UF CENTER FOR LANDSCAPE CONSERVATION PLANNING

Flooding Adaptation Symposium

October 30, 2024

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UF Center for Landscape Conservation Planning
UF Center for Coastal Solutions

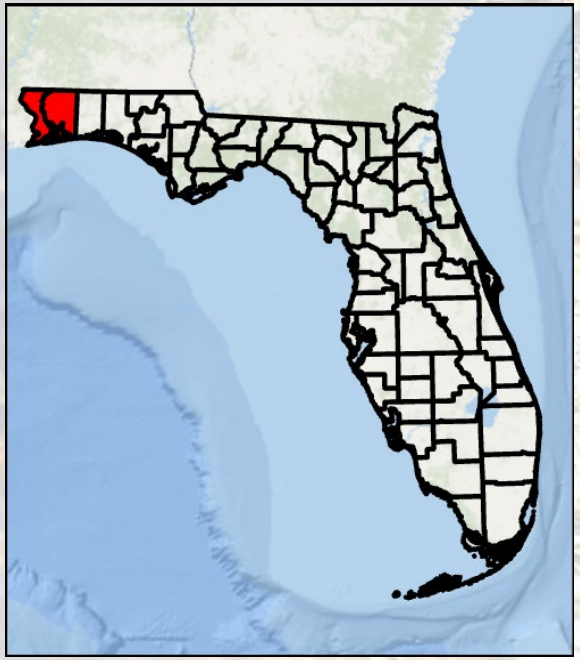
The Problem

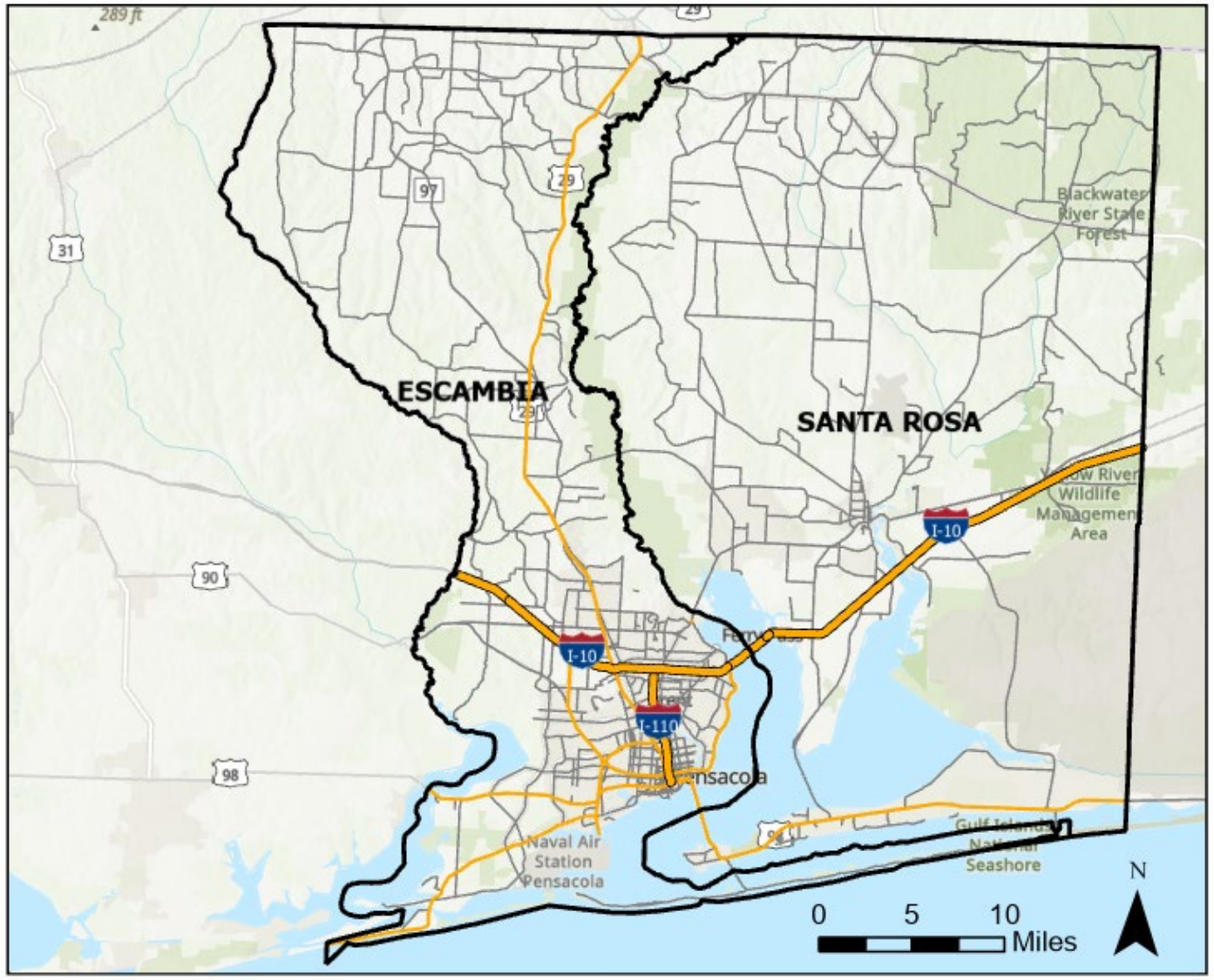
- Future land use in Florida is a major concern
- 2010 – 18.8M[1]
- 2020 – 21.5M[1]
- Projected to grow to 26.6M by 2040[2]
- 1996-2016 - 801 km^2 of wetland loss[3], and conversion continuing to happen every year
- LU planning is more important than ever to maintain water resources essential to healthy habitats and communities.

[1]U.S. Census Bureau QuickFacts: United States. (n.d.). Retrieved October 27, 2024, from https://www.census.gov/quickfacts/fact/table/US/PST045223
[2]UF BEBR. (n.d.). Projections of Florida Population by County, 2025–2050, with Estimates for 2023. Population Data | B.E.B.R. - Bureau of Economic and Business Research. Retrieved October 27, 2024, from https://bebr.ufl.edu/population/population-data/
[3]Kyzar, T., et al. (2021). Challenges and opportunities for sustaining coastal wetlands and oyster reefs in the southeastern United States. Journal of Environmental Management, 296, 113178. https://doi.org/10.1016/j.jenvman.2021.113178

Study Area

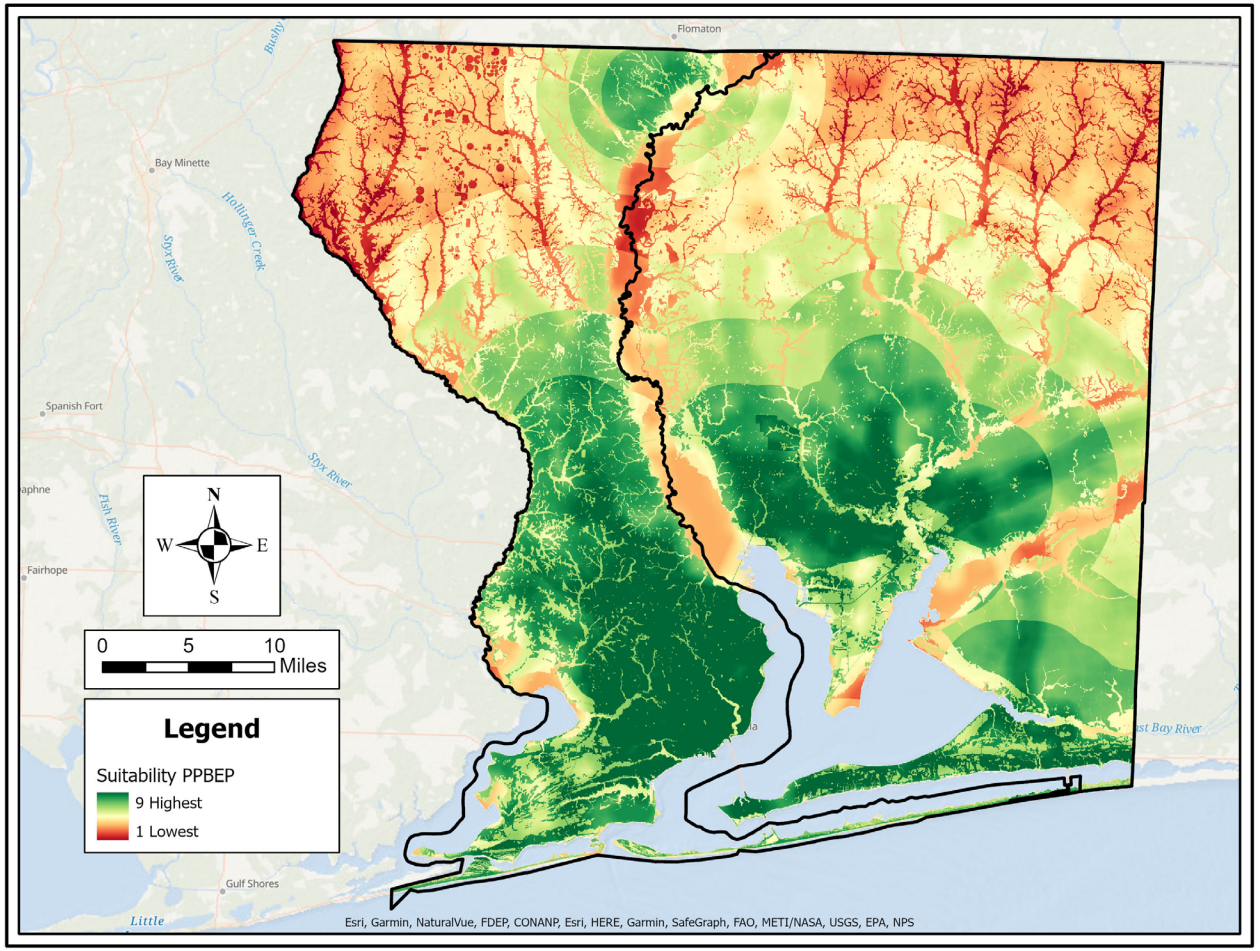
- Escambia and Santa Rosa Counties





Modeling Methods

- Models are based on two considerations: **where** growth is projected to occur and **how much land** is needed
  - **Where**
    - Most suitable locations for development
  - **How much land is needed**
    - Population Projections
    - Gross Development Density
- Two scenarios: Trend and Alternative



Likelihood of Development Map

Population Projections

- Current and Projected 2040 population
  - Bureau of Economic and Business Research at the University of Florida (BEBR) for 2023

County	2023 Population Baseline	BEBR (2023) Projection for 2040	Total Population Change	Percent Population Change
ESCAMBIA	333,452	364,200	30,748	9.22%
SANTA ROSA	202,772	251,500	48,728	24.03%

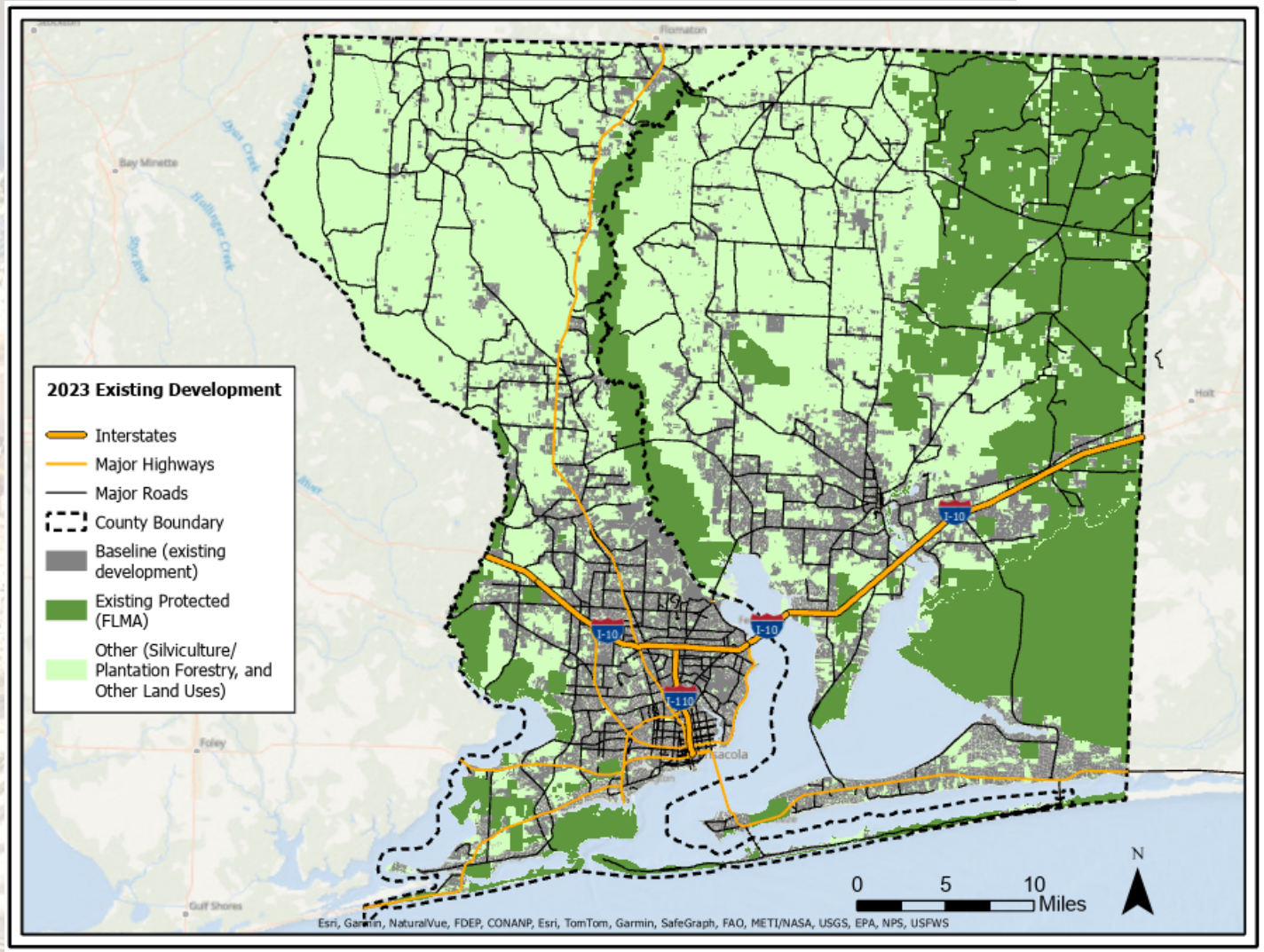
Development Patterns

- Gross Development Density (GDD)
  - Existing population divided by existing urban area
  - Result is the average number of people per acre for the county
- Trend Scenario vs Alternative Scenario
  - 30% GDD increase for Alternative Scenario
  - Redevelopment included in the Alternative Scenario

County	Trend Scenario	Alternative Scenario (30% increase)
ESCAMBIA	2.95	3.84
SANTA ROSA	2.11	2.74

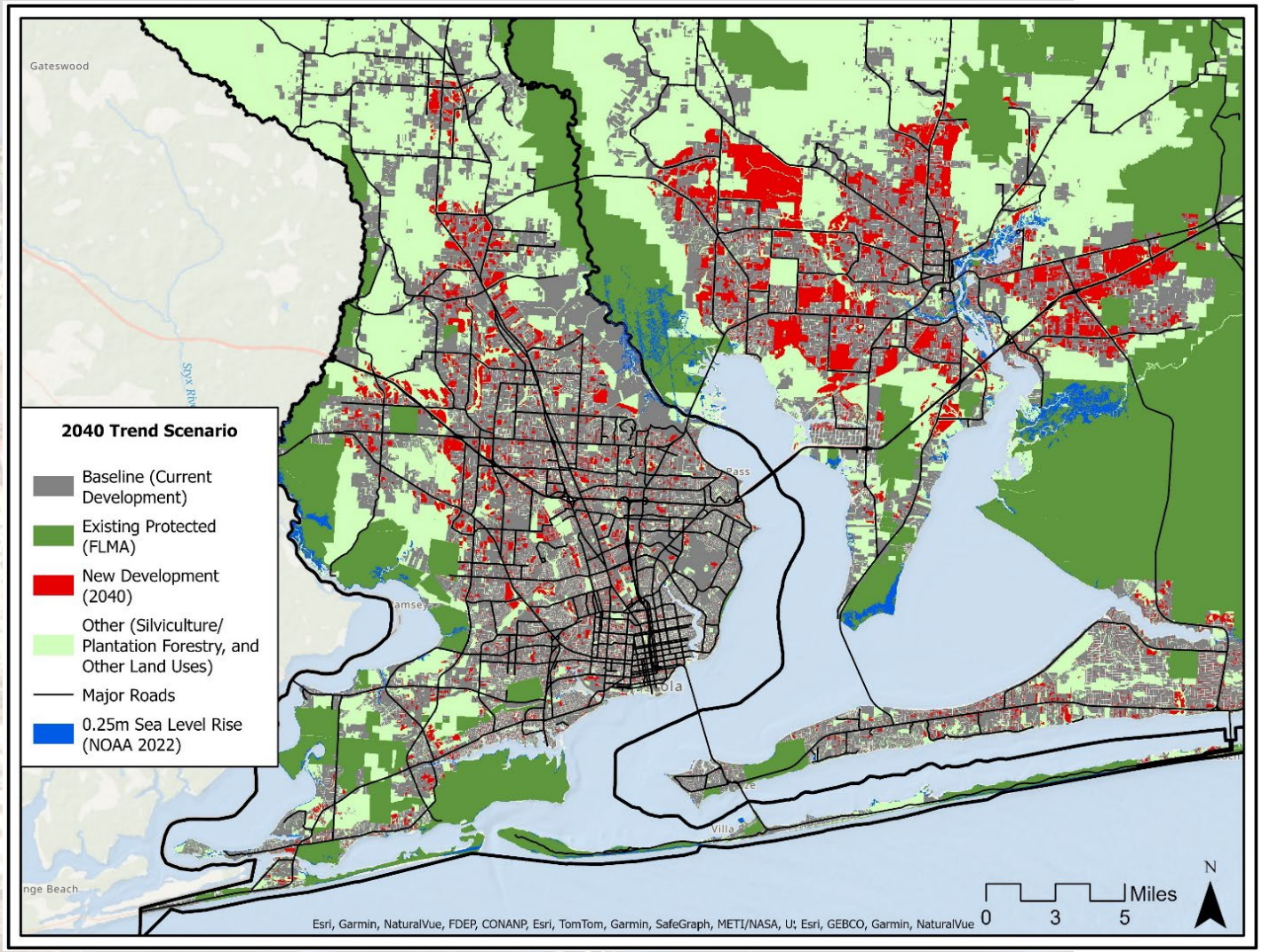
Development Patterns

- Approximately 545,000 acres of undeveloped and unprotected land



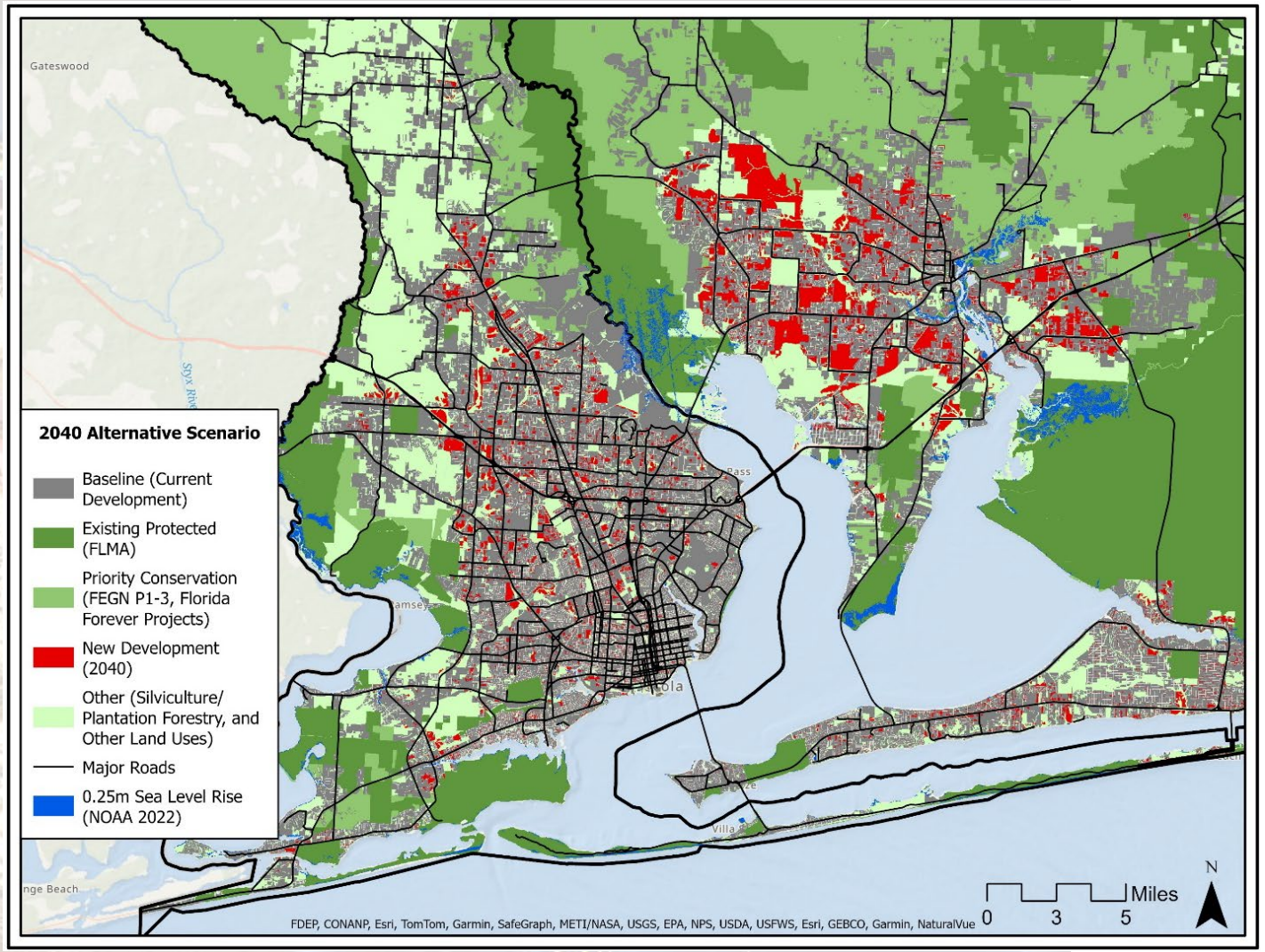
Development Patterns

- Trend Development Scenario Results (Milton and Pensacola region)



Development Patterns

- Alternative Development Scenario Results (Milton and Pensacola region)



Acreage and Land Use (Both Counties)

- Comparison between current (baseline), Trend, and Alternative

	2023	% of Total Acreage	Trend 2040	% of Total Acreage	Alternative 2040	% of Total Acreage
Developed	202,067	18.64%	222,390	20.52%	214,677	19.81%
Protected Natural Forest & Silviculture	271,215	25.02%	268,810	24.80%	491,467	45.35%
Protected Other	43,817	4.04%	42,303	3.90%	84,137	7.76%
Natural Forest / Silviculture (Unprotected)	342,434	31.59%	328,697	30.33%	111,406	10.28%
Other (Unprotected)	202,901	18.72%	194,234	17.92%	154,747	14.28%
2019 Open Water	21,403	1.97%	21,403	1.97%	21,403	1.97%
Sea Level Inundation: Protected Lands	0	0.00%	3,919	0.36%	4,362	0.40%
Sea Level Inundation: All Other Land Uses	0	0.00%	2,082	0.19%	1,638	0.15%
Total Acreage	1,083,837	**100.00%**	1,083,837	**100.00%**	1,083,837	**100.00%**
Total Land Acreage	1,062,434	98.03%	1,056,434	97.47%	1,056,434	97.47%
Total Sea Level Inundation	0	0.00%	6,000	0.55%	6,000	0.55%
Total Open Water including SLR	21,403	1.97%	27,403	2.53%	27,403	2.53%

EMC Potential runoff calculations and pollutant loading

- Within the development footprint for each scenario, identify
  - USDA Hydrologic Soil Group Classification
  - Florida Department of Revenue parcel ‘use code’
  - Export attribute table to csv

EMC Potential runoff calculations and pollutant loading

- Because the forecasts can not predict what type of 'new' development will occur where, the percentage of each of the soil and use code combinations was calculated for the Current development footprint
- Those percentages were then applied tot the total acreage in the Trend and Alternative scenarios to estimate how many acres were in each of the soil and use code combinations
- From this, calculate stormwater volume and pollutant loading
  - Curve numbers from Florida Department of Transportation Drainage Design Guide[4]
  - Runoff coefficients and concentration values from Escambia County LID Manual[5]

[4]Florida Department of Transportation (FDOT). (2024). *FDOT Drainage Design Guide*. https://www.fdot.gov/roadway/drainage/design-guide
[5]Wanielista, M., & Livingston, E. (2016). *Escambia County Low Impact Design BMP Manual*. http://www.myescambia/LID

EMC Potential runoff calculations and pollutant loading

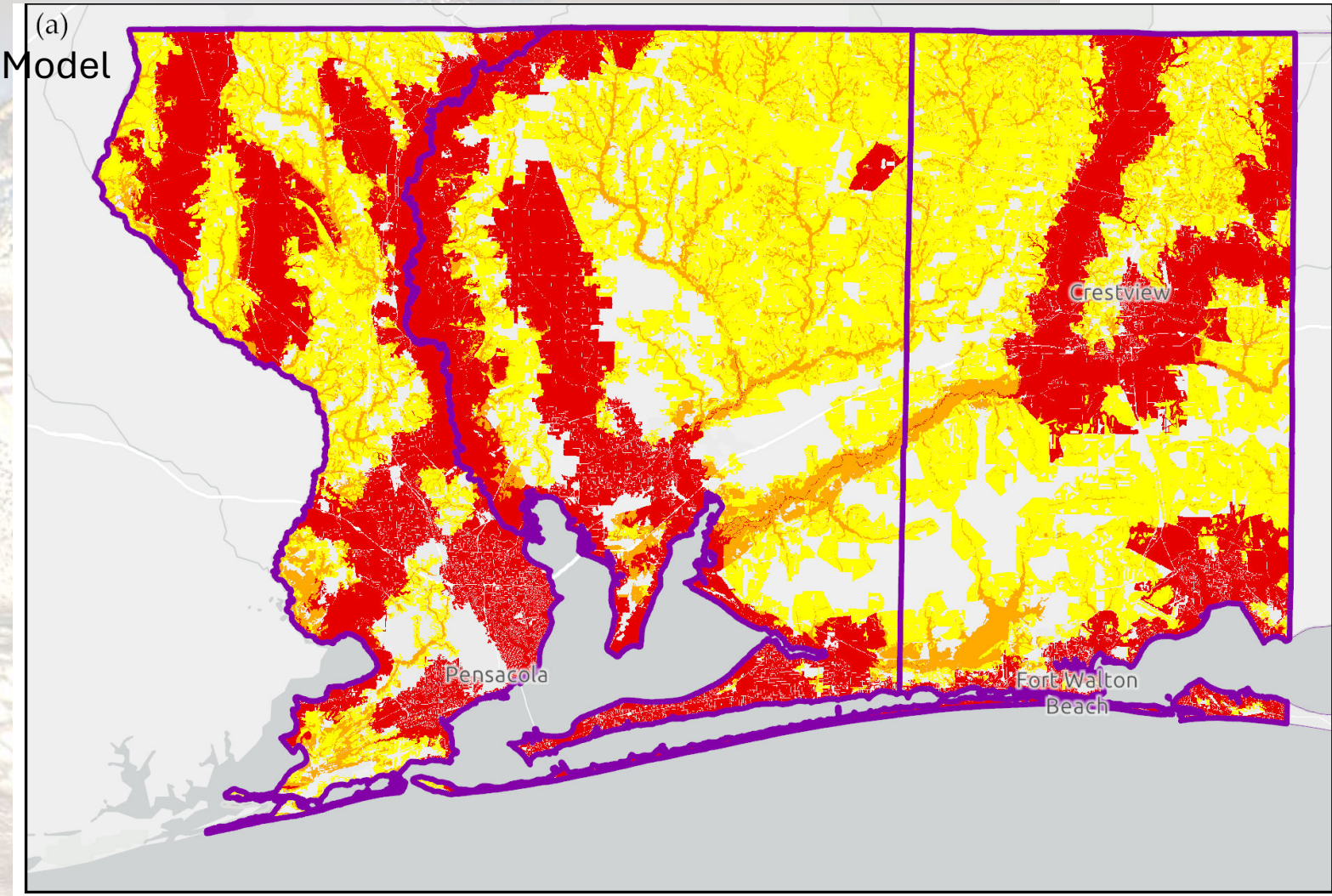
	Developed Acres		Acre-Feet of Runoff		# Olympic Swimming Pools*	Annual Mass Loading (lb/yr)			
						TN		TP	
	Total	%↑	Total	%↑		Total	%↑	Total	%↑
Baseline	202,170		477,885		317,794	2,368,393		417,033	
Escambia	108,848		280,640			1,365,786		242,819	
Santa Rosa	93,321		197,244			1,002,607		174,213	
Trend	211,553	4%	500,065	4%	332,544	2,478,321	4%	436,389	4%
Escambia	113,900		293,666			1,429,179		254,090	
Santa Rosa	97,653		206,399			1,049,142		182,299	
Alternate	204,074	1%	482,387	1%	320,788	2,390,706	1%	420,961	1%
Escambia	109,874		283,284			1,378,653		245,107	
Santa Rosa	94,201		199,102			1,012,053		175,855	

Water Quality and Water Storage Conservation Models

- 2023 UF Center for Coastal Solutions project sponsored by Senator Broxson for Escambia, Santa Rosa, and Okaloosa Counties
- Project Goals: identify project ideas for improving water quality
  - Septic to Sewer
  - Stormwater
  - Living Shorelines
  - Conservation
- Conservation Models
  - Identify those lands that could be put into conservation, and if so would provide
    - Water Quality benefits
    - Water Storage opportunities

Water Quality and Water Storage Conservation Models

- Results of the Water Quality Model
  - P1 – Highest Priority (red)
  - P2 (orange)
  - P3 (yellow)



Water Quality and Water Storage Conservation Models

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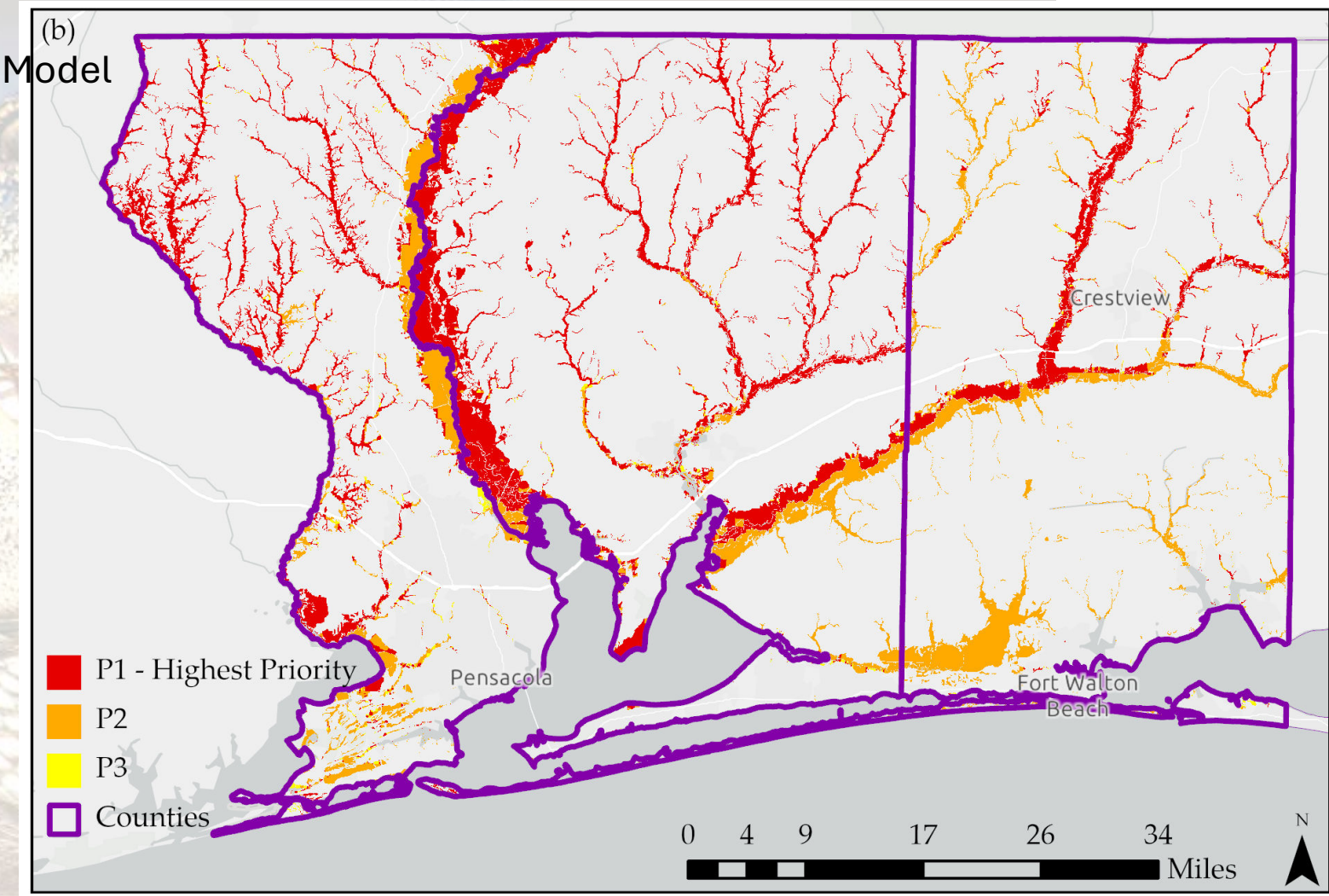
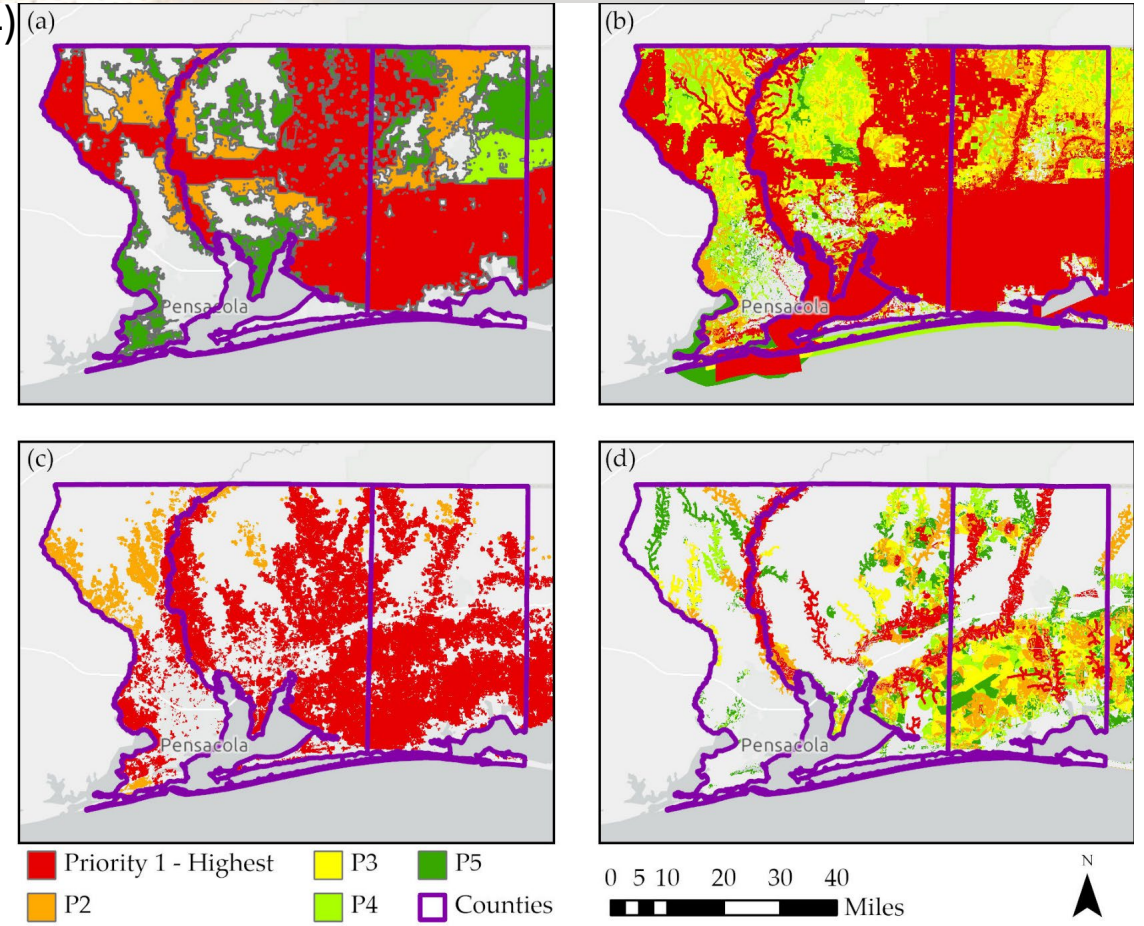


Additional Conservation Priorities

- (a) Florida Ecological Greenways Network (FEGN 2021)
- (b) Critical Lands and Waters Priorities (CLIP v4)
- (c) Florida Black Bear Habitat Priorities,
- (d) FNAI Habitat Conservation Priorities

- Priorities 1 (Highest) (red)
- P2 (orange)
- P3 (yellow)
- P4 (light green)
- P5 (dark green)
- County boundaries (purple).

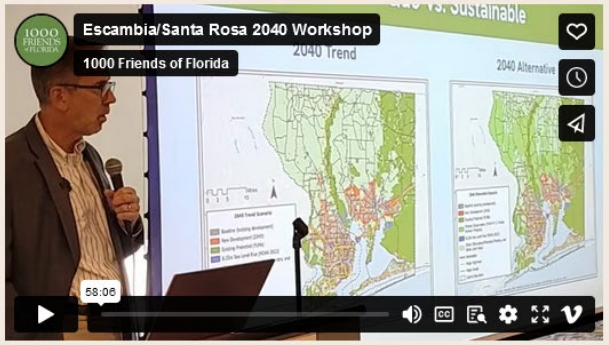
- Note Florida Black Bear Habitat Priorities has only P1 and P2.



Public Engagement

Download Presentation

Check out our April 23 presentation here



Read Report

Technical Report

County Maps

Residents were invited to learn more about these critical issues in a presentation at the downtown Pensacola Public Library on April 23rd. 1000 Friends President Paul Owens shared two scenarios for growth and development in 2040 for the two counties, as compiled by experts at the University of Florida's Center for Landscape Conservation Planning. These scenarios project significant differences in impact on land use and water quality if (1) the counties continue to follow their current patterns for growth and development or (2) they grow in more compact, sustainable patterns and protect high-priority natural and agricultural lands from development. Owens also shared ideas for policies to promote more sustainable development suggested by knowledgeable leaders and planning professionals from Escambia and Santa Rosa counties. Escambia and Santa Rosa counties are projected to add tens of thousands of new residents in the next couple of decades. This population growth will impact land use and water quality in the two counties.

- Pensacola and Perdido Bays Estuary Program
- https://1000fof.org/escambia-santarosa2040/

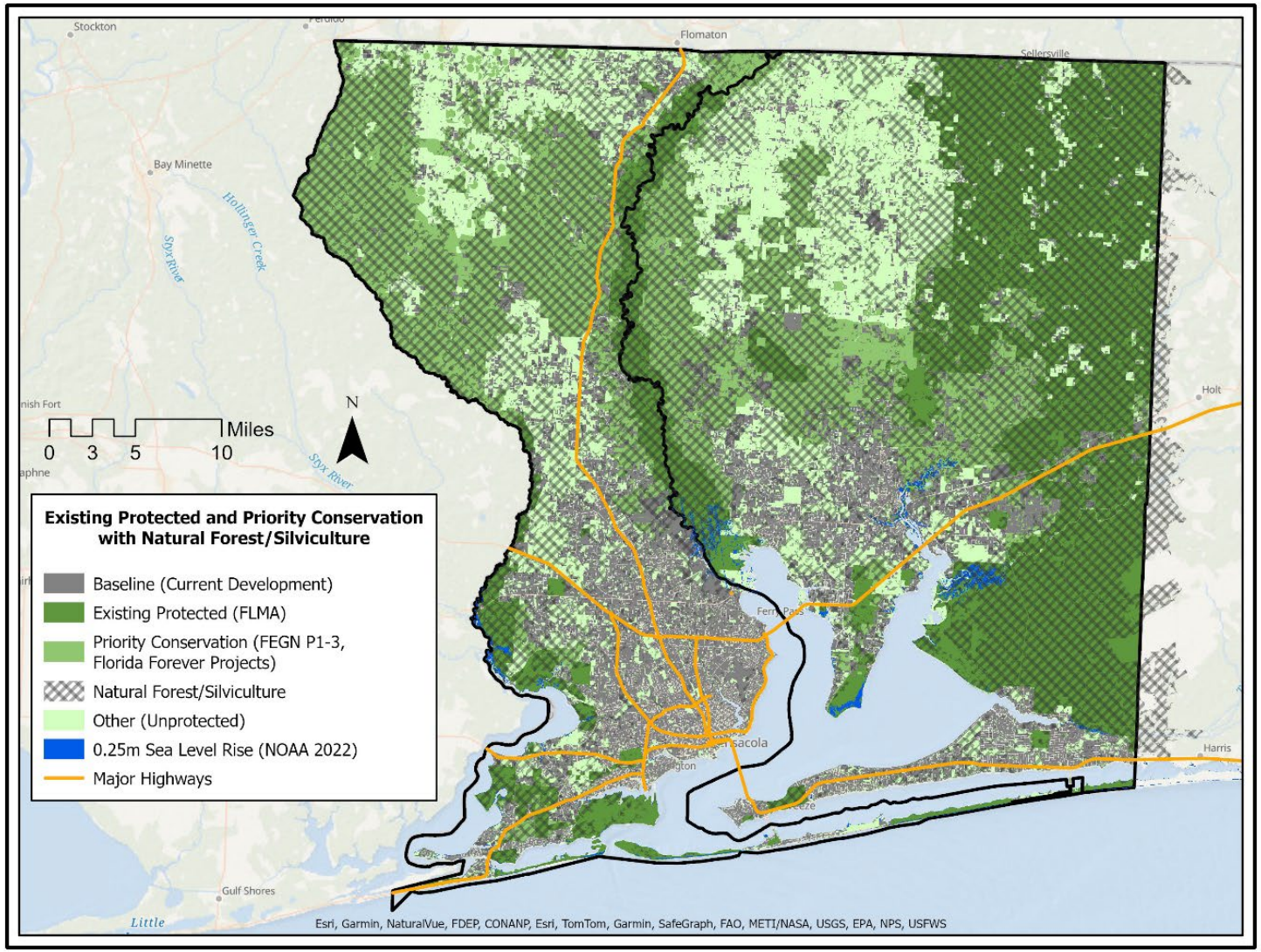
Key Findings

Land use, stormwater runoff, and potential flooding

- Impervious surfaces create more, concentrated runoff in targeted areas (larger volumes of water with fewer places to go)
- Impervious surfaces also result in increased pollutant runoff (as shown)
- Urban open spaces are important for BOTH urban stormwater management and infill/redevelopment
- Rural and natural lands are important for recharge, water storage, water quality
- Rural and natural lands provide many additional conservation values and ecosystem services
- Good urban and rural planning are closely linked to water quality and flood management.
- **Sprawling development impacts areas important for our agricultural economy, conservation values, and flood and water management**

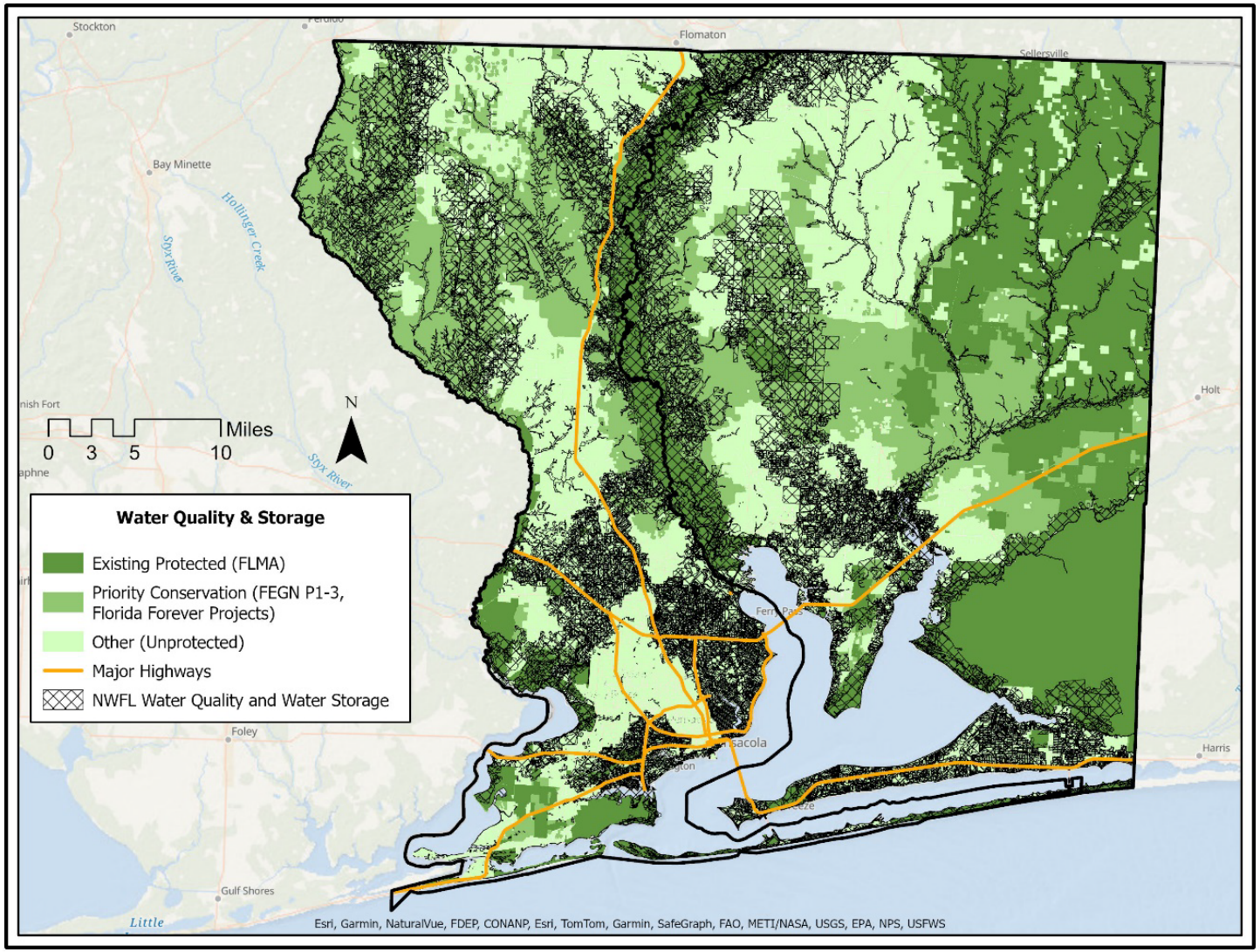
Forest Lands and Conservation Values

- Current silviculture and natural forest lands have significant conservation values
- These areas can be used to help manage water
  - Recharge
  - Quality
  - Storage
- Infill and redevelopment are important to minimize the impacts from sprawl on rural/natural lands



Water Resource and Conservation Priorities

- Priority areas for water quality protection and water storage intersect with priority conservation areas
- Urban areas also include open lands important for flood and runoff management



Additional Findings

- Incorporating the WQ/WS Conservation priorities exactly as they were created leads to significant leapfrog (sprawl) development scenarios

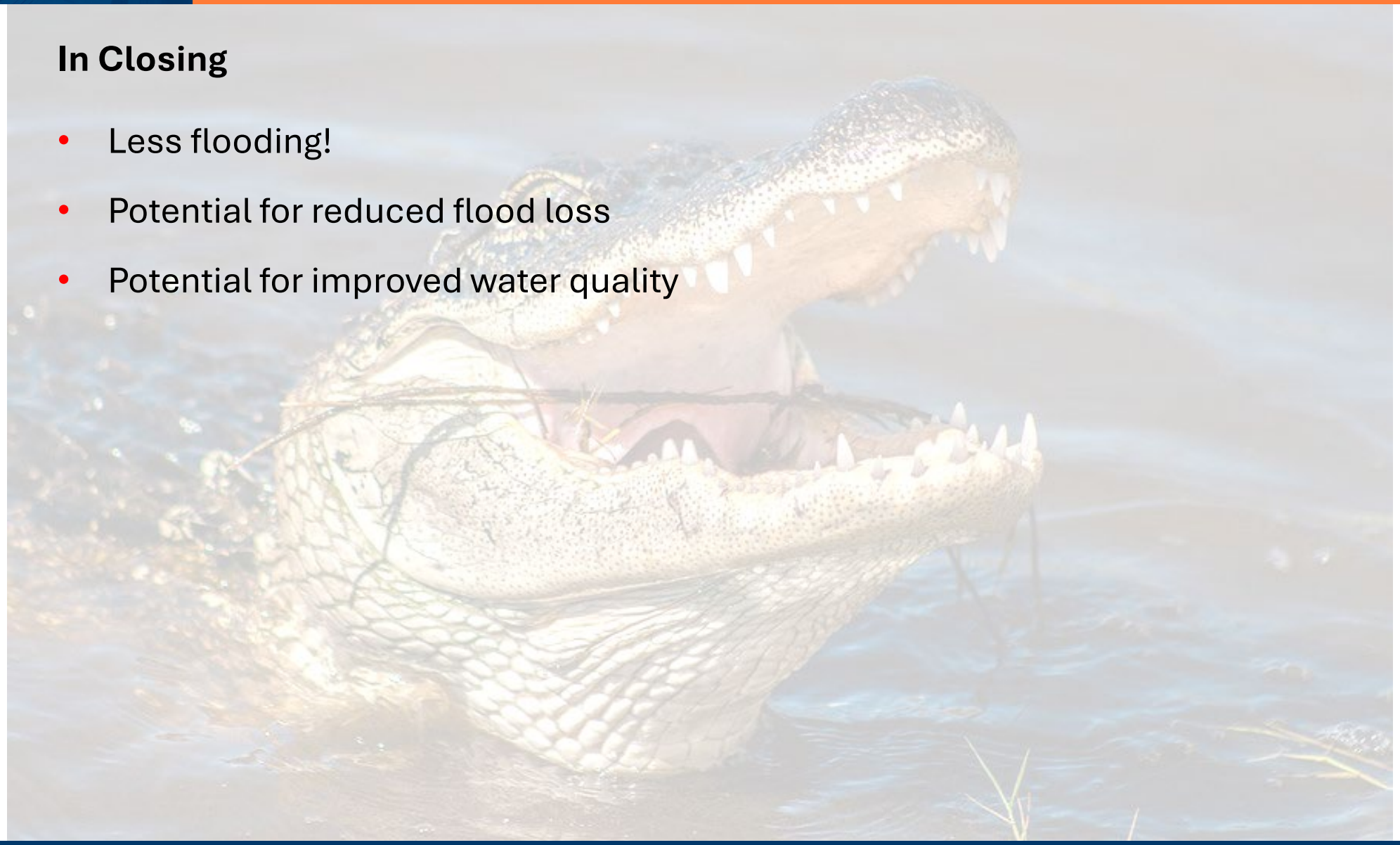
- Failing Forward – Policy Ideas
  - Expanding the 'Living Shorelines' model to inland water edges to affect riparian setbacks with suitable habitats
  - Incentivize developers through expedited permitting when plans include <habitat> friendly elements
  - Incentivize homeowners through property tax exemptions for being <habitat> friendly homeowners

Connections

- Florida is still experiencing significant population growth
- Population growth drives development
- Natural areas are being converted to accommodate growth
- Impervious surfaces can concentrate stormwater runoff volumes and pollutant loads to smaller, potentially more vulnerable, receiving areas
- Intentional development patterns are needed that:
  - Result in compact development instead of sprawl
  - Retain as much pervious area as possible
  - Incorporate protection and preservation of vulnerable and high value natural areas including:
    - Riparian
    - Wetlands and floodplains
    - Rare habitats

In Closing

- Less flooding!
- Potential for reduced flood loss
- Potential for improved water quality



Thank you!

- 1000 Friends of Florida
- Healthy Gulf
- Pensacola and Perdido Bays Estuary Program

https://1000fof.org/

https://healthygulf.org/

https://www.ppbep.org/

Questions?

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Acreage and Land Use (Escambia County)

- Comparison between current (baseline), Trend, and Alternative

	2023	% of Total Acreage	Trend 2040	% of Total Acreage	Alternative 2040	% of Total Acreage
Developed	109,006	25.47%	113,960	26.63%	111,279	26.00%
Protected Natural Forest & Silviculture	31,082	7.26%	30,666	7.17%	153,975	35.98%
Protected Other	12,521	2.93%	12,211	2.85%	30,380	7.10%
Natural Forest / Silviculture (Unprotected)	174,922	40.88%	172,129	40.22%	50,149	11.72%
Other (Unprotected)	88,993	20.80%	86,118	20.12%	69,301	16.19%
2019 Open Water	11,408	2.67%	11,408	2.67%	11,408	2.67%
Sea Level Inundation: Protected Lands	0	0.00%	726	0.17%	775	0.18%
Sea Level Inundation: All Other Land Uses	0	0.00%	714	0.17%	665	0.16%
Total Acreage in Escambia County	**427,932**	**100.00%**	**427,932**	**100.00%**	**427,932**	**100.00%**
Total Land Acreage	416,524	97.33%	415,084	97.00%	415,084	97.00%
Total Sea Level Inundation	0	0.00%	1,440	0.34%	1,440	0.34%
Total Open Water including SLR	11,408	2.67%	12,848	3.00%	12,848	3.00%

Acreage and Land Use (Santa Rosa County)

- Comparison between current (baseline), Trend, and Alternative

	2023	% of Total Acreage	Trend 2040	% of Total Acreage	Alternative 2040	% of Total Acreage
Developed	93,061	14.19%	108,430	16.53%	103,398	15.76%
Protected Natural Forest & Silviculture	240,133	36.61%	238,144	36.31%	337,492	51.45%
Protected Other	31,296	4.77%	30,092	4.59%	53,757	8.20%
Natural Forest / Silviculture (Unprotected)	167,512	25.54%	156,568	23.87%	61,257	9.34%
Other (Unprotected)	113,908	17.37%	108,116	16.48%	85,446	13.03%
2019 Open Water	9,995	1.52%	9,995	1.52%	9,995	1.52%
Sea Level Inundation: Protected Lands	0	0.00%	3,193	0.49%	3,587	0.55%
Sea Level Inundation: All Other Land Uses	0	0.00%	1,368	0.21%	973	0.15%
Total Acreage in Santa Rosa County	**655,905**	**100.00%**	**655,905**	**100.00%**	**655,905**	**100.00%**
Total Land Acreage	645,910	98.48%	641,350	97.78%	641,350	97.78%
Total Sea Level Inundation	0	0.00%	4,560	0.70%	4,560	0.70%
Total Open Water including SLR	9,995	1.52%	14,555	2.22%	14,555	2.22%

Title

- Bullet point 1

Title

- Bullet point 1