

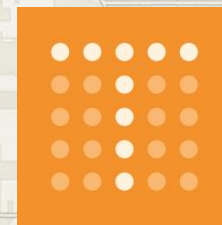
Weeks Bay Watershed Shoreline Assessment & Potential Effects of Climate Change

*Presented to Stakeholder Working Group
November 16, 2016*

Mobile Bay



**ecology and
environment, inc.**
Global Environmental Specialists



Overview of Assessment

- **Existing Shoreline Protection**
(from GSA Study)
- **Historical Shoreline Changes**
(1955 vs. Current aerials photos)
- **Sea Level Rise (SLR) Records and Predictions**
(Dauphin Island Gauge & USACE/NOAA SLR Curves)
- **Potential Impacts of Future SLR**
Potential future impacts to habitats and infrastructure (Prediction Models)

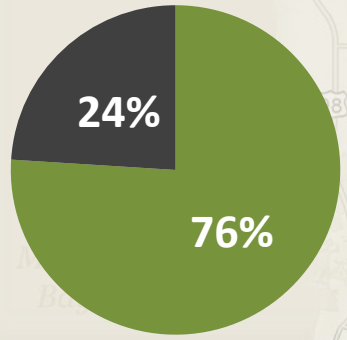


Shoreline Assessment Area



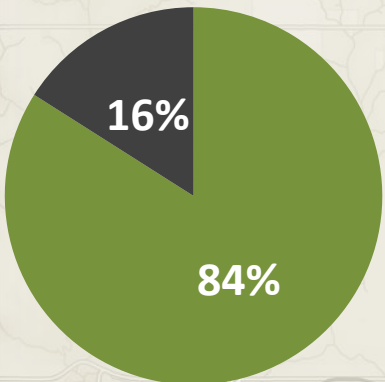
Existing Shoreline Protection

Fish River
(30 mi. of Shoreline)



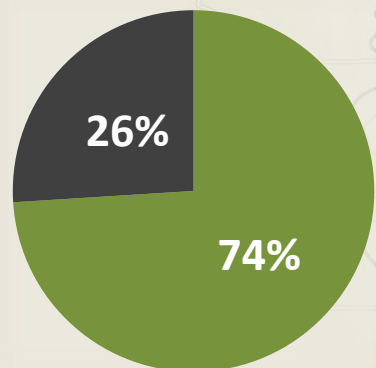
- Natural Unretained
- Hard Shore Protection

Magnolia River
(15 mi. of shoreline)



- Natural Unretained
- Hard Shore Protection

Weeks Bay
(11 mi. of shoreline)



- Natural Unretained
- Hard Shore Protection



Historic Shoreline Changes

Compared 1955 aerial photos with recent aerial photos

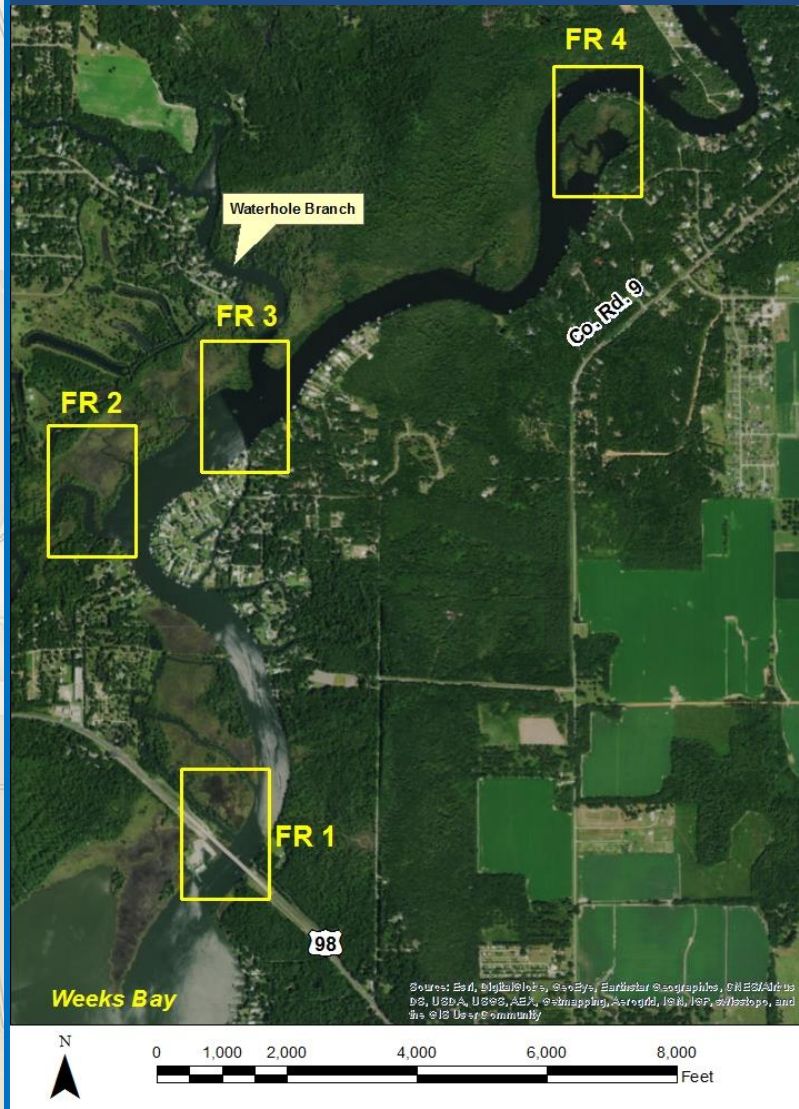
The assessment focused on observable changes to features such as:

- Shoreline geometry;
- Width and route of the rivers and tributaries;
- Major man-made alterations to the shoreline;
- Size and shape of peninsulas and islands; and
- Location and extent of marshes.



Historic Shoreline Changes

Aerial Photo Comparison Sites on Fish River



Historic Shoreline Changes

FR 1 - 1955



FR 1 - 2010



Key:

D

Man-made shoreline alteration (excavation).

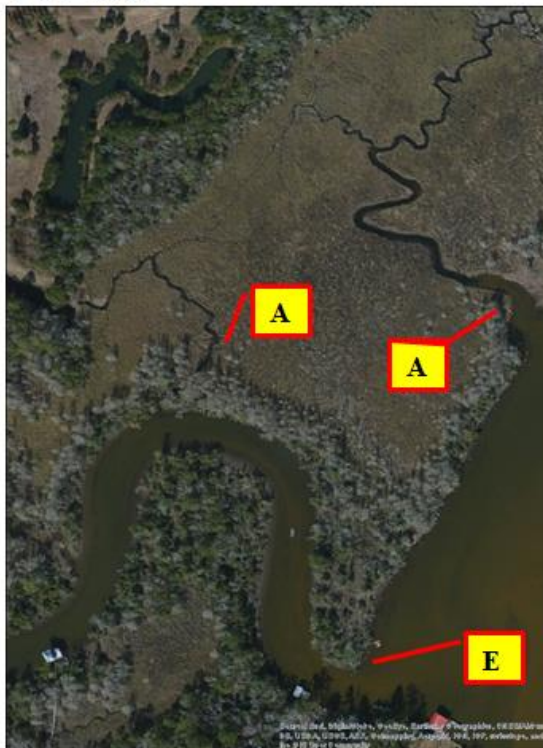


Historic Shoreline Changes

FR 2 - 1955



FR 2 - 2010



Key:

A Increase in stream width.

E Narrowing of peninsulas.



Historic Shoreline Changes

FR 3 - 1955



FR 3 - 2010



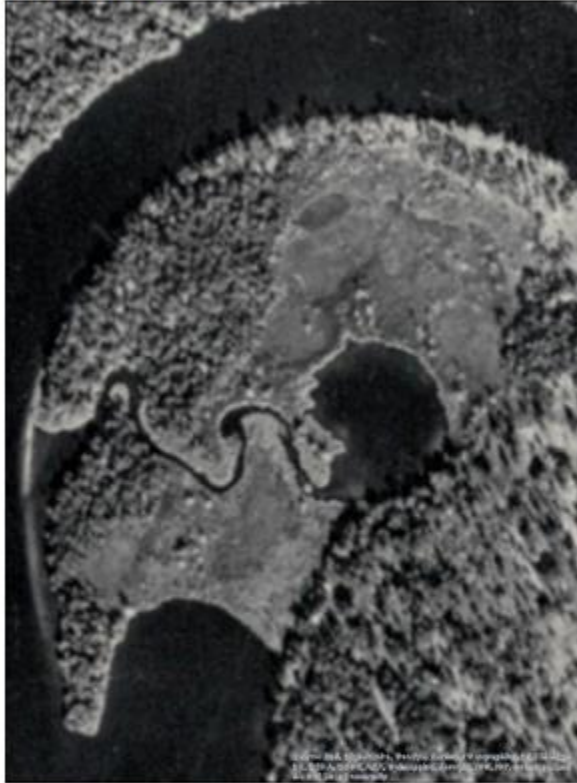
Key:

B Decrease in island size.



Historic Shoreline Changes

FR 4 - 1955



FR 4 - 2010



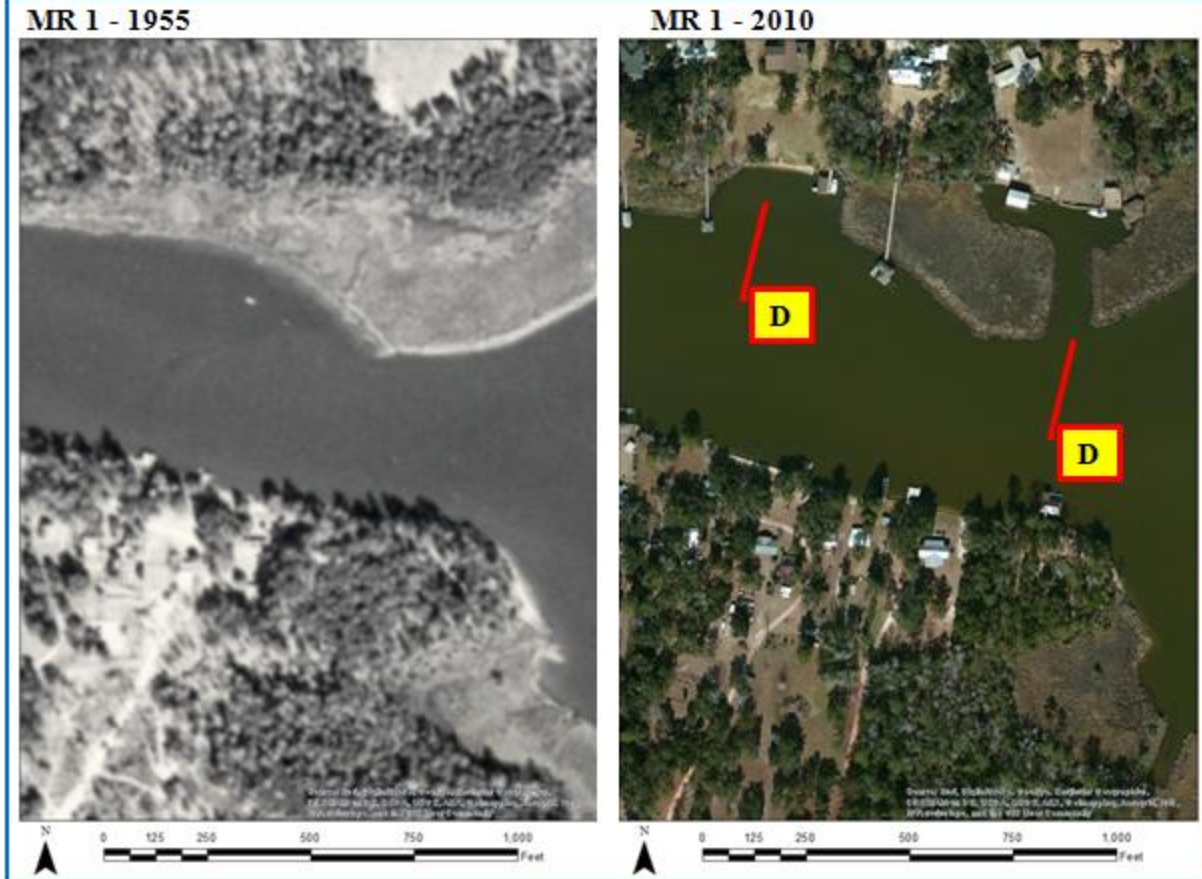
Key:

- A** Increase in stream width.
- B** Decrease in island size.
- E** Narrowing of peninsulas.

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Historic Shoreline Changes



Key:

D Man-made shoreline alteration (excavation).

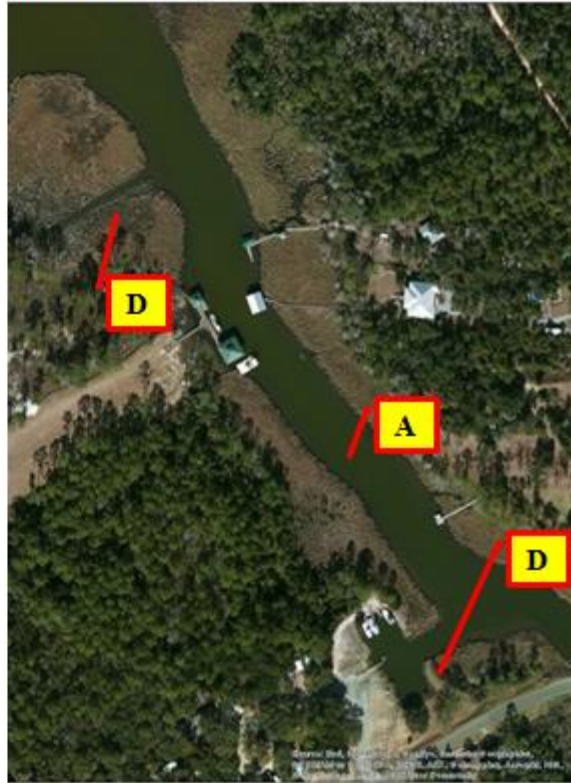


Historic Shoreline Changes

MR 2 - 1955



MR 2 - 2010



Key:

A Increase in stream width.

D Man-made shoreline alteration (excavation).



Historic Shoreline Changes

MR 3 - 1955



MR 3 - 2010



Key:

B Decrease in island size.



Historic Shoreline Changes

MR 4 - 1955



MR 4 - 2010

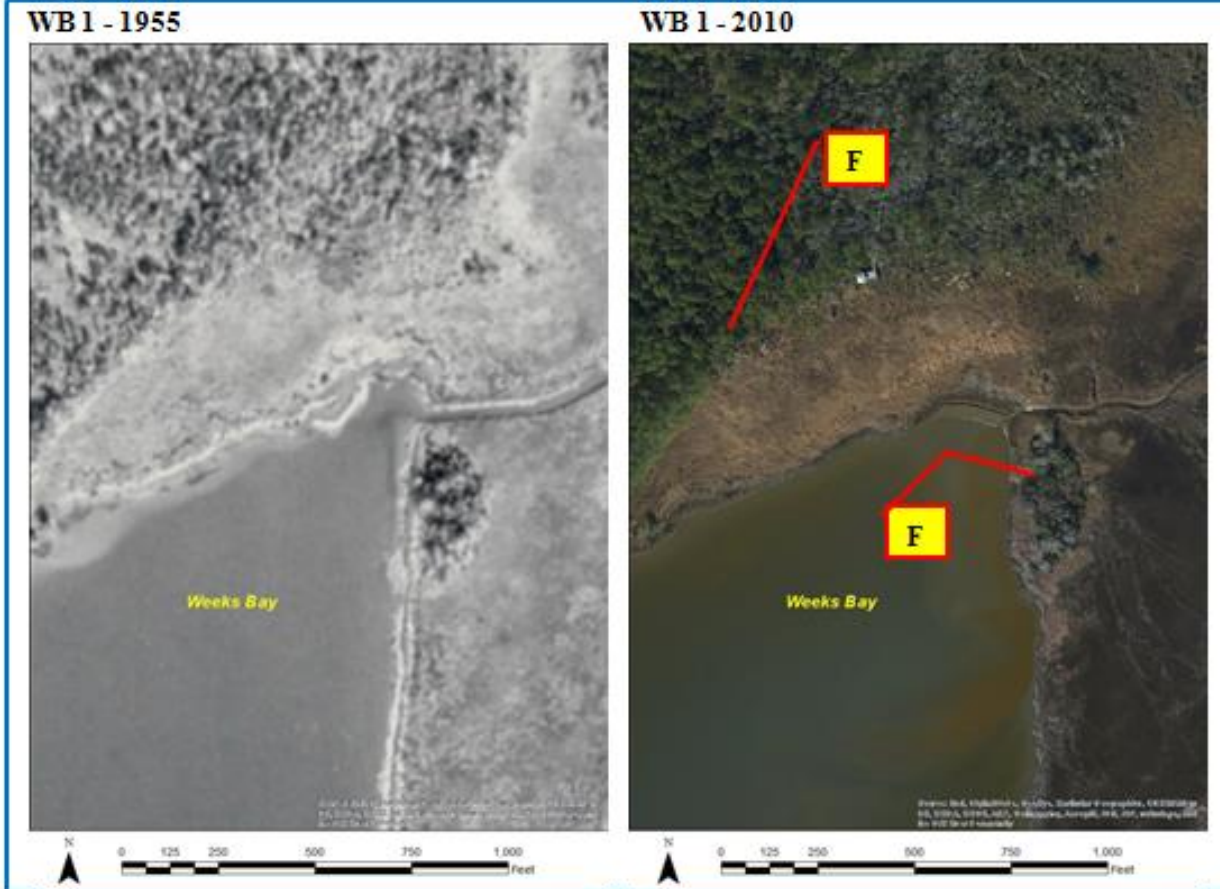


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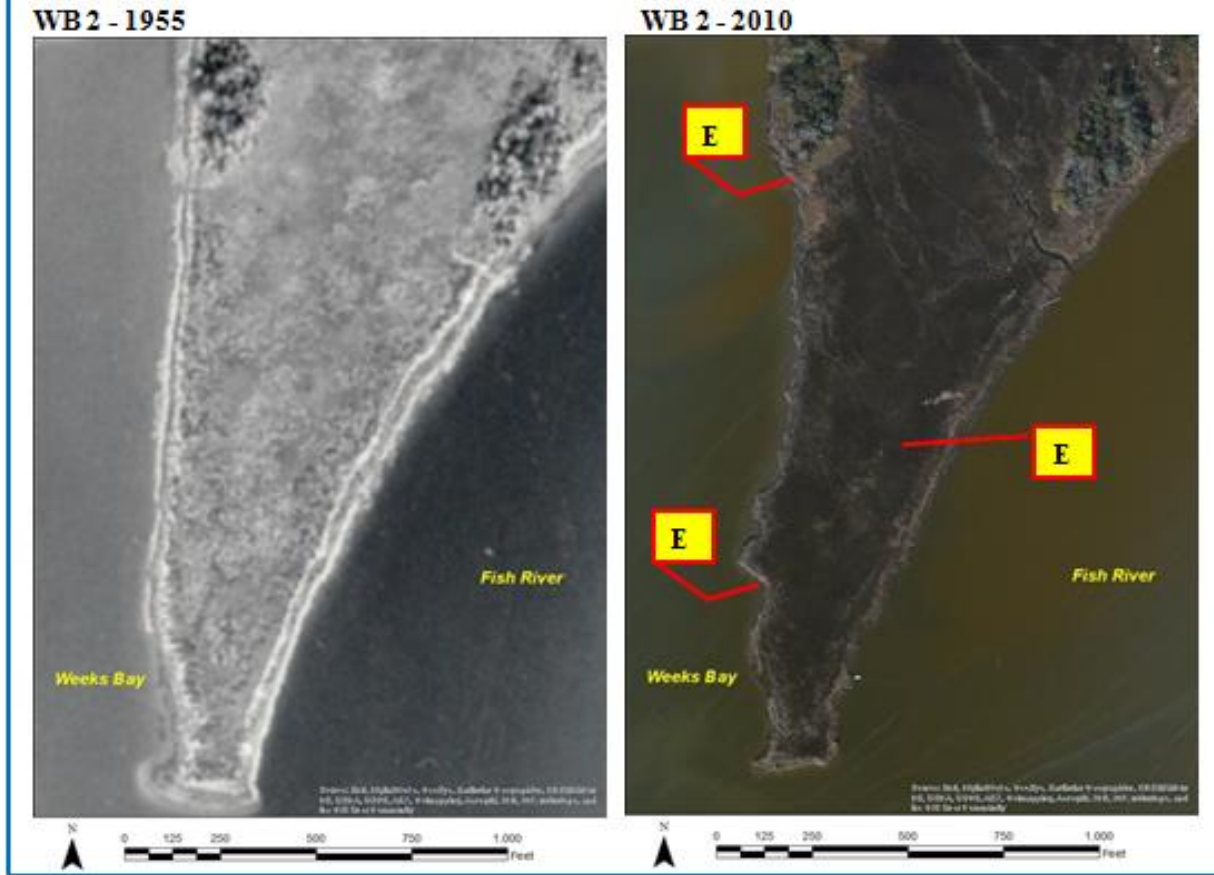
- A** Increase in stream width.
- E** Narrowing of peninsulas.



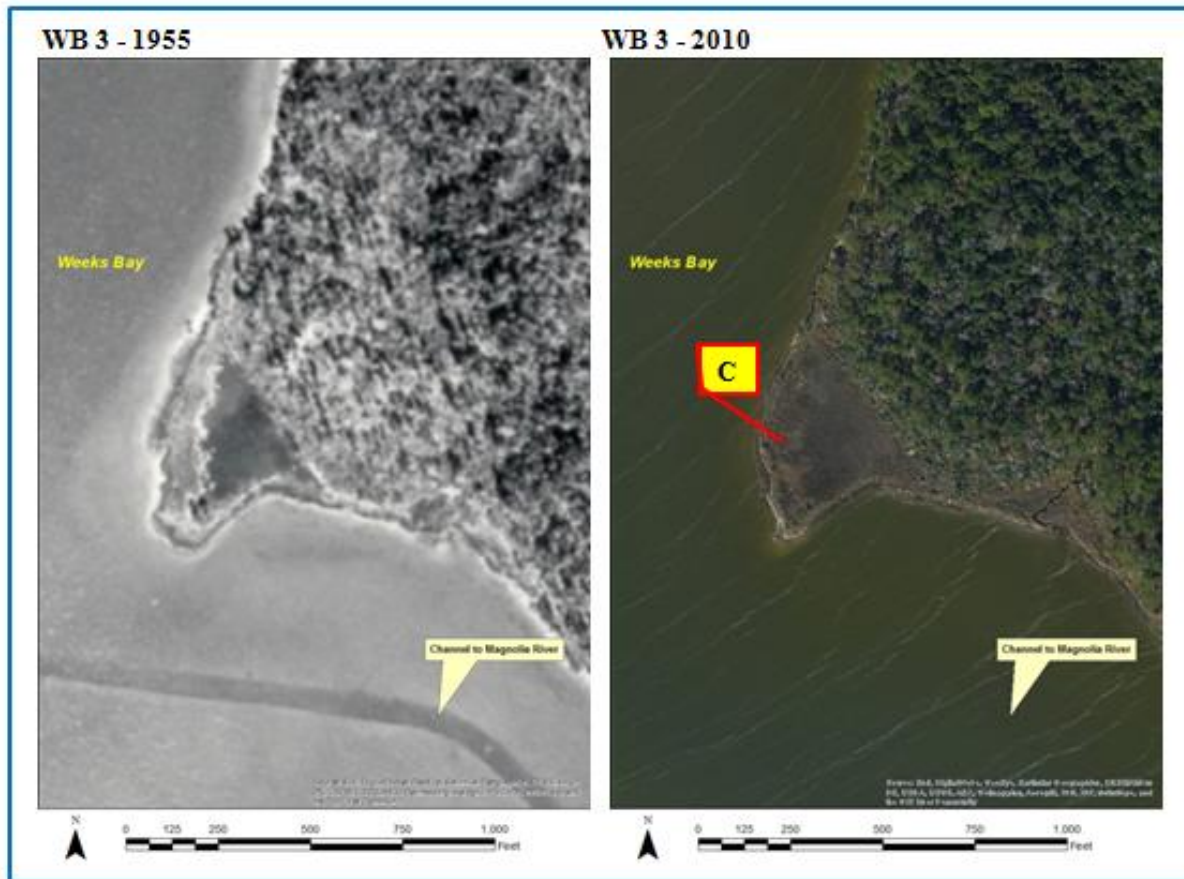
Historic Shoreline Changes



Historic Shoreline Changes



Historic Shoreline Changes



Key:



Conversion to wetter habitat (i.e., from wooded wetland to marsh).



Historic Shoreline Changes

WB 4 - 1955



WB 4 - 2010



Key:

E Narrowing of peninsulas.

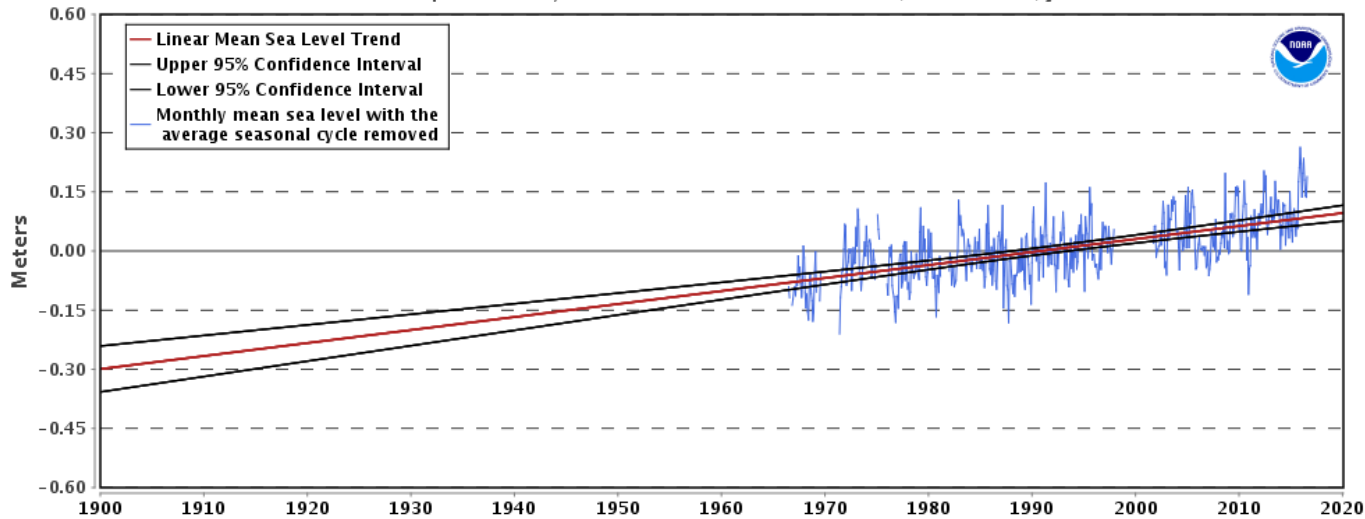


Sea Level Rise (SLR) Records

- Mean Relative Sea Level has risen 6.5 inches in the Mobile Bay Area since 1966

8735180 Dauphin Island, Alabama

3.30 +/- 0.61 mm/yr



Sea Level Rise (SLR) Projections in Mobile Bay Area

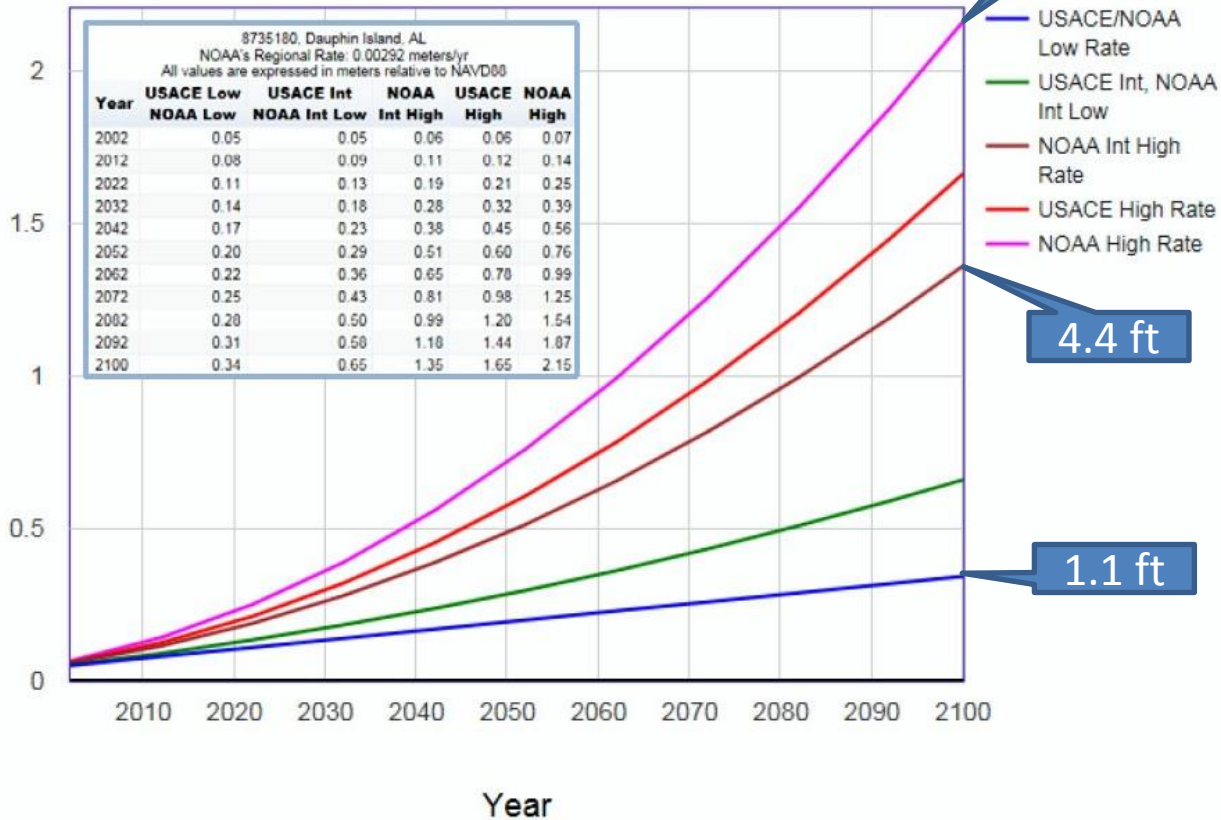
(by National Oceanic & Atmospheric Administration (NOAA) and U.S. Army Corps of Engineers (USACE))

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Relative Sea Level Change Projections - Gauge: 8735180, Dauphin Island, AL (05/01/2014)

RSLC in meters (NAVD88)

8735180, Dauphin Island, AL					
NOAA's Regional Rate: 0.00292 meters/yr					
All values are expressed in meters relative to NAVD88					
Year	USACE Low NOAA Low	USACE Int NOAA Int Low	NOAA Int High	USACE High High	NOAA High
2002	0.05	0.05	0.06	0.06	0.07
2012	0.08	0.09	0.11	0.12	0.14
2022	0.11	0.13	0.19	0.21	0.25
2032	0.14	0.18	0.28	0.32	0.39
2042	0.17	0.23	0.38	0.45	0.56
2052	0.20	0.29	0.51	0.60	0.76
2062	0.22	0.36	0.65	0.78	0.99
2072	0.25	0.43	0.81	0.98	1.25
2082	0.28	0.50	0.99	1.20	1.54
2092	0.31	0.58	1.18	1.44	1.87
2100	0.34	0.65	1.35	1.65	2.15



7.1 ft

4.4 ft

1.1 ft

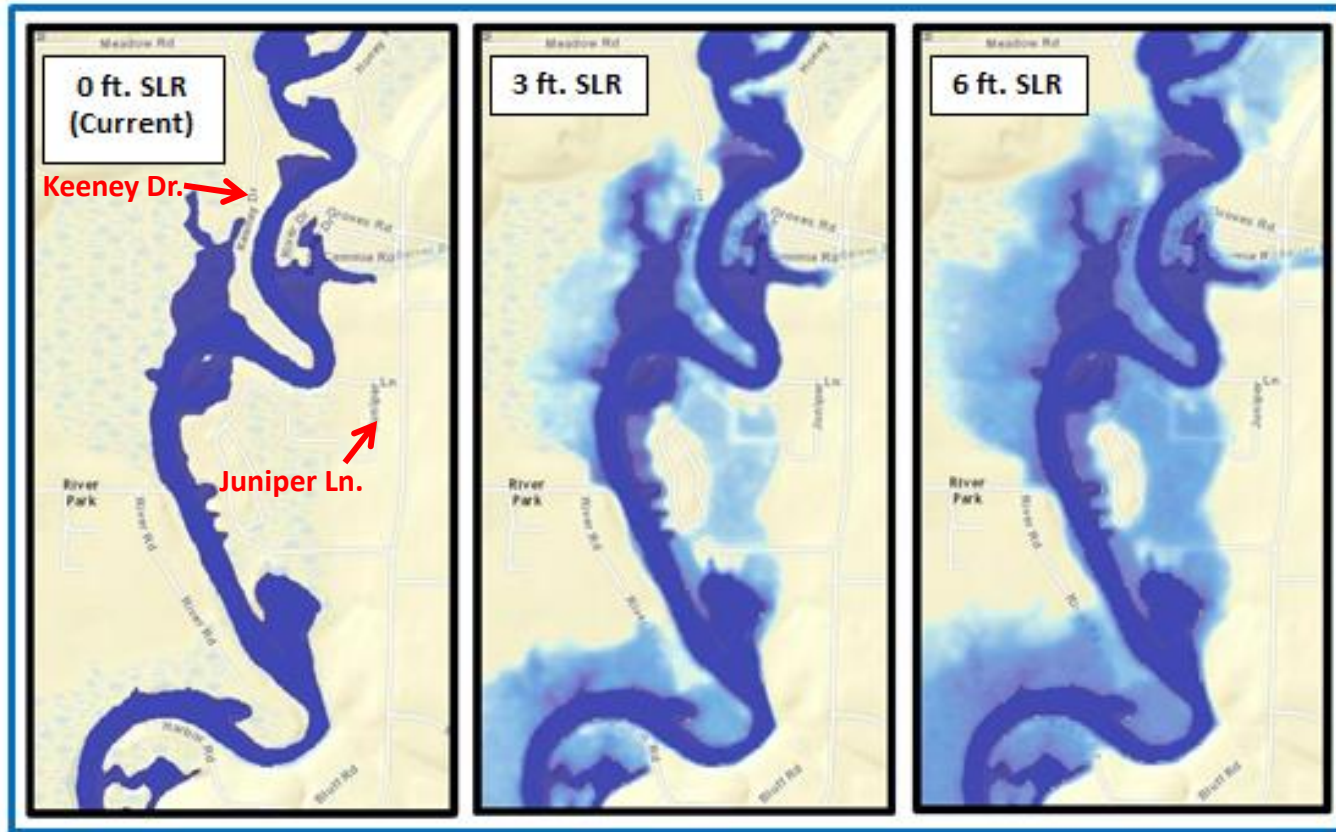


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Potential Effects of SLR Inundation Models



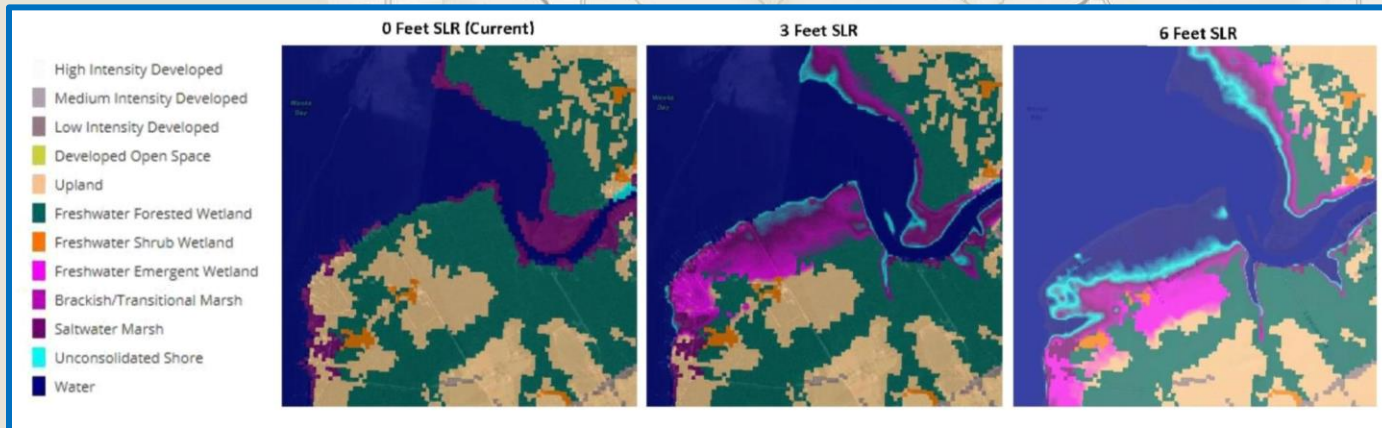
Predicted inundation along a portion of Fish River (as an example)
under 3 SLR scenarios using NOAA's Online SLR Viewer



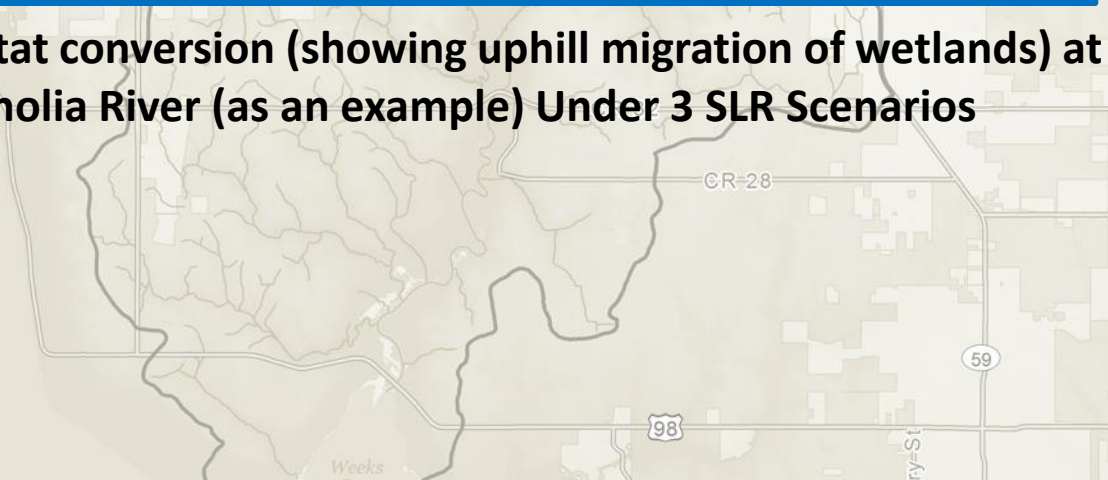
Potential Effects of SLR

Habitat Change Models

Sea Levels Affecting Marshes Model (SLAMM)

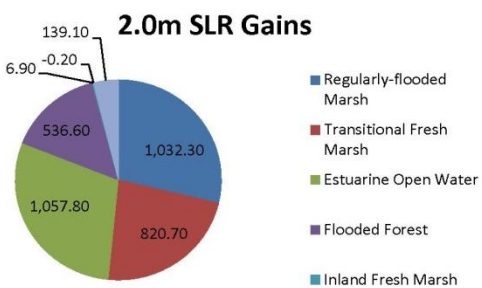
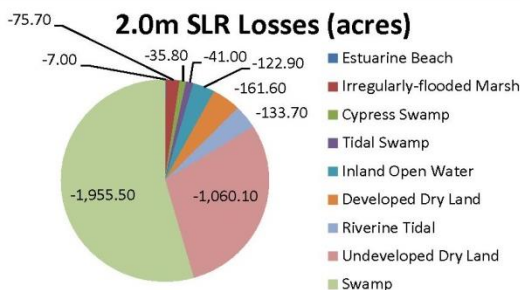
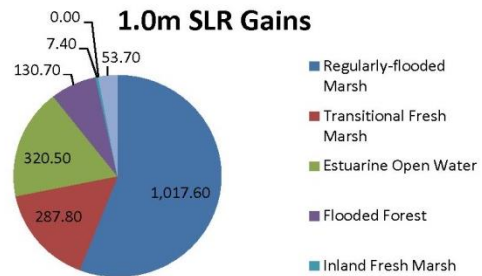
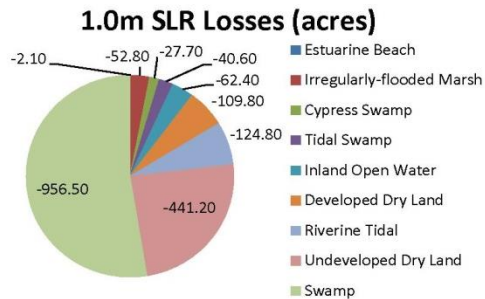
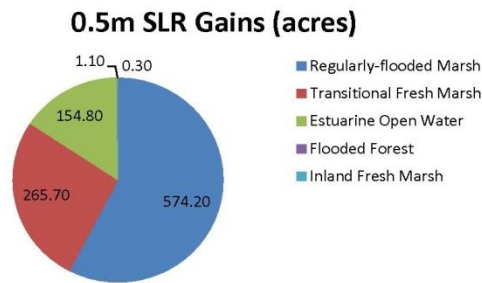
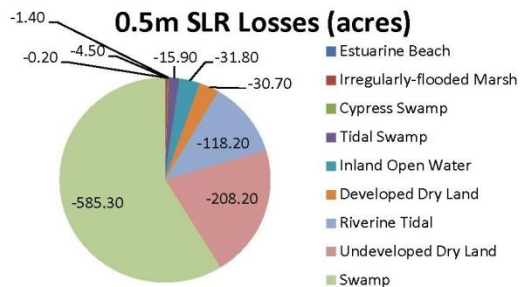


Predicted habitat conversion (showing uphill migration of wetlands) at mouth of Magnolia River (as an example) Under 3 SLR Scenarios



Potential Effects of SLR

Predicted Habitat Changes



LOSERS

- All SLR scenarios = Largest Net Loss was “Swamp” acreage
- 2nd highest Net Loss = “Undeveloped Dry Land”

WINNERS**

- All SLR scenarios = Largest Net Gain was “Regularly Flooded Marsh”
- 2nd highest Net Gain at 1 & 2m scenarios = “Estuarine Open Water” followed by “Transitional Fresh Marsh” and “Flooded Forest”

**BUT,

- If SLR occurs too quickly, habitats don’t have time to convert properly (and drown in place)
- If not enough “Swamp” and “Undeveloped Dry Land” is preserved, then the “Winners” above won’t see the predicted gains

Predicted Habitat Losses and Gains in Entire Weeks Bay Watershed from 2002 to 2100 under the 3 SLR Scenarios (Using SLAMM prediction model)

**THANK YOU FOR PLANNING!!
(for our future generations)**



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