNERS:** Academia; FDOT; ADEM; NFWFMD; DEP; TNC; NRCS
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Report on sediment sources including hotspot map and list of identified sources of sediment within the watersheds
- 📊 PERFORMANCE METRICS:** Number of sediment sources identified
- 📍 LOCATIONS:** Escambia watershed; Blackwater watershed; Yellow River basin; Areas with eroding soils; Active construction zones; Bare ground agriculture areas



**Sediment Runoff
from Development**
PPBEP



Objective 4.3

Address sources of sedimentation

Objectives

Assist partners in identifying and addressing sources of sedimentation issues within the Pensacola and Perdido Bays watersheds, including dirt roads, gullies, and streambank erosion

Status

Ongoing. DEP's Pensacola Bay Unpaved Roads Initiative is actively identifying and prioritizing unpaved roads and stream crossings to be addressed through future projects to improve water quality in the Pensacola Bay watershed. Fifteen locations will be identified to reduce sediment loading to Pensacola Bay.



Unpaved Road near
the Perdido River, FL
PPBEP

BACKGROUND

There are over 1.6 million miles of dirt and unpaved roads in the U.S. (Bloser 2012). Unpaved roads are used for a multitude of transportation purposes, including agricultural, construction, rural, private, and silvicultural purposes. Unpaved roads can adversely influence surrounding environments, including streams, rivers, other waterbodies, and riparian zones, through erosion and increased sediment delivery. Counties throughout FL and AL have used the "hilltop to hilltop" program which surveys dirt roads and assesses overall condition to assist in road paving prioritization. The erosion and sedimentation from unpaved roads have the potential to negatively affect downstream aquatic habitats, benthic organisms, and water quality.

Tributaries in the Pensacola and Perdido Bays watersheds are known to be affected by sedimentation from unpaved roads (NFWMD 2017a, 2017b). Ongoing oyster mapping and monitoring efforts in Pensacola Bay have identified heavy siltation of oyster reefs in the upper reaches of the bay due to sedimentation from a variety of human-induced sources. Projects have been developed by agencies such as DEP and TNC to stabilize some unpaved roads within the Pensacola and Perdido Bays watersheds to improve water quality. Most recently, DEP received funds from NRDA to identify unpaved roads and prioritize 15 of those roads for future unpaved roads stabilization projects. PPBEP will coordinate and identify potential partners and funding sources for future sediment remediation projects in the watersheds, particularly projects that address unpaved roads.



GOAL 4

ACTION 4.3.1

Identify unpaved roads and their contributions to water quality impairments and prioritize for paving or low impact designs

IMPLEMENTATION STRATEGY

Partner to identify key sources of sediment inputs due to unpaved roads in the watersheds and develop framework for prioritization

- 🕒 TIMEFRAME:** 2023 – 2025
- 👤 PPBEP ROLE:** Collaborator
- 🤝 PARTNERS:** DEP; Academia; FDOT; ADEM; NWFWMMD; NRCS; BFA; Counties; Cities
- 💰 FUNDING:** Committed and Pursuing
- ✅ DELIVERABLES:** Report on status of and priority of unpaved roads and identified impacts to water quality; Framework for prioritization and future improvements
- 📊 PERFORMANCE METRICS:** Number of unpaved roads identified as sediment sources; Number and/or miles of unpaved roads prioritized for future remediation
- 📍 LOCATIONS:** Pensacola Bay watershed; Agricultural areas with active BMPs

ACTION 4.3.2

Collaborate with partners to prioritize, develop, design, and implement sediment reduction and remediation projects to address gully and streambank erosion

IMPLEMENTATION STRATEGY

Identify partners and potential funding sources for prioritized sedimentation reduction and remediation projects

- 🕒 TIMEFRAME:** 2022 – 2026
- 👤 PPBEP ROLE:** Leader
- 🤝 PARTNERS:** DEP; Alabama Department of Conservation and Natural Resources (ADCNR); NRCS; FDOT; Counties
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** List of potential project concepts and identified funding sources
- 📊 PERFORMANCE METRICS:** Number of projects identified and planned; Number of priority source areas addressed
- 📍 LOCATIONS:** Watershed-wide; Areas of greatest concern for sediment inputs into bay systems (Carpenter, Pine, Moore, and Sandy Hollow Creeks)



Unpaved Road near
the Perdido River, FL
PPBEP



Objective 4.4

Assess the effects of sediment dynamics and resuspension on benthic habitats

Objectives

Identify areas within the Pensacola and Perdido Bays impacted by sedimentation and better understand bay bottom type to lessen impacts of sedimentation on submerged habitats and provide information to assist in oyster restoration in Pensacola Bay

Status

Ongoing. During summer 2021, oyster mapping efforts were conducted to assess bottom type, including buried shell, in Escambia and East Bays (Pensacola Bay). TNC received funding to conduct the East Bay survey and PPBEP filled a gap and funded a similar mapping effort in Escambia Bay. These surveys highlight areas of Pensacola Bay that succumbed to sedimentation and provide the groundwork to assess the effects of sediment dynamics on oysters and other submerged habitats in Pensacola and Perdido Bays.

Related Actions

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Strategy PPBEP4

Remnant Oyster Reef Smothered with Sediment in Pensacola Bay

The Baker Lab at the University of South Alabama/DISL

BACKGROUND

Estuarine bottom types are heterogeneous, contributing to differences in sediment quality and quantity and the sustainability of benthic habitats and associated species. For example, oysters need hard bottom substrate to settle upon, whereas infaunal organisms may depend on softer substrates. Changes to hard bottom types, including transitions to a softer bottom due to high sediment loading, can change species compositions and cause physiological stress to a multitude of organisms and their different life stages (e.g., high turbidity can smother fish and shellfish). In estuarine and coastal waters, sediment inputs stem from natural sources that are accelerated by human activities, such as land use changes in the watershed. In Pensacola and Perdido Bays, nearshore coastal development is known to cause sedimentation in the systems. For example, land clearing activities from agriculture and silviculture and erosion from unpaved roads has increased sedimentation to the Blackwater River Basin (NFWFMD 2017b). To assess the effects of sedimentation and ultimately preserve and conserve good ecological status of benthic habitats in the Pensacola and Perdido Bays systems, bottom type needs to be mapped to assess changes over time and identify areas with sedimentation issues.

Current and future oyster restoration efforts within Pensacola Bay will benefit from bottom type mapping to assess the condition of known oyster reefs, including the degree of sedimentation, and help plan for future restoration site implementation. An ongoing Florida TIG project will also place sediment collectors at various locations in Pensacola Bay to assess sedimentation rates. Implementing a restoration project in areas with high sediment influxes is problematic for the success and resilience of those restored reefs. PPBEP will continue to support sediment type and sediment resuspension assessments of the bays. Efforts need to be identified in Perdido Bay to address knowledge gaps of Perdido Bay bottom type.



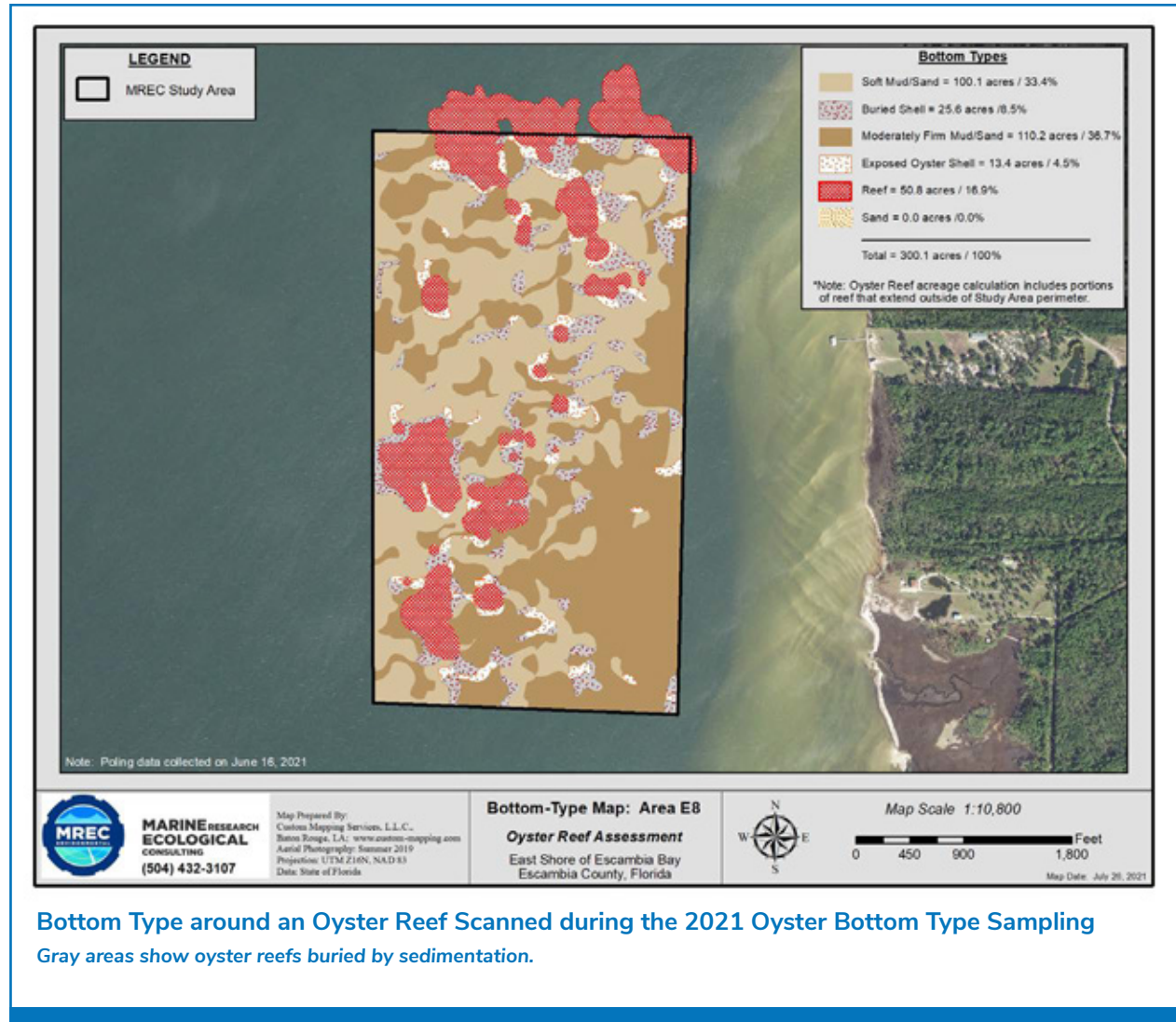
ACTION 4.4.1

Conduct benthic sediment mapping and synthesize existing data to assess sediment type, grain size, transport, and contours

IMPLEMENTATION STRATEGY

Incorporate sediment bottom type data from ongoing oyster mapping efforts in East, Blackwater, Pensacola, and Escambia Bays; Synthesize existing data from partner organizations

- TIMEFRAME:** 2022 – 2023
- PPBEP ROLE:** Leader
- PARTNERS:** TNC; EPA; NRCS; Academia
- FUNDING:** Committed – FL State Appropriations
- DELIVERABLES:** Report including total area surveyed; Sediment maps and bottom type characteristics for the Pensacola Bay system
- PERFORMANCE METRICS:** Total acreage and percentage of benthic habitat surveyed
- LOCATIONS:** Pensacola Bay system; Perdido Bay system (future)





GOAL 5

Conserve and Restore Critical Habitat

East Bay Oyster Habitat
Restoration Project
PPBEP



Objective 5.1

Improve and support the health and resilience of oysters, including wild, farmed, and restored oysters, to promote a sustainable oyster fishery in the Pensacola Bay system

Objectives

Develop a bay-wide monitoring program and identify funding sources for implementation with the aid of Oyster Sub-Committee members and partners; Map and monitor existing oyster habitats and add to existing knowledge base and models; Support community-based oyster monitoring and management; Expand oyster gardening programs by engaging volunteers

Status

Ongoing. PPBEP convened a fact-finding Oyster Sub-Committee of the Program's Technical Committee in June 2021 to advise the implementation of the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System. This Sub-Committee started as a group of representatives from multiple sectors, including state and federal agencies, oyster fishery, local government, aquaculture, academia, local community groups, development, and businesses, that were part of a Stakeholder Working Group lead by TNC in 2019 for the initial development of the management plan. This Sub-Committee will enable PPBEP to focus on the long-term protection and restoration of a critical natural resource in local communities: oysters, as both a fishery and a habitat. Using the best available science and leveraging partnerships and funding, the Program hopes to achieve short- and long-term success with oyster outreach and education and restoration across the Pensacola Bay system.

Related Actions

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System Strategy PPBEP2, PPBEP3, A3, and PPBEP5; Education and Outreach Strategy Actions 2.1.1, 2.2.1, 2.2.2

BACKGROUND

Oysters are sessile, filter feeding invertebrates that create complex reef structures which provide homes for other organisms including mussels, crabs, small fish, and shrimps. Oysters are a keystone species and ecosystem engineers that can also act as an environmental health indicator. In the region, reefs are comprised of the Eastern Oyster (*Crassostrea virginica*), and they are found in intertidal and subtidal estuarine ecosystems along the Gulf Coast. Oyster reefs provide ecosystem services that impact quality of life. Reefs provide nursery and foraging habitat for economically and recreationally important fish and invertebrate species, protect and stabilize shorelines from storms and wave action, sequester nutrients, and filter waters (Grabowski and Peterson 2007). Oyster reefs have the potential to save communities \$85,000 per year per hectare when used in place

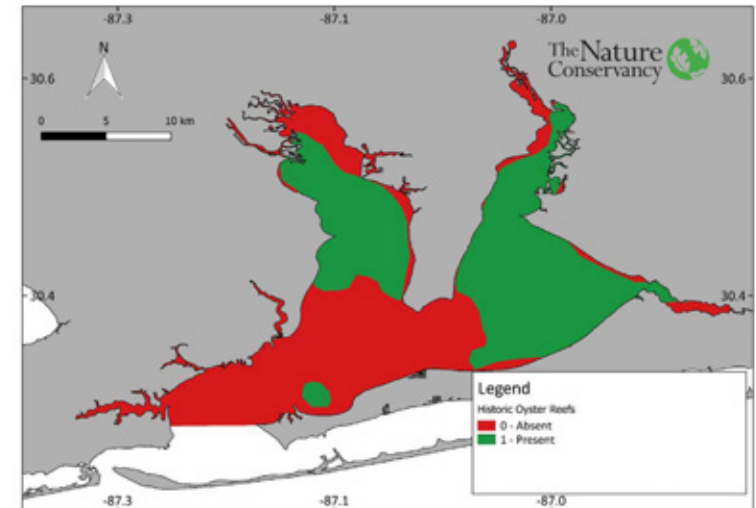


FIGURE 13. Historical Oyster Reef Presence from 1883 Throughout Escambia, Pensacola, Blackwater, and East Bays
TNC

Data: U.S. Fish Commission



of artificial breakwaters or other hardened structures (Spalding et al. 2016). Reef functions also provide secondary benefits including fish production and healthy and extensive submerged aquatic vegetation (SAV), like seagrass beds, that rely on clear water and sunlight for growth and production. In turn, these plants can store carbon, trap sediments, and sequester nutrients, further improving the health of the estuaries.

Historically, the Pensacola Bay system including East, Blackwater, and Escambia Bays had extensive oyster reefs, represented by the earliest map of oyster coverage in 1883 (Figure 13). Globally, an estimated 85% of oyster reefs have been lost (Beck et al. 2011), and regionally, Pensacola Bay harvest and acreage of reefs have declined, with only 480 acres of reef remaining in 2015 (Radabaugh et al. 2022) (Figure 14). Oyster declines are due to human-induced impacts including overharvesting, sedimentation, and algal blooms. Other threats to oysters include suboptimal and fluctuating salinities, climate change and sea-level rise, disease, and oil spill impacts (Radabaugh et al. 2022). Declines in oyster extent and health could mean a subsequent decline in the economy, seagrass coverage, water quality, and associated fish and shellfish communities that rely on this natural resource.

While shellfish harvesting is permitted in approved or conditionally approved harvest areas in Pensacola Bay, as regulated by the National Shellfish Sanitation Program, Perdido Bay waters are unclassified due to no known oyster reefs present and thus oystering is prohibited (DWH NRDA Trustees 2017). For this reason, the Program decided to focus on oyster-related efforts in the Pensacola Bay system for its first CCMP to align with priorities set in other statewide management plans.

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System

Currently, there are no known oyster plans in the U.S. that use a holistic oyster management approach, such as bay-wide oyster management (Birch et al. 2021). In coordination with the state and community stakeholders, TNC piloted the first bay-scale recovery plan for the Pensacola Bay system. TNC used a transparent, inclusive, and consensus-based decision-making process that encouraged collaboration and support from all sectors across the

community. The result was meant to be a model for other bay systems that strive for community ownership and management based on the best available science. The State of Florida is due to kick off a similar statewide planning effort in 2022. The [Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System](#) (Appendix 2) took 1.5 years to complete and included four themes: Ecology, Wild Harvest and Aquaculture, Economy, and Public Education and Communication.

The plan serves as a framework for enhancing oyster habitat resiliency in the Pensacola Bay system over the next 10 years. As a continuation of this planning effort, PPBEP committed to incorporating the top priorities identified in the Oyster Fisheries and Habitat Management Plan into the CCMP. PPBEP

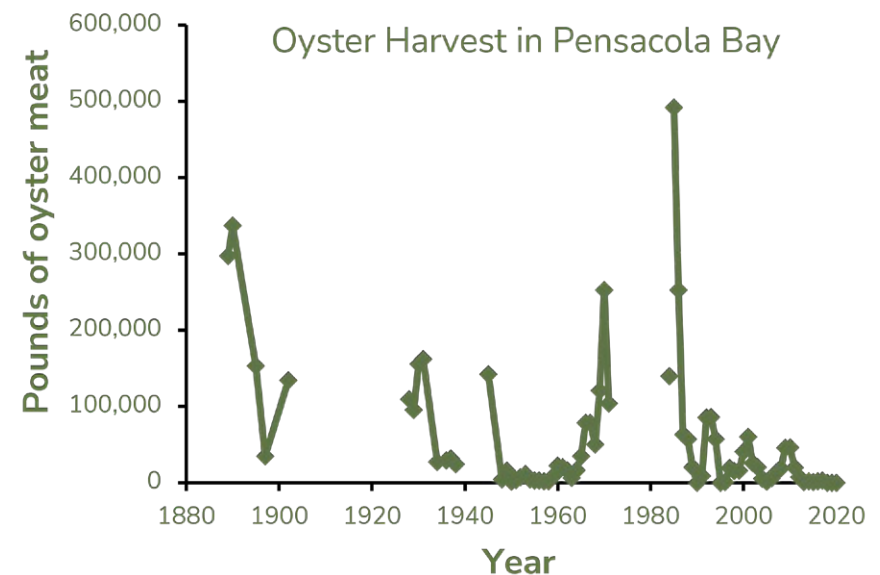
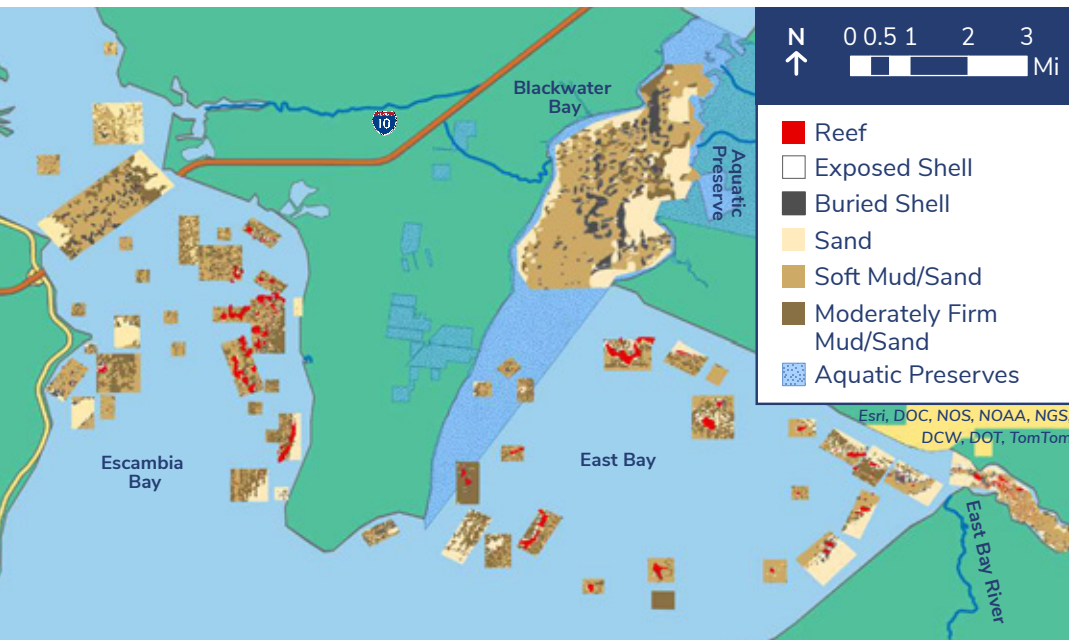


FIGURE 14. Oyster Landings (lbs) From 1880 to 2020 in Pensacola Bay
U.S. Commission of Fish and Fisheries



GOAL 5



Bottom Type Mapped in the Pensacola Bay System

Data: Johnson 2021a, 2021b, 2021c



Oyster Mapping in East Bay
Santa Rosa County

has been working with Sub-Committee members and partners from TNC, FWC, DEP, and Florida Sea Grant to develop a strategy for oyster restoration at a bay-wide scale.

PPBEP and its partners have set a restoration target of 600 ha (2.3 mi²) over 10 years, based on the best available science and oyster mapping conducted pre-Deepwater Horizon Oil Spill (2009/2010). This powerful metric, with meaningful historical significance, is a target to aspire to, rally the community around, and achieve in a meaningful time frame.

Oyster Associated Projects

Oyster Mapping

Santa Rosa County contracted TNC to complete an oyster mapping and condition assessment for Blackwater and East Bays using RESTORE Act funds. Preparation for oyster habitat mapping included an analysis of the data gaps in oyster resources from both bays to establish a baseline of the extent and condition of existing oyster reefs. Oyster habitat mapping, conducted by Marine Research Ecological Consulting (MREC), included compiling and preparing aerial imagery, existing maps, and associated GIS shapefiles of intertidal and subtidal oyster reef habitat within the project area and conducting ground truthing and condition analysis on any mapped reefs. The same methodology was employed in Escambia Bay, also by MREC for PPBEP with funding from FL State Appropriations. These two mapping efforts (Johnson 2021a, 2021b, 2021c) provide comprehensive information on the remnant and restored oyster reefs in the Pensacola Bay system. Both projects were completed by September 2021. The data sources were used to create preliminary maps of oyster habitat ([GIS map layers: FWC 2022](#)), identify gaps in existing mapped areas and in areas not yet mapped throughout the bays, and make recommendations for future oyster restoration and management.

Across the Gulf Coast, stakeholder working groups have convened to focus on statewide and regional collaboration for the protection and restoration of oyster reefs throughout the region. In 2016, FWC started a series of workshops to bring stakeholders (e.g., oyster scientists, managers, non-profits, community organizations) together throughout



GOAL 5

"For centuries Native Americans inhabited the shores of our bays. Oysters were a staple in their diet. Water depth and technology restricted Native Americans' harvest primarily close to shore. Hand selecting oysters resulted in very few small oysters being harvested. Based on studies of Middens, for thousands of years there is no evidence of a size decline up until around the early 1800s. It was then oysters became a commodity in demand by the palates of the new arrivals to our lands. Creek Indians living on Escribano Point and around East Bay traded fresh oysters in Pensacola up until the time they were removed on the Trail of Tears around 1830. Subsequent years of mismanagement and overharvesting brought decline to the once flourishing oyster beds."

CHIEF DAN "SKY HORSE" HELMS

SANTA ROSA BAND OF THE LOWER MUSCOGEE

FL to develop an OIMMP, which focuses on the status of oysters and the future of the resource. The Pensacola Bay system is part of the Northwest FL chapter of OIMMP and a technical report is updated and published every few years highlighting relevant oyster data and recommendations for oyster management, mapping, and monitoring.

Local Oyster Restoration Projects

Many agencies and community organizations are currently leading restoration projects and monitoring in the Pensacola Bay system. BFA, in partnership with UWF, implemented Project Oyster Pensacola in 2018. Cages were stocked with locally-reared oysters and deployed off docks to measure oyster growth and survival. In addition, water quality and invertebrate communities were also measured. The goal of the project was to increase community awareness about the importance of oysters and their connection to water quality, engage the public in research, and provide baseline information for future oyster restoration efforts.

Other small- and large-scale oyster restoration throughout the Pensacola Bay system include:

- ➔ NRDA cultched reefs
- ➔ East Bay Living Shoreline Project
- ➔ Naval Air Station Pensacola Living Shoreline
- ➔ DEP Living Shoreline Initiative with homeowners
- ➔ Navy Point Living Shoreline Project
- ➔ Reef prism (Santa Rosa County Extension)
- ➔ EscaRosa OysterCorps

Pensacola East Bay Oyster Habitat Restoration Project

Darryl Boudreau, NFWMD



GOAL 5

ACTION 5.1.1

Form and convene a sub-committee to assist in implementing the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System

IMPLEMENTATION STRATEGY

Engage a committee to assist with project planning, implementation, monitoring, and policy recommendations

- ⌚ TIMEFRAME:** Ongoing
- P PPBEP ROLE:** Leader
- 👥 PARTNERS:** TNC; Florida Department of Agriculture and Consumer Services (FDACS); DEP; Private sector; Aquaculture farmers; Wild harvesters; Community science groups; Cities; Counties; Academia
- 💰 FUNDING:** Committed – EPA grant
- ✅ DELIVERABLES:** Established an active Oyster Sub-Committee supporting the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System development
- 📊 PERFORMANCE METRICS:** Number of partners engaged; Number of project proposals submitted
- 📍 LOCATIONS:** Pensacola Bay system

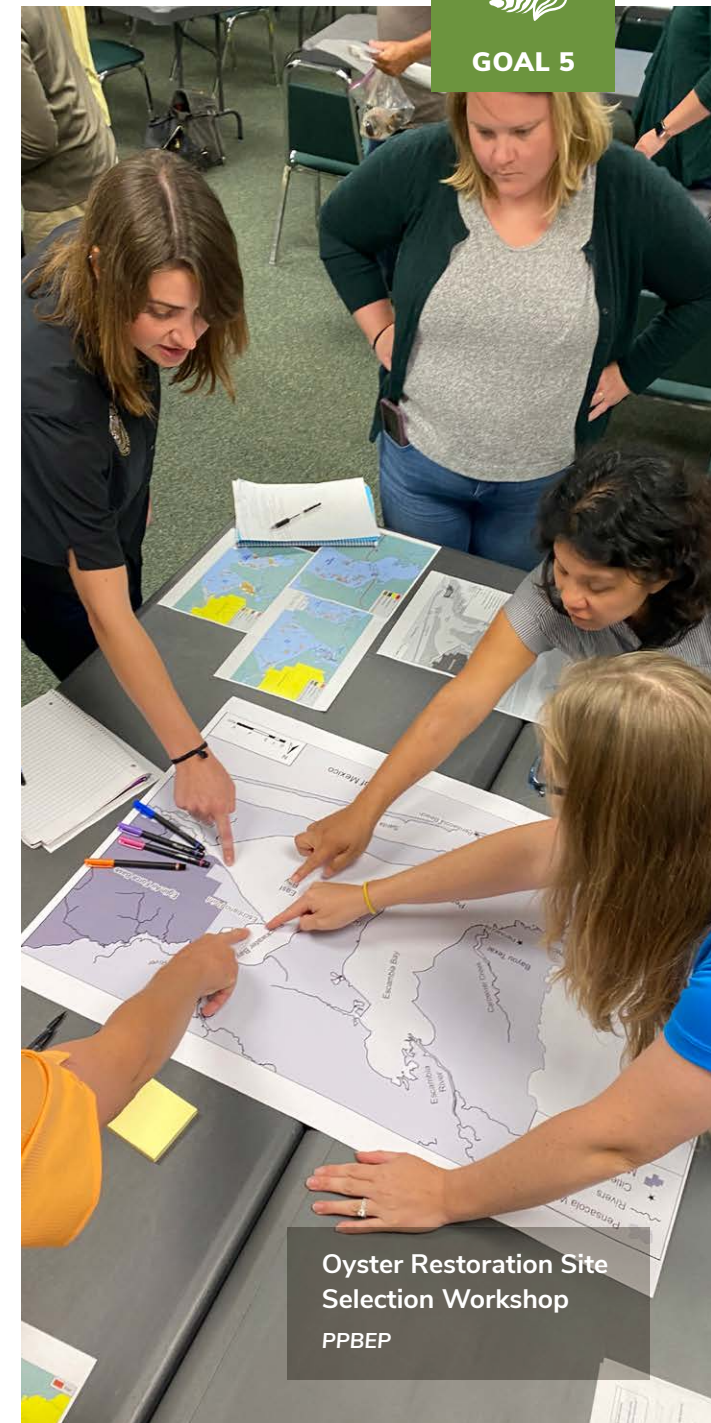
ACTION 5.1.2

Create a comprehensive restoration approach for Oyster Plan implementation including an analysis for future grant funding and implementation strategies

IMPLEMENTATION STRATEGY

Work with partners (e.g., Oyster Sub-Committee) to develop a strategy for future project implementation

- ⌚ TIMEFRAME:** 2022
- P PPBEP ROLE:** Leader
- 👥 PARTNERS:** TNC; FWC; FDACS; Aquaculture farmers; Community science groups; Academia; Watermen
- 💰 FUNDING:** Committed – FL State Appropriations; Pursuing
- ✅ DELIVERABLES:** Comprehensive restoration approach document or protocol
- 📊 PERFORMANCE METRICS:** Number of grants awarded; Total grant funds allocated
- 📍 LOCATIONS:** Pensacola Bay watershed



Oyster Restoration Site Selection Workshop

PPBEP



GOAL 5

ACTION 5.1.3

Conduct long-term monitoring to assess oyster condition and spat production and assess the effects of oysters on long-term environmental change

IMPLEMENTATION STRATEGY

Engage Oyster Sub-Committee members to assist in developing a monitoring strategy using existing regional oyster planning documents and handbooks; Conduct an oyster filtration rate model in partnership with TNC; Conduct baseline native oyster reef surveys to assess oyster condition and fisheries habitat

🕒 TIMEFRAME: 2023 – 2026

👤 PPBEP ROLE: Collaborator; Facilitator

👥 PARTNERS: Academia; Community science groups; FWC; Food and Drug Administration; TNC; FDACS; Aquaculture farmers; Florida Oyster Recovery Science Working Group

💰 FUNDING: Needed

✅ DELIVERABLES: Oyster monitoring strategy (handbook) incorporated into Comprehensive Monitoring Strategy

📊 PERFORMANCE METRICS: Number of locations monitored

📍 LOCATIONS: Pensacola Bay watershed

ACTION 5.1.4

Host and support oyster restoration projects in the Pensacola Bay system to improve native oyster populations

IMPLEMENTATION STRATEGY

Develop or expand oyster gardening; Host shell bagging or oyster spat monitoring construction events; Hold volunteer events to construct and deploy plastic-free oyster reef prisms; Create and manage a prioritized list of oyster restoration projects for the Pensacola Bay system; Participate in the TNC East and Blackwater Bays Restoration Projects and Escambia County's Pensacola Bay Living Shoreline Project

🕒 TIMEFRAME: 2022 – 2026

👤 PPBEP ROLE: Leader; Promoter

👥 PARTNERS: Oyster Sub-Committee members; UWF; College and university students; FWC; DEP; Escambia County and Santa Rosa County oyster shell recycling programs; Sea Grant; DEP; Plastic-free Restoration of Oyster Shorelines; UF-IFAS

💰 FUNDING: Pursuing

✅ DELIVERABLES: List of oyster restoration projects conducted

📊 PERFORMANCE METRICS: Number of oyster restoration projects; Number of volunteers engaged; Tons of recycled oyster shell deployed; Restore 2.3 mi² of oyster reef within 10 years

📍 LOCATIONS: Pensacola Bay watershed



Oyster Restoration Site Selection Workshop

PPBEP



Objective 5.2

Assess seagrass health and distribution and develop a restoration strategy for long-term protection and recovery

Objectives

Update the data on current extent and condition of seagrass beds across the Pensacola and Perdido Bays systems; Engage stakeholders in a participatory planning process to learn from the past to develop a future restoration strategy for seagrasses, increasing their resilience to climate stress by incorporating genetic diversity

Status

Ongoing. PPBEP's partnership with the University of New Orleans (UNO) and Mississippi State University (MSU) on a NOAA Actionable Science Grant (2021 – 2022) has enabled the Program to engage with a wide range of stakeholders, including researchers, practitioners, and community stakeholders, to develop a strategic plan for future seagrass restoration based on future climate change scenarios. The goal of this project is to reduce unknowns for restoration success by focusing on the inclusion and benefits of genetic variation. Steps include conducting a literature review of seagrass health, genetic diversity, and resilience; determining community values and perceptions of seagrass habitats; inventorying past and present planning efforts; and evaluating the effectiveness of restoration techniques. The project team selected 10 members from various local agencies and organizations (e.g., FWC, DEP, MBNEP, Seagrass CoP, TNC) to serve on an Advisory Panel to help guide the project engagements and deliverables. Future partnerships with DISL, the Gulf Coast Research Lab (GCRL), UWF, and UF-IFAS Sea Grant Extension will allow for increased monitoring capacity throughout the bays while engaging members of the community.

Related Actions

Education and Outreach Strategy Action 2.1.2

BACKGROUND

Seagrass beds are important aquatic ecosystems across the GoM and tropical and temperate zones around the world. These marine flowering plants provide many benefits to various fish and shellfish species including food resources and protection from predators. They also sequester nutrients from the water column, store carbon, trap sediments, and act as storm and wave buffers protecting shorelines from erosion, which are all valued ecosystem services provided to coastal communities.

The shallow coastal zones of the Pensacola and Perdido Bays systems are dominated by Shoalgrass (*Halodule wrightii*) mixed with other less abundant species, Turtle Grass (*Thalassia testudinum*) and Manatee Grass (*Syringodium filiforme*). Seagrasses extend from the lower



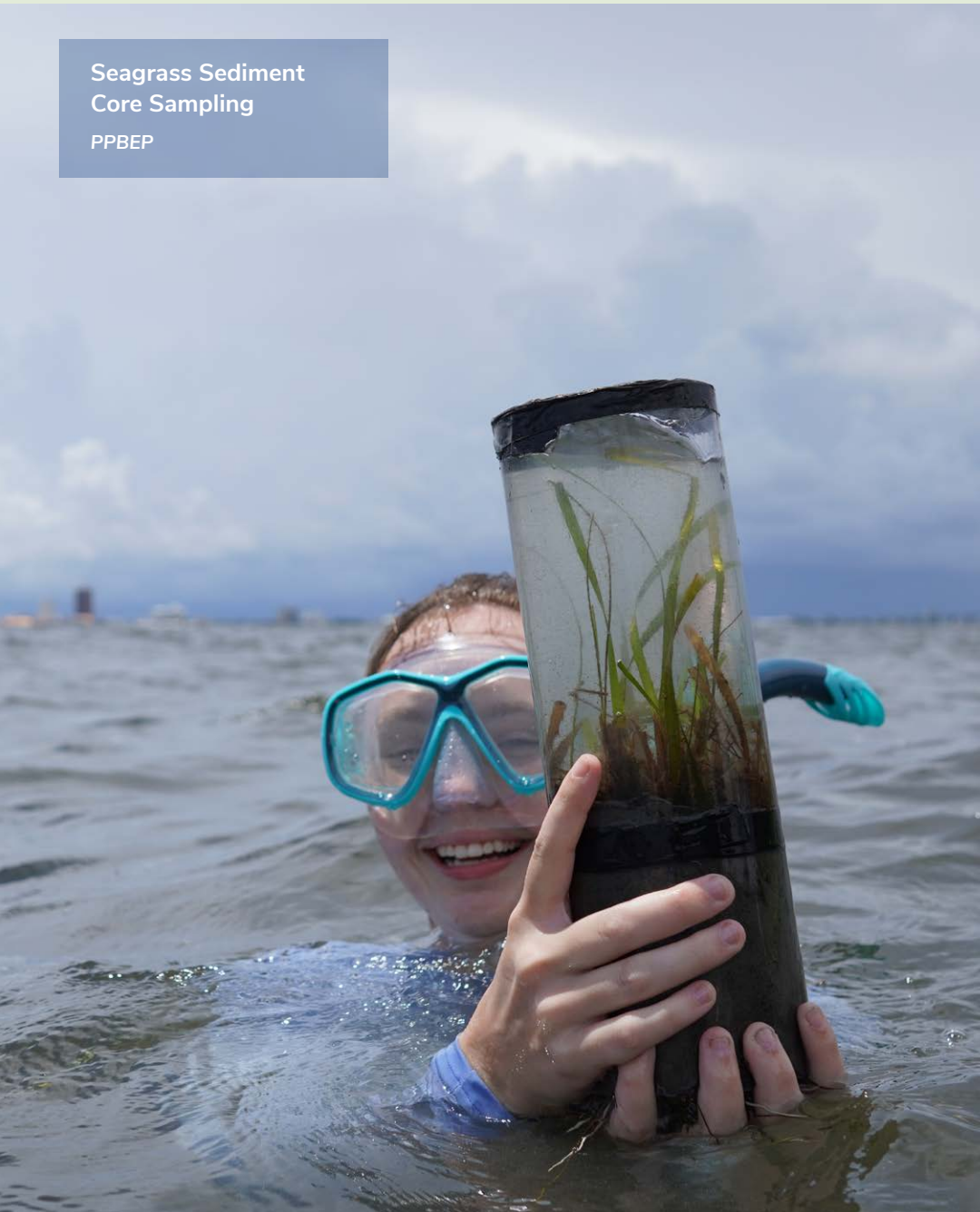
Mixed Seagrass Bed of Turtle Grass (wide flat blade; *Thalassia testudinum*) and Manatee Grass (narrow cylindrical blade; *Syringodium filiforme*)

PPBEP



Seagrass Sediment Core Sampling

PPBEP



Perdido Islands and Big Lagoon to Pensacola Bay and Santa Rosa Sound. Other species of SAV are present in the upper bays and more freshwater or brackish (freshwater mixed with saltwater) environments including the most common Wild Celery or Eelgrass (*Vallisneria americana*) and Widgeon Grass (*Ruppia maritima*).

Between 1987 and 2002, approximately 80% of the seagrass acreage had disappeared in Perdido Bay, leaving only 122 acres (Byron et al. 2018). However, since a 2010 mapping effort, there has been a 27% increase in seagrass coverage. South Pensacola Bay, East Bay, and Santa Rosa Sound lost 60% of seagrass coverage between 1955 and 2017, although seagrass cover did increase (primarily in Santa Rosa Sound) by 13% (454 acres) from 2010 to 2017 (Byron et al. 2018). Although some of these losses can be attributed to disturbance during tropical storms, poor water quality and propeller scarring are the two most common impacts or roadblocks to recovery of seagrass communities in the estuaries (Carlson and Yarbro 2020). Other stressors include dredging, sedimentation, eutrophication (growth of algae from excess nutrients in the water column), land use changes, and altered hydrology. These stressors can cause negative impacts, including habitat fragmentation and localized or large-scale die-offs.

Comprehensive long-term mapping and monitoring programs are critical for tracking the status and trends of seagrass habitats over time, informing future restoration, and potentially preventing future extensive damages. The GoM Seagrass CoP was established in 2017 to support the management, research, restoration, and conservation of seagrasses in shallow coastal environments throughout the Gulf. The CoP's goals are to facilitate information exchange, maximize collaboration by connecting experts and practitioners, and improve advocacy around seagrass efforts. In addition, existing planning, research, monitoring, and restoration efforts that have been conducted or are currently active throughout the Pensacola and Perdido Bays systems include, but are not limited to:



- ➔ Gulf Frontal Watershed Management Plan (Lead: MBNEP)
- ➔ Perdido Islands Management Plan (Lead: City of Orange Beach; TNC)
- ➔ Community science monitoring program and research lead by partners at UWF and UF-IFAS Sea Grant Extension office. Community members and students monitor sites throughout Big Lagoon and Santa Rosa Sound.
- ➔ FWC's statewide SIMM was developed to protect and manage seagrasses in FL by providing a collaborative resource for data sharing and to provide stakeholders and natural resource managers a summary of the status of seagrasses on a regular basis.
- ➔ DEP manages seagrasses and SAV and conducts semi-annual monitoring within the Fort Pickens Aquatic Preserve in the Pensacola Bay watershed.
- ➔ GCRL leads seagrass monitoring through the National Park Service (NPS) boundaries in coastal AL and the FL Panhandle.
- ➔ DISL has conducted seagrass monitoring and restoration projects in the Pensacola and Perdido Bays systems since the early 2000s. Researchers at DISL have carried out many studies that mapped seagrass extent in Perdido Bay, monitored seagrass cover and ecological condition, and carried out seagrass restoration in Perdido Bay and Big Lagoon using several different techniques.

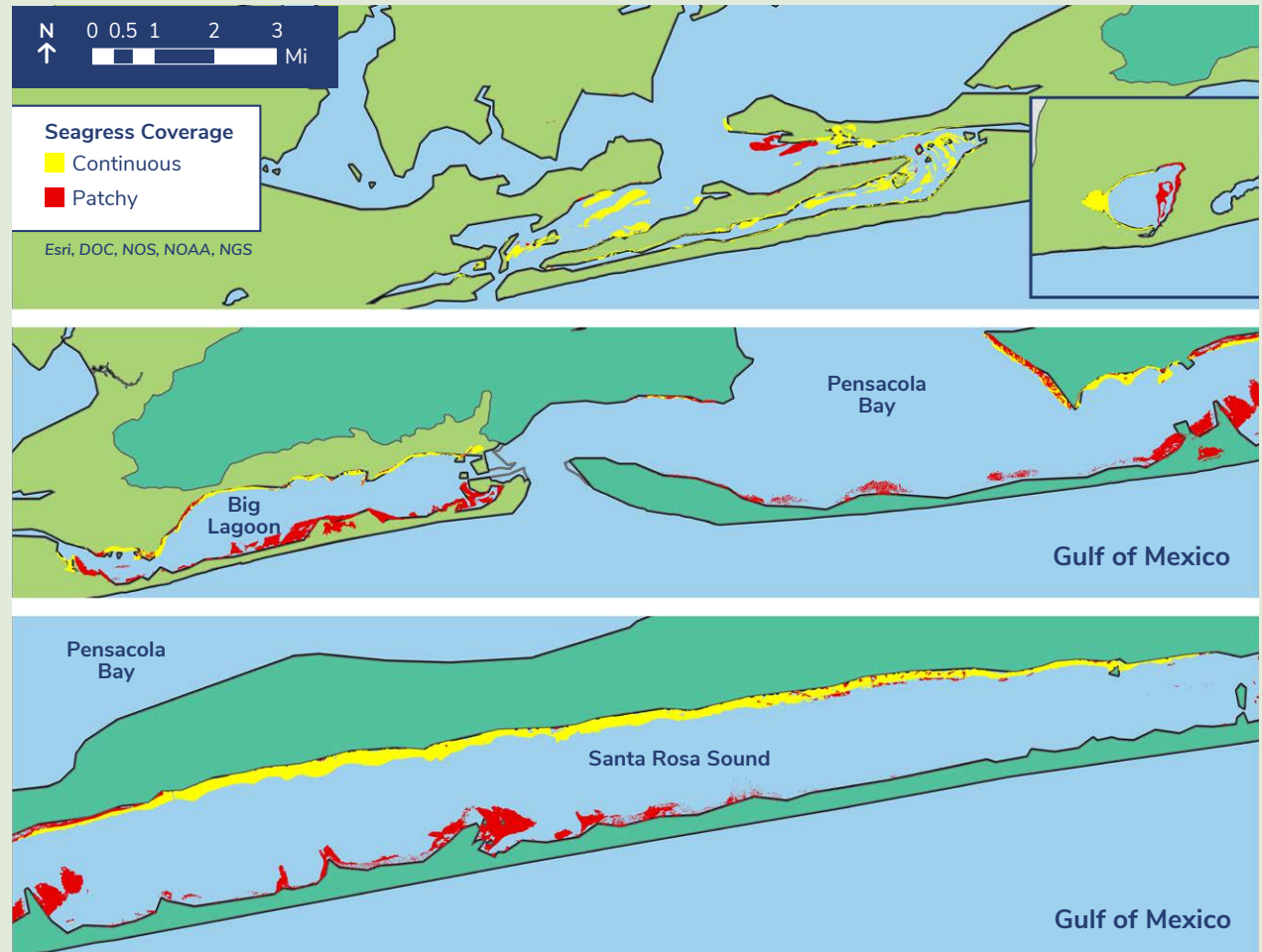


Birdstake Restoration

DISL



As noted above, PPBEP has partnered with researchers at UNO and MSU through a NOAA Actionable Science Grant opportunity to develop a strategic plan for seagrass restoration incorporating resilience through genetic diversity. To expand on existing efforts and fill stakeholder-identified data gaps, PPBEP has also partnered with DISL to map seagrass extent in both the Pensacola and Perdido Bays systems using multispectral digital imagery and has partnered with USM's GCRL to survey seagrass for percentage cover, species composition, and overall condition during the peak growing season (summer/fall 2022). This work will inform the status and trends of seagrass coverage and condition in bays, bayous, and sounds, which will assist with future protection measures and restoration projects and contribute to the implementation of the Program's Comprehensive Monitoring Strategy (Appendix 4).



Seagrass Coverage in the Pensacola and Perdido Bays Systems

Data: DISL, Vittor & Associates 2020 (Perdido data); FWC 2010–2011 (Pensacola data)



GOAL 5

ACTION 5.2.1

Conduct seagrass mapping and surveys (aerial and ground truth surveys) to assess the current extent, distribution, and condition of seagrass species in the Pensacola and Perdido Bays systems

IMPLEMENTATION STRATEGY

Engage and expand existing community science monitoring programs in the Pensacola and Perdido Bays systems; Continue to conduct annual surveys; Build on existing mapping efforts and identify coordinating agency to conduct future aerial surveys

🕒 TIMEFRAME: 2022 – 2026 (at least every three to five years)

👤 PPBEP ROLE: Leader; Collaborator

🤝 PARTNERS: DISL; GCRL; NPS; Seagrass CoP; Academia; UF-IFAS Sea Grant Extension; UWF; FWC

💰 FUNDING: Committed – EPA; AL COE

✅ DELIVERABLES: Seagrass extent maps reported in the State of the Bays report

📊 PERFORMANCE METRICS: Maps of percentage cover and acreage of seagrass and species diversity

📍 LOCATIONS: Pensacola and Perdido Bays

ACTION 5.2.2

Evaluate current protection measures and develop a comprehensive restoration strategy for seagrass and SAV

IMPLEMENTATION STRATEGY

Work with partners to set short- and long-term restoration goals for the Pensacola and Perdido Bays systems; Support and expand on seed-based restoration projects (e.g., Wild Celery [*Vallisneria americana*]) and propeller scar restoration; Evaluate genetic resilience of seagrasses

🕒 TIMEFRAME: 2021 – 2022

👤 PPBEP ROLE: Collaborator

🤝 PARTNERS: UNO; Seagrass CoP; Academia; DISL; DEP; USM; TNC; Auburn University/MS-AL Sea Grant

💰 FUNDING: Committed and Pursuing – NOAA Actionable Science Grant

✅ DELIVERABLES: Comprehensive restoration strategy including how best to incorporate genetic diversity into seagrass restoration

📊 PERFORMANCE METRICS: Identification of restoration goals (i.e., acres to be restored); Number of restoration projects identified

📍 LOCATIONS: Watershed-wide



Seagrass Survey Training,
Naval Live Oaks

PPBEP



Objective 5.3

Improve and support the health and resilience of native ecosystems in the Pensacola and Perdido Bays watersheds

Objectives

Define habitat conservation and restoration targets and collaborate with partners to monitor select native ecosystems and invasive species throughout the Pensacola and Perdido Bays watersheds

Status

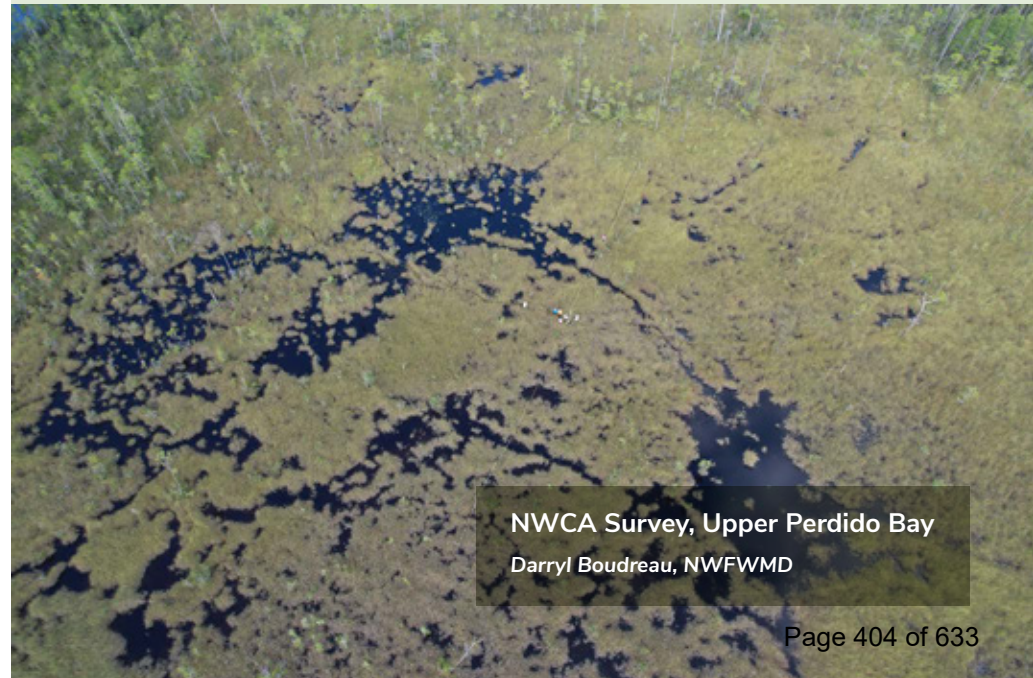
Ongoing. PPBEP conducted an intensification of the EPA's NWCA in summer 2021 as part of the NARS Program. The Program partnered with EPA staff to randomly select an additional 30 stations in designated estuarine wetlands across the Pensacola and Perdido Bays watersheds to add to the EPA's original sampling strategy. The survey was conducted in partnership with researchers at UF and UWF. Santa Rosa County, PPBEP, and Troy University secured NFWF funding to conduct LSSM and develop a master plan for the Pensacola and Perdido Bays systems and their shorelines. Project outcomes will function as a tool for assessing impacts to the shorelines due to land use changes and storms, identifying short- and long-term coastal resilience needs, and prioritizing projects and other activities within the watersheds. In addition to these efforts, PPBEP will lead coordination among teams as part of the Mangrove Survey Network (MSN), which intends to track the expansion of black and red mangroves across the northern GoM spanning from Harrison County, MS, to Franklin County, FL. To assess the status and condition of rivers and streams, PPBEP plans to conduct an intensification for the EPA's NRSA in 2023, like the intensification of the NCCA and NWCA surveys conducted previously, to establish a baseline for future monitoring and restoration efforts.

Related Actions

Education and Outreach Strategy Objective 2.1

BACKGROUND

Many native ecosystems throughout the Pensacola and Perdido Bays watersheds, including freshwater and estuarine wetlands, forests, dunes, rivers, and streams, need protection and restoration to ensure they provide communities with essential ecosystem services. These habitats can stabilize shorelines, filter surface runoff, trap sediments, store carbon, and provide nursery and hunting grounds for many species of fish and wildlife. Environmental stressors such as land use change, sea-level rise, and hardening of shorelines can have negative impacts on these critical habitats, which could cause cascading effects including habitat degradation or loss and fisheries and water quality declines. Many native longleaf forests have been cut for timber, cleared for agriculture, or managed for silviculture (NFWFMD 2017a, 2017b). As coastal development continues to increase, it is important that PPBEP and its partners prioritize tracking the current extent and condition of existing native ecosystems through regular monitoring and assessments to help inform future management and conservation.



NWCA Survey, Upper Perdido Bay
Darryl Boudreau, NFWFMD



GOAL 5

DEP, NFWFMD, TNC, ADCNR, the Longleaf Alliance, county and city governments, and local organizations have prioritized estuarine habitat restoration, strategic land conservation, invasive species management, comprehensive monitoring, and interstate coordination as top priority needs in their management plans.

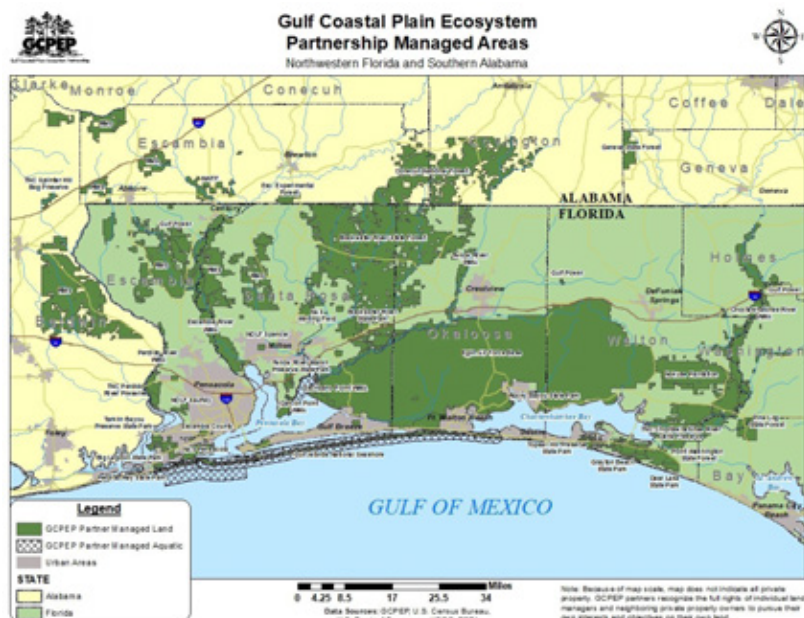
Six Rivers Cooperative Invasive Species Management Area, part of the Florida Invasive Species Partnership and Cooperative Invasive Species Management Areas (CISMA) network, was established in 2009 to facilitate collaboration among land managers to address the growing threat of invasive and nonnative species in northwest FL and coastal AL. The management area spans Baldwin, Escambia, Santa Rosa, Okaloosa, Covington, Walton, Holmes, and Washington Counties. Partners include (but are not limited to) the Longleaf Alliance, FWC, USFWS, TNC, NRCS, NFWFMD, county

governments, and UF-IFAS. This network builds upon the previous successes of the Gulf Coastal Plain Ecosystem Partnership (GCPEP) formed in 1996, which is comprised of 16 private and public partners that collectively own 2,000 mi² containing the remaining old growth longleaf pine trees, some of which are 500 years old (Compton 2021).

Invasive species are nonnative plants or animals introduced into an environment by human activity (e.g., ship ballasts, produce crates, aquarium trade) that reproduce and spread prolifically and have harmful impacts on the native ecosystem. The top five invasive plant species identified in the Six Rivers Management Area include Cogon Grass (*Imperata cylindrica*), Chinese Tallow Tree (*Triadica sebifera*), Chinese Privet (*Ligustrum sinense*), Japanese Climbing Fern (*Lygodium japonicum*), and Torpedo Grass (*Panicum repens*). Other invasive species found throughout AL and FL include Kudzu (*Pueraria montana*), Tropical Soad Apple (*Solanum viarum*), and aquatic species such as Eurasian Watermilfoil (*Myriophyllum spicatum*) and Hydrilla (*Hydrilla verticillata*). There are also nonnative fishes and mammals throughout the watersheds in freshwater, marine, and upland environments, including zebra mussels, lionfish, feral swine, nutria, and the Cuban treefrog, which have caused significant damages including the spread of disease, destruction of grasslands, species composition shifts, and direct impacts on threatened or endangered species (Engeman et al. 2007, Holzmüller and Jose 2012). Partner agencies (e.g., UF-IFAS, USFWS) have developed removal and management programs to control invaders and restore impacted habitats.

There are many preserves, state parks, and water and wildlife management areas across the Pensacola and Perdido Bays watersheds that focus on the protection and management of wetland habitats, dunes, and forests that are frequently visited by residents and tourists including:

- ➔ Jones Swamp Wetland Preserve and Nature Trail
- ➔ Big Lagoon State Park
- ➔ Blackwater River State Forest
- ➔ Perdido Key State Park
- ➔ Gulf Islands National Seashore
- ➔ Tarkiln Bayou Preserve State Park

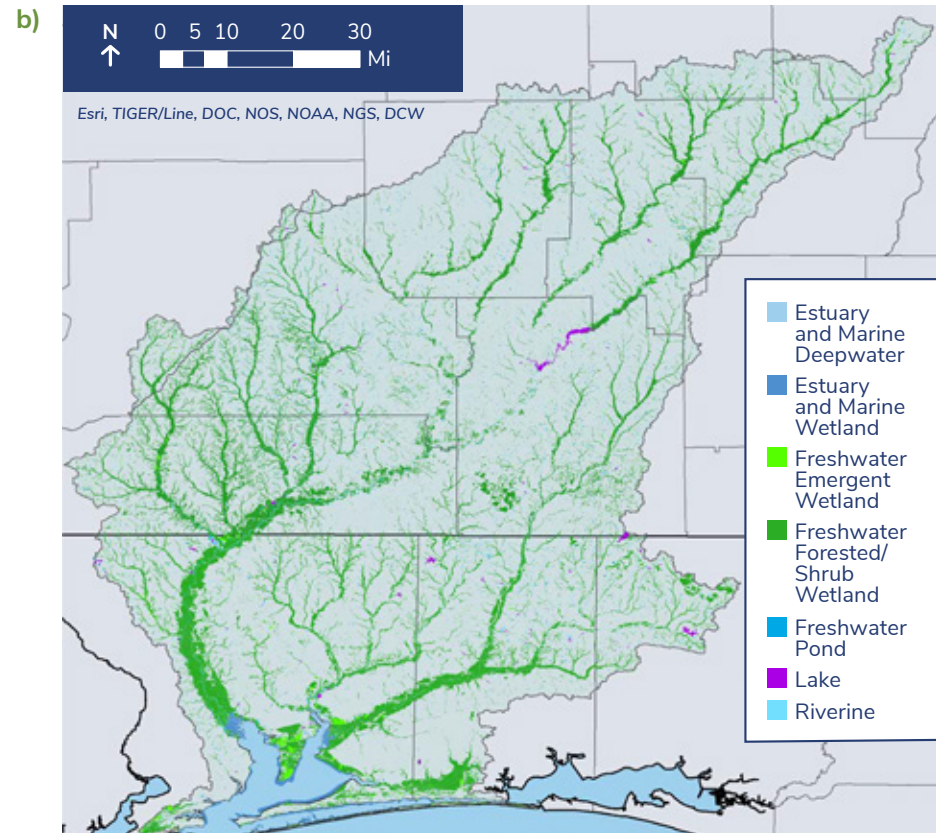
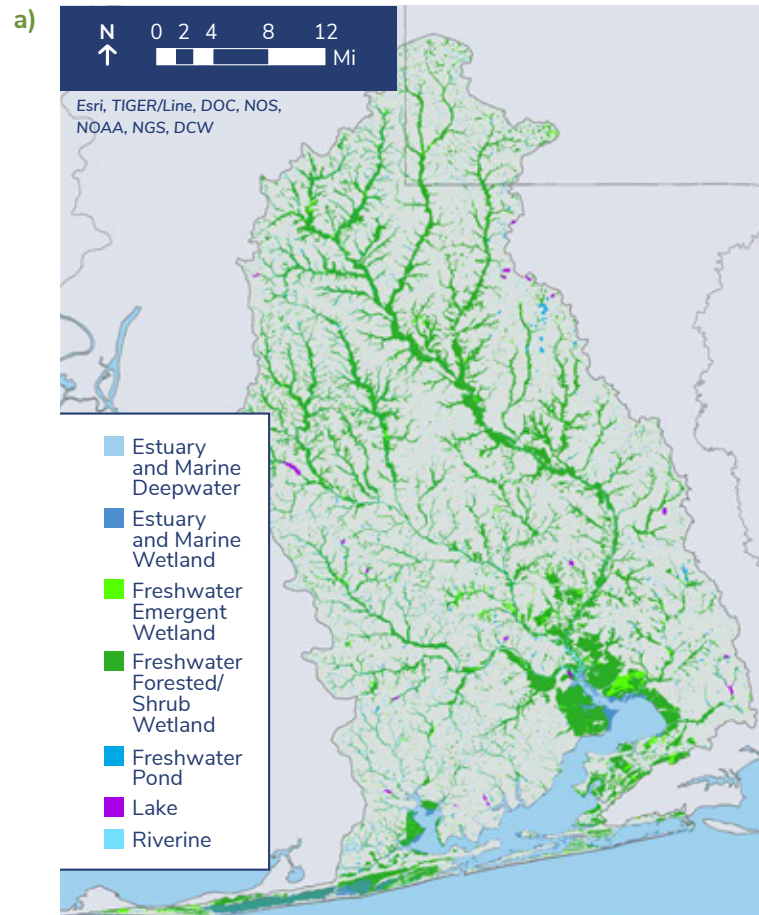


Map of the Gulf Coastal Plain Ecosystem Partnership Managed Lands in AL and FL



GOAL 5

- ➔ Yellow River Water Management Area
- ➔ Lower Escambia River Water Management Area
- ➔ Perdido River Water and Wildlife Management Areas
- ➔ Perdido Bay/Crown Pointe Preserve
- ➔ Lillian Swamp Complex
- ➔ Bayou Marcus Wetlands
- ➔ Conecuh National Forest
- ➔ Garcon Bayou Nature Park
- ➔ Graham Bayou Nature Preserve
- ➔ Bon Secour National Wildlife Refuge
- ➔ Splinter Hill Bog Preserve
- ➔ Gulf State Park
- ➔ Baycliff Preserve
- ➔ Covington Wildlife Management Area



Wetland Types in a) Perdido and b) Pensacola Bays Watersheds

Data: USFWS 2019



GOAL 5

Recognizing the importance of wetlands across the U.S., Congress enacted the Emergency Wetlands Resources Act (1986) which requires USFWS to regularly map the extent of wetlands and produce nationwide status and trends reports every decade (USFWS 2020). The Wetlands Status and Trends project comprises the monitoring component of the USFWS National Wetlands Inventory (NWI) program, which provides data for wetland science, management, and policy on local (regional) and national scales. In addition to the NWI program, the NWCA and NRSA are both nested under the EPA NARS and are conducted on a five-year cycle. NRSA supports a longer-term goal of determining whether the rivers and streams within the Nation's watersheds are getting cleaner and how to best invest in protecting and restoring them for future generations. PPBEP is currently collaborating with EPA staff to design and implement an intensification (similar to the previous intensification of the NCCA and NWCA) of NRSA in 2023.

Effective long-term comprehensive watershed monitoring is critical for evaluating ecosystem status and trends, predicting and informing future restoration and management efforts, and demonstrating programmatic success. The MSN was established in 2018 by researchers at MSU to track the expansion of mangroves along the northern GoM coastal counties including: Harrison and Jackson, MS; Mobile, Baldwin, and Escambia, AL; and Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, and Franklin, FL. MSN participating partner leads include representatives from academic institutions, Sea Grant Extension, National Estuarine Research Reserves (NERRs), and other local community organizations. In 2022, PPBEP became the lead coordinator for MSN. MSN is and will continue to be an example of successful collaboration across multiple states, counties, and waterbodies, allowing for enhanced data collection and tracking. Some partners have implemented community science programs to assist in completing the surveys, allowing for enhanced engagement and education of community members throughout the coastal watersheds.



Living Shoreline

Annabelle Rose Photography



GOAL 5

ACTION 5.3.1

[Wetlands] Conduct regular monitoring surveys to assess the condition of wetlands and buffer zones in the Pensacola and Perdido Bays watersheds

IMPLEMENTATION STRATEGY

Continue to conduct intensification of the NWCA for both watersheds

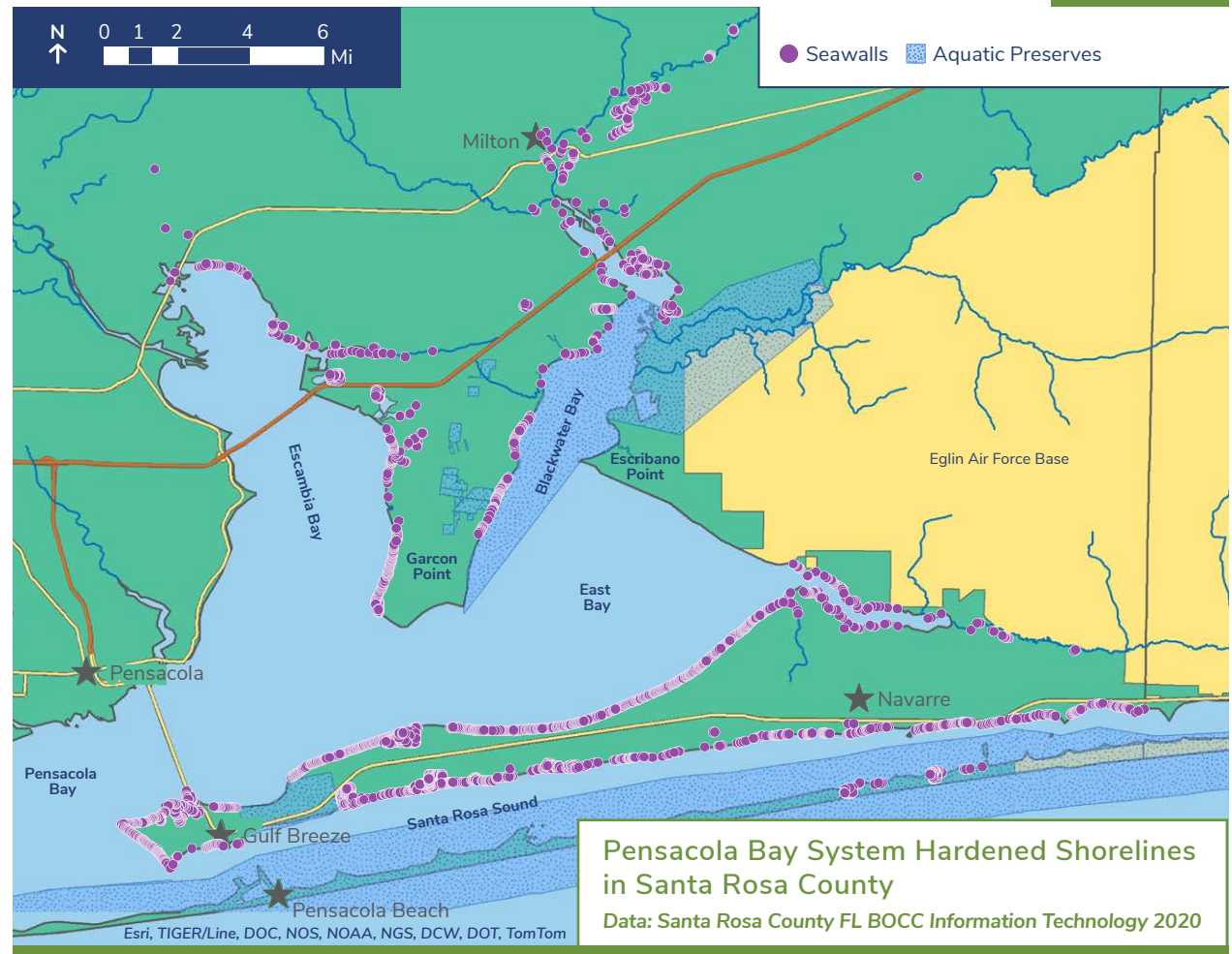
- 🕒 TIMEFRAME:** 2026 (every five years)
- 👥 PARTNERS:** Academia; EPA; Community science groups
- 🏠 PPBEP ROLE:** Leader
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Evaluation report of wetland condition indices in State of the Bays report
- 📊 PERFORMANCE METRICS:** Acreage and percentage of wetlands in each wetland condition category
- 📍 LOCATIONS:** Watershed-wide

ACTION 5.3.2

[Shorelines] Conduct a shoreline assessment of both watersheds to assess living versus armored shorelines

IMPLEMENTATION STRATEGY

Work with Program partners to synthesize existing information, fund future projects, conduct shoreline assessments, and develop LSSM



- 🕒 TIMEFRAME:** 2022
- 👥 PPBEP ROLE:** Collaborator
- 🏠 PARTNERS:** Santa Rosa County; Baldwin County; Troy University
- 💰 FUNDING:** Committed – EPA grant; NFWF grant

- ✅ DELIVERABLES:** Shoreline maps; Report of LSSM outputs; Recommendations for living shoreline prioritization
- 📊 PERFORMANCE METRICS:** Linear feet of living and armored shoreline assessed
- 📍 LOCATIONS:** Pensacola Bay watershed (future: Perdido Bay watershed)



ACTION 5.3.3

[Riparian] Conduct intensification for the EPA NARS NRSA

IMPLEMENTATION STRATEGY

Collaborate with the EPA and other Program partners to fund, plan, and implement an intensification for NRSA

- 🕒 TIMEFRAME:** 2023 – 2024 (every five years)
- 👤 PPBEP ROLE:** Leader
- 🤝 PARTNERS:** EPA; FWC; Academia; Community science groups
- 💰 FUNDING:** Pursuing
- ✅ DELIVERABLES:** Evaluation of river and stream condition indices in State of the Bays report
- 📊 PERFORMANCE METRICS:** Area or extent of stream condition for each classification
- 📍 LOCATIONS:** Watershed-wide

ACTION 5.3.4

[Mangroves] Coordinate and facilitate efforts to track expansion of mangrove species and synthesize data to communicate to the public

IMPLEMENTATION STRATEGY

Continue coordination and training for the northern GoM MSN

- 🕒 TIMEFRAME:** 2022 – 2026 (annually)
- 👤 PPBEP ROLE:** Leader; Coordinator
- 🤝 PARTNERS:** Sea Grant; NERRs; County Extensions; USM; USGS; TNC; Northeastern University
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Map of mangrove expansion of both species (black, red) updated annually; Annual report on seed production and mangrove growth indices
- 📊 PERFORMANCE METRICS:** Numbers of mangroves present in Pensacola and Perdido Bays systems
- 📍 LOCATIONS:** Northern GoM (regional)



Solitary Red Mangrove (*Rhizophora mangle*) Found near Naval Air Station Pensacola in Sherman Inlet

Geoff Smith, FWC



GOAL 5

ACTION 5.3.5

[Invasive species] Support removal and prevention activities for invasive species

IMPLEMENTATION STRATEGY

Coordinate with Program partners (CISMA and GCPEP) to support community science initiatives for documenting invasive species throughout the watersheds

- 🕒 TIMEFRAME:** 2022 – 2026
- 👤 PPBEP ROLE:** Promoter; Facilitator
- 👥 PARTNERS:** Sea Grant; Counties; UF-IFAS Extension; CISMA; GCPEP
- 💰 FUNDING:** Committed and Needed
- ✅ DELIVERABLES:** Outreach materials developed; Maps of area covered; List of invasive species reported
- 📊 PERFORMANCE METRICS:** Number of acres identified; Number of acres treated
- 📍 LOCATIONS:** Watershed-wide

ACTION 5.3.6

Define measurable habitat restoration and conservation targets (acres and condition) to support living resources, the economy, and biodiversity

IMPLEMENTATION STRATEGY

Collaborate with technical and community partners to develop short- and long-term targets based on the best available science

- 🕒 TIMEFRAME:** 2023 – 2026
- 👤 PPBEP ROLE:** Coordinator; Facilitator
- 👥 PARTNERS:** All partners
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Established list of measurable restoration and protection targets for native habitats (e.g., wetlands, shorelines, longleaf pines)
- 📊 PERFORMANCE METRICS:** List of measurable goals and targets; Identified progress toward reaching targets; Amount of funding dedicated and leveraged for achieving targets
- 📍 LOCATIONS:** Watershed-wide



**Beach Vitex Removal
in Pensacola Beach**
Rick O'Connor



GOAL 5

Objective 5.4

Coordinate with partners to identify and assess critical habitats of highest risk for imperiled and protected species

Objectives

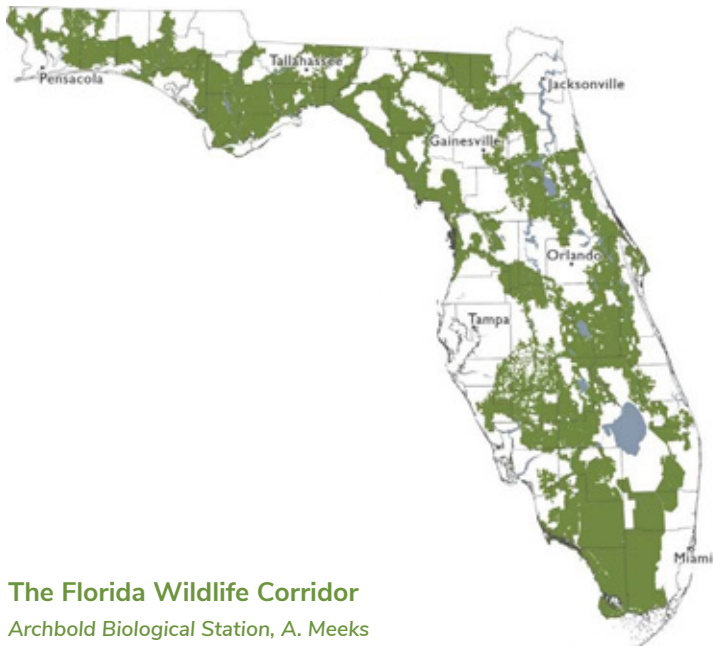
Partner with local groups to assess habitat fragmentation and the utility of wildlife corridors to protect current and future habitats in order to help conserve imperiled and protected species

Status

Not yet started

Related Actions

Habitat Action 5.3.5



The Florida Wildlife Corridor
Archbold Biological Station, A. Meeks

BACKGROUND

Wildlife corridors are natural, unfragmented pathways that permit the movement of wildlife during part or all of their life cycles. Protecting and restoring wildlife corridors is essential for conserving species, including imperiled and protected species. Wildlife corridors are particularly important for migratory species that rely on connected pathways and species with large home ranges (Chetkiewicz et al. 2006).

Wildlife corridors are at risk due to habitat fragmentation, which is becoming prevalent throughout the world as development increases to support the growing human population. Habitat fragmentation can lead to species loss and isolation, disrupting natural ecosystems. Land acquisition and conservation can be used as a strategy to preserve or reconnect important wildlife corridors.

The Pensacola and Perdido Bays watersheds are home to many imperiled and protected species with threatened wildlife corridors. An increase in watershed development has raised concerns over the state of wildlife corridors in these systems. AL and FL have long invested in strategic acquisitions of conservation lands to protect water resources and natural habitats through the Alabama Forever Wild Trust Fund and the Florida Forever Fund. In 2021, FL Governor DeSantis passed the Florida Wildlife Corridor Act, which strives to preserve continuous parcels of land throughout FL from national and state parks with open land tracts. PPBEP will build off this effort and coordinate with partners to prioritize land acquisition in the AL portions of the watersheds. Protection of wildlife corridors can benefit many species in the Pensacola and Perdido Bays watersheds (Table 3).

In February 2022, the Sentinel Landscape Partnership, formed in 2013 by the DoD, the U.S. Department of Agriculture, and the U.S. Department of the Interior, announced the adoption of the Northwest Florida Sentinel Landscape. The Northwest Florida Sentinel Landscape encompasses rural and agricultural lands, iconic longleaf pine forests, threatened and endangered species habitat, and all northwest FL's military installations. "The Northwest Florida Sentinel Landscape aims to enable collaborative efforts and provide greater access to



GOAL 5

funding assistance from federal, state, and local governments and private sector programs. These programs will be employed toward military mission assurance, restoring and increasing resiliency and sustainability of habitat and water resources, retaining working agriculture

and forest lands as compatible, resilient, and sustainable land uses; mitigating coastal risks, and increasing the climate resilience of military installations and the landscapes that overlap mission footprints" (Sentinel Landscape 2022).

TABLE 3. Species Endemic to the Pensacola and Perdido Bays Watersheds

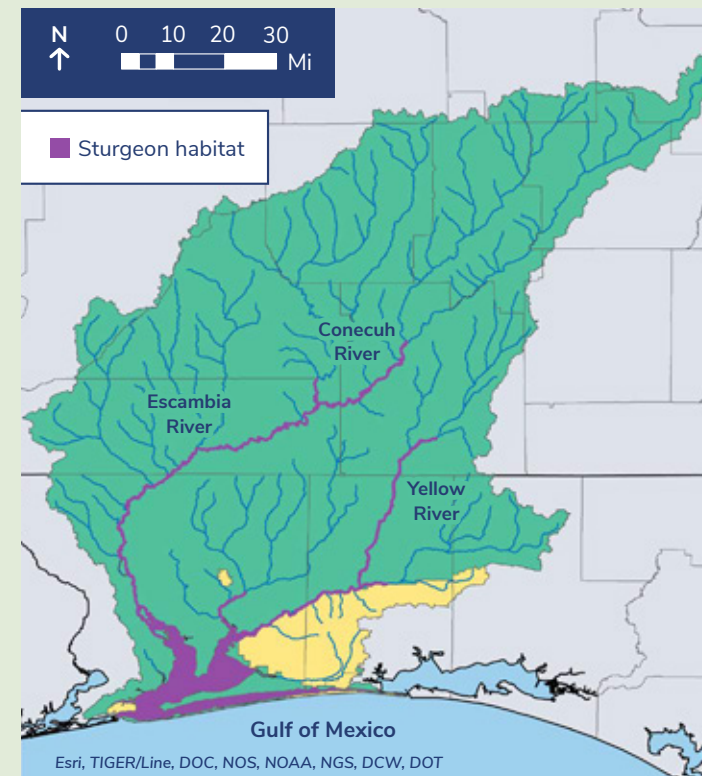
Common Name	Scientific Name	Range	Conservation Status (IUCN*)
Birds			
Red-Cockaded Woodpecker	<i>Picoides borealis</i>	Southeastern Coastal Plain	EN Endangered
Amphibians			
Fowler's Toad	<i>Anaxyrus fowleri</i>	Western FL Panhandle	LC Least concern
Bird-Voiced Treefrog	<i>Hyla avivoca</i>	Southeastern Coastal Plain	LC Least concern
Florida Bog Frog	<i>Rana okaloosae</i>	Okaloosa and Santa Rosa Counties, FL	VU Vulnerable
Cricket Frog	<i>Acris crepitans</i>	Western FL Panhandle	LC Least concern
Reticulated Flatwoods Salamander	<i>Ambystoma bishopi</i>	Slash and longleaf pine ecosystems west of the Apalachicola River	EN Endangered
Reptiles			
Yellow-Bellied Slider	<i>Trachemys scripta scripta</i>	Southeastern Coastal Plain	LC Least concern
Gopher Tortoise	<i>Gopherus polyphemus</i>	Southeastern Coastal Plain	TH Threatened
Fish			
Gulf Sturgeon	<i>Acipenser oxyrinchus desotoi</i>	Mississippi River, LA, to Suwannee River, FL	TH Threatened
Florida Sand Darter	<i>Ammocrypta bifascia</i>	Perdido River to Apalachicola, FL	LC Least concern
Crystal Darter	<i>Crystallaria asprella</i>	Escambia River drainage near the AL state line	TH Threatened

* International Union for Conservation of Nature



Gulf Sturgeon

Ryan Hagerty, USFWS



Gulf Sturgeon Habitat Range Extent in the Pensacola Bay Watershed

Data: DOC et al. 2003



GOAL 5

Common Name	Scientific Name	Range	Conservation Status (IUCN*)
Fish			
Choctawhatchee Darter	<i>Etheostoma davisoni</i>	Choctawhatchee and Pensacola Bays, FL, drainages	N/A
Brown Darter	<i>Etheostoma edwini</i>	Perdido River to St. Johns River, FL	LC Least concern
Harlequin Darter	<i>Etheostoma histrio</i>	Escambia River, FL, watershed	N/A
Speckled Darter	<i>Etheostoma stigmaeum</i>	Pensacola Bay, FL	LC Least concern
Saddleback Darter	<i>Percina vigil</i>	Escambia River, FL, watershed	LC Least concern
Bluenose Shiner	<i>Pteronotropis welaka</i>	Escambia county to St. Johns, FL	VU Vulnerable
Bivalves			
Narrow Pigtoe	<i>Fusconaia escambia</i>	Northwestern FL and southern AL	TH Threatened
Southern Sandshell	<i>Hamiota australis</i>	Northwestern FL and southern AL	TH Threatened
Alabama Moccasinshell	<i>Medionidus acutissimus</i>	AL, GA, MS	EN Endangered
Choctaw Bean	<i>Obovaria choctawensis</i>	Escambia River to Choctawhatchee River, FL	EN Endangered
Fuzzy Pigtoe	<i>Pleurobema strodeanum</i>	Northwestern FL and southern AL	TH Threatened
Southern Kidneyshell	<i>Ptychobranhus jonesi</i>	Northwestern FL and southern AL	EN Endangered
Round Ebonyshell	<i>Reginaia rotulata</i>	Conecuh River, AL	EN Endangered
Gulf Spike	<i>Elliptio pullata</i>	Escambia River to Suwannee River, FL	N/A
Southern Fatmucket	<i>Lampsilis straminea</i>	Amite River, LA, to Suwannee River, FL	N/A
Crustaceans			
Lavender Burrowing Crayfish	<i>Creaserinus byersi</i>	Pascagoula River, MS, to Escambia River, FL	N/A
Panhandle Crayfish	<i>Procambarus evermanni</i>	Escambia River at Flomaton and from Santa Rosa and Escambia Counties, FL	N/A
Mammals			
Perdido Key Beach Mouse	<i>Peromyscus polionotus trissyllepsis</i>	Perdido Key, FL and AL	N/A



Florida Bog Frog
FWC



GOAL 5

ACTION 5.4.1

Assess potential wildlife corridors and habitat fragmentation concerns for imperiled and protected wildlife species

IMPLEMENTATION STRATEGY

Coordinate with partners to assess and prioritize areas for land acquisition and restoration

- 🕒 TIMEFRAME:** 2023 – 2026
- 👤 PPBEP ROLE:** Facilitator
- 🤝 PARTNERS:** Longleaf Alliance; USFWS; ADCNR; DEP; FWC; TNC; La Florista Perdida; International Paper; Florida Wildlife Corridor Coalition; Forever Wild; DoD; Conservation Florida; South Alabama Land Trust; NFWFMD; GCPEP; Northwest Florida Sentinel Landscape
- 💰 FUNDING:** Needed
- ✅ DELIVERABLES:** Map of existing corridors and identified prioritized land parcels for conservation across Pensacola and Perdido Bays watersheds (focus on Perdido and Blackwater corridors)
- 📊 PERFORMANCE METRICS:** Number of parcels or segments added to Florida Wildlife Corridor; Number of acres restored within the watershed
- 📍 LOCATIONS:** Riparian buffer zones and forested lands throughout both watersheds; Wildlife corridors (Blackwater River State Forest, Eglin Air Force Base, Perdido Bay watershed)

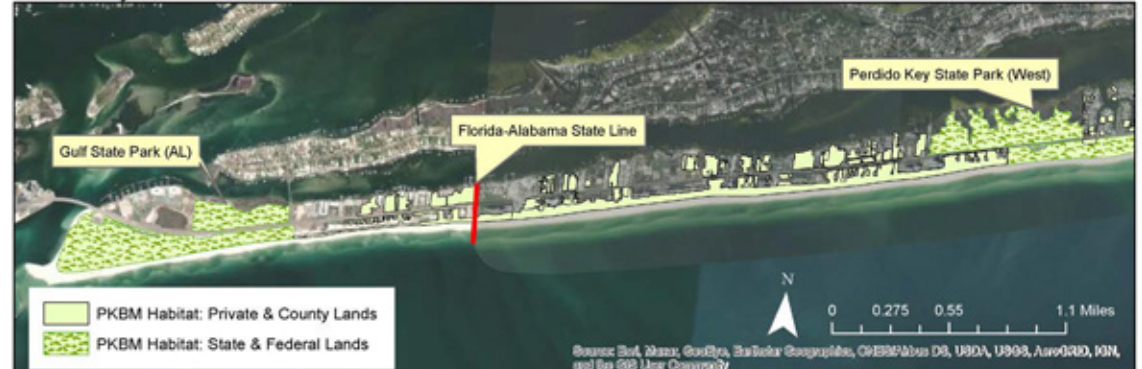


Perdido Key Beach Mouse
USFWS

Perdido Key East



Perdido Key West



Perdido Key Beach Mouse Habitat Range
Escambia County



GOAL 6

Restore and Conserve Fish and Wildlife

Diamondback Terrapin
Molly O'Connor



Objective 6.1

Collaborate on and communicate fish and wildlife monitoring efforts

Objectives

Increase regional monitoring capacity for fish and wildlife through collaboration and communication with partner organizations; Increase public awareness and participation in community science initiatives by advertising and promoting volunteer opportunities; Communicate the results of monitoring efforts to partners and the public through science dashboard tools available on the PPBEP website

Status

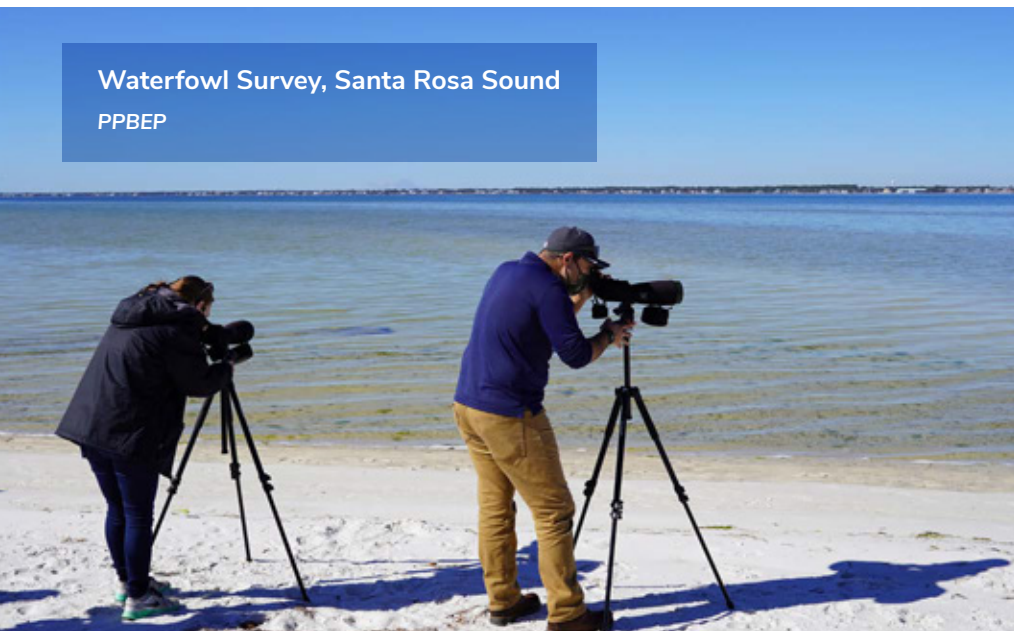
Not yet started

Related Actions

Education and Outreach Strategy Objective 2.1

Waterfowl Survey, Santa Rosa Sound

PPBEP



BACKGROUND

The Pensacola and Perdido Bays and their watersheds are home to a variety of imperiled or threatened species, migratory species, and endemic species, such as the loggerhead sea turtle, Perdido Key beach mouse, West Indian manatee, and snowy plover. Many species are economically important for commercial and recreational harvest or ecotourism. Other species play invaluable roles critical for ecosystem health and sustainability or provide direct benefits through ecosystem services (e.g., oysters). However, other introduced species can negatively impact habitat, compete with native species for resources, or cause direct harm through predation to native species assemblages (e.g., lionfish).

There are many regional and local efforts to monitor populations of interest. These efforts include both natural resource management agencies and community science initiatives. PPBEP will facilitate regional monitoring efforts of fish and wildlife by increasing monitoring capacity through collaboration and communication with partner organizations. PPBEP will increase public awareness and participation in community science monitoring programs by advertising and promoting volunteer opportunities.

PPBEP will also facilitate the communication of monitoring data both among partners and to the public. PPBEP will work toward increasing the visibility of existing monitoring programs by sharing program updates and results through newsletters and social media and incorporating data and reports into the PPBEP science dashboard and bibliography.



Snowy Plover with Chick
FWC



ACTION 6.1.1

Work with partners to increase the visibility of local community science initiatives and communicate volunteer opportunities and updates

IMPLEMENTATION STRATEGY

Coordinate and promote ongoing community monitoring and education efforts within the watersheds and disseminate data to public

 **TIMEFRAME:** 2022 – 2026

 **PPBEP ROLE:** Promoter

 **PARTNERS:** Escambia, Baldwin, Santa Rosa, and Okaloosa Counties; Audubon; City of Orange Beach; City of Pensacola; FWC; USFWS; Share the Beach; Sea Grant

 **FUNDING:** Needed

 **DELIVERABLES:** Shared efforts within the communities

 **PERFORMANCE METRICS:** Number of stakeholder groups represented; Monitoring metrics for represented wildlife (e.g., beach mice, sea turtles, birds); Number of social media posts pushed

 **LOCATIONS:** Primarily coastal counties (beaches, wetlands, upland forests, etc.)

Community Science Monitoring Initiatives Led by UF-IFAS Extension in the Pensacola and Perdido Bays Watersheds

Monitoring Effort	Locations Monitored	Partners	Project Duration
Terrapins	Escambia County	USGS	2007 – present
	Santa Rosa County		
	Okaloosa County		
	Walton County		
Scallops	Big Lagoon	None	2015 – present
Horseshoe crabs	Kees Bayou	FWC	2021 – present
	Park West West		
	Park West East		
	Little Sabine South		
	Little Sabine North		
	Morgan Park		
	Mom Beach		
	Sharp Point		
Invasive species	Big Sabine	None	2014 – present
	Pensacola Beach		
	Naval Live Oaks Nature Preserve		
	Perdido Key		
	Fort Pickens Jetties		
	Navarre Beach		
	Innerarity Point		
	Perdido Bay		
	Shoreline Park		
	Santa Rosa Boat Ramps		



Objective 6.2

Coordinate and expand fisheries monitoring capacity within the Pensacola and Perdido Bays systems

Objectives

Facilitate the regular monitoring of estuarine aquatic species assemblages with an emphasis on fisheries species and fish communities through collaboration and partnerships

Status

Not yet started



BACKGROUND

Some of the first known accounts of fisheries surveys conducted in the Pensacola Bay system date back to the late 1800s which described the diversity of the fish community (Lewis et al. 2016). Regional branches of the EPA and the Florida Fish and Wildlife Commission (FWC) Fish and Wildlife Research Institute (FWRI) have conducted fisheries-independent monitoring in estuarine and freshwater environments throughout the Pensacola and Perdido Bays watersheds since the 1980s. Following the many fish kills in the 1960s and 1970s, BFA and UWF conducted trawling and creel surveys to assess fish abundance, condition, diversity, and size frequency. Most of these efforts have been conducted sporadically through time and do not provide continuous monitoring to evaluate status and trends of communities over time.

More recently, monitoring across the bay systems has been episodic and patchy with relatively low spatial and temporal coverage in coastal areas throughout the Pensacola and Perdido Bays. Program staff at the FWC Apalachicola Field Laboratory implemented monitoring from 2017–2019 as part of their Fisheries Independent Monitoring (FIM) Program, a project funded by NRDA. The FIM team conducted monthly monitoring from July to December following a stratified random sampling design in Pensacola Bay and Santa Rosa Sound. Seine nets (river and bay) were used to collect young-of-the-year fish in tidal tributaries and bay environments. In addition to previous FIM monitoring, FWRI's Garcon Point Aquatic Research Lab, one of the Institute's 28 field labs located throughout FL, has conducted research on imperiled freshwater fish species in the Perdido, Escambia, Yellow, and Blackwater Rivers since 2005. As part of their monitoring program, they assess status and trends of sport fish and cryptic species, including species of shiner, darter, gar, and the Gulf sturgeon, throughout rivers and streams. In the AL portions of the watershed, ADEM has collected fish in areas of known or suspected contamination throughout Escambia and Baldwin Counties for analysis of contaminant levels since 1970 as part of their annual Fish Tissue Monitoring Program (ADEM 2021). In 1991, ADEM expanded the program to be a cooperative statewide effort between



ADEM, the Alabama Department of Public Health, and ADCNR.

During the PPBEP Technical Committee workshop series conducted in spring 2022, stakeholders identified fisheries monitoring data needs. Some needs identified included population trends over time, fish recruitment to seagrass beds and oyster reefs, tropicalization trends and species shifts, and more consistent fish community monitoring across both watersheds. In fall 2022, PPBEP will fill a gap in monitoring of fish and invertebrate communities within the bays and sounds by partnering with researchers at DISL, who have conducted otter trawl surveys of seagrass communities in Pensacola and Perdido Bays since 2005, to assess juvenile fish species composition and habitat quality for economically important finfish and shellfish. As part of the Community Grant Program, researchers at DISL have been collecting video footage of fish communities utilizing remnant and restored oyster reefs in East, Pensacola, and Blackwater Bays using a passive method of data collection. This work will serve as a baseline of information for future oyster restoration and management efforts. PPBEP will also work to expand regional monitoring efforts and capacity by increasing the spatial coverage, number of species and habitats targeted, and frequency of monitoring through increased collaboration and partnerships.

ACTION 6.2.1

Conduct seagrass trawling surveys to assess juvenile fish and shellfish communities and habitat quality

IMPLEMENTATION STRATEGY

Leverage existing efforts and identify funding for the continuation of trawling surveys (long-term dataset) within seagrass beds in the bays to collect valuable juvenile fish and shellfish information; Expand FIM to Pensacola and Perdido Bays

- 🕒 TIMEFRAME:** 2022 – 2026
- 👤 PPBEP ROLE:** Collaborator
- 🤝 PARTNERS:** DISL; FWC/FWRI; EPA
- 💰 FUNDING:** Committed – EPA grant
- ✅ DELIVERABLES:** Map of spatial coverage of monitoring locations; Report on fish and invertebrate abundance, diversity, and size; FWC report
- 📊 PERFORMANCE METRICS:** Number of monitoring events; Sampling effort; Species composition and abundance; Fish length frequency
- 📍 LOCATIONS:** Seagrass and SAV beds throughout the coastal and estuarine waters of Pensacola and Perdido Bays



Gray Snapper Caught during Trawling Survey
PPBEP



Objective 6.3

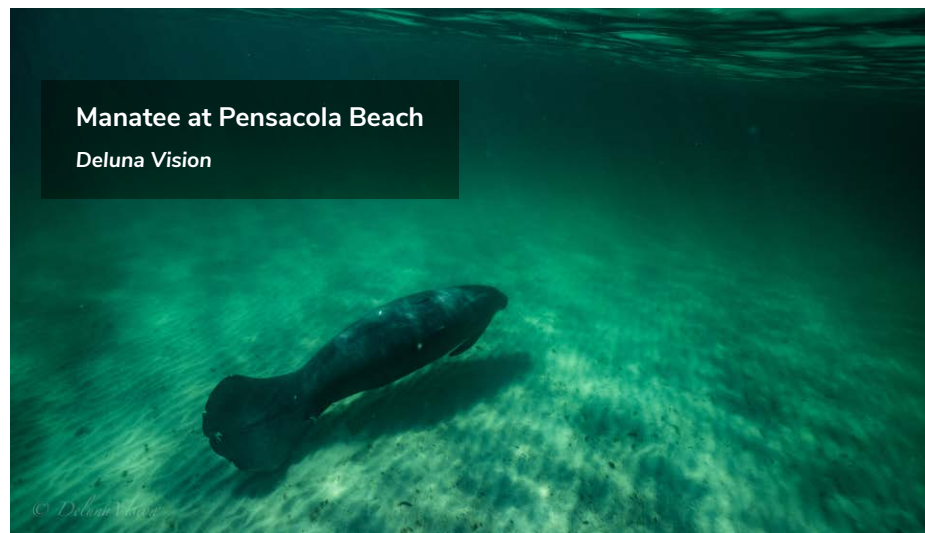
Increase regional monitoring capacity for marine mammals

Objectives

Continue to support DISL and NWF in obtaining manatee sighting information for Pensacola and Perdido Bays systems; Increase public awareness to document and report manatee sightings to panhandlemanatee.org, a partnership among PPBEP, DISL, NWF, and UF-IFAS Extension

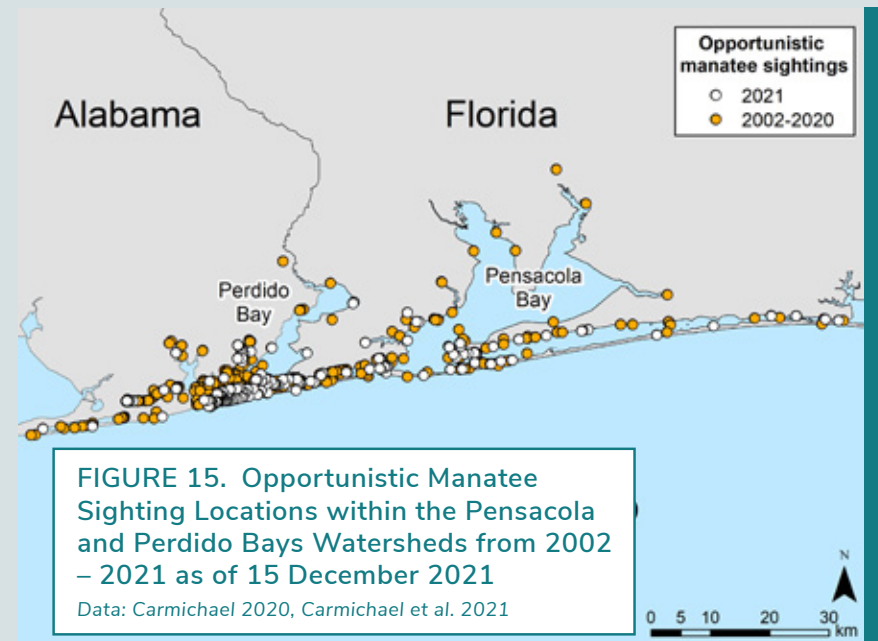
Status

Ongoing. PPBEP continues to house the panhandlemanatee.org website to facilitate quick and easy reporting from the public for manatee sightings. During summer 2021, the Panhandle Manatee Program distributed boater education kits and performed outreach at boat ramps, marinas, and local festivals to educate boaters and the public on safe boating practices around manatees and reasons why reporting manatee sightings is important. During summer 2022, outreach efforts will be expanded to other target groups, such as anglers, coastal residents, visitors, and businesses.



BACKGROUND

Manatees are an important keystone species for GoM rivers and estuaries, helping to sustain healthy seagrass beds. Historically, manatee range extent has been confined to peninsular FL where temperatures are higher than those in the northern GoM. Due to rising temperatures and the increasing manatee population, manatees have expanded their range to the northern GoM. In 2008, DISL in AL established the Manatee Sighting Network (MSN) to collect, map, and track manatee movements in the northern GoM, mainly outside of FL between AL and MS. Manatees are warm season migrants to the northern GoM and need to migrate back to peninsular FL in the colder months to reduce the likelihood of cold stress, which kills many manatees in the northern GoM during the colder months. Since the inception of MSN, manatee sightings have become more frequent in the northern GoM and potentially in the Pensacola and Perdido Bays systems (Figure 15). Reasons for increased manatee sightings could

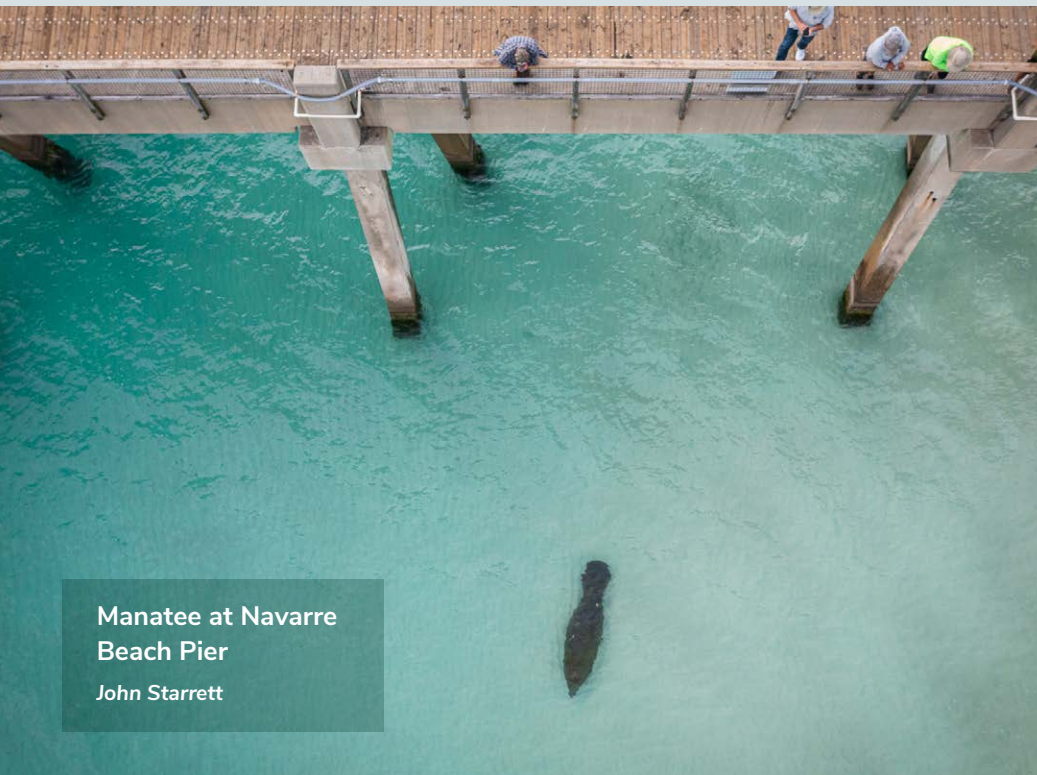




GOAL 6

include increased effort on the public's part in sighting manatees and/or range expansion and population growth of manatees due to rising temperatures and manatee conservation efforts. To increase spatial coverage of MSN, the Panhandle Manatee Program partnership was formed among PPBEP, DISL, and NWF to collect manatee sighting data from the Pensacola and Perdido Bays systems and create a website that reports all data back to MSN to house in a centralized database. Maps with quarterly manatee sightings will be posted on the panhandlemanatee.org website to share information collected with the public. This partnership will address data gaps in manatee sightings in the Pensacola and Perdido Bays systems.

Additionally, human recreational activities, such as boating, can put manatees at risk for negative human interactions. Boating strikes are particularly problematic for manatees, which are slow travelers residing near the surface and are difficult to see in the turbid waters of the Pensacola and Perdido Bays systems. To educate the public on safe boating practices, the Panhandle Manatee Program developed boater education kits to distribute to boaters at boat ramps and marinas surrounding Pensacola and Perdido Bays. Furthermore, the Panhandle Manatee Program hosts booths at local festivals to educate the public about manatee presence in the PPBEP waterways and to promote the use of panhandlemanatee.org to report sightings. This work will feed into local manatee conservation in the area while also assisting in data collection for MSN.



Manatee at Navarre
Beach Pier

John Starrett



Manatee in Ono Island Canal
Located in Perdido Bay

Anonymous DISL/MSN Contributor



ACTION 6.3.1

Increase long-term monitoring of manatee sighting coverage in Pensacola and Perdido Bays systems using PanhandleManatee.org

IMPLEMENTATION STRATEGY

Continue to partner with DISL, NWF, and Sea Grant Extension to update and maintain the Manatee Sighting Network database (DISL); Maintain and update Panhandle Manatee website with current data and reporting resources

- TIMEFRAME:** 2021–2026
- PPBEP ROLE:** Collaborator; Promoter
- PARTNERS:** DISL; NWF; Sea Grant Extension; Community science groups
- FUNDING:** Pursuing
- DELIVERABLES:** Develop panhandlemanatee.org; Maps of sighting locations
- PERFORMANCE METRICS:** Change in annual manatee sightings over time; Change in geographic extent of sightings; Number of Panhandle Manatee website hits and reports through website; Number of people reached through outreach campaigns
- LOCATIONS:** Coastal areas throughout watersheds (rivers, creeks, bays, bayous, sounds, coastal zone); Areas with seagrass and SAV



Jessica Bibza with Panhandle Manatee Volunteers
Panhandle Manatee



In memory of
Jessica Bibza,
dedicated manatee
advocate and
Panhandle Manatee
founder

Accomplishments

The Pensacola & Perdido Bays Estuary Program (PPBEP) was built upon an existing foundation of long-standing partnerships and activities to address the health of the Pensacola and Perdido Bays and associated watersheds. As such, PPBEP has already made notable progress toward the activities outlined in the Action Plan. Although efforts are on-going, highlights as of July 2022 are described below.

Footprints in the Sand Eco-Trail,
Pensacola Beach
PPBEP

National Aquatic Resource Surveys

The National Aquatic Resource Surveys (NARS) are collaborative programs among the U.S. Environmental Protection Agency (EPA), states, tribes, and other organizations designated to assess the quality of the Nation's coastal waters, lakes, streams, and wetlands using a statistical survey design (EPA 2022). In 2019, PPBEP identified the EPA's National Coastal Condition Assessment (NCCA) and the National Wetland Condition Assessment (NWCA) as potential partnership opportunities to develop baseline condition assessments of the Pensacola and Perdido Bays coastal waters and estuarine wetlands (Figure 16).

The NCCA, a national coastal monitoring program established in 2005, is a statistical survey of the condition of the Nation's marine coastal waters and Great Lakes that occurs every five years. The goals of the NCCA are to determine what percentage of coastal waters are in good, fair, or poor condition for key indicators of water quality, ecological health, and recreation and to evaluate the relative importance of key stressors in coastal environments. The goals of the NWCA are to understand wetland health by providing information on key ecological indicators and to determine the stressors most associated with poor condition. The NCCA evaluates four indices: water quality, sediment quality, benthic community condition, and fish tissue contaminants. The NWCA evaluates vegetation, soil, hydrology, water chemistry, algae, and buffer characteristic indices. These assessments are meant to complement existing status and trend

programs throughout the U.S., including the U.S. Fish and Wildlife Service (USFWS) Wetland Status and Trends Program, which characterizes changes in wetland coverage over time across the U.S.

PPBEP had the unique opportunity to partner with the EPA Office of Research and Development and Region 4 staff and other local partners (e.g., Escambia County Water Quality and Land Management Division and

Marine Resources Division, Florida Fish and Wildlife Conservation Commission [FWC], University of Florida [UF]) to design and conduct intensifications for both the NCCA and NWCA to assess conditions on a smaller local scale. Each intensification expanded on the base design to include an additional 24–30 randomized sites throughout the watersheds using the EPA's standardized methods. Due to COVID-19 restrictions and Hurricane Sally, the NCCA was



FIGURE 16. Map showing National Wetland Condition Assessment (NWCA) sites in brown and National Coastal Condition Assessment (NCCA) sites in blue. Sites were assessed in partnership with the U.S. Environmental Protection Agency in 2021.

postponed from August 2020 to June 2021 to overlap with the NWCA, which was conducted from May through August 2021. EPA and PPBEP staff coordinated sampling itineraries with agencies that were contracted to sample base sites for the original NCCA and NWCA designs, including the Alabama Department of Environmental Management (ADEM), the Fish and Wildlife Research Institute (FWRI), and UF. The data collected from both assessments will be presented in the Program's State of the Bays report. Both efforts have provided a foundation for PPBEP to build on existing networks and partnerships to conduct watershed-wide monitoring to track various status and trends across the watersheds.

\$ Funding: FL State Appropriations | \$140,000

P Leverage: EPA Region 4 | In-kind Support

Partners: EPA; Escambia County; FWC; UF

✓ Outputs: Coastal Condition Assessment; Estuarine Wetlands Condition Assessment

🕒 Timeline: Complete (November 2021)



NCCA Group Photo
GEMMD

Related Actions

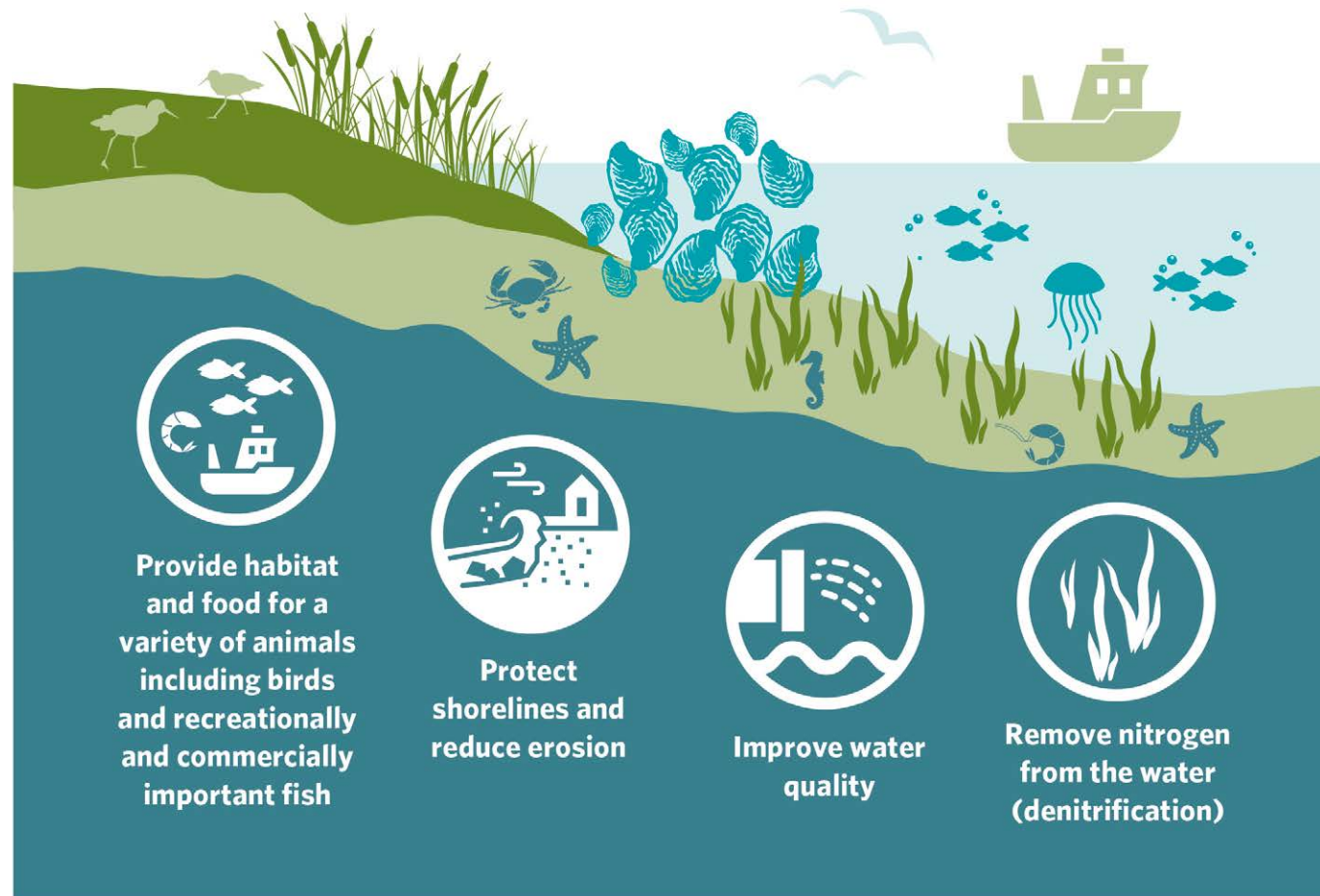
3.1.1

4.1.1

5.3.1

Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System

The Pensacola Bay system (PBS) has experienced a 72% decline in oyster reef extent since the 1960s, which has triggered impacts on the community, economy, fishery, and the surrounding ecosystem (Radabaugh et al. 2019). In 2018, The Nature Conservancy (TNC) convened a working group of scientists, government and business representatives, oystermen, community groups, and engineers as part of a collaborative and consensus-based planning effort to develop a management plan for oysters in the PBS. FWC and the Florida Department of Agriculture and Consumer Services (FDACS) assisted TNC in initiating the planning process in the absence of a statewide plan. The Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System, published in May 2021, addresses management of wild oyster harvest and aquaculture farming in harmony with the recovery of oyster habitat and aims to serve as a model for management of oyster resources across other FL estuaries, throughout the U.S., and globally. To ensure the implementation of the Oyster Plan, PPBEP committed to integrating the top priorities identified in the Oyster Plan into the Comprehensive Conservation and Management Plan (CCMP).



Ecosystem Services Provided by Oyster Reefs

TNC

The Plan includes four primary outcomes:

- A** **Ecology:** By 2030, the oyster reef ecosystem within the Pensacola Bay is managed in a sustainable manner providing measurable ecosystem services.
- B** **Wild Harvest and Aquaculture:** By 2030, oyster reefs in the PBS support a sustainably managed and productive fishery and aquaculture industry supported by stakeholders, using the best available science and monitoring to manage and regulate fishery and aquaculture activities in a fair and equitable manner.
- C** **Economy:** By 2030, recovery of the Pensacola Bay ecosystem spurred by restoration of oyster reef ecosystems, a sustainable oyster fishery, and development of aquaculture has led to a thriving economy that provides opportunities for sustainable and responsible industry, development, business, recreation, and tourism.
- D** **Public Education and Communication:** By 2030, PBS stakeholders are informed of the importance of sustaining the health of the Bay System and work actively to invest in and implement the Plan.

Oysters in Cage
PPBEP

The Oyster Plan is intended to be a living document adapted as new data sources become available, projects are completed, and environmental conditions change. As part of this science-based management effort, TNC was able to compile existing stakeholder data to develop a Habitat Suitability Model (HSM), which incorporates a set of environmental indicators to identify the most promising areas for oyster reef restoration, wild oyster harvest and aquaculture, and ecosystem services regeneration. The HSM informed the Oyster Plan's priorities and strategies and continues to act as a guide for future planning efforts and CCMP implementation.

- \$ Funding:** TNC Florida
- P Leverage:** 800 hours collectively invested by Working Group members
- 👥 Partners:** Working Group members
- ✓ Outputs:** Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System
- 🕒 Timeline:** Complete (May 2021)

Related Actions

5.1.1

5.1.2

5.1.3

5.1.4

Oyster Mapping and Condition Assessment

Partners at TNC led a mapping and condition assessment of oyster reefs in the PBS through a grant provided by Santa Rosa County's Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) Direct Component funds. Project mapping was completed in August 2021. Preparation for oyster habitat mapping included an analysis of the data gaps in oyster resources from East and Blackwater Bays to establish a baseline of the extent and condition of existing oyster reefs. Oyster habitat mapping included compiling and preparing aerial imagery, existing maps, and associated geographic information system (GIS) shapefiles of intertidal and subtidal oyster reef habitat in the project region. This was followed by a side-scan sonar survey (acoustic measure of variations along the bottom) along transects covering a certain acreage of the bay systems, which were divided into study areas. To ground truth bottom characteristics, polling surveys were conducted to determine bottom type along each transect (e.g., sand, buried shell, reef, soft bottom) and oysters were collected from areas where reefs were present to assess condition and density.

The same survey and assessment design was used for Pensacola and Escambia Bays using funds provided by the FL State Appropriations awarded to PPBEP. These two assessments provide comprehensive information on the remnant and restored oyster reefs in the PBS and fill a critical data gap that had been identified by stakeholders in the Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System. These data sources were used to create preliminary maps of oyster habitat and suitability and make recommendations for future bay-wide oyster restoration and management. Oyster reef data layers and oyster condition indices were incorporated into the most recent update of the Oyster Integrated Mapping and Monitoring Program (OIMMP) Report for the Northwest FL Chapter led by FWC and partners.

- \$ Funding:** FL State Appropriations | \$120,000
- P Leverage:** Santa Rosa County; TNC | \$150,000
- 🔄 Partners:** TNC; Santa Rosa County
- ✓ Outputs:** Oyster reef extent maps; Oyster condition assessment for PBS
- 🕒 Timeline:** Complete (August 2021)

Related Actions

[4.4.1](#)
[5.1.3](#)
[5.1.4](#)


White Sands Conservation Area, Navarre
PPBEP

Oyster Documentary

Restoration of oyster reefs is a critical component of managing the ecological health of the Pensacola and Perdido Bays systems. Impacts on oyster reefs are generated throughout the watershed, from the first order streams down through the bayous and bays. It is critical to the success of the CCMP to ensure that a significant percentage of the general population understand the importance of ecological restoration and environmental management, which this project will assist with.

The Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System identified the creation of an oral history project as an important action to help increase public awareness and support for a healthy and well-managed oyster habitat and fisheries and the ecosystem services they provide.

PPBEP has partnered with Mississippi State University (MSU) to facilitate the creation of a half-hour documentary investigating the history of the area's oyster industry, the current and future threats to the oyster industry, and steps being taken today and in the future to protect and preserve the oyster industry.

The documentary will feature interviews with select local oyster harvesters, oyster seed producers, area historian(s), and others involved in the oyster industry to provide a firsthand account of the industry's history, hardships, and

outlook. In addition to these expert interviews, the film will follow select individuals as they go about their work in the oyster industry; these characters will provide the emotional and human connection to the story, allowing viewers to experience the oyster industry through their eyes and thoughts.



Funding: PPBEP EPA Grant
| \$50,000



Partners: MSU



Outputs: Oyster documentary to air on local Public Broadcasting Service affiliates



Timeline: December 2022

Related Actions

5.1.4

Education and Outreach Strategy 2.3.1

Education and Outreach Strategy 2.4.3



Oyster Farm Maintenance
Avalon Aquaculture



Styx River
UWF

Upper Watershed Streams Assessment

Partners at the University of West Florida (UWF) and The Bream Fishermen Association (BFA) will conduct a condition assessment of the upper Perdido River, Escambia River, Conecuh, Yellow River, and Shoal watersheds to generate meaningful data to fill stakeholder-identified water quality data gaps. The study will establish 24 sampling stations that aim to fill spatial and temporal data gaps identified by the gap analyses conducted by Florida RESTORE Act Centers of Excellence Program (FLRACEP) staff at UWF and UF that were presented as part of the Technical Committee workshop series in spring 2021 to support CCMP development. Sites will be selected in areas with clear data gaps based on a gradient of land use characteristics to inform potential impacts to waterways and bays downstream. The assessment will include water quality parameters including microbiology, chemical, and physical characteristics. There will be five sampling events at each of the stations throughout 2022. This work will also serve as a baseline for a future intensification of the EPA's National Rivers and Streams Assessment (NRSA) that will be led by PPBEP.

- Funding:** PPBEP EPA Grant | \$75,000
- Partners:** UWF; BFA
- Outputs:** Upper Watersheds Condition Assessment
- Timeline:** December 2022

Related Actions

5.3.3

Trawling Survey

Researchers at Dauphin Island Sea Lab (DISL) have regularly sampled juvenile fish communities in seagrass beds across the northern Gulf of Mexico (GoM) since 2005, including Perdido Bay, Big Lagoon, Pensacola Bay, and Santa Rosa Sound (Fodrie et al. 2010, 2011). The purpose of these studies has been to document species composition, with particular interest in the increasing number of tropically associated species that have recently become more abundant in the northern GoM estuaries (e.g., snappers, groupers, parrotfishes). These data also illustrate the value of seagrass nurseries for commercially and recreationally important species of fish. Although these surveys are normally conducted annually, since 2020 there have been interruptions in sampling efforts due to COVID-19 restrictions and other limitations.

School of Pinfish Foraging in a
Seagrass Bed in Lower Perdido Islands
DISL

PPBEP is partnering with researchers from DISL to conduct this survey across the Pensacola and Perdido Bays systems in September 2022 to fill a critical data gap in juvenile fish community composition and abundance. The survey, using established methods (Fodrie et al. 2010), will be conducted using a 16-ft otter trawl with float and lead lines towed behind a small research vessel. Trawls will cover a mosaic of seagrass beds that include Turtle Grass (*Thalassia testudinum*), Widgeon Grass (*Ruppia maritima*), Shoal Grass (*Halodule wrightii*), and Manatee Grass (*Syringodium filiforme*). Fish species collected will be identified, enumerated, and measured. Site-specific information including distance traveled (for each trawl) and water depth will be recorded in addition to water quality parameters including salinity, temperature, and dissolved oxygen. This information will add to an existing long-term dataset and will inform changes in conditions across the estuaries, future restoration efforts, and predict future changes.



Funding: PPBEP EPA Grant | \$15,000



Partners: DISL



Outputs: Final report with 2022 catch per unit (CPU) data



Timeline: October 2022

Related Actions

6.2.1

Living Shoreline Suitability Model

PPBEP partnered with Santa Rosa County and researchers at Troy University to evaluate coastal processes and shoreline conditions within the Pensacola Bay system by running a GIS-based Shoreline Management Model (SSM V5.1) originally developed by the Virginia Institute of Marine Science. Some of the variables used in this model include fetch, bathymetry, bank condition and height, existing habitat extent (e.g., submerged aquatic vegetation [SAV], marsh, beach), and existing shoreline defense structures. The model was developed to guide decision making of local governments, marine contractors, property owners, and natural resource managers. The shorelines throughout Escambia, Pensacola, East, and Blackwater Bays, Santa Rosa Sound, and Big Lagoon were evaluated (2021–2022) and a Living Shoreline Master Plan was developed based on model outputs. Best Management Practice (BMP) recommendations for shorelines were published in an [Esri ArcGIS StoryMap](#) and “[The Pensacola Bay Watershed Living Shoreline Suitability Model Operator’s Manual](#)” (Boyd et al. 2022a, 2022b; Boyd and Niu 2022). The manual provides background on the benefits of living shorelines and outlines the steps for the viewer. Model outputs will assist in predicting the best management practices for coastal properties and determining which may be suitable for living shorelines.

This project will help fill a data gap by covering over 65 miles of shoreline along the FL portions of the upper and lower Perdido Bay system to help support future living shoreline site selection, restoration, and coastal resilience planning for the greater Pensacola and Perdido region.

- \$ Funding:** PPBEP EPA Grant | \$30,000
- P Leverage:** National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund; Santa Rosa County; PPBEP | \$74,000
- 👤 Partners:** Troy University; Santa Rosa County
- ✓ Outputs:** Living Shoreline Suitability Model; Story Map
- 🕒 Timeline:** December 2022

Related Actions

[2.3.2](#)
[5.3.2](#)


Garcon Point
Darryl Boudreau, NFWFMD

Seagrass Extent Mapping

The Program has partnered with researchers at DISL to map seagrass extent using multispectral digital imagery throughout the Pensacola and Perdido Bays systems. This project will build on an existing mapping effort DISL is conducting in coastal AL by expanding coverage into the FL portion of Perdido Bay as well as Pensacola Bay. The flight lines used to obtain photography will include areas with known and potential SAV. Imagery will be collected in late summer into early fall 2022 to capitalize on the peak growing season.

The project deliverables will be used to update existing seagrass coverage maps for the Pensacola and Perdido Bays systems and will be a continuation of previous efforts conducted in coastal AL and FL lead by UWF, DISL, and FWC. This project will assist in filling a data need for the two PPBEP bay systems and will provide the data necessary to make future management decisions for the protection and restoration of seagrass and SAV beds.

\$ Funding: PPBEP EPA Grant | \$60,000

P Leverage: DISL | \$100,000

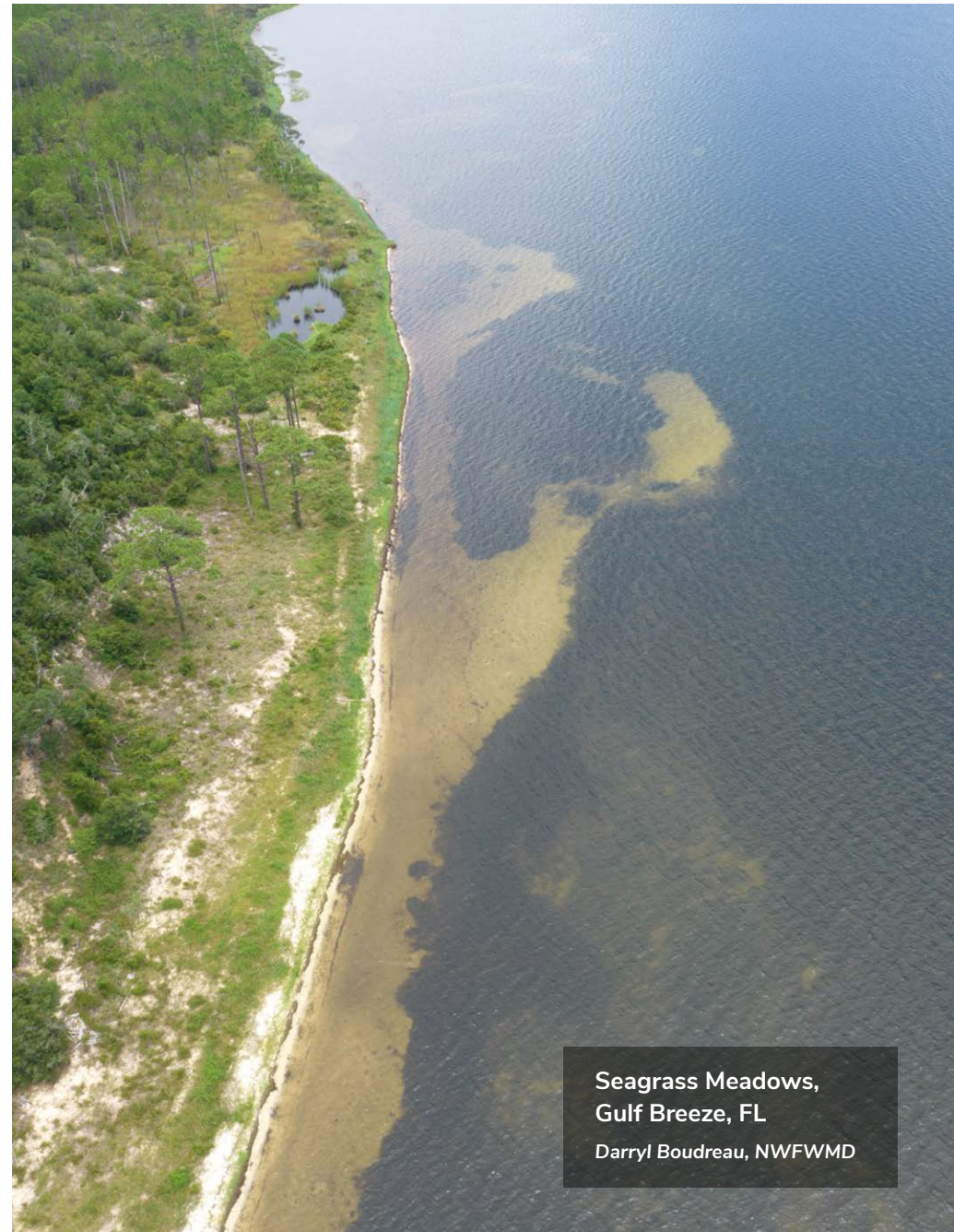
👤 Partners: DISL

✓ Outputs: Seagrass extent maps for the Pensacola and Perdido Bays systems

🕒 Timeline: December 2022

Related Actions

5.2.1



Seagrass Meadows,
Gulf Breeze, FL

Darryl Boudreau, NFWMD

Seagrass Monitoring

Restoration of seagrass habitat is a critical component of managing the ecological health of the Pensacola and Perdido Bays systems. To effectively establish and monitor targets for CCMP actions, PPBEP requires accurate and current data on the extent and condition of existing seagrass beds.

The Program partnered with the University of Southern Mississippi's Gulf Coast Research Lab (GCRL) to implement a fixed station annual seagrass monitoring program in the Pensacola and Perdido Bays systems that will provide information on the ecological condition of seagrasses. This project will implement Tier 2 monitoring at 110 stations across the Pensacola and Perdido Bays systems. Each station will be monitored for 1) seagrass condition indicators including seagrass percent cover by species, seagrass canopy height, and reproductive status; and 2) environmental parameters including water depth, salinity, dissolved oxygen, pH, temperature, total suspended solids, turbidity measured as secchi depth, light availability, and presence or absence of attached and drift macroalgae.

This data will be paired with the collection of sediment cores for quantification of seagrass dormant seed densities with Tier 2 stations to further understand plant demographics and the potential for seagrass expansion and/or recovery from seed following a disturbance.

\$ Funding: PPBEP EPA Grant | \$50,000

P Leverage: GCRL In-kind Support | \$15,000

Partners: GCRL

✓ Outputs: Seagrass map products and visuals; Tier 2 monitoring data summary; Seagrass seed density data summary

🕒 Timeline: December 2022

Related Actions

5.2.1

The resulting spatial and temporal data on the distribution and condition of seagrasses will be used by PPBEP to:

Serve as a present-day baseline of seagrass distribution and condition

Further understand the potential for seagrass expansion or recovery by seed

Predict seagrass response to future changes

Inform decision-making processes for conservation and management of coastal nearshore species, including those of commercial and recreational importance

PPBEP

Building Resilience into Seagrass Bed Restoration: The Role of Genetic Variation

Research has shown that increasing genetic diversity (range of different inherited traits within a species) can enhance community resistance to a disturbance (e.g., grazing event, storms) or environmental stressors (e.g., high temperature, low light) (Hughes and Stachowicz 2004, Reynolds et al. 2012). Therefore, restored seagrass beds could be more resilient if 1) planted seagrass beds are genetically diverse with genotypes adapted to an array of environmental conditions, and 2) these beds maintain genetic variation through gene flow between populations. Incorporating genetic strategies, such as using transplants or seeds from local highly diverse beds, into restoration practices could provide greater ecosystem benefit.

Researchers at the University of New Orleans (UNO), in partnership with PPBEP and MSU, received funding from the National Oceanic and Atmospheric Administration (NOAA) Actionable Science Program to develop a strategic plan for seagrass restoration in the Pensacola and Perdido Bays systems. This project aims to reduce the unknowns of restoration success by focusing on the benefits of genetic diversity. The plan that is developed collaboratively with the project team, an advisory panel of experts, practitioners, and community stakeholders will assist in the critical management decisions related to the restoration of seagrass beds, dominated by Shoal Grass (*Halodule wrightii*), in the Pensacola and Perdido Bays for resilience to climate stress. The advisory panel is comprised of representatives from the Gulf of Mexico Seagrass Community of Practice (CoP), FWC, Florida Department of Environmental Protection (DEP), Auburn University/MS-AL Sea Grant, NOAA, Alabama Department of Conservation and Natural Resources (ADCNR), and TNC.

As part of the strategic planning process, the project team conducted a literature review of existing relevant seagrass data and information and developed surveys to gather feedback from northern GoM researchers, practitioners, and local community users on their experiences with restoration techniques, perceptions of seagrass condition and extent, and on potential data needs. The project team also hosted a stakeholder workshop in Perdido Key, FL, that brought together 47 seagrass experts from across the Gulf region to discuss the potential for integrating genetic techniques into future management strategies and decision making. The goals of the workshop

were to share seagrass knowledge, identify data gaps and uncertainties, and discuss necessary steps for implementing the strategic plan.

- Funding:** NOAA Actionable Science | \$118,000
- Partners:** PPBEP; UNO; MSU; NOAA
- Outputs:** Literature review and meta-analysis report on restoration and resilience in seagrass environments; Community user, manager, and practitioner survey reports; Seagrass restoration workshop report; Strategic plan for seagrass restoration in the Pensacola and Perdido Bays systems
- Timeline:** August 2022

Related Actions

5.2.2



Shoal Grass Bed
PPBEP



Explore the Shore Program
PPBEP

Community Grant Program

The PPBEP Community Grant Program funds local action projects led by local government, educational institutions, and non-profit organizations that serve to restore, preserve, connect, inform, and educate. The funding opportunity was established through the support of the FL Legislature, with \$200,000 awarded in 2020, and grew to \$250,000 in awards in 2021 and 2022. Community Grant proposals are reviewed by a Selection Committee (comprised of members from both the Technical and Education and Outreach Committees) that provides recommendations to the Policy Board, which then selects the grant recipients. PPBEP hosts an annual Community Grant Symposium, held during National Estuaries Week, that provides grant recipients the opportunity to share their efforts and findings with the community.

During the first funding cycle (2020–2021), ten grants and a total of \$200,000 were awarded:

- ➔ **Living Shoreline Training for Marine Contractors**
[National Wildlife Federation \(NWF\) | \\$12,872.75](#)
 Held a two-day Living Shoreline Training that engaged 25 participants and produced a living shoreline manual for marine contractors in northwest FL
 Related Action: Resilience Action 2.3.2
- ➔ **Quantifying Fish Communities on Remnant Oyster Reefs in Pensacola and Perdido Bays with Underwater Video: A Baseline for Monitoring Restoration Projects**
[University of South Alabama | \\$18,045](#)
 Collected 512 video samples from 11 oyster reefs in East Bay and identified observed species
 Related Actions: Fish and Wildlife Action 6.1.1, Objective 6.2

- ➔ **Explore the Shore Science Show and Stations**
[Pensacola Math, Engineering, Science & Stuff \(MESS\) Hall | \\$5,000](#)
 Provided hands-on education to 600 students
 Related Action: Education and Outreach Strategy Action 2.3.1
- ➔ **Bayou Grande and Davenport Bayou Water Quality Monitoring Program**
[Escambia High School | \\$10,000](#)
 Engaged 235 students in water quality monitoring and research
 Related Action: Education and Outreach Strategy Action 2.3.1
- ➔ **Bringing Back Our Bayous**
[Booker T. Washington High School | \\$10,000](#)
 Engaged 150 students in water quality monitoring and research
 Related Action: Education and Outreach Strategy Action 2.3.1

➔ **A Compelling Mini-Series Featuring the Positive Social and Economic Impacts of Our Waterways**

[350 Pensacola and Community Action Network](#) | \$36,000

Produced 10 two-minute videos about the waterways

Related Action: Education and Outreach Strategy Action 1.3.1

➔ **Wintering Waterfowl Use of the Pensacola and Perdido Bays Estuary System**

[UWF](#) | \$13,248.89

Completed a longitudinal analysis of waterfowl abundance in Escambia and Santa Rosa Counties

Related Action: Fish and Wildlife Action 6.1.1

➔ **Escambia Watershed Documentary Project**

[Blackwater Soil and Water Conservation District](#) | \$25,620

Produced a 12-minute documentary on agriculture and the Escambia River

Related Action: Education and Outreach Strategy Action 1.3.1

➔ **Increasing Watershed Responsibility through a Local Inventory of Microplastics and Educational Community Outreach**

[UWF](#) | \$19,645.86

Quantified microplastics from 40 sites across the Pensacola Bay watershed and engaged students in research

Related Action: Education and Outreach Strategy Action 2.2.3

➔ **Citizen Science Water Quality and Habitat Monitoring Network: A Path to Connect, Inform, and Educate for Smart Community Resiliency**

[Institute for Human and Machine Cognition \(IHMC\)](#) | \$49,567

Configured proof-of-concept for a community-science based augmented reality app for Bayou Texar

Related Actions: Water Quality Action 3.1.1; Education and Outreach Strategy Action 1.1.1

During the second funding cycle (2021–2022), eight grants and a total of \$250,000 were awarded:

➔ **Perdido Key Coastal Demonstration Garden**

[Escambia County Natural Resources](#) | \$10,450

Related Action: Education and Outreach Strategy Action 2.4.1

➔ **Estuary Exhibit**

[Pensacola MESS Hall](#) | \$11,627

Related Action: Education and Outreach Strategy Action 2.3.1

➔ **Historical Ecology of Pensacola and Perdido Bays: Using the Past to Protect the Future of Our Bays**

[UWF](#) | \$43,461

Related Action: Information Action 1.1.1

➔ **Fish Communities on Remnant and Restored Oyster Reefs of East and Escambia Bays: A Baseline for Assessing Restoration Success**

[University of South Alabama](#) | \$22,850

Related Actions: Fish and Wildlife Action 6.1.1, Objective 6.2

➔ **Citizen Science Water Quality and Habitat Monitoring Network: Community Deployment and Network Sustainability**

[IHMC](#) | \$49,830

Related Actions: Water Quality Action 3.1.1; Education and Outreach Strategy Action 1.1.1

➔ **Santa Rosa County Watershed Awareness Signage and Stormwater Drain Marking Project**

[Santa Rosa County](#) | \$16,573

Related Actions: Resilience Action 2.5.1; Education and Outreach Strategy Action 2.5.2

➔ **EscaRosa OysterCorps**

[Franklin's Promise Coalition](#) | \$49,999

Related Action: Habitat Action 5.1.4

➔ **Fischer Landing Master Plan Study**

[Town of Century](#) | \$45,210

Related Action: Sediment Action 4.3.2

During the third funding cycle (2022–2023), eight grants and a total of \$250,000 were awarded:

- ➔ **EscaRosa OysterCorps**
[Franklin's Promise](#) | \$49,998.99
 Related Action: Resilience Objective 2.3; Habitat Objective 5.1; Education and Outreach Strategy Actions 2.1.1, 2.2.1, 2.2.2
- ➔ **Empowering Students to Take Action: Aquatic Care Team**
[Navarre Beach Marine Science Station](#) | \$19,615.63
 Related Action: Water Quality Objective 3.1; Education and Outreach Strategy Objective 2.1, Action 2.3.1
- ➔ **Manatees and Meadows: Protecting Manatees and Their Habitat Through Outreach**
[NWF](#) | \$22,678.15
 Related Action: Fish and Wildlife Objective 6.3; Education and Outreach Strategy Actions 2.1.3, 2.5.4
- ➔ **Escambia County Coastal Landscaping Workshop & Plant Giveaway**
[Escambia County Natural Resources](#) | \$13,200
 Related Action: Resilience Objective 2.3; Habitat Objective 5.3; Education and Outreach Strategy Actions 2.2.4, 2.5.1
- ➔ **Zooplankton Ecology and Water Quality Monitoring of Perdido Bay**
[UWF](#) | \$39,326.75
 Related Action: Water Quality Objective 3.2; Sediment Objective 4.3; Habitat Objective 5.1

- ➔ **No-Till Seed Drill Rental Program**
[Blackwater Soil and Water Conservation District](#) | \$ 50,000
 Related Action: Water Quality Objective 3.2; Sediment Objective 4.3; Education and Outreach Strategy Objective 2.6
- ➔ **Streambank Erosion in the Pensacola Bay and Perdido Bay Watersheds**
[UWF](#) | \$31,550
 Related Action: Sediment Objective 4.2; Education and Outreach Strategy Objective 2.3
- ➔ **Peripheral Oyster Mapping in Santa Rosa Sound and Urban Bayous of Pensacola Bay**
[Northwest Florida State College](#) | \$23,630.48
 Related Action: Habitat Objective 5.1; Education and Outreach Strategy Objective 2.3

Acknowledgements: PPBEP offers its deepest appreciation to Representative Andrade and Senator Broxson for sponsoring the Program's FL State Appropriations request. Special thanks to Emerald Coast Oyster Company for sponsoring the inaugural Community Grant Symposium in 2021.

- 💰 **Funding:** FL State Appropriations | \$700,000
- 📌 **Leverage:** Grantee Match and In-kind Support | \$285,000
- 🤝 **Partners:** 26 Grantees
- ✅ **Outputs:** Listed Above
- 🕒 **Timeline:** Ongoing

Related Actions

1.3.2



EscaRosa OysterCorps
PPBEP

Communities RISE (Resilience in Sea-Level Rise Education)

The effects of sea-level rise and climate change will disproportionately affect communities across the northern GoM due to a combination of factors including socioeconomic challenges, higher than average rates of sea-level rise, and low-lying topography. Resilience of northern GoM social, economic, and cultural resources in the face of sea-level rise requires an informed and engaged community and leadership that understands risks, options for adaptation, and the processes required for action. This project uses a holistic approach to address sea-level rise resilience barriers through inclusive education ranging from high school students to community groups, capitalizing and expanding on existing efforts and resources available throughout the GoM. The main objective is to produce a comprehensive, sustainable sea-level rise education program that spans ages, locations, and demographics to generate better-prepared northern GoM coastal communities.

The Program for Local Adaptation to Climate Effects: Sea-Level Rise (PLACE: SLR) team is partnering with staff from PPBEP, Santa Rosa County, UF-IFAS Extension, and the City of Pensacola to design and host a Community Connection Dialogue and a series of “Pop-In” events across the watersheds to bring together the science, civic process, and solutions to residents and municipal officials. The Pop-Ins will use immersive learning tools at everyday locations throughout the watershed and are meant to target new audiences that are not already aware or engaged in conversations surrounding climate change and sea-level rise. Expected outcomes would be that coastal residents are able to describe the risks of sea-level rise in their communities, that residents are aware of and support ongoing resilience efforts, and that residents and municipal officials build productive and trusting relationships to act on reducing identified risks.



Communities RISE Workshop
PPBEP

- Funding:** NOAA Environmental Literacy Grant | \$450,000
- Partners:** PPBEP; City of Pensacola; 350 Pensacola; UF-IFAS Extension; Santa Rosa County
- Outputs:** A comprehensive, sustainable sea-level rise education program; Six educator workshops across the GoM; Twelve Community Connection Dialogues; Twelve Pop-Ins led by the Project Team; Twelve Pop-Ins led by northern GoM coastal community members and/or youth
- Timeline:** December 2024

Related Actions

2.6.1

Resilience Readiness: A Community-Based Participatory Assessment in the City of Pensacola, FL

In November 2021, PPBEP secured funds from the MS-AL Sea Grant Consortium, NOAA Office for Coastal Management, and the Gulf of Mexico Climate and Resilience CoP to develop a climate adaptation project with local communities at risk that will serve as an example for other communities across the GoM. Sea-level rise and climate change continue to impact coastal communities through increased frequency of flood events and major storms. To address these issues on a local scale, PPBEP staff is collaborating with researchers at UWF, sustainability planners at the City of Pensacola, an agent from UF-IFAS Sea Grant Extension, and staff from PLACE: SLR to develop a demonstration project. A main element of the project will be developing and administering resilience readiness surveys in selected communities within the city limits of Pensacola, FL.

Specifically, the project focuses on residents of the city's five priority planning areas, as identified by the City of Pensacola, to assess each community's "resilience readiness," or awareness and acceptance of local risk for impacts associated with sea-level rise and climate change. Citizens' perceptions of vulnerable and resilient areas of the community will be visualized using sketch mapping activities. Undergraduate honors students at UWF will work with PPBEP staff to finalize and administer the surveys and analyze the results. This project will compile, analyze, and package the survey data so it can be incorporated into the City of Pensacola's Sea Level Rise Vulnerability Assessment tool (City of Pensacola 2021).

This project uses a novel approach to address local vulnerability by assessing local risk perceptions around sea-level rise to inform pilot community-based resilience actions. This work will provide a framework for future projects that seek to apply community-based methods to address community resilience, social vulnerability, and inequity. The purpose is to assess vulnerability of critical coastal communities to sea-level rise and support communities in long-term resilience planning by achieving the following goals:

- 1 Enhance resilience planning efforts in the City of Pensacola by providing community vulnerability data gathered by assessing local perceptions of climate risks
- 2 Engage students in a meaningful research experience that emphasizes learning and development in resiliency and environmental science, equipping students to support and develop future resilience efforts, thus expanding the local capacity and support for climate resilience planning
- 3 Build community resilience through partnership building and community participation in pilot project development and implementation
- 4 Build on existing and develop new cross-organizational partnerships to identify, design, and implement one pilot resilience project with the intent to prioritize a sustainable project that can serve as an asset to community resilience

This project builds partnerships that support local climate adaptation planning, while seeking to build trust between the Program and residents in the watershed. This project is a springboard for future community-driven resilience action in the Pensacola and Perdido Bays watersheds.

\$ Funding: NOAA; MS-AL Sea Grant
| \$28,000

🔄 Partners: PLACE: SLR; City of
Pensacola; UWF

✓ Outputs: Resilience Readiness
Survey results; Implementation of a
pilot resilience project

🕒 Timeline: January 2023

Related Actions

2.6.1



Promoting Community
Resilience Survey
PPBEP



Jones Creek Cleanup
PPBEP



Pond Creek Litter Boom Monitoring
PPBEP

Trash Free Waters

In 2019, the Program received funding from the EPA Trash Free Waters program to develop a holistic community-based litter removal and reduction program. Throughout a four-year period, the project aims to identify and remediate potential sources of water-borne trash in three creeks within the Pensacola Bay system: Jones Creek (Escambia County), Carpenter Creek (City of Pensacola), and Pond Creek (Santa Rosa County). The project heavily engages community members in trash removal and prevention, collaborating with local businesses, non-profits, and schools to reduce water-borne trash and improve the safety, health, function, and beauty of local creeks. This project also supports PPBEP's mission of protecting and restoring water quality and natural resources within the watersheds through partnerships, using a scientifically-sound, community-based approach to enhance resilience.

The Program contracted Osprey Initiative, a local environmental consultant specializing in litter removal and solutions, to install six floating litter booms (two per creek), conduct initial large-scale cleanups within the creeks, and assist with implementation of the Escaped Trash Assessment Protocol (ETAP) developed by the EPA to standardize data collection among all funded Trash Free Waters projects. Before project activities commenced, Osprey Initiative conducted a training with PPBEP staff to review the data collection process and demonstrate best practices.

To date, 134 volunteers have removed over 3,500 lbs or approximately 350 ft³ of combined trash and debris from the three creeks. The Program has many partners to thank for their continued involvement in planning and participation in events, promoting events, and providing passionate volunteers.

PPBEP has made lasting connections with community members and organizational partners while addressing water-borne trash, one of the most visible environmental impacts that the local waterways face. The Program will continue to build collaborative partnerships with community members and organizations to pursue relevant, innovative ways to build community resilience and promote watershed health.

- \$ Funding:** EPA | \$297,220
- 🤝 Partners:** City of Pensacola; Escambia County; Santa Rosa County
- ✓ Outputs:** Install six litter capture devices in Carpenter, Jones, and Pond Creeks to evaluate trash flow and quantity; Remove 5,000 lbs of trash and legacy debris from the three creeks; Recruit 45 volunteers to monitor and remove trash collected in litter booms; Engage 1,000 people through educational programs and outreach events; Engage two schools per watershed with educational programming and volunteer opportunities; Develop watershed curriculum; Develop Property Trash Reduction Plans to reduce trash and debris contributions
- 🕒 Timeline:** June 2023

Related Actions

Education and Outreach Strategy 2.2.3

Education and Outreach Strategy 2.3.2



Storm Drain Marking Program

In spring 2020, PPBEP worked with Chasidy Hobbs (UWF) and several upperclassmen enrolled in the Community Engagement through Environmental Science (CEES) course who developed community education and outreach resources to support PPBEP objectives. Students conducted research on existing National Estuary Programs and formed high-priority project recommendations based on their research. The CEES student team identified stormwater drain marking as an effective, implementable outreach project. Students generated a budget and secured funding to purchase supplies for a large-scale storm drain marking project within the PPBEP watersheds. In addition, the team developed an implementation strategy with defined safety considerations, a project timeline, and reference materials all to facilitate the installation of storm drain markers across the PPBEP watershed. Amidst the COVID-19 pandemic, three K–12 educators elected to incorporate storm drain marking into their curriculum and guide students through the process of marking storm drains on their campus. Storm drain marking proves to be an accessible, cost-effective way to engage with citizens around stormwater, community resilience, and water quality. PPBEP seeks to expand the storm drain marking program as a component of its Education and Outreach Strategy and CCMP Action Plan.

\$ Funding: UWF | \$5,000

🔄 Partners: UWF

✓ Outputs: Stormwater drain markings in priority locations across the watersheds

🕒 Timeline: Ongoing

Related Actions

2.5.1**Education and Outreach Strategy 2.3.3**

**Storm Drain Marking at
Workman Middle School**

Elizabeth Walker

Appendices

Appendix 1. University of West Florida Haas Center Community Values Survey

www.ppbep.org/PDFs/PPBEP_Community-Values-Report.pdf

Appendix 2. Oyster Fisheries and Habitat Management Plan for the Pensacola Bay System

www.ppbep.org/PDFs/PensacolaOysterEBFMPlan_Summary.pdf

Appendix 3. Education and Outreach Strategy

www.ppbep.org/PDFs/EducationandOutreachStrategy.pdf

Appendix 4. Comprehensive Monitoring Strategy

www.ppbep.org/PDFs/ComprehensiveMonitoringStrategy.pdf

Appendix 5. Financial Strategy

www.ppbep.org/PDFs/FinancialStrategy.pdf

Appendix 6. CCMP Public Comment Summary

The draft CCMP was released for public comment 04 August 2022. A press release was issued to local media outlets notifying the public that the draft CCMP was open for comment until August 28. The announcement was published in the August Pelican Post newsletter, which is distributed to subscribers; PPBEP Policy Board members; and all Committee and Sub-Committee participants (Technical, Oyster Sub-Committee, Education and Outreach, Business Partnership). The public comment release and specific posts regarding key CCMP goals and elements were posted on PPBEP social media platforms (Instagram, Facebook) to reach a broader audience. Since the CCMP designer was tasked with copy editing and conducting a full technical review of the document, public comment focused mainly on content additions and corrections.

A total of 17 public comment responses were received, including feedback from the U.S. Environmental Protection Agency (EPA), Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (DEP), Northwest Florida Water Management District (NFWFMD), and Baldwin County, AL, in addition to community members. A compiled document with all CCMP draft comments can be found on the PPBEP website (www.ppbep.org/PDFs/CCMPPublicComments.pdf).

All feedback was compiled and evaluated by PPBEP staff upon the closure of the public comment period. Most comments received by the public and Program partners focused on incorporating additional or editing existing content to clarify statements, adding partners and specific areas of interest to actions throughout the Action Plan, aligning with existing literature and management plans, correcting general inconsistencies, and making editorial corrections. Feasible and relevant recommendations were incorporated where appropriate.

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List of Figures

Figure 1. Pensacola and Perdido Bays Watersheds	21	Figure 12. Escambia County-Wide Tidal Flooding under Mean Higher High Water Conditions for Sea-Level Rise (SLR) Scenarios for a) 2045 and b) 2085	130
Figure 2. Perdido Bay Watershed	42		
Figure 3. Waterbodies of the Perdido Bay System	43	Figure 13. Historical Oyster Reef Presence from 1883 Throughout Escambia, Pensacola, Blackwater, and East Bays	157
Figure 4. Perdido Bay Watershed Land Use	46	Figure 14. Oyster Landings (lbs) From 1880 to 2020 in Pensacola Bay	158
Figure 5. Perdido Bay Watershed Conservation Lands	47	Figure 15. Opportunistic Manatee Sighting Locations within the Pensacola and Perdido Bays Watersheds from 2002 – 2021 as of 15 December 2021	184
Figure 6. Pensacola Bay Watershed	48		
Figure 7. Waterbodies of the Pensacola Bay System	49	Figure 16. Map showing National Wetland Condition Assessment (NWCA) sites in brown and National Coastal Condition Assessment (NCCA) sites in blue. Sites were assessed in partnership with the U.S. Environmental Protection Agency in 2021.	188
Figure 8. Pensacola Bay Watershed Land Use	53		
Figure 9. Pensacola Bay Watershed Conservation Lands	54		
Figure 10. Total Maximum Daily Loads (TMDLs) (Outlined Polygons) and Impaired Waters (Filled Polygons) in the Perdido Bay Watershed	67		
Figure 11. Total Maximum Daily Loads (TMDLs) (Outlined Polygons) and Impaired Waters (Filled Polygons) in the Pensacola Bay Watershed	68		

List of Tables

Table 1. Impaired Waters	69
Table 2. Total Maximum Daily Loads	71
Table 3. Species Endemic to the Pensacola and Perdido Bays Watersheds	176

Acronyms

ADCNR Alabama Department of Conservation and Natural Resources

ADEM Alabama Department of Environmental Management

BARC Bay Area Resource Council

BFA The Bream Fishermen Association

BMAP Basin Management Action Plan

BMP Best Management Practice

BMWRF Bayou Marcus Water Reclamation Facility

BOD Biochemical Oxygen Demand

CCMP Comprehensive Conservation and Management Plan

CEES Community Engagement through Environmental Science (University of West Florida course)

CISMA Cooperative Invasive Species Management Area

COE Centers of Excellence

CoP Community of Practice

DDT Dichlorodiphenyltrichloroethane

DEP Florida Department of Environmental Protection

DISL Dauphin Island Sea Lab

DOC Department of Commerce

DoD U.S. Department of Defense

DWH Deepwater Horizon

ECUA Emerald Coast Utilities Authority

EECT Environmental Education Coordination Team

EPA U.S. Environmental Protection Agency

ETAP Escaped Trash Assessment Protocol

FDACS Florida Department of Agriculture and Consumer Services

FDEO Florida Department of Economic Opportunity

FDOH Florida Department of Health

FDOT Florida Department of Transportation

FEMA Federal Emergency Management Agency

FIM Fisheries Independent Monitoring

FLRACEP Florida RESTORE Act Centers of Excellence Program

FWC Florida Fish and Wildlife Conservation Commission

FWRI Fish and Wildlife Research Institute

GCPEP Gulf Coastal Plain Ecosystem Partnership

GCRL Gulf Coast Research Lab

GEMMD Gulf Ecosystem Measurement and Modeling Division

GIS Geographic Information System

GIWW Gulf Intracoastal Waterway

GoM Gulf of Mexico

GOMA Gulf of Mexico Alliance

GMP Gulf of Mexico Program

HSM Habitat Suitability Model

IHMC Institute for Human and Machine Cognition

IP International Paper

IUCN International Union for Conservation of Nature

LSSM Living Shoreline Suitability Model

MBNEP Mobile Bay National Estuary Program

MDP Marine Debris Program

MREC Marine Research Ecological Consulting

MESS	Math, Engineering, Science & Stuff	NWCA	National Wetland Condition Assessment	SSO	Sanitary Sewage Overflow
MGD	Million Gallons Per Day	NWF	National Wildlife Federation	SWIM	Surface Water Improvement and Management
MS4	Municipal Separate Storm Sewer Systems	NWFWMD	Northwest Florida Water Management District		
MSN	Manatee Sighting Network or Mangrove Survey Network	NWI	National Wetlands Inventory	TAC	Technical Advisory Council
MSU	Mississippi State University			TBEP	Tampa Bay Estuary Program
		OIMMP	Oyster Integrated Mapping and Monitoring Program	TIG	Trustee Implementation Group
NARS	National Aquatic Resource Surveys			TN	Total Nitrogen
NCCA	National Coastal Condition Assessment	PAH	Polycyclic Aromatic Hydrocarbon	TNC	The Nature Conservancy
NEP	National Estuary Program	PBS	Pensacola Bay System	TMDL	Total Maximum Daily Load
NERRs	National Estuarine Research Reserves	PCB	Polychlorinated Biphenyl	TP	Total Phosphorus
NFWF	National Fish and Wildlife Foundation	PCP	Pentachlorophenol		
NGO	Non-Governmental Organization	PLACE: SLR	Program for Local Adaptation to Climate Effects: Sea-Level Rise	UF	University of Florida
NOAA	National Oceanic and Atmospheric Administration	PPBEP	Pensacola & Perdido Bays Estuary Program	UF-IFAS	University of Florida Institute of Food and Agricultural Sciences
				UNO	University of New Orleans
NPDES	National Pollutant Discharge Elimination System	RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act	USDA	U.S. Department of Agriculture
NPL	National Priority List			USFWS	U.S. Fish and Wildlife Service
NPS	National Park Service	RISE	Resilience in Sea-Level Rise Education	USGS	U.S. Geological Survey
NRCS	Natural Resources Conservation Service			USM	University of Southern Mississippi
		SAV	Submerged Aquatic Vegetation	UWF	University of West Florida
NRDA	Natural Resource Damage Assessment	SIMM	Seagrass Integrated Mapping and Monitoring		
NRSA	National Rivers and Streams Assessment	SLR	Sea-Level Rise	VOC	Volatile Organic Compound
				WBID	Water Body Identification Number
				WTP	Wastewater Treatment Plant



**PENSACOLA
& PERDIDO BAYS
ESTUARY PROGRAM**

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Pensacola, FL 32502

Protecting What Matters

Darryl Boudreau, NFWFMD

Page 758 of 683



Agenda Item # 2022-730

Complete Streets Discussion for Design Collaboration with FDOT

MEETING DATE

November 17, 2022

PREPARED BY

Dawn Molinero, City Clerk

BACKGROUND

Implementing Complete Streets is an FDOT department-wide priority. The Complete Streets approach builds on flexibility and innovation in roadway planning and design to put the right street in the right place.

SUMMARY

Implementing Complete Streets is an FDOT department-wide priority. The Complete Streets approach builds on flexibility and innovation in roadway planning and design to put the right street in the right place.

RECOMMENDATION

Discussion item

ATTACHMENTS

1. fdot-completestreets-brochure
2. FDOT2017CSIHandbookDraft
3. Context Classification Guide 2022_lo-res

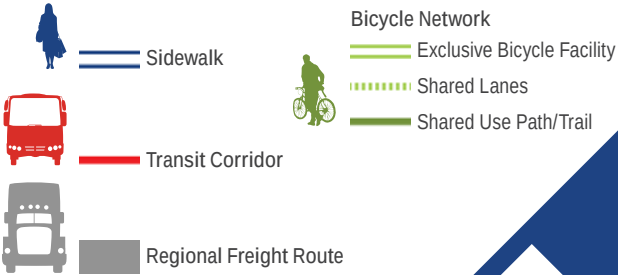
WHAT IS THE ROLE OF LOCAL PARTNERS?

A network of Complete Streets cannot be built entirely within the state roadway system and solely within FDOT's right of way. Transportation system and development pattern (such as land use, development density and intensity, building design, and site layout) are inextricably linked, and both have an effect on travel choices and mobility. A robust, connected roadway network provides options for the movement of people and goods and is the foundation for safe and comfortable travel for pedestrians, bicyclists, and transit riders.

Local governments and metropolitan planning organizations (MPOs) are responsible for land use and transportation planning to create supportive infrastructure and development patterns that match community goals and visions. Comprehensive plans, subarea plans, and land development regulations are some of the documents that will be reviewed to determine future visions and other land use-related items in evaluating context classification.

FDOT will apply criteria and standards based on the context classification. There is no separate FDOT funding category or FDOT funding source specifically for Complete Streets. Projects that require modifications to comply with criteria associated with the context classification will be funded through the funding programs currently available to Federal, State, and local roadways, as appropriate. The existing MPO funding process will remain the same. If local governments or other partners would like to include features that go beyond what is required by FDOT design criteria, such as decorative lighting or landscaping, patterned pavements, or street furniture and wayfinding, local communities must coordinate with FDOT to align local resources and projects with the FDOT project.

CONTEXT-SENSITIVE SYSTEM OF COMPLETE STREETS



WHAT IS FDOT'S APPROACH TO COMPLETE STREETS?

In September 2014, the Florida Department of Transportation (FDOT) adopted the Statewide Complete Streets Policy (Topic No. 000-625-017-a). Complete Streets serve the transportation needs of transportation system users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers. A transportation system based on Complete Streets principles can help to promote safety, quality of life, and economic development.

Safety: Safety for all users is FDOT's top priority. Roadways with context-appropriate speeds can result in reduced fatalities and serious injuries. The Complete Streets approach considers the mobility, convenience, accessibility, and safety of all road users, and places an emphasis on the most vulnerable users of a given roadway.

Quality of Life: A Complete Streets approach helps to align transportation decisions with land use, resulting in quality places where transportation investments support a community's quality of life.

Economic Development: A Complete Streets approach connects communities and supports Florida's existing economic centers, employment centers, and visitor destinations by striving to provide the highest level of multimodal infrastructure in these core areas.

Implementing Complete Streets is an FDOT department-wide priority. The Complete Streets approach builds on flexibility and innovation in roadway planning and design to put the right street in the right place.

WHEN WILL COMPLETE STREETS BE IMPLEMENTED?

The determination of a roadway's context classification is required in order to utilize the criteria in the FDOT Design Manual (FDM.) The context-based criteria in the FDM will be required on projects that have not begun design by January 1, 2018, and may be applied to active design projects at the discretion of the district. For PD&E projects, implementation of context classification and the FDM is required for projects that have the Public Hearing scheduled in April 2018 or later. The 2017 Plans Preparation Manual (PPM) will apply through the completion of the PD&E studies for projects that have the Public Hearing scheduled prior to April 2018. Criteria contained in the FDM may also be applied earlier at the discretion of the district.



WHERE CAN I FIND MORE RESOURCES?

WWW.FLCOMPLETESTREETS.COM

DeWayne Carver, AICP
State Complete Streets Program Manager
(850) 414 4322
dewayne.carver@dot.state.fl.us

Revised 3/29/2018

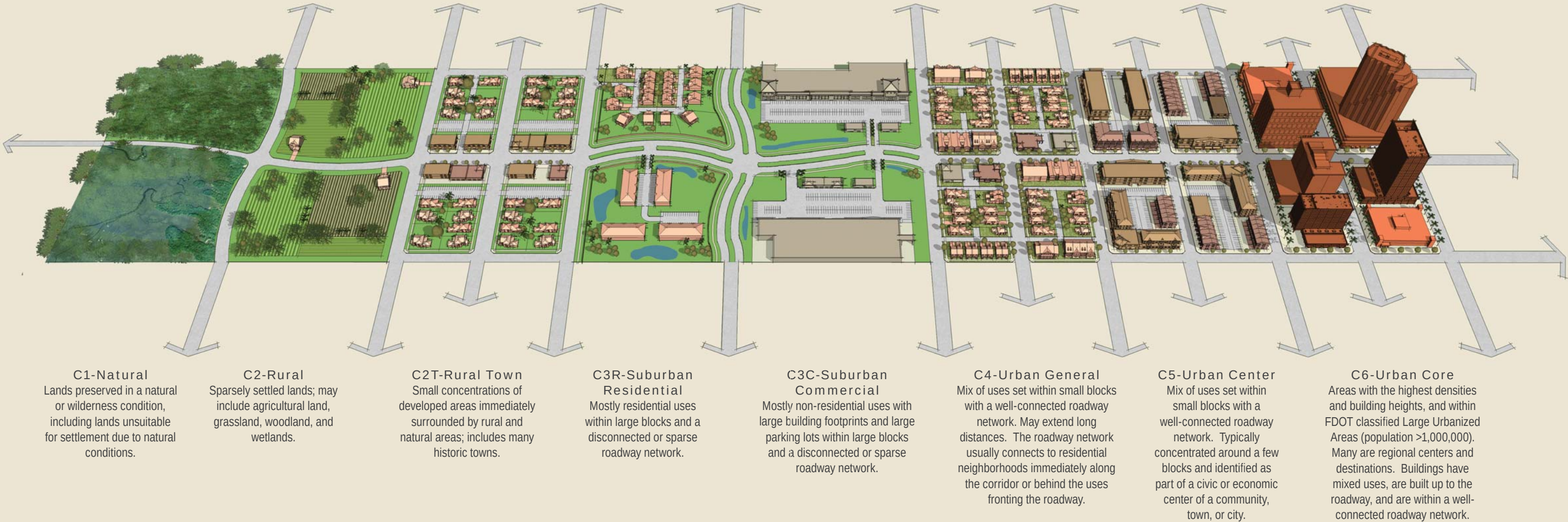
WHAT IS FDOT CONTEXT CLASSIFICATION?

Complete Streets are context sensitive, and the approach provides transportation system design that considers local land development patterns. Roadways will be planned and designed to support the safety, comfort, and mobility of all users based on the unique context of each roadway. The FDOT context classification system broadly identifies the various built environments existing in Florida. The context classification of a roadway will inform FDOT's planning, Project Development and Environment (PD&E), design, construction, and maintenance approaches to ensure that state roadways are supportive of safe and comfortable travel for their anticipated users. Identifying the context classification is a preliminary step in planning and design, as different context classifications will have different design criteria.

The Context Classification document presents and explains the Context Classification Matrix, which outlines the measures used to determine context classification. These include:

- (1) **Distinguishing Characteristics**, which give a broad description of the land use types and street patterns found within each context classification
- (2) **Primary Measures**, which measure the roadway connectivity and building use and form
- (3) **Secondary Measures**, which look at existing and allowed development intensity

FDOT CONTEXT CLASSIFICATIONS



CONTEXT CLASSIFICATION AND TRANSPORTATION CHARACTERISTICS

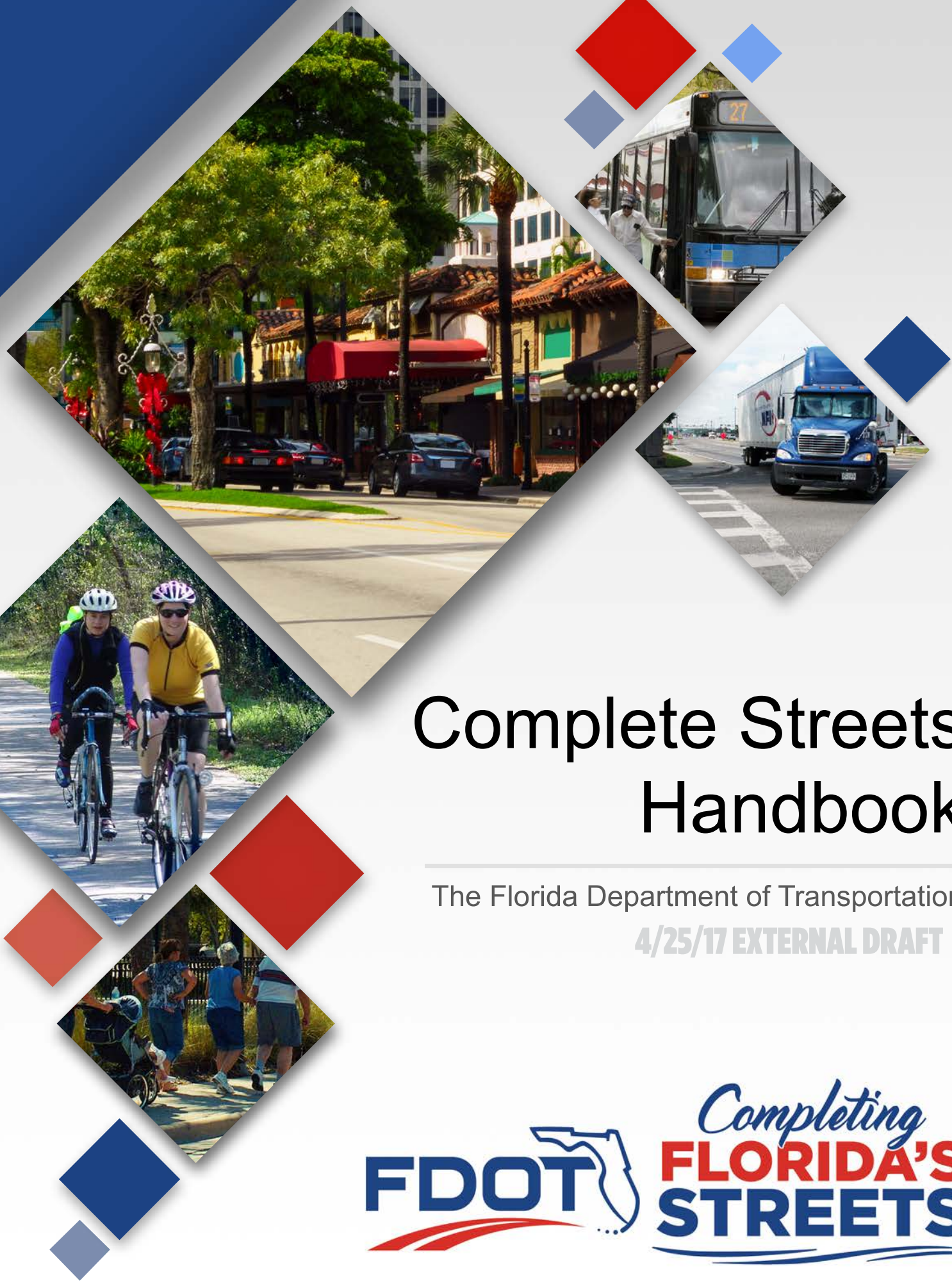


The context classification of a roadway, together with its transportation characteristics, will provide information about who the users are along the roadway, the regional and local travel demand of the roadway, and the challenges and opportunities of each roadway user.

WHAT IS THE FDOT PROCESS FOR IMPLEMENTING CONTEXT CLASSIFICATION?

Complete Streets are not a specific type of project, but rather are an approach to ensuring that projects are based on their contexts. This means that a Complete Streets approach will be implemented consistently for all non-limited access projects — from capital projects qualifying for Efficient Transportation Decision Making process (ETDM) screening to Resurfacing, Restoration and Rehabilitation (RRR), traffic operations, and safety projects.

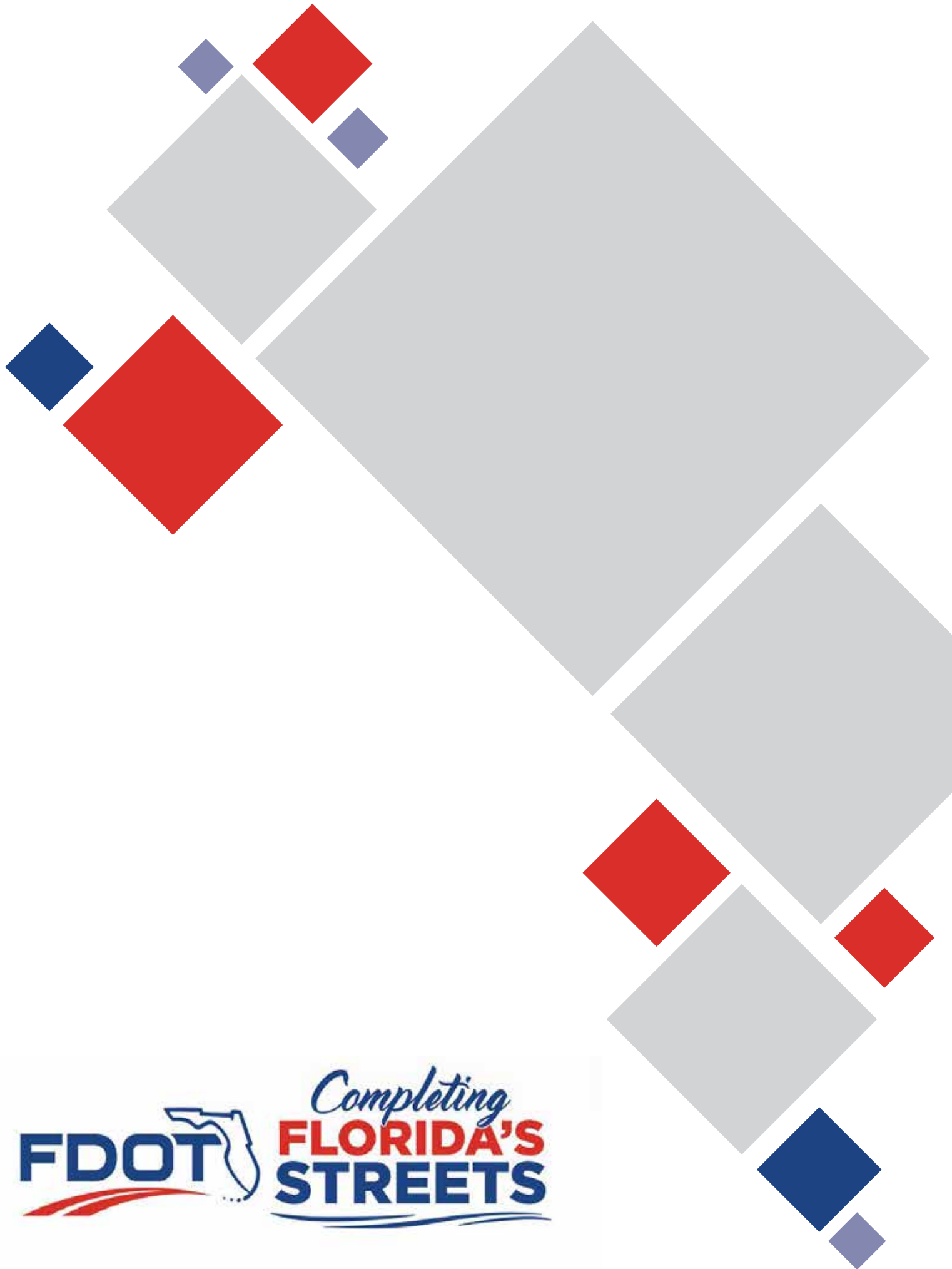
FDOT will develop a database of context classification for all state roadways. Initially, districts will evaluate and map context classification as projects occur, while working to complete a statewide database of context classification. The context classification evaluations completed for the statewide database will utilize available data and information on existing built conditions. As FDOT projects are conducted, these initial evaluations will be updated or confirmed based on current data, as well as future conditions.



Complete Streets Handbook

The Florida Department of Transportation
4/25/17 EXTERNAL DRAFT





Contents

i	GLOSSARY		
iv	FDOT COMPLETE STREETS POLICY ADOPTED SEPTEMBER 17, 2014		
1	Executive Summary	34	Process for Implementing Complete Streets
1	CONTEXT-BASED PLANNING AND DESIGN	34	REGIONAL TRANSPORTATION PLANNING AND COMPLETE STREETS
1	WHAT IS FDOT'S APPROACH TO COMPLETE STREETS?	35	PROJECT PLANNING AND COMPLETE STREETS
4	COMPLETE STREETS PRINCIPLES AND THE FLORIDA TRANSPORTATION PLAN	39	DEFINING CONTEXT CLASSIFICATION IN THE FDOT PROCESS
5	WHAT IS IN THIS HANDBOOK?	47	IMPLEMENTATION
6	NEXT STEPS	47	FUNDING AND MAINTENANCE
7	Partnership and Agency Collaboration	48	Design Considerations for Complete Streets
7	THE ROLE OF COMMUNITY VISIONS	48	CONTEXT-BASED DESIGN CONTROLS
7	HOW LAND USE SUPPORTS COMPLETE STREETS	56	THE ROADWAY AS PART OF A SYSTEM
8	PROJECT DEVELOPMENT PROCESS	60	UNIQUE DESIGN CONSIDERATIONS
9	FDOT'S ROLE		
10	THE ROLES OF PARTNERS		
13	Context-Based Complete Streets		
14	CONTEXT CLASSIFICATION		
27	TRANSPORTATION CHARACTERISTICS		
31	ENVIRONMENTAL CHARACTERISTICS		
31	CONTEXT CLASSIFICATION RELATIONSHIP WITH EXISTING HANDBOOKS AND PROCESSES		
		Appendix	
		A1	APPENDIX A Land Use Tools to Support Safe and Comfortable Multimodal Travel
		A7	APPENDIX B Context Classifications Case Studies
		A16	APPENDIX C How to Calculate Floor Area Ratio if Not Defined in Zoning Code
		A17	APPENDIX D Proposed FDM Design Speed Ranges by Context Classifications For Non-Limited-Access Facilities
		A18	APPENDIX E Draft Sample Context Classification Letter of Agreement with Local Governments
		A20	APPENDIX F List of Handbooks and Guidance Documents that Include Tools for Implementing Complete Streets

Figures

FIGURE ES-1	FDOT's Approach to Complete Streets	2
FIGURE ES-2	Linking the Florida Transportation Plan and Complete Streets Principles	4
FIGURE 1-1	How Community Visions Can Inform Context Classification, Users, and Roadway Design	8
FIGURE 2-1	Context Classification and Transportation Characteristics	13
FIGURE 2-2	FDOT Context Classifications	14
FIGURE 2-3	Measurement Area: The Block on Either Side of the Roadway	21
FIGURE 2-4	Measurement Area: Fronting Parcels on Either Side of the Roadway	21
FIGURE 2-5	Building Placement	22
FIGURE 2-6	Fronting Uses	22
FIGURE 2-7	Location of Off-Street Parking	22
FIGURE 2-8	Intersection Density	23
FIGURE 2-9	Block Perimeter and Block Length	23
FIGURE 3-1	Complete Streets Planning Approach	35
FIGURE 3-2	Example of How to Communicate Results of Evaluating Alternatives for Each Mode	38
FIGURE 3-3	Example of Illustrating Trade-offs Between Alternatives	39
FIGURE 3-4	Examples of Steps to Define the Context Classification and Scope of Work for Non-Qualifying Projects	41
FIGURE 3-5	Potential Approach for RRR Projects When Elements other than Resurfacing are Required for the Roadway to Meet FDM Design Standards	43
FIGURE 3-6	ETDM Planning Screen and Context Classification	45
FIGURE 3-7	ETDM Programming Screen and Context Classification	46
FIGURE 4-1	Fatalities in Florida Involving At-Risk Drivers	49
FIGURE 4-2	Florida Transportation Fatalities and Serious Injuries by Mode, 2014	50
FIGURE 4-3	Relationship between Curb Radii and Pedestrian Crossing Distance	52
FIGURE 4-4	Type of Encroachment into Opposing and Adjacent Lanes that can Occur for Control Vehicle	52
FIGURE 4-5	Vehicular Impact Speeds and Pedestrian Risk of Fatality and Serious Injury	53
FIGURE 4-6	Context-Sensitive System of Complete Streets	57

FIGURE 4-7	Example of a Transition Zone (SR 26 through Newberry, Florida)	58
FIGURE 4-8	Transition Zone from C1-Natural/ C2-Rural to C2T-Rural Town Context Classification	59
FIGURE 4-9	Example of a Transition Zone (SR 50, Entrance to Town of Aldie, Virginia)	59
FIGURE A-1	Collaborative Investments to Support a Context-Sensitive System of Complete Streets	A2
FIGURE A-2	Example of Local Network Connectivity	A3
FIGURE A-3	Example of Investments in Local Multimodal Infrastructure	A3
FIGURE A-4	Example of Multimodal Network Plan	A4
FIGURE A-5	Cross-Access Easements	A5

Tables

TABLE 1-1	Stakeholder Roles in FDOT's Complete Streets Approach	12
TABLE 2-1	Context Classification Matrix	16
TABLE 2-2	Primary Measures to Define Context Classification	20
TABLE 2-3	Secondary Measures To Define the Context Classification	24
TABLE 2-4	Relationship between FDOT Context Classifications and the SmartCode™ Transect System	26
TABLE 2-5	Roadway Functional Classification and Role in the Transportation System	27
TABLE 2-6	Examples of Potential Data to Determine User Needs by Mode	29
TABLE 3-1	Examples of Potential Project-level Evaluation Measures by Mode	36
TABLE 3-2	Examples of How Project Evaluation Measures Can be Linked to Project Purpose and Needs	37

GLOSSARY

LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic	PD&E	Project Development and Environment
AASHTO	American Association of State Highway Transportation Officials	PED	Preliminary Environmental Determination
AASHTO Green Book	AASHTO A Policy on Geometric Design of Highways and Streets	PPM	Plans Preparation Manual
ACE	Alternative Corridor Evaluation	RCI	FDOT Enterprise Application Roadway Characteristics Inventory
BEBR	University of Florida Bureau of Economic and Business Research	RPC	Regional Planning Council
CNU	Congress for the New Urbanism	RRR	Resurfacing, Restoration, and Rehabilitation
D	Directional distribution factor	SD	Special District
ETAT	Environmental Technical Advisory Team	SIS	Strategic Intermodal System
ETDM	Efficient Transportation Decision Making	T	The percentage of the AADT volume generated by trucks or commercial vehicles
FAC	Florida Administrative Code	TAZ	Traffic Analysis Zone
FDM	FDOT Design Manual	TDP	Transit Development Plan
FDOT	Florida Department of Transportation	TPO	Transportation Planning Organization
FHWA	Federal Highway Administration	TSMO	Transportation Systems Management and Operations
FTP	Florida Transportation Plan	VMT	Vehicle Miles Traveled
GIS	Geographic Information System		
ITE	Institute of Transportation Engineers		
LAP	Local Agency Program		
LEHD	U.S. Census Bureaus' Longitudinal Employer-Household Dynamics website		
LOS	Level of Service		
LRTP	Long-Range Transportation Plan		
MPO	Metropolitan Planning Organization		
NACTO	National Association of City Transportation Officials		
NCHRP	National Cooperative Highway Research Program		
NEPA	National Environmental Policy Act of 1969		

DEFINITION OF TERMS

Context Classification System Comprised of eight context classifications, it broadly identifies the various built environments in Florida, based on existing or future land use characteristics, development patterns, and roadway connectivity of an area. In FDOT projects, the roadway will be assigned a context classification(s). The context classification system is used to determine criteria in the *FDM*.

The eight context classifications and their general descriptions:

C1-Natural	Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.
C2-Rural	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.
C2T-Rural Town	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.
C3R-Suburban Residential	Mostly residential uses within large blocks and a disconnected/ sparse roadway network.
C3C-Suburban Commercial	Mostly non-residential uses with large building footprints and large parking lots. Buildings are within large blocks and a disconnected/ sparse roadway network.
C4-Urban General	Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor and/or behind the uses fronting the roadway.
C5-Urban Center	Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of the civic or economic center of a community, town, or city.
C6-Urban Core	Areas with the highest densities and building heights and within FDOT classified Large Urbanized Areas (population > 1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadways, and are within a well-connected roadway network.

Control Vehicle The infrequent vehicle that must be accommodated by allowing encroachment (see Chapter 4).

Design User The anticipated users of a roadway (including drivers, pedestrians, bicyclists, and freight handlers) that form the basis for each roadway's design (see Chapter 4).

Design Vehicle The vehicle that must be accommodated without encroachment into opposing traffic lanes (see Chapter 4).

Form-Based Code Land development regulations that use physical form, rather than separation of uses, as the organizing principle for the code. For more information, visit <http://formbasedcodes.org>.

Induced Demand	Describes the additional demand for travel when the cost of travel decreases, either in time savings or monetary costs.
K-Factor	The ratio of a design-hour traffic volume to AADT
Large Urbanized Areas	Quality/Level of Service Handbook - areas with population over 1,000,000.
Non-qualifying Project	Projects that do not go through ETDM screening.
Qualifying Project	Roadway project types that qualify for ETDM screening, per the PD&E Manual Section 2.3.1, including additional through lanes that add capacity to an existing road, new or reconstructed arterial highway (e.g., realignment), and bridge replacements.
Rural	FHWA Definition — Encompasses all population, housing, and territory not included within an urban area. Quality/Level of Service Handbook Definition — areas that are not urbanized, urban, or transitioning.
Small Urban Areas	FHWA definition — Designated as population between 5,000 and 49,999, and not within any urbanized area with boundaries to be fixed by responsible State and local officials in cooperation with each other, subject to approval by the Secretary. (Identified as Urban Areas in the Quality/Level of Service Handbook).
Transect	The rural-to-urban transect is a tool utilized by the Congress for New Urbanism and others to describe the characteristics of human settlements. The rural-to-urban Transect is divided into six zones (see Chapter 2).
Transitioning Areas	Quality/Level of Service Handbook Definition - areas generally considered as transitioning into urbanized/urban areas or areas over 5,000 population and not currently in urbanized areas. These areas can also at times be determined as areas within a Metropolitan Planning Area, but not within an urbanized area. These areas are anticipated to reach urban densities in a 20-year horizon.
Urbanized Areas	FHWA and Quality/Level of Service Handbook Definition — Designated as population of 50,000 or more by the U.S. Census Bureau, within boundaries to be fixed by responsible State and local officials in cooperation with each other, subject to approval by the Secretary. Such boundaries shall encompass, at a minimum, the entire urbanized area within a State as designated by the U.S. Census Bureau.

FDOT COMPLETE STREETS POLICY

ADOPTED SEPTEMBER 17, 2014



Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

POLICY

Effective: September 17, 2014
Office: Design Director
Topic No.: 000-625-017-a

COMPLETE STREETS

It is the goal of the Department of Transportation to implement a policy that promotes safety, quality of life, and economic development in Florida. To implement this policy, the Department will routinely plan, design, construct, reconstruct and operate a context-sensitive system of "Complete Streets." While maintaining safety and mobility, Complete Streets shall serve the transportation needs of transportation system users of all ages and abilities, including but not limited to:

- Cyclists
- Freight handlers
- Motorists
- Pedestrians
- Transit riders

The Department specifically recognizes Complete Streets are context-sensitive and require transportation system design that considers local land development patterns and built form. The Department will coordinate with local governments, Metropolitan Planning Organizations, transportation agencies and the public, as needed to provide Complete Streets on the State Highway System, including the Strategic Intermodal System.

This **Complete Streets Policy** will be integrated into the Department's internal manuals, guidelines and related documents governing the planning, design, construction and operation of transportation facilities.

Ananth Prasad, P.E.
Secretary

Executive Summary

CONTEXT-BASED PLANNING AND DESIGN

In 1997, the Federal Highway Administration (FHWA) released guidance encouraging context-based transportation planning and design. Since then, many regional and local transportation planning agencies in Florida and throughout the U.S. have adopted context-based planning and design policies and practices. Context-based planning and design offers a flexible approach using existing tools in creative ways to address multimodal needs in different contexts. A specific context-based approach, called Complete Streets, also considers community needs, trade-offs between those needs, and alternatives to achieve multiple objectives.

In September 2014, the **Florida Department of Transportation (FDOT)** adopted the **Statewide Complete Streets Policy (Topic No. 000-625-017-a)**, (see facing page) joining 22 other state departments of transportation that have made a commitment to planning, designing, and operating their transportation systems for all users. Implementation of the Complete Streets Policy is an FDOT department-wide priority to provide FLEXIBILITY in the planning and design of projects on state roads, to put the right street in the right place.

WHAT IS FDOT'S APPROACH TO COMPLETE STREETS?

The FDOT Complete Streets policy captures three core concepts in its approach to Complete Streets:

- Complete Streets serve the transportation needs of transportation system users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers.

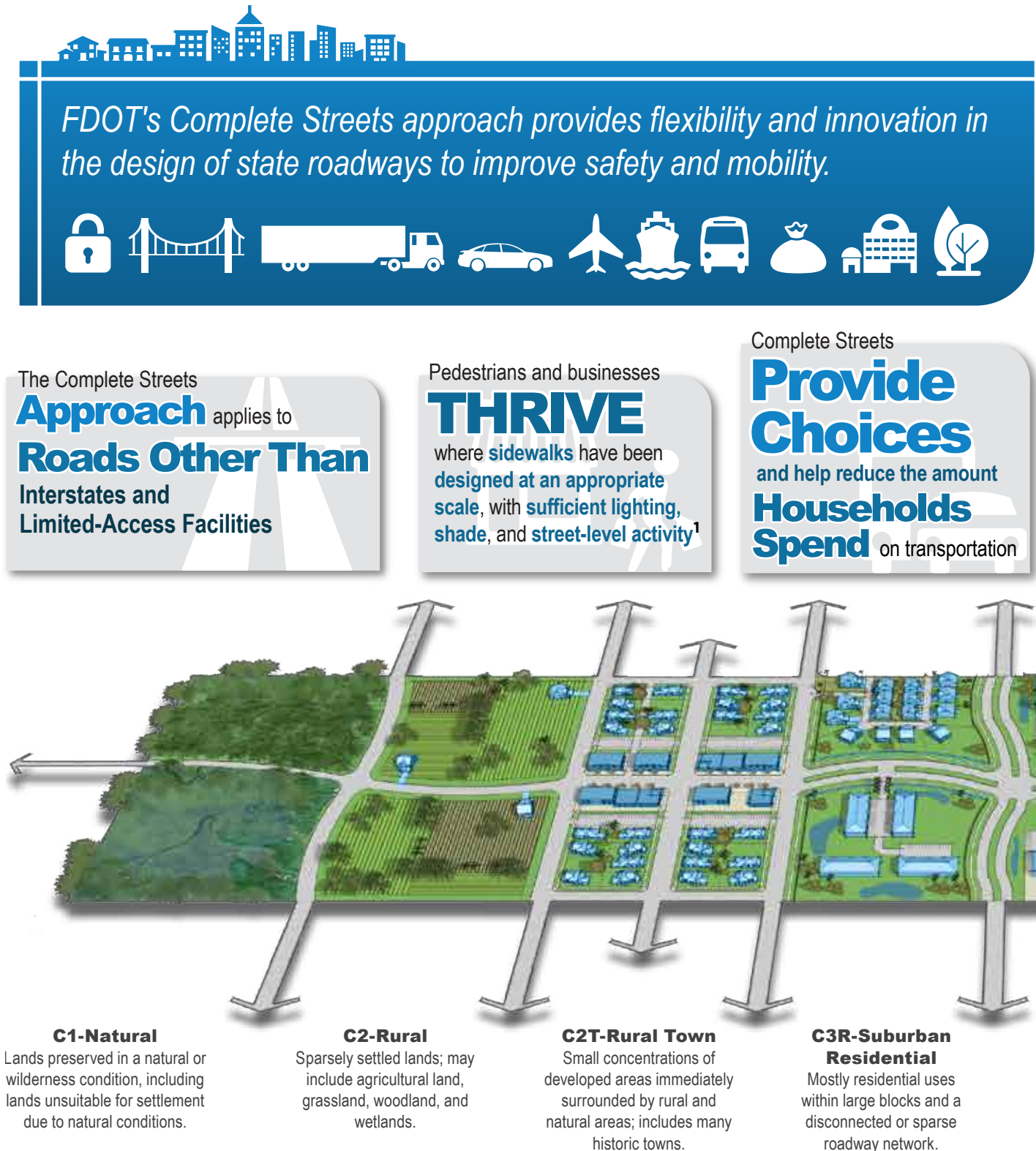
- Complete Streets are context sensitive, and the approach provides transportation system design that considers local land development patterns.
- A transportation system based on Complete Streets principles can help to promote safety, quality of life, and economic development.

The FDOT Complete Streets approach builds on flexibility and innovation to ensure that all state roadways are developed based on their context classification, as determined by FDOT to the maximum extent feasible.

With a Complete Streets approach, every non-limited-access state roadway project, including those on the Strategic Intermodal System (SIS), is uniquely planned and designed to serve the context of that roadway and the safety, comfort, and mobility of all users. In a high-speed rural context, where higher truck traffic is anticipated and walking and bicycling are infrequent, wider travel lanes with paved shoulders or a shared use path may be appropriate. In urban contexts, where high volumes of pedestrians, bicyclists, and transit users are expected or desired, a roadway could include features such as wide sidewalks, bicycle facilities, transit stops, and frequent, safe pedestrian crossing opportunities. Limited-access highways and interstates may incorporate elements of context-based design where they connect to the non-limited-access system, but this handbook is not intended for use on the limited-access system itself.

Most roadway projects are funded by strategically matching federal, state, and local funding sources to specific elements of the project. FDOT's Complete Streets approach to the planning and design of state roadway projects uses existing funding sources, and these funding practices will not change.

FIGURE ES-1 FDOT'S APPROACH TO COMPLETE STREETS



¹ National Association of City Transportation Officials, Urban Street Design Guide (2013).
² Smart Growth America. Complete Streets Promote Good Health (2012).
³ Smart Growth America, Complete Streets Stimulate the Local Economy (2012).
⁴ AASHTO Guide to the Design of Pedestrian Facilities (2004).

Complete Streets

Promote Connectivity

by offering customers access to an **interconnected network** of pedestrian, bicycle, transit, and roadway facilities

Complete Streets spur

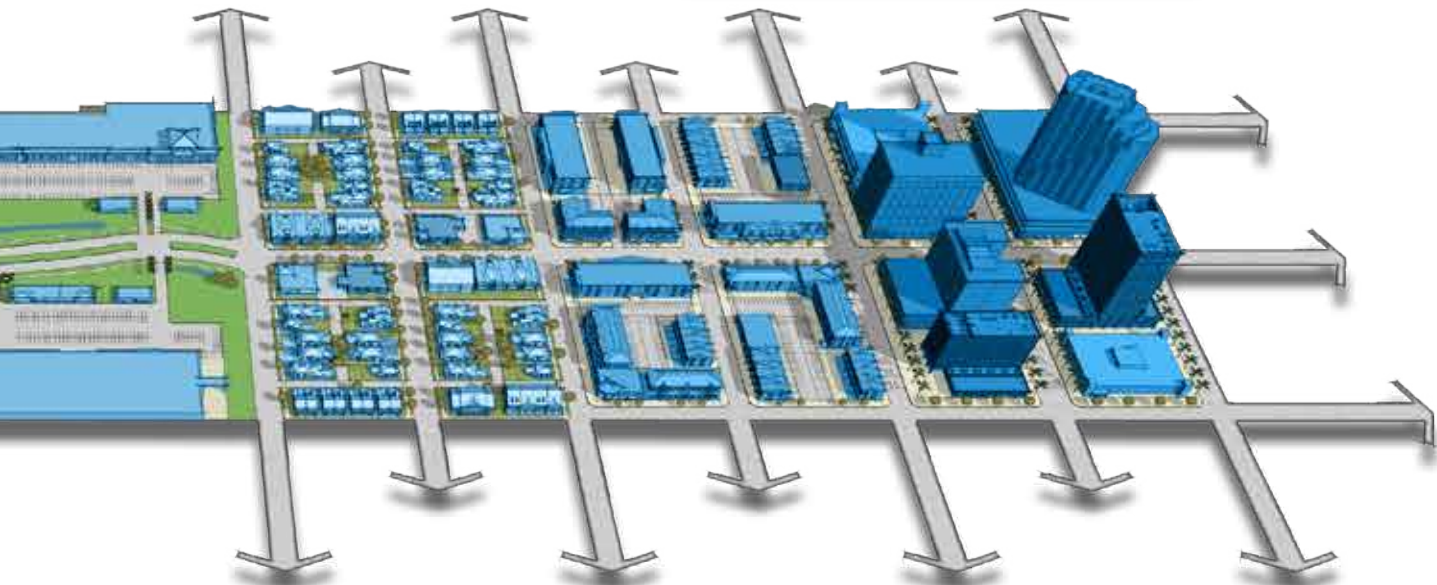
Private Investment & Enhance Economic Prosperity³

Complete Streets provide opportunities for

Increased Physical Activity & Improved Community Health

by incorporating features that promote regular walking, bicycling, and transit use²

Context appropriate vehicle speeds

Reduce the chance of Pedestrian Fatalities⁴**C3C-Suburban Commercial**

Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

C4-Urban General

Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5-Urban Center

Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.

C6-Urban Core

Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population >1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.

COMPLETE STREETS PRINCIPLES AND THE FLORIDA TRANSPORTATION PLAN

The *Florida Transportation Plan (FTP)* is the statewide long-range transportation plan guiding Florida's transportation future. FDOT's Complete Streets approach exemplifies the goals of the *FTP* regarding innovation and flexibility in design and collaboration and coordination with partners to create better transportation solutions. The Complete Streets approach uses existing tools in creative ways to address multimodal needs in different contexts, calling for a holistic consideration of community needs, trade-offs between needs, and alternatives to achieve multiple objectives. FDOT's Complete Streets

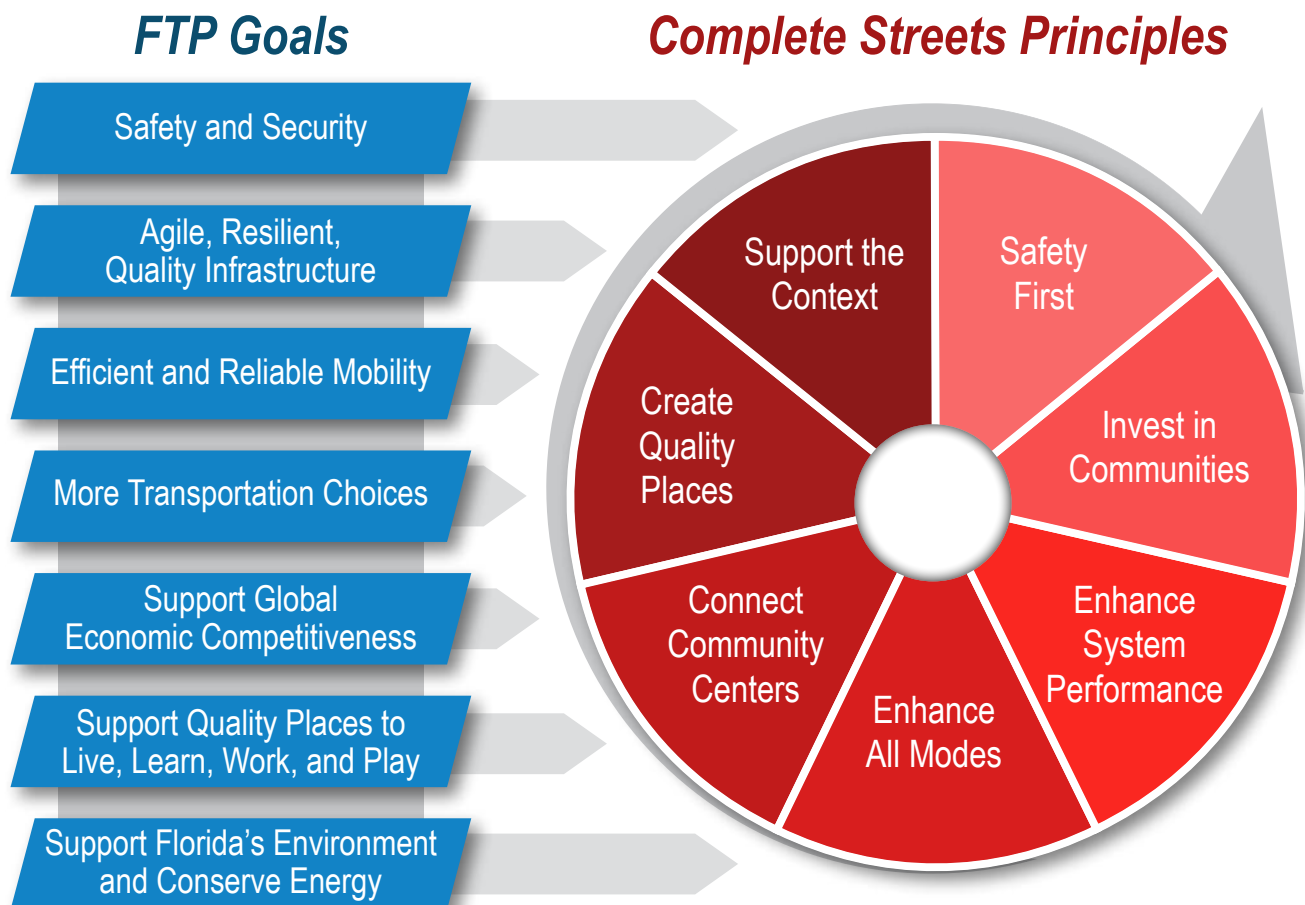
principles align with the FTP's goals as shown in Figure ES-2, and serve to guide the implementation of FDOT's Complete Streets Policy.

COMPLETE STREETS PRINCIPLES

Safety First

Safety for all users is FDOT's top priority and a goal of the *FTP*. Roadways with context-appropriate speeds can result in reduced fatalities and serious injuries in locations with higher levels of pedestrian and bicycle activity. The Complete Streets approach considers the mobility, convenience, accessibility, and safety of all road users, and places an emphasis on the most vulnerable users of a given roadway.

FIGURE ES-2 LINKING THE FLORIDA TRANSPORTATION PLAN AND COMPLETE STREETS PRINCIPLES



Invest in Existing and Emerging Communities

The **FTP** goal of agile, resilient, and quality infrastructure focuses on investing resources wisely. The Complete Streets approach helps to match roadways with the needs of urban areas as well as emerging growth centers, investing in the right road for the right location. The approach calls for design flexibility to develop roadway projects that consider local character and vision, the role and characteristics of the roadway within the transportation system, and the roadway's physical characteristics.

Enhance System Performance

Efficient and reliable mobility is a goal of the **FTP**. The Complete Streets approach matches, based on context, the roles of each roadway with customized solutions that consider local access and regional and interregional mobility for people and freight. A Complete Streets approach relies on a complete network of transportation facilities made up of unique streets, each supporting the role and function it has within the system. A complete network enhances efficiency and reliability for all modes by providing direct and multiple route choices, improving access to all modes, and reducing trip lengths.

Enhance All Modes

Increasing transportation choice is a goal of the **FTP**, reflecting the desire of residents, visitors, and businesses to have mobility options based on travel preferences, need, convenience, cost, or time. A Complete Streets approach provides opportunities to expand mobility options by considering all users and all modes during roadway planning and design. This is important for short-distance and local trips, where walking, bicycling, and transit are most desired.

Connect Community Centers

Transportation solutions that support Florida's economic competitiveness are a goal of the **FTP**. A Complete Streets approach connects communities and supports Florida's existing economic centers, employment centers, and visitor destinations by striving to provide the highest level of multimodal infrastructure in these core areas.

Create Quality Places

Creating quality places to live, learn, work and play is a goal of the **FTP**. A Complete Streets approach helps to align transportation decisions with land use, resulting in quality places offering transportation choices where transportation investments support a community's economic competitiveness and quality of life.

Support the Context

Transportation solutions that support the environment and conserve energy is a goal of the **FTP**. A Complete Streets approach uses design flexibility to develop roadways that consider the local character and vision, which often reflect a desire for a future in which a community manages land more efficiently, preserves environmental resources and natural countryside, and create distinctive places in which to live in both rural and urban settings.

WHAT IS IN THIS HANDBOOK?

This handbook provides:

- An explanation of FDOT's Complete Streets approach and principles for state roads
- Guidelines for FDOT's collaboration with local and regional partners
- Definitions of context classifications used for state roads
- Guidelines for applying a Complete Streets approach to state projects
- Guidelines for roadway design considerations

FDOT will coordinate with partner agencies when implementing this Complete Streets approach.

Chapter 1 describes FDOT's role in determining context classification, identifying associated transportation elements to incorporate in a project based on the context classification, and coordinating with local and regional partners to implement and fund projects. Chapter 1 also highlights the role partners play and how FDOT depends on their involvement and contributions. Local governments are responsible

for community visions, land use decisions, and local and regional transportation network connectivity, all of which influence the choice of multimodal solutions. Local governments, regional planning councils, and Metropolitan or Transportation Planning Organizations (MPOs/TPOs) are responsible for regional and community visions, including transportation goals. Other partners, such as transit agencies and private developers, provide targeted expertise and information about their services and plans.

Chapter 2 describes the context classifications FDOT will use for project planning and design of state projects, including projects on the SIS. Figure ES-1 presents the eight context classifications and provides short descriptions. Chapter 2 also describes the primary and secondary measures used to determine context classification.

Chapter 3 details how the Complete Streets approach is incorporated in existing FDOT processes and when the context classification is determined. FDOT will have the final determination of the context classification for state roadways. FDOT context classifications are assigned at the earliest stage possible, typically during project scoping. Information to determine context classification will be obtained using multiple sources and tools, such as through partner coordination for the desired future context, and field reviews and aerial photography for existing development patterns. Chapter 3 also explains how the Complete Streets approach integrates with existing processes, such as long-range transportation plan projects that use Efficient Transportation Decision Making (ETDM) screening and RRR – Resurfacing, Restoration, and Rehabilitation projects.

Chapter 4 explains design considerations in applying FDOT's Complete Streets approach. The FDOT context classification and transportation characteristics, such as the road's functional class, will be used together when applying Complete Streets planning or design considerations. After looking at the community's current environment and future vision to determine the context classification, FDOT staff will assign a context classification and choose transportation elements that fit within the parameters of that classification. The details are presented in the **FDOT Design Manual (FDM)** updates.

NEXT STEPS

Adopting the Complete Streets policy was only the beginning. FDOT has already taken bold steps towards making the Complete Streets implementation a priority. The **FDOT Complete Streets Implementation Plan** (December 2015) provides the framework for necessary changes to fully align with the Complete Streets philosophy. In particular, the Implementation Plan calls for:

- Integrating a context-based approach into project planning and design
- Revising standards, manuals, and policies
- Updating decision-making processes
- Modifying approaches for measuring performance

FDOT has begun revising its standards, policies, and guidance documents to align with this Complete Streets approach. These include:

- FDOT Design Manual (FDM), replacing the current Plans Preparation Manual (PPM)
- Efficient Transportation Decision Making Manual
- Project Development and Environment Manual
- Project Traffic Forecasting Handbook
- Level of Service Standards, Policies, and Procedures
- Strategic Intermodal System Highway Component Standards and Criteria
- Traffic Engineering Manual
- Quality/LOS Handbook

The **FDM** will be effective January 1, 2018. See Chapter 3 for details.

Partnership and Agency Collaboration

FDOT is committed to supporting the needs of all users as part of incorporating a Complete Streets approach in every phase of project development — planning, design, construction, operations, and maintenance. A system of Complete Streets cannot be built entirely within the state roadway system and solely within FDOT's right of way. Local and regional decisions have a strong influence on the state's decisions, and FDOT will seek to strengthen collaboration and partnerships with local governments, regional agencies, MPOs/TPOs, transportation agencies, and the public to further Complete Streets principles.

The **Florida Transportation Plan (FTP)** recognizes the importance of collaborating across sectors, jurisdictions, modes, and disciplines to create the desired transportation system for Florida. Regions and communities have different needs and expectations, and the flexibility of FDOT's Complete Streets approach is key to supporting each area's unique character and vision. For state roads, achieving the state's goals and the community's goals requires a balancing of priorities, constraints, and opportunities. Working together allows multiple agencies to achieve individual objectives while effectively and efficiently achieving shared and related goals to deliver a safe and quality transportation system to the public.

THE ROLE OF COMMUNITY VISIONS

To support quality places, the FTP calls for transportation systems to reflect regional and community visions. These visions are important to FDOT and other partners in setting the framework for transportation decision making. FDOT relies upon partners to develop and actively communicate their visions and goals to provide clear direction, not only to FDOT but to public and private partners engaged

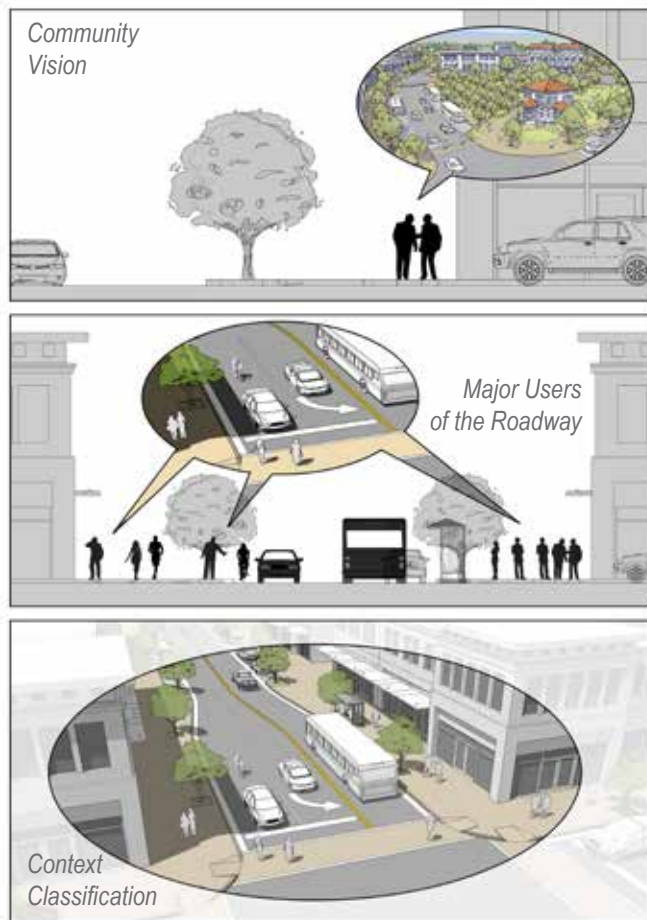
in community development. Visions also provide the basis for the land development regulations and policies used to implement community goals. Local and regional visions can take many forms, such as standalone vision documents, comprehensive plans, neighborhood or sub area plans, including community redevelopment areas, or land development regulations.

FDOT's approach to Complete Streets is context-sensitive, and FDOT will support local partners by building projects that help support local and regional visions to the maximum extent feasible. Where context-based design has not previously been envisioned, FDOT will collaborate with partners and rely upon existing development patterns and plans to determine the context classification. If the future vision of an area for a proposed transportation project is intended to be different from the existing, clear and documented direction from the local or regional government on that vision is imperative. (See Figure 1-1.)

HOW LAND USE SUPPORTS COMPLETE STREETS

The transportation system and development pattern (such as land use, development density and intensity, building design, and site layout) are inextricably linked, and both have an effect on travel choices and mobility. A robust, connected network provides options for the movement of people and goods and also is the foundation for safe and comfortable multimodal travel for pedestrians, bicyclists, and transit riders. Thoughtful application of context-based planning and design considers all modes of transportation and customizes projects appropriately. For example, in a more urban environment, emphasizing multimodal elements in the roadway may be important to match the diverse level of activity. In suburban and rural areas, vehicular travel remains important, and

FIGURE 1-1 HOW COMMUNITY VISIONS CAN INFORM CONTEXT CLASSIFICATION, USERS, AND ROADWAY DESIGN



Community visions can help inform who the major users are and what the context classification of the roadway is.

Source: Adapted from FDOT District 5 Multimodal Corridors Planning Guidebook

balancing needs is more nuanced.

For the transportation components, local and regional governments (counties, municipalities, military, etc.) take the lead in implementing projects on their facilities. FDOT is responsible for projects on the State Highway System and is available to offer technical assistance and expertise to its partners. Land use decisions are made by local governments, and FDOT will collaborate with these partners when applying the Complete Streets approach for projects. For projects serving multiple jurisdictions, this can include coordinating with multiple jurisdictions to determine the context classifications. Appendix A

presents additional information on land use tools to support safe and comfortable multimodal travel.

PROJECT DEVELOPMENT PROCESS

Throughout the project development process, local and regional partners will influence FDOT's Complete Streets approach to planning, design, and implementation of projects on state roads. Many of FDOT's processes will function as they currently do, with an additional emphasis on coordination and engagement with partners to achieve mutual benefits. Most importantly, FDOT planners and designers are able to support the local community context through flexibility in the placement and types of components (such as bike lanes or on-street parking) considered for a project.

The transportation planning process begins with long-range plans such as those created by FDOT for the Strategic Intermodal System (SIS) and by MPOs/TPOs for their planning areas. Local Government Comprehensive Plans, developed pursuant to **Chapter 163, Florida Statutes**, also provide system-level information about the desired long-term transportation network and community development. These plans identify at a high level the needs for certain types of projects or projects in specific locations while at the same time articulating policies that promote the system-wide use of context-based design.

A next step of the project's development is to perform a Project Development and Environment (PD&E) study, if applicable, to evaluate design concepts and alternatives that address the purpose and need for the project. Balancing mobility needs and community needs is an integral part of alternatives consideration, and coordination with environmental resource agencies, local governments, and the public is critical in the process. After selecting a preferred alternative, the project moves to the design phase, where additional coordination with local governments, partners and public continues, as appropriate.

FDOT will apply the Complete Streets approach to maintenance and operational projects; however, opportunities for significant enhancements to these types of projects are constrained because of

the purpose of these projects. Coordination and collaboration becomes more integrated and complex when applying the Complete Streets approach to projects later in the development process, because of more defined project schedules. The best opportunities in these cases are for resurfacing, restoration, and rehabilitation (RRR) projects. FDOT will coordinate early with local partners to identify feasible enhancements within the constraints of the project. More information regarding this process can be found Chapter 3 of this Handbook.

A key factor in the Complete Streets approach is blending and merging of projects and concepts to create the desired long-term solution. FDOT will fund the construction and maintenance of aspects of transportation projects that are necessary to comply with adopted FDOT design criteria contained in the FDM. If local governments or other partners would like to include features that go beyond what is required by FDOT design criteria, funding for the construction and maintenance of those additional components will be the responsibility of the local government or local partner, as defined in a local maintenance agreement. Current elements being maintained by local governments or other partners as part of local maintenance agreements (e.g. traffic signals on state roadways) will continue to be maintained per the agreements in place.

FDOT'S ROLE

The FDOT context classification for state projects will be determined as early as possible in the planning, design, and maintenance cycle. The process for project development is detailed in Chapter 3 of this Handbook, but summarized here as it relates to local government interaction. For state projects, the project manager (or designee, such as a scoping team member, growth management liaison, or MPO/TPO liaison) is responsible for coordinating with affected local and regional governments and agencies during the determination of the context classification. This information may eventually be stored in an integrated roadway asset identification system, such as the FDOT Enterprise Application Roadway Characteristics Inventory (RCI), the straightline diagram, and the typical section data sheet. Measures used to determine the context classification are based on

existing development patterns and may include future visions of the community. Collaboration with the local and regional agencies and governments associated with a project is the key for successful projects. In an ideal situation, a future vision for an area or corridor will be documented and approved by the community's governing body, such as in its comprehensive plan and land development codes. Community redevelopment area master plans or sector plans are other possible examples. FDOT will have the final determination of the context classifications to be used for state transportation projects (i.e., for roads on the State Highway System, including the SIS). Interstates and freeways are high-volume transportation facilities that are independent of the surrounding land uses, and are considered "complete," but context classification will be needed at locations where these facilities connect to the non-limited-access system.

To address projects identified as part of the MPO/TPO long-range planning process, districts may identify the context classification of state projects during the Efficient Transportation Decision Making (ETDM) screening and collaborate with affected local governments as part of Long-Range Transportation Plan (LRTP) preparation, or may follow other processes as described in Chapter 3. Each FDOT district has flexibility in its process for documenting context classifications that could vary within the district due to local and regional agency preferences. For example, instead of working on a project-by-project basis, a district could decide to proactively determine the context classification for all state facilities, or all state facilities in a specific area (e.g., an urbanized area). Or, a district could coordinate with a MPO/TPO to recommend context classifications for LRTP state projects.

After determining a project's context classification, or potentially multiple context classifications for a longer corridor, FDOT will choose transportation criteria that fit within the parameters of the classification(s). The FDOT context classification and transportation characteristics, such as the road's functional class and network connectivity, will be used together for planning and design. This task is easiest for new roads with right of way to incorporate all appropriate transportation elements. For existing roads, with limited rights of way, the ability to include transportation elements may require a balancing of

needs and constraints. Based on its processes and procedures, FDOT will coordinate with partners to evaluate options. Each FDOT district will decide how best to incorporate a Complete Streets planning and design approach in its processes. For example, some districts have scoping teams and tools to identify and tag projects for increased community collaboration and flexibility early.

The SIS is composed of facilities of statewide and regional significance with the objective of supporting interregional connectivity, intermodal connectivity, and economic development. To local communities, a SIS facility can serve as a corridor connecting communities or may be a main street for a town. Multiple partners working collaboratively to find solutions is key to the Complete Streets approach, whether for a SIS facility or state or local road. For example, some districts have worked with communities to shift SIS corridors to avoid main street areas and have designated alternate SIS routes or connectors to support interregional travel and local needs simultaneously.

FDOT will continue to use the same funding categories (federal, state, and local funds) with the Complete Streets planning and design approach. Context classification allows FDOT greater flexibility in designs and helps to match roads to their locations. FDOT will plan more carefully for what treatments are wanted, and where, and can help identify appropriate funding. Although no new funding is available for Complete Streets, existing sources will be tapped in more specific ways, by understanding place better than before. This also means FDOT will continue to rely on local partners to provide features that go beyond FDOT design criteria (e.g., decorative lighting or patterned facilities).

FDOT can collaborate with a community to identify a road's context classification at any time and communities are encouraged to reach out to their district to coordinate with FDOT before projects are identified. This is particularly the case if a community is interested in changing the character of a street over time or is considering requesting a lane elimination or "road diet" on a state road, where additional studies and steps are warranted. Each district will address community collaboration based on partner engagement preferences. For some of the more urban districts, a Complete Streets coordinator may

be designated. Other districts may rely on MPO/TPO liaisons or SIS or growth management coordinators.

THE ROLES OF PARTNERS

A Complete Streets approach to planning and design allows for flexibility in projects, which means that collaboration and partnering is required to meet and balance the transportation needs of the community, the region, and the State. It is important to ensure that state roadways maintain vital regional and statewide mobility goals, especially for SIS facilities. When planning and designing state projects, FDOT will rely on partners within the affected jurisdiction(s) who have local and regional expertise.

METROPOLITAN PLANNING ORGANIZATIONS

The transportation planning process requires MPOs/TPOs, with the involvement of state and local governments and stakeholders, to create an LRTP. The LRTP provides guidance on the MPO's/TPO's vision for the planning area's transportation system. For example, MPOs/TPOs have identified transit networks and systems of bicycle, sidewalk, and trail networks. Identifying projects, prioritizing them, allocating funding, and tracking performance measures also influence FDOT's Complete Streets approach for state projects. As part of the LRTP process, MPOs/TPOs are encouraged to work with FDOT districts to identify context classifications for projects, and identify and allocate funding to address FDOT and local Complete Streets needs.

A MPO/TPO is available to work with constituent communities to clarify and define regional and community visions that will be used during context classification determination. Also, communities may desire infrastructure for state roads that go beyond FDOT design criteria, and MPOs/TPOs are in a position to assist local governments in identifying those items and allocating and aligning other funding.

LOCAL GOVERNMENTS

Local governments are responsible for land use and transportation planning to create supportive infrastructure and development patterns that match community goals and visions. Clear policies delineated in a community's comprehensive plan to retain current development patterns, such as in historical or rural towns, or promote changes in development patterns, such as in urbanizing areas, provide direction to private and public partners in land development, infrastructure, and provision of services. FDOT will look to local governments when determining context classification as part of a state project. Comprehensive plans, subarea plans, and land development regulations, such as zoning or form-based codes, are some of the documents that will be reviewed to determine future visions and the land use-related items in determining context classification. The existing development pattern, determined through aerial/asset mapping or site visits, for example, will be used to evaluate current transportation network connectivity for the project and surrounding areas. It also will be used to evaluate current site plan oriented criteria, such as building and parking placement, and development intensity. The private sector is responsible for site development in accordance with local policies and codes and approval from the local government. For example, land use and development decisions to mix uses or locate buildings close to the road support easier pedestrian and bicyclist access. The specifics of how context classification is determined are covered in Chapters 2 and 3 of this Handbook.

After determining the context classification, FDOT identifies the elements that are appropriate for the context and assesses design and implementation options. If infrastructure for state roads that go beyond FDOT design criteria, such as decorative lighting or landscaping, patterned pavements, or street furniture and wayfinding is desired, local communities must coordinate with FDOT to align local resources and projects with the state project. Each district has flexibility in how the coordination of projects is handled. For example, districts have performed construction with the local government assuming maintenance responsibilities, particularly for the enhancements. Other districts have relied on the Local Agency Program (LAP) to allow the local government to implement the combined, broader project.

As part of the decision-making process to identify the elements to include in a state project, FDOT will evaluate the surrounding and connecting transportation network. Finding flexible and innovative solutions can mean looking at other roads/networks to support state and community goals. Local and regional roads are the responsibility of county and municipal governments, and others. Creating a roadway network with appropriate design elements also provides multiple travel options for all modes, assists with pedestrian and bicycling routing, shortens trip distances, and reduces the need to widen intersections and roadways. Regional and local road designs, such as inhibiting through access or limiting lanes, can increase the reliance on state roads for mobility for some road users.

TRANSIT AGENCIES

Transit agencies — at the city, county, and regional levels — play a significant role in providing transportation choices for all users. Transit agencies develop short-term Transit Development Plan (TDPs) and may develop longer-term plans that identify the investments needed in transit within their service areas. As part of project planning, FDOT districts will coordinate with local transit agencies to determine the proper role for transit along a roadway. This determination also requires coordination with local governments given their role in defining and regulating the desired land development. FDOT's **Assessing Transit Guidebook** includes planning and design recommendations for transit-supportive communities.

OTHER PARTNERS

Other agencies and entities may engage with FDOT as part of state project planning and design. Regional Planning Councils may prepare regional or community visions and transportation long-range plans, and support local government comprehensive planning and development regulations. Advocacy and community groups may raise items to be addressed by FDOT or local governments. Other public stakeholders also are involved through existing FDOT and other agencies processes and procedures.

Table 1-1 provides a representative overview of the roles of various partners in FDOT's Completes Streets approach.

TABLE 1-1 STAKEHOLDER ROLES IN FDOT'S COMPLETE STREETS APPROACH

	Project Planning	Context Classification	Identification of Project Elements	Selection of Project Elements	Project Funding
FDOT	- Plans state projects - Coordinates with partners	- Determines context classification - Coordinates with partners, as needed based on type of project	- Uses FDM and other guidance to define potential project elements based on context classification and transportation characteristics - Studies concepts, alternatives, and feasibility	- Considers benefits and costs of project elements - Determines feasible project elements - Coordinates with partners, as needed based on type of project	- Matches funding to project elements, within existing budget parameters - Coordinates with partners for project funding
MPOs/ TPOs	- Initiates project requests to FDOT via LRTP and other studies - Performs and participates in planning and studies	- Establishes transportation vision through long-range plans - Considers project context classifications during LRTP development	- Defines project in LRTP - Coordinates with partners, as needed	Collaborates with FDOT and partners on companion projects	- Establishes project funding during LRTP and Transportation Improvement Program (TIP/STIP) - Considers multimodal elements in project planning - Coordinates with FDOT and other partners
Local Governments	- Initiates project request to FDOT, as needed - Participates in planning processes and studies	- Establishes community vision through comprehensive and other plans - Sets local land use policies and land development regulations	- Identifies companion projects for additional elements, e.g., lighting, landscape, street furniture - Coordinates with partners, as needed	Supplements project elements provided by FDOT with companion projects, as needed	- Provides local funding for elements not funded by FDOT, as needed - Enters into maintenance agreements with FDOT for additional enhancements, as needed - Coordinates with FDOT and other partners
Other Partners (such as private businesses, developers, transportation operators, law enforcement, or advocacy groups)	Participates in planning processes and studies	- Participates in development of community and regional visions - Establish transit plans - Performs land development and economic development projects	Identifies companion projects for additional elements, e.g., transit stops	Supplements project elements provided by FDOT with companion projects, as needed	Coordinates with FDOT and other partners

Context-Based Complete Streets

FDOT will routinely plan, design, construct, and maintain state roadways in harmony with the surrounding land use characteristics and the intended uses of the roadway. To this end, a context classification system comprising eight context classifications has been adopted. The context classification of a roadway, together with its transportation characteristics, will provide information about who the users are along the roadway, the regional and local travel demand of the roadway, and the challenges and opportunities of each roadway user (see Figure 2-1). The context classification and transportation characteristics of a roadway will determine key design criteria for all non-limited-access state roadways.

This chapter describes the measures to be used to determine the context classification of a roadway. See Chapter 3 of this Handbook for a discussion of how context classification is incorporated into the existing FDOT project development process.

FIGURE 2-1 CONTEXT CLASSIFICATION AND TRANSPORTATION CHARACTERISTICS



CONTEXT CLASSIFICATION

The context classification system broadly identifies the various built environments existing in Florida, as illustrated in Figure 2-2. State roadways will extend through a variety of context classifications. Figure 2-2 should not be taken literally to imply all roadways will have every context classification or that context classifications occur in the sequence shown. FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity along a roadway, providing cues as to the types of uses and user groups that will likely utilize the roadway. The context classification

of a roadway will inform FDOT's planning, PD&E, design, construction, and maintenance approaches to ensure that state roadways are supportive of safe and comfortable travel for their anticipated users. Identifying the context classification is a preliminary step in planning and design, as different context classifications will have different design criteria and standards.

The use of context classifications to determine criteria for roadway design elements is consistent with national best practices and direction, including the National Cooperative Highway Research Program

FIGURE 2-2 FDOT CONTEXT CLASSIFICATIONS



C1-Natural

Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.

C2-Rural

Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.

C2T-Rural Town

Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.

C3R-Suburban Residential

Mostly residential uses within large blocks and a disconnected or sparse roadway network.

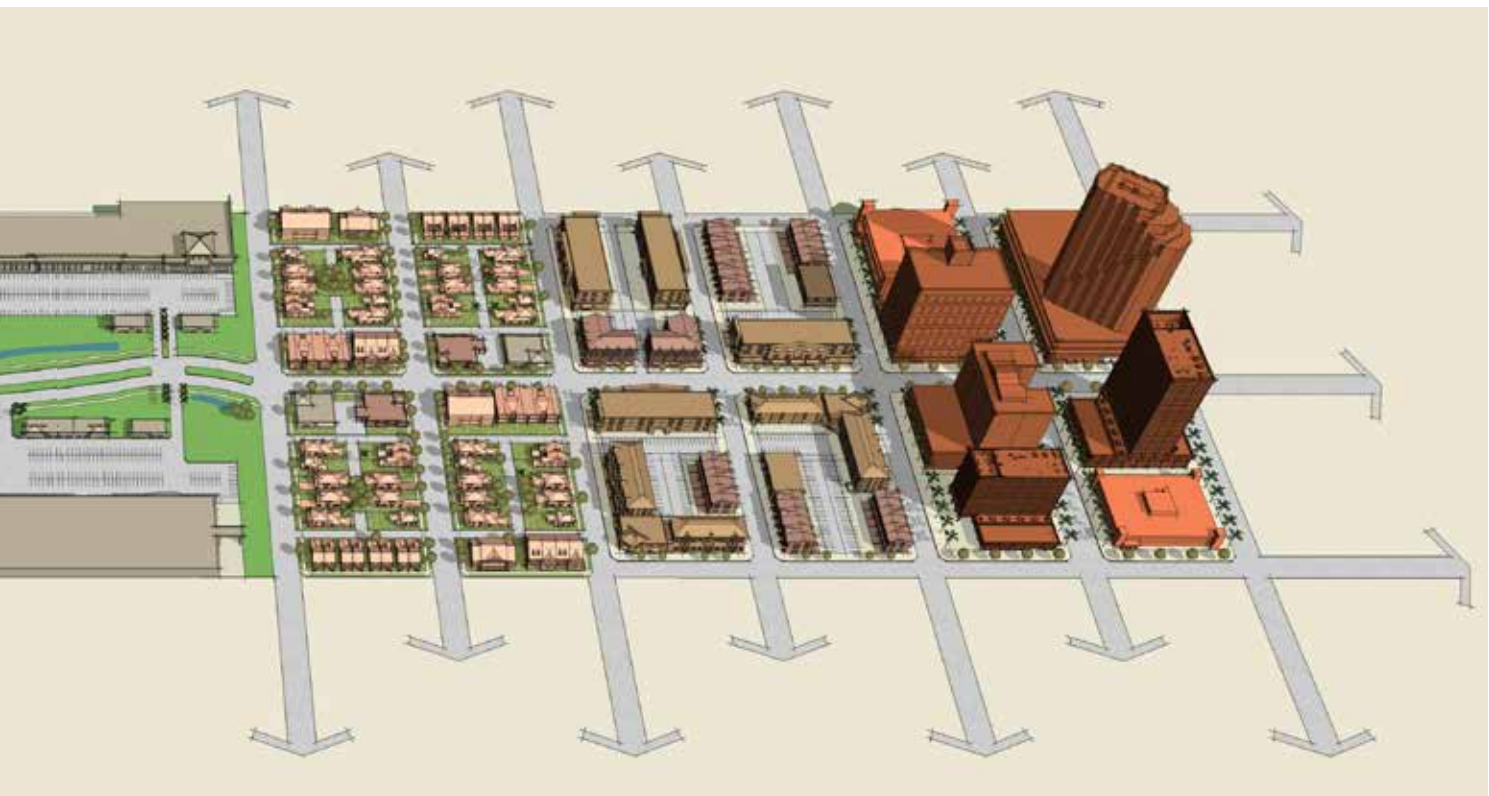
(NCHRP) that informs Federal Highway Administration (FHWA) and American Association of State Highway Transportation Officials (AASHTO) guidance.

Ongoing research under ***NCHRP 15-52: Developing a Context-Sensitive Functional Classification System for more Flexibility in Highway Design***

is proposing a similar context-based approach to design that incorporates context, user needs, and transportation functions into the design process. This research was born out of a need to better define contexts beyond urban and rural classifications, and to incorporate multimodal needs into the existing functional classification system.

This chapter outlines the steps to determine a roadway's context classification. Measures used to determine the context classification are presented, and a process to define the context classification is outlined for:

- All projects on existing roadways and for projects that propose new roadways and are in the PD&E or design phases
- Projects evaluating new roadways in the planning and ETDM screening phases



C3C-Suburban Commercial

Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

C4-Urban General

Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5-Urban Center

Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.

C6-Urban Core

Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population >1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.

CONTEXT CLASSIFICATION MATRIX

Table 2-1 Context Classification Matrix presents a framework to determine the context classifications along state roadways. This Context Classification Matrix outlines (1) distinguishing characteristics, (2) primary measures, and (3) secondary measures.

The distinguishing characteristics give a broad description of the land use types and street patterns found within each context classification. The primary and secondary measures provide more detailed assessments of the existing or future conditions along the roadway. These measures can be evaluated through a combination of a field visit, internet-based

TABLE 2-1 CONTEXT CLASSIFICATION MATRIX

Context Classification	Distinguishing Characteristics	Primary Measures		
		Land Use	Building Height	Building Placement
		Description	Floor Levels	Description
C1-Natural	Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.	Conservation Land, Open Space, or Park	N/A	N/A
C2-Rural	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.	Agricultural or Single-Family Residential	1 to 2	Detached buildings with no consistent pattern of setbacks
C2T-Rural Town	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.	Retail, Office, Single-Family or Multi-Family Residential, Institutional, or Industrial	1 to 2	Both detached and attached buildings with no, shallow (<10'), or medium (10' to 24') front setbacks
C3R-Suburban Residential	Mostly residential uses within large blocks and a disconnected or sparse roadway network.	Single-Family or Multi-Family Residential	1 to 2, with some 3	Detached buildings with medium to large (>10') front setbacks
C3C-Suburban Commercial	Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.	Retail, Office, Multi-Family Residential, Institutional, or Industrial	1 (retail uses) and 1 to 4 (office uses)	Detached buildings with medium to large (>10') setbacks on all sides
C4-Urban General	Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.	Single-Family or Multi-Family Residential, Institutional, Neighborhood Scale Retail, or Office	1 to 3, with some taller buildings	Both detached and attached buildings with no, shallow (<10'), or medium (10' to 24') front setbacks
C5-Urban Center	Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.	Retail, Office, Single-Family or Multi-Family Residential, Institutional, or Light Industrial	1 to 5, with some taller buildings	Both detached and attached buildings with no, shallow (<10'), or medium (10' to 24') front setbacks
C6-Urban Core	Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population >1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.	Retail, Office, Institutional, or Multi-Family Residential	>4, with some shorter buildings	Mostly attached buildings with no or shallow (<10') front setbacks

The thresholds presented in Table 2-1 are based on the following sources, with modifications made based on Florida case studies:

1) *2008 Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities*, New Jersey Department of Transportation and Pennsylvania Department of Transportation;

aerial and street view imagery, map analysis, review of future land use or existing zoning information, and discussions with local governments. The Context Classification Matrix presents the primary and secondary measures thresholds for the eight context classifications.

Appendix B illustrates the eight FDOT context classifications through case studies. These case studies present examples of real-world values for the primary and secondary measures that determine a roadway's context classification.

					Secondary Measures			
Fronting Uses	Location of Off-street Parking	Roadway Connectivity			Allowed Residential Density	Allowed Office/ Retail Density	Population Density	Employment Density
		Intersection Density	Block Perimeters	Block Length				
Yes/No	Description	Intersections/ Square Mile	Feet	Feet	Dwelling Units/ Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No	N/A	N/A	N/A	N/A	<1	N/A	<2	N/A
Yes	Mostly on side or rear; occasionally in front	>100	<3,000	<500	>4	>0.25	N/A	>2
No	Mostly in front; occasionally in rear or side	<100	N/A	N/A	1 to 8	N/A	N/A	N/A
No	Mostly in front; occasionally in rear, or side	<100	>3,000	>660	N/A	<0.75	N/A	N/A
Yes	Mostly on side or rear; occasionally in front	>100	<3,000	<500	>4	N/A	>5	>5
Yes	Mostly on side or rear; occasionally in front, or in shared off-site parking facilities	>100	<2,500	<500	>8	>0.75	>10	>20
Yes	Side or rear; often in shared off-site garage parking	>100	<2,500	<660	>16	>2	>20	>45

2) [2012 Florida TOD Guidebook](#), Florida Department of Transportation;

3) [2009 SmartCode Version 9.2.](#), Duany, Andres, Sandy Sorien, and William Wright; and

4) [2010 Designing Walkable Urban Thoroughfares: A Context Sensitive Approach](#), Institute of Transportation Engineers and Congress for the New Urbanism.

DETERMINING CONTEXT CLASSIFICATION

The distinguishing characteristics and primary and secondary measures provide analytical measurements to evaluate land use characteristics, development patterns, and roadway connectivity and to determine context classification. The data available to quantify existing and future contexts will vary depending on the specificity of the roadway alignments being considered. Many projects conducted by FDOT occur along existing corridors where a single alignment is being considered. The range of alternatives for new roadways also narrows to a single alignment alternative as projects proceed from planning, through PD&E and design. In planning and ETDM screening for existing roadways, and PD&E and design for new roadways, it is possible to analyze both the existing and future conditions to determine context classification of a roadway. For projects involving new roadways in planning and ETDM screening, multiple alternative alignments may be considered over larger areas. For these latter type of projects, a broader understanding of the context classification will be used to inform the planning process and development of alternatives.

To be able to utilize the context-based criteria in the **FDM**, all projects must be informed by their roadway context classification. The context classification will be developed or confirmed at the beginning of each project phase, including planning, PD&E, and design. Each district can assign staff who will oversee the determination of context classification. It is recommended that an interdisciplinary team within each district help determine the context classification. For projects where FDOT currently coordinates with local governments, FDOT will coordinate with those local governments to determine context classification (see Chapter 3 for more information). The final determination of context classification will be made by FDOT. For smaller projects, such as traffic operations push-button projects, the context classification may be determined without additional local coordination (see Chapter 3 for more information). Refer to the **Public Involvement Handbook**, **FDM**, **PD&E Manual**, and **Project Management Handbook** for guidance on local government coordination.

Existing Roadways and Proposed New Roadways in PD&E or Design Phases

Steps for determining the context classification for all projects on existing roadways, and for projects that propose new roadways and are in the PD&E or design phases include:

1. Identify Major Changes in Context

Utilize the distinguishing characteristics based on the Context Classification Matrix to determine if multiple context classifications are necessary due to significant changes in the type or intensity of uses located along the roadway. A context classification segment may be as short as two blocks or, where there is no defined block structure, a quarter-mile in length.

2. Evaluate the Primary Measures

A roadway segment must meet a majority of the primary measures defined for a context classification in order to be assigned that context classification. Table 2-2 describes the primary measures, methodology, and data sources associated with each measure. For the primary measures, two measurement areas — the block and the parcel — are used, as explained in Figures 2-3 and 2-4. The measurement areas used for each measure are identified in Table 2-2. Figure 2-5 through Figure 2-9 provide guidance for evaluating some of the primary measures.

For RRR, Safety, and Traffic Operations projects, each segment identified in step 1 can be evaluated using the primary measures based on existing conditions or future context. Qualifying projects in all phases for existing roadways will be evaluated using the future context of the primary measures. The future context should be clearly documented in a well-defined, community-supported and implementation-focused plan or in policies such as the land use element of the local comprehensive plan, zoning overlays, form-based codes, community redevelopment plans, or permitted development plans.

Qualifying Projects:

Roadway project types that qualify for ETDM screening, per the *ETDM Manual* Section 2.3.1 include:

- Additional through lanes which add capacity to an existing road
- A new roadway, freeway or expressway
- A highway which provides new access to an area
- A new or reconstructed arterial highway (e.g., realignment)
- A new circumferential or belt highway that bypasses a community
- Addition of interchanges or major interchange modifications to a completed freeway or expressway (based on coordination with FHWA)
- A new bridge which provides new access to an area, bridge replacements

Non-qualifying Projects:

Projects that do not go through ETDM screening.

The future desired conditions should be consistently documented across all appropriate local policies and should be well-understood and accepted by local stakeholders. In short, the future conditions should be those that are predictable and that will occur over an anticipated timeframe rather than visionary plans or broad goals and ideas that do not have a clear timeline for actual implementation. Use of a form-based code is one indicator that significant community discussion occurred on a future vision, and that future development is more likely to result based on the adopted form-based code.

3. Evaluate the Secondary Measures

In most cases, especially for RRR, safety, and traffic operations projects, primary measures are sufficient to understand and determine a roadway's context classification. Secondary measures can be used to



An example of a high volume roadway that balances the needs of freight traffic, transit, and pedestrians and bicyclists of varying abilities.

Location: US 98, Polk County, FL

Source: KAI

further understand the context when there is no clear consensus on the context classification based on the primary measures. Secondary measures are also useful in cases where local municipalities have adopted a future vision for a place that is not consistent with the existing context classification. Table 2-3 describes the secondary measures and the methodology and data sources associated with each measure.

The secondary measures quantify the intensity of development. A roadway segment needs to meet only one of the two criteria, either population density or employment density, to be classified within a context classification. Zoning may show that the local municipality intends for the area to be developed into a more intense development form in the future, and therefore does not meet the existing population and employment densities, but will meet them in the future.

TABLE 2-2 PRIMARY MEASURES TO DEFINE CONTEXT CLASSIFICATION

Measure	Description	Methodology	Measurement Area*	Data Source**
Land Use	Land use mix for more than 50% of the fronting uses	Record based on existing or future adopted land uses.	Fronting parcels on either side of the roadway	Field review, GIS files, existing or future land use maps
Building Height	The range in height of the buildings for more than 50% of the properties	Record based on existing buildings or future permitted building height requirements based on land development regulations.	Fronting parcels on either side of the roadway	Field review, internet-based aerial and street view imagery, or land development regulations
Building Placement	Location of buildings in terms of setbacks for more than 50% of the parcels	Measure the distance from the building to the property line or future required building placement based on land development regulations (see Figure 2-5).	Fronting parcels on either side of the roadway	Field review, internet-based aerial and street view imagery, building footprint and parcel GIS files, or land development regulations
Fronting Uses	Buildings that have front doors that can be accessed from the sidewalks along a pedestrian path for more than 50% of the parcels	Record the percent of buildings that provide fronting uses or site design and lot layout requirements in land development regulations that require fronting uses (See Figure 2-6).	Fronting parcels on either side of the roadway	Field review or internet-based aerial and street view imagery, or land development regulations
Location of Off-street Parking	Location of parking in relation to the building: between the building and the roadway (in front); on the side of the building; or behind the building	Record location of off-street parking for majority of parcels or parking requirements based on land development regulations (see Figure 2-7).	Fronting parcels on either side of the roadway	Field review or internet-based aerial and street view imagery, or land development regulations
Roadway Connectivity	Intersection Density	Number of intersections per square mile	Calculate by dividing the total number of intersections by the area of the blocks along both sides of the street, excluding natural features and public parks; consider future roadway connectivity if an approved or permitted development plan is in place (see Figure 2-8).	The block on either side of the roadway; if the roadway and block structure is not complete, the evaluation area should extend 2000' on either side of the roadway
	Block Perimeter	Average perimeter of the blocks adjacent to the roadway on either side	Measure the block perimeter for the blocks adjacent to the roadway on either side and take the average; consider future roadway connectivity if an approved - permitted development plan is in place (see Figure 2-9).	The block on either side of the roadway; if the roadway and block structure are not complete, the evaluation area should extend 2000' on either side of the roadway
	Block Length	Average distance between intersections	Measure the distance along the roadway between intersections with a public roadway, on either side, and take the average; consider future roadway connectivity if an approved or permitted development plan is in place (see Figure 2-9).	Roadway

* The measurement area applies to each context classification segment. Evaluate each measure for each context classification segment. Where characteristics differ for each side of the street, use the characteristics for the side that would yield the higher context classification.

** Land use, zoning, streets, and other GIS data and maps are available from local government agencies, FDOT Efficient Transportation Decision Making (ETDM) Database, and regional agencies.

FIGURE 2-3 MEASUREMENT AREA: THE BLOCK ON EITHER SIDE OF THE ROADWAY

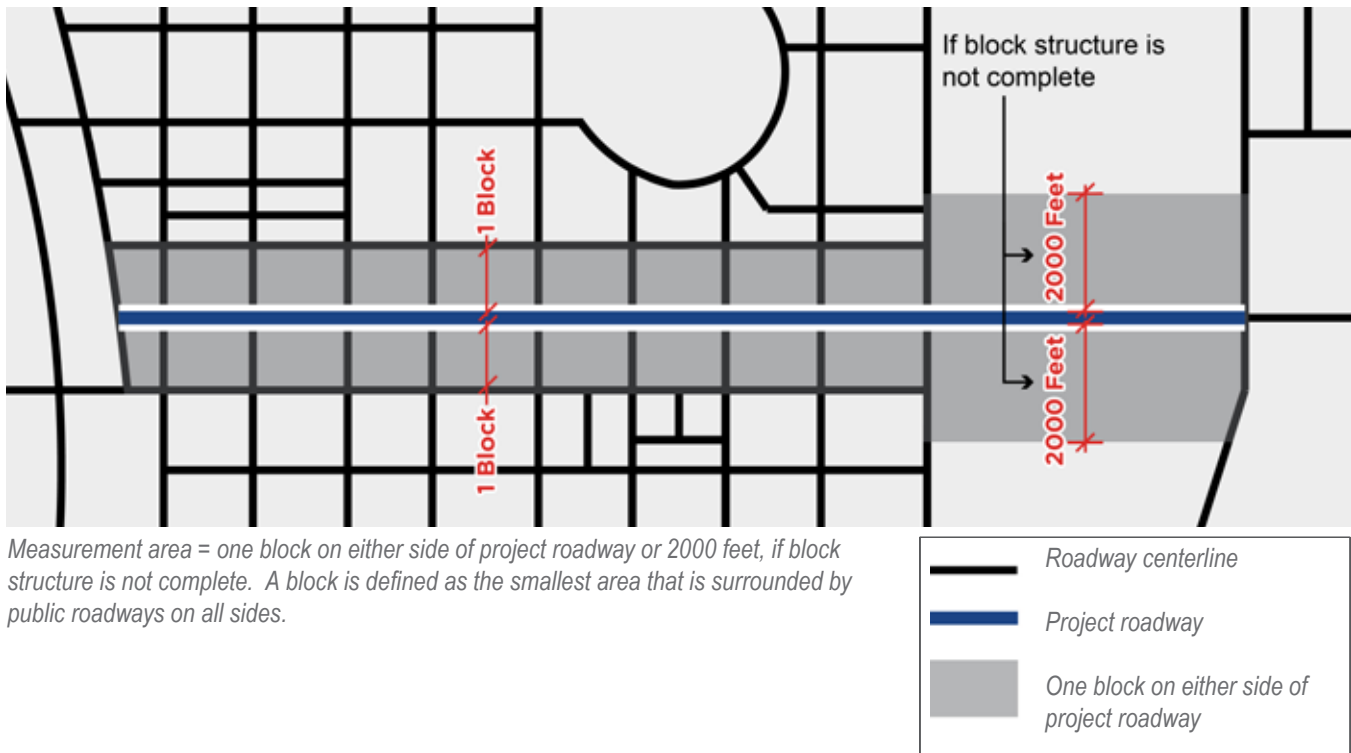


FIGURE 2-4 MEASUREMENT AREA: FRONTING PARCELS ON EITHER SIDE OF THE ROADWAY

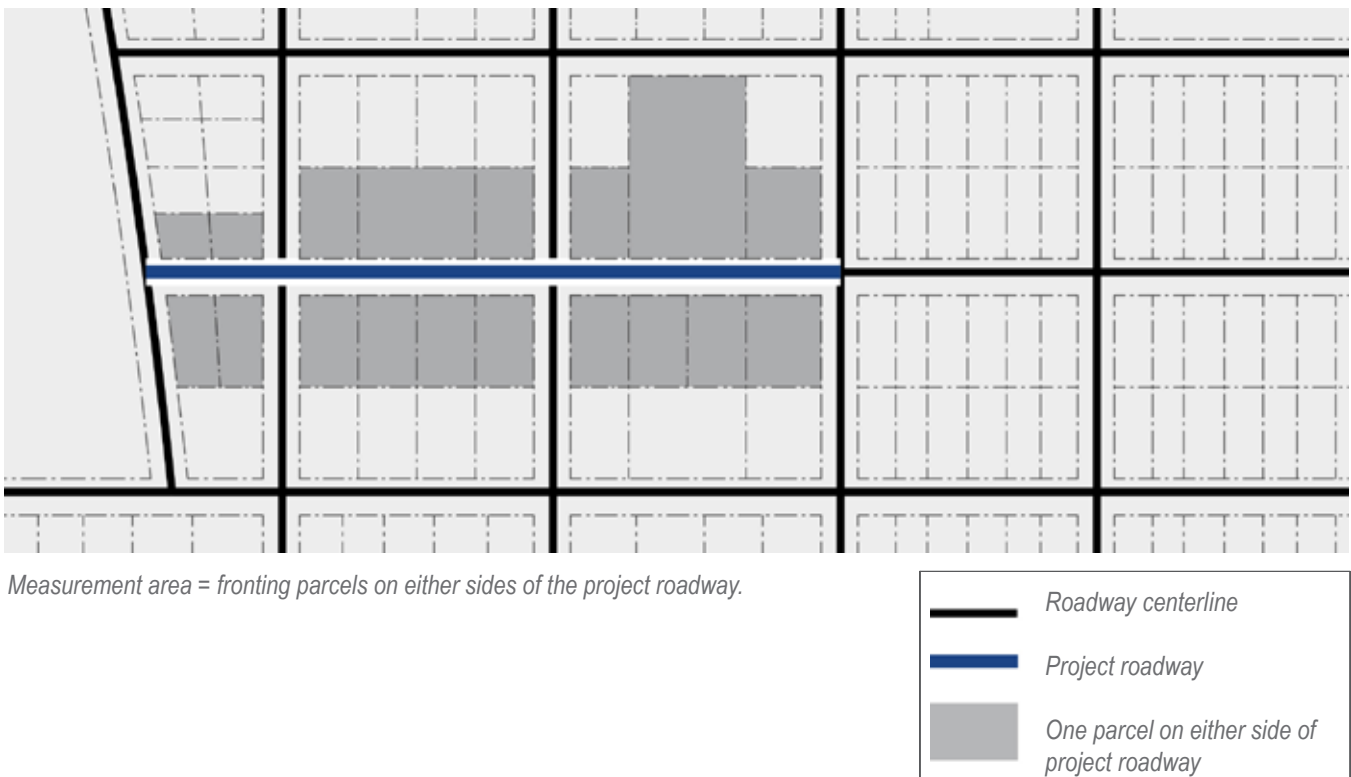


FIGURE 2-5 BUILDING PLACEMENT

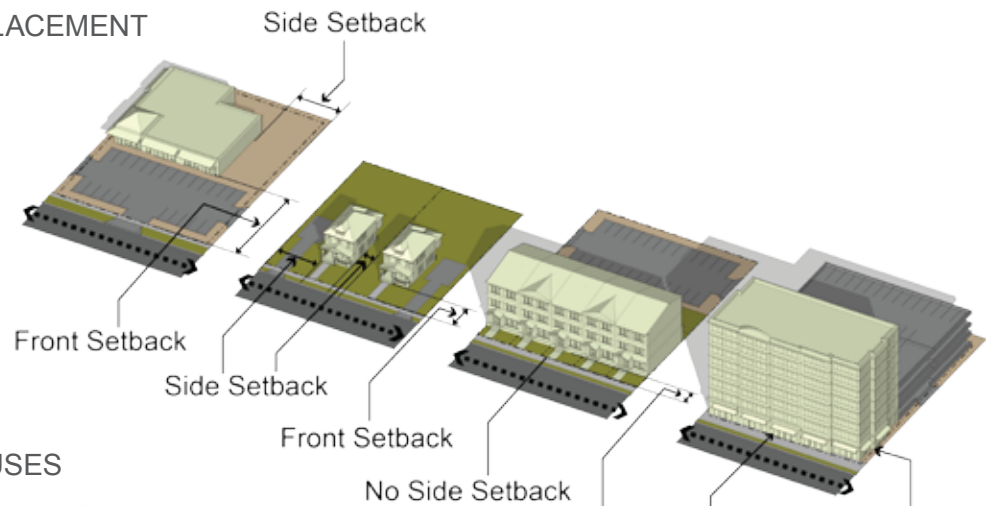


FIGURE 2-6 FRONTING USES

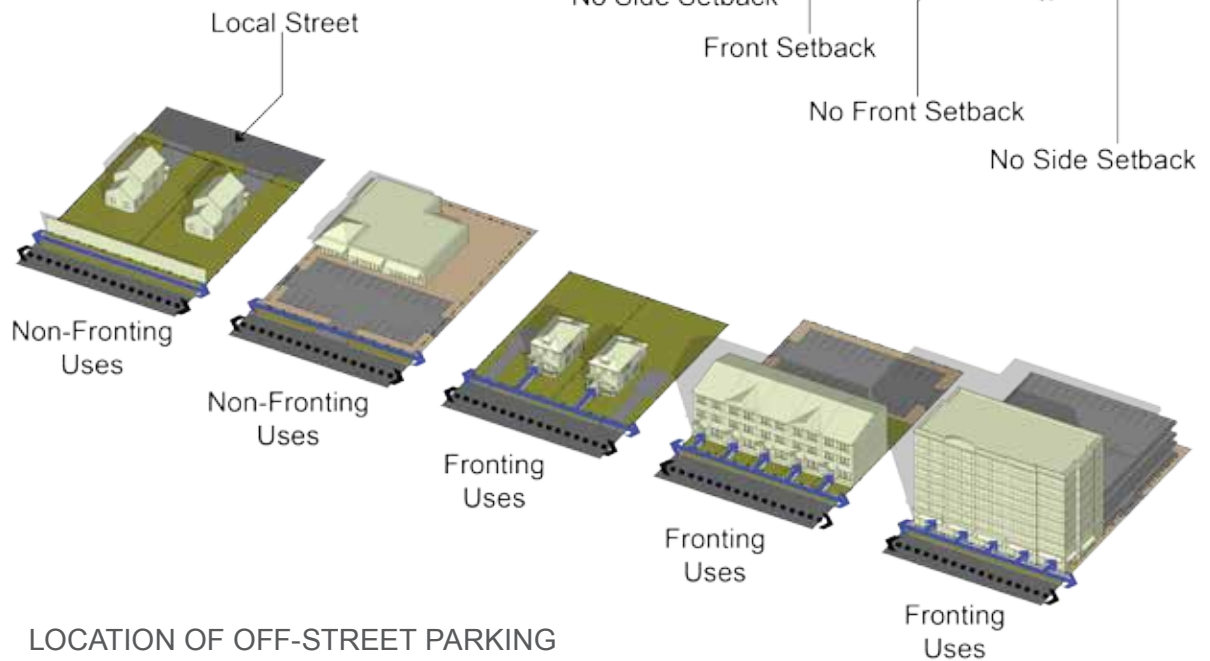


FIGURE 2-7 LOCATION OF OFF-STREET PARKING

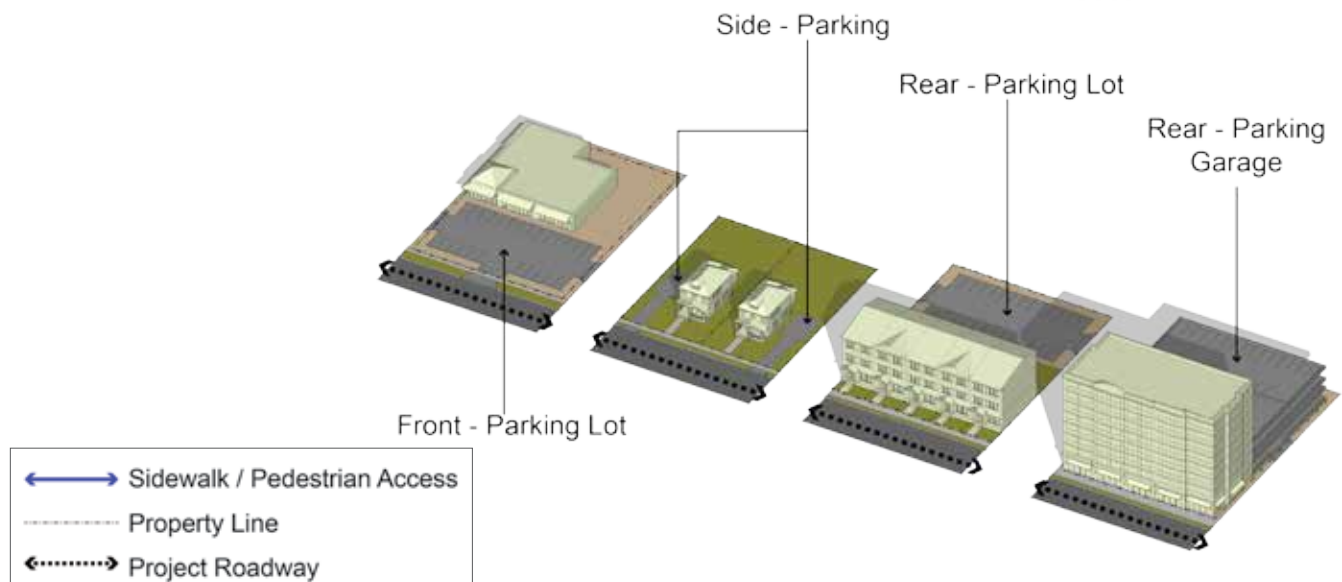


FIGURE 2-8 INTERSECTION DENSITY

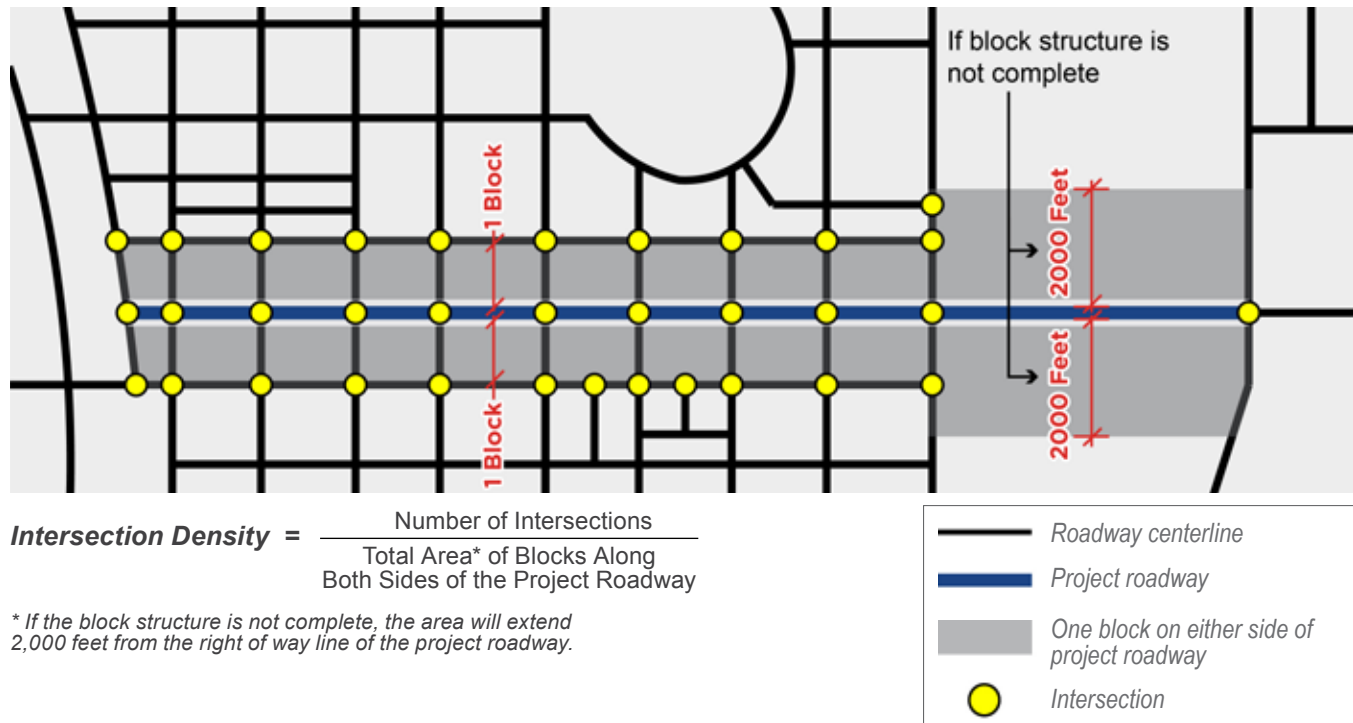


FIGURE 2-9 BLOCK PERIMETER AND BLOCK LENGTH

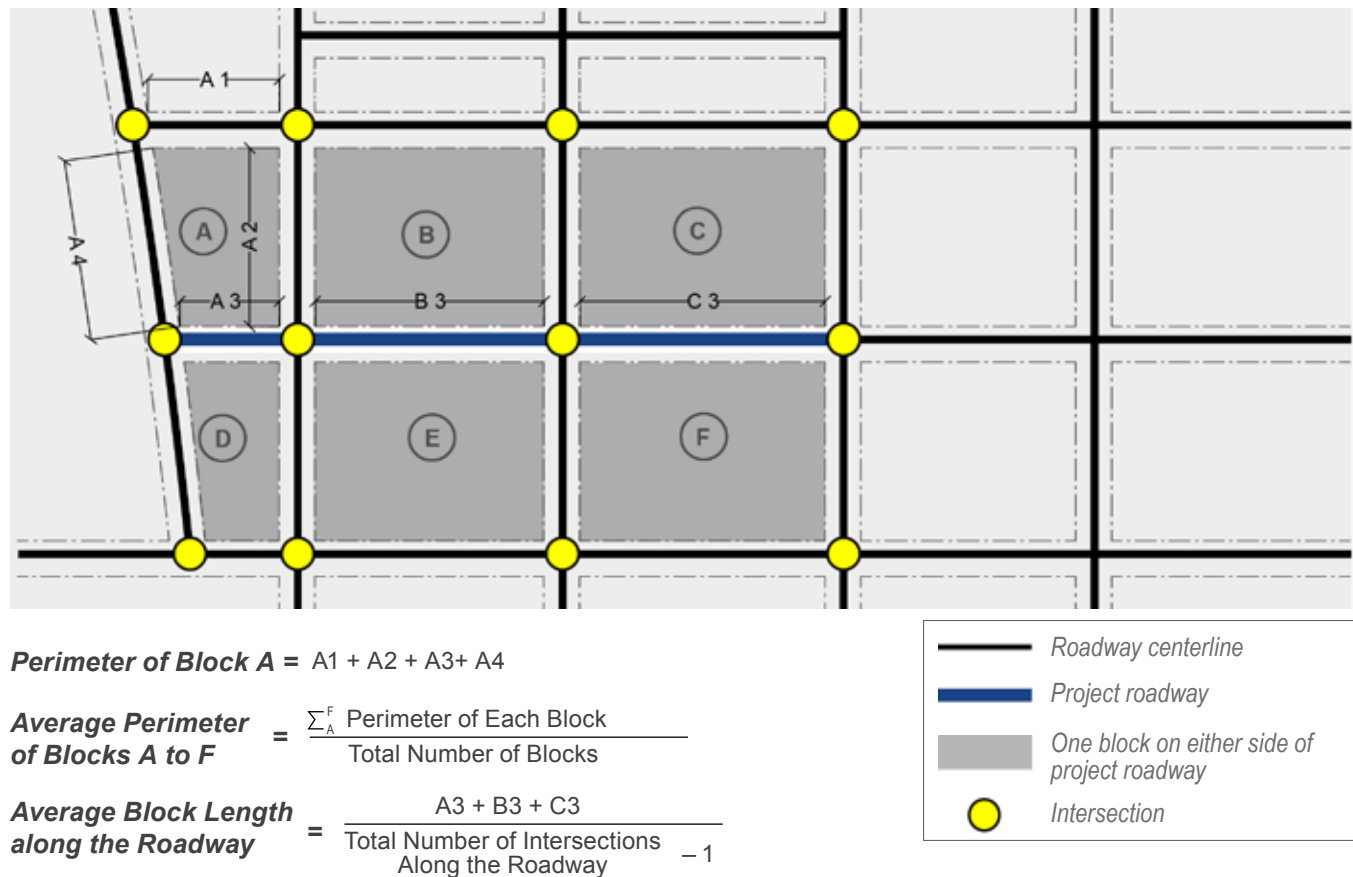


TABLE 2-3 SECONDARY MEASURES TO DEFINE THE CONTEXT CLASSIFICATION

Measure	Description	Methodology	Measurement Area	Data Source
Allowed Residential Density	Maximum allowed residential density by adopted zoning	Identify which zoning district the context classification segment is within, and record maximum allowed residential density for that particular zoning district by dwelling units per acre.	Parcels along either side of the roadway	Zoning code, land development regulations
Allowed Office/Retail Density	Maximum allowed office or retail density in terms of Floor Area Ratio (FAR), or the ratio of the total building floor area to the size of the property on which it is built	Identify which zoning district the context classification segment is within, and record allowed commercial density for that particular zoning district. In some jurisdictions, allowed commercial density might be stated based on specific regulations limiting building height and minimum setbacks. Jurisdictions also regulate minimum parcel size allowed in each zoning district. Maximum allowable FAR for an area can be calculated using site design and height standards (see Appendix C for more details).	Parcels along either side of the roadway	Zoning code, land development regulations
Population Density (existing)	Population per acre based on the census block group	Download census information at the block group level. Divide the population of the census block group by the area of the block group. This area should exclude large natural features and public parks. If the roadway segment is the boundary between two block groups, average the population density of the block groups on either side of the roadway. If the roadway runs through multiple block groups, calculate the population density by the weighted average of roadway within each block group.	Census block group(s) that encompasses the roadway	US Census Bureau decennial data
Population Density (future)	Projected population per acre based on the regional travel demand model traffic analysis zone (TAZ)	Divide the population of the TAZ by the area of the TAZ. If the roadway segment is the boundary between two TAZs, average the population density of the TAZs on either side of the roadway. If the roadway runs through multiple TAZs, calculate the population density by the weighted average of roadway within each TAZ. Use 20-year forecast number from the regional travel demand model. If a regional travel demand model is not available, use University of Florida Bureau of Economic Research (BEER) population projections.	TAZ(s) that encompasses the roadway. If TAZ population density is not available, use smallest geographic area available from BEBR projections.	Regional travel demand model from MPO, BEBR
Employment Density (existing)	Total number of jobs per acre	Use GIS to map the number of jobs within the blocks adjacent to the roadway utilizing the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) website. Sum the number of jobs within the blocks along either side of the roadway, and divide by the area of the blocks. This area should exclude large natural features and public parks. Blocks can be imported as a shapefile or can be manually drawn on the census website.	One block area adjacent to either side of the roadway. If the block structure is not complete, the evaluation area should extend 500 feet from the property line along the roadway.	U.S. Census Bureau LEHD website
Employment Density (future)	Total number of jobs per acre	Divide the number of jobs of the TAZ by the area of the TAZ. If the roadway is the boundary between two TAZs, average the employment density of the TAZs on either side of the roadway. If the roadway runs through multiple TAZs, calculate the employment density by the weighted average of roadway within each TAZ. Use 20-year forecast number from the regional travel demand model. If a regional travel demand model is not available, use BEBR employment projections.	TAZ(s) that encompasses the roadway. If TAZ employment density is not available, use smallest geographic area available from BEBR projections.	Regional travel demand model from MPO, BEBR

Proposed New Roadways in Planning or ETDM Screening

During planning and ETDM screening for new roadway alignments, a broad understanding of the context classification will be used to inform the planning process. For example, area-wide studies such as the Future Corridors studies would use more general criteria to determine the context classification as compared to a corridor study on an existing roadway for the purposes of defining a concept to be advanced into PD&E or design.

For new roadways in planning and ETDM screening that include multiple alternative alignments, future land use conditions should be used to determine the context classification. The steps for determining the context classification for new roadways in planning or ETDM screening include:

1. Identify Major Changes in Context

Utilize the distinguishing characteristics to determine if multiple context classifications are necessary based on the Context Classification Matrix due to significant changes in the type or intensity of future land uses located along the roadway. The segment lengths should be based on the change in land use or other distinguishing features. Segment lengths can vary, and may be as short as two blocks or, where this is no defined block structure, longer than a mile.

2. Evaluate the Future Land Use

Evaluate the land use along the roadway based on the future land use element of the adopted local comprehensive plan using the land use description provided in Table 2-1.

3. Evaluate the Secondary Measures

Table 2-3 describes the secondary measures, and the methodology and data sources associated with each measure. Future population and employment densities can be quantified based on the data in the regional travel demand model. If no regional model is available, utilize BEBR estimates for future population and employment projections. A context classification segment only needs to meet one of the two criteria, either population density or employment density, to be classified within a context classification.

For the C3C-Suburban Commercial and C3R-Suburban Residential Context Classifications, population and employment densities vary widely throughout the State. Use the allowed residential and office/retail densities, the distinguishing characteristics, and the future land use listed in the Context Classification Matrix to determine if a roadway is within the C3C-Suburban Commercial or CR3-Suburban Residential Context Classification.

Bridges and Tunnels

The context classification of a bridge or tunnel should be based on the higher context classification of the segments on either end of the bridge or tunnel.

Special Districts

Special Districts (SD) are areas that, due to their unique characteristics and function, do not adhere to standard measures identified in the Context Classification Matrix. Examples of SDs include military bases, university campuses, airports, seaports, rail yards, theme parks and tourist districts, sports complexes, hospitals, and freight distribution centers. Due to their size, function, or configuration, SDs will attract a unique mix of users and create unique travel patterns. Planning and engineering judgment must be used to understand users and travel patterns and to determine the appropriate design controls and criteria for streets serving an SD on a case-by-case basis. If an FDOT district believes that an area does not fit within a context classification and an SD designation is required, the district should coordinate that with the State Complete Streets Program Manager.

DOCUMENTING CONTEXT CLASSIFICATION

Context classification will be determined on a project-by-project basis, and will be developed or confirmed at the beginning of each project phase, including planning, PD&E, and design. The districts will be responsible for collecting the context classification information for each project. This information may eventually be stored in an integrated roadway asset identification system, such as the FDOT Enterprise Application RCI, as well as the straightline diagram and the typical section data sheet.

RELATIONSHIP BETWEEN CONTEXT CLASSIFICATIONS AND CNU/SMARTCODE™ TRANSECT SYSTEM

The SmartCode™ is a form-based land development code that incorporates Smart Growth and New Urbanist principles. It is a unified development ordinance, addressing development at all scales of design, from regional planning to building signage. It is based on rural-to-urban transects, rather than separated-use zoning.

FDOT's context classifications generally align with the SmartCode™, with some critical distinctions. The SmartCode™ was developed to describe and codify

desired future visions of development form by local jurisdictions. The key implementation tool for form-based codes is a regulating plan that clearly identifies different transect zones that would guide how future land use development should occur. In contrast, FDOT's context classifications are descriptive, rather than visionary, and therefore include all land areas and types found within the State of Florida, with less local specificity.

The general relationship between the zones used by the transect system and FDOT's context classification is outlined in Table 2-4.

TABLE 2-4 RELATIONSHIP BETWEEN FDOT CONTEXT CLASSIFICATIONS AND THE SMARTCODE™ TRANSECT SYSTEM

FDOT Context Classification	SmartCode™ Transect Zone	Description of SmartCode™ Transect Zone
C1 – Natural	T1- Natural Zone	Lands approximating wilderness conditions
C2 – Rural	T2-Rural Zone	Sparsely settled lands in open or cultivated states
C2T – Rural Town		No corresponding transect zone; may sometimes be coded as a small T5 or T4 hamlet or village
C3R – Suburban Residential C3C – Suburban Commercial	Coded as Conventional Suburban Development (CSD)	The SmartCode™ does not provide for this type of development pattern
FDOT Context Classification does not address this SmartCode™ Transect Zone	T3-Sub-urban Zone	Lower density, primarily single-family residential with very limited non-residential uses, in a limited dispersion and directly within walking distance of a higher transect. Transect Zone T3 will be considered C4-Urban General
C4 – Urban General	T4-General Urban Zone	Mixed use but primarily residential urban fabric in a variety of housing types and densities
C5 – Urban Center	T5- Urban Center Zone	Higher density mixed use buildings that accommodate retail, offices, rowhouses, and apartments
C6 – Urban Core	T6- Urban Core Zone	Highest density and height, with the greatest variety of uses, and civic buildings of regional importance; some T6 areas may belong to FDOT C5 because of FDOT population requirement
SD – Special District	Special Districts	Areas that, by their intrinsic size, function, or configuration, cannot conform to the requirements of any transect zone or combination of zones

TRANSPORTATION CHARACTERISTICS

The transportation characteristics define the role of a particular non-limited-access roadway in the transportation system, including the type of access the roadway provides, the types of trips served, and the users served. The transportation characteristics take into consideration regional travel patterns, freight movement, and SIS designation. Together with context classification, they can provide information about who the users are along the roadway, the regional and local travel demand of the roadway, and the challenges and opportunities of each roadway user.

FUNCTIONAL CLASSIFICATION

Functional classification defines the role a particular roadway plays in serving the flow of vehicular traffic through the network. Roadways are assigned to one of several possible functional classifications within a hierarchy, according to the character of travel service each roadway provides (see Table 2-5).¹

The **AASHTO A Policy on Geometric Design of Highways and Streets, 5th Edition (2011)** presents a discussion of highway functional classifications. **Florida Statutes, Title XXVI, Chapters 334, 335, and 336**, give similar definitions, and establish classifications for roadway design in Florida.

Complete Streets continue to recognize functional classification but also consider the context classification of the street as part of the total picture. For example, the relationship between functional classification and access needs may be less consistent in more urban context classifications where roadways serve a wider variety of purposes beyond moving motor vehicle traffic. In evolving suburban areas, retail and commercial business tend to locate along arterial roadways, requiring access and creating demands for short-distance and local trips that include vehicular trips as well as walking and bicycling trips. Transit service is also often located along arterial roadways, due to retail and commercial uses generating high demands for transit trips and the efficiency of providing higher levels of transit

service along these roadways. At the same time, many state roadways travel through large and small (often historic) town centers that require multimodal mobility and access in order to thrive. Therefore, the context classification provides an important layer of information that complements functional classification in determining the transportation demand characteristics along a roadway, including typical users, trip length, and vehicular travel speeds.

TABLE 2-5 ROADWAY FUNCTIONAL CLASSIFICATION AND ROLE IN THE TRANSPORTATION SYSTEM

Roadway Classification	Role in the Transportation System
Principal Arterial	Serves a large percentage of travel between cities and other activity centers, especially when minimizing travel time and distance is important.
Minor Arterial	Provides service for trips of moderate length, serves geographic areas that are smaller than their higher arterial counterparts, and offers connectivity to the higher arterial system.
Collector	Collects traffic from local streets and connects them with arterials; more access to adjacent properties compared to arterials.
Local	Any road not defined as an arterial or a collector; primarily provides access to land with little or no through movement.

* This Handbook does not address limited-access facilities.

For non-limited-access roadways, the **FDM** provides design criteria and standards based on both context classification and functional classification.

¹ Federal Highway Administration, "Highway Functional Classification Concepts, Criteria and Procedures."

CONTEXT CLASSIFICATION AND STREET USERS

The context classification informs planners and engineers of the types of users and the intensity of use expected along the roadway. For example, in the C6-Urban Core Context Classification, there will be a higher number of pedestrians, bicyclists, and transit users than in a C2-Rural Context Classification. Therefore, reduced speeds, signal spacing, crossing distances, lane widths, and other design elements such as bicycle facilities, on-street parking, and wide sidewalks should be provided to increase the safety and comfort of bicyclists, pedestrians, and transit users. For the C2-Rural Context Classification, vehicles and freight are primary users; however, bicyclists and pedestrians are accommodated with bike lanes, paved shoulders, or sidepaths. A state roadway in C2-Rural Context Classification is expected to have higher speeds, wider lanes, and lower levels of traffic delay.

When determining the roadway typical section to be used, give appropriate consideration for all users of the roadway. Include required elements associated with the context classification of the roadway. The **FDM** contains criteria to be used for each context classification.

HOW TO IDENTIFY ROADWAY-SPECIFIC TRANSPORTATION TRAVEL DEMANDS

While context classification and functional classification can provide general guidelines for the type and activity level of different users, additional information can assist in obtaining a more thorough understanding of the needs of all the intended users. The anticipated users of a roadway and the travel patterns of those users should be determined well before the design phase of a project, and are best explored during the planning and design scoping phase.

The **Traffic Forecasting Handbook** documents data collection efforts to understand vehicular travel patterns. Table 2-6 provides a menu of data sources that could be useful in identifying different needs for different users. Not all of the data presented in Table 2-6 will be required for all projects. The data collected for a project should be tailored to the scale, purpose, and needs of a project.

Depending on the scale, purpose, and needs of the project, the following are some examples of questions that could augment the analysis to better understand transportation travel demand and needs for all users:

- **Land Uses:** What pedestrian, bicycle, or transit generators are located along the roadway? Are there large shopping destinations? Large employers? Public facilities? Are there visitor destinations? How might existing land use patterns change based on approved or planned development? Is there a redevelopment plan for the area? What land use changes are planned or anticipated to occur?
- **Vehicular Trip Types:** What percentage of the vehicular trips are local? What is the average trip length? Is the roadway part of the SIS?
- **Travel Patterns:** Are there unique travel patterns or modes served by the corridor? Will new or emerging transportation services or technologies influence trip-making characteristics (e.g., rideshares, scooters, interregional bus service, bikeshare)?
- **Safety Data:** How many and what types of crashes are occurring along the roadway?
- **Types of Pedestrians:** Are there generators or attractors that would suggest that younger or older pedestrians, or other special user groups, will be using the roadway (e.g., schools, parks, elderly care facilities, assisted living centers)?
- **Types of Bicyclists:** Is the roadway a critical link for the local or regional bicycle network? Does the roadway connect to or cross trails or bicycle facilities? Are bicyclists using the roadway to access shopping, employment, or recreational destinations?
- **Transit:** What type of transit service exists or is planned for the area? Where are transit stops located? Can pedestrians reach these stops from either side of the street without significant diversion of their trip? Are transit stops accessible using the network of existing bicycle and pedestrian facilities?
- **Freight:** What is the percentage and volume of heavy trucks using the roadway? Are there destinations that require regular access by heavy trucks or other large vehicles? Is the roadway part of a designated freight corridor? Where does loading and unloading occur along the roadway?

- **Demographics:** Based on census data, are there areas of high transit, pedestrian, or bicyclist demand? These include areas overrepresented, when compared to the general population, by elderly or low-income residents, or households without access to automobiles.



The anticipated users of a roadway and the travel patterns of those users should inform the purpose and needs of a project.
Location: Fletcher Avenue, Tampa, FL
Source: FDOT

TABLE 2-6 EXAMPLES OF POTENTIAL DATA TO DETERMINE USER NEEDS BY MODE

Mode	Data
 Pedestrian	• Location of signalized pedestrian crossings • Location of marked or signed pedestrian crossings • Posted and operating speeds • Vehicular traffic volumes • Existing sidewalk characteristics (location, width, pavement condition, obstacles or pinch points) • Intersection ramps and alignment/Americans with Disabilities Act (ADA) compliance • Utilities location • Existing landscape buffer and shade trees • Pedestrian counts • Crash data • Lighting levels • Existing and future land use, building form and site layout, development scale and pattern • Existing and future pedestrian generators (e.g. schools, parks)
 Bicyclist	• Local and regional bicycle network • Posted and operating speeds • Vehicular traffic volumes • Number of vehicular travel lanes • Location of bicycle parking • Bicycle user type (see Chapter 4) • Bicyclist counts • Crash data • Location of destinations • Lighting levels • Pavement condition • Existing and future land use, building form and site layout, development scale and pattern
 Car	• Design Traffic (Existing and projected Average Annual Daily Traffic (AADT), K-factor (K), directional distribution (D), and traffic growth projections) • Trip lengths; origin/destination patterns • Turning movement counts • Posted and operating speeds • Signal timing • Location of parking • Crash data • Lighting levels • Pavement condition • Existing and future land use, building form and site layout, development scale and pattern
 Transit	• Existing and future transit routes and stops • Transit service headways • Location and infrastructure at transit stops • Sidewalk connection to transit stops • ADA compliant transit stops • Existing and projected ridership (route or stop level) • Existing and future transit generators and attractors • Type of transit technology • Trip lengths, origin/destination patterns
 Freight	• Designated truck routes • Truck volumes • Vehicle classification counts • Existing and future location of industrial land uses or other generators of freight trips • Freight loading areas/truck parking

STRATEGIC INTERMODAL SYSTEM AND CONTEXT CLASSIFICATION

The SIS was established in 2003 to enhance Florida's economic competitiveness by focusing state resources on the transportation facilities most critical for statewide and interregional travel. The three SIS objectives identified in the **SIS Policy Plan** are:

- **Interregional Connectivity:** Ensure the efficiency and reliability of multimodal transportation connectivity between Florida's economic regions and between Florida and other states and nations.
- **Intermodal Connectivity:** Expand transportation choices and integrate modes for interregional trips.
- **Economic Development:** Provide transportation systems to support Florida as a global hub for trade, tourism, talent, innovation, business, and investment.

The SIS includes the State's largest and most significant commercial service and general aviation airports, spaceports, public seaports, intermodal freight terminals including intermodal logistics centers, interregional passenger terminals, urban fixed guideway transit corridors, rail corridors, waterways, military access facilities, and highways. The SIS includes three types of facilities: hubs, corridors, and connectors.

SIS Highway corridors and connectors traverse varying context classifications. Given the purpose and intent of the SIS, the requirements of a particular context classification may not always align with the function of the SIS highway. In the case of interstates and limited-access facilities, the function of the roadway is considered complete. For all others, there is a need to balance the safety and comfort of users who live and work along the SIS facility with interregional and interstate freight and people trips through the area. This is consistent with the intent of the **SIS Policy Plan**, which specifically calls for the need to improve coordination with regional and local transportation and land use decisions by:

- Better reflecting the context of the human and natural environment;

- Balancing the need for efficient and reliable interregional travel with support for regional and community visions;
- Developing multimodal corridor plans that coordinate SIS investments with regional and local investments; and
- Leveraging and strengthening funding programs for regional and local mobility needs such as the Transportation Regional Incentive Program, Small County Outreach Program, and Small County Road Assistance Program.

This balance could mean that other throughput options to the SIS facility (e.g., a bypass or express lanes) are studied and considered if redesigning the currently designated roadway is needed to conform to the context classification. The **SIS Policy Plan** outlines that SIS improvements should consider the context, needs, and values of the communities serviced by the SIS, which may include flexibility in design and operational standards. Most importantly, communication with all parties involved is key to determining the best solution to realize the intent of both the SIS and a Complete Streets approach within a community.

The **FDM** provides design standards for facilities on the SIS. Appendix D presents proposed design speed ranges for SIS facilities. Roadways located on the SIS require coordination with the District SIS Coordinator during the determination of the facility's context classification.



Accommodations of freight vehicles is an important part of Complete Streets.

Location: Estero Boulevard, Fort Myers Beach, FL

Source: Rick Hall

ENVIRONMENTAL CHARACTERISTICS

Environmental characteristics, including the social, cultural, natural, and physical aspects of an area, play a role in the planning, design, and maintenance of transportation projects. FDOT is focused on responsible stewardship of Florida's environmental resources. The FDOT Mission states that FDOT will provide a safe transportation system that "enhances economic prosperity and preserves the quality of our environment and communities." Aligning with this mission, FDOT considers the social, cultural, natural, and physical impacts of its investments throughout the planning and design process.

Transportation projects that utilize Federal transportation dollars (or that require a Federal environmental permit such as wetlands or water quality) are subject to review under the ***National Environmental Policy Act of 1969 (NEPA)***. FDOT developed the PD&E process to address how NEPA is evaluated for Federally funded transportation projects in Florida, including the identification and assessment of environmental characteristics for all projects. Public involvement and agency coordination is part of the PD&E process. Chapter 3 of this Handbook discusses how the ETDM and PD&E processes will incorporate the Complete Streets approach. Detailed information on FDOT procedures for environmental review can be found in the following documents:

- PD&E Manual
- ETDM Manual
- Public Involvement Handbook
- Sociocultural Effects Evaluation Process
- Cultural Resource Management Handbook

CONTEXT CLASSIFICATION RELATIONSHIP WITH EXISTING HANDBOOKS AND PROCESSES

The FDOT Complete Streets context-based design approach is compatible with and supported by national guidance documents. The following section describes the relationship between FDOT context classification and contexts defined in existing FDOT and national manuals and handbooks.

AASHTO A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS

AASHTO recognizes that different places have different characteristics with regard to density and type of land use, density of street and highway networks, nature of travel patterns, and the ways in which these elements are related. ***AASHTO A Policy on Geometric Design of Highways and Streets*** provides design standards based on urban and rural areas, as defined by the FHWA. FHWA identifies urban areas as those places, within boundaries set by the responsible state and local officials, having a population of 5,000 or more. Urban areas are comprised of:

- **Urbanized Areas**, designated as population of 50,000 or more by the U.S. Census Bureau.
- **Small Urban Areas**, designated as population between 5,000 and 49,999, and not within any urbanized area.

Rural encompasses all population, housing, and territory not included within an urban area.

For the purpose of funding considerations and other processes and procedures, FDOT will continue to define urban and rural areas following the FHWA criteria. For design criteria and standards for non-limited-access roadways, FDOT utilizes context classification in the *FDM*. There is no direct relationship between context classification and FHWA's definition of urban and rural. In general, C4-Urban General, C5-Urban Center, and C6-Urban Core will be located in the FHWA urban areas. C1-Natural and C2-Rural will be primarily located in the FHWA rural areas. C2T-Rural Town, C3C-Suburban Commercial, and C3R-Suburban Residential may be found in FHWA-urban or rural areas.

QUALITY/LEVEL OF SERVICE HANDBOOK

The *FDOT Quality/Level of Service Handbook (Q/LOS)* and its accompanying software are intended to be used by engineers, planners, and decision makers in the development and review of street users' quality/level of service and capacity at generalized and conceptual planning levels. The *Q/LOS Handbook* recognizes that motorists have different thresholds for acceptable delay in rural versus urban areas. Four broad area-type groupings are used in *Q/LOS Handbook* and accompanying software:

- **Urbanized Areas** — Areas that meet FHWA's definition of Urbanized Areas. These consist of a densely settled core of census tracts and census blocks that meet minimum population density requirements, along with adjacent densely settled surrounding census blocks that together encompass a population of at least 50,000 people. The *Q/LOS Handbook* further identifies areas with population over 1,000,000 as **Large Urbanized Areas**.
- **Urban Areas** — Areas with a population between 5,000 and 49,999 (mostly used to distinguish developed areas that are not urbanized).
- **Transitioning Areas** — Areas generally considered as transitioning into urbanized/urban areas or areas over 5,000 population and not currently in urbanized areas. These areas can also at times be determined as areas within a

Metropolitan Planning Area, but not within an urbanized area. These areas are anticipated to reach urban densities in a 20-year horizon.

- **Rural Areas** — Areas that are not urbanized, urban, or transitioning. Rural areas are further classified as rural developed areas and cities or developed areas with less than 5,000 population; and rural undeveloped areas in which there is no or minimal population or development.

A direct, one-to-one relationship does not exist between the classification system used in the *Q/LOS Handbook* and the context classifications, but generally C1-Natural, C2-Rural, and C2T-Rural Town areas will be identified as rural areas or transitioning areas, while C4-Urban General, C5-Urban Center, and C6-Urban Core will be identified as urban. C3C-Suburban Commercial and C3R-Suburban Residential can fall into any of the Q/LOS categories.

Future editions of the *Q/LOS Handbook* will be revised to be consistent with the FDOT context classification.

ROADWAY CHARACTERISTICS INVENTORY

The RCI is a database of information related to the roadway environment maintained by FDOT. The database includes information on a roadway's features and characteristics. Feature 124-Urban Classification, Feature 125-Adjacent Land Classification, Feature 145-LOS Input Data, and Feature 481-Highway Maintenance Classification describe land use contexts in different ways.

These categories are not related to the context classification system detailed in this chapter. FDOT is considering recording context classification information in RCI at the time when state roadways are evaluated through FDOT projects. If this occurs, RCI information may be a starting point for future projects in evaluating a roadway's context classification.

For more information on the RCI, refer to the *RCI Features and Characteristics Handbook*.

ACCESS MANAGEMENT CLASSIFICATION

Access management classification reflects the desired access management standards to be followed for each state roadway. These are standards for restrictive medians, median opening separation, and driveway separation. The ranges are from 00-07 and 99. Class 01 reflects the highest amount of access management control (freeways), and Class 07 the lowest. Class 07 is usually found on suburban built-out roadways. Class 99 refers to a special corridor access management plan. Refer to **Florida Administrative Code (FAC), Rule Chapter 14-97.003, Access Management Classification System and Standards** for more information on access management classification.

No direct correlation can be made between access management classification and context classification. It can be generally stated that higher intensities of use, including C2T-Rural Town, C4-Urban General, C5-Urban Center, and C6-Urban Core, as well as roadways with established land use patterns, may require less restrictive access management. In these context classifications, frequent intersections, smaller blocks, and a higher degree of connectivity and access support the multimodal needs of the area. Beyond the context classification, the role of the roadway in the transportation system and safety considerations must also be taken into account to determine access management needs.

The Systems Planning Office is currently studying the relationship between existing access management practices and the implementation of Complete Streets. The Systems Planning Office is reviewing general recommendations to bring the access management classifications documented in **Administrative Rule 14-97** into a closer relationship with the FDOT context classifications. This process will take some time, as it will require an administrative rule change and review of multiple sections by FDOT, the public, and other stakeholders (such as the roadside development industry) before it can be finalized.

Process for Implementing Complete Streets

Complete Streets are not a specific type of project, but rather are an approach to ensuring that projects are pursued based on their contexts. This means that a Complete Streets approach will be implemented consistently for all non-limited-access projects — from capital projects qualifying for ETDM screening to RRR, traffic operations, and safety projects. The successful implementation of Complete Streets requires the identification of a roadway's context classification early in the project development process. Context classification also informs all phases of a project: planning, PD&E, design, construction, and maintenance.

Chapter 2 provides the Context Classification Matrix (see Table 2-1) and outlines the methodology for using it. This chapter details how the context classification will be determined for different types of FDOT projects. Transportation planning related to Complete Streets occurs at the regional level and at the project level. Regional transportation planning is typically conducted by MPOs/TPOs, whereas project level transportation planning can be performed by the FDOT, MPOs/TPOs, or local governments. Local governments are responsible for the land use planning decisions that are intrinsically linked to transportation planning decisions.

REGIONAL TRANSPORTATION PLANNING AND COMPLETE STREETS

Regional transportation planning includes the development of LRTPs by MPOs/TPOs where an outcome is the identification of a series of transportation needs across a region. Traditionally, the LRTP process focuses on the deficiencies of the system in relation to automobile and freight mobility

as defined by a regional travel demand model. In a Complete Streets approach, the needs of all users, including non-motorized users and transit users are incorporated into the identification of potential problems to be addressed. Many MPOs/TPOs and FDOT districts are already beginning to use this latter approach.¹

LRTP needs are often defined in terms of specific solutions such as adding more lanes to an existing roadway or building a new roadway. A successful Complete Streets approach would involve more planning and analysis to determine the actual needs of all users based on a roadway's context classifications, prior to programming a solution for that roadway. This planning analysis is best addressed as part of project-level planning.

LRTP processes are often structured to outline capital projects (e.g. new roadways, new transit service, or widening of roadways), but do not always explore maintenance and smaller scale projects (e.g. resurfacing, maintenance, safety, or intersection improvements). However, many MPOs/TPOs have started to include maintenance and Transportation Systems Management and Operations (TSMO) projects on their Priority Lists. Including these latter set of projects in MPO Priority Lists ensures that the right type of funding is identified early in the project development process to support transportation improvement that addresses the roadway's context and users.

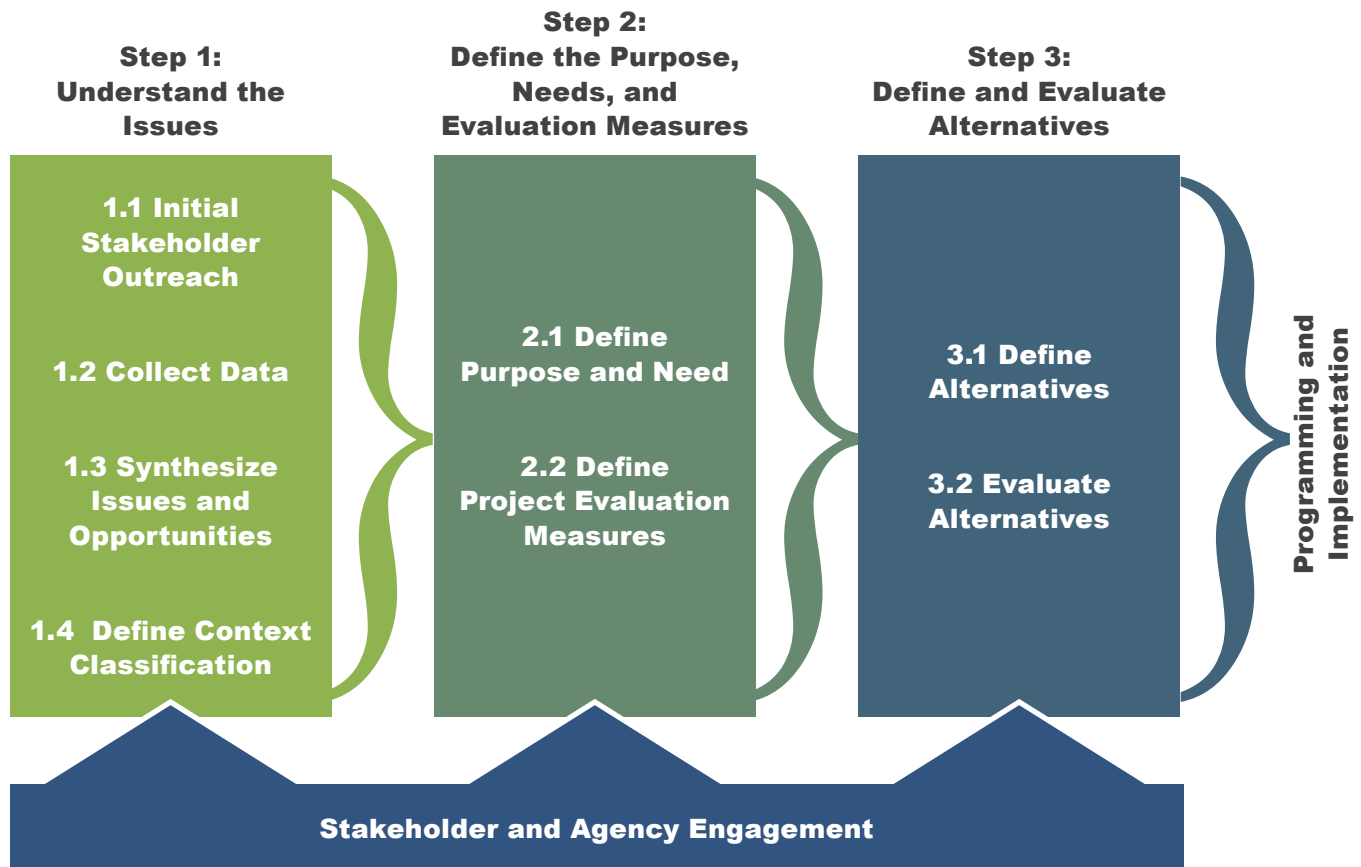
¹ For example, FDOT District 5 is using multimodal transportation and land use screening criteria to identify potential corridor planning studies. These planning studies are meant to better define the transportation opportunities and challenges of all users of a roadway.

PROJECT PLANNING AND COMPLETE STREETS

Project-level transportation planning is conducted to understand the needs of the anticipated users of a roadway and to explore the full range of potential solutions to address those needs. This level of planning typically occurs prior to the PD&E phase and offers an early opportunity to incorporate Complete Streets principles and to establish the framework for a Complete Streets approach for the life of the project. The key steps in project planning are illustrated in Figure 3-1, and include:

1. **Understand the Issues.** This includes collecting and analyzing data, and gathering input from stakeholders to better understand the issues for each user. The context classification will be defined in this step.
2. **Define the Purpose, Needs, and Evaluation Measures.** Informed by the findings in Step 1, this step defines the overall purpose of the transportation investment and the specific needs of the roadway for each of the intended users of the roadway. Project evaluation measures should also be developed that will be used to determine how well different potential alternative solutions meet the needs of all users.
3. **Define and Evaluate Alternatives.** Based on the needs for each user, this step defines a range of alternatives. These alternatives should be analyzed to compare how well each one meets the needs of all intended users.

FIGURE 3-1 COMPLETE STREETS PLANNING APPROACH



Source: Adapted from FDOT District 5 Multimodal Corridor Planning Guidebook

PROJECT EVALUATION MEASURES

Project evaluation measures allow project teams to evaluate alternatives based on the purpose and needs of a project and the roadway's context classification(s). Currently, FDOT utilizes vehicular LOS and safety measures for roadway and area studies. Some projects go beyond these LOS measures and safety, and evaluate accessibility and comfort for all users. Multimodal project evaluation measures can be applied to all projects, including planning studies, new construction, reconstruction, RRR projects, traffic operations, and safety projects.

Project evaluation measures should be tailored to understand each alternative's ability to respond to the project's documented purpose and needs. The extent and type of evaluation may vary depending on the time and resources available — RRR projects, for instance, will have a shorter timeframe than a planning study or new construction project. Judgment should be used in determining the appropriate level of evaluation. Table 3-1 provides a menu of potential project evaluation measures based on Complete Streets best practices. This list is not intended to be exhaustive or prescriptive. The list draws from industry best practices, including the latest guidance and research from FHWA, such as the **FHWA Guidebook for Developing Pedestrian and Bicycle Performance Measures**. Evaluation measures should relate to a project's purpose, needs, and objectives. An example is shown in Table 3-2.

In addition to the evaluation measures listed in Table 3-1, other project measures could be applied over the length of a roadway or at an area-wide level. Some of these include:

- Person throughput (i.e. the total capacity for a roadway based on vehicular, transit, bicycle, and pedestrian throughput)
- Network completeness (i.e. the continuity of sidewalk and bicycle facilities)
- Street connectivity
- Person-miles traveled
- Access to jobs, housing, retail, civic facilities, and recreational facilities
- Mode split

The evaluation measures above and those presented in Table 3-1 focus on transportation-

related elements. Projects may also require detailed evaluation of potential impacts and benefits related to environmental, socio-cultural, economic, and human elements as described in the **PD&E Manual**. Refer to the **PD&E Manual** for details on those evaluation measures.

TABLE 3-1 EXAMPLES OF POTENTIAL PROJECT-LEVEL EVALUATION MEASURES BY MODE

Vehicular

- | | |
|---|--|
| <ul style="list-style-type: none"> • Vehicular LOS (refer to the Q/LOS Handbook) • Volume-to-capacity ratio • Estimated potential crash reduction utilizing crash modification factors (CMFs) | <ul style="list-style-type: none"> • Travel-time reliability • Peak and off-peak travel time between key origins and destinations • Project cost and cost effectiveness |
|---|--|

Freight

- | | |
|--|--|
| <ul style="list-style-type: none"> • Travel-time reliability • Ability to serve freight origins and destinations | <ul style="list-style-type: none"> • Peak and off-peak travel time • Project cost and cost effectiveness |
|--|--|

Transit

- | | |
|---|--|
| <ul style="list-style-type: none"> • Transit LOS (refer to the Q/LOS Handbook) • Number of ADA-compliant transit stops • Travel time • Travel time reliability • Percent of population within | <ul style="list-style-type: none"> the study area that are within 1/2 mile network distance from a transit stop • Project cost and cost effectiveness • Weekday span of service |
|---|--|

Bicycle

- | | |
|--|--|
| <ul style="list-style-type: none"> • Bicycle LOS (refer to the Q/LOS Handbook) • Bicycle Level of Stress analysis • Percent of roadway served by an exclusive bicycle facility • Estimated potential crash reduction utilizing CMFs | <ul style="list-style-type: none"> • Percent of roadway with bicycle facilities meeting current standards for roadway context • Bicycle delay at intersections • Travel time • Project cost and cost effectiveness |
|--|--|

Pedestrian

- | | |
|---|--|
| <ul style="list-style-type: none"> • Pedestrian LOS (refer to the Q/LOS Handbook) • Pedestrian Level of Stress analysis • Percent of sidewalk coverage/linear feet of sidewalk • Average or range of distances between marked pedestrian crossings • Percent of ADA-compliant pedestrian crossings • Average or range of pedestrian delay at intersections | <ul style="list-style-type: none"> • Presence of pedestrian refuge islands • Sidewalk continuity along the roadway and throughout the surrounding network • Presence of shade • Adequate pedestrian-level street lighting • Estimated potential reduction in crashes utilizing CMFs • Travel time • Project cost and cost effectiveness |
|---|--|

TABLE 3-2 EXAMPLES OF HOW PROJECT EVALUATION MEASURES CAN BE LINKED TO PROJECT PURPOSE AND NEEDS

Purpose	Needs	Objectives	Evaluation Measures
Serve anticipated future travel demand	An additional 10,000 vehicular trips are projected along the roadway in 20 years	Increase capacity for regional trips	Peak-hour travel times from point A to point B
Provide safe travel options along roadway	Number and percent of rear-end crashes in the last 5 years is higher than statewide averages of similar facilities	Decrease rear-end crashes	Potential reduction in rear-end crashes
	Number of fatal and serious injury crashes in the last 5 years is higher than statewide averages of similar facilities	Decrease the severity of automobile crashes	Potential for reducing the severity of crashes
	Number of fatal and serious injury pedestrian crashes in the last 5 years is higher than statewide averages of similar facilities	Decrease number and severity of pedestrian crashes	Linear feet of roadway with adequate levels of pedestrian lighting
Provide multimodal mobility options that support local economic development goals	10 percent of households in the study area do not have access to an automobile	Increase mobility through walking and bicycling	Percentage of roadway with sidewalks and bicycle facilities meeting current standards for context classification
		Increase ease of transit use	Number of ADA-compliant transit stops Percent of population reached within 0.25 miles of improved transit stops
	A new activity center along a major state roadway will introduce an additional 3,000 new daily vehicular trips	Maintain vehicular mobility	Overall street connectivity
			Intersection LOS Travel-time reliability
Support freight access to businesses	Retail and restaurants along the corridor require daily deliveries	Allow efficient local area delivery	Presence of loading and unloading zones near businesses

Local Vision and Economic Development Goals

Beyond the project evaluation measures identified in Table 3-1, investments should be aligned with local and regional land use and economic development plans and visions to the maximum extent feasible. Developing a roadway design that is consistent with the context classification will help ensure that investments support the local vision. Additionally, the planning process should seek the input of stakeholders, weigh alternatives against a broader community vision, and work to obtain stakeholder buy-in.

Balancing Competing Needs

The context classification informs the types of users and the intensity of uses within each context classification. For almost every project, the needs of users can be addressed in multiple ways. The alternatives developed to respond to those needs should explore a variety of methods and means for meeting them.

Sometimes, due to limited right of way, difficult choices may have to be made for how to serve different users along a roadway. For example, in a higher intensity area such as a C5-Urban Center or C6-Urban Core, local business owners might like to prioritize on-street parking over a dedicated bicycle facility. One way to address such a case would be to look beyond the roadway and consider the larger network in the

development of alternatives. The FDOT Complete Streets policy is founded on the concept of a complete network. Where it is not possible to provide similarly high-quality facilities for all modes along all FDOT roadways, it may be necessary to rely upon parallel networks to provide additional travel options.

The network approach requires close coordination between FDOT and local communities. In the example of prioritizing on-street parking over a dedicated bicycle facility, analysis should be informed by local vision, availability of parallel routes, and the local partner's willingness to invest in and maintain parallel facilities. A decision could also be informed by technical analysis of bicycling trip origins and destinations, the need for bicycling connectivity, safety data, and user input. In many cases, there may not be one clear-cut alternative that equally serves users at the same level of service. Selecting a well-vetted set of evaluation measures that relate to the project purpose and needs will frame a discussion and decision-making process and provide information to help FDOT, the public, and local officials understand the trade-offs among the alternatives. Potential

measures to evaluate the trade-offs in this example might include:

- Understanding the trade-offs between impacts on safety versus convenience of users (e.g., asking motorists to park and walk an extra block to access destinations, versus asking bicyclists to ride in mixed traffic);
- Economic impact (understanding the potential economic development impact of convenient on-street parking spaces versus a bicycle facility adjacent to businesses); and
- How each alternative supports other defined project needs.

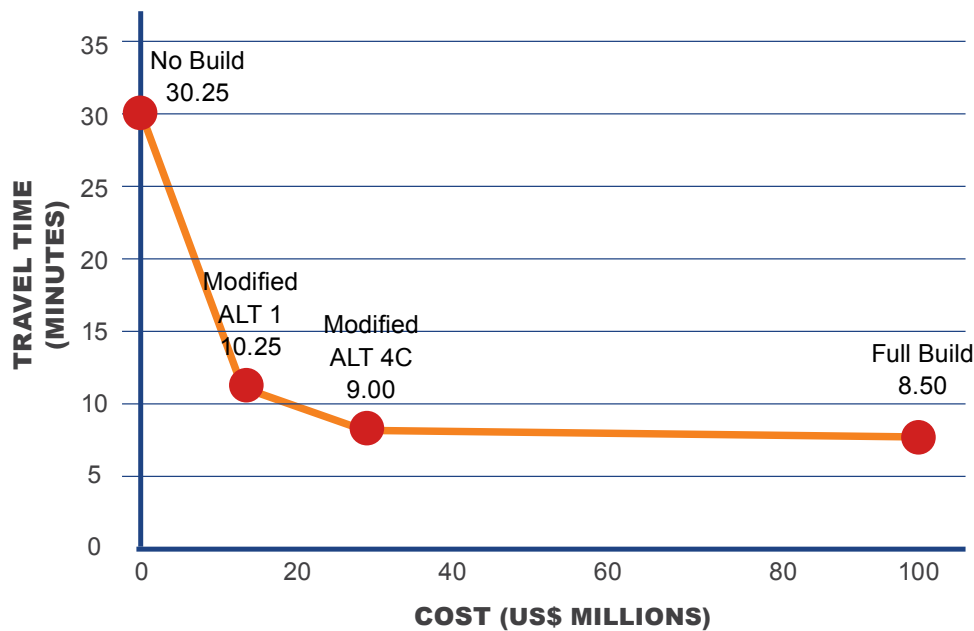
Figures 3-2 and 3-3 illustrate examples of how trade-offs among alternatives can be communicated to decision makers and stakeholders.

Additional guidance for defining the project purpose and needs, and developing and evaluating alternatives that accommodate each user, will be incorporated in the *PD&E Manual*. The guidance will also be

FIGURE 3-2 EXAMPLE OF HOW TO COMMUNICATE RESULTS OF EVALUATING ALTERNATIVES FOR EACH MODE

	Alternative A	Alternative B	Alternative C
 Pedestrian			
 Bicyclist			
 Car			
 Transit			
 Freight			
	 Fully Meets Needs	 Partially Meets Needs	 Does Not Meet Needs

FIGURE 3-3 EXAMPLE OF ILLUSTRATING TRADE-OFFS BETWEEN ALTERNATIVES



Source: Marshalls Creek Study, PennDOT Smart Transportation Case Study

included in the FDOT Alternative Corridor Evaluation (ACE) process which is performed prior to the PD&E phase (see Part 1, Chapter 4, of the PD&E Manual). FDOT uses the ACE process to identify, evaluate, and eliminate alternative corridors on certain types of projects that qualify for ETDM screening prior to the PD&E phase (see Chapter 2 for definition of qualifying and non-qualifying projects).

FDOT District 5 has developed guidance on best practices that can be used during the planning phase of a project. This guidance, the **Multimodal Corridor Planning Guidebook**, provides some best practices and examples of defining the problem, purpose and needs, and developing alternatives that consider the perspectives of all users.

DEFINING CONTEXT CLASSIFICATION IN THE FDOT PROCESS

The context classification of a roadway provides guidance on the anticipated users of the roadway. Understanding the needs of all users at these early phases assures that the project scope of work will define all necessary improvements and that the budget

is adequate for design, right of way, and construction. The context classification and users will inform key design elements, such as the design speeds, lane widths, and types of pedestrian, bicycle, transit, and freight facilities to be included in the design concept.

All FDOT projects on non-limited-access roadways require the evaluation and documentation of context classification early in the life of a project. The context classification will be defined or confirmed at the beginning of each project phase, including planning, PD&E, and design. For RRR projects, which have a more compressed timeframe, the steps to identify context classification may need to be taken ahead of time (where possible) or abbreviated. Context classification evaluation is incorporated as follows:

- For Non-Qualifying Projects: During the work program development cycle and prior to the development of the design scope of work; and
- For Qualifying Projects: During the ETDM screening.

NON-QUALIFYING PROJECTS

For projects not going through ETDM screening, Figure 3-4 outlines the potential steps needed to determine the context classification prior to developing the scope of work for the design phase. This process is not intended to be prescriptive, but rather outlines the key actions needed to define the context classification so that such actions can be incorporated into existing scoping processes. It is imperative that the context classification and corresponding users of the roadway are determined prior to defining the scope of work and developing the concept(s) to be designed. Each district can assign staff who will oversee the determination of context classification. Multiple groups within each district should be involved in determining the context classification (such as Design, Program Management, Intermodal Systems Development, Planning, and other relevant technical experts, as needed). On projects where FDOT currently coordinates with local governments, FDOT will coordinate with local governments to determine context classification. The final determination of context classification will be made by FDOT. Refer to the **Public Involvement Handbook**, **FDM**, **PD&E Manual**, and **Project Management Handbook** for guidance on local government coordination.

RRR projects will be designed and implemented consistently with the context classification evaluation defined in this Handbook and the design criteria outlined in the **FDM**. Any design elements required by the **FDM** criteria that are not typically provided through funding sources for resurfacing activities should be supplemented with additional Federal, State, or local funds. FDOT project managers should coordinate with the Work Program staff in their district to assemble a funding package to meet specific project needs. Additional guidance regarding the eligibility of these funds can be found in the **Work Program Instructions**.

The general steps to determine the context classification and the scope of work for non-qualifying projects are shown in Figure 3-4 and described as follows:

STEP 1: Identify the candidate project.

STEP 2: Collect and assess data, including SIS designation if applicable, to understand the existing conditions and inform the context classification. The

data requirements and methods for determining the context classification are described in detail in Chapter 2 of this Handbook.

STEP 3: Identify a preliminary context classification along with a list of the intended user needs of the roadway.

STEP 4: Engage local governments (for projects that currently involve local governments) and other FDOT technical experts and conduct field reviews, discuss the context classification, and develop preliminary concept(s). It may be beneficial to document context classification discussions through a formal agreement. Appendix E presents a draft sample local agreement, to be used and edited at the discretion of the district.

STEP 5: Confirm and document the context classification and share draft concept(s) and preliminary budget estimates with local governments, when appropriate.

STEP 6: Develop the draft scope of work, schedule, and budget estimates for the draft concept(s). If the proposed project involves work beyond what is required by the design criteria in the **FDM**, initiate agreements with local governments.

STEP 7: Hold internal technical review meetings with FDOT district staff to confirm the final scope of work.

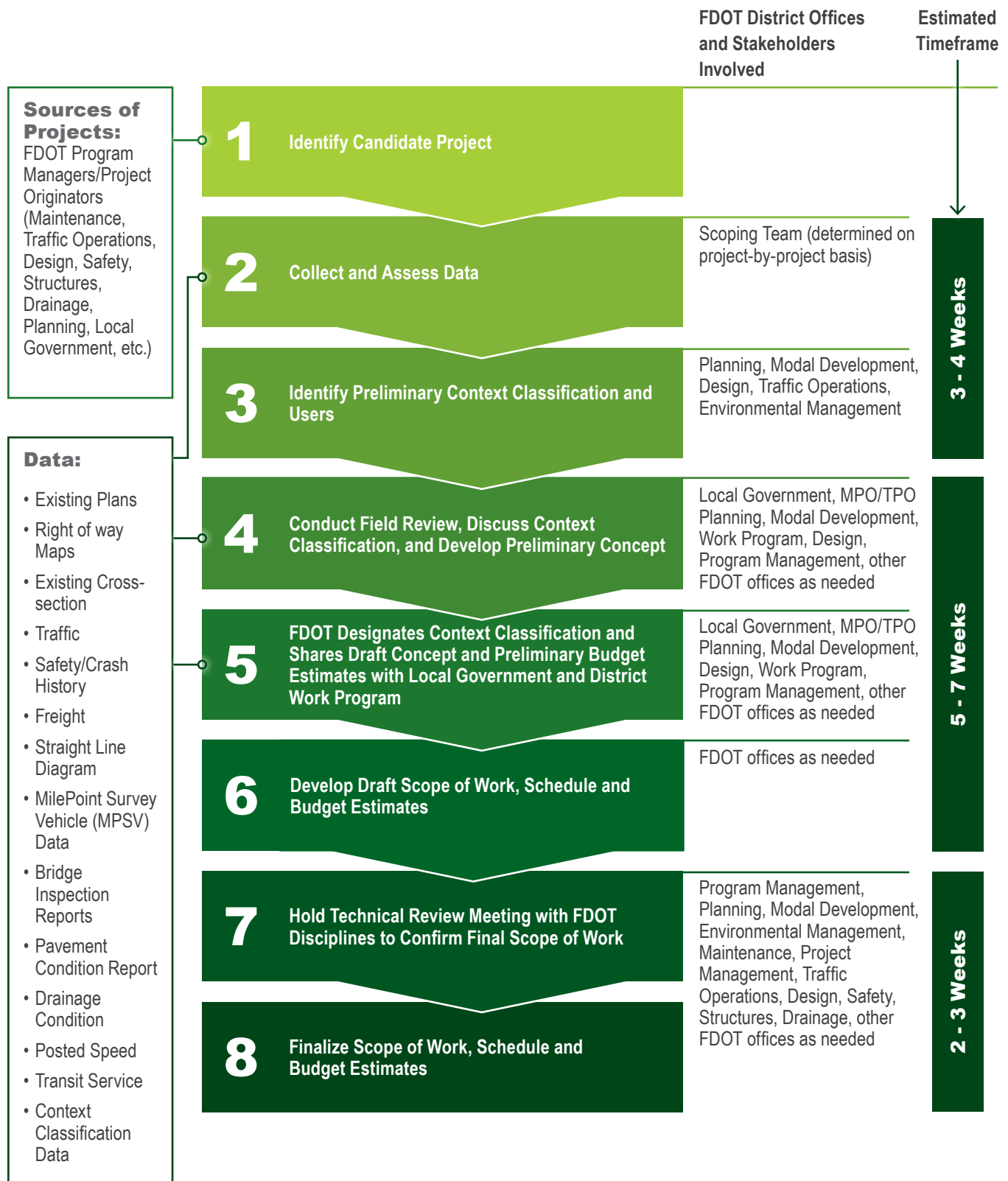
STEP 8: Finalize the scope of work and develop the schedule and budget estimates for the design phase. If local agreements are needed per Step 6, these are then finalized.



Multimodal elements can be incorporated through improvements as part of RRR projects, such as re-striping to narrower vehicle lanes to accommodate buffered bike lanes.

Location: SR A1A, Fort Lauderdale, FL

Source: FDOT

FIGURE 3-4 EXAMPLES OF STEPS TO DEFINE THE CONTEXT CLASSIFICATION AND SCOPE OF WORK FOR NON-QUALIFYING PROJECTS

Multimodal elements of projects should be addressed on all state roadways based on the context classification of the roadway, including RRR, traffic operations, and safety projects. The primary purpose of this process is to facilitate an understanding of the context classification and users before a concept, scope of work, and budget are determined. The general steps shown in Figure 3-4 show a comprehensive evaluation, but smaller projects such as push-button traffic operations may not require an extensive data collection effort or local government engagement.

When multimodal features are required to be built or expanded to meet FDOT criteria, the funding source for those elements must be identified as part of the scoping process. Identifying multimodal elements and potential additional funding needs early in the scoping process will enable funding types and budgets to be assigned appropriately to complement the RRR funding for each project.

FDOT anticipates that some RRR projects will take place on roadways that are either misaligned with the context classification, or where FDOT and local governments do not agree on the context classification. For example, if an RRR project in a C5-Urban Center Context Classification requires that pedestrian or bicycle facilities be provided based on **FDM** criteria and there is no space to accommodate them within the existing curb line or right of way, then discussions within FDOT and with local partners may be needed to determine how each of the roadway users can be accommodated. During the discussion, it will be determined if the RRR project should continue and the timing of the RRR in relationship to potential planning activities (refer to Figure 3-5). The following are two likely scenarios that may occur as a result. Other scenarios are conceivable, but these are anticipated to be the most likely:

- FDOT and the partners may agree that the RRR project will proceed within the existing constraints, and separate planning activities might occur to determine how to incorporate the **FDM**-required elements as a separate project. The level of planning effort will vary on a project-by-project basis. If all elements required in the **FDM** cannot be implemented immediately due to significant right of way limitations or impact to utilities, FDOT district staff will provide documentation through the design variation and exception process.
- FDOT and the partners may agree that the RRR project can incorporate the necessary **FDM** criteria, and that the RRR project will either be implemented within the original work program schedule or implemented later than the original intended work program timeframe. This decision will be coordinated with District Work Program staff.

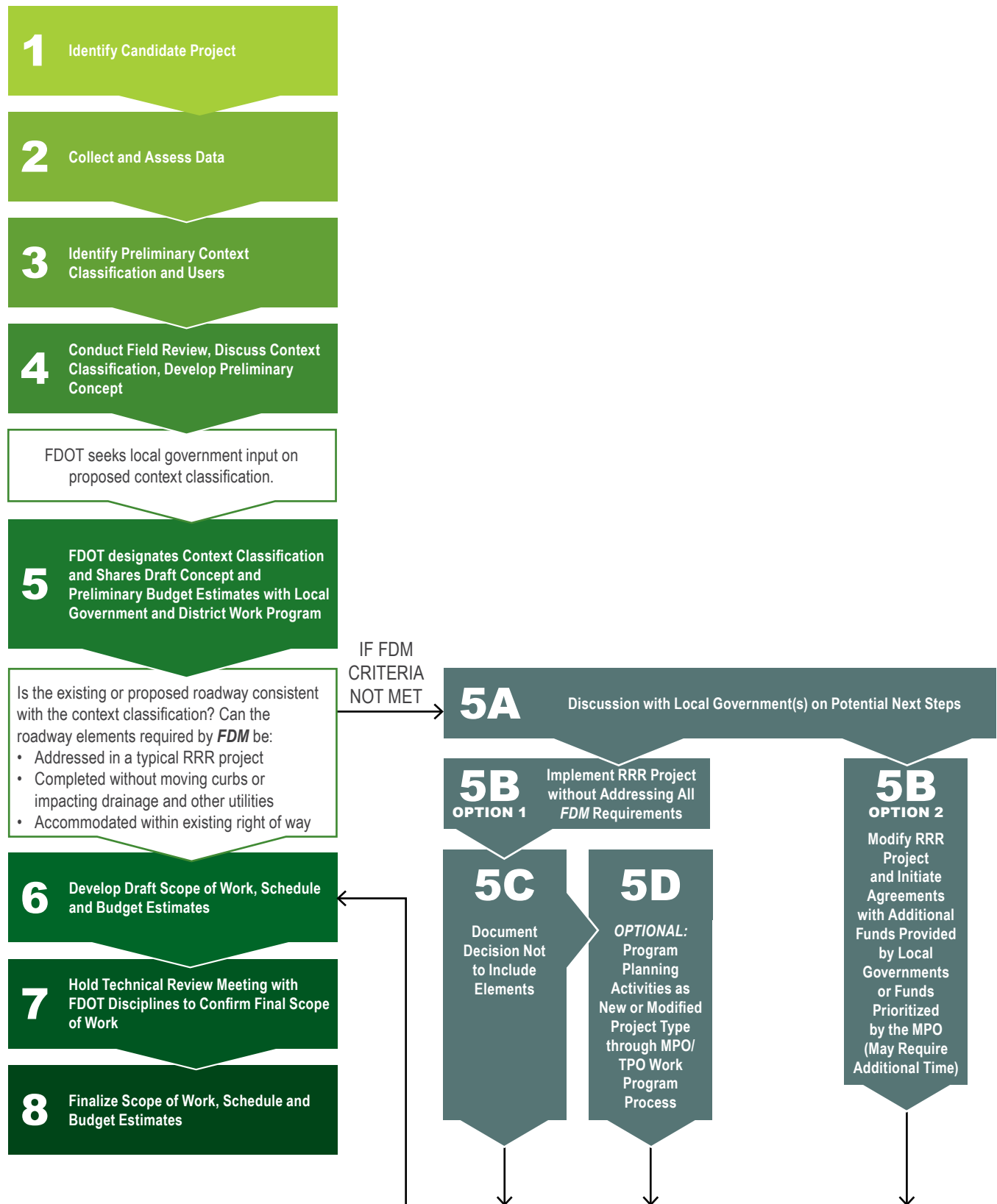
If additional guidance or suggestions are desired, the district may contact the State Complete Streets Program Manager for assistance.



Coordination with local partners can inform context classification and help the project team better understand all the users and needs of a roadway.

Location: Clematis Street, West Palm Beach, FL

Source: FDOT

FIGURE 3-5 POTENTIAL APPROACH FOR RRR PROJECTS WHEN ELEMENTS OTHER THAN RESURFACING ARE REQUIRED FOR THE ROADWAY TO MEET **FDM** DESIGN STANDARDS

QUALIFYING PROJECTS SCREENED THROUGH ETDM SCREENING

Projects identified by MPOs and TPOs for inclusion in LRTPs are usually screened through FDOT's ETDM screening process. Examples of such qualifying projects might include additional through lanes which add capacity to an existing road (see Chapter 2 for definition of qualifying projects). The ETDM screening process provides agencies and other stakeholders with the opportunity for early input and consideration of the environment in transportation planning. The ETDM screening process is composed of the Planning Screen and the Programming Screen. The Planning Screen best occurs when considering projects for inclusion or prioritization within a Cost Feasible LRTP. The Programming Screen supports development of the **FDOT Five-Year Work Program** (see the **ETDM Manual** for details describing the ETDM screening process).

The ETDM Planning Screen and Programming Screen assist in identifying potential environmental constraints and are used to establish and communicate the project context. The ETDM screening contains the Preliminary Environmental Determination (PED) which summarizes the FDOT understanding of environmental issues on the project. The Environmental Technical Advisory Team (ETAT) and other stakeholders participating in the ETDM screening review the PED and provide comments to FDOT.

ETDM Planning Screen and Context Classification

The ETDM Planning Screen occurs prior to and as input into the LRTP/Cost Feasible Plan. The Planning Screen is conducted by either the FDOT District Environmental Management Office or the MPO/TPO, depending on the roadway type and resource constraints of the MPO/TPO.

The preliminary context classification will be identified in the PED and provided for review and comment to the ETAT (State and Federal agencies and tribes) and local governments for review. The results of this screening, including comments received during the screening, are documented in the Planning Screening Summary Report. Figure 3-6 illustrates the steps in the ETDM Planning Screen, including the step at which the context classification could be determined.

ETDM Programming Screen and Context Classification

The ETDM Programming Screen is completed prior to a PD&E Study. The context classification will be identified or updated during this screening. As with the Planning Screen, the context classification will be documented as part of the PED and reviewed by the ETAT, with results incorporated into a report (the Programming Screening Summary Report). Chapter 4 of the **ETDM Manual** provides more details on the Programming Screen. Figure 3-7 illustrates the point at which the context classification will be reviewed and updated as part of the ETDM Programming Screen.

PD&E and Context Classification

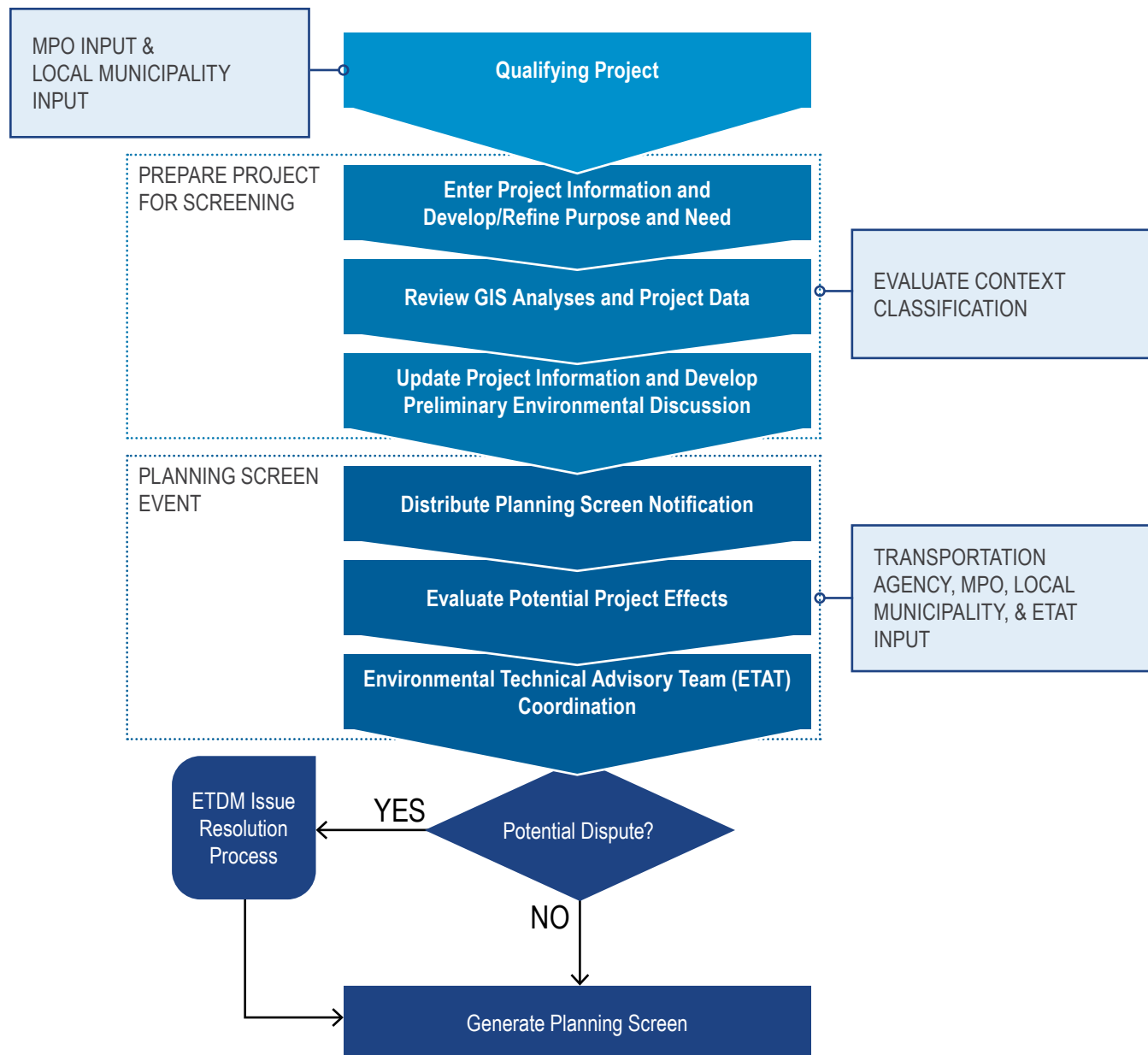
The use of the context classification continues during the PD&E process. The context classification for the project will be stated in the project description. The context classification determined during ETDM screening may be refined following coordination with local governments or if additional land use data becomes available during the PD&E study. Criteria used to determine the context classification will be documented into the existing land use and future land use. The context classification and the intended users will be documented in the Preliminary Engineering Report or other related engineering documentations.



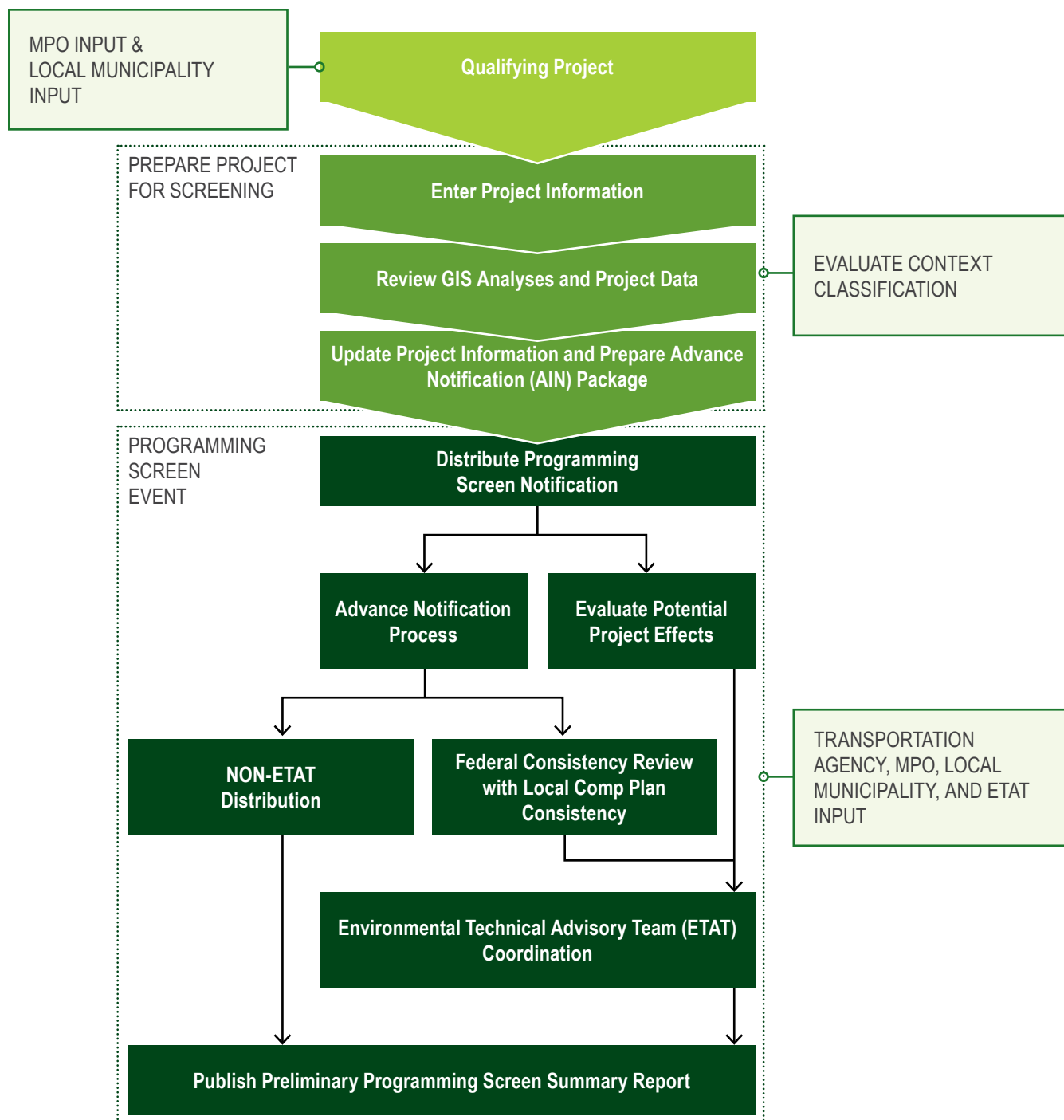
Public engagement in PD&E supports the application of context-based Complete Streets approach.

Source: KAI

FIGURE 3-6 ETDM PLANNING SCREEN AND CONTEXT CLASSIFICATION



Source: Adapted from the FDOT PD&E Manual

FIGURE 3-7 ETDM PROGRAMMING SCREEN AND CONTEXT CLASSIFICATION

Source: Adapted from the FDOT PD&E Manual

IMPLEMENTATION

The determination of a roadway's context classification is required in order to utilize the criteria in the **FDM**. The context-based criteria in the **FDM** will be required on projects that have not begun design by January 1, 2018, and may be applied to active design projects at the discretion of the district. For PD&E projects, implementation of context classification and the **FDM** is required for projects that have the Public Hearing scheduled in April 2018 or later. The 2017 **Plans Preparation Manual (PPM)** will apply through the completion of the PD&E studies for projects that have the Public Hearing scheduled prior to April 2018. Criteria contained in the **FDM** may also be applied earlier at the discretion of the district.

FUNDING AND MAINTENANCE

There is no separate FDOT funding category or FDOT funding source specifically for Complete Streets. Projects that require modifications to comply with criteria associated with the context classification will be funded through the funding programs currently available to Federal, State, and local roadways, as appropriate. The existing MPO funding process will remain the same.

FDOT will fund the maintenance of aspects of transportation projects that are necessary to comply with adopted FDOT design criteria contained in the **FDM**. If local governments or other partners would like to include features that go beyond what is required by FDOT design criteria, funding for the construction and maintenance of those additional components will be the responsibility of the local government or local partner, as defined in a local maintenance agreement. Current elements being maintained by local governments or other partners as part of local maintenance agreements (e.g. traffic signals on state roadways) will continue to be maintained per the agreements in place.

Design Considerations for Complete Streets

FDOT's Complete Streets approach calls for selecting design controls to reflect the roadway context and intended outcomes, and then applying appropriate design criteria based on these design controls. This chapter discusses:

- Context-based design controls and how they influence multimodal travel; and
- Effects of the transportation network on roadway design.

This Handbook is not intended to be a design manual; rather, it offers guidelines for a successful design approach. Refer to the **FDM** for the latest context-based design criteria. FDOT also has a number of handbooks and guidance documents that provide information on tools for implementing Complete Streets. A list of guidance documents is included in Appendix F.



*Consider the range of users in roadway design.
Location: Commonway Road, Orlando, FL
Source: KAI*

CONTEXT-BASED DESIGN CONTROLS

For implementation of context-based planning and design, the **FDM** and other FDOT manuals will provide a range of design controls based on FDOT's context classification and functional classification. The key context-based design controls are:

- Design users
- Design vehicle
- Design speed
- Traffic characteristics

These design controls are described in this Handbook and discussed in detail in the **FDM** and other manuals.

DESIGN USERS

Design users are those anticipated users of a roadway (including drivers, pedestrians, bicyclists, and freight handlers) that form the basis for each roadway's design. Roadway users' varying skills and characteristics introduce a variety of human factors that can influence users' driving, walking, and bicycling capabilities. Design users should be taken into consideration when determining design details such as sidewalk widths, type of bicycle facility, design speed, signal timing and spacing, location of pedestrian crossings, number of vehicular travel lanes, intersection width, and lighting.

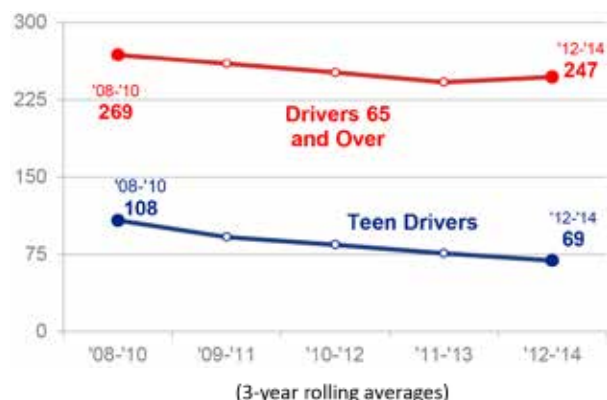


Driver

Driver performance informs roadway design. Designers should pay attention to roadway elements that can influence the safety of at-risk drivers, particularly in areas with higher concentrations of these

at-risk populations. FDOT has identified teen drivers (age 15 to 19) and aging drivers (age 65 and up) as at-risk drivers. The 2010 census reports that these age groups make up almost one-quarter of Florida's population. Fatalities involving teen drivers and aging drivers have historically accounted for approximately one-quarter of all Florida traffic fatalities (see Figure 4-1).¹ As compared to other drivers, older drivers tend to process information more slowly, and have slower reaction time, deteriorated vision and hearing, and limited depth perception.² For additional information, refer to the FHWA publications *Highway Design Handbook for Older Drivers and Pedestrians* and *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*.

FIGURE 4-1 FATALITIES IN FLORIDA INVOLVING AT-RISK DRIVERS



Source: FDOT 2015 Performance Report



Pedestrian

Pedestrians are among the most vulnerable roadway users. In 2014, pedestrians made up 24 percent of Florida's transportation fatalities (see Figure 4-2).³ Pedestrian characteristics that serve as design

controls include walking speed, walkway capacity, and the needs of persons with disabilities. The 2010 census reports that 19 percent of the population in the United States had a disability in 2010.⁴ Age plays an important role in how pedestrians use a facility, as older adults are the most vulnerable pedestrians.⁵ The Complete Streets approach considers the pedestrian design user to represent people with a range of abilities, including the elderly, children, and persons with disabilities. This is especially true in context classifications where a higher level of pedestrian activity is expected. People with varying abilities require a continuously paved level surface on both sides of the roadway, a network that allows multiple and direct routes to destinations, short crossing distances, and protection from the weather. Several design elements have been found to assist elderly pedestrians, including simple designs, accommodation for slower walking speeds, and adequate median refuge islands at wide intersections. For additional information, refer to the FHWA publications *Highway Design Handbook for Older Drivers and Pedestrians* and *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*.



Consider people with a range of abilities.

Location: West Central Avenue, Lake Wales, FL

¹ Florida Department of Transportation, 2015 Performance Report, 2015, p. 1-10, <http://www.dot.state.fl.us/planning/performance/2015/2015PerformanceReport.pdf>.

² American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, pp. 2-43.

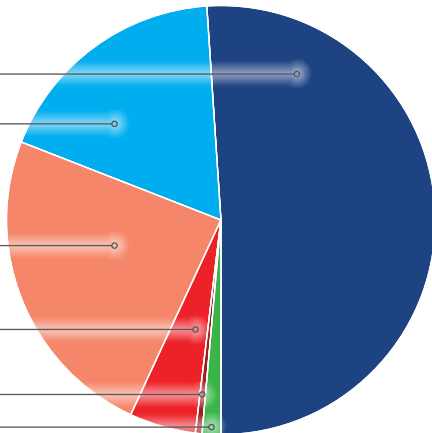
³ Florida Department of Transportation, 2015 Performance Report, (2015), p. 1-6.

⁴ United States Census Bureau, "Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports," July 25, 2012, <https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html>.

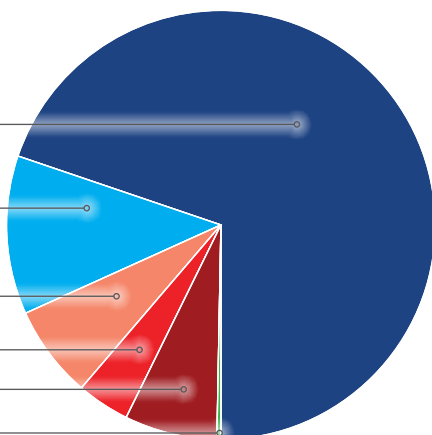
⁵ "Aging Road User," accessed September 22, 2016, <http://www.safeandmobileseniors.org/AgingRoadUser.htm#Bicyclists>.

FIGURE 4-2 FLORIDA TRANSPORTATION FATALITIES AND SERIOUS INJURIES BY MODE, 2014**Fatalities**

Vehicle	51%
Motorcycle	18%
Pedestrian	24%
Bicycle	5%
Transit	0.5%
Others	1.4%

**Serious Injuries**

Vehicle	70%
Motorcycle	12%
Pedestrian	7%
Bicycle	4%
Transit	7%
Others	0.3%



Source: FDOT 2015 Performance Report



The needs of bicyclists vary by age, experience, and trip purpose. Location: US 17/92, Orlando, FL (right), SR A1A, Deerfield Beach, FL (top left), and Alton Road, Miami Beach, FL (bottom left)

**Bicyclist**

Bicyclists pose different safety and geometric considerations and must also be considered in roadway design. Bicyclist characteristics vary by skill level, age, experience, preferences and trip purpose.

Bicycling trip purposes are broadly categorized into utilitarian trips and recreational trips:

- Utilitarian trips are non-discretionary trips needed as part of a person's daily activity, such as commuting to work or shopping.
- Recreational trips include trips for exercise or social interaction. Experienced riders or those who travel regularly, and casual riders or infrequent users all make recreational trips.

Data on trip purpose and experience level provide some information on bicyclist characteristics and preferences. Long distance and experienced adult riders tend to:

- Be more comfortable riding with vehicles on streets. Some will prefer to ride in mixed traffic on lower speed streets, while others will prefer dedicated bicycle facilities
- Ride at speeds up to 25 mph on level ground⁶

Casual, infrequent, and younger riders tend to:

- Prefer a physical separation from vehicular traffic
- Ride on the sidewalk
- Achieve travel speeds of around 8 to 12 mph
- Bicycle shorter distances

The bicyclist design user should reflect the long distance and experienced rider in all context classifications, and the casual and younger rider where possible. The need to accommodate casual and younger riders might be indicated by:

- Origins and destinations that generate bicycle trips along or in close proximity to a roadway, such as schools, parks, high-density residential housing, shopping centers, and transit stops
- Roadways within well-connected street networks

⁶ American Association of State Highways and Transportation Officials, Guide for the Development of Bicycle Facilities Fourth Edition, 2012, p. 15.

- Roadways that connect to local or regional dedicated bicycle facilities
- Data showing that bicyclists are currently riding on the sidewalk
- Public input

AASHTO's *Guide for the Planning, Design and Operation of Pedestrian Facilities* (2004) and *Guide for the Development of Bicycle Facilities* (2012) expand significantly on the *AASHTO A Policy on Geometric Design of Highways and Streets* (*AASHTO Green Book*), presenting factors, criteria, and design controls. See the *FDM* for FDOT criteria related to bicycle and pedestrian facilities.



The roadway design must take the design vehicle into consideration.

DESIGN VEHICLE

FDOT is developing new guidance for freight roadway design that will address selection of the design vehicle based on context and users. Currently, the selection of a design vehicle is controlled by FDOT rules and regulations that reflect the largest vehicle that may be assumed to use the roadway (WB-62FL). The design vehicle must be accommodated on all state roadways. In areas where the context classification suggests a demand for multimodal travel, the turning template of a smaller vehicle may be more appropriate for turning movements at intersections where cross streets will not be expected to have significant levels of truck traffic.

Assuming a WB-62FL design vehicle for all movements at all intersections can result in suboptimal intersection designs for pedestrians (see Figure 4-3). Because WB-62FL turning movements are infrequent in urban contexts and at intersections with

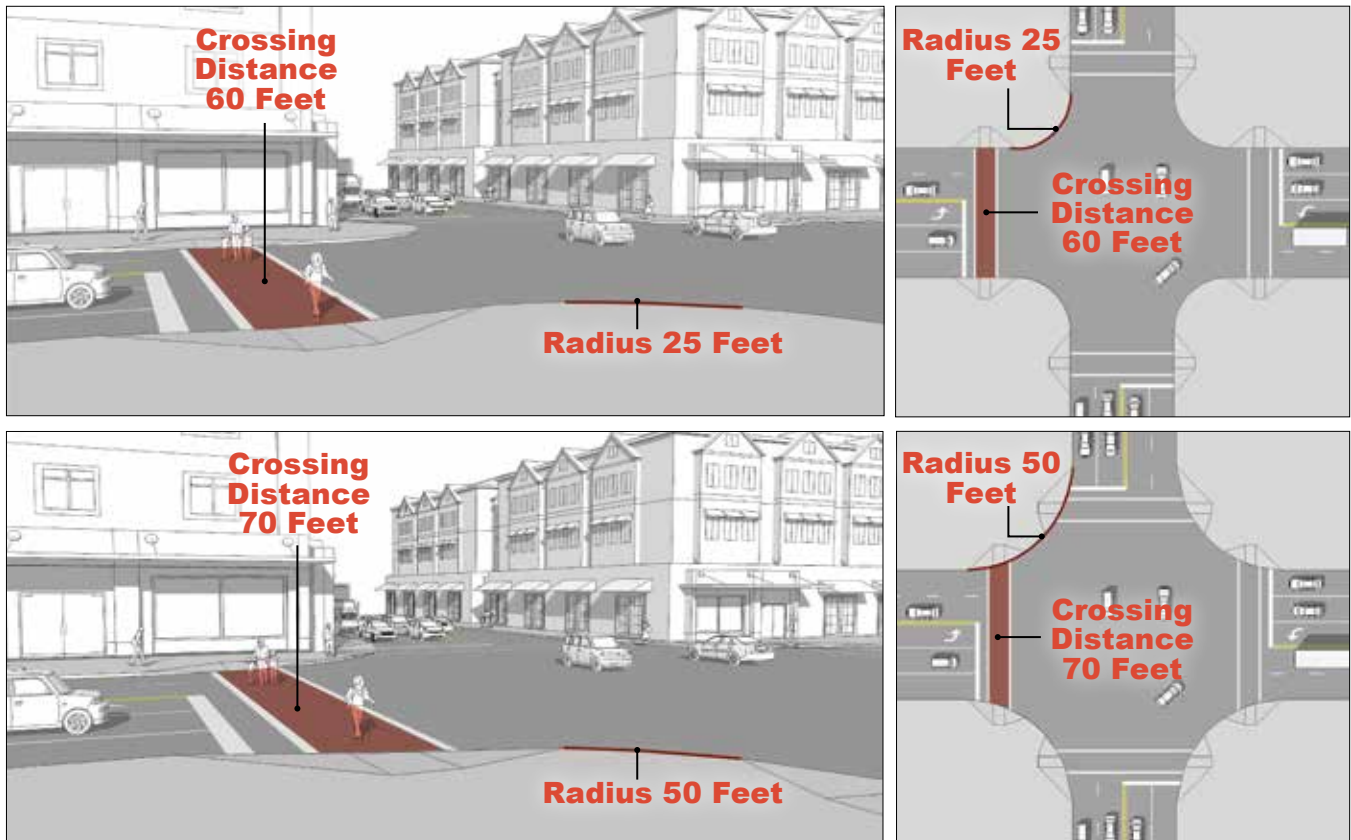
local or collector streets, designs that accommodate a WB-62FL design vehicle without encroachment for all turning movements may result in more pavement and longer pedestrian crossing distances than are necessary for most turning maneuvers. Larger turning radii are difficult to achieve in the constrained conditions that exist in many of the most urban contexts. Such designs also result in higher speeds for turning vehicles of all sizes. Additional pavement increases the capital cost and right of way costs of an improvement, particularly where urban development densities contribute to high property values.

The consideration of a smaller design vehicle for turning movements between designated freight roadways and other roadways can help balance goods movement with access for and comfort of other users. Recommended by the National Association of City Transportation Officials (NACTO), the Institute of Transportation Engineers (ITE), and the CNU, this approach introduces the concept of both a design vehicle and a control vehicle in designing roadways. The control vehicle is the largest vehicle that can be expected to make use of the roadway. In this approach, the current WB-62FL design vehicle is termed a “control vehicle.” A smaller vehicle, such as a transit vehicle expected to make frequent turns, is considered the design vehicle. The design of an intersection should consider the turning movements of both the design vehicle and the control vehicle:

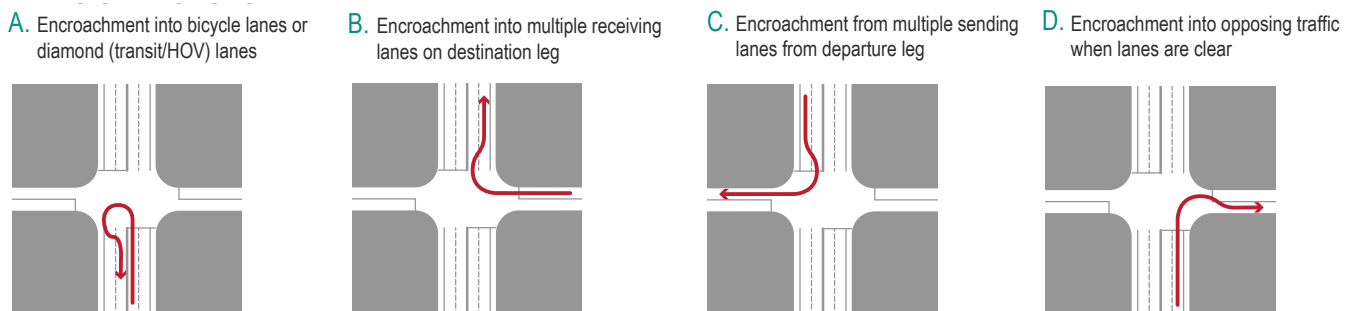
- The design vehicle is the vehicle that must be accommodated without encroachment into opposing traffic lanes.
- The control vehicle is the infrequent vehicle that must be accommodated by allowing:
 - Encroachment into opposing lanes if no raised median is present (see Figure 4-4).
 - Minor encroachment into the street side area if no critical infrastructure (traffic signal, poles, etc.) is present.⁷ This type of encroachment should take into consideration the visibility and safety of non-motorized users.

Further information on the use of the control vehicle will be provided in the upcoming FDOT freight roadway design guidance.

⁷ Florida Department of Transportation District 7, Freight Roadway Design Considerations, 2015.

FIGURE 4-3 RELATIONSHIP BETWEEN CURB RADII AND PEDESTRIAN CROSSING DISTANCE

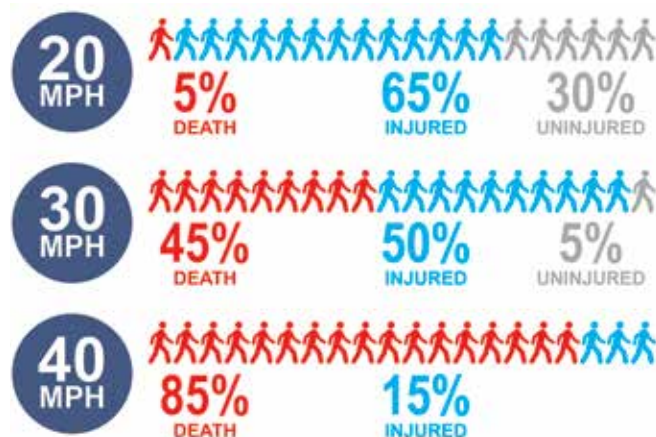
Curb radii has significant influence on the pedestrian crossing distance at intersections. Top and bottom illustrations compare the crossing distances between an intersection with 50 feet and 25 feet curb radius.

FIGURE 4-4 TYPE OF ENCROACHMENT INTO OPPOSING AND ADJACENT LANES THAT CAN OCCUR FOR CONTROL VEHICLE

DESIGN SPEED

Research confirms that lower vehicular speeds are safer, and that lowering speed limits can decrease both crash frequency and severity (see Figure 4-5).⁸ However, speeds cannot be reduced simply by changing posted speed limits. Roadway geometric and cross-sectional elements, in combination with the context, establish a driving environment in which drivers choose speeds that feel reasonable and comfortable.⁹

FIGURE 4-5 VEHICULAR IMPACT SPEEDS AND PEDESTRIAN RISK OF FATALITY AND SERIOUS INJURY



Lower vehicular speeds can decrease both pedestrian crash severity and fatality rates.

Source: "Killing Speed and Saving Lives - The Government's Strategy for Tackling the Problems of Excess Speed on our Roads." London: Department of Transport, November 1992.

Appendix D presents proposed design speed ranges for all arterial and collector state roadways by context classifications. More details on the design speeds and other design controls based on context classification are presented in the **FDM**. Design criteria, as well as application of engineering judgment, will assist in selecting the appropriate design speed for a roadway. Questions that should be asked to determine appropriate design speed include:

- **Average trip length:** How far is the average vehicular trip along the roadway? What percent

of the vehicular trips are coming from and going to destinations along the roadway, and how many trips travel through the roadway? Answers to these questions will help identify the balance of local access versus regional mobility along a roadway.

- **Signal spacing:** What is the average signal spacing along the roadway? How much of the vehicle delay occurs at the signal?
- **Access management:** What is the access management classification?
- **Special user groups:** Is there a special user group along the roadway (e.g. school children, visually impaired, senior population)?
- **Roadway function within the transportation system:** Is the roadway part of the SIS? Is it a designated freight route?
- **Land use/built environment:** Do buildings have shallow setbacks from the roadway and do entrances front the street?

The next release of the **Speed Zone of Highways, Roads, and Streets in Florida (Topic number 750-010-002)** will introduce a new speed concept called target speed. The concept of target speed is to identify a desired operating speed and develop design strategies and elements that help reinforce the operating speeds to be consistent with the posted or proposed speed limits (which may also be the design speed). A target speed should be consistent with the level of multimodal activity generated by adjacent land uses, to provide mobility and safety for all users. Target speed is influenced by elements of roadway design that are governed by design speed, as well as the form and function of the adjacent uses beyond the right of way.

For lower speed roadways, those with design speed 45 mph or less, it is desirable for the posted speed, the operating speed, and the design speed to be identical.

⁸ Federal Highway Administration, "Design Speed," last modified on October 15, 2014, http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_designspeed.cfm.

⁹ Federal Highway Administration, "Design Speed," last modified on October 15, 2014, http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_designspeed.cfm.

The following are roadway elements that could be used to influence operating speed.¹⁰ Some of these elements are not currently utilized on FDOT roadways, but can be considered on lower speed roadways depending on the context classification and transportation characteristics of the roadway. See the **FDM** for criteria related to roadway elements:

- Horizontal deflection (strategic use of roundabouts, splitter islands, location of on-street parking)
- Vertical deflections (such as raised intersections)
- Lane width
- Use of physical measures, such as curb extensions and medians, to narrow the traveled way
- Smaller curb-return radii at intersections and elimination or reconfiguration of high-speed channelized right turns
- Enclosure of a roadway formed by the proximity of a wall of buildings or other vertical built elements
- On-street parking to create side friction
- Proper use of speed limit, warning, and advisory signs, along with other appropriate devices to gradually transition speeds when approaching and traveling through a low-speed environment
- Street trees and other landscape treatments
- Striping of edge lines, bicycle lanes, or parking lanes
- Intersection spacing
- Setting signal timing to moderate progressive speeds from intersection to intersection

Additional information on the use of target speed and design elements to reinforce target speed will be provided in the next edition of the **Traffic Engineering Manual**.



On-street parking creates side friction.
Location: Centre Street, Fernandina Beach, FL
Source: FDOT



Roundabouts provide horizontal deflections.
Location: First Coast Highway, Amelia City, FL
Source: FDOT



Narrower travel lanes help manage speed and provide for wider bike lanes.
Location: Capital Circle NE, Tallahassee, FL
Source: FDOT

¹⁰ Kay Fitzpatrick et al., NCHRP Report 504: Design Speed, Operating Speed, and Posted Speed Practices, Transportation Research Board, 2003, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_504.pdf.

TRAFFIC CHARACTERISTICS

Vehicular traffic volumes and composition of traffic directly influence the selection of geometric design features, including number of lanes, lane widths, alignments, and grades. Design traffic defines the traffic volumes forecasted for the design year of a project, and has historically been the basis for determining the number of vehicular travel lanes (through and turning). Decisions related to design traffic often directly impact the comfort, safety, and convenience of other roadway users and the roadway's ability to successfully support the land uses along it. Consider the following elements to incorporate a context-based Complete Streets approach in roadway design.

Determining the Appropriate Design Year

The design year of a roadway project reflects the projected life of a the planned improvement. The design year is used to estimate future traffic demand and the volume expected along a roadway, and should account for anticipated future land use development. The **FDOT Project Traffic Forecasting Handbook** states that the design year is usually 20 years from the opening year (or the year of the targeted project completion), but may consider a shorter duration for minor safety and operational improvements.

The **AASHTO Green Book** states that estimating traffic volumes for a 20-year design period may not be appropriate for many rehabilitation projects. Due to the uncertainties of predicting traffic, rehabilitation projects may be developed on the basis of a shorter design period (5 to 10 years). The **AASHTO Green Book** further emphasizes that the design year decision is greatly influenced by fiscal realities, where limited resources require a balance between short-term and long-term investments.

Induced Travel of Excess Roadway Capacity¹¹

Induced travel is often characterized as “*If you build it, they will come.*” Induced travel describes the additional demand for travel when the cost of travel decreases, either in time savings or monetary costs. In locations where a variety of transportation options exist, congestion is often self-regulating, such that, when a roadway is congested, users will either choose a different route, travel during a different time of day, choose a different mode, or decide to not make the trip. When the capacity of a roadway is increased, travelers may switch to that roadway to take advantage of the decreased congestion and travel time.

Induced travel has been shown to result in increased Vehicle Miles Traveled (VMT) on the highway system. The overall user benefit per traveler decreases with increased VMT and the resulting increase in congestion. In addition, increased VMT due to new or longer trips can result in increased air and noise pollution. Lastly, building roadways with excess capacity often results in unintended consequences, such as faster vehicle operating speeds and longer pedestrian crossing distances. The impacts of allocating more capacity than is immediately needed for a roadway should be considered in evaluating the overall impacts and benefits of a roadway capacity project.

¹¹ Robert Cervero, “Are Induced Travel Studies Inducing Bad Investments?,” University of California Transportation Center, 2003.

Gilles Duranton and Matthew A. Turner, “The Fundamental Law of Highway Congestion: Evidence from the US,” *American Economic Review*, 2011.

Kent M. Hymel, Kenneth A. Small and Kurt Van Dender, “Induced Demand And Rebound Effects In Road Transport,” *Transportation Research Part B: Methodological* 44, no. 10 (2010): 1220-1241.

Todd Litman, “Generated Traffic and Induced Travel: Implications for Transport Planning,” *ITE Journal* 71, no. 4 (April 2001): 38-47.

LEVEL OF SERVICE

LOS is a quantified stratification used to describe the quality of travel on an A to F scale with LOS A representing the best operation conditions from the traveler's perspective and LOS F the worst. LOS standards have historically been developed and used to describe vehicular LOS, and are used to identify and prioritize transportation needs. Once a LOS threshold is adopted as a policy by a jurisdiction, roadways are designed, operated, and maintained to meet that LOS. Therefore, LOS standards have a varying and significant impact in the type, quantity, and quality of services provided for various modes along a roadway. The following are general principles related to how LOS standards can support Complete Streets.

Vehicular Level of Service

Vehicular LOS standards were intended to be used as a long-term planning tool, applied on a roadway corridor level but not at the intersection or segment level. The **FDM** discusses this understanding of LOS. FDOT's currently adopted vehicular LOS standards for state roadways (**Topic No.: 000-525-006-b**) states that LOS for state roadways during peak travel hours are LOS D in urbanized areas and LOS C outside urbanized areas. Many local agencies in Florida have adopted a similar standard for local roadways. FDOT is considering revisions to the LOS Policy to provide LOS targets instead of LOS standards to provide more flexibility in the application of this planning tool.

Pedestrian, Bicycle, and Transit Level of Service

Measuring the pedestrian experience requires quantifying safety and comfort for the pedestrian, based on pedestrian delay and other roadway attributes. The bicycle experience is generally described by the delay encountered at intersections and the attributes of the bicycle facility itself. Transit LOS is primarily focused on service levels rather than facility characteristics. However, because transit passengers typically must walk or bicycle to and from transit stops on either end of their trip, the quality of the walking experience at the beginning or end of a trip contributes to overall transit LOS.

The FDOT **Q/LOS Handbook** includes methodologies to calculate pedestrian, bicycle and transit LOS. As FDOT continues to update its standards and policies, it is exploring the possibility of working with local governments to establish appropriate LOS targets for multimodal mobility. These targets should be responsive to context, roadway function, network design, and user safety.

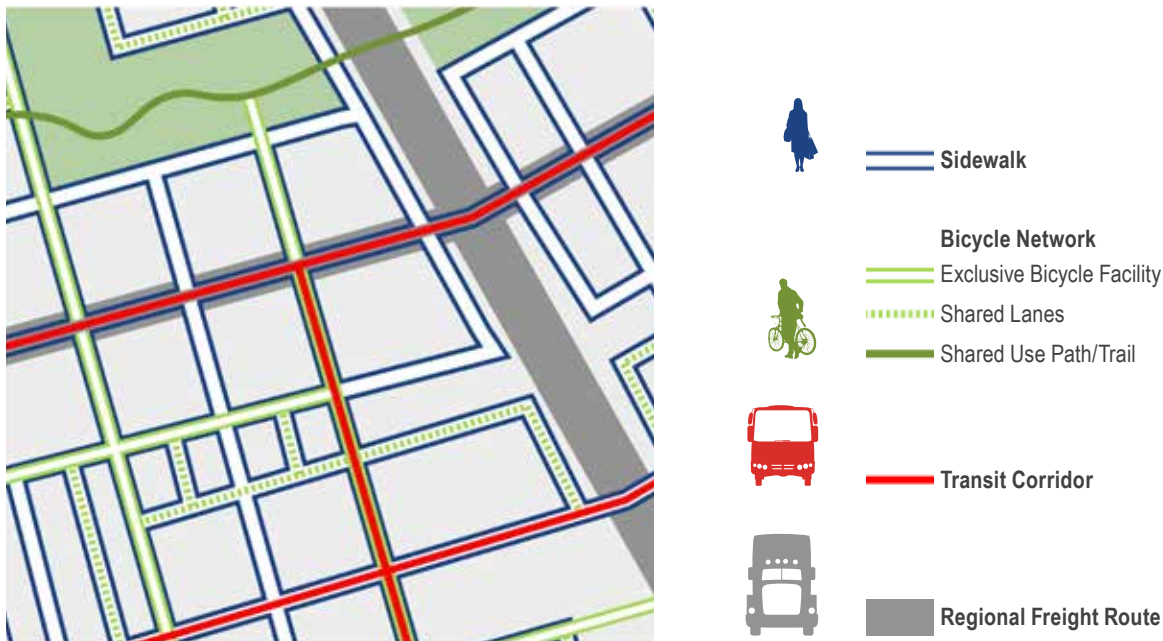
THE ROADWAY AS PART OF A SYSTEM

All roadways function as part of a broader transportation system. The safety, function and efficiency of a roadway are influenced by the other elements in the system. Parallel and connecting multimodal systems will influence the type of users and the travel demand on a roadway. The following section addresses how each roadway's ability to support all users is influenced by the transportation network. It also addresses transition zones needed between context classifications.

BUILDING A COMPLETE STREETS NETWORK

The FDOT policy states that the Department "...will routinely plan, design, construct, reconstruct and operate a context-sensitive **system** of Complete Streets." This Handbook furthers these ideas and emphasizes the need to support all users within a context-sensitive system of complete streets, according to each street's existing and desired future context and transportation characteristics. Figure 4-6 illustrates a conceptual idea of a context-sensitive system of complete streets, where each roadway contributes to the system's ability to serve all users.

Well-designed, connected roadway systems make travel more efficient by providing choice not only in modes, but also in routes. A fine-grained system of roadways and crossing opportunities provides more direct paths to destinations, reduces delay, and creates redundancy of path options for all users. Networks allow pedestrians, bicyclists, and transit riders to find direct routes to their destination or their transit stop. A system of connected roadways also disperses vehicular travel along multiple roadways.

FIGURE 4-6 CONTEXT-SENSITIVE SYSTEM OF COMPLETE STREETS

With multiple intersections and roadways sharing the traffic demand, there is less need to construct wider roadways or large intersections that could potentially create barriers to walking and bicycling and increase crash rates and severity for all users. A fine-grained network allows for roadways to complement each other, with some roadways providing better quality of service for high-speed travel, and other parallel roadways providing comfort, safety, and access for bicyclists and pedestrians.

Many roadways in Florida are built in C3C and C3R Suburban Context Classifications, with limited roadway connectivity and land uses dispersed along large areas of land. In these suburban contexts, the arterial roadway network typically supports both local access and regional mobility, concentrating most vehicular trips onto the state arterial roadways. Critical transit service, major employers, and retail services are also often located on these roadways. As investments are made along major arterial roadways, roadway design elements that support walking, bicycling, and transit use should be integrated. New local roadway connections and shared use paths should also be considered to complement and provide a network alternative to the arterial roadway system.

Due to right of way and financial constraints, it may not be possible to provide a similar level of accommodation for all travel modes, even though minimal accommodation appropriate to context classification is expected. In some locations, it may be desirable to rely upon parallel roadways to provide additional travel options for some modes. The system approach requires collaboration between FDOT and local communities, as all partners work together to develop a network of Complete Streets comprising of state and local roadways.

TRANSITION ZONES

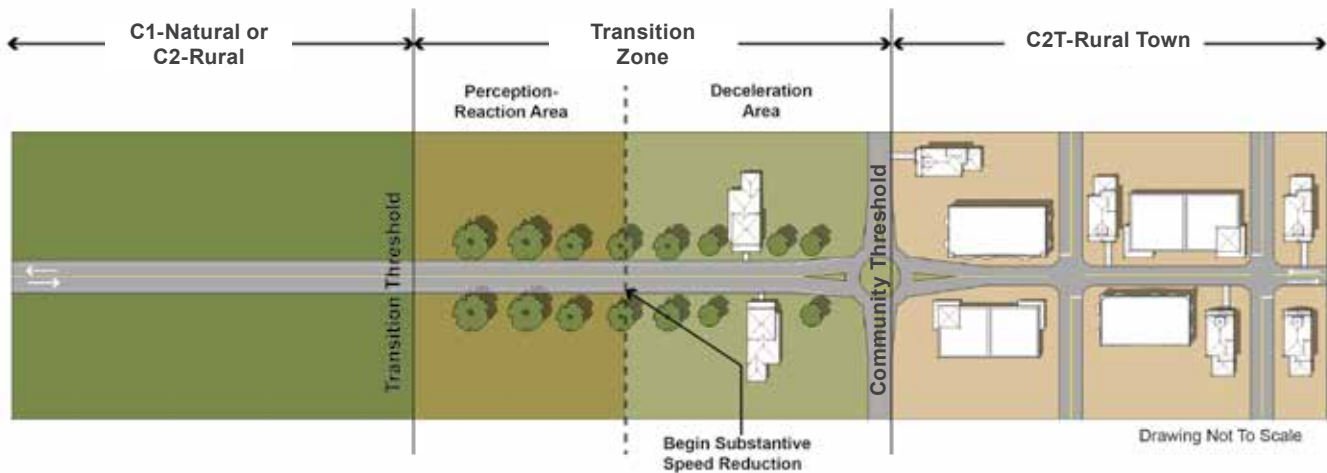
A roadway may traverse a variety of context classifications. As the context changes, the design criteria for the roadway will also change. This occurs across all context classifications, but the transition from C1-Natural or C2-Rural Context Classification to a higher classification such as C2T-Rural Town provides a particularly sharp shift in the recommended design speed and design users. For example, the land use surrounding SR 26 through Newberry, Florida transitions from C2-Rural to C2T-Rural Town over the course of a few blocks (see Figure 4-7). This condition requires a transition zone to alert drivers to the change and allow them to adjust their behavior and expectations accordingly. Changes in speed limit as part of transition zones will continue to comply with the requirement of the ***Speed Zone of Highways, Roads, and Streets in Florida (topic number 750-010-002)***.

NCHRP 737: Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways defines two distinct sections in a transition zone: the perception-reaction area and the deceleration area (see Figure 4-8). The perception-reaction area is the portion of the transition zone where drivers are made aware of the need to reduce speed. This section has roadway characteristics similar to the rural context, but will include visual cues to alert the driver of an upcoming deceleration. These cues may include:

- Signage, including warning signs such as “reduce speed ahead” signs, or gateways signs where appropriate.
- Texture or pavement markings; lane narrowing can be highlighted with the use of a wider outside stripe or rumble strips.
- Curb changes, from flush paved shoulders to curbed roadway.
- Architectural elements such as type, location, and spacing of lighting and landscaping.

FIGURE 4-7 EXAMPLE OF A TRANSITION ZONE (SR 26 THROUGH NEWBERRY, FLORIDA)



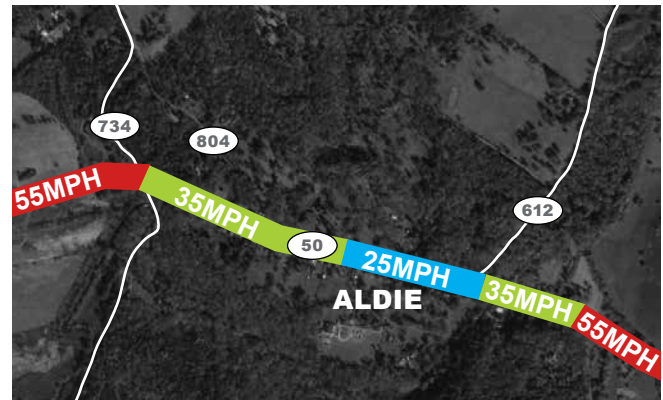
FIGURE 4-8 TRANSITION ZONE FROM C1-NATURAL/C2-RURAL TO C2T-RURAL TOWN CONTEXT CLASSIFICATION

Source: Adapted from NCHRP 737: Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways.

The deceleration area is the portion of the transition zone where drivers are expected to decelerate to an operating speed that matches the context of the community being approached. In the deceleration area, there is a noticeable change in roadway characteristics. The length of the deceleration area is a function of design speed, sight distance, and design criteria of the town. Transition from a high-speed to low-speed cross section can be accomplished through a variety of geometrics features, including:

- Horizontal deflection, such as splitter islands, chicanes, or roundabouts
- Lane width narrowing
- Lane elimination
- Transverse pavement markings
- Introduction of curb and gutter
- Street enclosure through vertical landscaping
- Signage or gateway treatments

A combination of elements is more effective for reducing speeds than an individual design element. Figure 4-9 illustrates an example that utilizes horizontal deflection, lane width narrowing, introduction of curb and gutter, and a gateway treatment at the entrance of a rural town.

FIGURE 4-9 EXAMPLE OF A TRANSITION ZONE (SR 50, ENTRANCE TO TOWN OF ALDIE, VIRGINIA)

Transition zones at either side of the Town of Aldie with 35 MPH posted speed limit transitions drivers from 55 MPH posted speed to 25 MPH posted speed. (2016)

Source: Google Earth



Gateway feature, SR 50, Aldie, Virginia (2016)

Source: KAI

UNIQUE DESIGN CONSIDERATIONS

In a large and diverse state such as Florida, there will be locations that do not conform to the context classifications. Or, there may be areas where flexibility beyond the range of criteria contained in the **FDM** and a design variation or design exception is required.

DESIGNING FOR SPECIAL DISTRICTS (SD)

Special Districts are areas that, due to their unique characteristics and function, do not adhere to standard measures identified in the Context Classification Matrix (refer to Chapter 2). Examples include military bases, university campuses, airports, seaports, rail yards, theme parks and tourist districts, sports complexes, hospital campuses, and freight distribution centers. These areas are likely to have a unique set of users and needs when compared to the surrounding context classifications. There is no one set of design controls appropriate for all SDs. Project-specific data collection and engineering judgment should inform the selection of design controls for these areas. To select design controls and criteria in the **FDM**, the project team will select a context classification that best suits the characteristics of the SD. If a district believes that an SD designation is required, the district should coordinate with the State Complete Streets Program Manager.

ADDRESSING DESIGN EXCEPTIONS AND DESIGN VARIATIONS

The **FDM** is context-based and provides design flexibility through lower design speeds and the inclusion of criteria for low speed roadways. It is anticipated this flexibility will decrease the need for Design Exceptions and Design Variations; however, there may be areas where right of way, funding constraints, or other considerations require flexibility beyond the range of criteria contained in the **FDM**. The **FDM** includes a chapter that outlines the exception and variation processes. When referring to AASHTO A Policy on Geometric Design of Highways and Streets for evaluation of design exceptions, FDOT will continue to define urban and rural areas following the FHWA criteria.

STRATEGIC INTERMODAL SYSTEM

The design speeds along SIS facilities should be informed by their context classification, but should still preserve the ability for the SIS facilities to allow “for high-speed and high-volume traffic movements within the State” (**Section 163.380110 F.S.**). To follow the Complete Streets approach without compromising the function of the SIS, an alternate facility for SIS designation, if available, should be considered when the context classification does not align with the function of the SIS facility and the proposed design speeds shown in Appendix D. The **FDM** provides context-specific design controls and criteria for the SIS.

Appendix A

LAND USE TOOLS TO SUPPORT SAFE AND COMFORTABLE MULTIMODAL TRAVEL

HOW LAND USE CAN SUPPORT COMPLETE STREETS

The transportation system and development pattern (including land use, development density and intensity, building design, building height, building setback, and site layout) are inextricably linked. Each plays a significant role in creating a human-scale environment that invites walking, bicycling, and transit and that supports community economic development. Thoughtful application of context-based design provides for all modes of transportation.

Transportation and land use both have an effect on roadway network connectivity. An extensive, connected network provides route options for goods delivery and vehicular access to land uses, as well as the foundation for safe and comfortable multimodal travel. A fine-grained roadway network with the appropriate design elements also provides multiple pedestrian and bicycling routing, shortens trip distances, and reduces the need to widen intersections and roadways, which may impact ease of walking and bicycling.

Similarly, development form and pattern complete the necessary elements of a multimodal environment. A mix of uses, located where people live, work, shop, and spend leisure time, that are thoughtfully integrated within a building, a parcel, or a few blocks, provides multiple destinations within walking and bicycling distance. Buildings located at the back of sidewalks with active store fronts, such as restaurants and retail, provide a comfortable sense of enclosure, visual interest, passive surveillance, and comfortable access to destinations. Direct, logical, and comfortable connections between destinations encourage walking and bicycling. The best multimodal transportation strategy is the right land use strategy.¹



A complete street environment requires both transportation and land use strategies.

Source: (top to bottom) FDOT, Rick Hall, KAI

¹ Charlotte-Mecklenburg Planning Department, "Centers, Corridors, Wedges Growth Framework", (August 10, 2010).

LOCAL GOVERNMENTS

Complete Streets rely on collaborative investments throughout the transportation network, from private site development, to local roadway network, to regional thoroughfares. Local governments are responsible for land use and transportation planning that supports a context-sensitive system of Complete Streets through supportive infrastructure and development patterns. Local government land use and transportation planning should also work to preserve the capacity of important regional roadways through the creation of a well-connected roadway network that accommodates short-distance and local trips, thus removing these trips from the regional roadways.

FDOT will plan and design transportation projects to be consistent with the existing or proposed land use context of the areas served. However, this process is not a one-sided relationship in which State roadways

are constantly expected to respond to land-use-generated travel demands. In a truly integrated land use and transportation planning approach, one that can result in Complete Street systems, potential transportation changes should be anticipated and should help inform decision making related to land uses. Land use decisions should be made to help manage travel needs and support the desired mobility patterns of a community. For example, if a community desires a higher level of transit investment, land use decisions should be made to encourage the intensity and density of transit-supportive development. Figure A-1 illustrates collaborative land use and transportation investments that support Complete Streets.

FIGURE A-1 COLLABORATIVE INVESTMENTS TO SUPPORT A CONTEXT-SENSITIVE SYSTEM OF COMPLETE STREETS



Many state arterials serve as the only alternative for local and regional mobility. The roadway may be over capacity but cannot be widened because of physical, financial, or environmental realities. However, growth is still desired by local governments searching for new tax base. These conditions are requiring FDOT and partner agencies to explore solutions that go beyond widening — solutions that are multimodal and integrate land use planning.



Partnerships with landowners, developers, municipal leaders, and others can help achieve solutions that go beyond the right of way, such as adding and connecting to the local roadway network. The new network can allow new growth but with a different development pattern. This more compact mixture of uses can reduce trip lengths and total number of trips, and would allow for pedestrian, bicycling, and transit to become viable alternatives.

Source: Adapted from PennDOT Smart Transportation Training Materials

Local governments have a number of tools available to support a Complete Streets network. Some of these tools include:

Local Network Connectivity. In new development areas and large-scale redevelopment areas, local governments may recommend a block length of 300 to 800 feet and/or develop internal or external street connectivity ratios or intersection densities that will create a well-connected street network (see Figure A-2).

Investments in Local Multimodal Infrastructure. Local governments can encourage or require property owners and developers to provide infrastructure for all modes, such as sidewalks and crosswalks, bicycle facilities, streetscapes, and bicycle parking, as part of new development and redevelopment. A complete pedestrian network includes direct, convenient, and safe connections from the public sidewalk to the building (see Figure A-3).

FIGURE A-2 EXAMPLE OF LOCAL NETWORK CONNECTIVITY



Local governments can build local network connectivity by using regulatory tools such as requiring maximum block lengths or minimum intersection densities.

Source: LEED Neighborhood Development (ND) Reference Guide

FIGURE A-3 EXAMPLE OF INVESTMENTS IN LOCAL MULTIMODAL INFRASTRUCTURE



FDOT District 5 is working with local governments to plan for multimodal connectivity around SunRail commuter rail stations. This plan illustrates how multimodal investments can support transit-oriented development and expand SunRail's ridership area.

Source: FDOT

Multimodal Network Plans. Many local and regional governments prepare multimodal network plans that outline a long-term commitment to provide a well-connected multimodal system (see Figure A-4).

FIGURE A-4 EXAMPLE OF MULTIMODAL NETWORK PLAN



Many regions around the State are incorporating transit and multimodal investments as part of regional long range transportation plans. The example above is from Southeast Florida.
Source: 2040 Southeast Florida Regional Transportation Plan

Zoning. Single-use zoning (Euclidean zoning) codes can lead to a separation of land uses that creates long distances between residents and jobs, services, and recreational activities. One alternative tool is form-based code, which uses physical form, rather than separation of land uses, as the organizing principle.¹ Another option is to introduce more mixed-use districts and development of higher intensity and density activity centers, or arrange land uses in closer proximity, to reduce the overall demand for vehicular trips.



Mixed-use zoning districts allow for arrangement of various land uses within close proximity, thus encouraging travel by various modes.

Source: KAI

¹ Form-Based Codes Institute, <http://formbasedcodes.org/>

Site Design and Building Placement.

Large building setbacks surrounded by parking increase walking distances and create isolated and unwelcoming environments for pedestrians and bicyclists. In areas where local municipalities would like to support multimodal travel, cities should consider building scales, placement, and design that support pedestrian activity. Form-based codes can be used to address site design and building placement requirements.

Land development regulations can require building design, site design, and lot layout to support a pedestrian-friendly street environment.

Source: KAI

Access Management Standards. Where development occurs along State roadways, local governments can use land use policies and regulations to address access management. This can be in the form of requiring multiple roadways to access a development or allowing for cross-access easement and shared driveways between different properties. This not only helps to accommodate improved traffic flow along roadways but also helps to reduce the number of curb cuts along a roadway, improving walking and bicycling conditions. A more connected network of roadways also allows for internal site circulation by multiple modes (see Figure A-5).



FIGURE A-5 CROSS-ACCESS EASEMENTS



Parking Standards. Large surface parking lots are a barrier to connectivity, as these can create longer distances between destinations and contribute to an uncomfortable walking environment. Some local governments are beginning to implement parking maximum requirements instead of parking minimum requirements. Establishing a maximum allowable amount of parking can prevent developers from building excessively large lots, or limit the parking supply in an area based on community priorities. Communities looking to increase tax revenue through redevelopment of parking lots, improve pedestrian safety and comfort downtown, or reduce stormwater runoff and heat island impacts of parking can also consider parking maximums as a way to achieve those goals.² Establishing parking maximums, combined with allowing for shared parking across properties and uses, can also support a park-once environment to support multimodal travel.



*Parking policies such as allowing for shared use parking can support a park-once environment.
Source: KAI*

² Metropolitan Area Planning Council, "Maximum Parking Allowances," last modified March 8, 2010, <http://www.mapc.org/resources/parking-toolkit/strategies-topic/parking-allowances>.

Appendix B

CONTEXT CLASSIFICATIONS CASE STUDIES

Context Classification System: Comprised of eight context classifications, it broadly identifies the various built environments in Florida, based on existing or future land use characteristics, development patterns, and roadway connectivity of an area. In FDOT projects, the roadway will be assigned a context classification(s). The context classification system is used to determine criteria in the *FDM*.

The eight context classifications and their general descriptions are:

C1-Natural	Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.
C2-Rural	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.
C2T-Rural Town	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.
C3R-Suburban Residential	Mostly residential uses within large blocks and a disconnected/ sparse roadway network.
C3C-Suburban Commercial	Mostly non-residential uses with large building footprints and large parking lots. Buildings are within large blocks and a disconnected/ sparse roadway network.
C4-Urban General	Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor and/or behind the uses fronting the roadway.
C5-Urban Center	Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of the civic or economic center of a community, town, or city.
C6-Urban Core	Areas with the highest densities and building heights and within FDOT classified Large Urbanized Areas (population > 1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadways, and are within a well-connected roadway network.



C1-NATURAL: FL 24, CEDAR KEY SCRUB STATE RESERVE, LEVY COUNTY

Primary Measures

Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Open Space				Not developed			



Aerial Satellite Image

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
Not Allowed	Not Allowed	0	0

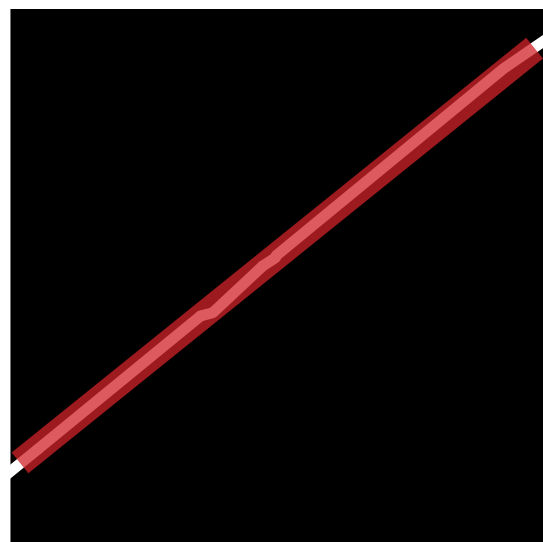


Street View



Bird's Eye View

Open Space 



Streets and Blocks Network



Existing Land Use

C2-RURAL: SR 52, SOUTH OF DADE CITY, PASCO COUNTY

Primary Measures

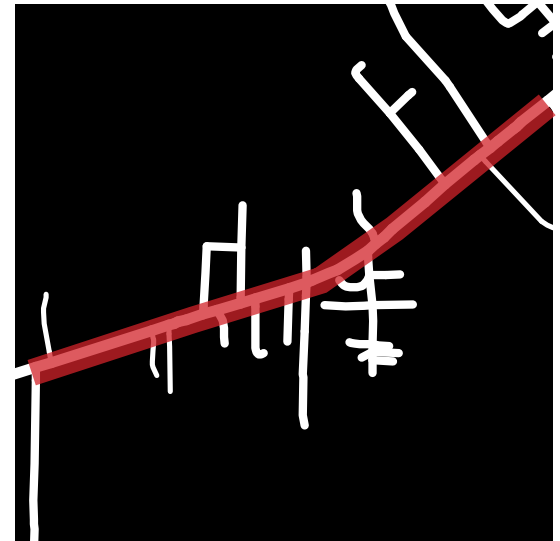
Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Agricultural, Single-Family Residential, and Retail	1	Detached buildings with no consistent pattern of setbacks	No	No consistent pattern	58	NA	NA

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
1	NA	1	<1



Aerial Satellite Image



Streets and Blocks Network

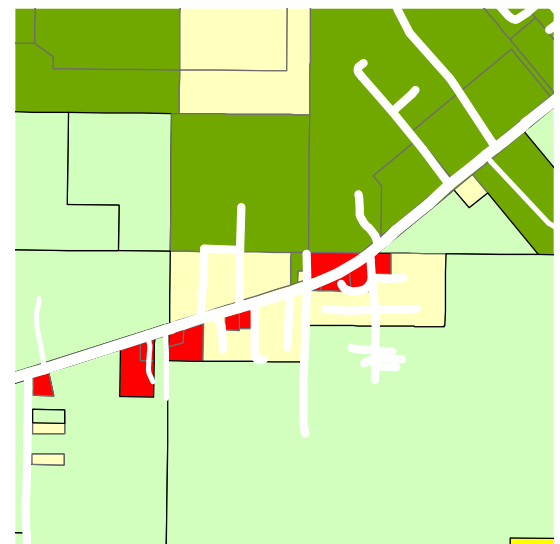


Street View



Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Agriculture	
Open Space	
Vacant	



Existing Land Use

C2T-RURAL TOWN: MAIN ST, HAVANA, GADSDEN COUNTY

Primary Measures

Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Retail and Commercial	1 - 2	Mostly attached buildings with no setbacks	Yes	Mostly in rear, occasionally on side	325	1,520	330

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
27	1.2	0.3	4



Street View



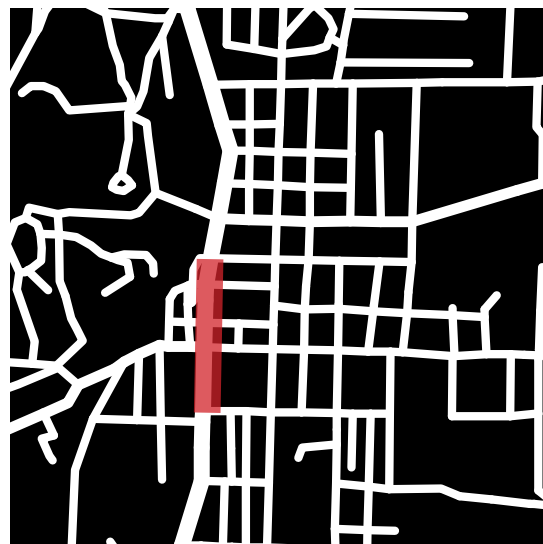
Bird's Eye View

Single-Family Residential	Yellow
Multi-Family Residential	Orange
Commercial	Red
Retail	Dark Red
Agriculture	Light Green
Institutional/Government	Blue
Industrial	Dark Blue
Open Space	Green
Vacant	White

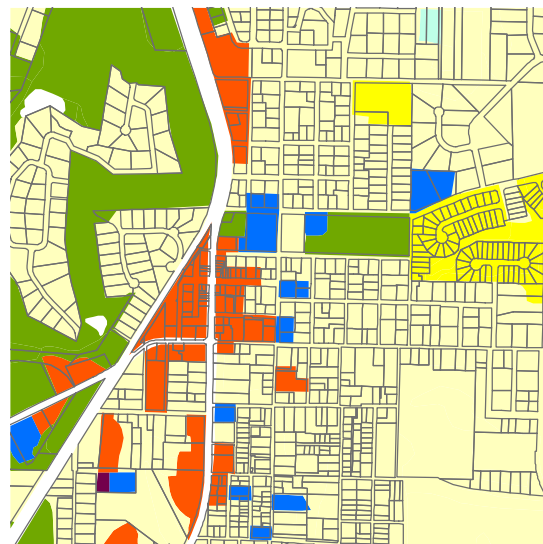
0 0.5 1 Miles



Aerial Satellite Image



Streets and Blocks Network



Future Land Use

C3R-SUBURBAN RESIDENTIAL: SR 70, LAKEWOOD RANCH, MANATEE COUNTY

Primary Measures

Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Single-Family Residential and Institutional	1 - 2	Detached buildings with medium (10' to 24') to large (> 24') setbacks on all sides	No	Front	40	6,040	1,140

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
1	0.23	0.4	0

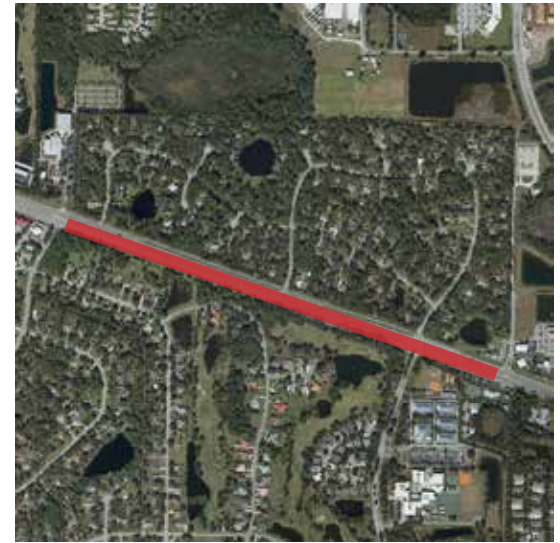
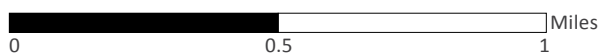


Street View



Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Open Space	
Vacant	



Aerial Satellite Image



Streets and Blocks Network



Existing Land Use

C3C-SUBURBAN COMMERCIAL: US 441, BROWARD COUNTY

Primary Measures

Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Retail, Commercial, and Light Industrial	1 - 2	Detached buildings with large (> 24') setbacks on all sides	No	Surrounded by parking on all sides	94	3,320	680

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
Not Applicable	0.7	8.5	7



Street View



Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Industrial	
Open Space	
Vacant	

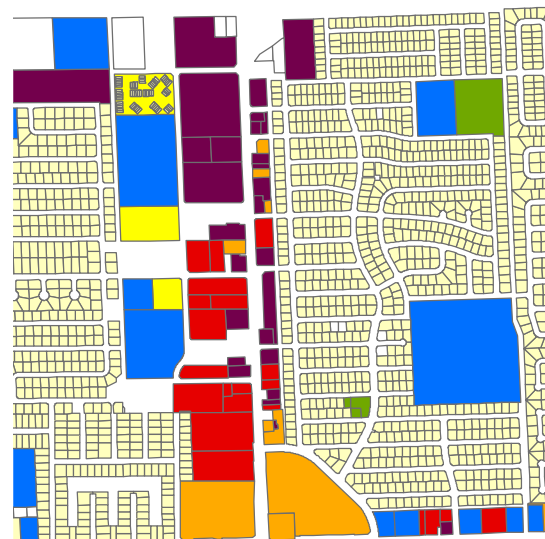
0 0.5 1 Miles



Aerial Satellite Image



Streets and Blocks Network



Existing Land Use

C4-GENERAL URBAN: DR. MLK JR. BLVD, EAST TAMPA, TAMPA, HILLSBOROUGH COUNTY

Primary Measures

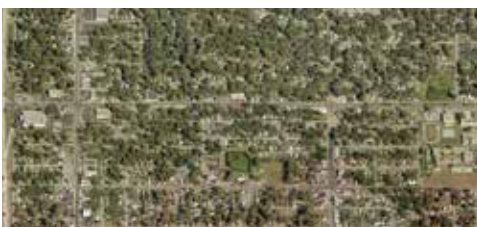
Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Single-Family and Multi-Family Residential, Neighborhood Scale Retail, and Office	1 - 2	Detached buildings with small (<10') to medium (10' to 24') front and side setbacks	Yes	Mostly in side, occasionally in rear or front	230	1,760	490

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
12	1.5	8.5	3

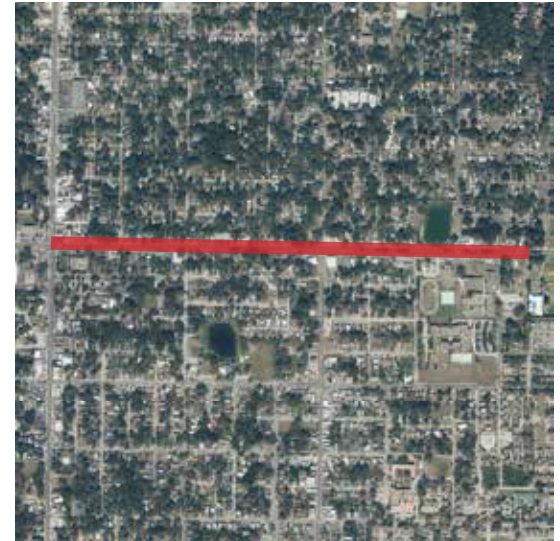
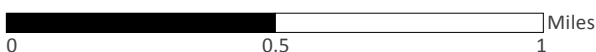


Street View

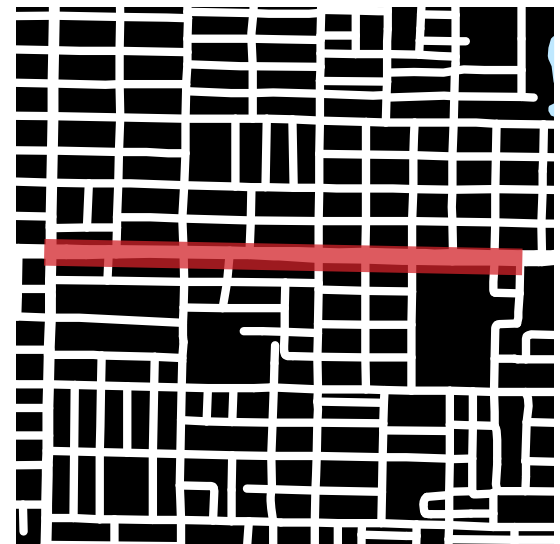


Bird's Eye View

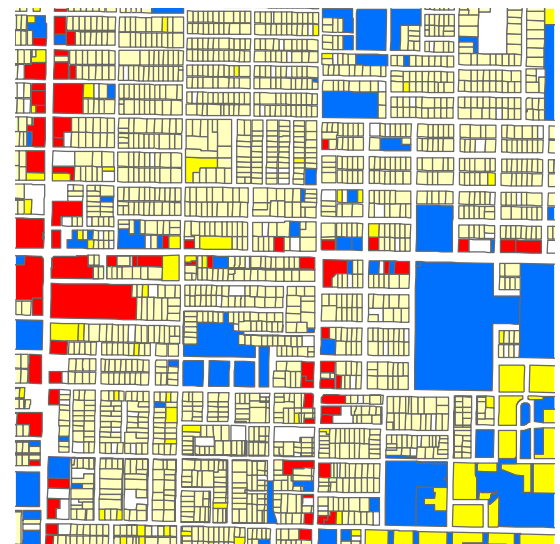
Single-Family Residential	Yellow
Multi-Family Residential	Orange
Commercial	Red
Retail	Dark Red
Institutional/Government	Blue
Open Space	Green
Vacant	White



Aerial Satellite Image



Streets and Blocks Network



Existing Land Use

C5-URBAN CENTER: MONROE ST, DOWNTOWN TALLAHASSEE, LEON COUNTY

Primary Measures

Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Retail, Office, Institutional, Commercial	1 - 5 with some taller buildings	Mostly attached buildings with no setbacks or with few having shallow setbacks	Yes	Rear and garage	180	1,770	380

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
150	8	2.4	90

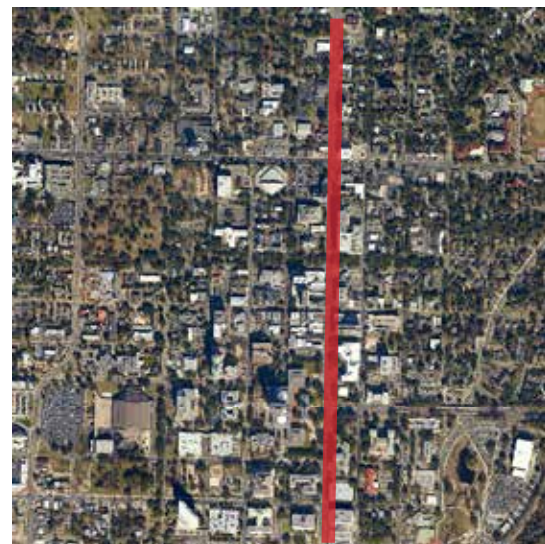
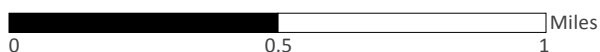


Street View



Bird's Eye View

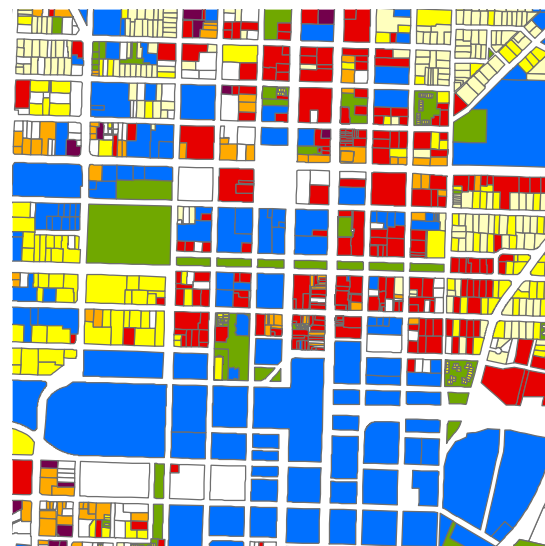
Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Industrial	
Open Space	
Vacant	



Aerial Satellite Image



Streets and Blocks Network



Existing Land Use

C6-URBAN CORE: ORANGE AVE, DOWNTOWN ORLANDO, ORANGE COUNTY

Primary Measures

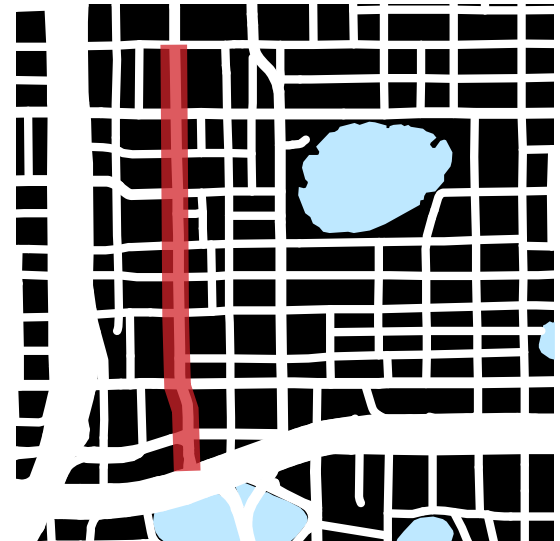
Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
					Intersection Density	Block Perimeter	Block Length
Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Retail, Office, Institutional, and Multi-Family Residential	> 4 with some shorter buildings	Mostly attached buildings with no setbacks	Yes	Rear and garage	220	1,910	450

Secondary Measures

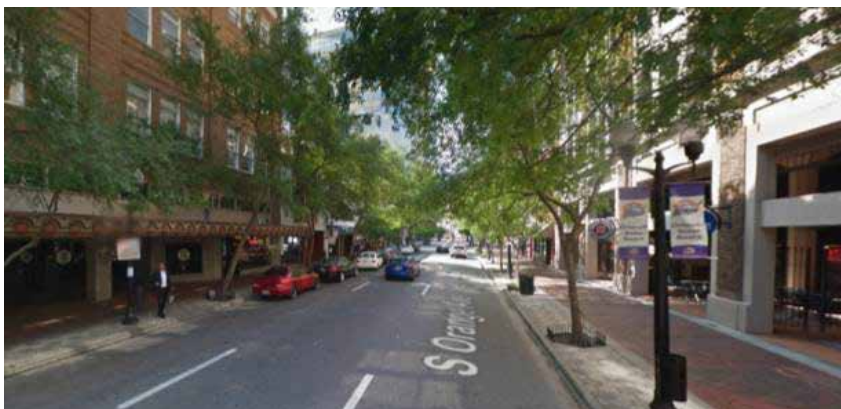
Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
200	3	8.5	170



Aerial Satellite Image



Streets and Blocks Network

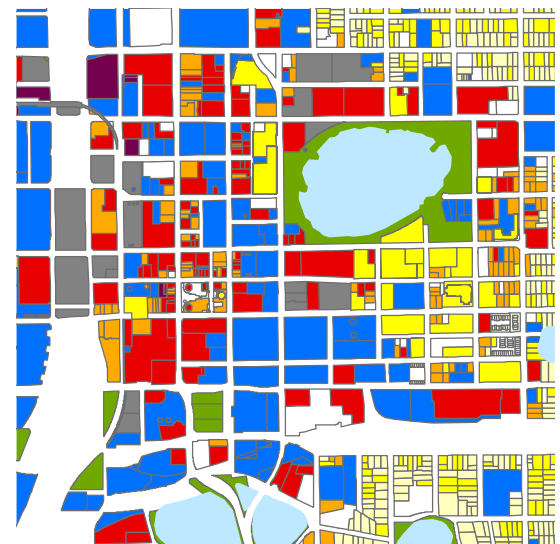


Street View

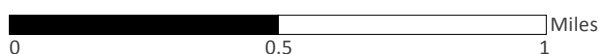


Bird's Eye View

Single-Family Residential	Yellow
Multi-Family Residential	Orange
Commercial	Red
Retail	Dark Red
Institutional/Government	Blue
Industrial	Dark Blue
Open Space	Green
Vacant	White



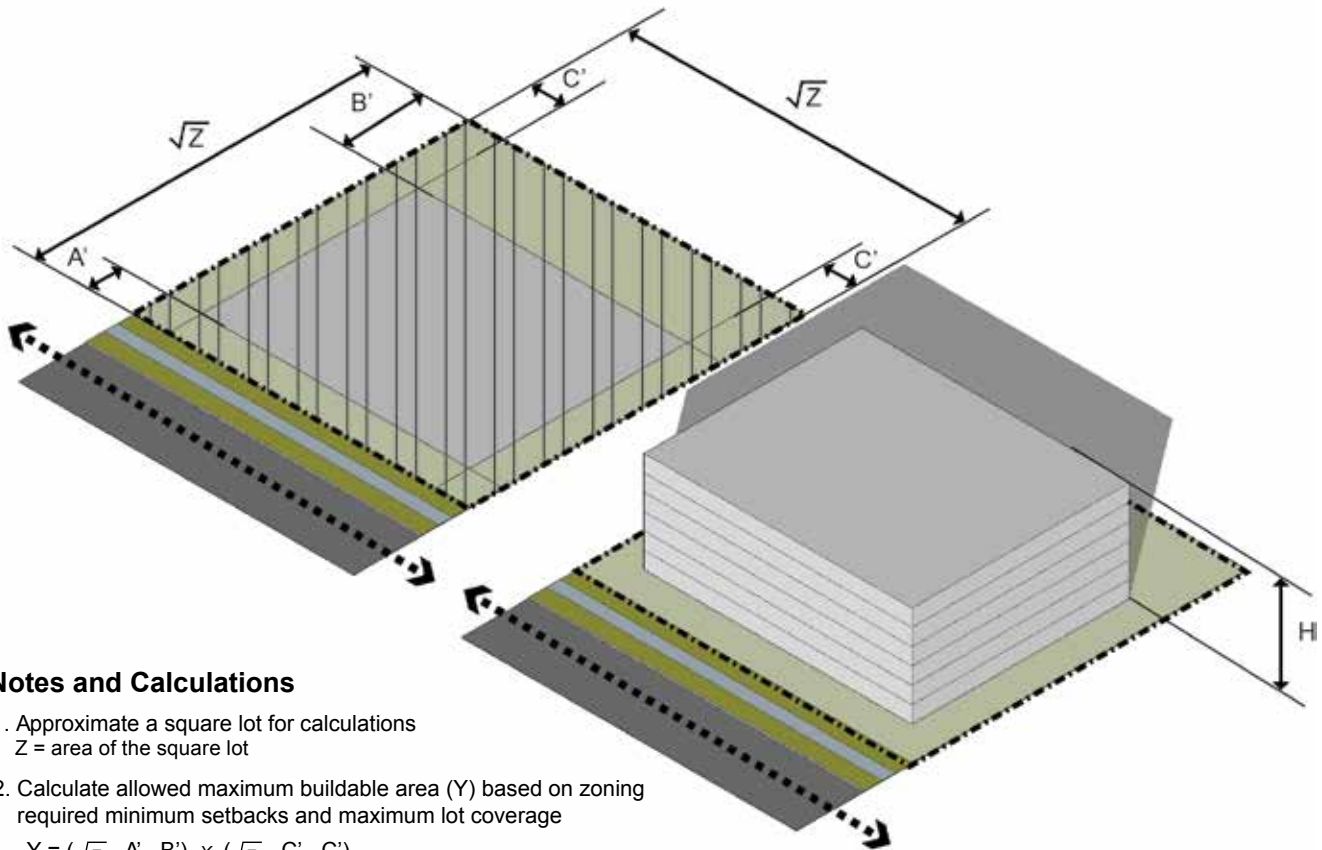
Existing Land Use



Appendix C

HOW TO CALCULATE FLOOR AREA RATIO IF NOT DEFINED IN ZONING CODE

FAR can be calculated using these various site design and height standards. For example, assuming floor height of 10 feet, total number of floors can be calculated based on maximum building height measure. Based on minimum parcel size, and minimum setbacks, maximum floor plate area can be calculated. Multiplying maximum floor plate area by total number of floors will give total building floor area. Finally, dividing total building floor area by minimum parcel size will provide FAR.



Notes and Calculations

1. Approximate a square lot for calculations
 Z = area of the square lot
2. Calculate allowed maximum buildable area (Y) based on zoning required minimum setbacks and maximum lot coverage
 $Y = (\sqrt{Z} - A' - B') \times (\sqrt{Z} - C' - C')$
or
 $Y = (\text{Maximum lot coverage area in (\%)} \text{ allowed by zoning code}) \times (Z)$
Use the smaller of the two values as Y
3. Calculate total floor levels based on zoning allowed maximum height (J)

$$\frac{H}{\text{Height of a floor level}^*}$$
* Assume 12' for commercial land use or 10' for residential land use
4. Calculate Floor Area Ratio (FAR)

$$\text{Floor Area Ratio (FAR)} = \frac{Y \times J}{Z}$$

Y = Maximum allowed buildable area in square feet

A = Minimum allowed front setback in feet based on zoning code

B = Minimum allowed rear setback in feet based on zoning code

C = Minimum allowed side setback in feet based on zoning code

H = Maximum allowed height allowed by zoning code in feet



Appendix D

PROPOSED *FDM* DESIGN SPEED RANGES BY CONTEXT CLASSIFICATIONS FOR NON-LIMITED-ACCESS FACILITIES

Context Classification	Allowable Design Speed Range for Non-SIS (mph)	Minimum Design Speed for SIS (mph)
C1-Natural	55-70	65
C2-Rural	55-70	65
C2T-Rural Town	25-45	40
C3-Suburban	35-55	50
C4-Urban General	30-45	45
C5-Urban Center	25-35	35
C6-Urban Core	25-30	30

Refer to the *FDM* for design criteria and refer to the *SIS Procedure 525-030-260-b* for SIS standards.

Appendix E

DRAFT SAMPLE CONTEXT CLASSIFICATION LETTER OF AGREEMENT WITH LOCAL GOVERNMENTS

The successful implementation of Complete Streets requires the identification of a roadway's context classification early in the project development process. Context classification informs all phases of a project: planning, PD&E, design, construction, and maintenance. Chapter 2 of the Complete Streets Handbook provides the Context Classification Matrix (see Table 2-1 in the Complete Streets Handbook) and outlines the methodology for using it.

On projects where FDOT currently coordinates with local governments, FDOT will coordinate with local governments to determine context classification; however, the final determination of context classification will be made by FDOT. Refer to the **Public Involvement Handbook**, **FDM**, **PD&E Manual**, and **Project Management Handbook** for more guidance on needed local government coordination.

To ensure clarity and consistency throughout the project development process, it may be beneficial to document the agreement reached among FDOT and local partners on the context classification(s) of a roadway. This is most useful early in the project development process (see Figure 3-5 in the Complete Streets Handbook), but can be executed at any point in the life of a project.

The following is a sample Letter of Agreement that can be tailored to the needs of a project.

The following notes apply to the sample Letter of Agreement:

- If there is no FN Number, the associated phrase in the declarations section of the sample Letter of Agreement can be deleted.
- Replace COUNTY and CITY with the full county or city name, wherever they are not previously defined. Note that separate Letter of Agreements with multiple parties may be needed if the project extends through multiple jurisdictions.
- Maps, drawings, and other project information may be appended to the Letter of Agreement as exhibits.

SAMPLE CONTEXT CLASSIFICATION LETTER OF AGREEMENT

Sample Context Classification Letter of Agreement to Come

Appendix F

LIST OF HANDBOOKS AND GUIDANCE DOCUMENTS THAT INCLUDE TOOLS FOR IMPLEMENTING COMPLETE STREETS

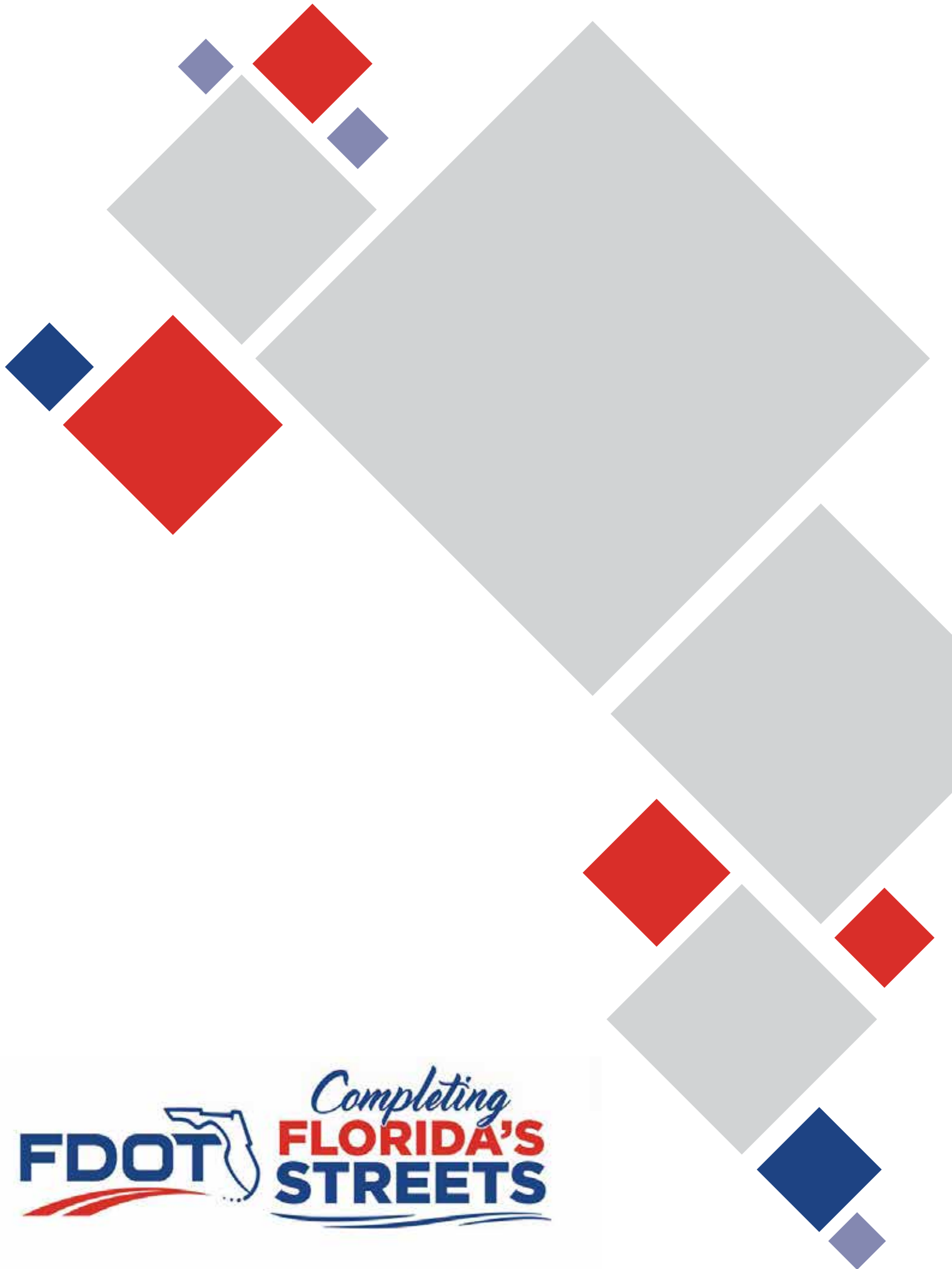
HANDBOOKS AND MANUALS

- 2014 Traffic Analysis Handbook-A Reference for Planning and Operations
- Accessing Transit: Design Handbook for Florida Bus Passenger Facilities (Version III, 2013)
- Cultural Resource Management Handbook
- Efficient Transportation Decision Making (ETDM) Planning and Programming Manual
- Florida Highway Landscape Guide
- Florida Scenic Highway Program Manual
- Guide for Roadside Vegetation Management
- Historic Highway Bridges of Florida
- Local Agency Program (LAP) Program Manual
- Project Development and Environment (PD&E) Manual
- Public Involvement Handbook
- Quality/Level of Service Handbook
- Manual for Speed Zoning of Highways, Roads & Streets
- Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (commonly referred to as the "Florida Greenbook")
- Traffic Engineering Manual

Latest versions of FDOT Handbook and Manuals listed above can be accessed here: <http://www.fdot.gov/publications/publications.shtm>

GUIDANCE

- Statewide Lane Elimination Guidance Parts 1
- Statewide Lane Elimination Guidance Parts 2
- Sociocultural Effects Guidance
- FDOT Transit-Oriented Development Guidebook
- Typical Sections for Exclusive Transit Running Ways





FDOT *Completing*
FLORIDA'S
STREETS



CONTEXT CLASSIFICATION GUIDE



February 2022

Contents

4 Message from the Secretary

Chapter 1 Complete Streets 360°

5 Introduction

Chapter 2 FDOT Context Classification

16 Introduction to Context Classification

20 Context Classification and Roadway Users

22 Determining Project-Specific Context Classification

40 Transportation Characteristics

Chapter 3 Context Based Speeds

48 Determining the Target Speed

50 Designing to the Target Speed

Chapter 4 Linking Context Classification to the FDM and Other Documents

51 AASHTO's a Policy on Geometric Design of Highways and Streets

53 FDOT Design Manual (FDM)

60 FDOT Access Management Guidebook

61 FDOT Traffic Engineering Manual

62 FDOT Quality/Level of Service Handbook

63 FDOT Speed Zoning Manual

63 Florida Greenbook

64 FDOT Lane Repurposing Guidebook

64 FDOT Transportation Site Impact Handbook

64 FDOT Intersection Control Evaluation

Chapter 5 Emerging Uses for Context Classification

65 CAV Technology

65 Resiliency

67 Context Classification Case Studies

Figures

- 6** **FIGURE 1** FDOT Complete Streets Policy
- 10** **FIGURE 2** Crashes by Context Classification
- 13** **FIGURE 3** The Five Elements of the Safe System Approach and Their Relevance to Pedestrians and Bicyclists
- 15** **FIGURE 4** Steps to Understanding Uses and Users of the Corridor Prior to Design
- 16** **FIGURE 5** FDOT Context Classifications
- 20** **FIGURE 6** Expected User Types in Different Context Classifications
- 21** **FIGURE 7** Context-Sensitive System of Complete Streets
- 23** **FIGURE 8** Context Classification Designations
- 27** **FIGURE 9** Step-by-Step Guide For Determining Context Classification
- 29** **FIGURE 10** Distinguishing Context Classification Segments by Development Intensity and Roadway Network
- 29** **FIGURE 11** Distinguishing Context Classification Segments by Type of Land Use
- 33** **FIGURE 12** Measurement Area: The Block on Either Side of the Roadway
- 33** **FIGURE 13** Measurement Area: Fronting Parcels on Either Side of the Roadway
- 34** **FIGURE 14** Intersection Density
- 34** **FIGURE 15** Block Perimeter and Block Length
- 35** **FIGURE 16** Building Placement
- 35** **FIGURE 17** Fronting Uses
- 35** **FIGURE 18** Location Of Off-Street Parking
- 48** **FIGURE 19** Example Process to Determine Context Classification
- 50** **FIGURE 20** C2T - Rural Town Speed Management
- 50** **FIGURE 21** C3C - Suburban Commercial Speed Management
- 55** **FIGURE 22** Relationship between Curb Radii and Pedestrian Crossing Distance
- 56** **FIGURE 23** Relationship between Curb Radii and Pedestrian Crossing Distance
- 57** **FIGURE 25** An Infrequent Control Vehicle Encroachment into Opposing and Adjacent Lanes
- 57** **FIGURE 24** FDOT District 7 Draft Freight Roadway Design Considerations: General Area Types
- 58** **FIGURE 26** Draft FDOT District 7 Freight Design Considerations for Design Vehicle and Control Vehicle at Intersections
- 77** **FIGURE 27** Potential Target Speeds for Case Studies

Tables

- 19** **TABLE 1** Context Classification Designations
- 24** **TABLE 2** Context Classification Matrix
- 31** **TABLE 3** Primary Measures to Define Context Classification
- 32** **TABLE 4** Secondary Measures to Define Context Classification
- 39** **TABLE 5** Relationship between FDOT Context Classifications and the SmartCode™ Transect System
- 41** **TABLE 6** Roadway Functional Classification and Role in the Transportation System
- 43** **TABLE 7** Examples of Potential Data to Determine User Needs by Mode
- 47** **TABLE 8** FDOT Context-Based Design Speeds for Arterials and Collectors

Message from the Secretary

July 26, 2021

The mission of the Florida Department of Transportation is clear. We are to provide a safe transportation system that accommodates all who use it – including motorists, freight handlers, transit users, pedestrians, and cyclists – and we are passionate about our work. FDOT remains committed to ensuring that Florida's roadways are safe for everyone, whether embracing and implementing new technologies or planning for our state's growing population.

Using a 360° approach that considers both location characteristics and user needs, FDOT plans, designs, constructs, and operates context-sensitive roadways that prioritize safety and are tailored to the unique areas of Florida. This commitment echoes in our Complete Streets and context classification principles that are the foundation of the ***FDOT Design Manual***, which governs every department project. Complete Streets also encompass FDOT's Vital Few by improving safety, enhancing mobility, and inspiring innovation.

Our Complete Streets mission is to inform, educate, inspire, and implement. FDOT is dedicated to accommodating our state's ever-evolving mobility needs. We will continue to lead the way in the advancement of Complete Streets, an essential part of enhancing safety and improving everyone's quality of life.



Kevin J. Thibault, P.E.
Secretary, Florida Department of Transportation

Chapter 1

Complete Streets 360°

INTRODUCTION

FDOT has embarked on a department-wide shift in transportation planning, design, and decision making. This approach is described as “putting the right street in the right place” or, more succinctly, **Complete Streets 360°**, representing that FDOT’s effort is all-encompassing. This effort is ambitious and comprehensive, based on the evolving view of roadways as valuable public spaces for all users, including those using the non-motorized modes of walking and bicycling.

Complete Streets 360° is FDOT’s response to today’s transportation challenges. Florida is the third most populous state in the nation, and we continue to grow by nearly 1,000 people each day. Our population is diverse, and the impacts of emerging technologies, an aging population, and consistent societal evolution are changing the way Floridians move in and around their communities. Aside from its increasing number of residents, the State has also seen strong growth in visitors. The number of visitors to Florida surged from 82 million in 2010 to more than 131 million in 2019.¹ This growth is coupled with shifting transportation demands led by demographic changes; the rise in pedestrian and bicycling fatalities on state roads²; declining local and Federal funding streams requiring more creativity and partnerships to implement projects; rapidly changing technologies that can lead to travel patterns different from historical trends; growth focused in urban centers and rural employment centers; and increasing development pressure on the State’s unique natural environment.³ These are the challenges of the 21st century, and **Complete Streets 360°** is how FDOT is addressing these realities.

This Guide provides background and overarching guidance for why and how FDOT policies, standards, and procedures are being refined to implement **Complete Streets 360°** through the context classification system. It provides guidance on how context classification can be used, describes the measures to determine the context classification of a roadway, and describes how context classification relates to the *FDOT Design Manual (FDM)* and other FDOT guidance.

COMPLETE STREETS POLICY

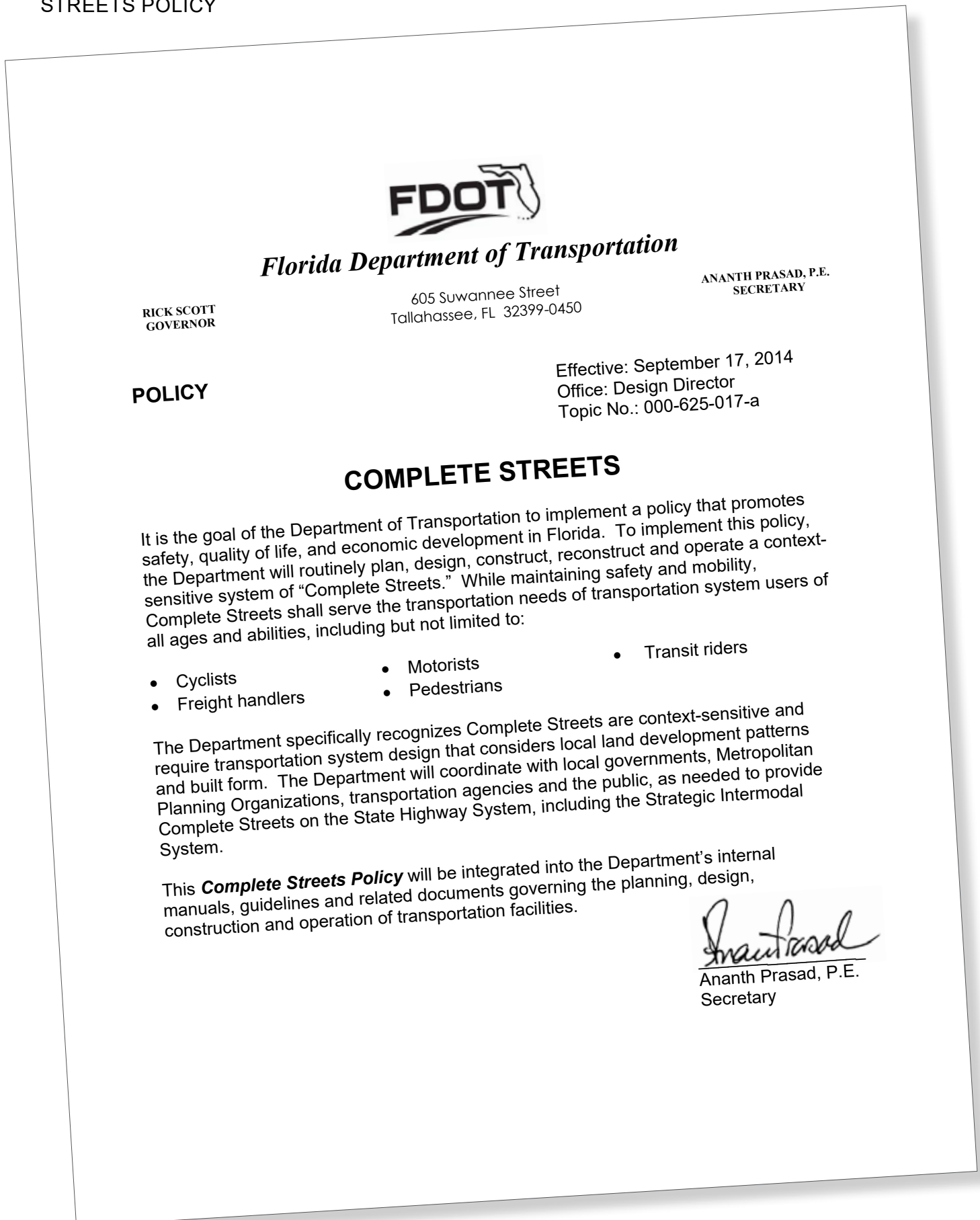
In September 2014, FDOT adopted the Statewide Complete Streets Policy (Topic No. 000-625-017) (see **Figure 1**), making a commitment to planning, designing, and operating their transportation system for all users. The Policy was a formal acknowledgment that each roadway location is unique, requiring its own customized solution through context-sensitive Complete Streets.

¹ Florida Department of Transportation, Florida Strategic Highway Safety Plan, March 2021.

² Both pedestrian and bicycle fatalities have increased since 2017. In 2018, Florida had the most bicycle fatalities of any US state. Florida Department of Transportation. (2021). Strategic Highway Safety Plan.

³ Florida Department of Transportation, Florida Transportation Plan Vision Element, 2015.

FIGURE 1 FDOT COMPLETE STREETS POLICY



COMPLETE STREETS ACCOMPLISHMENTS TO DATE

The journey to complete Florida's streets...

Florida is a leader in Complete Streets and has been for decades. As our state's population has grown and evolved over the years, so has our approach to transportation planning.



1984

Florida was the second state in the nation to adopt a statewide “routine accommodation” law, requiring that bicyclists and pedestrians be considered in road construction projects. This same statute also charged the state with developing a statewide “integrated system of bicycle and pedestrian ways.” According to a study published in the American Journal of Public Health (AJHP), after adoption of this law concluded: “Florida’s pedestrian fatality rates decreased significantly...resulting in more than 3,500 lives saved across 29 years.”

1999

FDOT adopted its Transportation Design for Livable Communities (TDLC) policy, requiring transportation designers to consider each specific community’s needs when selecting features for a roadway, as well as prioritizing the safety of all transportation users – including pedestrians, bicyclists, motorists, and public transit users. This balancing of community values and mobility needs became the foundation of FDOT’s context-sensitive design today.



2014

FDOT adopted an official Complete Streets Policy, a formal acknowledgment that each location is unique, requiring its own customized solution through context-sensitive Complete Streets. Further, the Policy was integrated into FDOT's manuals to govern the planning, design, construction, and operation of Florida's transportation facilities at the local level as well as within the State Highway System. This ensured that context-sensitive design and Complete Streets principles are the standard for all FDOT projects.

2018

After two years of development, FDOT published a new Design Manual that incorporates context-based design criteria and decision making. The new manual helps provide more context-sensitive roads throughout Florida by putting "the right street in the right place."



COMPLETE STREETS 360°

In 2021, FDOT officially rolled out **Complete Streets 360°**, emphasizing consideration of all roadway users as well as the context of the road. For example, the needs of Floridians who live, work, and play among the forests, prairies, and rivers of the Nature Coast are significantly different than the needs of Floridians in downtown Fort Lauderdale.

For FDOT, Complete Streets are not a specific type of project. Instead, the Department utilizes a 360° approach to ensure that all roadway projects are context-sensitive and consider the needs of all users, regardless of age and ability. This means that everything the Department undertakes – whether developing an entirely new corridor or resurfacing an existing road – is done to help promote safety, enhance mobility, improve quality of life, and promote economic development based on the roadway's context.

2018 – Today

With an average of 1,000 people moving to the Sunshine State each day, FDOT remains committed to enhancing the safety and mobility of all of our residents and visitors of all ages and abilities. Over the past several years, in addition to updating the Design Manual, we've made the following changes to integrate context classification and Complete Streets:

- Updated the **FDOT Traffic Engineering Manual** (TEM)
- Updated the **FDOT Access Management Guidebook**
- Introduced revisions to the **Project Development and Environment Manual (PD&E Manual)**
- Updated the **FDOT Lane Repurposing Guidebook**
- Released the Context Classification Framework for Bus Transit
- Developed preliminary context classification designation for all state roadway segments and kept an up-to-date database as part of the FDOT Roadway Characteristics Inventory (RCI)
- Launched **Complete Streets 360°** website at www.FLcompletestreets.com
- Launched ConnectPed
- Conducted comprehensive internal FDOT training

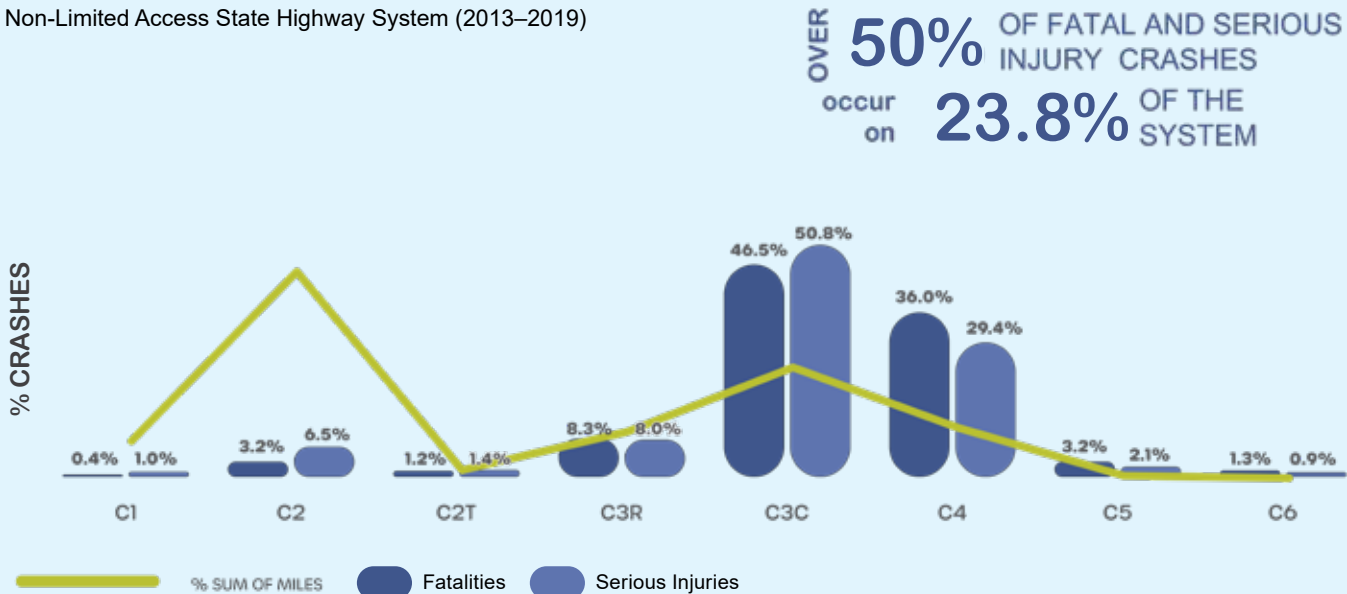
TARGET ZERO

Florida’s safety vision is simple: to eliminate all transportation-related fatalities and serious injuries for all modes of travel. This priority includes pedestrians, bicyclists, motorcyclists, micromobility device users, drivers, freight handlers, and transit users using the roadway system, as well as connections between the roadway system and other modes of transportation.

The personal and societal costs of traffic crashes in Florida today are unacceptably high. Additionally, bicycle and pedestrian crashes are not evenly distributed across roadway types and context classifications within Florida. According to the Florida Pedestrian and Bicycle Strategic Safety Plan, pedestrian and bicyclist exposure and risk on the non-limited access state highway system shows that corridors with C3C or C4 context classification, higher posted speeds, and higher transit frequency have the highest likelihood of bicycle and pedestrian crashes based on the exposure and risk in these areas. For example, although only 24% of the state roadway system is classified as C3C-Suburban commercial, 50% of fatal bicycle and pedestrian crashes occur on these roadway miles (see **Figure 2**).¹

FIGURE 2 CRASHES BY CONTEXT CLASSIFICATION

Non-Limited Access State Highway System (2013–2019)



Source: Florida Pedestrian and Bicycle Strategic Safety Plan

¹ Florida Department of Transportation, Florida Pedestrian and Bicycle Strategic Safety Plan, September 2021

SAFE SYSTEM APPROACH

The **FDOT Strategic Highway Safety Plan (SHSP)** calls for the development of a systematic approach for identifying locations and behaviors related to fatal and serious injury crashes, including locations and behaviors prone to pedestrian and bicycle crashes, to implement multi-disciplinary countermeasures. The Safe System approach aims to eliminate fatalities & serious injuries for all road users through a holistic view of the road system.¹

Safe System

The Safe System approach aims to eliminate fatalities and serious injuries of all users of the transportation system through a holistic model of multiple elements working together to safeguard against tragic crash outcomes. There are five elements of the Safe System: Safe Road Users, Safe Vehicles, Safe Speeds, Safe Roads, and Post-Crash Care. Each element is interrelated, and weaknesses in one element may be compensated with strengths in another.

The criteria within the **FDM** have been developed with the Safe System approach in mind as related to Safe Speeds and Safe Roads. The term “Safe System” may not be specifically mentioned; however, it is inherent within the criteria and important to keep in mind when making engineering decisions that vary from the criteria. The Safe System approach begins with a foundational acknowledgment that transportation system users, as humans, will inevitably make mistakes. These mistakes may lead to crashes on our transportation system. FDOT’s Target Zero goal is to eliminate fatalities and serious injuries.

To achieve zero fatalities and serious injuries, crash forces induced on the human body must be kept below the tolerable limits. When designing and operating the transportation system, it is critical to manage crash kinetic energy. Human error is to be expected; therefore, the transportation infrastructure should be designed and operated to eliminate fatalities and serious injuries. This may be achieved by first reducing the risk of error and secondly, when crashes do occur, to maintain collision forces on the human body within tolerable levels by managing speed and crash angles to reduce injury severity.

The following are six foundational principles for understanding and applying the Safe System approach:

- 
Fatalities and serious injuries are unacceptable – While no crashes are desirable, the Safe System approach emphasizes a focus on crashes resulting in fatalities and serious injuries. Regardless of road users’ socio-economic backgrounds, their abilities, and the modes of transportation they use, no one should experience fatalities or serious injuries when using the transportation system.
- 
Humans make mistakes – Road users will inevitably make mistakes, and those mistakes can lead to crashes. The Safe System approach expects the transportation system be planned, designed, and operated to be forgiving of inevitable human error, so that fatal and serious injury outcomes are unlikely to occur.
- 
Humans are vulnerable – Humans have a limited ability to tolerate the energy involved in crash impacts. Although the exchange of kinetic energy in collisions among vehicles, objects, and road users has multiple determinants, applying the Safe System approach involves managing the kinetic energy of crashes to avoid fatal and serious injury outcomes.

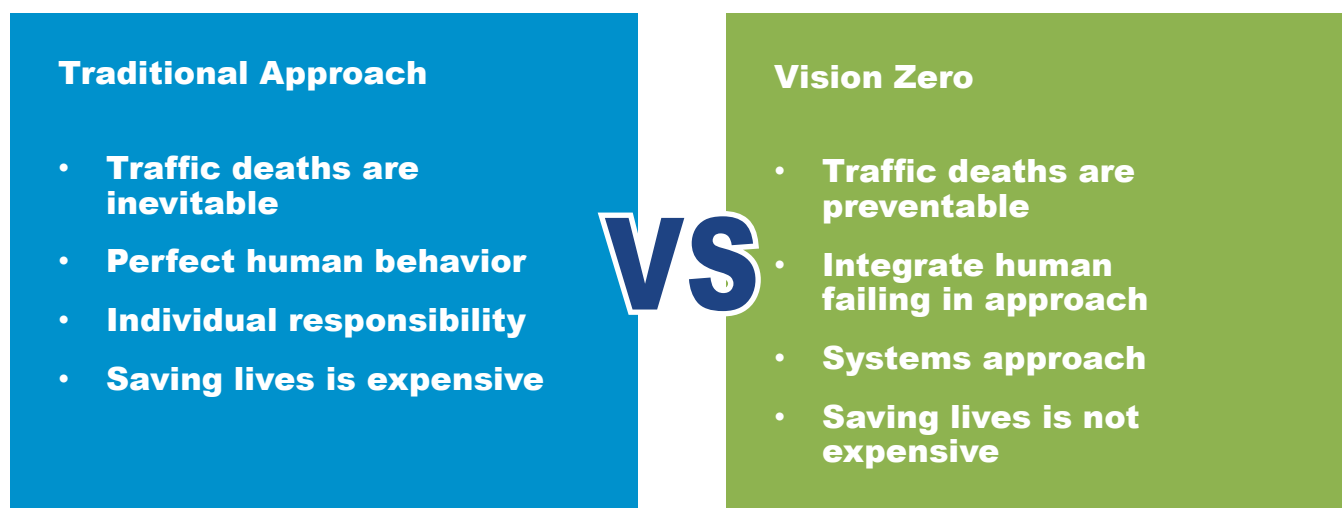
¹ Federal Highway Administration. The Safe Systems Approach. Accessed on September 25, 2021. https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA_SafeSystem_Brochure_V9_508_200717.pdf

- 4 Responsibility is shared** – All stakeholders (transportation system users and managers, vehicle manufacturers, emergency responders, etc.) must work collaboratively to ensure that crashes do not lead to fatalities or serious injuries.
- 5 Safety is proactive** – Proactive and data-driven tools should be used to identify and mitigate latent risks in the system, rather than waiting for crashes to occur and reacting afterwards.
- 6 Redundancy is crucial** – Reducing the risk of severe crash outcomes requires all parts of the system be strengthened so that if one element fails, the others protect transportation system users.

When you consider the vulnerability of a pedestrian or bicyclist without the protection of a vehicle—especially one equipped with safety technologies design to protect the passengers—reduced speeds and increased visibility have significant impacts on the severity of injuries and likelihood of surviving a crash. Nearly 22% of all fatalities on FDOT streets are pedestrians.²

When a Safe System approach is taken, the inevitability of human mistakes is anticipated and accommodated, resulting in less severe injury crashes. Safe Systems acknowledges the responsibility that rests with transportation planners and engineers as well as policymakers in designing and maintaining a safe system for people to function within. Everyone shares the responsibility to abide by the systems, laws, and policies set. If safety problems persist, then the responsibility comes back to the designers and policymakers to take further measures to improve safe conditions. A Safe Systems approach is a paradigm shift in approaching roadway safety as an “upstream” systemic issue, not one simply resting with individual users of the roadways. It is the crux of what makes Target Zero a different and effective approach to saving lives.

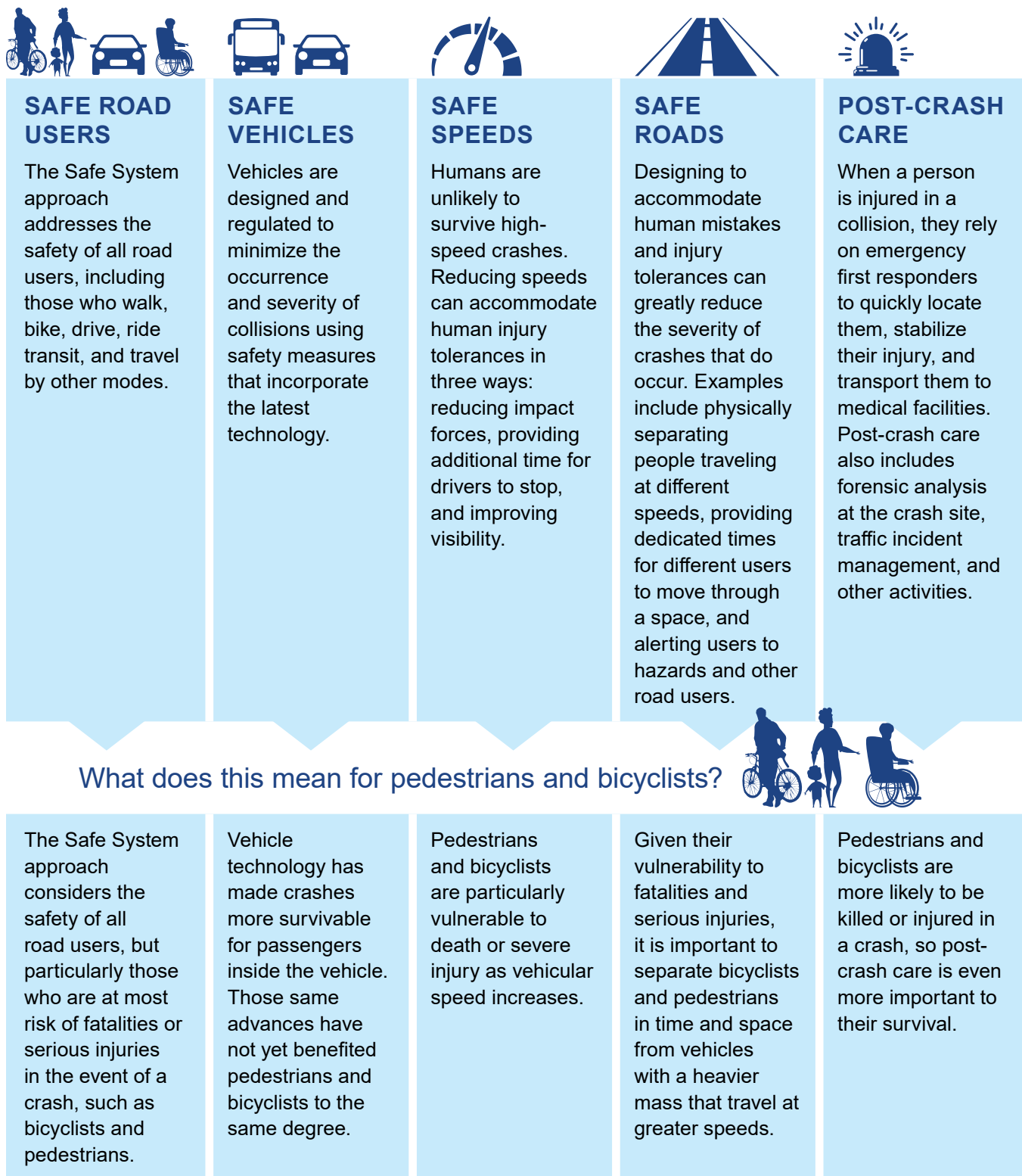
FDOT can leverage the context classification system, as described in this Guide, to implement this proactive approach to safety. Context classification can inform the types of users anticipated, what their travel needs may be, and typical safety challenges. Through this, FDOT can more proactively implement safety treatments to systematically improve the safety of our roadways for all users, even before evidence of occurrence of safety challenges.



Source: Adapted from Vision Zero Network

² E. Goughnour et al.. Primer on Safe System Approach for Pedestrians and Bicyclists. Federal Highway Administration. May 2021.

FIGURE 3 THE FIVE ELEMENTS OF THE SAFE SYSTEM APPROACH AND THEIR RELEVANCE TO PEDESTRIANS AND BICYCLISTS



Source: Adapted from FHWA (2020) *The Safe System Approach* [FHWA-SA-20-015]

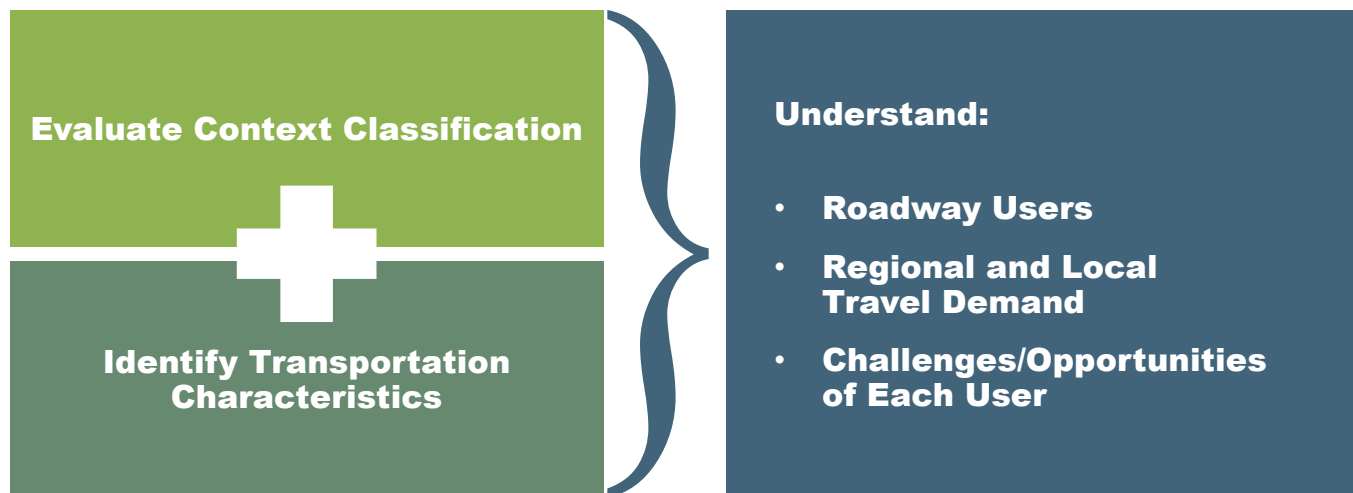
“Complete
Streets means
putting the right
road in the right
place.”

Chapter 2

FDOT Context Classification

To support the implementation of **Complete Streets 360°**, FDOT uses a context-based approach to planning, designing, and operating the state transportation network. FDOT has adopted a roadway classification system comprised of eight context classifications for all non-limited access state roadways. The context classification of a roadway must be considered, along with its transportation characteristics and the built form to understand who the users are, what the regional and local travel demand of the roadway is, and the challenges and opportunities of each roadway user (see **Figure 4**). The context classification and transportation characteristics of a roadway will determine key design criteria for all non-limited access state roadways.

FIGURE 4 STEPS TO UNDERSTANDING USES AND USERS OF THE CORRIDOR PRIOR TO DESIGN

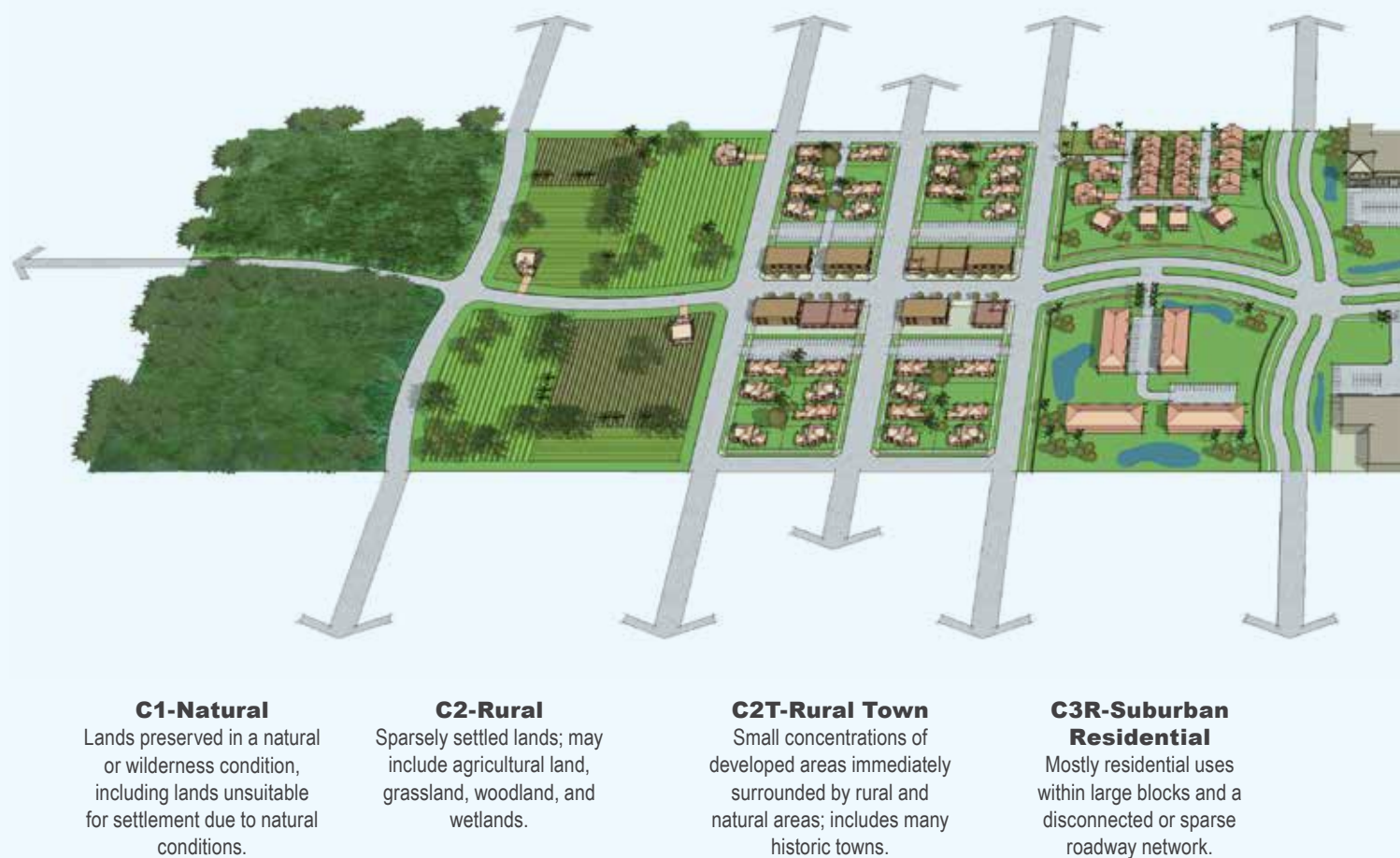


INTRODUCTION TO CONTEXT CLASSIFICATION

The context classification system broadly identifies the various built environments existing in Florida, as illustrated in **Figure 5**. State roadways extend through a variety of context classifications. FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity along a roadway, providing cues as to the types of uses and user groups that will likely utilize the roadway.

Figure 5 should not be taken literally to imply all roadways will have every context classification or that context classifications occur in the sequence shown. Identifying the context classification is a step in the planning and design processes, as different context classifications will have different design criteria and standards.

FIGURE 5 FDOT CONTEXT CLASSIFICATIONS



The use of context classifications to determine criteria for roadway design elements is consistent with national best practices and direction, including the **2018 American Association of State Highway and Transportation Officials (AASHTO) Green Book** and the **National Cooperative Highway Research Program (NCHRP) Report 855: An Expanded Functional Classification System for Highways and Streets**, which proposes a similar context-based approach to design that incorporates context, user needs, and transportation functions into the design process. This research was born out of a need to better define contexts beyond urban and rural classifications, and to incorporate multimodal needs into the existing functional classification system. Ongoing NCHRP research projects continue to refine the system and outline context-based design criteria.

This chapter outlines the steps to determine a roadway's context classification, including measures used to determine the context classification.



C3C-Suburban Commercial

Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

C4-Urban General

Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5-Urban Center

Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.

C6-Urban Core

Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population greater than one million). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.

HOW CONTEXT CLASSIFICATION INFORMS PROJECTS

Context classification helps identify the anticipated users of the roadway. As such, a roadway's context classification informs decisions made during FDOT's various project development phases, so that each state roadway is planned, designed, constructed, and maintained to support safe and comfortable travel for its anticipated users.

Project Origins

It is important that roadway users and their respective needs are understood early in the life of a project. Understanding the needs of all users at these early phases can help assure that the project scope of services defines all necessary improvements and that the budget is adequate for design, right-of-way, and construction. The context classification and users inform key design elements, such as the design speeds, lane widths, and types of pedestrian, bicycle, transit, and freight facilities to be included in the design concept.

Projects go through various phases of the project development process. The context classification should be determined and/or confirmed at the beginning of each project phase, including planning, PD&E, and design.

Projects that *go through* PD&E

It is helpful to understand the context classification prior to the start of PD&E to understand the needs of the anticipated users of a roadway and to ensure that a full range of potential solutions to address these needs is explored during PD&E. This can be accomplished through a streamlined project-level transportation planning phase that identifies the context classification, the needs of anticipated users, and recommends a target speed. This level of planning offers an opportunity to incorporate Complete Streets principles and establish the framework for a Complete Streets approach for the life of the project.

Projects that *do not go through* PD&E

There are many FDOT projects, including rehabilitation (RRR), traffic operations, and safety projects, that do not qualify for an Efficient Transportation Decision Making (ETDM) screening and may or may not have a formal planning phase. Context classification and target speed must still be identified, and these should be established prior to the development of the scope of services for the project's design phase. Understanding the context classification and target speed will inform roadway elements and criteria that can significantly improve the safety of all users. Knowing this information at the early stages of any project will ensure that project budgets are accurate from the beginning and will help stabilize the work program.

Preliminary Context Classification Designations

Preliminary existing context classification designations have been developed for the state roadway system by each FDOT District. These districtwide assessments serve as the foundation for understanding the context classification for state roadways from a system perspective and are intended to be refined on a project-by-project basis.

The districtwide preliminary context classification was developed with a subset of the measures specified in the Context Classification Matrix (**Table 2**), based on each District's available GIS data. Before the design criteria are applied to a project, the preliminary context classification of a project roadway should be evaluated based on the most recent data available, with the complete set of context classification measures outlined in the matrix, and using the steps outlined in the following sections. This project-level evaluation confirms the most appropriate context classification for a roadway reflecting up-to-date existing and/or future conditions as precisely as possible (see **Table 1**). To ensure statewide consistency, contact the State Complete Streets Program Manager if the District believes a modification to this approach is needed for any reason.

Statewide Context Classification Database in the RCI

The Roadway Characteristics Inventory (RCI) is a database of information related to the roadway environment maintained by FDOT Central Office. The database includes information on a roadway's features and characteristics*. The preliminary context classification is stored in the RCI as Feature 126 – Preliminary Context Classification. This feature includes two characteristics:

Preliminary Context Classification

This feature was initially populated with the preliminary context classification from each districtwide data set. Each District will update this dataset with the project-level context classification as project-level evaluations are completed.

Future Context Classification

This characteristic contains the future context classification. It is populated by the District, as applicable, when project-level future context classifications are completed. Not all roadway segments will have a future context classification assigned.

RCI information may be a starting point for research and planning purposes in evaluating a roadway's context classification. However, as this dataset is dynamic and constantly being updated, project-level context classification information must be confirmed with the District Complete Streets Coordinator.

*Feature 124-Urban Classification and Feature 481-Highway Maintenance Classification may describe land use contexts in different ways but do not contain context classification.

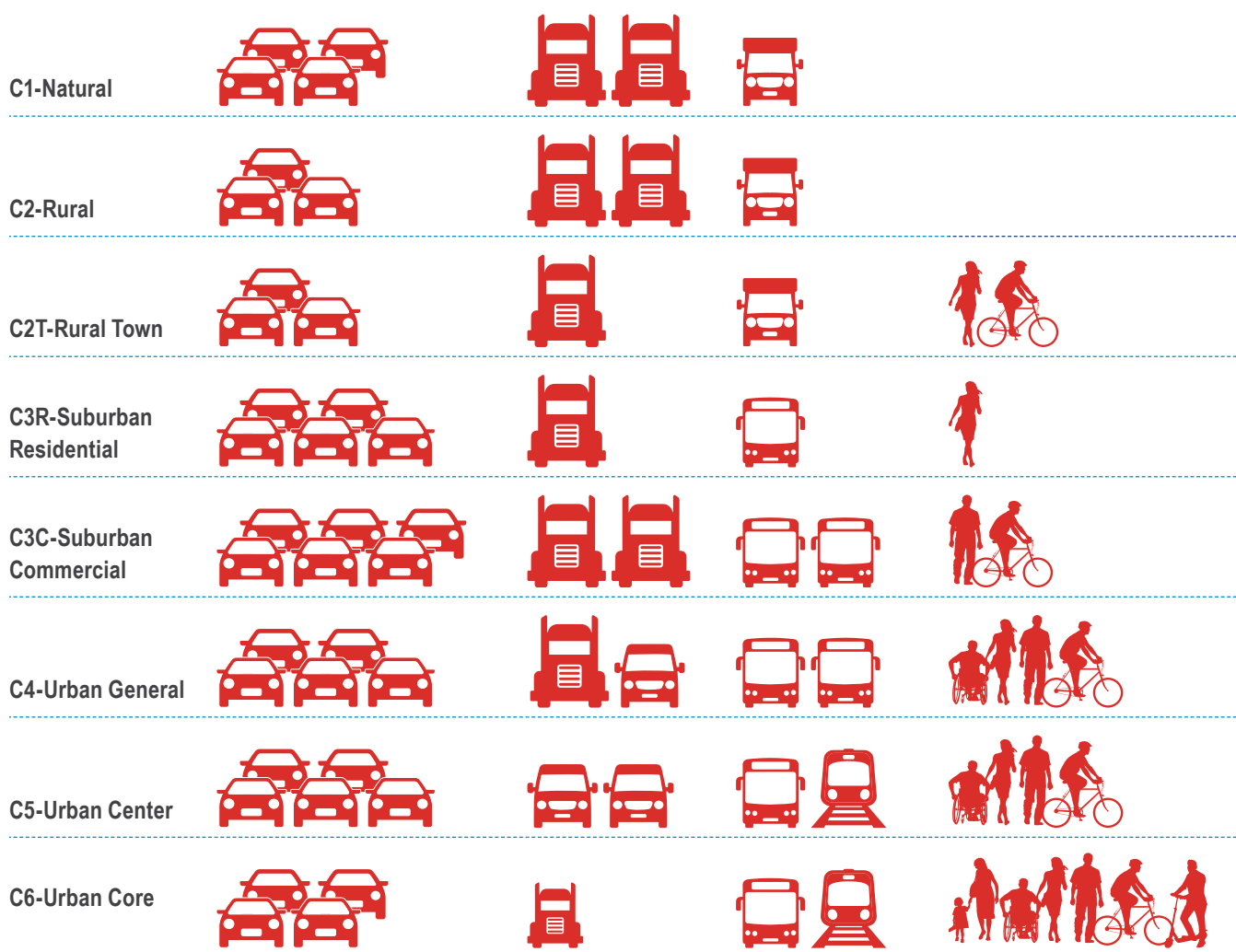
TABLE 1 CONTEXT CLASSIFICATION DESIGNATIONS

Time Period	Preliminary Method	Project-Level Method
Existing	Districtwide evaluation based on existing conditions, using readily available GIS data	Project specific evaluation based on existing conditions, using the most recent data available
Future	Districtwide evaluation based on future conditions, using readily available GIS data	Project specific evaluation based on forecasted/planned future conditions, using the most recent data available

CONTEXT CLASSIFICATION AND ROADWAY USERS

The context classification of a roadway informs planners and engineers of the types of users and the intensity of use expected along the roadway. **Figure 6** illustrates the user types and intensities expected in each context classification. For example, the C6-Urban Core Context Classification is anticipated to have more pedestrians, bicyclists, and transit users than in a C2-Rural Context Classification. Therefore, design and posted speeds towards the lower end of the speed range, signal spacing, crossing distances, lane widths, and other design elements such as bicycle facilities, on-street parking, and wide sidewalks should be provided to increase the safety and comfort of bicyclists, pedestrians, and transit users. For the C2-Rural Context Classification, vehicles and freight are primary users; the infrequent bicyclists and pedestrians are accommodated with paved shoulders or sidepaths. A state roadway in C2-Rural Context Classification is expected to have relatively higher speeds, wider lanes, and fewer pedestrian and bicycle crossings.

FIGURE 6 EXPECTED USER TYPES IN DIFFERENT CONTEXT CLASSIFICATIONS

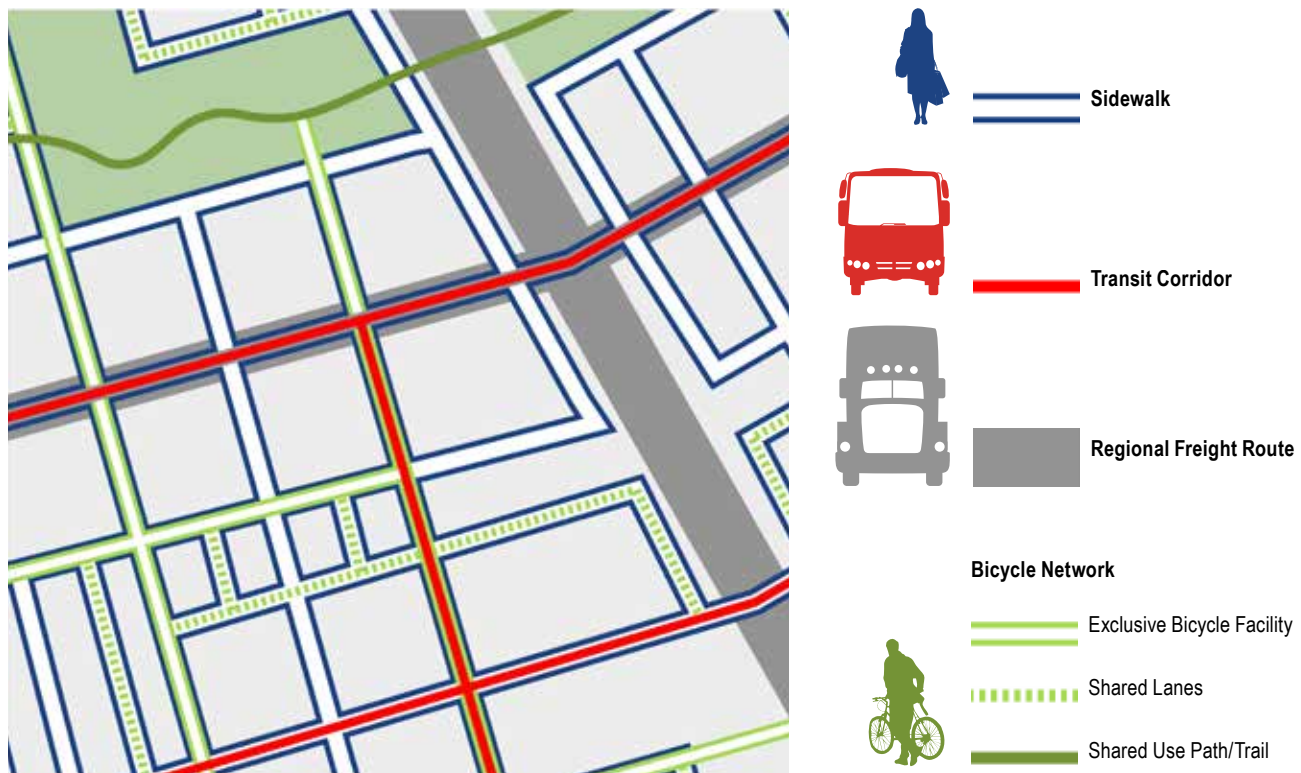


BUILDING A COMPLETE STREETS NETWORK

Every Complete Street is uniquely planned and designed to serve the context of that roadway. Although Complete Streets focus on the safety of all users, each Complete Street will strike a different balance of user comfort, based on existing and desired future contexts. For instance, in urban contexts, where high volumes of pedestrians, bicyclists, and transit users are expected or desired, a roadway may include wide sidewalks, special bus lanes, and transit shelters. The **FDOT Design Manual**, **Traffic Engineering Manual**, and **Access Management Guide** contain standards, criteria, and guidance to be used for planning, designing, and operating roadways in each context classification.

Figure 7 illustrates a conceptual idea of a complete network of roadways, where each roadway contributes to the system's ability to serve all users.

FIGURE 7 CONTEXT-SENSITIVE SYSTEM OF COMPLETE STREETS



Well-designed, connected roadway networks make travel more efficient by providing choice not only in modes, but also in routes. Pedestrians, bicyclists, and transit riders are especially motivated to find direct routes to their destination or their transit stop. A fine-grained network of roadways and crossing opportunities provides more direct paths to destinations, reduces delay, and creates redundancy of path options for all users. A network of connected roadways also disperses vehicular travel along multiple roadways.

With a number of intersections and roadways sharing the traffic demand, there is reduced need to construct wider roadways and large intersections that can potentially create barriers to walking and bicycling and increase crash rates and severity for all users. Lastly, a fine-grained network allows for roadways to complement each other, with some roadways providing better quality of service for high-speed travel, and other parallel roadways providing comfort, safety, and access for bicyclists and pedestrians.

Many roadways in Florida are built in suburban contexts (C3R-Suburban Residential and C3C-Suburban Commercial), with limited roadway connectivity and land uses dispersed over large areas of land. In these suburban contexts, the existing arterial roadway network supports both local access and regional mobility, concentrating most vehicular trips, both local and regional, onto the arterial roadways. Critical transit service, major employers, and retail services are also often located on these roadways, even though the large setbacks on large lots and wide, high-speed roadways may not be optimal for pedestrian circulation. Therefore, as investments are made along the major arterial roadways, design elements that support walking, bicycling, and transit use should be integrated. In addition to these on-roadway investments, network alternatives in the form of new local roadway connections and shared use paths should be developed to complement the arterial roadway system, to provide high quality, safe, and comfortable travel for all modes.

Due to local context, right-of-way, and financial constraints, it may not be possible to provide similar levels of high quality facilities for all modes along all FDOT roadways. In some locations, it may be necessary to rely upon parallel networks to provide additional travel options for all modes. The network approach requires close coordination between FDOT and local communities, as all partners work together to develop a system of Complete Streets comprised of State and local roadways.

DETERMINING PROJECT-SPECIFIC CONTEXT CLASSIFICATION

CONTEXT CLASSIFICATION MATRIX

Table 2 Context Classification Matrix presents a framework to determine the context classifications along state roadways. This Context Classification Matrix outlines (1) distinguishing characteristics, (2A/B) primary measures, and (2C) secondary measures. The distinguishing characteristics give a broad description of the land use types and street patterns found within each context classification. The primary and secondary measures provide more detailed assessments of the existing or future conditions along the roadway. The primary measures can be evaluated through a combination of a field visit, internet-based aerial, and street view imagery. The secondary measures require map analysis and review of future land use or zoning information, which may not be readily available on every project. The Context Classification Matrix presents the thresholds for the primary and secondary measures for the eight context classifications.

Appendix A illustrates the FDOT context classifications through case studies. These case studies illustrate real-world values for the primary and secondary measures that determine a roadway’s context classification.

The context classification will be updated or confirmed at the beginning of each project phase, including planning, PD&E, and design. Each District can assign staff to oversee the determination of context classification. It is recommended that an interdisciplinary team within each District help determine the context classification. For projects where FDOT currently coordinates with local governments, FDOT will coordinate with those local governments to confirm context classification. The final determination of context classification will be made by FDOT District staff. For smaller projects, such as traffic operations push-button projects, the context classification may be determined without additional local coordination. Refer to the *Public Involvement Handbook*, *FDM*, and *PD&E Manual* for guidance on local government coordination.

When to Use Existing Versus Future Context Classifications

The measures in **Table 2** can be evaluated based on existing or future conditions. In general, the horizon year for the context classification should match the horizon year for the traffic analysis being conducted on projects. Districts may choose to use future context classification for other projects at their discretion. Some Districts have completed a districtwide preliminary future context classification assessment. The preliminary future context classification can serve as a starting point for many projects, and may be an efficient way to explore future conditions.

Project types that qualify for ETDM screening, per the ETDM Manual Section 2.3.1, are considered qualifying projects (see **Figure 8**). These are projects that go through the PD&E process. Qualifying projects in all project development phases should evaluate future conditions of the measures and utilize future context classification. See page 16 for more discussion on evaluating context classification for new roadways.

Non-qualifying projects, or projects that do not go through ETDM screening, may be evaluated based on existing conditions, and utilize existing context classification. However, Districts may choose to use future context classification based on a longer project timeline. For example, a Resurfacing, Restoration, and Rehabilitation (RRR) project with an expected 15-year design life may consider future conditions expected in that time frame. See page 10 for more information about determining future context classification.

Figure 8 lists a sample of qualifying and non-qualifying projects. This is not a complete list of qualifying and non-qualifying projects. Please review the ETDM Manual for a complete list: <https://www.fdot.gov/environment/pubs/etdm/etdmmanual.shtm>.

FIGURE 8 CONTEXT CLASSIFICATION DESIGNATIONS

Qualifying Projects

- A highway which provides new access to an area
- New roadway
- New or reconstructed arterial highway (e.g. realignment)
- New circumferential highway that bypasses a community
- New bridge which provides access to an area/bridge replacements

Conduct a future context classification evaluation

Non-qualifying Projects

- Projects that do not go through ETDM screening
- RRR
- Lighting
- Intersection Improvement
- New or reconstruction of bicycle and pedestrian facilities

Conduct an existing context classification evaluation

TABLE 2 CONTEXT CLASSIFICATION MATRIX

Context Classification	(1) Distinguishing Characteristics	(2 A/B) Primary Measures			
		Roadway Connectivity			Land Use
		Intersection Density	Block Perimeters	Block Length	
		Intersections/ Square Mile	Feet	Feet	Description
C1-Natural	Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.	N/A	N/A	N/A	Conservation Land, Open Space, and/or Park
C2-Rural	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.	<20	N/A	N/A	Agricultural and/or Single-Family Residential
C2T-Rural Town	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.	>100	<3,000	<500	Retail, Office, Single-Family Residential, Multi-Family Residential, Institutional, and/or Industrial
C3R-Suburban Residential	Mostly residential uses within large blocks and a disconnected or sparse roadway network.	<100	N/A	N/A	Single-Family and/or Multi-Family Residential
C3C-Suburban Commercial	Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.	<100	>3,000	>660	Retail, Office, Multi-Family Residential, Institutional, and/or Industrial
C4-Urban General	Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.	>100	<3,000	<500	Single-Family or Multi-Family Residential, Institutional, Neighborhood Scale Retail, and/or Office
C5-Urban Center	Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.	>100	<2,500	<500	Retail, Office, Single-Family or Multi-Family Residential, Institutional, and/or Light Industrial
C6-Urban Core	Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population > one million). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.	>100	<2,500	<660	Retail, Office, Institutional, and/or Multi-Family Residential

The thresholds presented in Table 2 are based on the following sources, with modifications made based on Florida case studies:

- 1) [2008 Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities](#), New Jersey Department of Transportation and Pennsylvania Department of Transportation;
- 2) [2012 Florida TOD Guidebook](#), Florida Department of Transportation;
- 3) [2009 SmartCode Version 9.2](#), Duany, Andres, Sandy Sorlien, and William Wright; and
- 4) [2010 Designing Walkable Urban Thoroughfares: A Context Sensitive Approach](#), Institute of Transportation Engineers and Congress for the New Urbanism.
- 5) Colors correspond to flowchart in Figure 9.

(2 C) Secondary Measures

Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Allowed Residential Density	Allowed Office/ Retail Density	Population Density	Employment Density
Floor Levels	Description	Yes/No	Description	Dwelling Units/ Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1 to 2	Detached buildings with no consistent pattern of setbacks	No	N/A	<1	N/A	<2	N/A
1 to 2	Both detached and attached buildings with no or shallow (<20') front setbacks	Yes	Mostly on side or rear; occasionally in front	>4	>0.25	N/A	>2
1 to 2, with some 3	Detached buildings with medium (20' to 75') front setbacks	No	Mostly in front; occasionally in rear or side	1 to 8	N/A	N/A	N/A
1 (retail uses) and 1 to 4 (office uses)	Detached buildings with large (>75') setbacks on all sides	No	Mostly in front; occasionally in rear or side	N/A	<0.75	N/A	N/A
1 to 3, with some taller buildings	Both detached and attached buildings with no setbacks or up to medium (<75') front setbacks	Yes	Mostly on side or rear; occasionally in front	>4	N/A	>5	>5
1 to 5, with some taller buildings	Both detached and attached buildings with no or shallow (<20') front setbacks	Yes	Mostly on side or rear; occasionally in front, or in shared off-site parking facilities	>8	>0.75	>10	>20
>4, with some shorter buildings	Mostly attached buildings with no or minimal (<10') front setbacks	Yes	Side or rear; often in shared off-site garage parking	>16	>2	>20	>45

STEP-BY-STEP GUIDE FOR DETERMINING CONTEXT CLASSIFICATION

This page and **Figure 9** outline a step-by-step process on how to evaluate context classification at the project level. Detailed methodology for segmenting roadways, evaluating context classification measures, and common data sources needed to evaluate measures are described on the following pages. In many cases, a subset of the primary measures is sufficient to determine a roadway segment’s context classification and not all measures outlined in **Table 2** may always need to be evaluated. **Figure 9** illustrates the process to evaluate context classification, focusing on the most important measures that can distinguish between context classifications.

● **Step 1**

Review distinguishing characteristics as described in **Table 2** to identify major changes in land use types and street patterns along the project corridor. Where a major change happens, a roadway should be segmented and each segment evaluated separately.

● **Step 2A**

Once segments are defined, utilize the measures pertaining to roadway connectivity (intersection density, block perimeter, and block length) to determine if a roadway segment is in one of these three context classification groupings:

C2T, C4, C5, or C6

C3R or C3C

C1 or C2

● **Step 2B**

Use the land use measures to further refine the evaluation.

C2T, C4, C5, or C6

Determine if the land uses along the roadway segment are surrounded by rural or natural land.

- **Yes:** this can be classified as C2T context classification.
- **No:** then further evaluate using building setback measure.

Determine if non-C2T segments have less than 20’ setbacks.

- **Yes:** further evaluate in Step 2C.
- **No:** this segment can be classified as C4 context classification.

C3R or C3C

Review the land uses along the roadway. Are they predominantly residential?

- **Yes:** this segment can be classified as C3R context classification. Many C3R segments have fences, walls, or landscaping immediately along the state road with residential uses behind the barrier.
- **No** (land uses are primarily commercial and/or industrial): this segment can be classified as C3C context classification. Many C3C segments have residential land use one or more blocks off the segment, but the primary land use along the segment is commercial and/or industrial.

C1 or C2

Determine if the roadway segment is surrounded by conservation land, such as a park or wildlife refuge.

- **Yes:** this can be classified as C1 context classification.
- **No:** this can be classified as C2 context classification.

● **Step 2C**

Use the land use measures to further refine the evaluation.

C5 or C6

Evaluate if within a Large Urbanized Area.

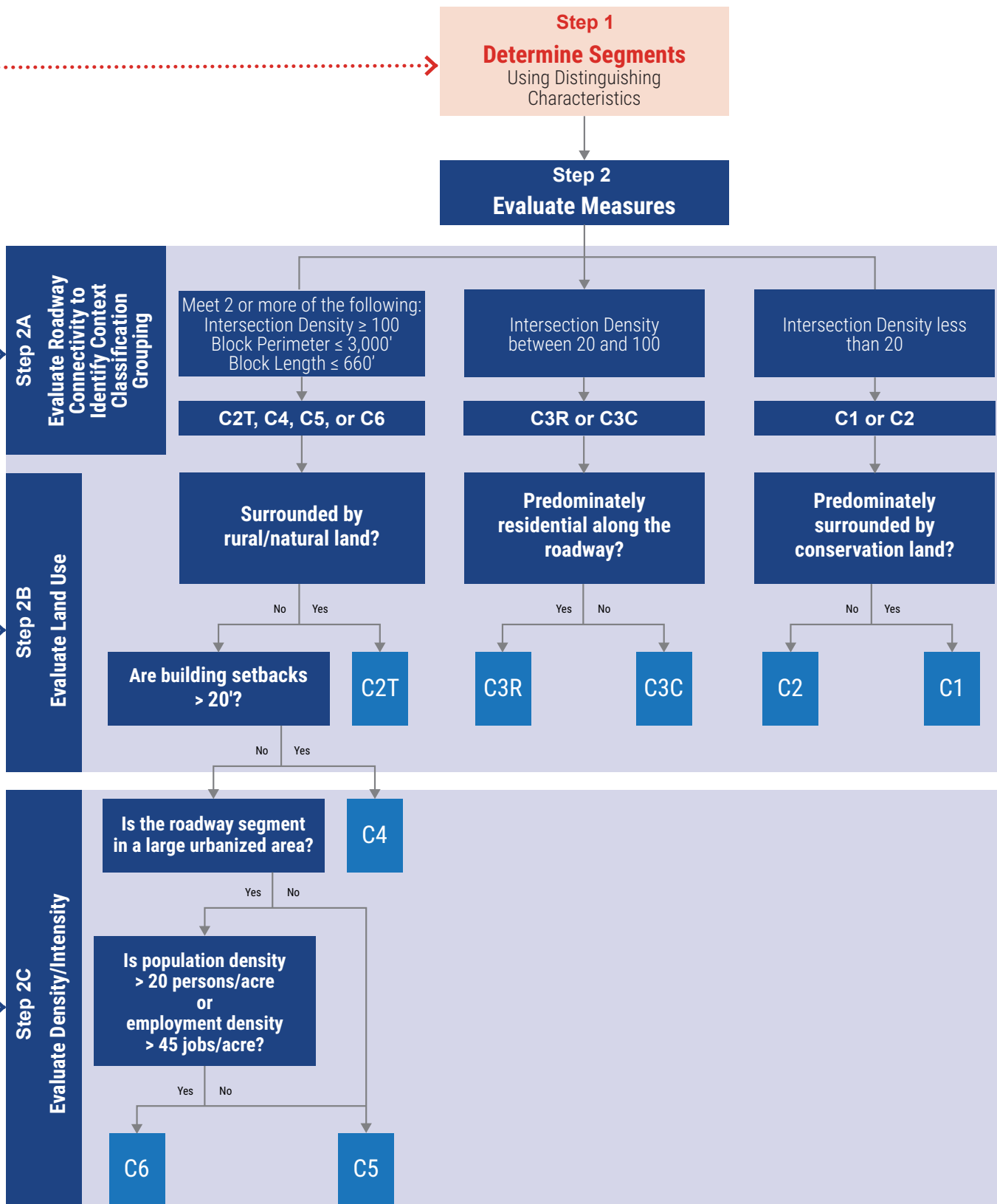
- **Yes:** further evaluate using population and employment density.
- **No:** this segment can be classified as C5 context classification.

Population and employment density can be used to distinguish between the C5 and C6 context classifications in Large Urbanized Areas. Is either the population density greater than or equal to 20 persons per acre or the employment density greater than or equal to 45 jobs per acre?

- **Yes:** this segment can be classified as C6 context classification.
- **No:** this segment can be classified as C5 context classification.

26

Page 577 of 633

FIGURE 9 STEP-BY-STEP GUIDE FOR DETERMINING CONTEXT CLASSIFICATION

Note: Large urbanized refers to an MPO urbanized area greater than one million in population. The population threshold refers to the MPO urbanized area not the individual city or town. For example, parts of Tampa could be considered a C6 because the MSA population is greater than one million even though the population of the City of Tampa is not one million.

CONTEXT CLASSIFICATION

DETAILED METHODOLOGY

The distinguishing characteristics, primary measures, and secondary measures provide analytical measurements to evaluate land use characteristics, development patterns, and roadway connectivity to determine context classification. These land use and transportation measures differentiate between different contexts. Other measures were originally considered by FDOT, but ultimately not included in the methodology. Transit service, for example, can be an indicator of multimodal need since all riders are at one point a pedestrian or a bicyclist, but levels of transit service and occurrence of transit stops do not always relate to adjacent development patterns. Frequent transit service can be present in both suburban and urban contexts, and even some rural towns.

The data available to characterize existing and future context classifications will vary depending on the specificity of the roadway alignments being considered. Many projects conducted by FDOT occur along existing corridors where a single alignment is being considered. The range of alternatives for new roadways also narrows to a single alignment alternative as qualifying projects proceed from planning through PD&E and design. In planning and ETDM screening for existing roadways, and in PD&E and design for new roadways, it is possible to analyze both the existing and future conditions to determine the context classification of a roadway. For projects involving new roadways in planning and ETDM screening, multiple alternative alignments may be considered over larger areas. For these latter types of projects, a broader understanding of the context classification will be used to inform the planning process and development of alternatives.

The following are the two key steps for determining context classification at the project level:



1 Define Segments by Identifying Major Changes in Context

Context classification segments are based on land development pattern changes, as characterized by land use, development density, and roadway connectivity changes. A new segment starts where the land development patterns change. Project-limits do not define the segmentation for context classification. Like access management classification, there may be several context classification segments within a single project, and the limits of those segments may extend beyond the project limits.

Use the distinguishing characteristics described in the Context Classification Matrix to identify if multiple context classifications are present along a project roadway and if a long roadway corridor needs to be segmented. Where a block structure, or grid network, is present, a context classification segment may be as short as two blocks in length. Where there is no defined block structure, a context classification segment may be as short as a quarter mile in length.

Figure 10 and **Figure 11** demonstrate cases where roadway segmentation can change based on major changes in land use and roadway connectivity.

FIGURE 10 DISTINGUISHING CONTEXT CLASSIFICATION SEGMENTS BY DEVELOPMENT INTENSITY AND ROADWAY NETWORK

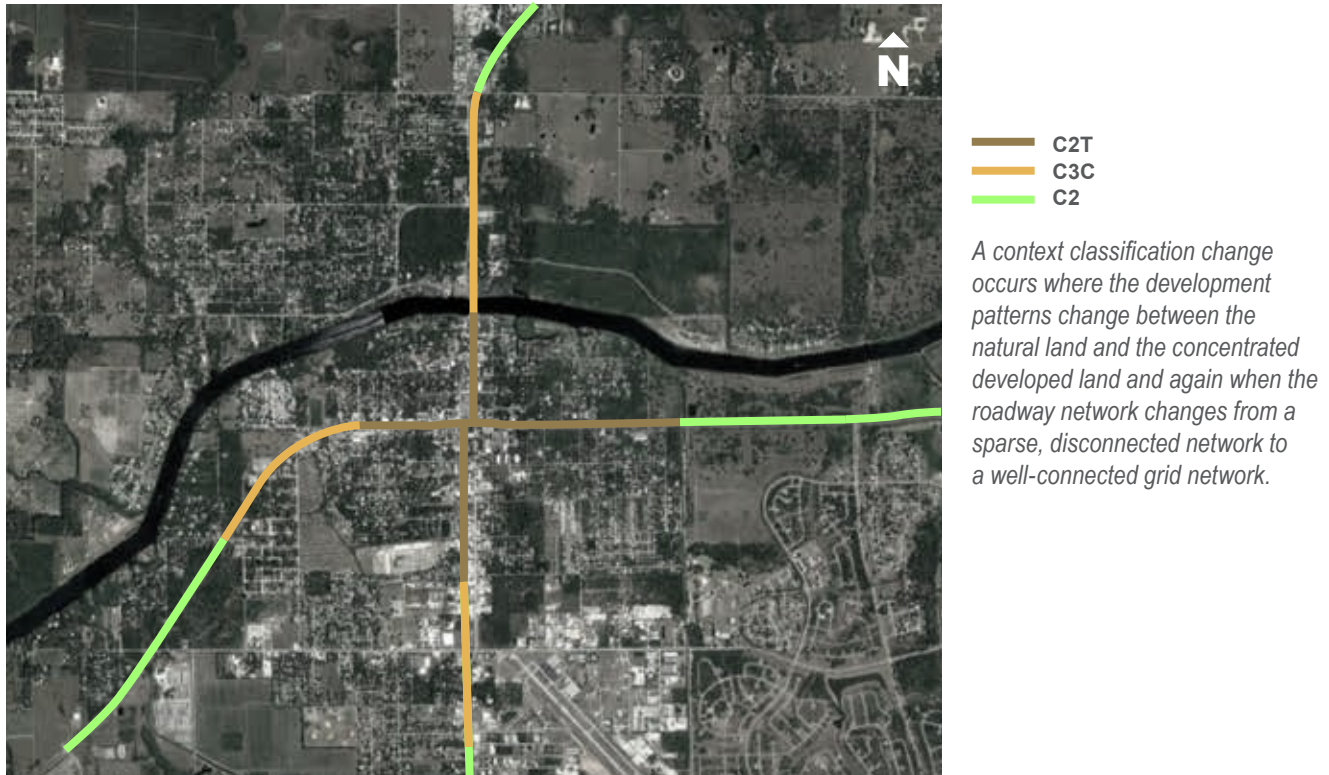
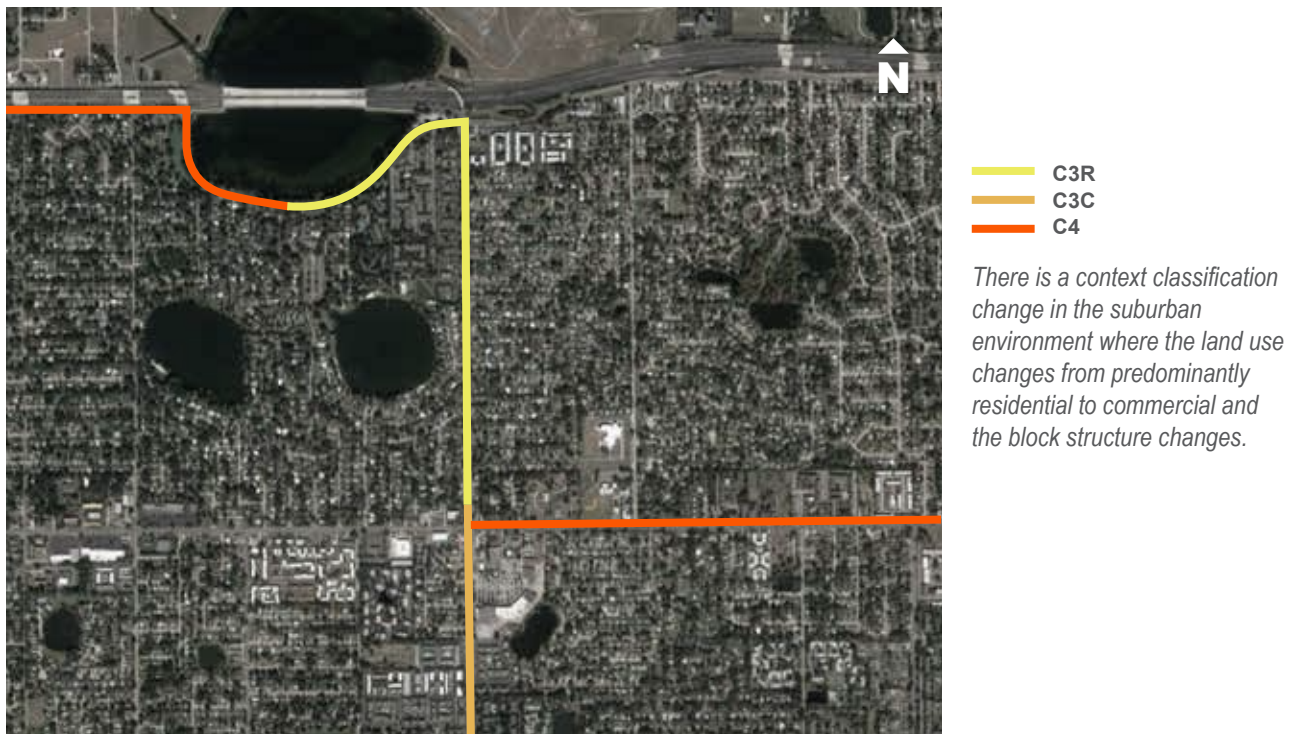


FIGURE 11 DISTINGUISHING CONTEXT CLASSIFICATION SEGMENTS BY TYPE OF LAND USE



2

Evaluate the Measures

A roadway segment must meet most of the measures defined for a context classification in order to be assigned that context classification.

Table 3 and **Table 4** describe the methodology and data sources associated with the primary and secondary measures, respectively. Two measurement areas — the block and the parcel — are used, as explained in **Figures 12** and **13**. **Figures 14** through **18** provide guidance for evaluating some of the primary measures.

The distinction between primary and secondary measures is based on the availability of data and does not imply intended sequence of evaluation or relative importance. The primary measures can be evaluated through a combination of a field visit, internet-based aerial, and street view imagery. The secondary measures require map analysis and review of zoning information, which may not be available on every project.

Evaluation of the measures for each segment can be done based on existing conditions or updated with future conditions, if needed. For existing context classification, consider existing plus committed roadway network when evaluating roadway connectivity and existing land use plus permitted development when evaluating land use measures.

For future context classification, consider the adopted future cost-feasible metropolitan transportation plan (MTP), also known as the long range transportation plan (LRTP), and programmed local roadway network projects when evaluating roadway connectivity. Future land use should be clearly documented in a well-defined, community-supported, and implementation-focused plan or in policies such as zoning overlays, form-based codes, or community redevelopment plans. These plans detail short- and mid-term changes to the roadway and built form using established mechanisms for implementation.

The future desired conditions should be consistently documented across all appropriate local policies and should be well-understood and accepted by local stakeholders. In short, the future conditions should be those that are predictable and that will occur over an anticipated time frame rather than visionary plans or broad goals and ideas that do not have a clear timeline for actual implementation. Use of a form-based code is one indicator that significant community discussion occurred on a future vision and that future development is more likely to result based on the adopted form-based code. See page 21 for more discussion on evaluating future context classification for new roadways.



Districts with a districtwide preliminary context classification may have calculated some of the measures as part of the districtwide evaluation. Use this as a starting point where possible, adding new or updated data and measures that were not gathered during the districtwide evaluation.

TABLE 3 PRIMARY MEASURES TO DEFINE CONTEXT CLASSIFICATION

Measure	Description	Methodology	Measurement Area*	Data Source**
Roadway Connectivity	Intersection Density	Number of intersections per square mile	Calculate by dividing the total number of intersections by the area of the blocks along both sides of the street, excluding natural features and public parks; consider future roadway connectivity if an approved or permitted development plan is in place (see Figure 14).	The block on either side of the roadway; if the roadway and block structure is not complete, the evaluation area should extend 2000' on either side of the roadway
	Block Perimeter	Average perimeter of the blocks adjacent to the roadway on either side	Measure the block perimeter for the blocks adjacent to the roadway on either side and take the average; consider future roadway connectivity if an approved or permitted development plan is in place (see Figure 15).	The block on either side of the roadway; if the roadway and block structure are not complete, the evaluation area should extend 2000' on either side of the roadway
	Block Length	Average distance between intersections	Measure the distance along the roadway between intersections with a public roadway, on either side, and take the average; consider future roadway connectivity if an approved or permitted development plan is in place (see Figure 15).	Roadway
Land Use	Land use mix for more than 50% of the fronting uses	Record based on existing or future adopted land uses.	Fronting parcels on either side of the roadway	Field review, GIS files, existing land use, or future land use clearly documented in a well-defined, community-supported, and implementation-focused plan or in policies such as zoning overlays, form-based codes, or community redevelopment plans.
Building Height	The range in height of the buildings for more than 50% of the properties	Record based on existing buildings or future permitted building height requirements based on land development regulations.	Fronting parcels on either side of the roadway	Field review, internet-based aerial and street view imagery, or land development regulations
Building Placement	Location of buildings in terms of setbacks for more than 50% of the parcels	Measure the distance from the building to the property line or future required building placement based on land development regulations (see Figure 16).	Fronting parcels on either side of the roadway	Field review, internet-based aerial and street view imagery, building footprint and parcel GIS files, or land development regulations
Fronting Uses	Buildings that have front doors that can be accessed from the sidewalks along a pedestrian path for more than 50% of the parcels	Record the percentage of buildings that provide fronting uses or site design and lot layout requirements in land development regulations that require fronting uses (see Figure 17).	Fronting parcels on either side of the roadway	Field review or internet-based aerial and street view imagery, or land development regulations
Location of Off-Street Parking	Location of parking in relation to the building: between the building and the roadway (in front); on the side of the building; or behind the building	Record location of off-street parking for majority of parcels or parking requirements based on land development regulations (see Figure 18).	Fronting parcels on either side of the roadway	Field review or internet-based aerial and street view imagery, or land development regulations

* The measurement area applies to each context classification segment. Evaluate each measure for each context classification segment. Where characteristics differ for each side of the street, use the characteristics for the side that would yield the higher context classification.

** Land use, zoning, streets, and other GIS data and maps are available from local government agencies, FDOT Efficient Transportation Decision Making (ETDM) Database, and regional agencies.

TABLE 4 SECONDARY MEASURES TO DEFINE CONTEXT CLASSIFICATION

Measure	Description	Methodology	Measurement Area	Data Source
Allowed Residential Density	Maximum allowed residential density by adopted zoning	Identify which zoning district the context classification segment is within, and record maximum allowed residential density for that particular zoning district by dwelling units per acre.	Parcels along either side of the roadway	Zoning code, land development regulations
Allowed Office/Retail Density	Maximum allowed office or retail density in terms of Floor Area Ratio (FAR), or the ratio of the total building floor area to the size of the property on which it is built	Identify which zoning district the context classification segment is within, and record allowed commercial density for that particular zoning district. In some jurisdictions, allowed commercial density might be stated based on specific regulations limiting building height and minimum setbacks. Jurisdictions also regulate minimum parcel size and building area allowed in each zoning district. Maximum allowable FAR for an area can be calculated using site design and height standards (see Appendix B for more details).	Parcels along either side of the roadway	Zoning code, land development regulations
Population Density (existing)	Population per acre based on the census block group	Download census information at the block group level. Divide the population of the census block group by the area of the block group. This area should exclude large natural features and public parks. If the roadway segment is the boundary between two block groups, average the population density of the block groups on either side of the roadway. If the roadway runs through multiple block groups, calculate the population density by the weighted average of roadway within each block group.	Census block group(s) that encompasses the roadway	US Census Bureau decennial data. If the census data is more than 5 years old, the latest American Community Survey data can be used.
Population Density (future)	Projected population per acre based on the regional travel demand model traffic analysis zone (TAZ)	Divide the population of the TAZ by the area of the TAZ. If the roadway segment is the boundary between two TAZs, average the population density of the TAZs on either side of the roadway. If the roadway runs through multiple TAZs, calculate the population density by the weighted average of roadway within each TAZ. Use 20-year forecast number from the regional travel demand model. If a regional travel demand model is not available, use University of Florida Bureau of Economic and Business Research (BEBR) population projections.	TAZ(s) that encompasses the roadway. If TAZ population density is not available, use smallest geographic area available from BEBR projections.	Regional travel demand model from MPO, BEBR
Employment Density (existing)	Total number of jobs per acre	Use GIS to map the number of jobs within the blocks adjacent to the roadway utilizing the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) website. Sum the number of jobs within the blocks along either side of the roadway, and divide by the area of the blocks. This area should exclude large natural features and public parks. Blocks can be imported as a shapefile or can be manually drawn on the census website.	One block area adjacent to either side of the roadway. If the block structure is not complete, the evaluation area should extend 500 feet from the property line along the roadway.	U.S. Census Bureau LEHD website
Employment Density (future)	Total number of jobs per acre	Divide the number of jobs of the TAZ by the area of the TAZ. If the roadway is the boundary between two TAZs, average the employment density of the TAZs on either side of the roadway. If the roadway runs through multiple TAZs, calculate the employment density by the weighted average of roadway within each TAZ. Use 20-year forecast number from the regional travel demand model. If a regional travel demand model is not available, use BEBR employment projections.	TAZ(s) that encompasses the roadway. If TAZ employment density is not available, use smallest geographic area available from BEBR projections.	Regional travel demand model from MPO, BEBR

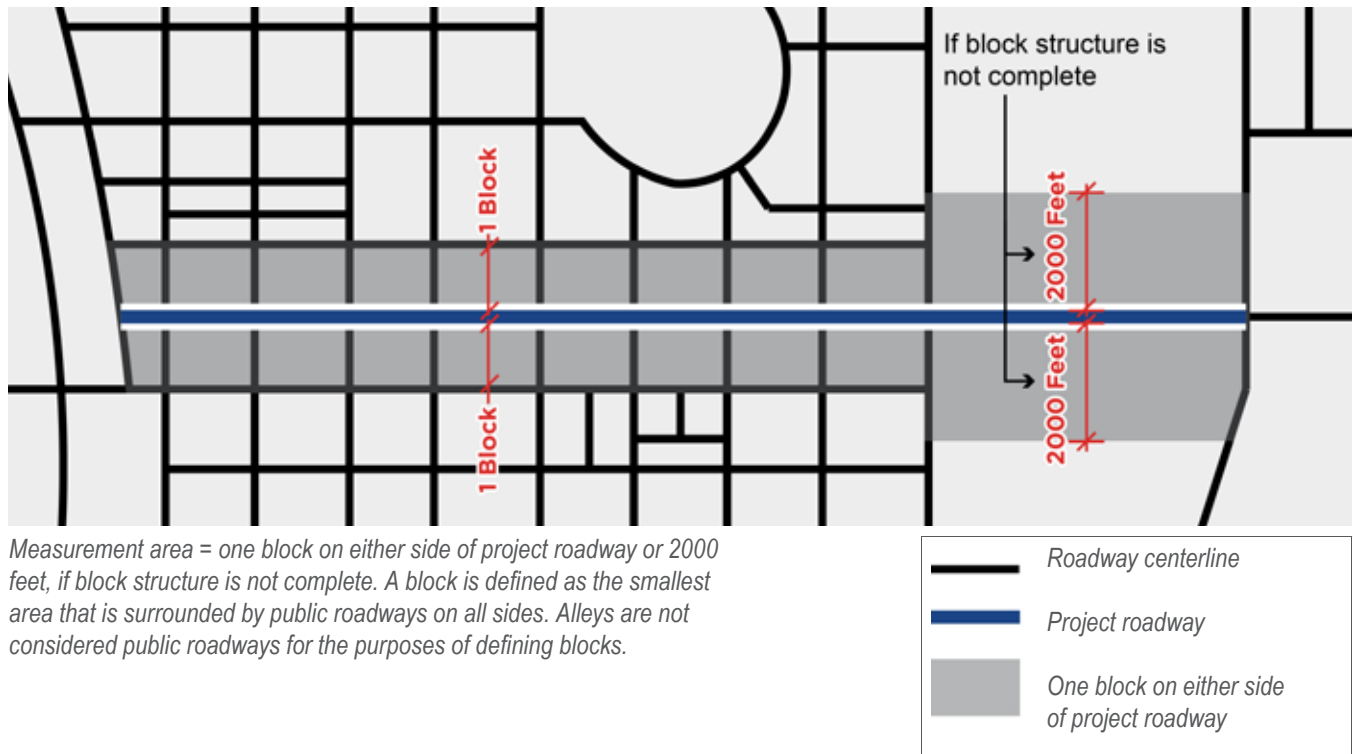
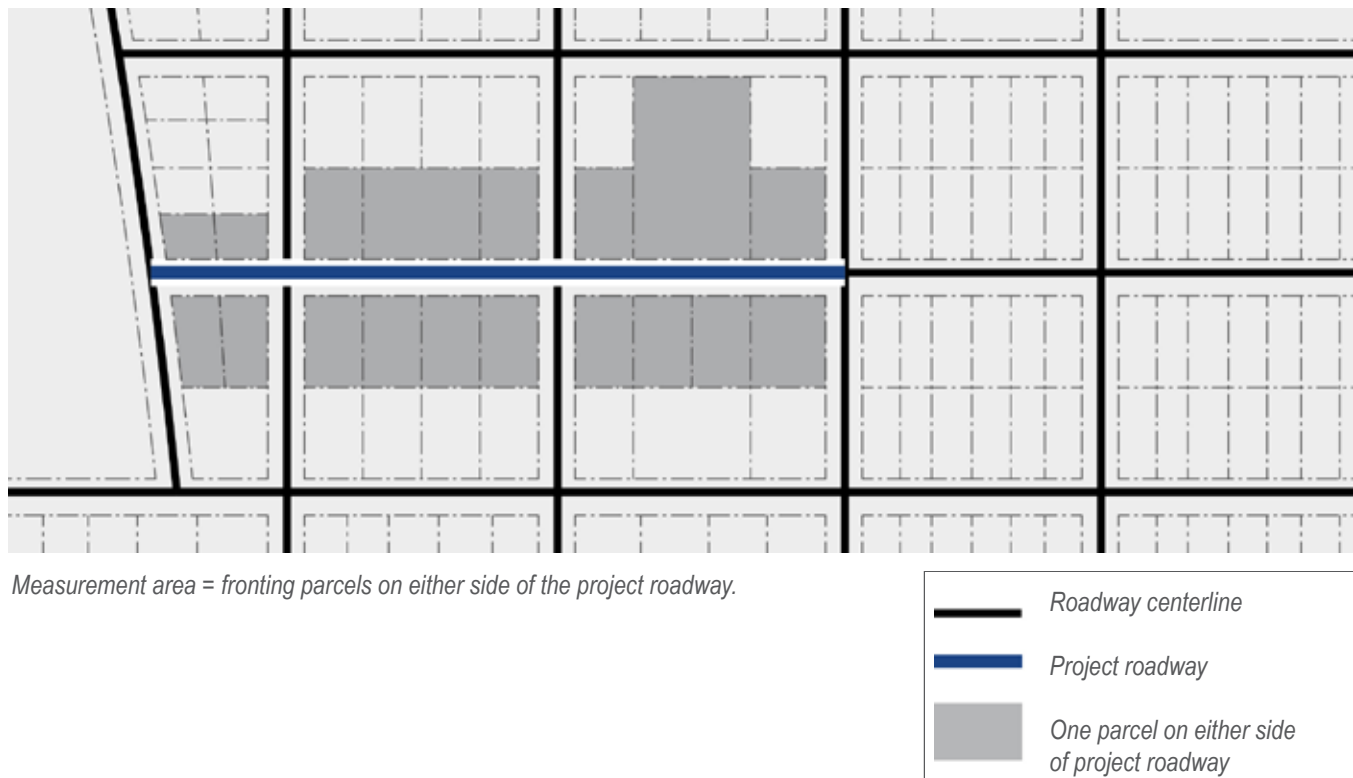
FIGURE 12 MEASUREMENT AREA: THE BLOCK ON EITHER SIDE OF THE ROADWAY**FIGURE 13** MEASUREMENT AREA: FRONTING PARCELS ON EITHER SIDE OF THE ROADWAY

FIGURE 14 INTERSECTION DENSITY

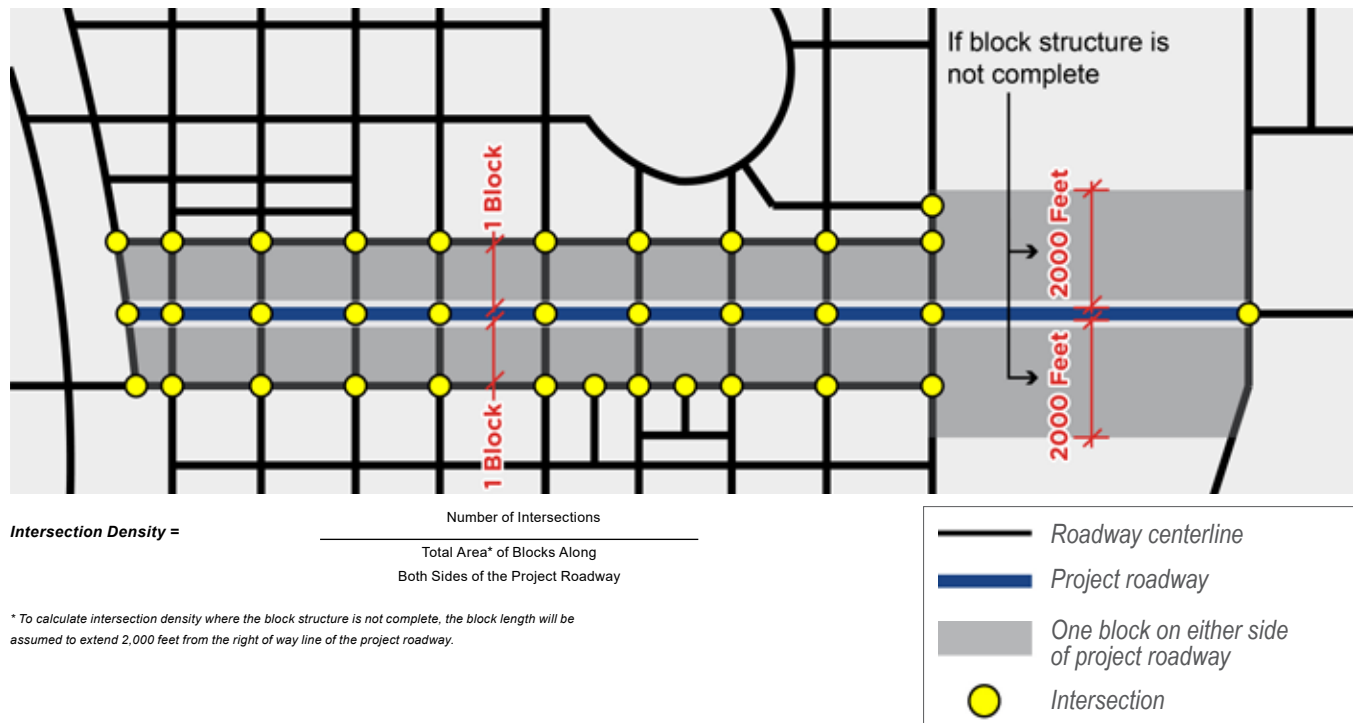


FIGURE 15 BLOCK PERIMETER AND BLOCK LENGTH

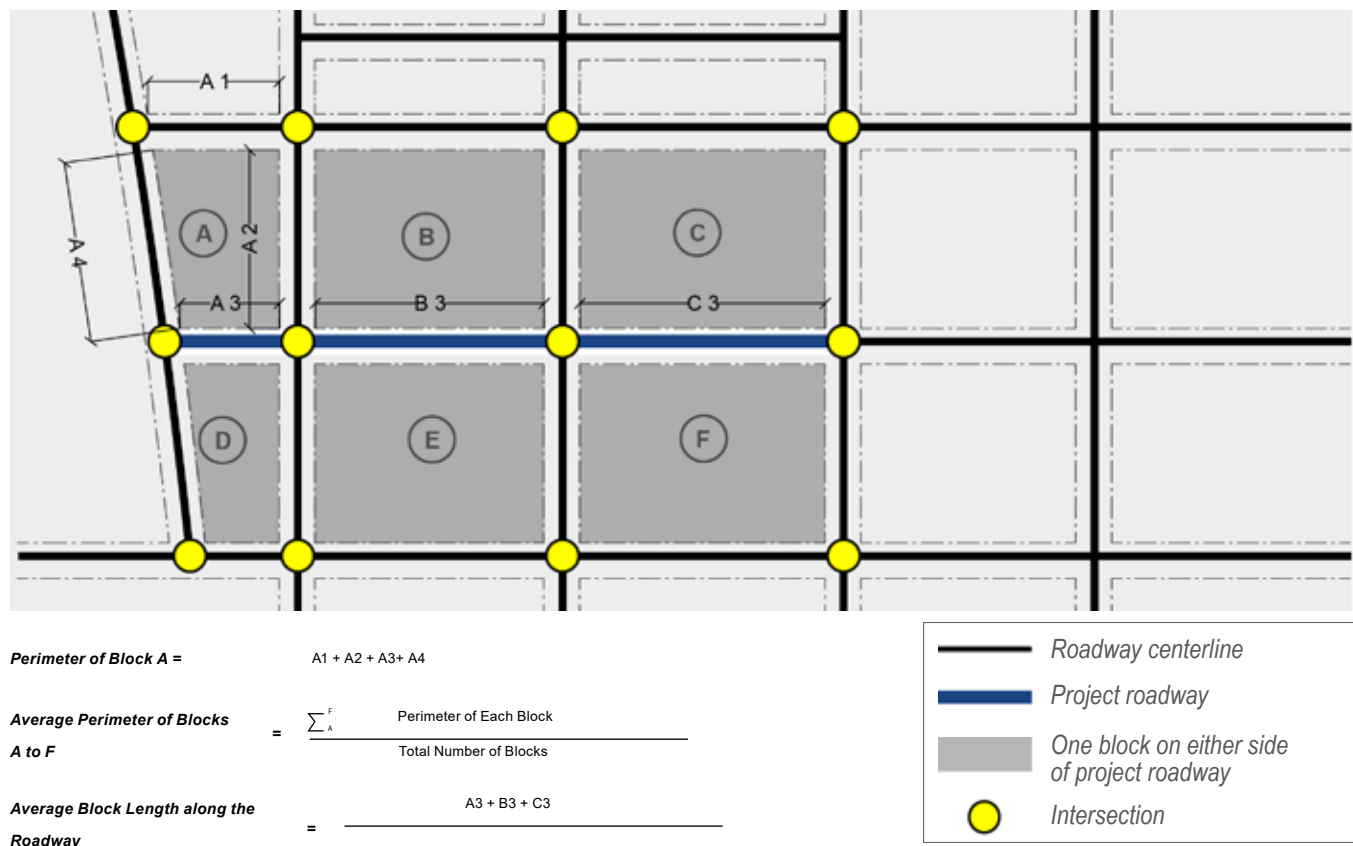
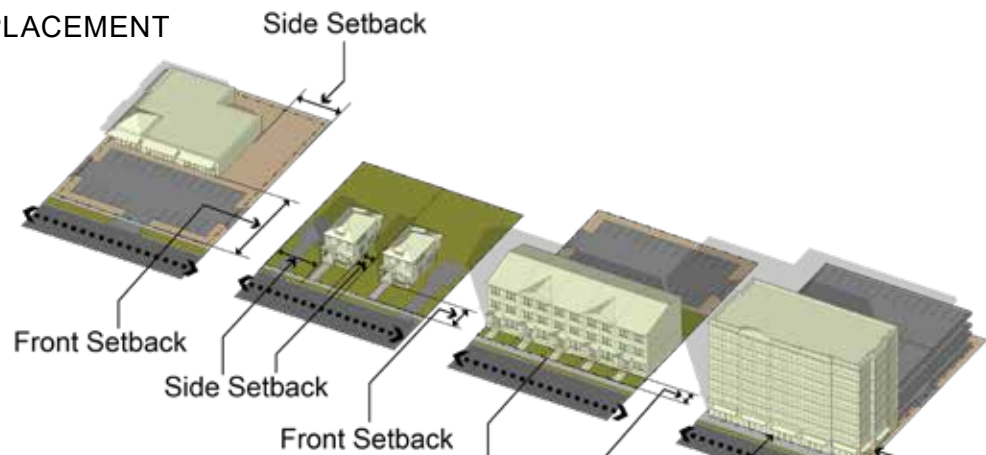
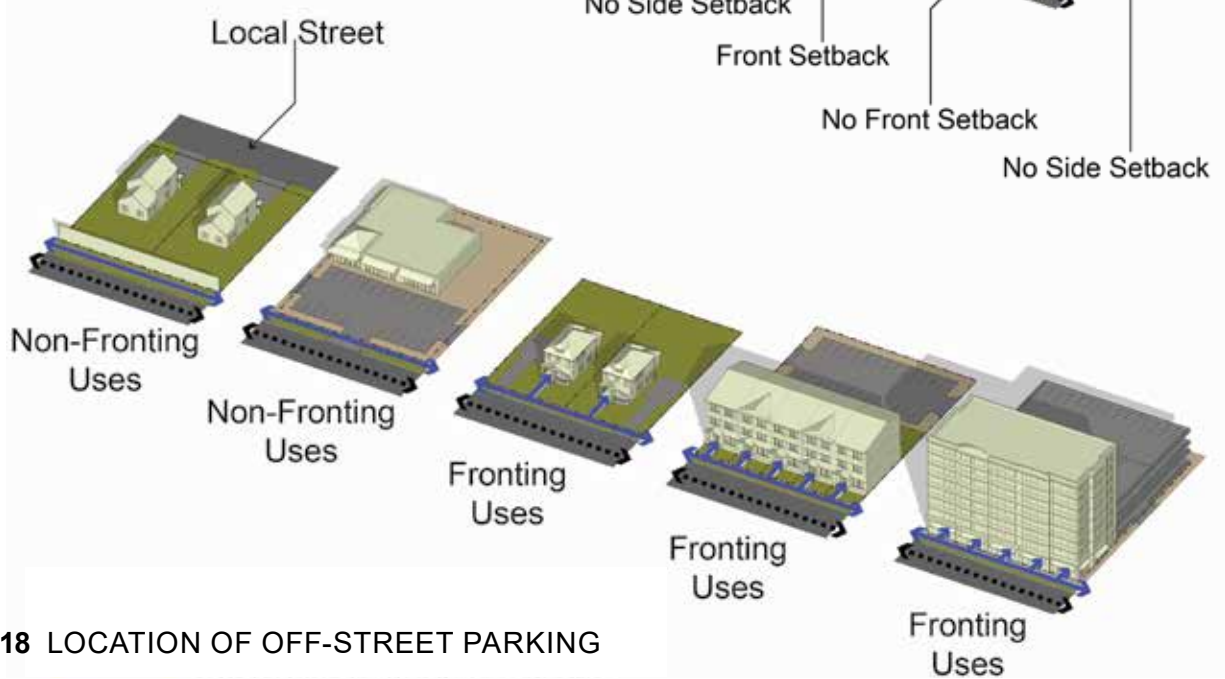
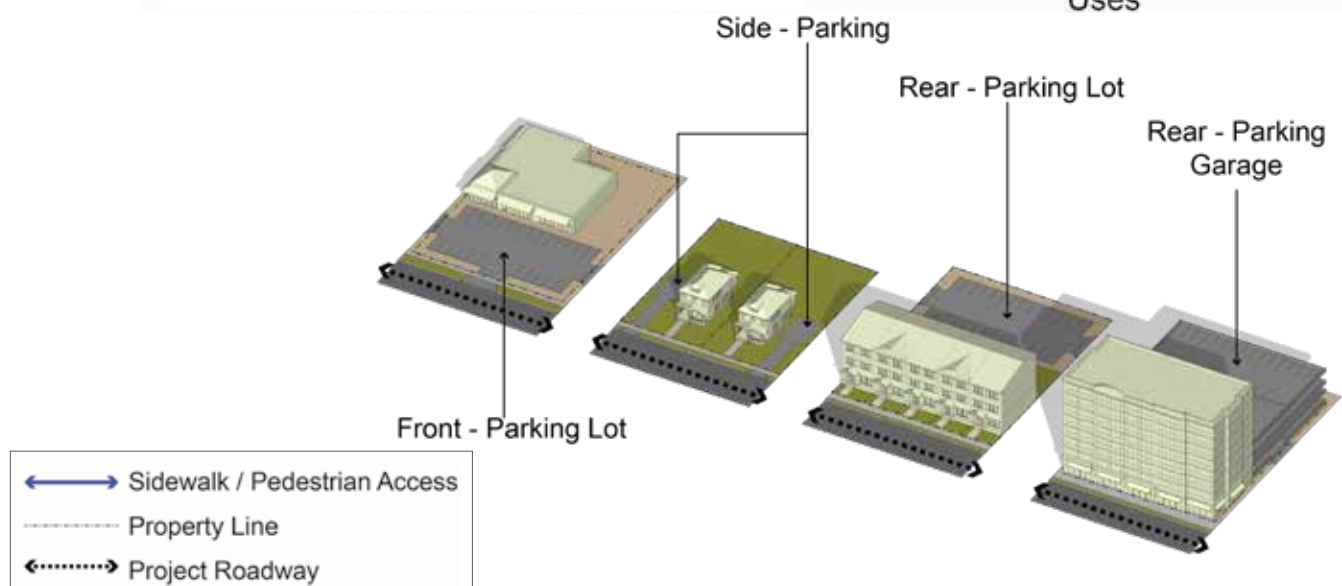


FIGURE 16 BUILDING PLACEMENT**FIGURE 17 FRONTING USES****FIGURE 18 LOCATION OF OFF-STREET PARKING**

DISTINGUISHING BETWEEN C3R AND C3C SUBURBAN CONTEXT CLASSIFICATIONS

The distinction between Suburban Residential (C3R) and Suburban Commercial (C3C) is an important one because the different land uses result in different roadway users and usage patterns.

C3R corridors are characterized by low-density residential land uses and typically do not have any land uses directly fronting or accessed from the state road. Buildings are often set back from the state road with fences, walls, and/or heavy landscaping between the roadway and the residences. C3R development tends to be static and less likely to change over time. Where a roadway is more consistent with a C3C on one side and a C3R on the other, default to the higher context classification which is C3C.

In C3C corridors, the development fronting the roadway (immediately adjacent) is commercial uses, typically with large building footprints and large surface parking lots in front of buildings. C3C environments generally attract trips to and from retail and commercial establishments and have more transit ridership and transit service than C3R. As a result of transit activity and the commercial uses, C3C corridors also experience higher bicycle and pedestrian activity compared to C3R environments. Some C3C corridors also have intermittent multi-family apartments generating trips to and from the commercial uses. C3C development tends to be more dynamic, with commercial and retail uses changing over time.

With different user types (all modes), trip types (short and long trips), and vehicle speeds (through trips and local trips accessing establishments) in C3C context classifications, crashes between motorists and bicyclists/pedestrians are more prevalent than in C3R areas. In these corridors, the combination of frequent vehicle turning movements, commercial driveways, differing operating speeds, and large blocks with long distances between crosswalks contribute to increased exposure for bicyclists and pedestrians. Large blocks, a disconnected roadway network, and the location of transit stops encourage pedestrians to cross at mid-block crossing locations.



In general, on C3C corridors, commercial land uses are the most prevalent and front the roadway, with residential land uses behind these.



In C3C environments, bicycle, pedestrian, and transit users are typically expected.



C3C corridors generally experience more bicycle and pedestrian activity compared to C3R environments.

OTHER CONDITIONS

Bridges and Tunnels

The context classification of a bridge or tunnel should be based on the higher context classification of the segments on either end of the bridge or tunnel.

Constrained Corridors/ Barrier Islands

Geographic constraints, such as water or railroad lines, may naturally limit a roadway's ability to meet the roadway connectivity measures characteristic of more urban context classifications. However, some of these constrained roadway networks still experience development density and intensity and user types commonly found in urban context classifications. These conditions often occur on barrier islands where beach access and amenities on the inland side of the roadway create high pedestrian and bicycle demand, like that found in the urban contexts. In these conditions, the mix of land uses, built form, and population and job density thresholds should be the key measures used to identify the context classification. Even if the roadway connectivity measures are not met, it may be appropriate to classify roadways on barrier islands and similarly constrained corridors as a C2T, C4, C5, or C6 context classification based on the mix of land uses, built form, and population or employment density.

Trails

According to the **FDM**, shared use paths, or trails, are appropriate in C1 and C2 context classifications as it is anticipated there will be a lower volume of non-motorists than there are in other contexts, and in C3 where higher vehicle speeds are anticipated. A simplified context classification evaluation may be determined for trails and shared use paths moving into the design phase to determine their level of appropriateness. In cases where the shared use path or trail is not running along a roadway, assume that the trail or shared use path segment being evaluated is the corridor. Engineers and planners can follow **Figure 9** to identify the context classification grouping. In most cases, knowing the grouping provides enough information to inform trail design and an official context classification determination may not be needed.

Special Districts

Special Districts (SD) are areas that, due to their unique characteristics and function, do not adhere to standard measures identified in the Context Classification Matrix. Examples of SDs include military bases, university campuses, airports, seaports, rail yards, theme parks and tourist districts, sports complexes, hospitals, and freight distribution centers. Due to their size, function, or configuration, SDs will attract a unique mix of users and create unique travel patterns. Planning and engineering judgment must be used to understand users and travel patterns, and to determine the appropriate design controls and criteria for streets serving an SD on a case-by-case basis. If an FDOT district believes that an area does not fit within a context classification and an SD designation is required, the district should coordinate that with the State Complete Streets Program Manager. The most appropriate context classification will be determined and applied to the segment and indicated as "SD" with the appropriate context classification in RCI (e.g., SD-C4). The district will internally record both the original classification and the Special District Classification, in the event there are questions about the designation at a later time.

Local Roadways

The **FDOT Context Classification Guide** was developed for state roadways. Local governments may wish to adapt the FDOT context classifications for use on their streets. However, local communities should consider that the FDOT Context Classification Matrix reflects state roadways, which are primarily arterial roads. As such, if these are applied to local roadways, the measures and thresholds may need to be recalibrated to reflect the wider range of functional classes including collector and local streets. These roadways can be designed for lower traffic volumes, much lower speeds, and smaller design vehicles compared to State roadways in many cases.

Local governments seeking to apply context classification to their roadways should also refer to the 2018 **Florida Greenbook** for design criteria and further information on how to use these or other locally developed context classifications to implement context-based design.

Proposed New Roadways

Proposed new roadways are qualifying projects for which future context classification is determined, as seen in the flowchart of **Figure 9**. During planning phases and ETDM screening for new roadway alignments, a broad understanding of the context classification will be used to inform the planning process. For new roadways in planning and ETDM screening that include multiple alternative alignments, future land use conditions should be used to determine the context classification. The steps for determining the context classification for new roadways in planning or ETDM screening include:

1

Identify Major Changes in Context

Utilize the distinguishing characteristics to determine if multiple context classifications exist due to significant changes in the type or intensity of future land uses located along the roadway. The segment lengths should be based on the change in land use, change in density of the roadway network, or other distinguishing features. Segment lengths can vary and may be as short as two blocks or, where there is no defined block structure, longer than a mile.

2

Evaluate the Future Land Use

Evaluate the land use along the roadway based on a clearly documented, well-defined, community-supported, and implementation-focused plan such as zoning overlays, form-based codes, community redevelopment plans, or permitted development plans. These plans detail short- and mid-term changes to the roadway and built form using established mechanisms for implementation. For example, minimum block sizes indicated in a form-based code will determine the level of network connectivity in new development, which in turn will help bracket, if not determine outright, the future context classification of the area at build-out. Requirements for building orientation and setbacks in a form-based code also provide important information about the future context classification. Where well-defined, implementation-focused plans are not available, review the future land use element of the adopted local comprehensive plan using the land use description provided in **Table 2**.

3

Evaluate the Secondary Measures

Table 4 describes the secondary measures and the methodology and data sources associated with each measure. Future population and employment densities can be quantified based on the data in the regional travel demand model. If no regional model is available, utilize Bureau of Economic and Business Research (BEBR) estimates for future population and employment projections. A segment only needs to meet one of the two criteria, either population density or employment density, to be classified within a context classification. For the C3C-Suburban Commercial and C3R-Suburban Residential Context Classifications, population and employment densities vary widely from one community to another. Use the allowed residential and office/retail densities, the distinguishing characteristics, and the future land uses listed in the Context Classification Matrix to determine if a roadway is within the C3C-Suburban Commercial or C3R- Suburban Residential Context Classification.

RELATIONSHIP BETWEEN CONTEXT CLASSIFICATIONS AND CNU/SMARTCODE™ TRANSECT SYSTEM

The SmartCode™ is a form-based land development code that incorporates Smart Growth and New Urbanist principles formed by the Congress for the New Urbanism (CNU). It is a unified development ordinance, addressing development at all scales of design, from regional planning to building signage. It is based on rural-to-urban transects, rather than separated-use zoning.

FDOT's context classifications generally align with the SmartCode™, with some critical distinctions. The SmartCode™ was developed to describe and codify desired future visions of development form by local jurisdictions. The key implementation tool for form-based codes is a regulating plan that clearly identifies different transect zones that would guide how future land use development should occur. In contrast, FDOT's context classifications are descriptive, rather than visionary or regulatory, and therefore include all land areas and types found within the State of Florida, with less local specificity. In addition, FDOT's context classifications are specific features associated with the roadway, analogous to functional classification or access management classification, and are not intended to describe overall land use patterns, provide land use controls, or serve as a regulating plan.

The general relationship between the zones used by the transect system and FDOT's context classification is outlined in **Table 5**.

TABLE 5 RELATIONSHIP BETWEEN FDOT CONTEXT CLASSIFICATIONS AND THE SMARTCODE™ TRANSECT SYSTEM

FDOT Context Classification	SmartCode™ Transect Zone	Description of SmartCode™ Transect Zone
C1 – Natural	T1 - Natural Zone	Lands approximating wilderness conditions
C2 – Rural	T2 - Rural Zone	Sparsely settled lands in open or cultivated states
C2T – Rural Town		No corresponding transect zone; may sometimes be coded as a small T5 or T4 hamlet or village
C3R – Suburban Residential	Coded as Conventional Suburban Development (CSD)	The SmartCode™ does not provide for this type of development pattern
C3C – Suburban Commercial		
FDOT context classification does not address this SmartCode™ Transect Zone	T3 - Sub-urban Zone	Lower density, primarily single-family residential with very limited non-residential uses, in a limited dispersion and directly within walking distance of a higher transect. Transect Zone T3 will be considered C4-Urban General
C4 – Urban General	T4 - General Urban Zone	Mixed use but primarily residential urban fabric in a variety of housing types and densities
C5 – Urban Center	T5 - Urban Center Zone	Higher density mixed use buildings that accommodate retail, offices, row houses, and apartments
C6 – Urban Core	T6 - Urban Core Zone	Highest density and height, with the greatest variety of uses, and civic buildings of regional importance; some T6 areas may belong to FDOT C5 because of FDOT population requirement
SD – Special District	Special Districts	Areas that, by their intrinsic size, function, or configuration, cannot conform to the requirements of any transect zone or combination of zones

TRANSPORTATION CHARACTERISTICS

The transportation characteristics define the role of a particular non-limited access roadway in the transportation system, including the type of access the roadway provides, the types of trips served, and the users served. The transportation characteristics consider regional travel patterns, freight movement, transit operations, and SIS designation. Together with context classification, transportation characteristics can provide information about who the users are along the roadway, the regional and local travel demand of the roadway, and the challenges and opportunities of each roadway user.

The context classification designations affect more than the appropriate design criteria for roadways. Roadways with the same context classification may have very different transportation characteristics. For example, a C3C with frequent transit service will have more multimodal activity than a similar corridor without transit. Corridors with frequent transit service should be planned, designed, and operated for pedestrians and bicyclists, in addition to transit vehicles. Both the context classification and transportation characteristics must be considered to understand users' needs.

FUNCTIONAL CLASSIFICATION

Functional classification defines the role that a particular roadway plays in serving the flow of vehicular traffic through the network. Roadways are assigned to one of several possible functional classifications within a hierarchy according to the character of travel service each roadway provides (see **Table 6**).¹

The AASHTO *A Policy on Geometric Design of Highways and Streets, 7th Edition (2018)* presents a discussion of highway functional classifications. *Florida Statutes, Title XXVI, Chapters 334, 335, and 336* give similar definitions and establish classifications for roadway design in Florida.

Functional classification and context classification should be considered together when determining the role and function of a roadway. For example, the relationship between functional classification and access needs may be less consistent in more urban context classifications where roadways serve a wider variety of purposes beyond moving motor vehicle traffic. In evolving suburban areas, retail and commercial businesses tend to be located along arterial roadways, thereby requiring access and creating demands for short-distance and local trips that include vehicular trips as well as walking and bicycling trips. Transit service is also often located along arterial roadways due to retail and commercial uses generating high demand for transit trips. At the same time, many state roadways travel through large and small (and often historic) town centers that require multimodal mobility and access in order to thrive. Therefore, the context classification provides an important layer of information that complements functional classification when determining the transportation demand characteristics along a roadway, including typical users, trip length, access needs, and appropriate vehicular travel speeds.

¹ Federal Highway Administration, "Highway Functional Classification Concepts, Criteria and Procedures."

**TABLE 6 ROADWAY FUNCTIONAL CLASSIFICATION AND
ROLE IN THE TRANSPORTATION SYSTEM**

Roadway Classification	Role in the Transportation System
Principal Arterial	Serves a large percentage of travel between cities and other activity centers, especially when minimizing travel time and distance is important
Minor Arterial	Provides service for trips of moderate length, serves geographic areas that are smaller than their higher arterial counterparts, and offers connectivity to the higher arterial system
Collector	Collects traffic from local streets and connects them with arterials; more access to adjacent properties compared to arterials
Local	Any road not defined as an arterial or a collector; primarily provides access to land with little or no through movement

** Federal Highway Administration, "Highway Functional Classification Concepts, Criteria and Procedures."
Context classification is not applied to limited access facilities. For non-limited access roadways, the FDM
provides design criteria and standards based on both context classification and functional classification.*

HOW TO IDENTIFY PROJECT-SPECIFIC TRANSPORTATION DEMANDS

While context classification and functional classification can provide a general understanding of the type and activity level of different users, additional data related to travel patterns and user demographics can help identify user needs and inform solutions to meet those needs. The anticipated users of a roadway and their travel patterns should be determined well before the design phase of a project and are best explored during the planning phase and prior to the design scoping phase. In addition, context classification often has implications for transportation and land use planning decisions, and not just roadway design decisions. For instance, C3C and C3R have the same design speed ranges and minimum lane-width requirements; however, corridors with either designation will differ in terms of land development, site design, access management, or transit considerations, among other features.



The anticipated users of a roadway and the travel patterns of those users should inform the needs and the alternatives developed for a project. Location: Fletcher Avenue, Tampa, FL

Source: FDOT

The ***Traffic Forecasting Handbook*** outlines data-collection efforts that can help planners and designers understand vehicular travel patterns. **Table 7** provides a menu of useful data sources for identifying different needs for different users. Not all the data presented in **Table 7** will be required for all projects. The data collected for a project should be tailored to the scale of the project and the users the project needs to serve.

TABLE 7 EXAMPLES OF POTENTIAL DATA TO DETERMINE USER NEEDS BY MODE

Mode	Data
 Pedestrian	• Location of signalized pedestrian crossings • Location of marked or signed pedestrian crossings • Posted, design, and operating speeds • Vehicular traffic volumes • Existing sidewalk characteristics (location, width, condition, obstacles or pinch points, gaps, separation from vehicles) • Intersection ramps and alignment/Americans with Disabilities Act (ADA) compliance • Utilities location • Existing landscape buffer and shade trees • Pedestrian counts • Crash data • Lighting levels • Existing and future land use, building form and site layout, development scale and pattern • Existing and future pedestrian generators (e.g. schools, parks, transit stops) • Problems/needs identified on the Safety Needs List Dashboard • Activity levels (StreetLight, Strava, etc) • Transit ridership (stop level)
 Bicyclist	• Local and regional bicycle network • Posted, design, and operating speeds • Vehicular traffic volumes • Number of vehicular travel lanes • Location and availability of bicycle parking • Bicycle user type • Existing bicycle facility characteristics (location, width, obstacles or pinch points, separation from vehicles) • Bicyclist counts • Crash data • Location of destinations • Lighting levels • Pavement condition • Existing and future land use, building form and site layout, development scale and pattern • Problems/needs identified on the Safety Needs List Dashboard • Activity levels (StreetLight, Strava, etc)" • Transit ridership (stop level)
 Automobile	• Design Traffic [existing and projected Average Annual Daily Traffic (AADT), K-factor (K), directional distribution (D), and traffic growth projections] • Trip lengths and origin/destination patterns • Turning movement counts • Posted, design, and operating speeds • Signal timing • Location and availability of parking • Crash data • Lighting levels • Pavement condition • Existing and future land use, building form and site layout, development scale and pattern • Problems/needs identified on the Safety Needs List Dashboard
 Transit	• Existing and future transit routes and stops • Transit service headways • Location and infrastructure at transit stops • Sidewalk and bicycle facility connection to transit stops • ADA compliant transit stops • Existing and projected ridership (route or stop level) • Existing and future transit generators and attractors • Type of transit technology • Trip lengths, origin/destination patterns
 Freight	• Designated truck routes • Truck volumes • Vehicle classification counts • Existing and future location of industrial land uses or other generators of freight trips • Freight loading areas/truck parking

Depending on the scale, purpose, and needs of the project, the following are some examples of questions that could augment the analysis to better understand transportation travel demand and needs for all users:

- **Land uses:** What pedestrian, bicycle, or transit generators are located along the roadway? Are there large shopping destinations? Large employers? Public facilities? Are there visitor destinations? How might existing land use patterns change based on approved or planned development? Is there a redevelopment plan for the area? What land use changes are planned or anticipated to occur?
- **Demographics:** Based on census data, are there indicators that people living near the corridor will want or need to travel by walking, biking and/or transit? These include areas overrepresented—when compared to the general population—by elderly or low-income residents or households without access to automobiles.
- **Vehicular trip characteristics:** What percentage of the vehicular trips are local? What is the average trip length? Is the roadway part of the SIS?
- **Travel patterns:** Are there unique travel patterns or modes served by the corridor? Will new or emerging transportation services or technologies influence trip-making characteristics (e.g., rideshares, scooters, interregional bus service, bikeshare)?
- **Safety data:** How many and what types of crashes are occurring along the roadway? Does crash data identify bicycle or pedestrian crashes? What is the severity of crashes?
- **Types of pedestrians:** Are there generators or attractors that would suggest that younger or older pedestrians, or other special user groups, will be using the roadway (e.g., schools, parks, elderly care facilities, assisted living centers)?
- **Types of bicyclists:** Is the roadway a critical link for the local or regional bicycle network? Does the roadway connect to or cross trails or bicycle facilities? Are bicyclists using the roadway to access shopping, employment, or recreational destinations?
- **Transit:** What type of transit service exists or is planned for the area? Where are transit stops located? Can pedestrians reach these stops from either side of the street without out-of-direction travel and delays? What amount of out-of-direction travel is required? Are transit stops accessible using the network of existing bicycle and pedestrian facilities?
- **Freight:** What is the percentage and volume of heavy trucks using the roadway? Are there destinations that require regular access by heavy trucks or vehicles with wide wheelbases? Is the roadway part of a designated freight corridor? Where does loading and unloading occur along the roadway?



The two photos above are from the same roadway and illustrate an example of a high-volume roadway that balances the needs of freight traffic, transit, and pedestrians and bicyclists of varying abilities. The corridor includes a shared use path, bicycle lanes, bus pull-outs, bus shelters with benches, and other amenities. Location: US 98, Polk County, FL Source: KAI

ENVIRONMENTAL CHARACTERISTICS

Environmental characteristics, including the social, cultural, natural, and physical aspects of an area, play a role in the planning, design, and maintenance of transportation projects. FDOT is focused on responsible stewardship of Florida's environmental resources. The FDOT Mission states that FDOT will provide a safe transportation system that “enhances economic prosperity and preserves the quality of our environment and communities.” Aligning with this mission, FDOT considers the social, cultural, natural, and physical impacts of its investments throughout the planning and design process.

Transportation projects that utilize federal transportation dollars (or that require a federal environmental permit such as wetlands or water quality) are subject to review under the **National Environmental Policy Act of 1969 (NEPA)**. FDOT developed the PD&E process to address NEPA for federally-funded transportation projects in Florida, including the identification and assessment of environmental characteristics for all projects.

Public involvement and agency coordination are required by NEPA and are part of the PD&E process. Detailed information on FDOT procedures for environmental review can be found in the following documents:

- ***PD&E Manual***
- ***ETDM Manual***
- ***Public Involvement Handbook***
- ***Sociocultural Effects Evaluation Process***
- ***Cultural Resource Management Handbook***

STRATEGIC INTERMODAL SYSTEM AND CONTEXT CLASSIFICATION

The SIS was established in 2003 to enhance Florida's economic competitiveness by focusing State resources on the transportation facilities most critical for statewide and interregional travel. The three SIS objectives identified in the **SIS Policy Plan** are:

- **Interregional connectivity**
Ensure the efficiency and reliability of multimodal transportation connectivity between Florida's economic regions and between Florida and other states and nations.
- **Intermodal connectivity**
Expand transportation choices and integrate modes for interregional trips.
- **Economic development**
Provide transportation systems to support Florida as a global hub for trade, tourism, talent, innovation, business, and investment.

The SIS includes Florida's largest and most significant commercial service and general aviation airports, spaceports, public seaports, intermodal freight terminals including intermodal logistics centers, interregional passenger terminals, urban fixed guideway transit corridors, rail corridors, waterways, military access facilities, and highways. The SIS includes three types of facilities: hubs, corridors, and connectors.



*Accommodation of freight vehicles is an important part of context-based design. Location: Estero Boulevard, Fort Myers Beach, FL
Source: Rick Hall*

SIS Highway corridors and connectors traverse varying context classifications. Given the purpose and intent of the SIS, the requirements of a particular context classification may not always align with the function of the SIS highway. In the case of interstates and limited access facilities, the function of the roadway is considered complete. For all others, there is a need to balance the safety and comfort of users who live and work along the SIS facility with interregional and interstate freight and people trips through the area. This is consistent with the intent of the **SIS Policy Plan**, which specifically calls for the need to improve coordination with regional and local transportation and land use decisions by:

- Better reflecting the context of the human and natural environment.
- Balancing the need for efficient and reliable interregional travel with support for regional and community visions.
- Developing multimodal corridor plans that coordinate SIS investments with regional and local investments.
- Leveraging and strengthening funding programs for regional and local mobility needs such as the Transportation Regional Incentive Program, Small County Outreach Program, and Small County Road Assistance Program.

The **SIS Policy Plan** outlines that SIS improvements should consider the context, needs, and values of the communities serviced by the SIS, which may include flexibility in design and operational standards. Most importantly, communication with all parties involved is key to determining the best solution to realize the intent of both the SIS and a context-based approach within a community.

The **FDM** provides design standards for facilities on the SIS. Roadways located on the SIS require coordination with the District SIS Coordinator during the determination, update, or confirmation of the facility's context classification.

Chapter 3

Context Based Speeds

Vehicle speed concepts can be classified into four types:



Design speed—the selected speed used to determine various geometric elements of the roadway.¹



Operating speed—the speed at which drivers are observed traveling during free flow conditions.²



Posted speed limit—established by methods described in the Speed Zoning for Highways, Roads, and Streets in Florida Manual. This manual is adopted by Rule 14-15.012, F.A.C.



Target speed—the highest speed at which vehicles should operate in a specific context, consistent with the level of multimodal activity generated by adjacent land uses, to provide both mobility for motor vehicles and a supportive environment for pedestrians, bicyclists, and public transit users.³

Target speeds should be within the design speed range provided in the **FDM** for each context classification, as shown in **Table 8**. Ideally, the target speed, design speed, and posted speed are all the same where speeds are 45 mph or less. When these speeds are different, it can result in inconsistent driver expectation about the intended operating speed. The concept of target speed is to identify a desired operating speed and develop design strategies and elements that reinforce operating speed. Design speed and posted speed may take time to change and may need to be changed over the course of several projects.

The target speed is influenced by context classification and should be selected to provide for both the safety and mobility needs of all anticipated users.

TABLE 8 FDOT CONTEXT-BASED DESIGN SPEEDS FOR ARTERIALS AND COLLECTORS

CONTEXT CLASSIFICATION	ALLOWABLE DESIGN SPEED RANGE (MPH)	SIS MINIMUM (MPH)
C1 Natural	55-70	65
C2 Rural	55-70	65
C2T Rural Town	25-45	40
C3 Suburban	35-55	50
C4 Urban General	25-45	45
C5 Urban Center	25-35	35
C6 Urban Core	25-30	30

¹ American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011

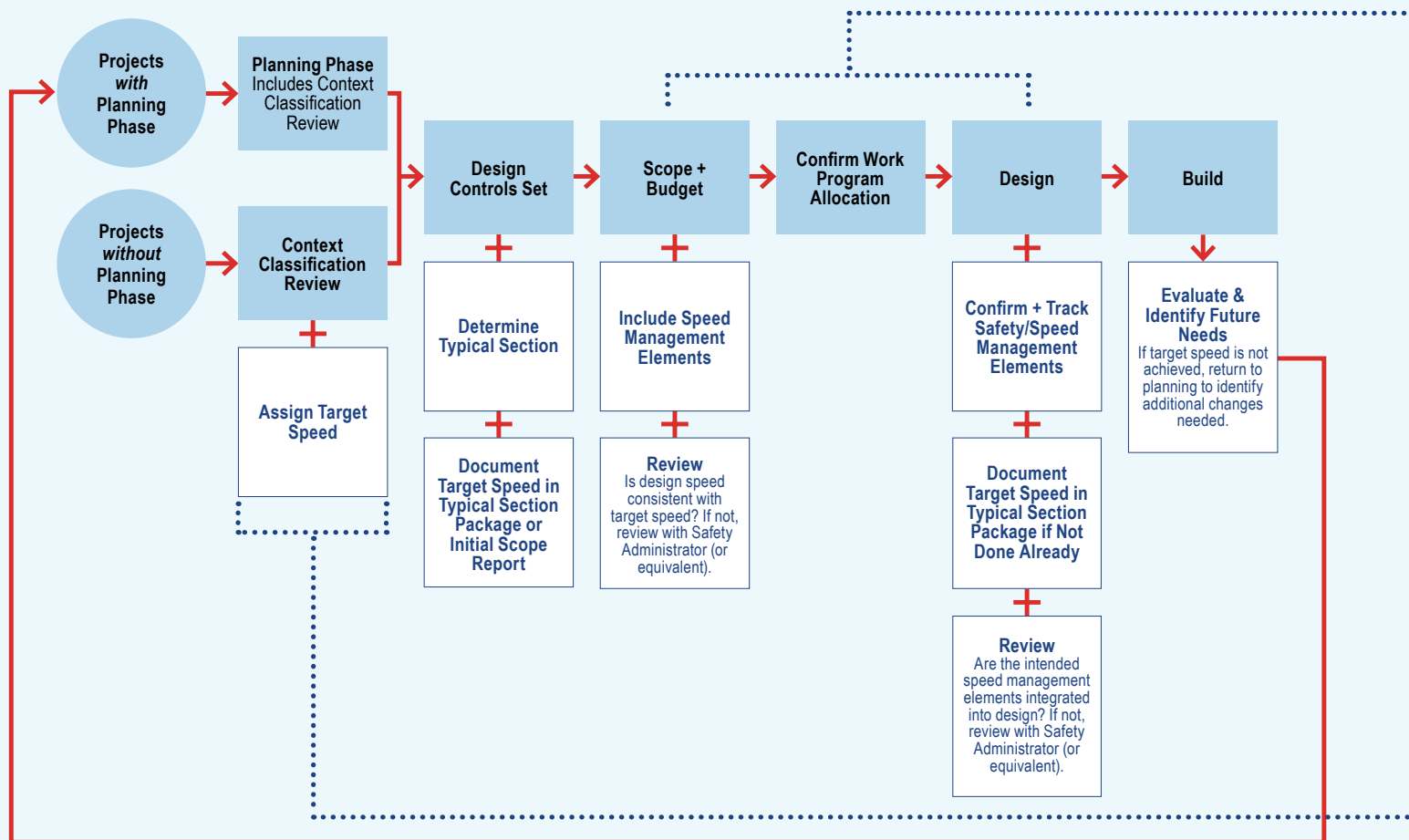
² American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011

³ FDOT Design Manual, 2021.

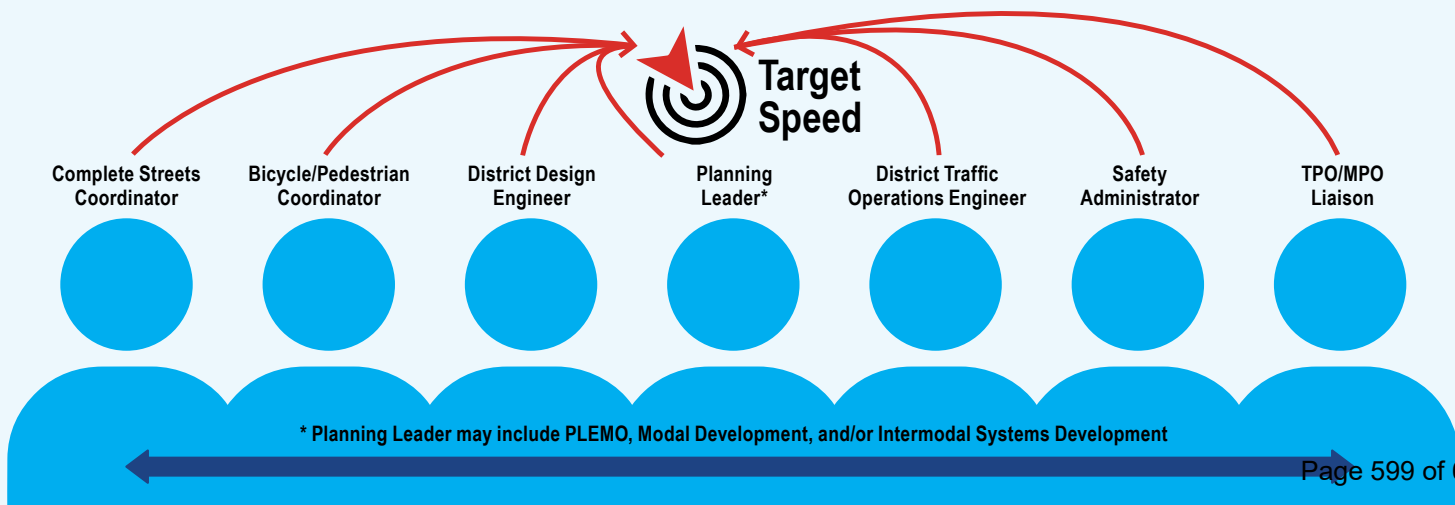
DETERMINING THE TARGET SPEED

The target speed must be identified early in the development process to inform and influence the selection and establishment of the design speed. Each District should define its own process for setting target speeds, including the individuals responsible. **Figure 19** shows an example process that identifies target speeds during the planning phase of the project and at the same time that the context classification is determined. Many datapoints used to define context classification also aid in determining target speed. **Districts should develop and adjust the process as needed to meet their unique needs, maintaining the key element of identifying and documenting target speed early in the process and prior to scope development.**

FIGURE 19 EXAMPLE PROCESS TO DETERMINE TARGET SPEED



The target speed should be identified by a multidisciplinary group of engineers and planners. This group can work together to set the target speed and make sure the elements identified to achieve the target speed are carried through scoping, design, and implementation.



- Include design elements to achieve the target speed in project scopes to limit changes after scoping. During design, scoped safety and speed management elements should be tracked for inclusion in the final project design. If elements are removed, they should be discussed with the District Safety Administrator or equivalent.

Within the design speed range, use the steps below to assign a target speed. The first two steps can be used to determine an initial target speed and may serve as a reasonable stopping point. Steps 3 through 5 help refine the target speed and arrive at a target speed that is more likely to be achieved based on project constraints.

STEPS TO DETERMINING TARGET SPEED

1. **DETERMINE FDM CONSISTENCY:** Identify context classification, current design and posted speed, SIS designation, and **FDM** design speed range

2. **IDENTIFY STARTING POINT FOR TARGET SPEED:**

↓ In C1 and C2, start at the high end of the design speed range and **justify reduction**.

↑ In C2T, C3R, C3C, C4, C5, and C6 start at the low end of the design speed range and **justify increase**.

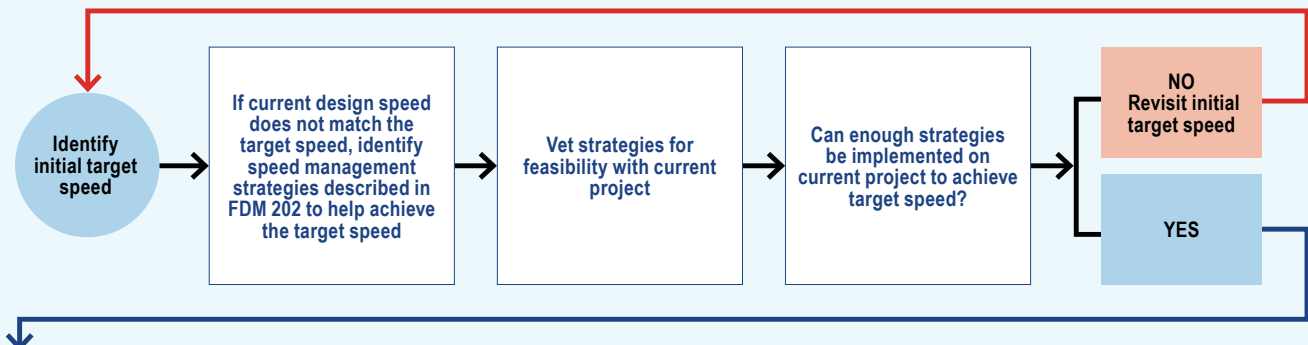


3. **IDENTIFY PROJECT NEEDS:** Refine the target speed using the following questions:

- a. Who are the intended users? Are pedestrians, bicyclists, and transit riders traveling along or across the roadway?
- b. What are potential safety challenges? Are safety needs identified on the Safety Needs List Dashboard? Does crash data identify bicycle or pedestrian crashes? What is the frequency, severity, and key crash patterns of auto crashes?
- c. Are there special population groups using the corridor (lower income, 0-car households, aging population, school age children)?
- d. What is the level of community support? Has the community requested lower speeds?
- e. What is the transportation role of the roadway in the network? Is it used to access destinations? What is the density of driveways, side streets, and signals?

Under a safe system approach, the absence of crashes does not mean the current posted speed is appropriate. Characteristics such as conflict points and separation of users can inform potential safety challenges. The FDM allows design flexibility to support the safe system approach and proactive safety efforts.

4. **REVIEW POTENTIAL COUNTERMEASURES:**



5. **DOCUMENT TARGET SPEED:** If the initial recommended target speed value is not feasible to attain in a single project, the target speed should be as close to the initial target speed values as can be achieved within the constraints of the project.

DESIGNING TO THE TARGET SPEED

Multiple design modifications may be necessary to achieve the target speed in a single project. In some cases, it may take multiple projects. For example, on a resurfacing project, it may not be feasible to move the curb line to significantly lower the target speed, but other treatments can be added to move toward the target speed. If the roadway is reconstructed in the future, the curb line could be moved to further reduce speeds.

After a project is complete, the project team can conduct a speed study in accordance with the Speed Zoning Manual to measure the operating speed and determine if the target speed has been achieved. If the target speed has not been achieved, another project may need to be programmed with additional speed management treatments. If after all feasible roadway design and operational modifications have been tried and the target speed has not been achieved, the speed limit should be posted per the FDOT Speed Zoning Manual. The roadway should continue to be prioritized for future projects to continue to work toward the target speed.

If the target speed is not met, increased emphasis should be placed on providing facilities that can achieve safe travel at the higher operating speed. Examples include:

- 1 More frequent controlled crossings for pedestrians and bicyclists.
- 2 Enhanced parallel facilities for pedestrians and bicyclists
- 3 Greater separation between vehicle traffic and bicycle and pedestrian facilities.



The Explorer Tool on the FDOT Complete Streets Website provides examples of speed management tools for each context classification. For example, as shown in **Figure 20**, in C2T-Rural Town treatments including terminated vistas, raised crosswalks, and street trees can be used to help achieve target speeds. In C3C-Suburban Commercial treatments including raised medians, raised barriers between vehicle traffic and bicycle facilities, and median noses at intersections can be used to help achieve target speeds, as shown in **Figure 21**. Refer to **FDM 202** for additional speed management tools by context classification and design speed.

FIGURE 20 C2T-RURAL TOWN SPEED MANAGEMENT



- 1 Terminated vista
- 2 Raised crosswalk
- 3 Shared lanes with sharrows
- 4 Street trees

FIGURE 21 C3C-SUBURBAN COMMERCIAL SPEED MANAGEMENT



- 1 Lane narrowing
- 2 8' sidewalk
- 3 Separated bicycle lanes
- 4 Green-colored pavement markings
- 5 Intersection refuge islands

Chapter 4

Linking Context Classification to the FDM and Other Documents

The FDOT context-based design approach is compatible with and supported by national guidance documents. The following section describes the relationship between FDOT context classification and other FDOT and national manuals and handbooks.

AASHTO'S A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS

The AASHTO *A Policy on Geometric Design of Highways and Streets (Green Book)*, 7th Edition (2018) provides geometric design guidance based on established practices that are supplemented by recent research. AASHTO recognizes that different places have different characteristics regarding density and type of land use, density of street and highway networks, nature of travel patterns, and the ways in which these elements are related. AASHTO's *Guide for the Planning, Design and Operation of Pedestrian Facilities* (2004) and *Guide for the Development of Bicycle Facilities* (2012) expand significantly on the *AASHTO Green Book*, presenting factors, criteria, and design controls for pedestrian and bicycle facilities.

Functional classification and context classification make up the framework for geometric design, presented in the *Green Book*. In the 7th Edition, Chapter 1 was rewritten, expanding the consideration of two land use contexts (urban and rural) to five land use contexts: rural, rural town, suburban, urban, and urban core. The context classifications considered in the *Green Book* were initially presented in *NCHRP Report 855*, which also influenced the FDOT context classifications. Design guidance for the context classifications presented in the *Green Book* is preliminary, with more comprehensive guidance planned for the 8th edition of the *Green Book*.

The rewritten Chapter 1 encourages flexible design by asking engineers to move beyond nominal design criteria. Instead of merely meeting minimum values, engineers should consider the influence of project-specific conditions on design dimensions. Land use context (existing and future) is considered an element of the geometric design process and focuses the consideration of multimodal needs in design. In some cases, the need to serve pedestrians may conflict with the need to serve other transportation modes (*Section 1.6.1.3*). Designers should find an appropriate balance among the needs of all users, suitable for the conditions at each specific location. The *Green Book* identifies some general changes between context classifications that may aid in finding an appropriate balance among the needs of all users (*Section 1.5.2.1*).

Considerations as Roadways Transition between Contexts

As a roadway transitions from rural to a rural town:

-  Design speed is reduced
-  Pedestrian and bicyclist flows increase
-  Need to blend in with the community increases
-  Importance of parking increases

As a roadway transitions from suburban to more urban and eventually to urban core:

-  Emphasis on high operating speed is reduced
-  Pedestrian and bicyclist flows increase
-  Importance of parking increases

Design speed is a key design control that impacts the geometric design features of the roadway. Speed expectations and the typical level of pedestrian, bicycle, and transit activity vary between the different context classifications. The **Green Book** provides general ranges for design speeds based on context classification, shown in the table below, as well as provides guidance in the selection of design speed. The selection of design speed should consider a combination of safety, mobility, environmental impacts, economics, aesthetics, and social or political impacts (*Section 2.3.6.3, p.2-23*). The selected design speed should reflect the needs of all transportation modes expected to use a particular facility (*Section 2.3.6.3, p.2-24*). Control devices and congestion regulate the traveled speed in some contexts, especially in urban areas. In these locations, arterials should be designed to permit running speeds of 20–45 mph in urban areas (*Section 2.3.6.3, p.2-26*). Streets through crowded business areas should be designed for a lower running speed, which in some cities is between 15–25 mph (*Section 2.3.6.3, p.2-27*).

TABLE 9 DESIGN SPEED RANGES BY CONTEXT FROM THE GREENBOOK

Facility Type	Rural	Rural Town	Suburban	Urban	Urban Core
Collector (Sections 6.2.1.1, 6.3.1.1)	≥50 mph	≤45 mph	35–50 mph	30–40 mph	25–35 mph
Arterial (Sections 7.2.2.1, 7.3.2.1)	≥45 mph (based on terrain)	20–45 mph	30–55 mph	25–45 mph	≤30 mph

Note: The design speed ranges from the **Greenbook are similar but not identical to the FDOT design speed ranges.*

The **Green Book** acknowledges that the context classification may vary along a given corridor. Each portion of a project should be designed in accordance with its corresponding context classification and with appropriate transitions between different context classifications (*Section 1.5.3*). The **Green Book** especially emphasizes the transition that occurs when rural highways enter a small town (*Section 1.5.1.2*). In the rural town context, it is important that a roadway meets the needs of both the community and through travelers. The **Green Book** provides specific guidance related to the transition of roadways from rural context to rural town context. The transition area should be designed to encourage speed reduction. Design treatments that may be implemented include: center islands, raised medians, roundabouts, roadway narrowing, lane reductions, transverse pavement markings, colored pavements, and layered landscaping (*Sections 6.2.10, 7.2.19*).

Other decisions impacted by context classification include:

- The appropriate level of service, which is also affected by functional classification, community goals, and adjacent land use types. In general, the level of service for motor vehicles in rural contexts is expected to be higher than in other contexts (*Table 2-3, p.2-37*).
- In suburban, urban, and urban core contexts, sidewalk construction should be considered as part of any street improvement (*Section 2.6.2, p.2-51*).

- High rates of superelevation are generally undesirable on high-volume roads where vehicles may need to slow substantially, such as roadways in the suburban, urban, and urban core contexts (*Section 3.3.2.1*).
- Lighting along roadways in rural contexts may be desirable, but it typically has a lower need than lighting on roadways in urban contexts. In suburban, urban, and urban core contexts where there are concentrations of pedestrians and roadside intersectional interferences, fixed-source lighting tends to reduce crashes (*Section 3.6.3, p.3-188*).

FDOT DESIGN MANUAL (FDM)

In order to design the various elements of a roadway, including its alignment and cross section, the designer must understand the basic design controls associated with the roadway to implement context-based planning and design. Context classification is used to select project standards so that facilities will function safely for all expected users (*Section 110.4, 5*). Chapter 2 of the **FDM** presents design criteria based on context classification, functional classification, and design speed (*Section 200.1, 1*). The selected design speed should be context-appropriate, to attain a desired degree of safety, mobility, and efficiency (*Section 201.5.1, 8*). Design speed was covered in more detail in the previous chapter. This section focuses on the design user and design vehicle.

THE DESIGN USER

Roadway users' varying skills and abilities should influence roadway design. The physical characteristics of the young, the aging, and people with different physical abilities introduce a variety of human factors that can influence driving, walking, and cycling abilities. Design users should be taken into consideration when determining design details such as sidewalk width, type of bicycle facility, design speed, signal timing and spacing, location of pedestrian crossings, number of vehicular travel lanes, intersection width, and lighting.

Driver performance informs roadway design.

FDOT has identified teen drivers (ages 15–19) and aging drivers (age 65 and up) as at-risk drivers. The 2019 American Community Survey reports that 5.7 percent of Florida's population was 15–19 years old, and 20.9 percent of Florida's population was 65 years old or older. Historically, fatalities involving teen drivers and aging drivers typically account for around one-quarter of all Florida traffic fatalities. Compared to younger drivers, older drivers tend to process information slower and have slower reaction times, deteriorated vision and hearing, and limited depth perception.¹ For additional information, refer to FHWA publications **Highway Design Handbook for Older Drivers and Pedestrians** and **Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians**.

Consider the pedestrian design user.

Pedestrians are among the most vulnerable roadway users. In 2019, Florida led the state rankings in annual pedestrian fatalities per 100,000 people with a recorded 5,433 pedestrian fatalities between 2008 and 2017.² Pedestrian characteristics that serve as design controls include walking speed, walkway capacity, and the needs of persons with disabilities. According to the U.S. Census Bureau, 27 percent of the population in the United States had a disability in 2014.³ Age plays an important role in how pedestrians use a facility, as older adults are the most vulnerable pedestrians.⁴

¹ American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, 6th Edition, 2011, 2–43.

² Smart Growth America, *Dangerous by Design 2019*

³ United States Census Bureau, "Americans With Disabilities: 2014," November 2018 <https://www.census.gov/content/dam/Census/library/publications/2018/demo/p70-152.pdf>.

⁴ "Aging Road User," accessed September 22, 2016, <http://www.safeandmobileseniors.org/AgingRoadUser.htm#Bicyclists>.

Context-based design considers the pedestrian design user to represent people with a range of abilities, including the elderly, children, and persons with disabilities. This is especially true in context classifications C2T-Rural Town, C3C-Suburban Commercial, C4-Urban General, C5-Urban Center, and C6-Urban Core where a higher level of pedestrian activity is expected. People with varying abilities require a continuously paved level surface on both sides of the roadway, a network that allows multiple and direct routes to destinations, short crossing distances, and protection from the weather including shade. Several design elements have been found to assist elderly pedestrians, including accommodation for slower walking speeds and adequate median refuge islands at wide intersections. For additional information, refer to FHWA publications *Highway Design Handbook for Older Drivers and Pedestrians* and *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*.

Bicyclist characteristics vary by user skill level, which varies by age, experience, and trip purpose. Bicycling trip purposes are broadly categorized into utilitarian trips and recreational trips:

- Utilitarian trips are non-discretionary trips needed as part of a person's daily activity, such as commuting to work, school, or shopping.
- Recreational trips include trips for exercise or social interaction. Experienced riders, regular travelers, casual riders, and infrequent users all make recreational trips.

Bicyclists pose different safety and geometric considerations and must also be considered in roadway design. Bicyclist characteristics, preferences, and trip purposes may vary from rider to rider. However, in most cases the design user should reflect the casual and younger rider. Data on trip purpose and experience level provide some



information on bicyclist characteristics and preferences.

Casual and younger riders tend to:

- Prefer a physical separation from vehicular traffic.
- Ride on the sidewalk.
- Achieve travel speeds of around 8–12 mph.
- Bicycle shorter distances.

Experienced adult riders tend to:

- Be more comfortable riding with vehicles on streets. Some will prefer to ride in mixed traffic on lower speed streets, while others will prefer dedicated bicycle facilities.
- Ride at speeds up to 25 mph on level ground.⁵

For bicyclists, the design user should reflect the casual and younger rider in most cases. Data that may indicate the need to accommodate casual and younger riders include:

- Origins and destinations that generate bicycle trips along or within proximity to a roadway, such as schools, parks, high-density residential housing, shopping centers, and transit stops.
- Data that indicate propensity of bicycle crashes.
- Roadways within well-connected street networks.
- Roadways that connect to local or regional dedicated bicycle facilities.
- Data that indicate bicyclists are currently riding on the sidewalk.
- Public input.

See the *FDM* for current FDOT criteria related to bicycle and pedestrian facilities.

⁵ American Association of State Highway and Transportation Officials, *Guide for the Development of Bicycle Facilities* Fourth Edition, 2012, 15.

DESIGN VEHICLE

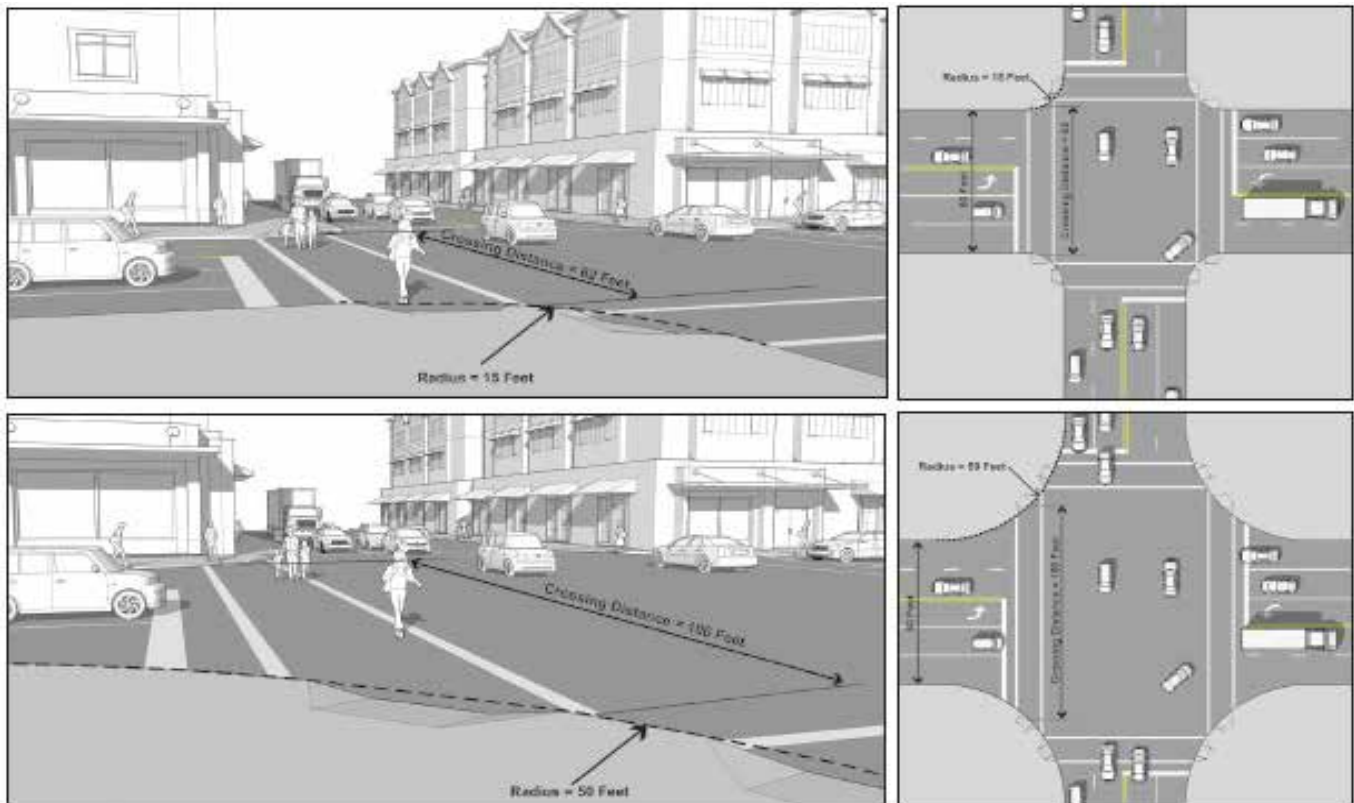
The type of design vehicle is influenced by the functional and context classification of a roadway (Section 201.6, 13). This guide builds on existing guidance from the **FDM** and the [FDOT District 7 Draft Freight Roadway Design Considerations](#) in determining the design vehicle based on context and users. The type of design vehicle is influenced by the functional and context classification of a roadway, the role of the roadway in the network, and the land uses served. The design vehicle is the largest vehicle that is accommodated without encroachment on to curbs (when present) or into adjacent travel lanes. The WB-62FL is often used as the design vehicle on state roadways. In areas where the context classification suggests a need for multimodal travel, a smaller vehicle turning template may be more appropriate for turning movements at intersections where cross streets will not be expected to have significant levels of heavy truck traffic.

All movements at all intersections may not need to be designed for WB-62FL turning movements, which are rare in urban contexts and at intersections with local or collector streets. Designs that accommodate a WB-62FL without encroachment for all turning movements may result in consequences including:

- Increased pavement resulting in higher capital and right-of-way costs, particularly in dense or constrained areas with high property values.
- Increased pedestrian crossing distances.
- Higher turning speeds for all vehicles of all sizes.
- Reduced pedestrian comfort and convenience.

The consideration of a smaller vehicle for turning movements between designated freight roadways and lower-classified urban streets can help balance goods movement with user access and comfort (see Figure 22). To address this, the **FDM** calls for using both a design vehicle and a control vehicle when designing roadways.

FIGURE 22 RELATIONSHIP BETWEEN CURB RADII AND PEDESTRIAN CROSSING DISTANCE



Curb radii has significant influence on the pedestrian crossing distance at intersections. Top and bottom illustrations compare the crossing distances between an intersection with 50 feet and 15 feet curb radius.

The control vehicle is the largest vehicle that can be expected to make use of the roadway. In this approach, the current FDOT design vehicle could be used as the control vehicle for curbed roadways within C4, C5, and C6 context classifications (*Section 201.6.1, 14*). For the purposes of turning movements, the control vehicle is expected to make a turn only rarely. A smaller vehicle, expected to make frequent turns to lower-class side streets, is designated the design vehicle. The intersection turning movement considers both the design vehicle and the control vehicle (see **Figure 23**):

- The **design vehicle** is the vehicle that must be accommodated without encroachment onto curbs (where present) or into opposing traffic lanes.
- The **control vehicle** is the vehicle that is infrequent and is accommodated by allowing:
 - Encroachment into opposing lanes if no raised median is present (see **Figure 24**).
 - Minor encroachment into the street side area if no critical infrastructure (traffic signal, poles, etc.) is present.

FIGURE 23 INTERSECTION DESIGN SHOULD CONSIDER BOTH DESIGN VEHICLE AND CONTROL VEHICLE

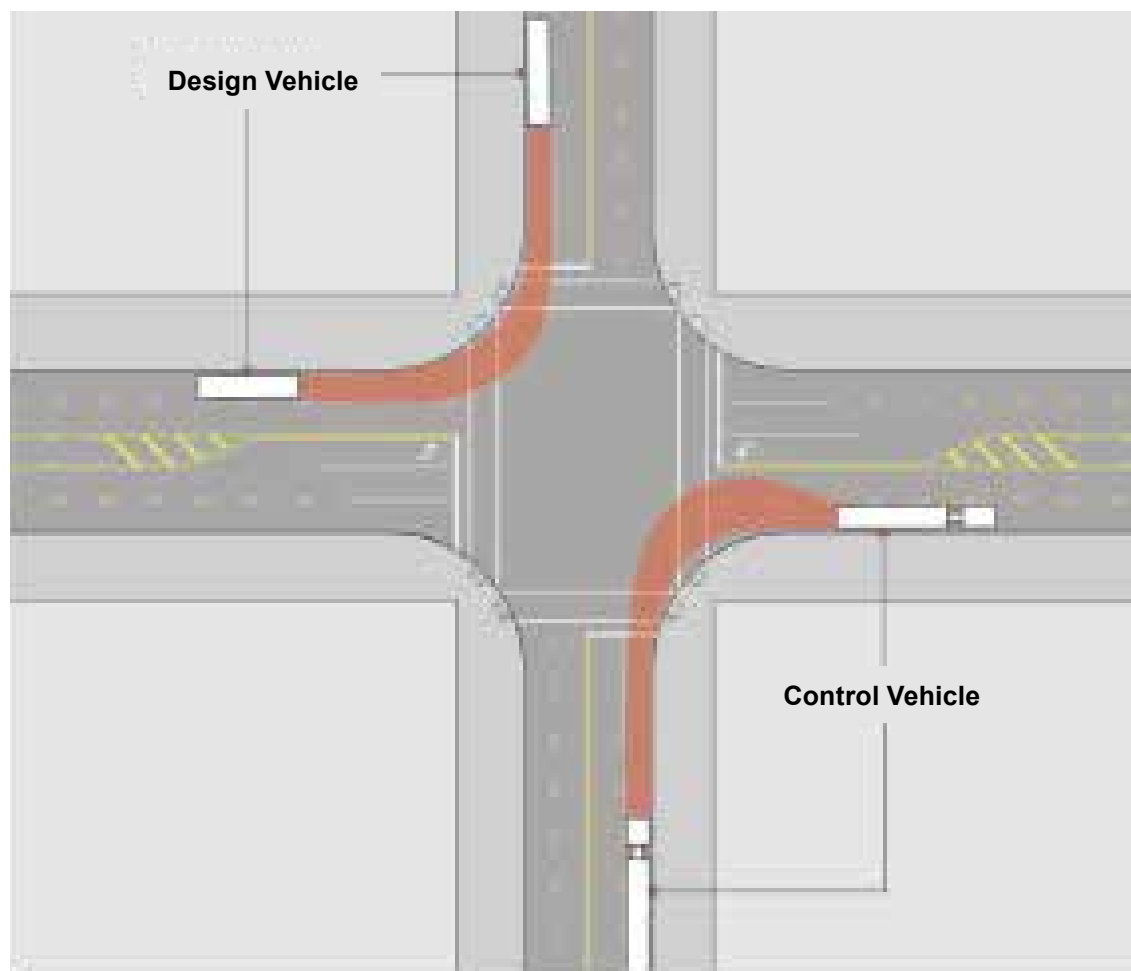
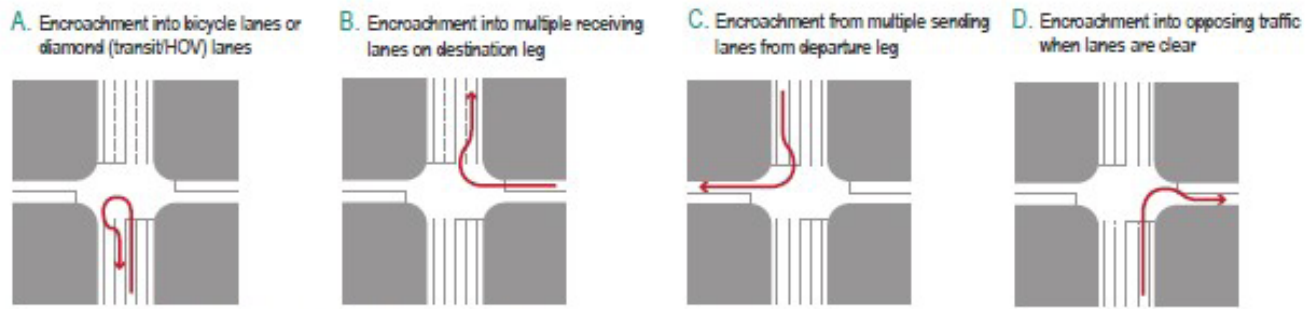


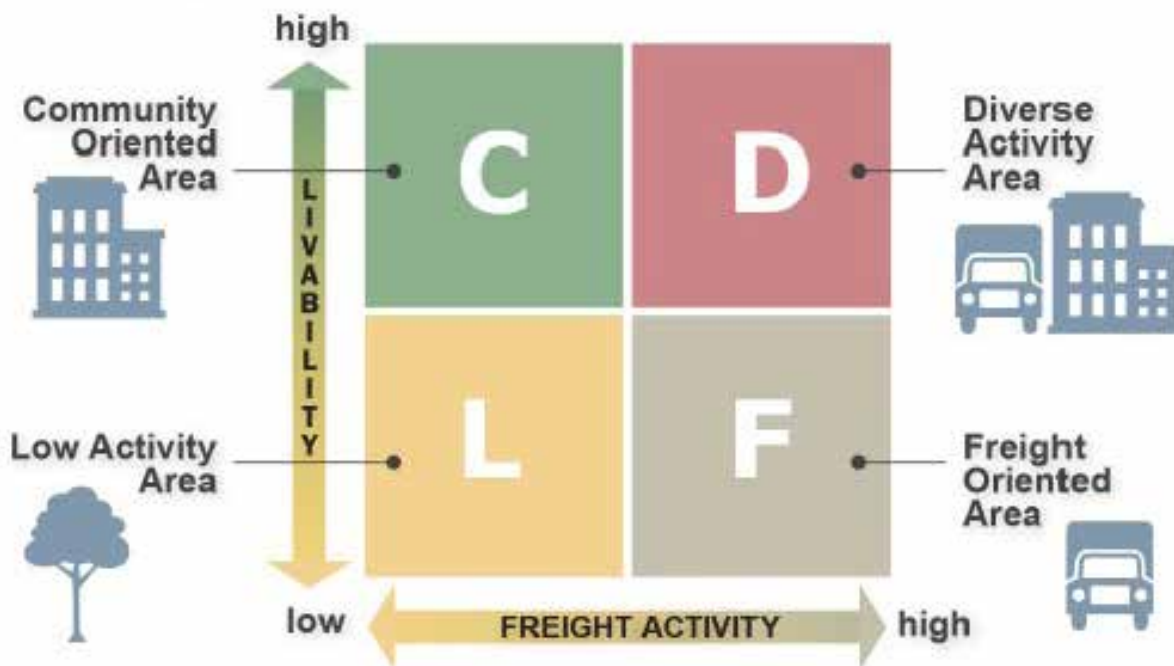
FIGURE 24 AN INFREQUENT CONTROL VEHICLE ENCROACHMENT INTO OPPOSING AND ADJACENT LANES



Source: FDOT District 7 Draft Freight Roadway Design Considerations.

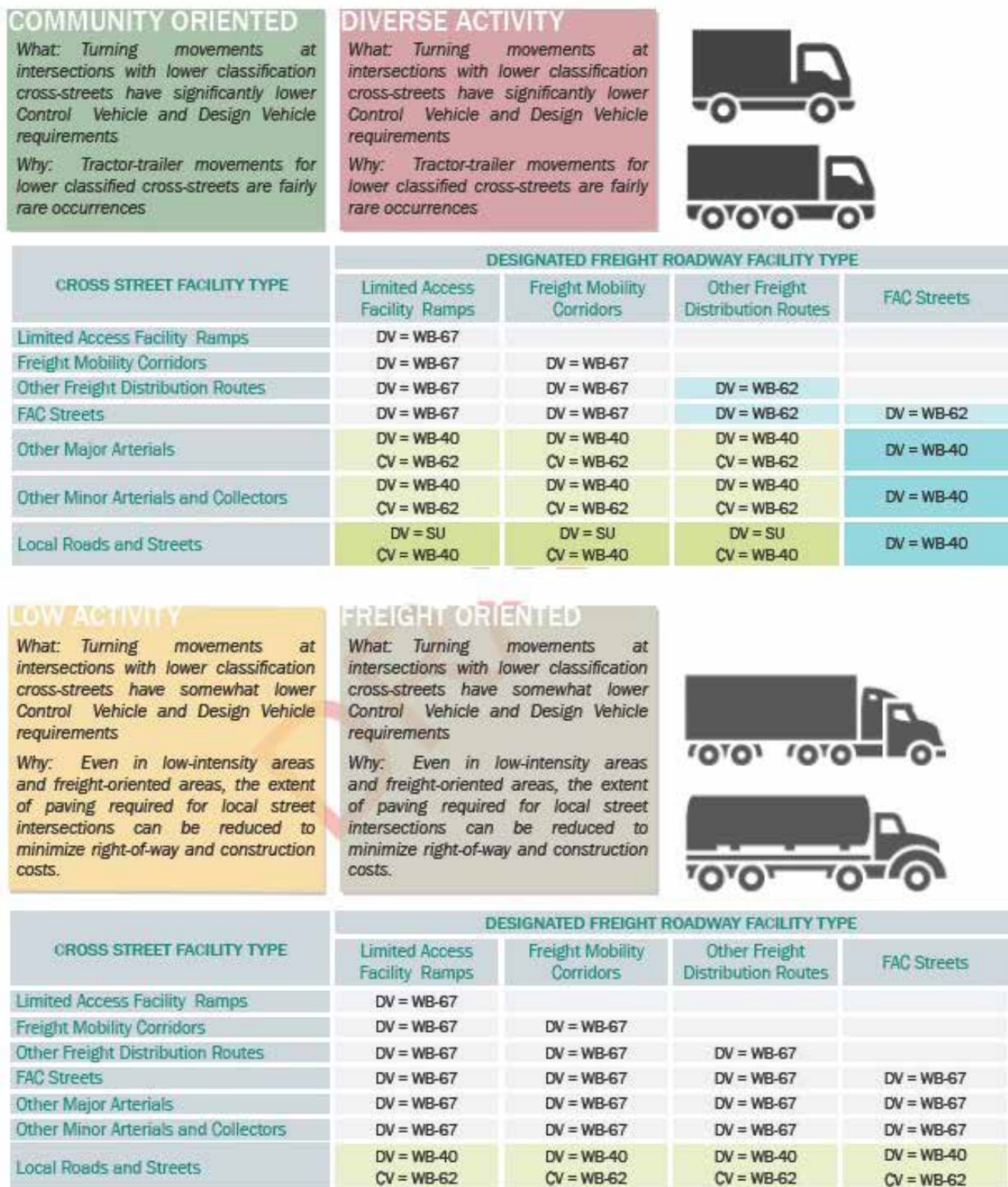
FDOT District 7 Draft Freight Roadway Design Considerations outlines a context-sensitive design approach and strategies for freight accommodations. The report identifies four general area types characterized by the land uses and activities that exist or are anticipated in areas throughout the Tampa Bay region (see **Figure 25**). The report defines four freight roadway facility types and seven cross-street facility types. **Figure 26** presents the recommended design vehicle and control vehicle for the intersection of each freight roadway facility type with each cross-street facility type within four different contexts. For more information on the District 7 design vehicle and control vehicle recommendations and the type of encroachment permissible in different contexts, refer to the [FDOT District 7 Draft Freight Roadway Design Considerations](#).

FIGURE 25 FDOT DISTRICT 7 DRAFT FREIGHT ROADWAY DESIGN CONSIDERATIONS: GENERAL AREA TYPES



Source: FDOT District 7 Draft Freight Roadway Design Considerations.

FIGURE 26 DRAFT FDOT DISTRICT 7 FREIGHT DESIGN CONSIDERATIONS FOR DESIGN VEHICLE AND CONTROL VEHICLE AT INTERSECTIONS



Source: FDOT District 7 Draft Freight Roadway Design Considerations.

OTHER DESIGN CRITERIA



Sidewalk Criteria influenced by context classification in the **FDM** include:

- Need to demonstrate demand for use of sidewalk in C1, C2, and C3C context classifications (*Section 222.2.1, 3*).
- Sidewalk width (*Table 222.1.1, 4*).
- Choice of the use of pedestrian fencing or railing at pedestrian drop-off hazards (*Section 222.4, 16*).
- Sidewalk width across bridge structures (*Section 260.2.2, 6*).



Bicycle Facility Criteria influenced by context classification in the **FDM** include:

- Marking a paved shoulder as a bicycle facility (*Section 223.2.2, 7*).
- Substitution of a shared use path for a bicycle lane in C1, C2, or C3 context classifications (*Section 223.2.3, 8*).

Other Design Criteria influenced by context classification in the **FDM** include:

- Speed management treatments (*Section 202 and Table 202.3.1*).
- Lane widths of travel, auxiliary, and two-way left turn lanes (*Table 210.2.1, 3*).
- Presence of on-street parking, which is a key element of urban contexts C4, C5, and C6 but also may be found in C2T. Where on-street parking is not present in C4, C5, or C6, it should be considered if in alignment with local plans, speed management needs, or parking needs (*Section 210.2.3, 4*).
- Median widths along curbed and flush shoulder roadways (*Table 210.3.1, 18*).
- Channelization island design (*Section 210.3.2.1, 20*).
- Border width along curbed and flush shoulder roadways (*Table 210.7.1, 48*).
- Maximum grade (*Table 210.10.1, 58*).
- Minimum clearance from the bottom of the roadway base course to the Base Clearance Water Elevation (*Section 210.10.3 (2), 61*).
- Intersections should be designed to accommodate the placement of trees and other vegetation in urbanized context classifications (*Section 212.11.6, 27*).
- Corner radii (*Section 212.12.1, 40*) and design of channelized right turn lanes (*Section 212.12.2, 42*).
- Requirements for external lighting of overhead signs (*Section 230.2.4, 3*).
- Guidelines for the installation of ITS support infrastructures and vehicle detection systems (*Section 233.4, 11; 233.9, 20*).

FDOT ACCESS MANAGEMENT GUIDEBOOK

The **FDOT Access Management Guidebook** provides standards for medians, median openings, and driveways along state roads. Roadways are assigned an access management classification to determine the applicable standards. Access management classifications range from 00 to 07 and 99. Class 01 reflects the highest amount of access management control (freeways), and Class 07 reflects the lowest. Class 07 is usually found on urban or suburban built-out roadways. Class 99 is assigned to roadways with a special corridor access management plan. Refer to Florida Administrative Code (FAC), Rule Chapter 14-97.003, Access Management Classification System and Standards, for more information on access management classification.

Context classification is based, in part, on the characteristics and spacing of cross-street intersections. In general, higher intensities of use, including C2T, C4, C5, and C6 may require less restrictive access management. In these context classifications, frequent intersections, smaller blocks, and a higher degree of connectivity and access support the multimodal needs of the area. More restrictive median and connection spacing is typically found in C1, C2, C3C, C3R, and in some cases, C2T. Beyond the context classification, the role of the roadway in the transportation system and safety considerations must also be considered to determine access management needs.

The guidebook identifies the context classifications that typically occur within each access management classification. The access management classification defines the allowable median type, median opening spacing, driveway spacing, and signal spacing (*Section 2.4, Table 3*). Other parameters, such as median width are set in consideration of the context classification (*Section 3.4.1, Table 9*).

Additionally, the guidebook assigns modal priorities for the design of medians and driveways (*Section 3.8, Table 14 and Table 15*). In context classifications C4, C5, and C6 it is especially important to balance large vehicle needs and pedestrian needs (*Section 3.4.1, Table 9*). The modal priorities are complementary to the expected user types in different context classifications presented previously in **Figure 6**. The guidebook also identifies specific considerations regarding medians and driveways by context classification (*Section 3.8, Table 14 and Table 15*).

Other decisions that are affected by context classification include:

- The radial return or presence of turn lanes at driveways (*Section 2.2.1, 14*).
- The types of delivery areas that are available to freight traffic (*Section 7.6.1, 129*).
- Appropriateness of higher speed driveways in C1, C3, and C3C (*Section 4.2.3, 65*).
- Recommendations for offset left-turn lanes in C4, C5, and C6 (*Section 5.4.2, 91*).
- Consideration for right turn lanes at driveways (*Section 6.2.1, 98*).

FDOT TRAFFIC ENGINEERING MANUAL

The **FDOT Traffic Engineering Manual (TEM)** provides traffic engineering standards and guidelines for the State Highway System. The manual outlines the process on how traffic engineering standards and guidelines are adopted as well as provides chapters devoted to roadway signs, traffic signals, markings, and specialized operational topics.

The **TEM** establishes context-based criteria for the consistent installation and operation of marked pedestrian crosswalks at midblock and unsignalized intersections. The 2021 **TEM** requires an engineering study to install marked crosswalks at midblock or unsignalized crossing locations. Pedestrian volume data is not needed to place a marked crosswalk in context classifications C2T, C3C, C4, C5, and C6 (*Section 5.2.5.1 (2c)*).

The **TEM** allows the DTOE to implement Leading Pedestrian Intervals (LPIs) at their discretion in context classifications C2T, C4, C5, and C6. In context classifications C1, C2, C3R, and C3C additional analysis is required to determine if an LPI is appropriate (*Section 3.11.4*).

The **TEM** aligns several additional decisions with consideration of context classification, including:

- If a site warrants a pedestrian hybrid beacon (PHB), the PHB may be substituted with a midblock traffic control signal using Warrant 8 of the MUTCD, in context classifications C4, C5, and C6 (*Section 5.2.5.2 (2e)*).
- Context classification should be considered when reviewing requests for bicycle signs (*Section 2.11.2 (4a)*).

FDOT QUALITY/LEVEL OF SERVICE HANDBOOK

The **FDOT Quality/Level of Service Handbook (Q/LOS Handbook)** and the Generalized Service Volume Tables are intended to be used by engineers, planners, and decision makers in the development and review of street users' quality/level of service and capacity at generalized and conceptual planning levels. The **Q/LOS Handbook** recognizes that motorists have different thresholds for acceptable delay in rural versus urban areas.

Four broad area-type groupings are used in the **Q/LOS Handbook** and the Generalized Service Volume Tables:

- **Urbanized Areas**—Areas that meet FHWA's definition of Urbanized Areas, as well as the surrounding geographic area likely to become urbanized within the next 20 years, as agreed on by FDOT, FHWA, and the Metropolitan/Transportation Planning Organization (MPO/TPO). These areas consist of densely developed territory that contains 50,000 or more people. The **Q/LOS Handbook** further identifies areas with population over one million as Large Urbanized Areas.
- **Urban Areas**—A place with a population between 5,000 and 50,000 and not in an urbanized area. This definition helps distinguish developed areas that are not urbanized.
- **Transitioning Areas**—Areas generally considered as transitioning into urbanized/urban areas or areas with a population over 5,000 and not currently in urbanized areas. These areas can also at times be determined as areas within a Metropolitan Planning Area, but not within an urbanized area. These areas are anticipated to reach urban densities in a 20-year horizon.
- **Rural Areas**—Areas that are not urbanized, urban, or transitioning. Rural areas are further classified as rural developed areas and rural undeveloped areas. Generally, rural developed areas are populated areas with a population less than 5,000, and rural undeveloped areas are rural areas with no or minimal population or development.

For the purpose of funding considerations and other processes and procedures, FDOT will continue to define urban and rural areas following the FHWA criteria. A direct, one-to-one relationship does not exist between the classification system used in the **Q/LOS Handbook** and the context classifications, but generally C1-Natural, C2-Rural, and C2T-Rural Town areas will be identified as rural areas or transitioning areas, while C4-Urban General, C5-Urban Center, and C6-Urban Core will be identified as urban. C3C-Suburban Commercial and C3R-Suburban Residential can fall into any of the **Q/LOS Handbook** categories.

FDOT SPEED ZONING MANUAL

The FDOT Manual on Speed Zoning for Highways, Roads, and Streets in Florida (Speed Zoning Manual) provides guidelines and recommended procedures for establishing uniform speed zones on state, municipal, and county roadways throughout Florida. The manual encourages the consideration and implementation of facilities that are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Paramount to this effort is careful evaluation (or re-evaluation) of speed zone locations and proper selection of target speeds and appropriate posted speed limits.

This manual includes guidelines and procedures for performing traffic engineering investigations related to speed zoning. It also includes information on the philosophy of speed zoning and the identification of some of the factors to be considered in establishing realistic, safe, and effective speed zones to which meaningful enforcement can be applied.

FLORIDA GREENBOOK

The *Draft 2018 Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highway (Florida Greenbook)* encourages context-based transportation planning and design and aligns with the FDOT context classification system. The 2018 *Florida Greenbook's* Context-Based Design policy captures three core concepts:

- Serve the needs of transportation system users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers.
- Design streets and highways based on local and regional land development patterns and reflect existing and future context.
- Promote safety, quality of life, and economic development.

This context-based approach builds on flexibility and innovation to ensure that all streets and highways are developed based on their context classification, as determined by the local jurisdiction to the maximum extent feasible.

The *Florida Greenbook* identifies functional classification and context classification as playing important roles in setting expectations for and measuring outcomes for safety. Context classification may be used to evaluate relative safety and the implementation of safety improvements and programs (*Section 1C.1, p.1-9*). The degree and type of access permitted on a facility is dependent upon its intended function and context (*Section 1C.3, p.1-9*).

The *Florida Greenbook* identifies several strategies to promote the creation of context-sensitive high quality interconnected streets, including (*Section 2A, p.2-2*):

- Design for target speed.
- Design geometry to achieve sufficient sight distance and appropriate cross section.
- Provide right of way for uses including pedestrian features and stormwater facilities.
- Provide reasonable control of access.

For areas that meet the description of a traditional neighborhood development, Chapter 19 of the *Florida Greenbook* provides design criteria appropriate to C2T, C4, C5, and C6 context classifications. See Chapter 19 and the *FDOT Traditional Neighborhood Communities Handbook* (<https://www.fdot.gov/design/publicationslist.shtm>) for more information.

FDOT LANE REPURPOSING GUIDEBOOK

The ***FDOT Lane Repurposing Guidebook*** is intended to serve as a resource for FDOT and local agency planners and engineers. The guidebook includes analysis processes, factors to consider prior to the design and implementation of a lane repurposing project, and a summary of the related documentation requirements and FDOT processes.

Context classification does not directly affect the lane repurposing process; however, it is important to understand both the current and future context classification of the roadway. This understanding aids in assessing what user needs the roadway may have. Different uses for the repurposed lane may be appropriate in different context classifications as well.

FDOT TRANSPORTATION SITE IMPACT HANDBOOK

The ***FDOT Transportation Site Impact Handbook*** was developed to assist FDOT staff in their review of developments. The review of developments is intended to be broader than traffic analysis and include the review of local government comprehensive plans, community planning responsibilities, and multimodal transportation. The handbook acknowledges that every project should consider the unique context it is in and highlights the important role intersections play in Complete Streets. The Intersection Control Evaluation (ICE) process can be used to assess intersection control alternatives considering multiple objectives, including community needs and transportation needs.

FDOT INTERSECTION CONTROL EVALUATION

The ***FDOT Intersection Control Evaluation Manual*** was developed to implement the Intersection Control Evaluation (ICE) procedure on the State Highway System. The purpose of ICE is to consistently consider multiple context-sensitive intersection control strategies when planning a new or modifying an existing intersection. The context classification is considered during Stage 1 evaluations (p. C-1). The selected intersection control type should serve all roadway users.

Chapter 5

Emerging Uses for Context Classification

In order to truly integrate Complete Streets and leverage the context classification system to its best use, FDOT must continuously evaluate its approach and evolve its established culture to respond to the changing transportation landscape. While FDOT's current focus is on addressing the shifting transportation demands and concerns over safety of all users, tomorrow will bring new challenges related to emerging technologies, the vulnerability of our infrastructure, and shifting demands once again as the nation responds to a pandemic. This chapter provides insights into some of the next challenges and what FDOT has started doing to prepare for the future.

CAV TECHNOLOGY

Connected and autonomous vehicles (CAV) technologies hold promise to provide significant benefits to safety, mobility, and economic development throughout the state. FDOT's CAV Business Plan identifies specific short-term to long-term action items needed to fulfill safety, mobility, and economic development goals in Florida. These include policies/governance, program funding, education/outreach, partnerships, standards/specifications, implementation readiness, and implementation/deployment. Each of the seven priority focus areas can be impactful on context classification.

Initial CAV deployment and integration plans address all context classifications and how technologies can be implemented in different built environments. These technologies are not only beneficial to urban context, but they can also be beneficial to rural and suburban communities. Additionally, CAV technologies can impact and change the future context classification of a facility due to possibilities such as land use changes, reduced parking needs, development densification, and potential for sprawl.

FDOT's CAV plan focuses on coordination with local, regional, and metropolitan planning agencies. This integrated approach will help create regionally-specific partnerships and allow a more nuanced approach to addressing challenges and opportunities related to emerging technologies in different contexts. FDOT's ***Considerations and Applications for Integrating CAV into Complete Streets*** is available on the Resources tab at www.FLcompletestreets.com

RESILIENCY

Resiliency includes the ability of the transportation system to adapt to changing conditions and prepare for, withstand, and recover from disruption. Disruptions are events and conditions that are often characterized as shocks and stresses. While weather and natural hazards such as hurricanes, wildfires, and sustained environmental changes such as sea level rise are often the most identified disruptions, other events such as cyberattacks and longer-term stresses such as economic downturns and pandemics also impact the transportation system.

FDOT Policy 000-525-053, **Resiliency of State Transportation Infrastructure** (<https://www.fdot.gov/planning/policy/resilience/default.shtm>), states:

“It is the policy of the Florida Department of Transportation to consider resiliency of the State’s transportation system to support the safety, mobility, quality of life, and economic prosperity of Florida and preserve the quality of our environment and communities.”

A variety of factors influence the resiliency of our network:

- Since 2000, tidal flooding across Florida has increased by 352 percent.
- The amount of precipitation during heavy rainstorms has increased by 27 percent in the Southeast over the last 60 years.
- Florida is impacted by 40 percent of all U.S. hurricanes.
- Long-haul freight is expected to increase by 40 percent by 2040.
- Cyberattacks, including the 2017 attack on CSX’s Jacksonville headquarters, threaten to shut down entire transportation systems.

It is essential to plan and prepare Florida’s transportation system to adapt and recover from a wide array of disruptions and stresses. Though resiliency is important in all context classifications, we also know there are various strategies needed in each context classification. Urban contexts may focus on multimodal transportation options as a way to reduce single occupant vehicle trips and emissions. Rural and suburban transitioning contexts may have more challenges associated with conveying water with new impervious surfaces.

As we plan for the future of our transportation system, FDOT is incorporating resiliency into all areas of FDOT’s business. The **Resilience Subject Brief** provides a brief overview of planning for resiliency and how FDOT is advancing resiliency. In addition, resiliency is a cross-cutting topic shaping the overarching goals and strategies in *The Florida Transportation Plan*, the state’s long-range plan guiding Florida’s transportation future.

Appendix A

CONTEXT CLASSIFICATION CASE STUDIES

Context Classification System: Comprised of eight context classifications, it broadly identifies the various built environments in Florida, based on existing or future land use characteristics, development patterns, and roadway connectivity of an area. In FDOT projects, the roadway will be assigned a context classification(s). The context classification system is used to determine criteria in the *FDM*.

The eight context classifications and their general descriptions are:

C1-Natural	Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.
C2-Rural	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.
C2T-Rural Town	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.
C3R-Suburban Residential	Mostly residential uses within large blocks and a disconnected/ sparse roadway network.
C3C-Suburban Commercial	Mostly non-residential uses with large building footprints and large parking lots. Buildings are within large blocks and a disconnected/ sparse roadway network.
C4-Urban General	Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor and/or behind the uses fronting the roadway.
C5-Urban Center	Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of the civic or economic center of a community, town, or city.
C6-Urban Core	Areas with the highest densities and building heights and within FDOT classified Large Urbanized Areas (population greater than one million). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadways, and are within a well-connected roadway network.



C1-NATURAL: FL 24, CEDAR KEY SCRUB STATE RESERVE, LEVY COUNTY

Primary Measures

Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
		Floor Levels	Description	Yes / No	Description	Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Lands unsuitable for settlement due to natural conditions	Open space			Not developed				



Aerial Satellite Image

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
Development not allowed	Development not allowed	0	0

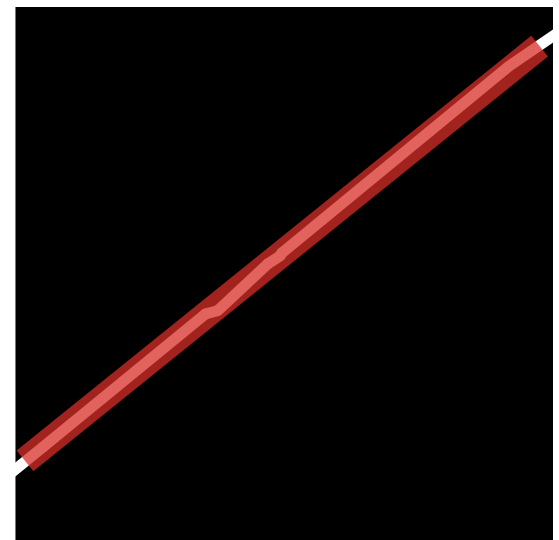
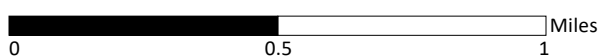


Street View



Bird's Eye View

Open Space



Streets and Blocks Network



Existing Land Use

C2-RURAL: S.R. 52, WEST OF DADE CITY, PASCO COUNTY

Primary Measures

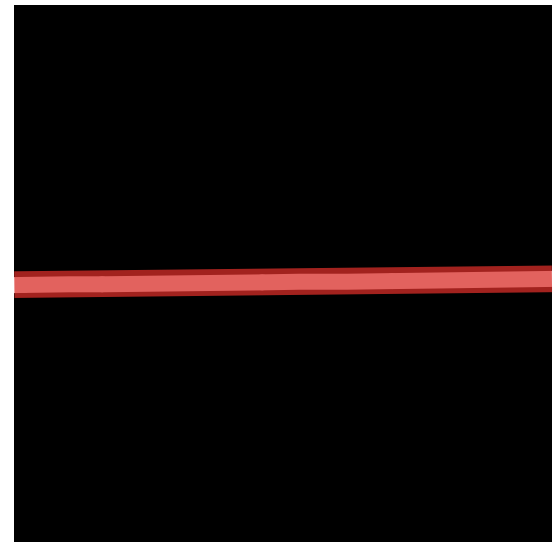
Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Sparsely settled lands surrounded by agricultural lands	Agricultural	1	Detached buildings with no consistent pattern of setbacks	No	No consistent pattern	<1	No defined block pattern	



Aerial Satellite Image

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
0.1 (1 per 10 Acres)	Office and retail uses are not allowed	0.08	0



Streets and Blocks Network

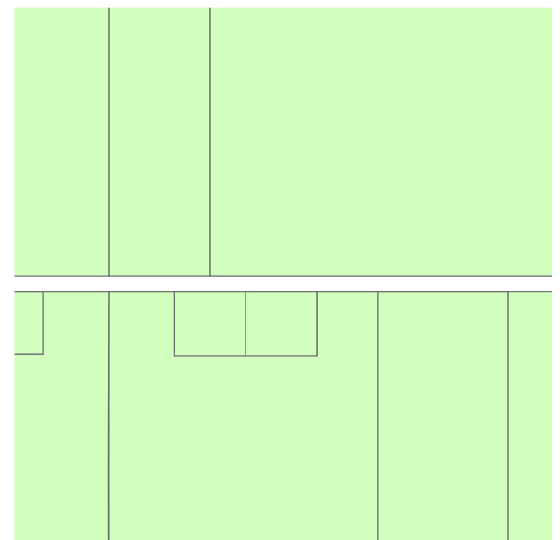


Street View



Bird's Eye View

Agriculture 



Existing Land Use

0 0.5 1 Miles



C2T-RURAL TOWN: MAIN ST, HAVANA, GADSDEN COUNTY

Primary Measures

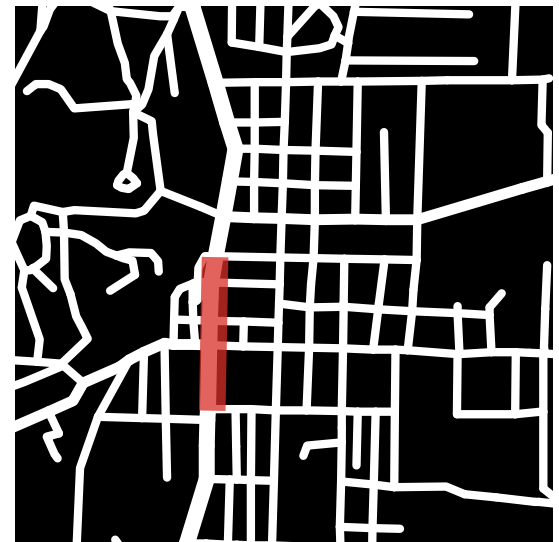
Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Small concentration of developed area immediately surrounded by rural areas	Retail and commercial	1 - 2	Mostly attached buildings with no setbacks	Yes	Mostly in rear, occasionally on side	325	1,520	330



Aerial Satellite Image

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
27	1.2	0.3	4



Streets and Blocks Network



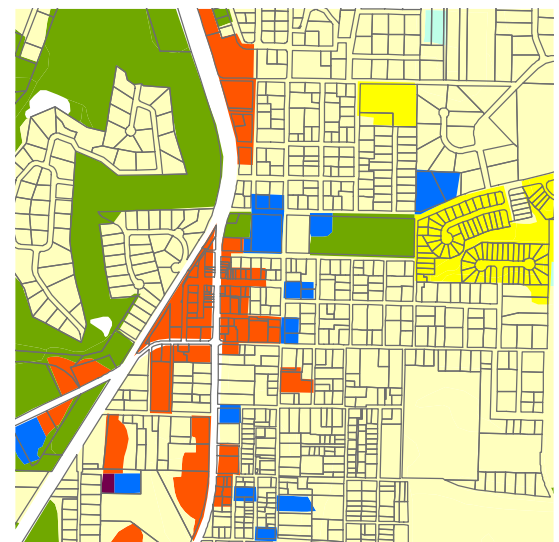
Street View



Bird's Eye View

Single-Family Residential	Yellow
Multi-Family Residential	Orange
Commercial	Red
Retail	Dark Red
Agriculture	Light Green
Institutional/Government	Blue
Industrial	Dark Blue
Open Space	Light Blue
Vacant	White

0 0.5 1 Miles



Future Land Use

C3R-SUBURBAN RESIDENTIAL: S.R. 70, LAKEWOOD RANCH, MANATEE COUNTY

Primary Measures

Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
		Floor Levels	Description	Yes / No	Description	Intersection Density	Block Perimeter	Block Length
Mostly residential uses on both sides of the road with a disconnected roadway network	Single-family residential and institutional	1 - 2	Detached buildings with medium (20' to 75') setbacks on all sides	No	Front	40	6,040	1,140

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
1	0.23	0.4	0



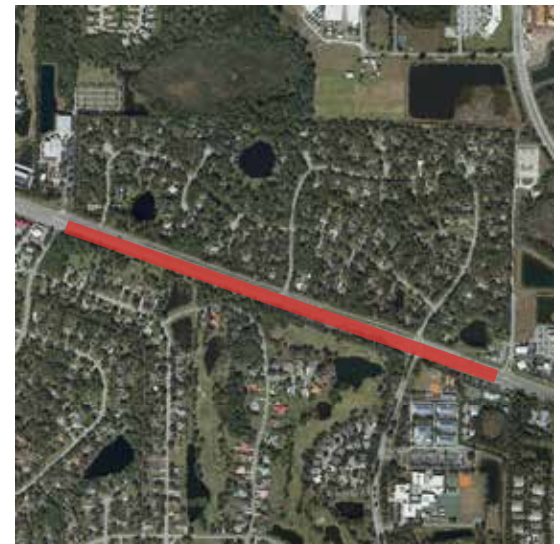
Street View



Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Open Space	
Vacant	

0 0.5 1 Miles



Aerial Satellite Image



Streets and Blocks Network



Existing Land Use

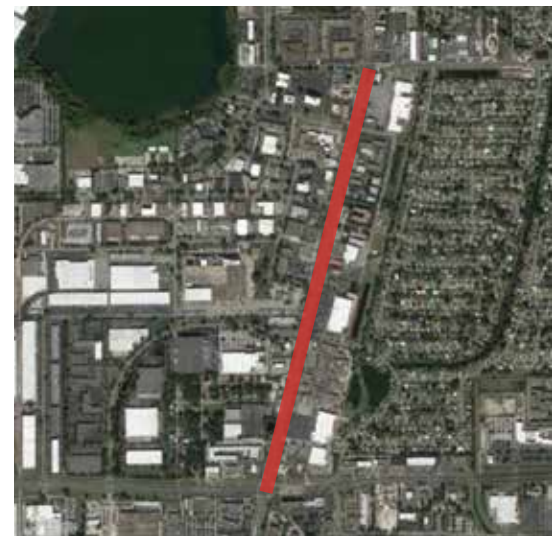
C3C-SUBURBAN COMMERCIAL: ORANGE BLOSSOM TRAIL, ORLANDO, ORANGE COUNTY

Primary Measures

Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Mostly non-residential uses immediately fronting the roadway, with a disconnected roadway network	Commercial and industrial	1 - 3	Detached buildings with large (> 75') setbacks on both sides	No	Mostly in front; occasionally in the rear or side	60	5,000	800

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
Not Applicable	0.75	2	28



Aerial Satellite Image



Streets and Blocks Network

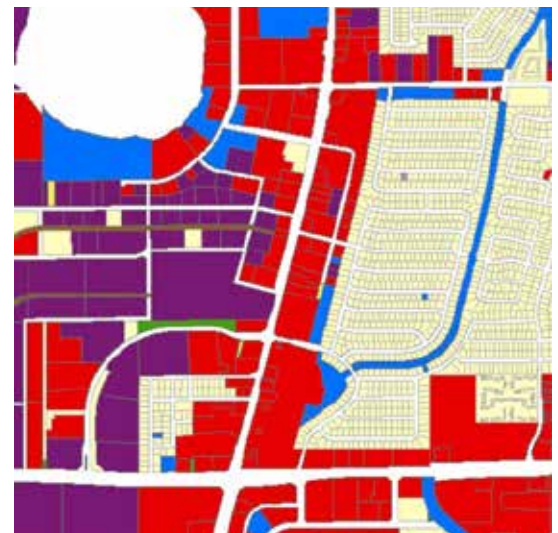


Street View

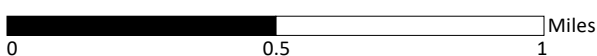


Bird's Eye View

Single-Family Residential	Yellow
Commercial	Red
Institutional/Government	Blue
Industrial	Purple
Open Space	Green
Vacant	White



Existing Land Use



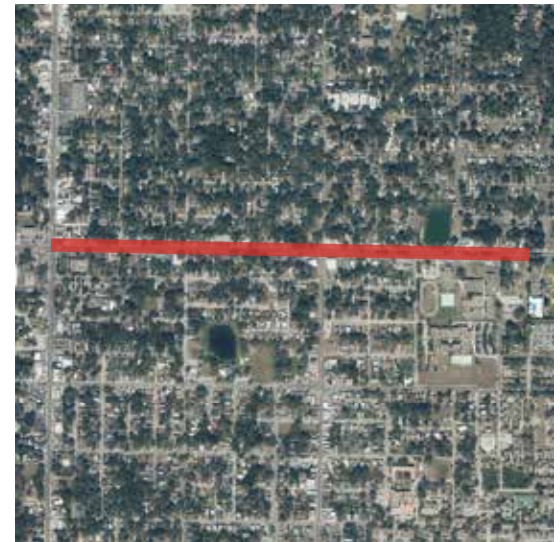
C4-URBAN GENERAL: DR. MLK JR. BLVD, EAST TAMPA, TAMPA, HILLSBOROUGH COUNTY

Primary Measures

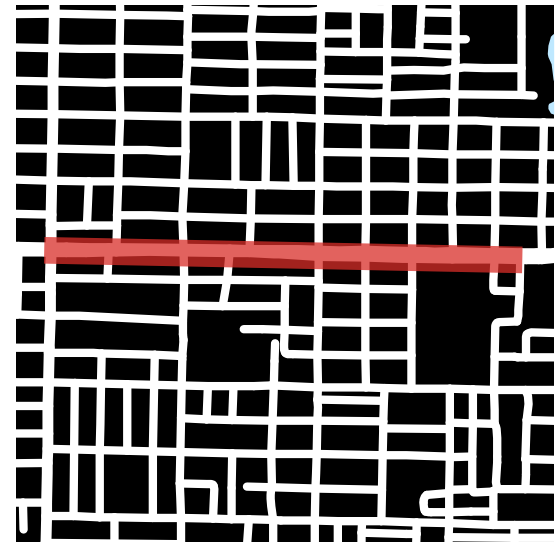
Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/ Sq Mile	Feet	Feet
Mix of uses set within small blocks with a well-connected roadway network. The roadway network connects to residential neighborhoods immediately along the corridor and behind the uses fronting the roadway.	Single-family and multi-family residential, neighborhood-scale retail, and office	1 - 2	Detached buildings with minimal to shallow (10' to 20') front and side setbacks	Yes	Mostly in side, occasionally in rear or front	230	1,760	490

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
12	1.5	8.5	3



Aerial Satellite Image



Streets and Blocks Network

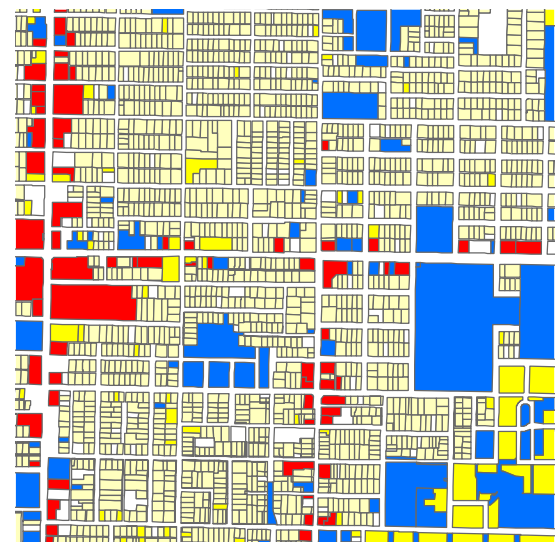


Street View

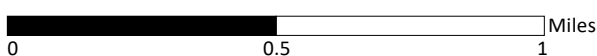


Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Open Space	
Vacant	



Existing Land Use



C5-URBAN CENTER: MONROE ST, DOWNTOWN TALLAHASSEE, LEON COUNTY

Primary Measures

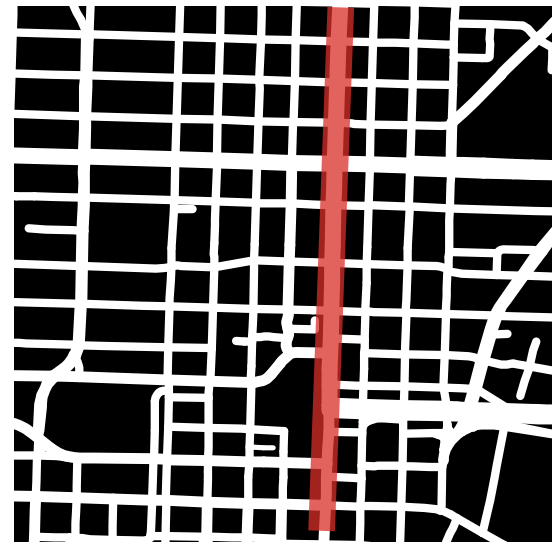
Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
Mix of uses set within small blocks with a well-connected roadway network, and part of the civic and economic center of Tallahassee	Retail, office, institutional, commercial	1 - 5 with some taller buildings	Mostly attached buildings with no setbacks and a few buildings with minimal (<10') setbacks	Yes	Rear and garage	180	1,770	380

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
150	8	2.4	90



Aerial Satellite Image



Streets and Blocks Network

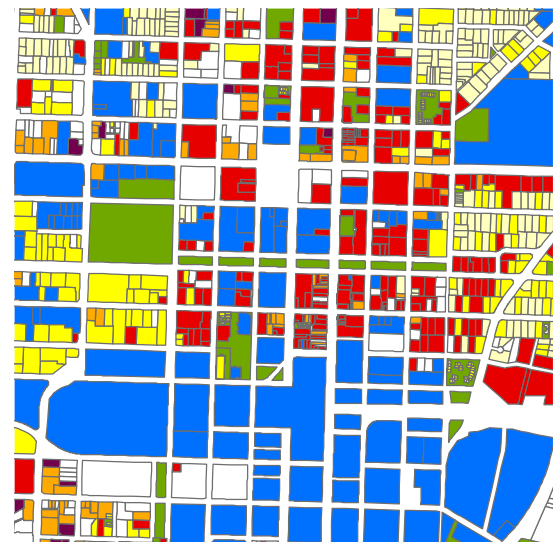


Street View

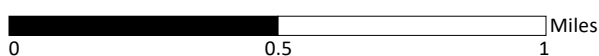


Bird's Eye View

Single-Family Residential	Yellow
Multi-Family Residential	Light Yellow
Commercial	Red
Retail	Orange
Institutional/Government	Blue
Industrial	Purple
Open Space	Green
Vacant	White



Existing Land Use



C6-URBAN CORE: ORANGE AVENUE, DOWNTOWN ORLANDO, ORANGE COUNTY

Primary Measures

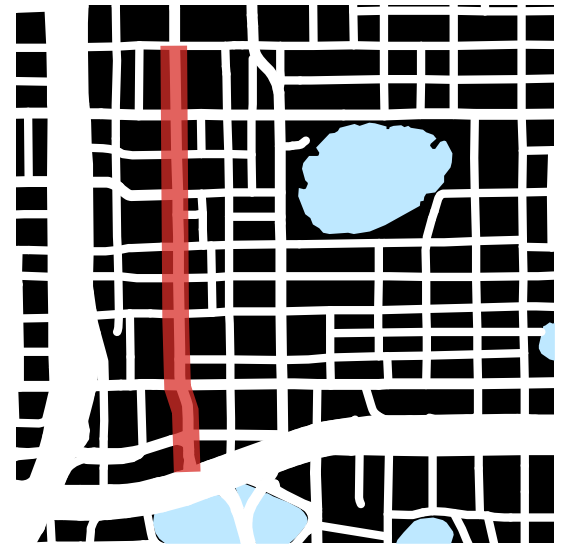
Distinguishing Characteristics	Land Use	Building Height	Building Placement	Fronting Uses	Location of Off-street Parking	Roadway Connectivity		
						Intersection Density	Block Perimeter	Block Length
Description	Description	Floor Levels	Description	Yes / No	Description	Intersections/Sq Mile	Feet	Feet
In an MPO urbanized area with population greater than 1,000,000. Multi-story buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.	Retail, office, institutional, and multi-family residential	> 4 with some shorter buildings	Mostly attached buildings with no setbacks	Yes	Rear and garage	220	1,910	450

Secondary Measures

Allowed Residential Density	Allowed Office/Retail Density	Population Density	Employment Density
DU/Acre	Floor-Area Ratio (FAR)	Persons/Acre	Jobs/Acre
200	3	8.5	170



Aerial Satellite Image



Streets and Blocks Network

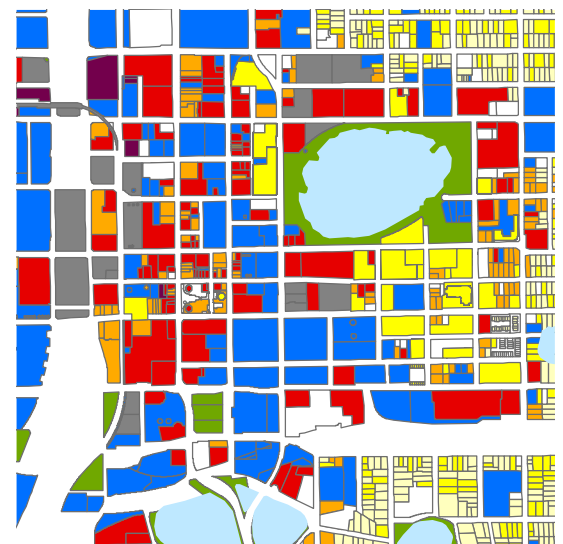


Street View

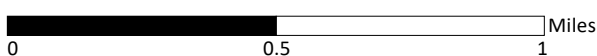


Bird's Eye View

Single-Family Residential	
Multi-Family Residential	
Commercial	
Retail	
Institutional/Government	
Industrial	
Open Space	
Vacant	

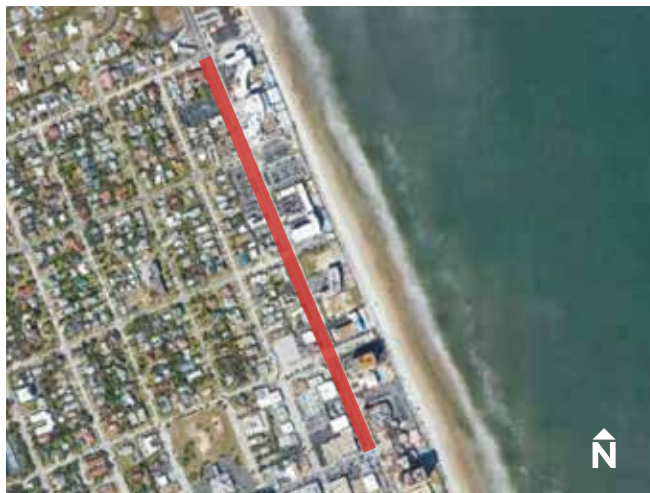


Existing Land Use



CONSTRAINED CORRIDORS/BARRIER ISLANDS

A constrained facility has a geographic barrier that can prevent roadway connectivity measures from meeting higher context classifications. This requires special attention to the land use, employment, and population densities during context classification evaluations. This example shows S.R. A1A in Daytona Beach, Volusia County. The corridor is along a barrier island where the segment does not meet the roadway connectivity measures for a C4-Urban General context classification, but the building height, building placement, fronting uses, and location of off-street parking measures do. In this case, the C4-Urban General context classification is appropriate and acknowledges the users and user needs present.



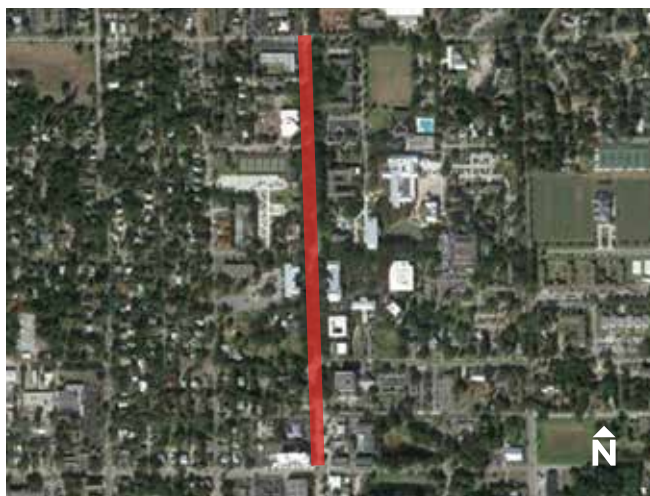
Aerial Satellite Image



Street View

SPECIAL DISTRICT

S.R. 15 through Stetson University in DeLand, Volusia County is an example of a Special District (SD). While the measures are consistent with a C4-Urban General context classification, engineering and planning judgment was used to identify this corridor as a Special District based on the university's land use, roadway users' needs, and proximity to downtown DeLand. This segment of the roadway was designated a C5-Urban Center because it is part of the civic or economic center for this community.



Aerial Satellite Image



Street View

FIGURE 27 POTENTIAL TARGET SPEEDS FOR CASE STUDIES

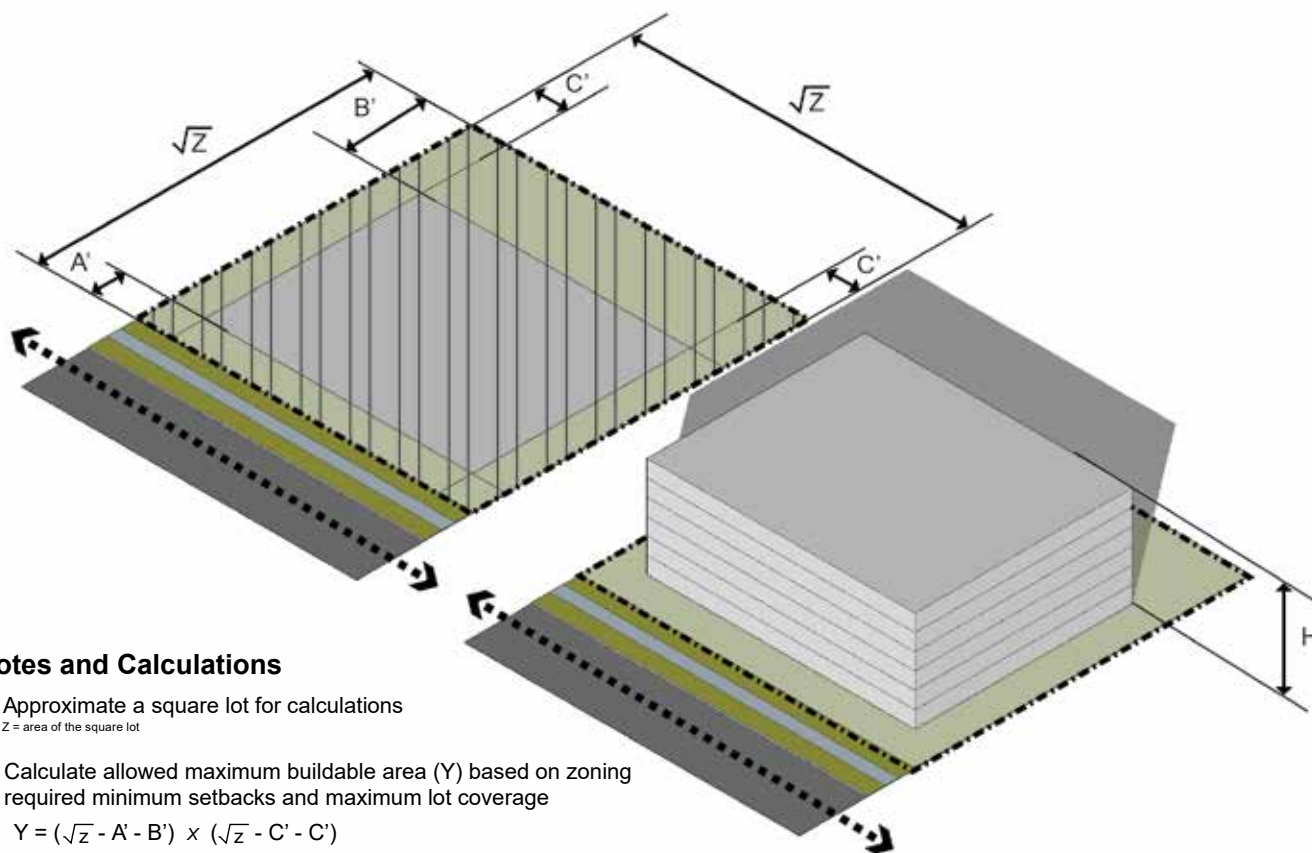
Context Classification	Location	Fronting Uses	Population Density	Vulnerable Users	Cross Section Elements	Access Classification	Transit Service	Pedestrian and Bicycle Generators	Existing Posted Speed	Target Speed
C1-NATURAL	FL 24, CEDAR KEY SCRUB STATE RESERVE, LEVY COUNTY	N/A	Low	Low N/A	Paved shoulder	4	None	None	60	60
C2-RURAL	S.R. 52, WEST OF DADE CITY, PASCO COUNTY	No	Low	Low N/A	Paved shoulder	3	None	None	55	55
C2T-RURAL TOWN	MAIN ST, HAVANA, GADSDEN COUNTY	Most parcels fronting street	Low	Medium Low median income	No dedicated bicycle facility (cyclists share lanes)	6	None	Downtown Havana, Havana Community Park, public library, private K-12 school	30	30
C3R-SUBURBAN RESIDENTIAL	S.R. 70, LAKEWOOD RANCH, MANATEE COUNTY	No	Low	Medium Presence of elementary and middle school students	Paved shoulder	3	None	Elementary & middle school	50	50
C3C-SUBURBAN COMMERCIAL	ORANGE BLOSSOM TRAIL, ORLANDO, ORANGE COUNTY	No	Low	Medium Presence of high school students	No dedicated bicycle facility (cyclists share lanes)	6	High frequency local service (3 routes, 4 buses per hour)	Charter high school	40	35
C4-URBAN GENERAL	DR. MLK JR. BLVD, EAST TAMPA, TAMPA, HILLSBOROUGH COUNTY	Most parcels fronting street	High	High Low median income, high poverty rate, and presence of elementary and middle school students	No dedicated bicycle facility (cyclists share lanes)	7	Lower frequency local service (One route, hourly service)	Elementary & middle school, Ragan Park, community lake, public pool, baseball fields, and tennis courts	40	30
C5-URBAN CENTER	MONROE ST, DOWNTOWN TALLAHASSEE, LEON COUNTY	Most parcels fronting street	Medium	Low	On-street parking, no dedicated bicycle facility (cyclists share lanes)	7	High frequency local service (3 local routes, 5 buses per hour)	Downtown Tallahassee, LeMoyne chain of parks, high school, Florida State Capitol, university basketball arena	25	25
C6-URBAN CORE	ORANGE AVE, DOWNTOWN ORLANDO, ORANGE COUNTY	Most parcels fronting street	High	Medium High poverty rate	No dedicated bicycle facility (cyclists share lanes)	7	High frequency local service (7 local routes, 9 buses per hour) and regional rail	Downtown Orlando, Lake Eola Park, professional basketball arena, private charter school	30	25

Appendix B

FREQUENTLY ASKED QUESTIONS

How is floor area ratio calculated if not defined in zoning code?

Floor area ratio (FAR) can be calculated using these various site design and height standards. For example, assuming floor height of 10 feet, total number of floors can be calculated based on maximum building height measure. Based on minimum parcel size and minimum setbacks, maximum floor plate area can be calculated. Multiplying maximum floor plate area by total number of floors will give total building floor area. Finally, dividing total building floor area by minimum parcel size will provide FAR.



Notes and Calculations

1. Approximate a square lot for calculations
 Z = area of the square lot
2. Calculate allowed maximum buildable area (Y) based on zoning required minimum setbacks and maximum lot coverage

$$Y = (\sqrt{Z} - A' - B') \times (\sqrt{Z} - C' - C')$$
 or

$$Y = (\text{Maximum lot coverage area in (\%) allowed by zoning code}) \times (Z)$$
 Use the smaller of the two values as Y
3. Calculate total floor levels based on zoning allowed maximum height (J)

$$\frac{H}{\text{Height of a floor level}}$$
 * Assume 12' for commercial land use or 10' for residential land use
4. Calculate Floor Area Ratio (FAR)

$$\text{Floor Area Ratio (FAR)} = \frac{Y \times J}{Z}$$

..... Property Lot Line
> Project Roadway

Y = Maximum allowed buildable area in square feet
 A = Minimum allowed front setback in feet based on zoning code
 B = Minimum allowed rear setback in feet based on zoning code
 C = Minimum allowed side setback in feet based on zoning code
 H = Maximum allowed height allowed by zoning code in feet

Who makes the final context classification determination?

FDM 120.2.3.2(8) indicates the FDOT District staff determine context classification, which includes concurrence from the District Intermodal Systems Development (ISD) Manager or Environmental Management Administrator. The Typical Section Package includes a checkbox and signature block for the concurrence signatures. For State projects, the project manager (or designee, such as the Complete Streets coordinator, community planning coordinator, a scoping team member, growth management liaison, or MPO/TPO liaison) is responsible for coordinating with affected local and regional governments and agencies during the determination of the context classification. Collaboration with the local and regional agencies and governments associated with a project is the key for successful projects.

Are future conditions reviewed for existing context classification evaluations?

The existing context classification looks at the measures listed in the Context Classification Matrix. Existing context classification evaluations consider permitted developments. Qualifying projects are reviewed using planned future conditions, but the Districts have the discretion to use future context classification on other appropriate projects.

How is a context classification decided on a corridor with both suburban commercial and suburban residential land uses?

In suburban environments, the land uses fronting the roadways are the distinguishing factor when designating a C3R-Suburban Residential or C3C-Suburban Commercial context classification. Typically, C3R corridors are predominantly made up of residential uses only, while C3C corridors have a greater mix of residential and commercial land uses, and residential developments are fewer or found behind the commercial land uses fronting the roadway. In C3C environments, there is expected to be a greater presence of pedestrians, bicyclists, and transit users; large building footprints with surface parking lots fronting the roadway; and a disconnected roadway network. If one side of the roadway is C3C and the other side is C3R, default to the highest context classification which is C3C.

Where are the districtwide context classification datasets stored?

The Roadway Characteristics Inventory (RCI) is a database of information related to the roadway environment maintained by FDOT. The preliminary existing context classification is stored in the RCI as Feature 126—Preliminary context classification. Each district will update this characteristic with the project-level existing context classification as project-level evaluations are completed. The future context classification characteristic is populated by the district, as applicable, when future project-level context classification evaluations are conducted. Not all roadway segments will have a future context classification assigned. Each District regularly sends updated context classification datasets to the RCI system. Preliminary context classifications for planning purposes (not to be used for design projects) can be seen using the ConnectPed GIS web application, found at <http://www.flcompletestreets.com/>.

Does context classification determine all the design decisions for a roadway?

Identifying context classification is the primary step in understanding the users along a roadway and will inform key design elements, such as the design speeds and lane widths. The transportation characteristics of a roadway are equally as important to understand when making design decisions such as the types of pedestrian, bicycle, transit, and freight facilities to be included in the design concept.

What should we do if the roadway network indicates a certain context classification, but land uses and development indicate another?

As shown in **Figure 9**, roadway connectivity measures should be reviewed first to understand the subset of context classifications that may be applied. Land use characteristics should then be used to identify the particular context classification within that subset.

Can we apply context classification on local roadways?

The context classification system was created to describe the state roadway network. Local governments may choose to adapt the context classification system to apply a similar evaluation to local roads, with roadway connectivity and land use measures calibrated to their roadway systems. Local governments' findings should be shared with the District to improve the context classification network. Local governments must also recognize that their local roadway networks will have a greater variety of roadway types compared to the State Highway System and be prepared to incorporate this diversity within their context classification-based criteria. For instance, yield streets, nine-foot travel lanes, and cul-de-sacs are all appropriate within a local network but would not be applied to the State Highway System. Local governments should avoid, therefore, simply replacing their local roadway standards with the **FDOT Design Manual** criteria. Local governments should consult the latest edition **Florida Greenbook** for additional guidance on the use of context classification.

Why do some measures have undefined thresholds in the Context Classification matrix?

Context Classification	Building Height, Building Placement, Fronting Uses	Location of Off-street Parking	Roadway Connectivity			Allowed Residential Density	Allowed Office/ Retail Density	Population Density	Employment Density
			Intersection Density	Block Perimeters	Block Length				
C1-Natural	No development along roadway		Sparse roadway network			No development along roadway			
C2-Rural		No consistent pattern of parking	Sparse roadway network				No consistent pattern of allowed office/ retail density	Some office/ retail may be present along the roadway	
C2T-Rural Town								Population will vary based on mix of single- and multi-family residential	
C3R-Suburban Residential				No consistent block pattern			No consistent pattern of allowed office/ retail density	Population will vary based on mix of single- and multi-family residential	Some office/ retail may be present along the roadway
C3C-Suburban Commercial						No consistent pattern of allowed residential density		Population will vary based on presence of multi-family residential	Varies based on intensity of commercial development along the roadway
C4-Urban General							No consistent pattern of allowed office/ retail density		

