

GIS Analyses Used in Developing the Hillsborough County Seagrass Management Plan

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Estuary Program

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Overview

- Geographical Context & Progress Towards Goals
- Importance of Seagrass Resources
- Why Develop a Seagrass Management Plan
- GIS Tools Used to Develop the Plan
 - Management Area Delineation
 - Recent Extent & Temporal Trends Seagrass Resources
 - Restoration Acreage Determination
 - Photo-digitization and Interpretation of Seagrass Scarring
- Management Actions Resulting from the Plan



Hillsborough County, FL

Quick Facts

- Total Land Area = 1,072 sq. mi.
- 2006 Pop. Est. ~1.16 million (+16% from 2000)
- Incorporated Cities include Tampa, Temple Terrace, Plant City
- ~500K Housing Units
- ~575K Persons in Work Force
- Mean Travel Time to Work ~ 26 min.
- Median Household Income ~ 45K



Tampa Bay Estuary: A Success Story

**250 projects implemented
between 1996-2007**

**Improved
fertilizer
handling at
ports**



**Reduced
industrial and
municipal
nitrogen loading
to the bay**

**Reduced
atmospheric
deposition from
power plants**

Residential actions

GET THE SCOOP ON POOP

Clean Parks, Clean Kids, Clean Pets, Clean Streets

Did You Know:

- ▶ Dog poop can transmit disease to other dogs and to humans.
- ▶ One ounce of dog feces contains about 23 million microorganisms of bacteria.
- ▶ Leaving it on the ground can spread bacteria, E. coli, roundworms, hookworms and more to children & adults who share the grass.
- ▶ Unscraped dog poop washes off into waterways and provides nutrients (nutrients) that may cause algae blooms and fish kills. Stormwater runoff may become your drinking water.
- ▶ Approximately 95% of the fecal coliform found in urban stormwater was nonhuman in origin. Pet waste contributes between 20 to 30% of water pollution in America.
- ▶ Four in ten U.S. households have at least one dog. Pinellas County has approximately 185,000 dogs.
- ▶ Each dog creates between 1/3 to 3/4 pound of excrement per day.
- ▶ Pinellas County dogs generate between 37 and 49 tons of poop per day.
- ▶ Roughly 40% of Americans do not pick up their dog feces. In Pinellas this means 12 - 28 tons of poop per day is left unscraped.

What Can You Do To Help?

Please clean up after your pet and place waste in a trash receptacle.

Pinellas County
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
FLORIDA DEPARTMENT OF HEALTH



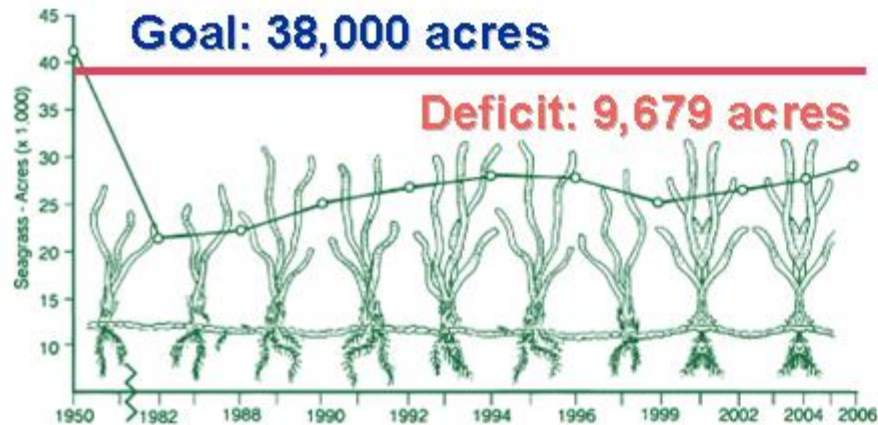
Seagrass: Tampa Bay's Canary in the Coal Mine

TBEP NITROGEN MANAGEMENT STRATEGY PARADIGM

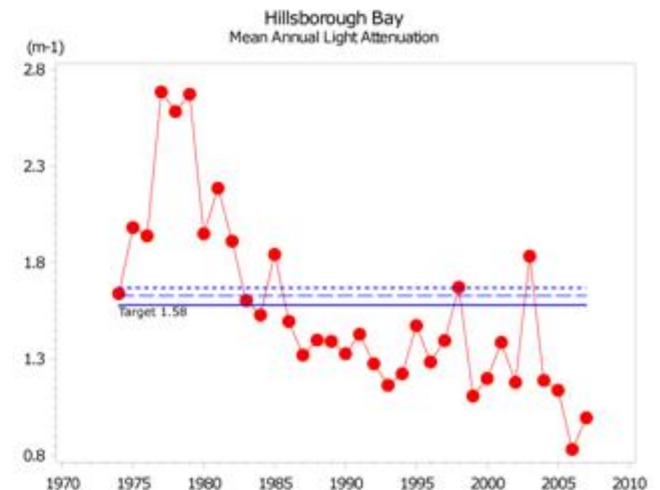
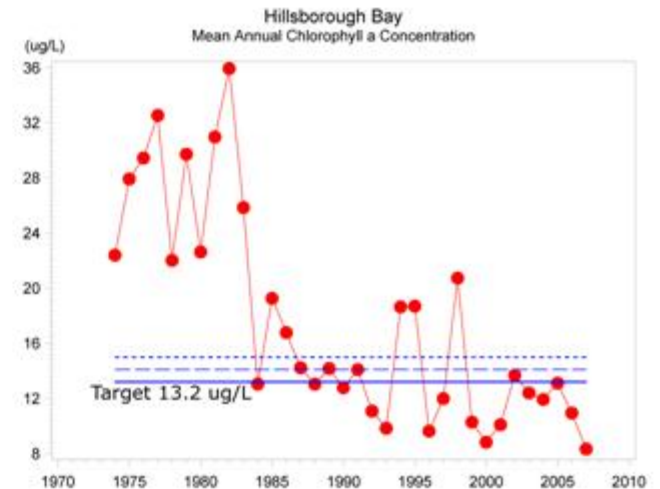
TN Load → Chlorophyll → Light Attenuation

Seagrass Growth
& Reproduction

Seagrass Light
Requirement

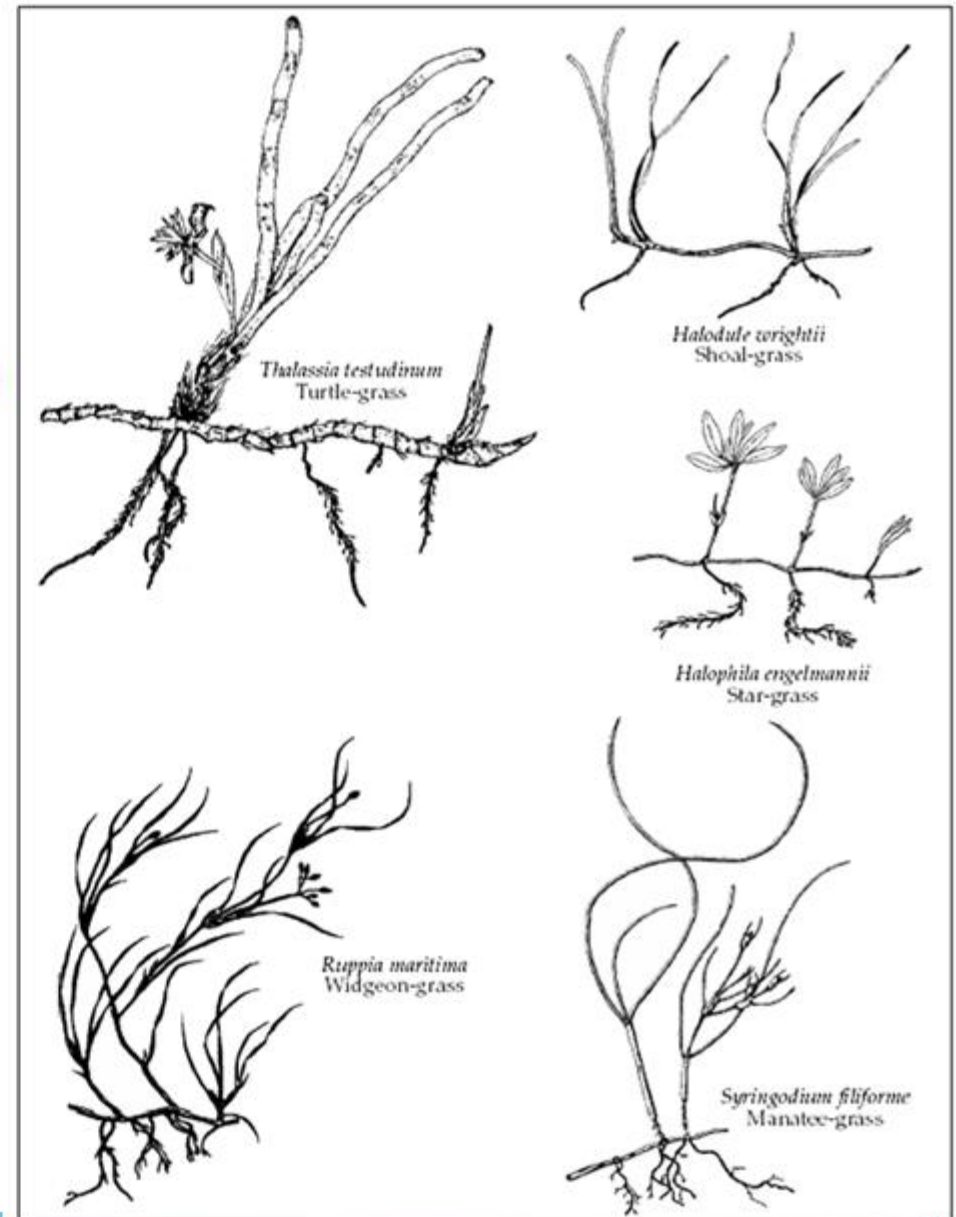


Year	OTB	HB	MTB	LTB
1975	Red	Red	Red	Green
1976	Red	Red	Red	Yellow
1977	Red	Red	Red	Red
1978	Red	Red	Red	Yellow
1979	Red	Red	Red	Red
1980	Red	Red	Red	Red
1981	Red	Red	Red	Red
1982	Red	Red	Red	Red
1983	Red	Yellow	Red	Red
1984	Red	Green	Red	Yellow
1985	Red	Red	Red	Yellow
1986	Red	Yellow	Red	Green
1987	Red	Yellow	Red	Green
1988	Yellow	Green	Yellow	Green
1989	Red	Yellow	Red	Yellow
1990	Red	Green	Red	Yellow
1991	Green	Yellow	Yellow	Yellow
1992	Yellow	Green	Yellow	Yellow
1993	Yellow	Green	Yellow	Yellow
1994	Yellow	Yellow	Red	Red
1995	Red	Yellow	Red	Yellow
1996	Yellow	Green	Yellow	Green
1997	Yellow	Green	Red	Yellow
1998	Red	Red	Red	Red
1999	Yellow	Green	Yellow	Yellow
2000	Green	Green	Yellow	Yellow
2001	Yellow	Green	Yellow	Yellow
2002	Yellow	Green	Green	Green
2003	Red	Yellow	Green	Yellow
2004	Red	Green	Green	Yellow
2005	Green	Green	Yellow	Yellow
2006	Green	Green	Green	Green
2007	Green	Green	Green	Green



Importance of Seagrass Resources

- Provide critical habitat for many important fish and shellfish species in the bay
- Important food source and feeding habitat for the Florida Manatee
- Help stabilize bay sediments and improve water quality
- Sensitive indicators of water quality degradation
- Primary focus of the regional water quality management effort for Tampa Bay



Why Develop a Local Seagrass Management Plan

- A step that is encouraged by the Tampa Bay Estuary Program, to help meet the bay-wide seagrass coverage goal
- Identifies and prioritizes local management areas and issues, allowing more efficient allocation of limited resources
- Allows better integration of Hillsborough County efforts into the regional management program

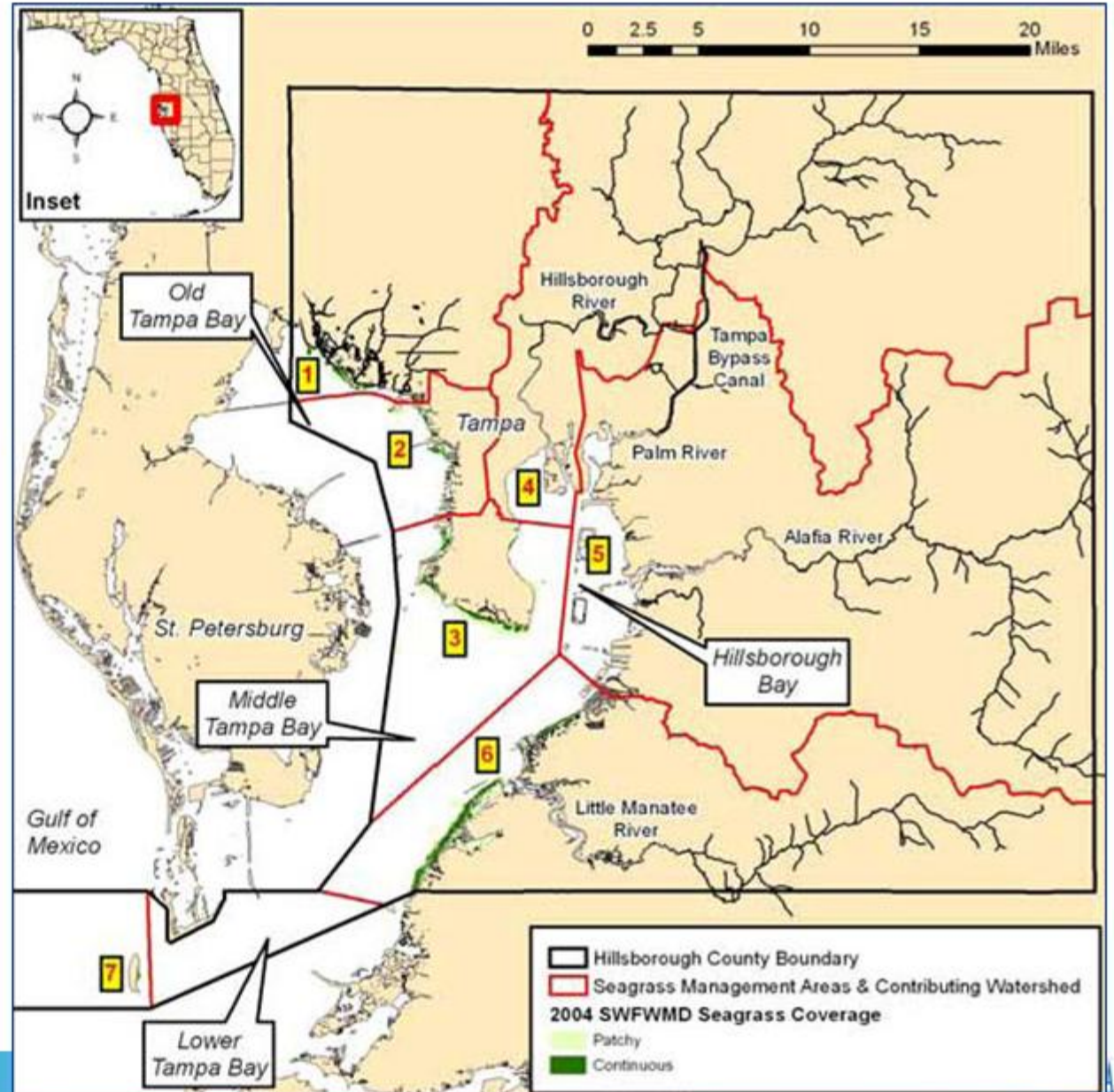


GIS Tools Used for the Plan



Defining Management Areas

- Developing Logical Management Areas with Similar Issues
- Watershed Contributions
- Physical Barriers



Defining Current Extent & Restoration Acreages for Prioritization

- Management areas used to aggregate seagrass coverages
- Estimated 1950s seagrass coverages edited to exclude dredged areas, intersections with land/new spoil areas.

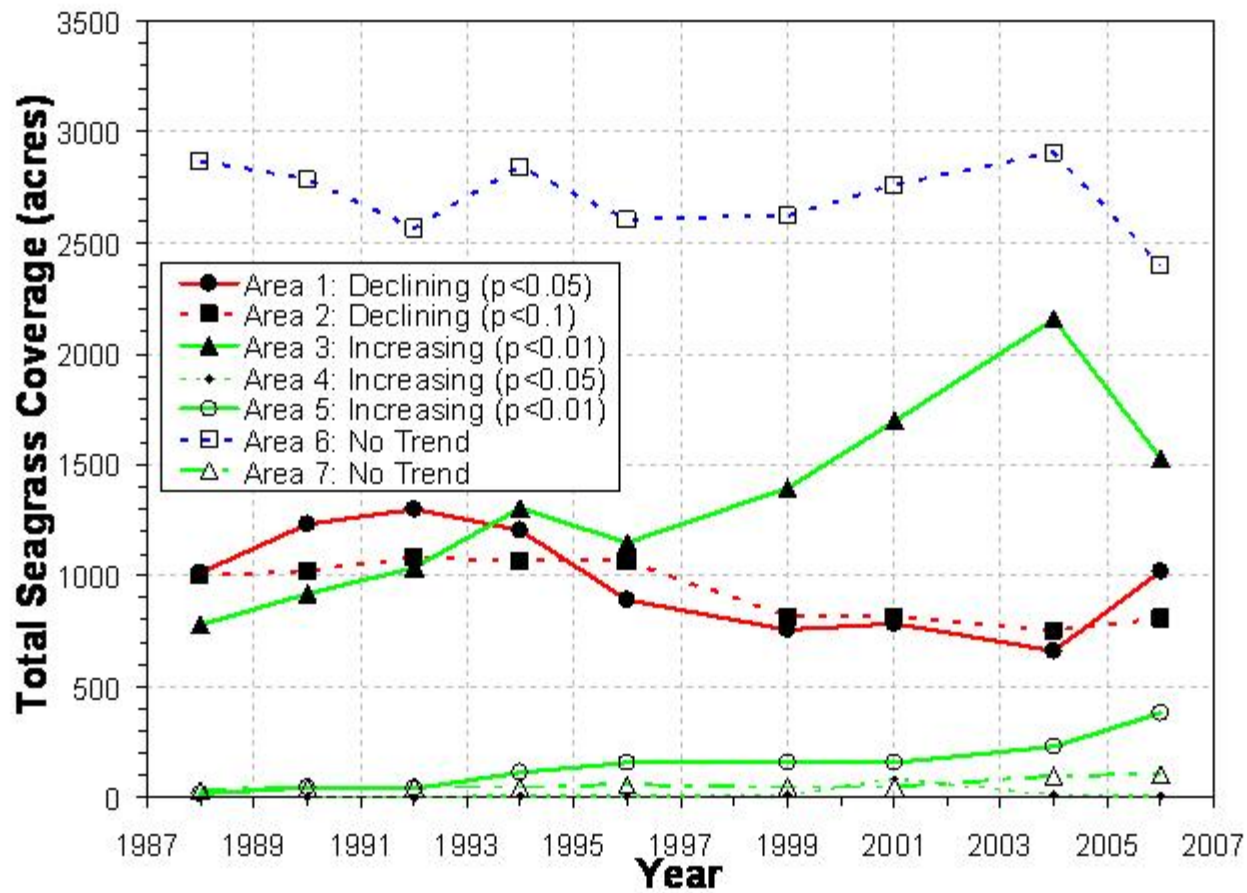


Management Area Number	Management Area Name	Protection Potential (2006 Acres)
6	Eastern Middle Tampa Bay	2,399
3	Interbay Peninsula / MacDill AFB	1,527
1	Northern Old Tampa Bay	1,020
2	Eastern Old Tampa Bay	806
5	Eastern Hillsborough Bay	379
7	Egmont Key	103
4	Western Hillsborough Bay	3

Management Area Number	Management Area Name	Restoration Potential (1950 Acres)
6	Eastern Middle Tampa Bay	2,749
5	Eastern Hillsborough Bay	2,428
1	Northern Old Tampa Bay	1,384
2	Eastern Old Tampa Bay	977
3	Interbay Peninsula / MacDill AFB	641
4	Western Hillsborough Bay	46
7	Egmont Key	N/A (current acreage is greater than estimated 1950s levels)



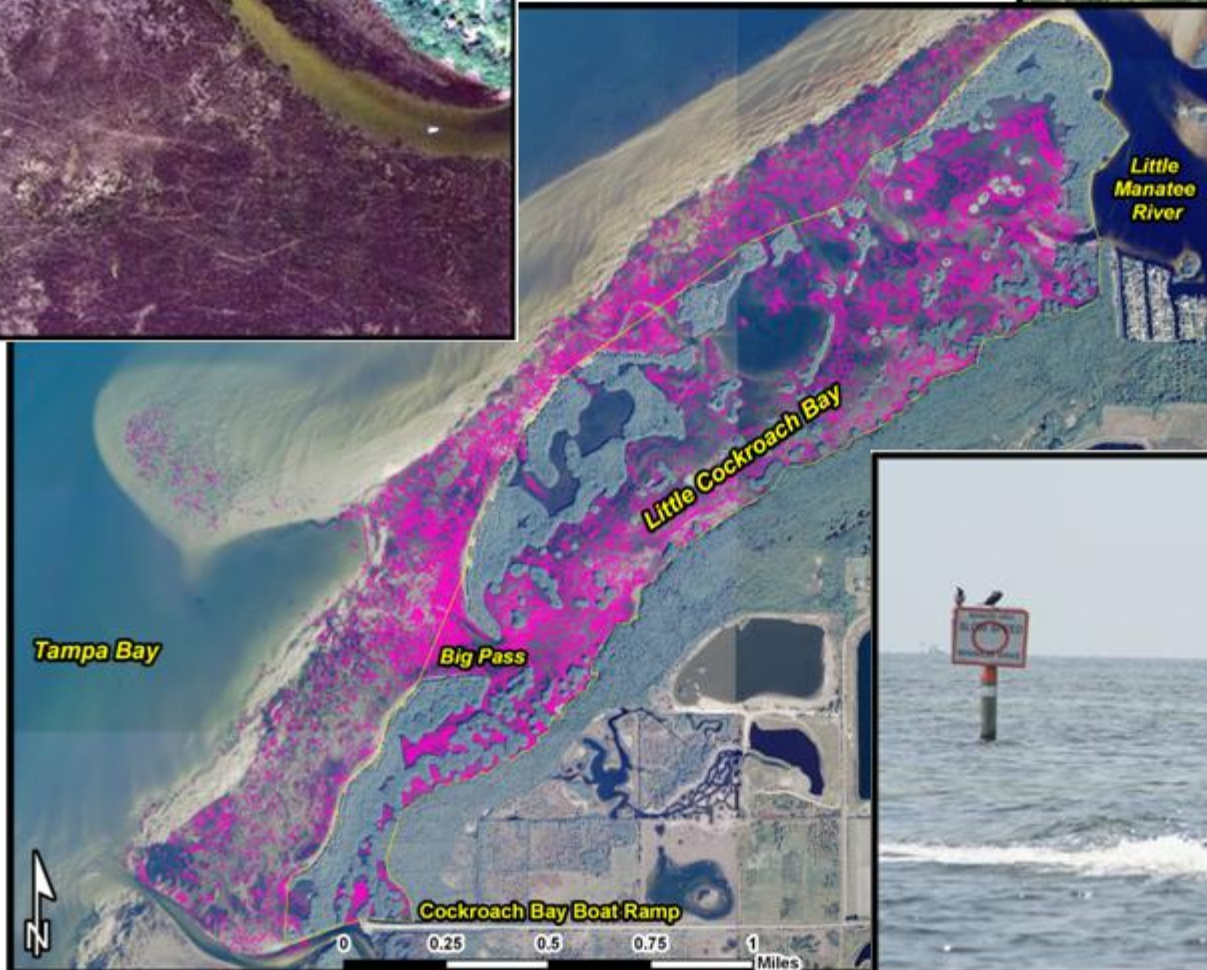
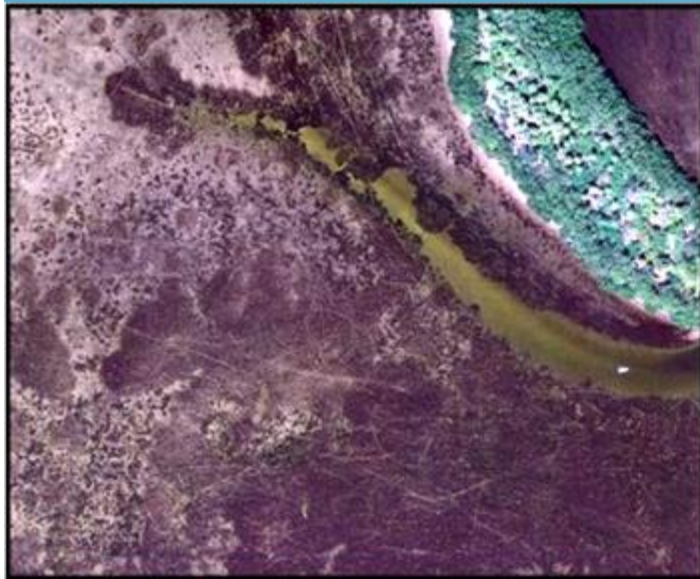
Assessing Trends in Seagrass



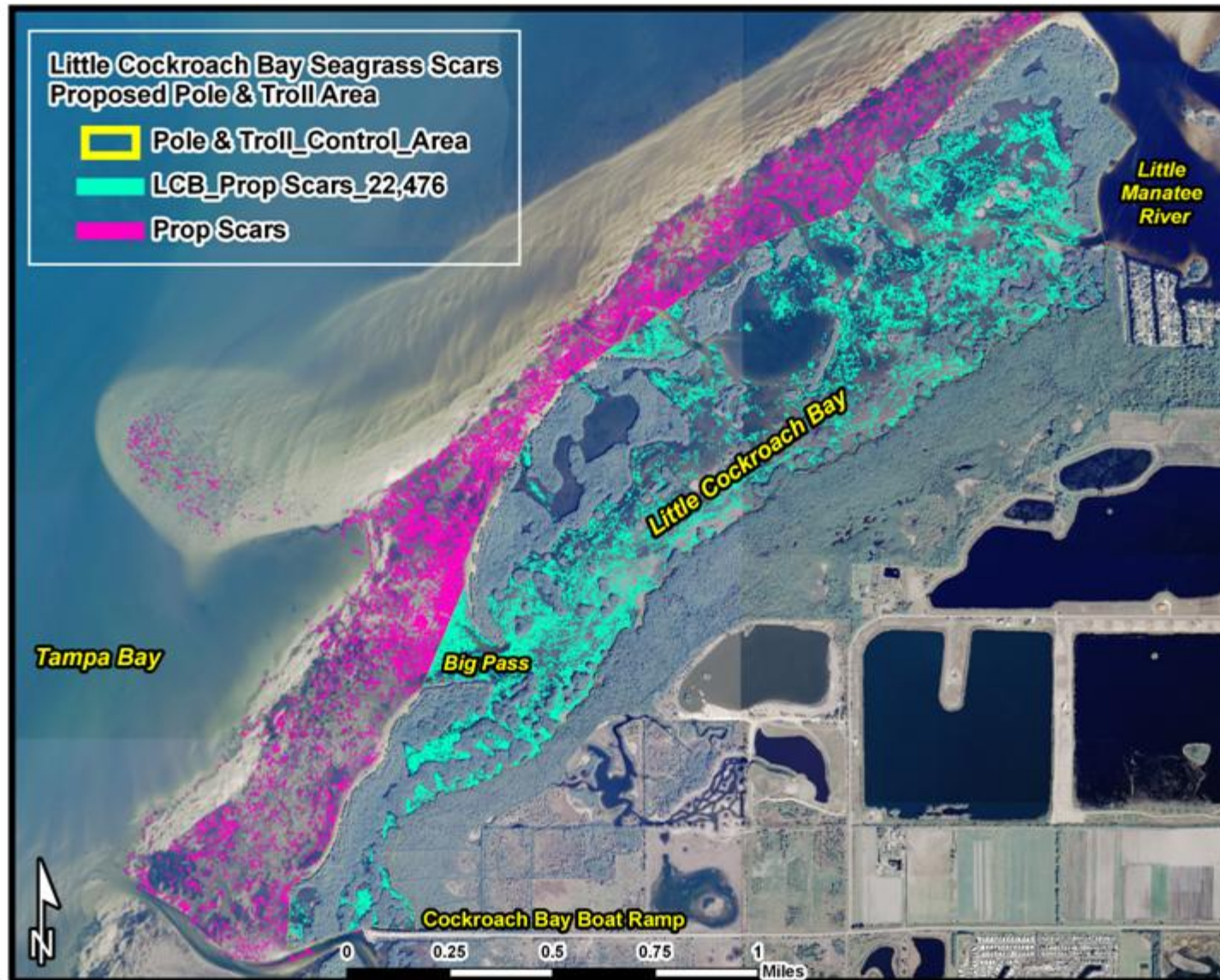
- [Kitchen Seagrass Edge Change.wmv](#)
 - [Tracking animation1.avi](#)



Assessing Boating Impacts



Assessing Boating Impacts



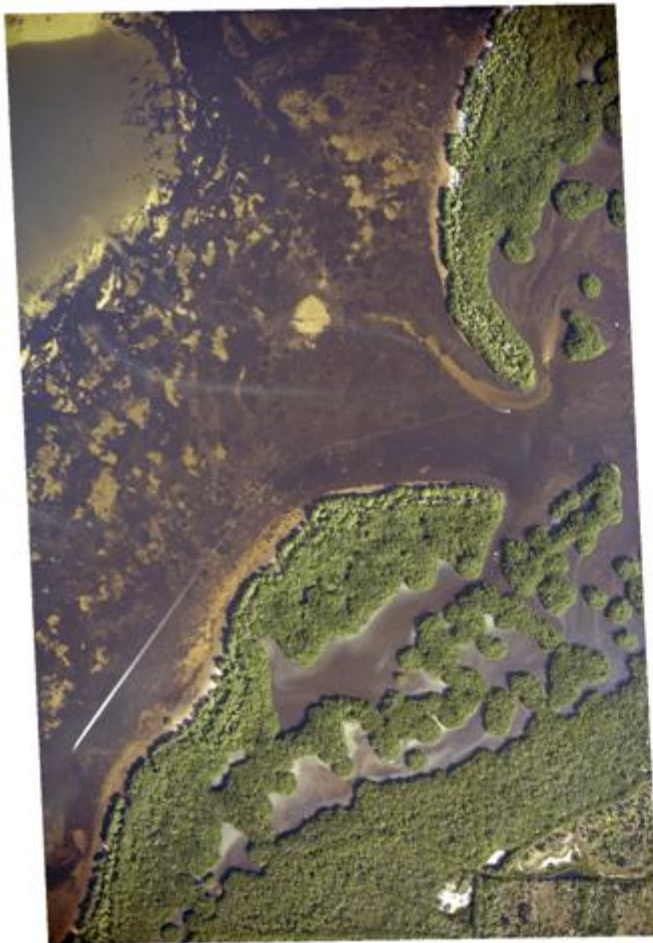
Assessing Boating Impacts

Method for **Seagrass Scar** digitization:

- **2006 digital aerials shared by SWFWMD (prepared by Photo Science) were radiometrically enhanced with Leica Image Analysis for ArcGIS™ (extension).**
- **LUT (Lookup Table) Stretch enhancement technique was applied to individual tif files.**
- **Tif images were oriented in following manner. More Northern tiles overlap adjacent Southern tiles and more Eastern tiles overlap adjacent Western tiles.**
- **The image was zoomed to a resolution of 1:750 in the ArcMap project's data view.**
- **The Editing tool was used to create (digitize) propeller scars where visible using a polyline of font size 0.2 and stored in a prepared personal geodatabase as a shapefile.**
- **Occasionally a reality check was taken using original tifs & low elevation flight photos or a surrealistic check using Brightness Inversion (opposite contrast of original) enhanced tif files also converted using Leica Image Analysis for ArcGIS™.**
- **Coordinates acquired from large white PVC discs placed in the project area for differential GPS located ground control points prior to flight as well as image-to-image registration were used for rectifying the low elevation photos with the ArcMap™ georeference tool.**

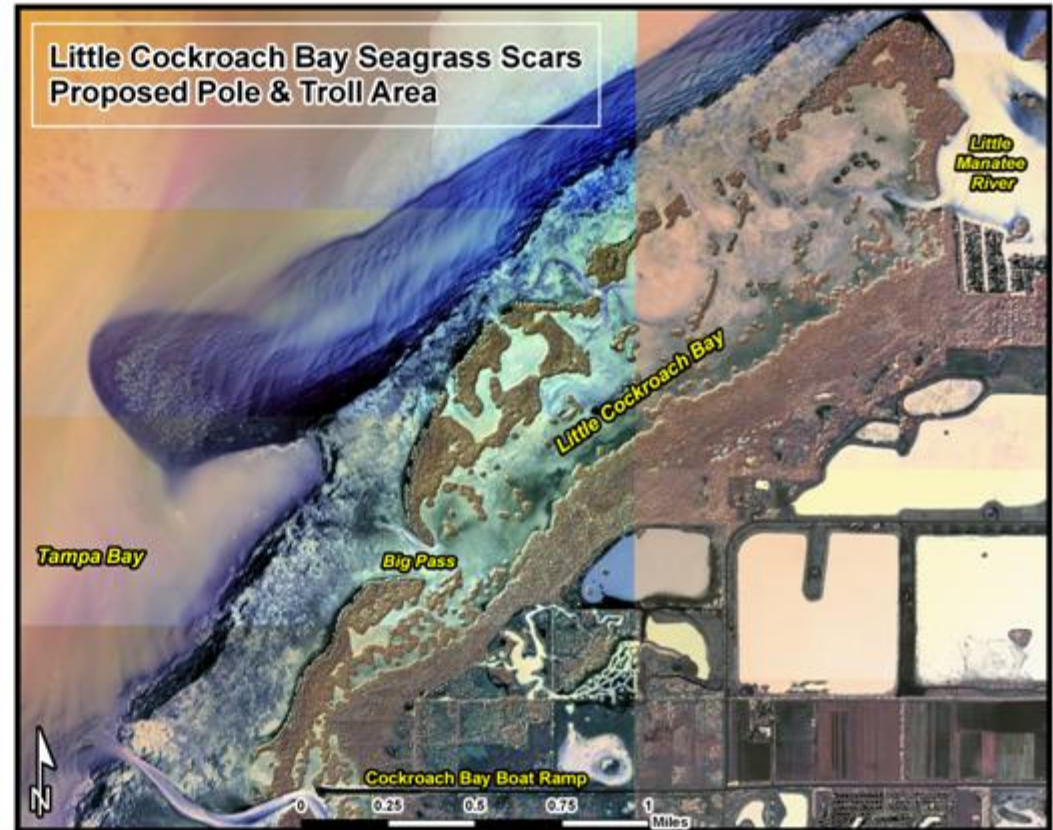


Assessing Boating Impacts



Low Elevation Flight

Radiometric Enhancement

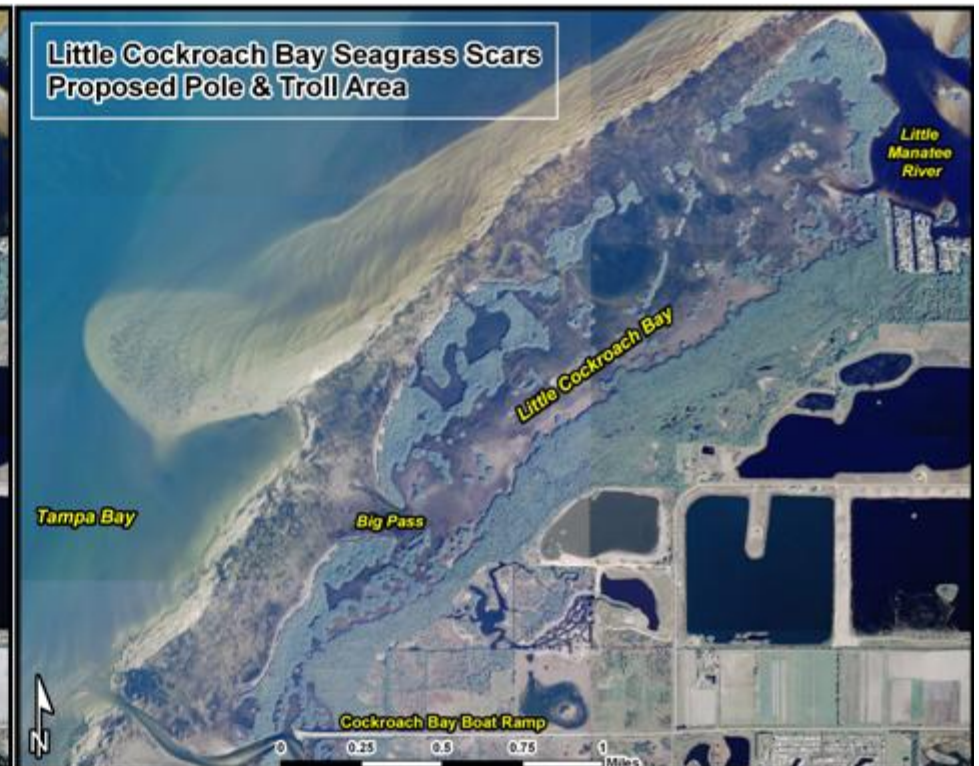
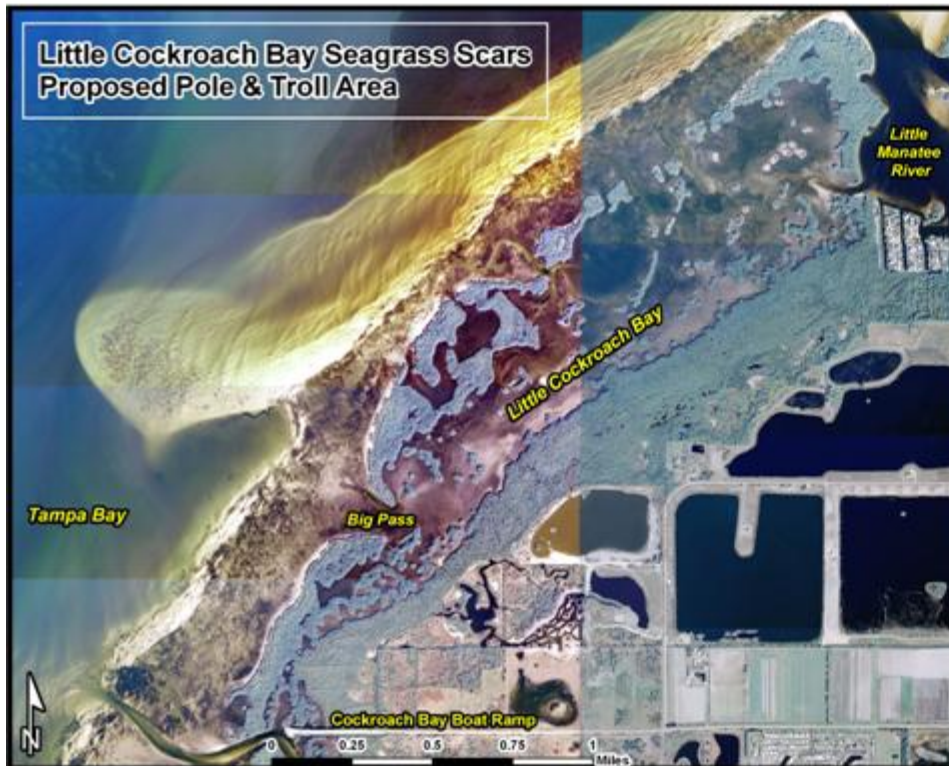


Brightness Inversion

Assessing Boating Impacts

Radiometric Enhancement

Original Tif



LUT (Look-Up Table)



Management Issues Refined in Each Area

- **Well-documented issues:**
 - Water quality (clarity and light attenuation)
 - Dredging and filling
 - Boating impacts (propeller scars, anchoring and grounding)
- **Potential issues**
 - Restoration of dredged holes
 - Excessive wave energy
 - Invasive exotic species (e.g., green mussel)
 - Other (bioturbation, sediment quality, sea level rise)



Proposed Management Actions

1. Continue managing nitrogen loads entering the bay
2. Continue monitoring seagrass condition and species composition
- 3. Address propeller scarring and seagrass restoration**
- 4. Encourage greater on-water enforcement of environmental laws and rules in Hillsborough County waters**
5. Continue to assess effects of wave energy
6. Continue to address impacts of dredging and dredge material management
7. Continue tracking seagrass status and trends, and evaluating priority management areas and issues



Actions Addressing Propeller Scarring

- Assist the Florida Department of Environmental Protection and the Hillsborough County Parks, Recreation and Conservation Department in establishing an experimental “Pole & Troll” zone in the area
- Boating would be allowed in the Pole & Troll area, but the operation of outboard motors and other internal combustion engines would be forbidden
- Maintain the Pole & Troll designation in the experimental zone for a minimum of five years, and measure and document changes in seagrass scarring rates during that period.
- Estimate prop scar intensity levels at the beginning and end of the five-year trial period, and providing recommendations on the continuation or elimination of the Pole & Troll designation at the end of the period.
- Four options explored to allow boater access to “Pole & Troll” Zones



Actions Addressing Propeller Scarring

Option 1: Move the existing County Manatee Protection Area boundary landward from the 6' depth contour towards the seagrass edge extent outside Little Cockroach Bay and establish a pole and troll area inside Little Cockroach Bay. Task Force members suggested that this option might promote better compliance, and therefore reduction in seagrass propeller scarring, in the existing Manatee Protection Area outside and inside Little Cockroach Bay (see attached figure).

Option 2: Establish a pole and troll regulatory zone in Little Cockroach Bay and provide perpendicular, high-speed access corridors to Sand Key, Little Cockroach Island, Mag's Pond / Marys Lake, and Big Pass through the existing Manatee Protection Area (see attached figure).

Option 3: Establish the Cockroach Bay Marine Sanctuary that encompasses the existing Manatee Protection Area from the Little Manatee River south to the Hillsborough/Manatee County border. Public boating use would be restricted to pole and troll within the sanctuary with five access corridors to within a 1000' contour of land (see attached figure).

Option 4: Establish an access corridor through Little Cockroach Bay from the Little Manatee River and define area outside the corridor and within the existing Manatee Protection Area as a Pole and Troll Zone (see attached figure). This option was proposed after the official meeting had ended.



Legend

-  Cockroach Bay Boat Ramp
-  Existing Hillsborough County Manatee Protection Area (Slow Speed)
-  FDEP/HC Aquatic Preserve Boundary
- Option 1: Move Existing Manatee Protection Area Landward**
-  Slow Speed - Manatee Protection Area Modification
-  Pole and Troll Zone

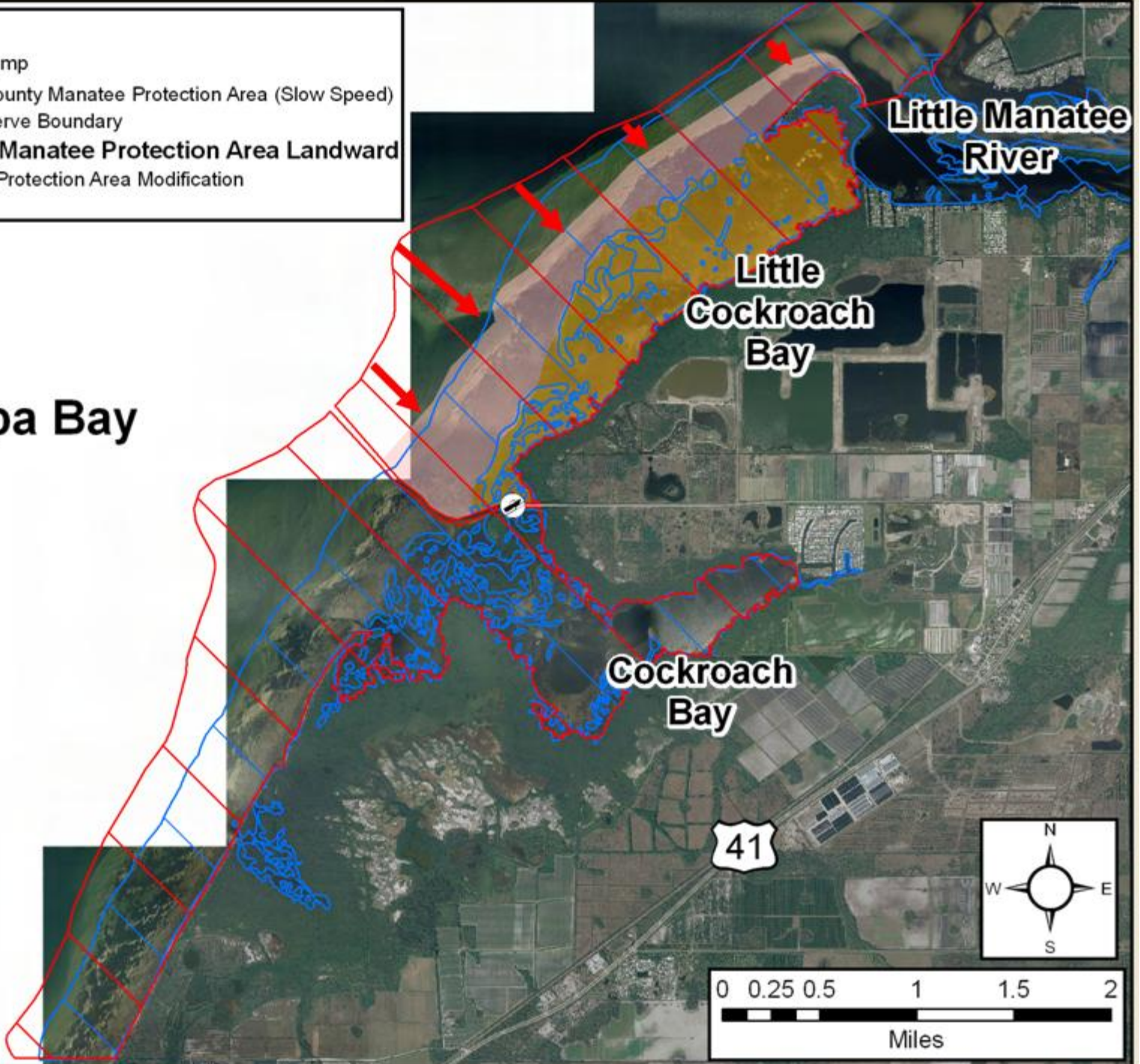
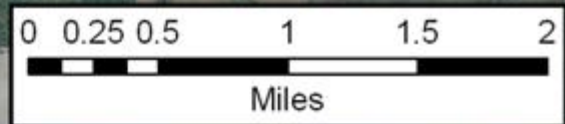
Tampa Bay

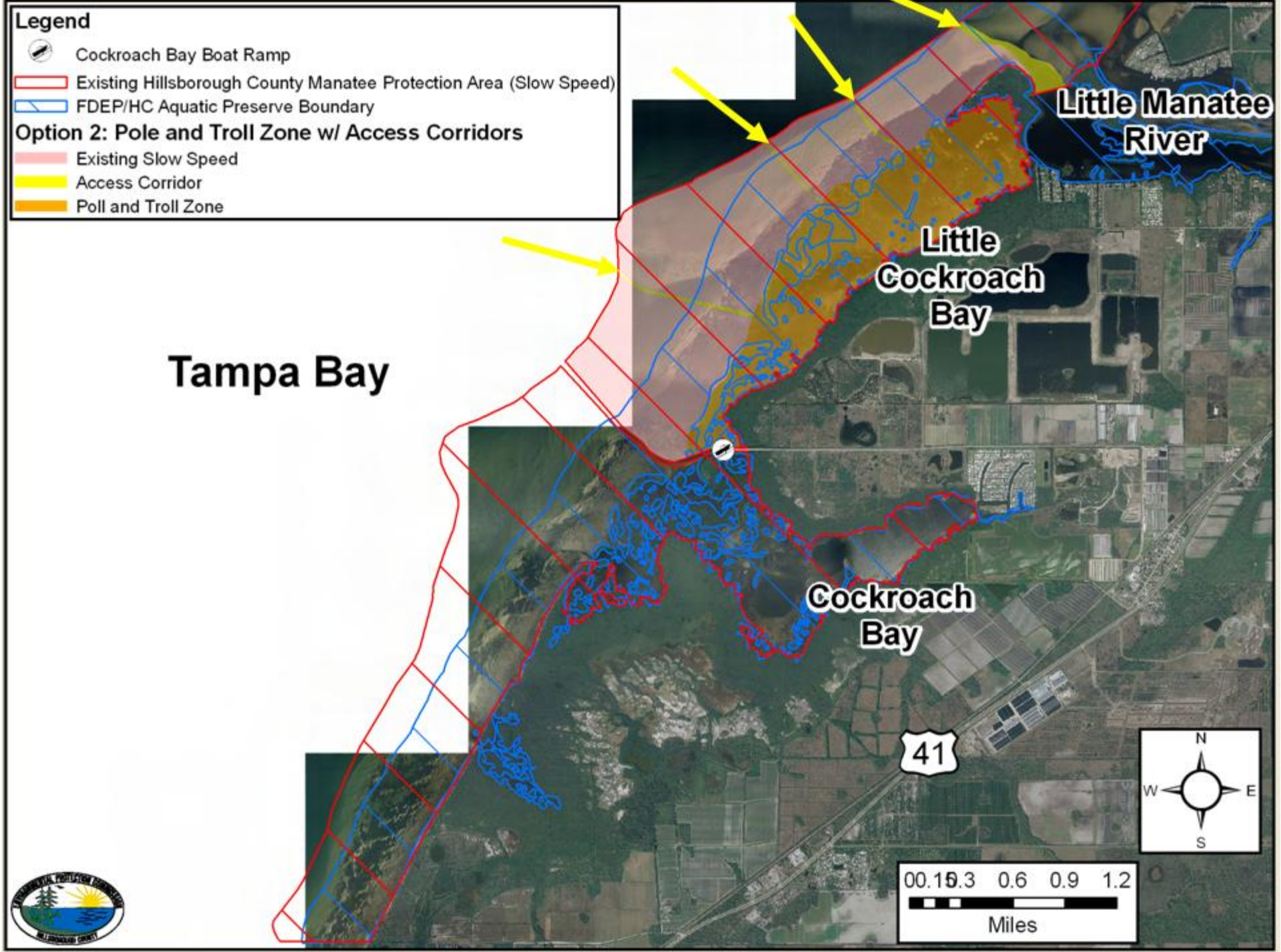
Little Manatee River

Little Cockroach Bay







Cockroach Bay

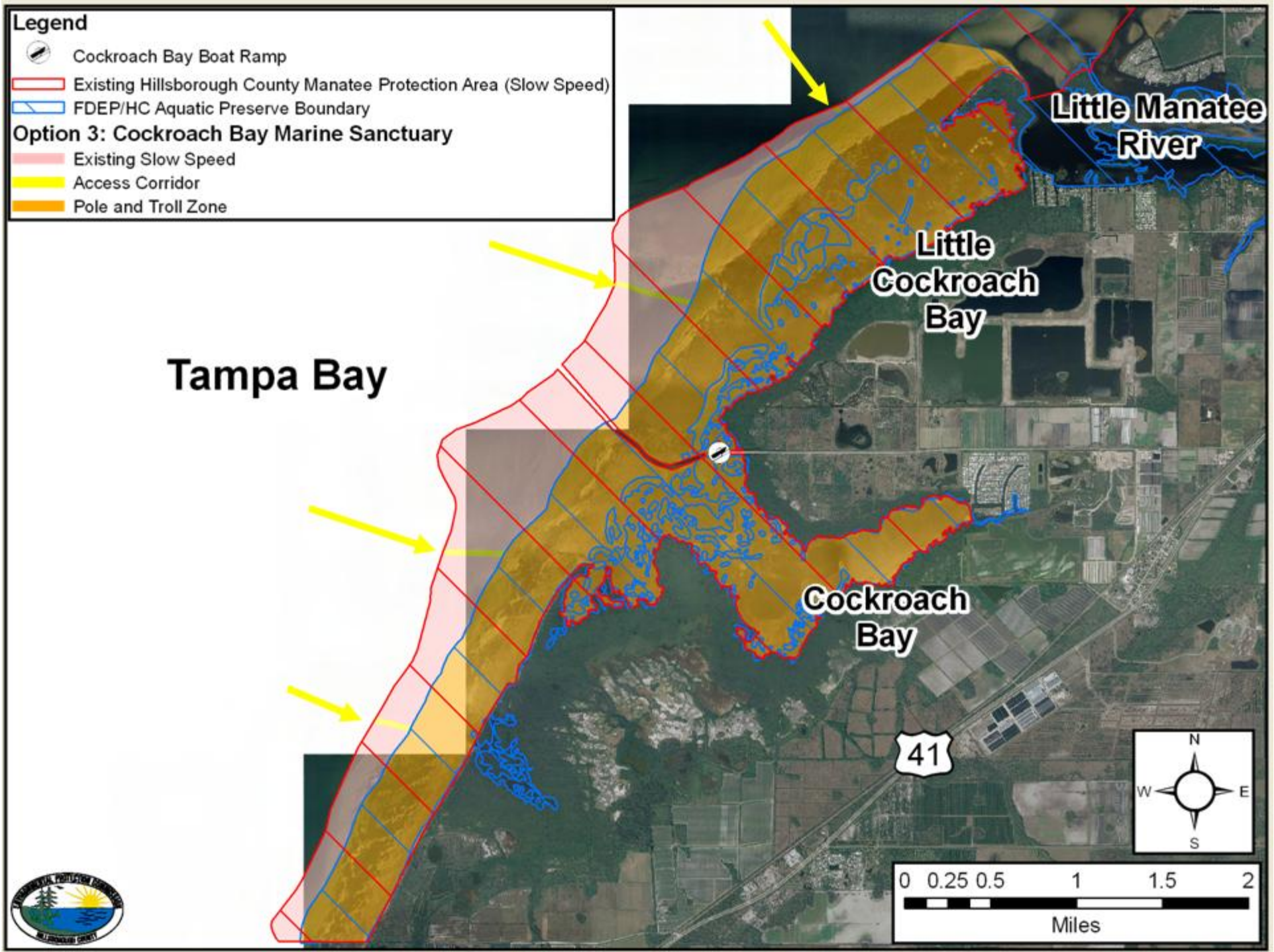
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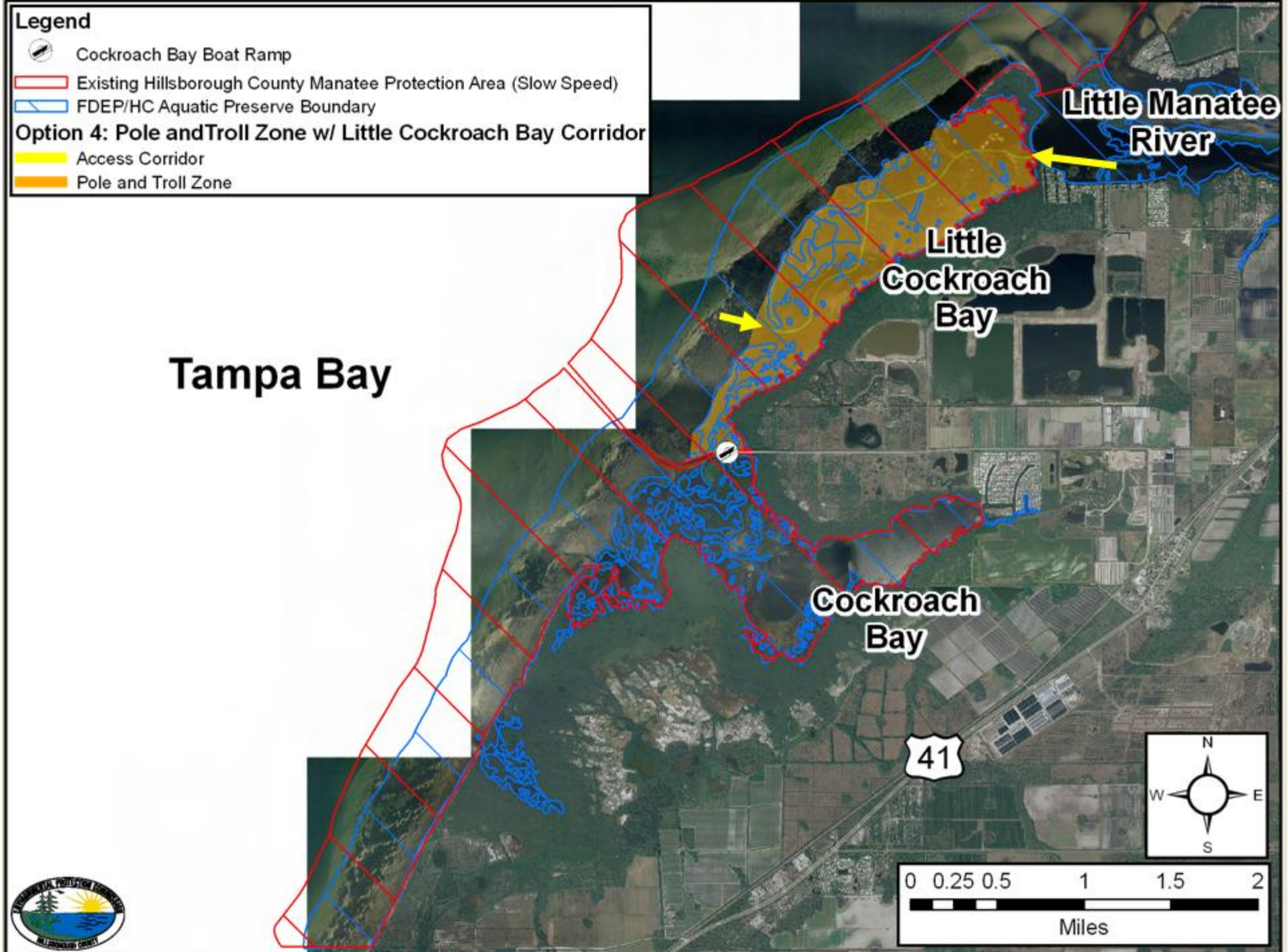




Legend

-  Cockroach Bay Boat Ramp
-  Existing Hillsborough County Manatee Protection Area (Slow Speed)
-  FDEP/HC Aquatic Preserve Boundary
- Option 3: Cockroach Bay Marine Sanctuary**
-  Existing Slow Speed
-  Access Corridor
-  Pole and Troll Zone





Pole & Troll Designation Challenges

- Reasonable Access at Faster Speeds
- Lack of Existing Natural Deep Water
- Marking / Signage for Boating Public
- Law Enforcement / Lack of Compliance
- Education and Outreach
- Existing Manatee Speed Zones
- Protecting Seagrass, Manatees, Users





Option 1: Modify Existing Manatee Protection Area Boundary with Manatee Overlay

Legend

Manatee GPS Locations 2002-2005

NAME

- BOFA
- BREVE
- BUMBLEBEE
- DANA
- HAGRID
- HEDGE
- HEDWIG
- KAI
- LISA
- LORAX
- LYDIA
- MINERVA
- NIMBUS
- NORBERT
- VEELA
- VYTAS
- WUMBUS
- YERTLE



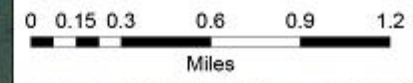
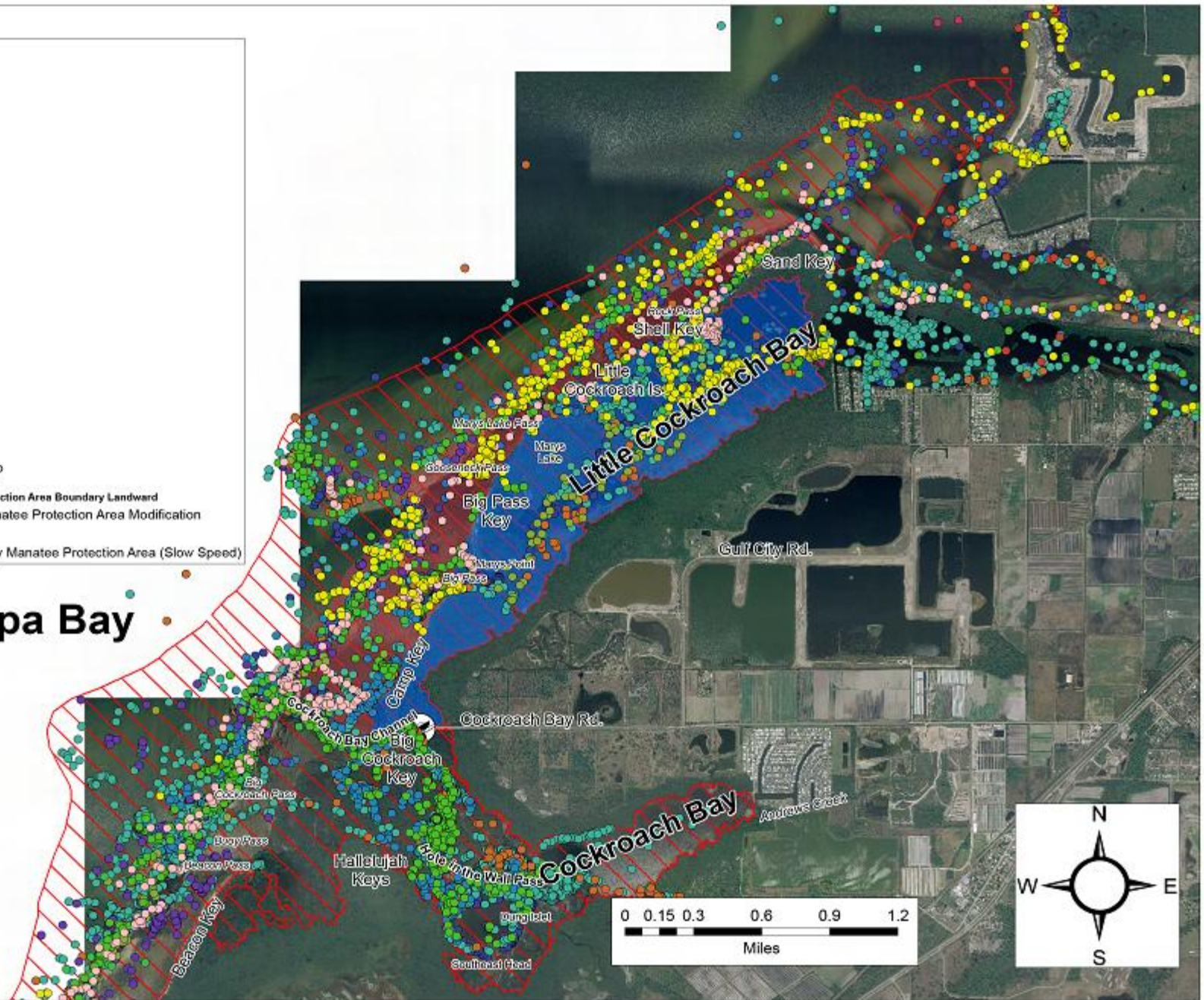
Option 1: Move Existing Manatee Protection Area Boundary Landward

■ Proposed Slow Speed - Manatee Protection Area Modification

■ Proposed Pole & Troll Area

■ Existing Hillsborough County Manatee Protection Area (Slow Speed)

Tampa Bay



Next Steps

- Update the Pole & Troll Task Force
- See if an "Option 5" can be developed
- Continue to rely on enforcement of existing manatee protection zone

