

USGS Research and Monitoring The Florida Manatee

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Funding Sources

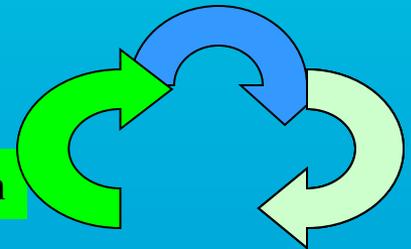
- **USGS**
- **U.S. Fish and Wildlife Service**
- Everglades National Park
- U.S. Army Corps of Engineers
- Other reimbursables

Overview of Current Research

- **Population Assessment and Modeling**
- **Population Genetics**
- **Spatial Modeling and Habitat Use**
 - Southwest Florida (Everglades Restoration)
 - Northwest Florida (Springs Carrying Capacity)
- **Application of Research to Management Issues**
 - Changes in Power Plant Operation
 - Climate Change and Sea Level Rise

Biological Planning

Monitoring and Research



Conservation Design

Photo-documentation of individual manatees to study life history: reproduction and survival



**Foundation
for modeling**



TB021 - 1993

TB021 - 2006



Manatee Individual Photo-identification System (MIPS)

- **The MIPS is a computerized database and photographic catalog of individually recognizable manatees.**
- **Manatees are identified by unique features, most commonly boat-inflicted scars.**
- **Documented sightings of cataloged manatees include date, location, and ancillary behavioral and life history data.**



Current MIPS Data

- **Total Individuals: 2,250**
- **Total Sightings: Over 50,000**
- **~ 97% of individuals in the database have multiple scar patterns indicating multiple boat strikes**

MOU: USGS

FWCC

MML

Survival Analysis

Cathy Langtimm, Jim Nichols

Objectives

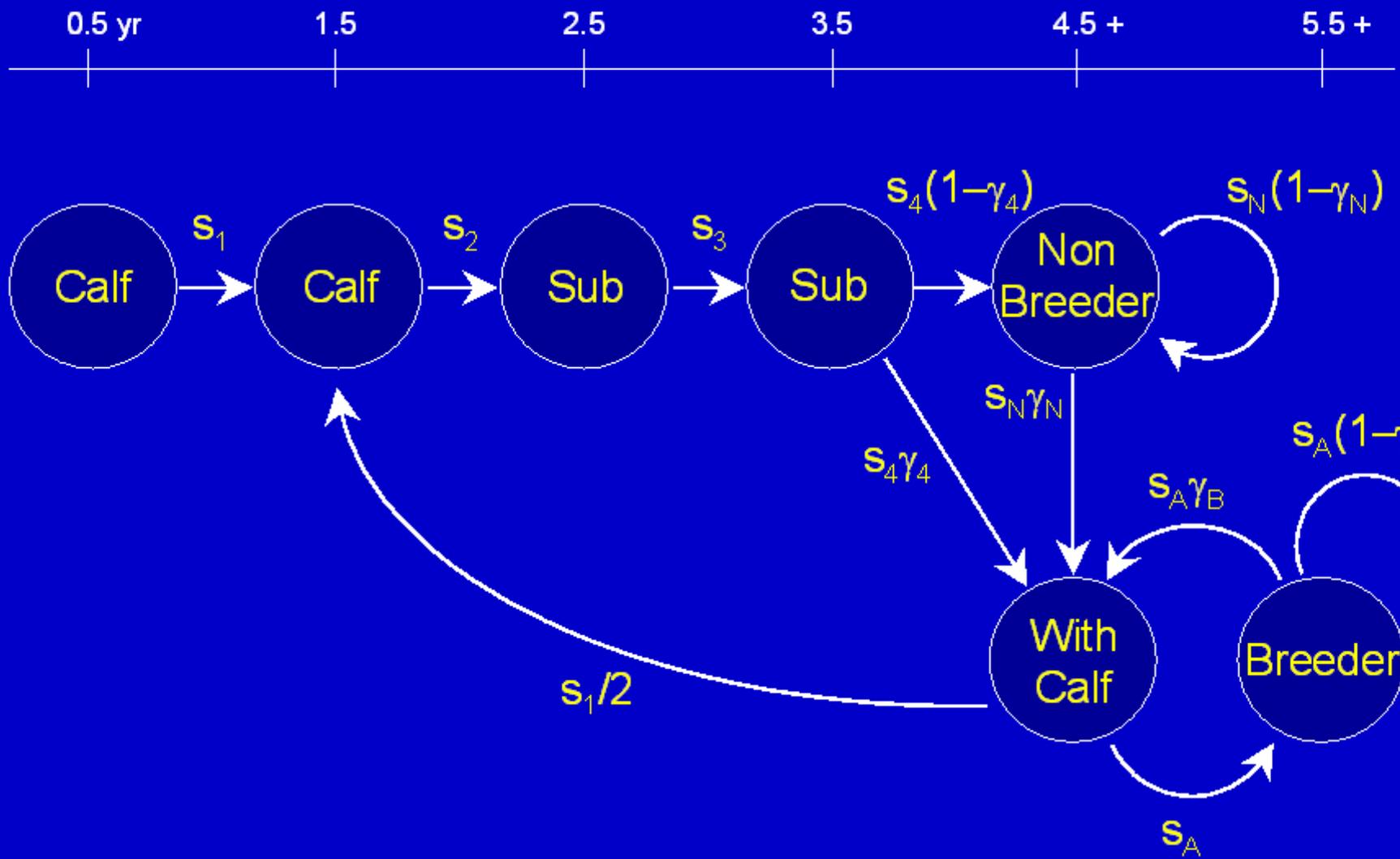
- Provide survival estimates for models of population dynamics
- Understand factors affecting survival probabilities and the magnitude of their impact

Population Modeling

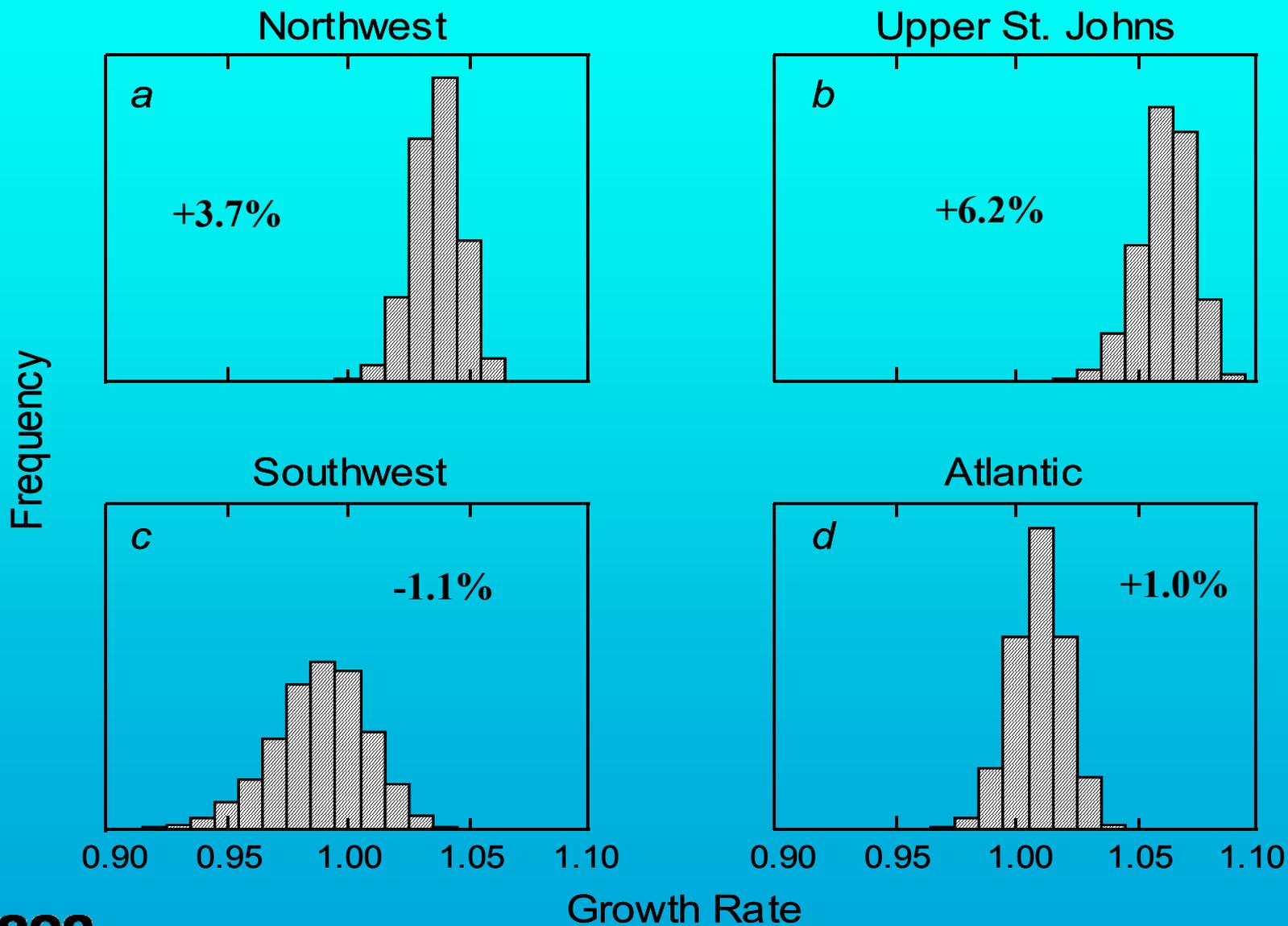
**Michael C. Runge¹, Catherine A. Langtimm²,
William L. Kendall¹, and James D. Nichols¹**

¹ Patuxent Wildlife Research Center
Laurel, Maryland

² Southeast Ecological Science Center
Gainesville, Florida



Growth rates from the population model for the four regional populations



Core Biological Model has or can be used to inform:

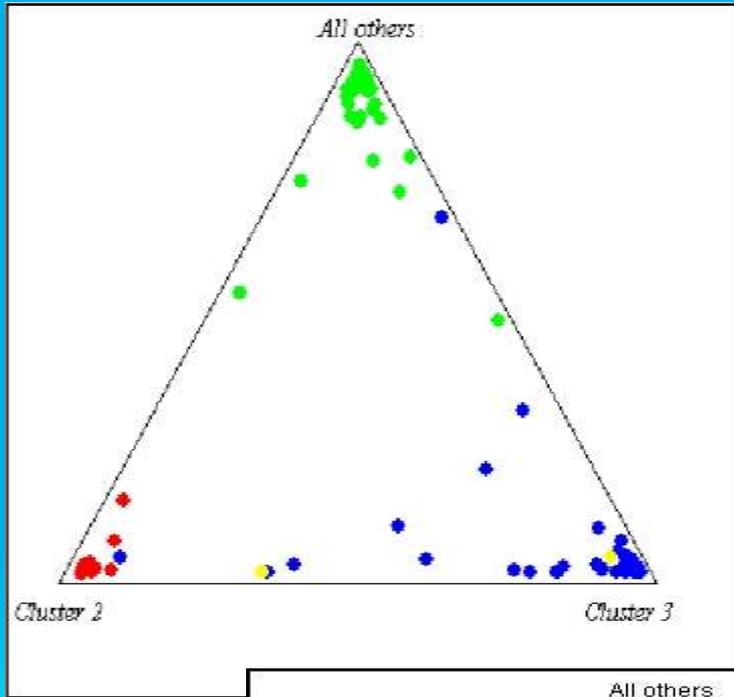
- **FWC biological status review**
- **FWS five-year review**
- **Comprehensive threats analysis for FWS**
- **Evaluation of new proposed recovery criteria**
- **Research prioritizing**
- **Other assessment needs that arise**

Population Structure

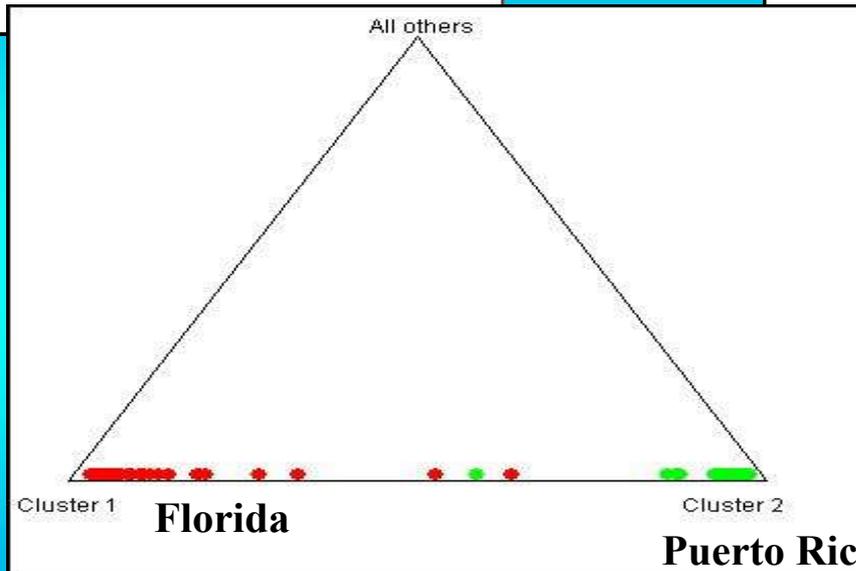
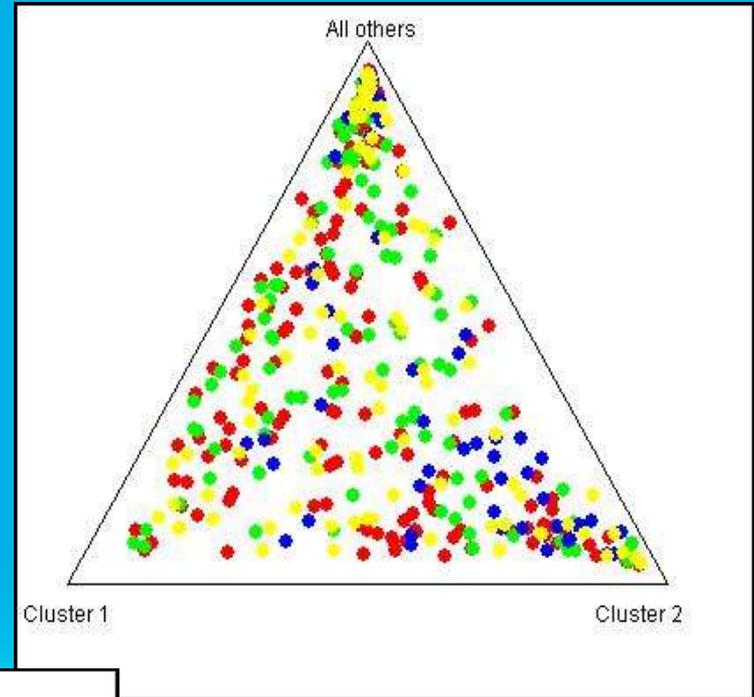
Dr. Bob Bonde et al.

- **Demonstrated lack of polymorphism in the Florida manatee genome**
- **Development of 36 polymorphic manatee-specific microsatellite loci**
- **Organization of the cooperative manatee genetics research group: USGS, FWS, Florida Fish and Wildlife Research Institute, University of Florida, and Mote Marine Lab**

Model



Florida

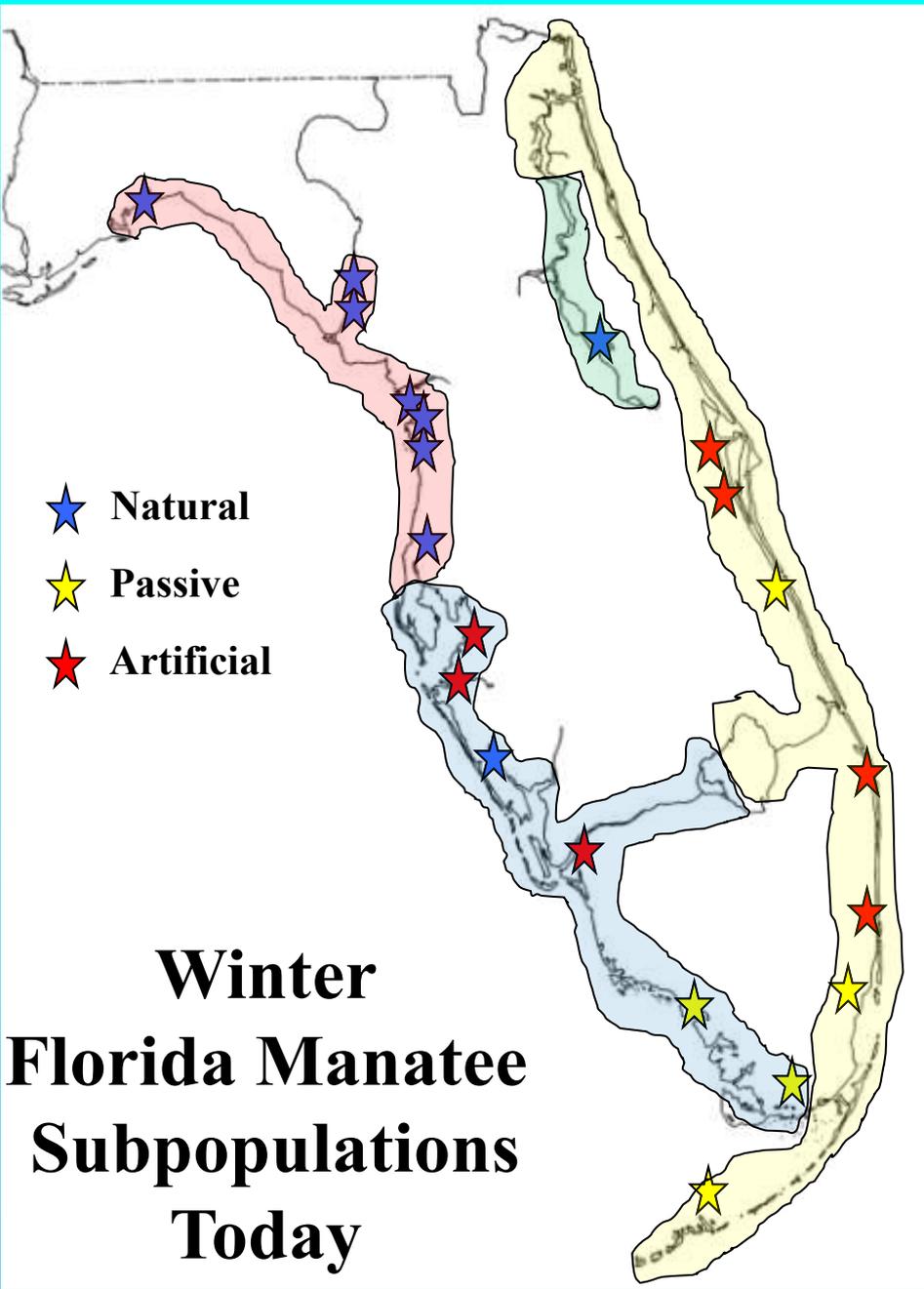


Pause, Kellogg, Bonde, Clark & McGuire

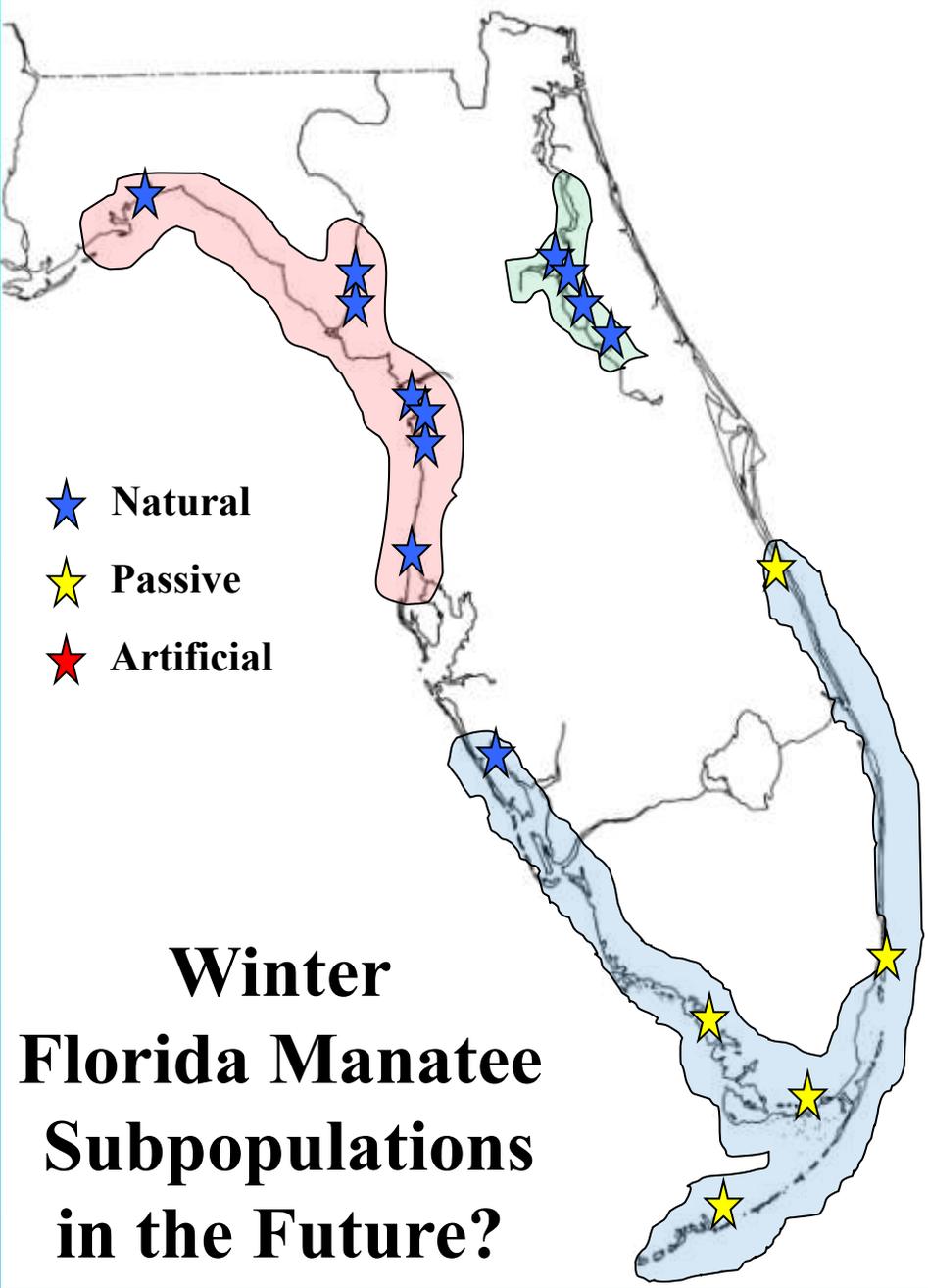
Population Structure - Future Research

Aspects of manatee behavioral ecology and population structure can be examined:

- **Are winter refuges used by extended family units?**
- **Will changes in warm water carrying capacity change population structure?**
- **Are specific feeding areas preferred by family groups?**
- **Do large, dominant males have higher reproductive success?**
- **How does population structure affect overall fitness and status of the manatee population in Florida?**



Winter Florida Manatee Subpopulations Today



Winter Florida Manatee Subpopulations in the Future?

Florida Manatees in the Western Everglades: Implications for Restoration Assessment

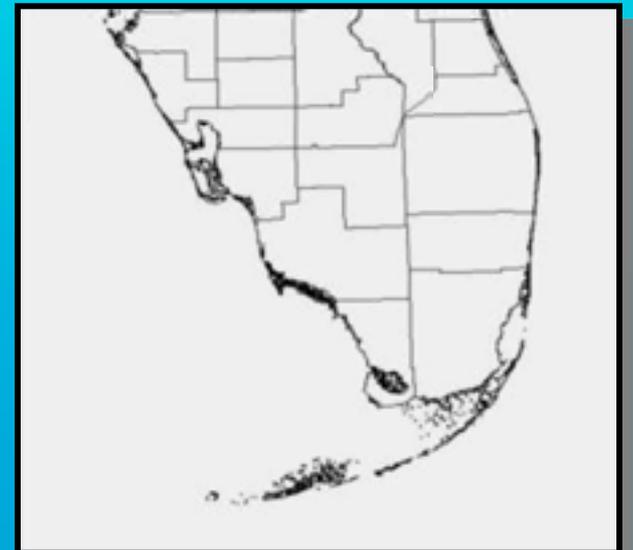
Jim Reid, Brad Stith, Catherine Langtimm, Eric Swain,
Dan Slone, and Susan Butler

Sirenia Project
U.S. Geological Survey
Florida Integrated Science Center
Gainesville, Florida



Everglades Restoration Overview:

- **Restore Everglades hydrology**
- **Modify or remove water control structures**
- **Protect Lake Okeechobee**
- **Minimize damage to estuaries**



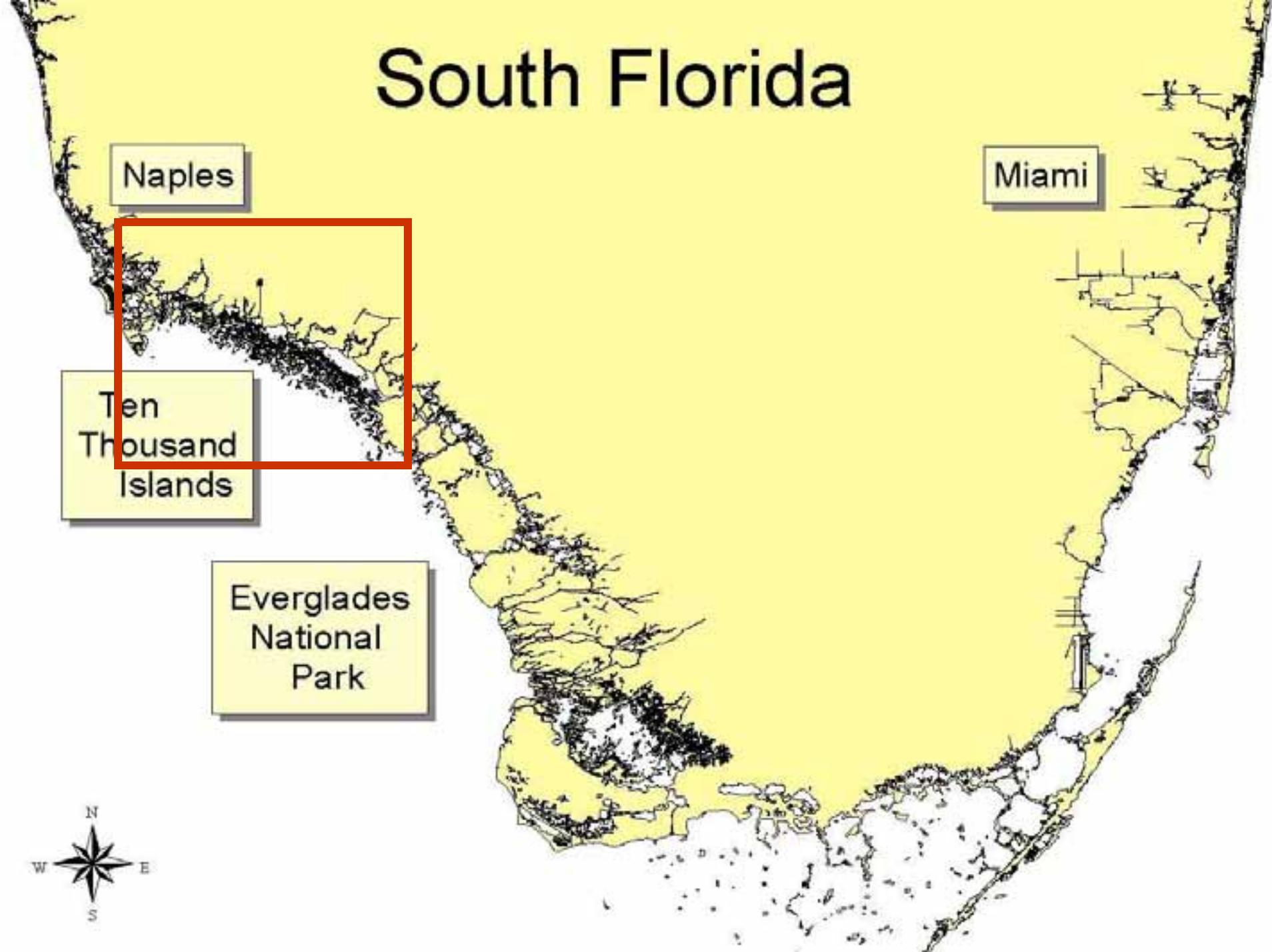
South Florida

Naples

Miami

Ten
Thousand
Islands

Everglades
National
Park



Southern
Golden Gate
Estates

Faka Union Canal
Port of the Islands

Ten
Thousand
Islands

9 0 9 Kilometers

N
W E
S

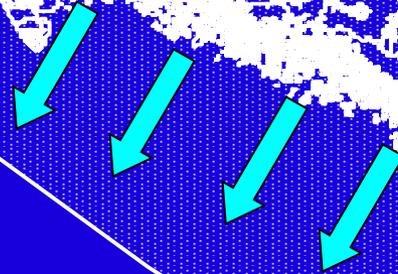
This map illustrates the geographical layout of the Southern Golden Gate Estates, which includes the Faka Union Canal Port of the Islands and the Ten Thousand Islands. The map features a yellow background with black outlines of the islands and waterways. A scale bar at the bottom indicates a distance of 9 kilometers, and a compass rose is located in the lower-left corner.

Point Source



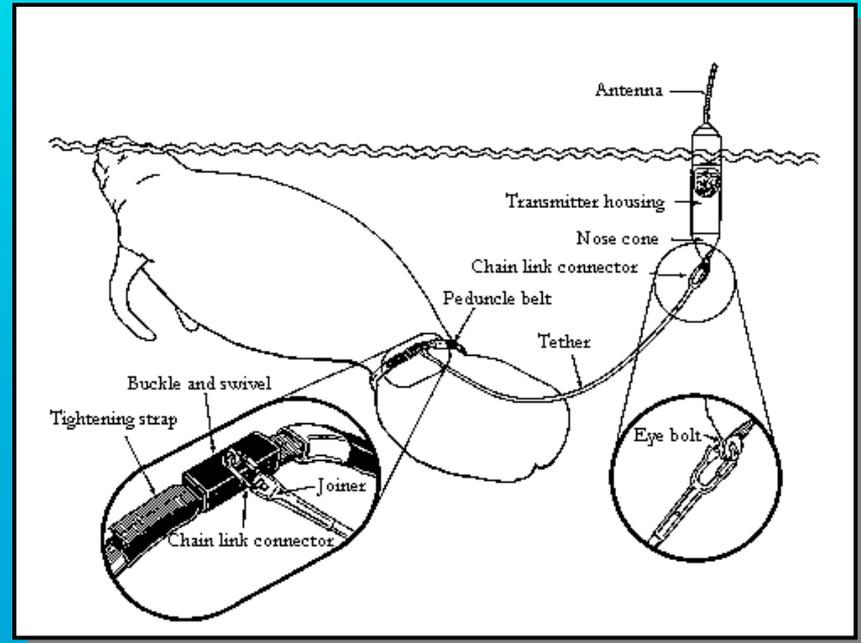
Sheet flow

Multiple fresh water sources



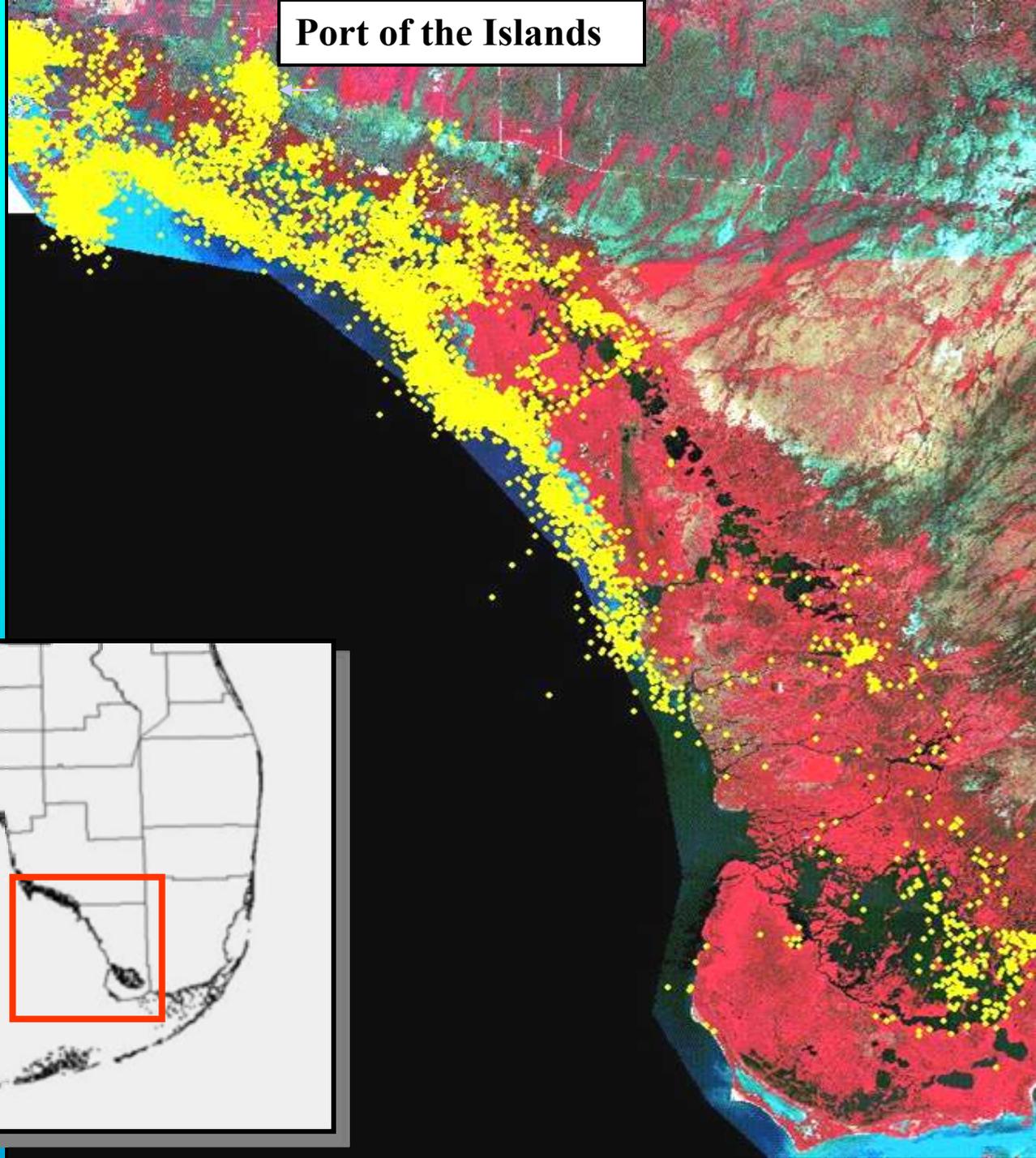
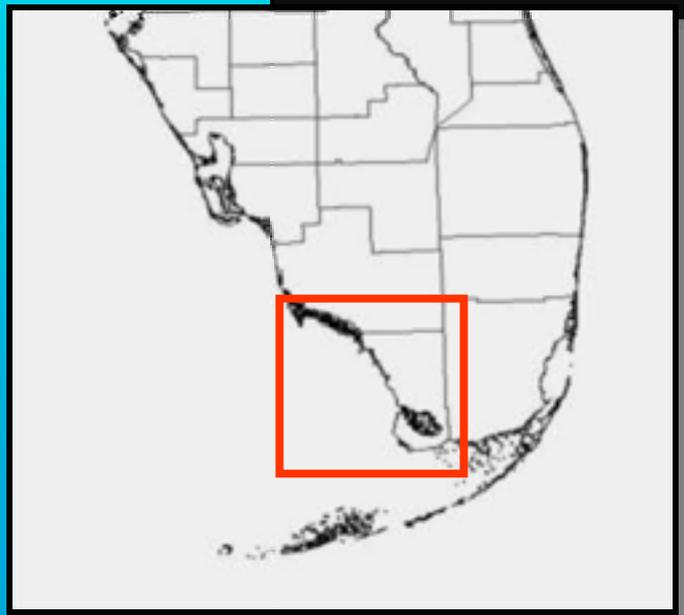
Manatee Radio Tagging

- **Satellite-monitored Argos tag**
- **VHF/Ultrasonic field tracking**
- **Application of GPS technology**
- **Manatee health assessments**



Southwest Florida Argos Fixes

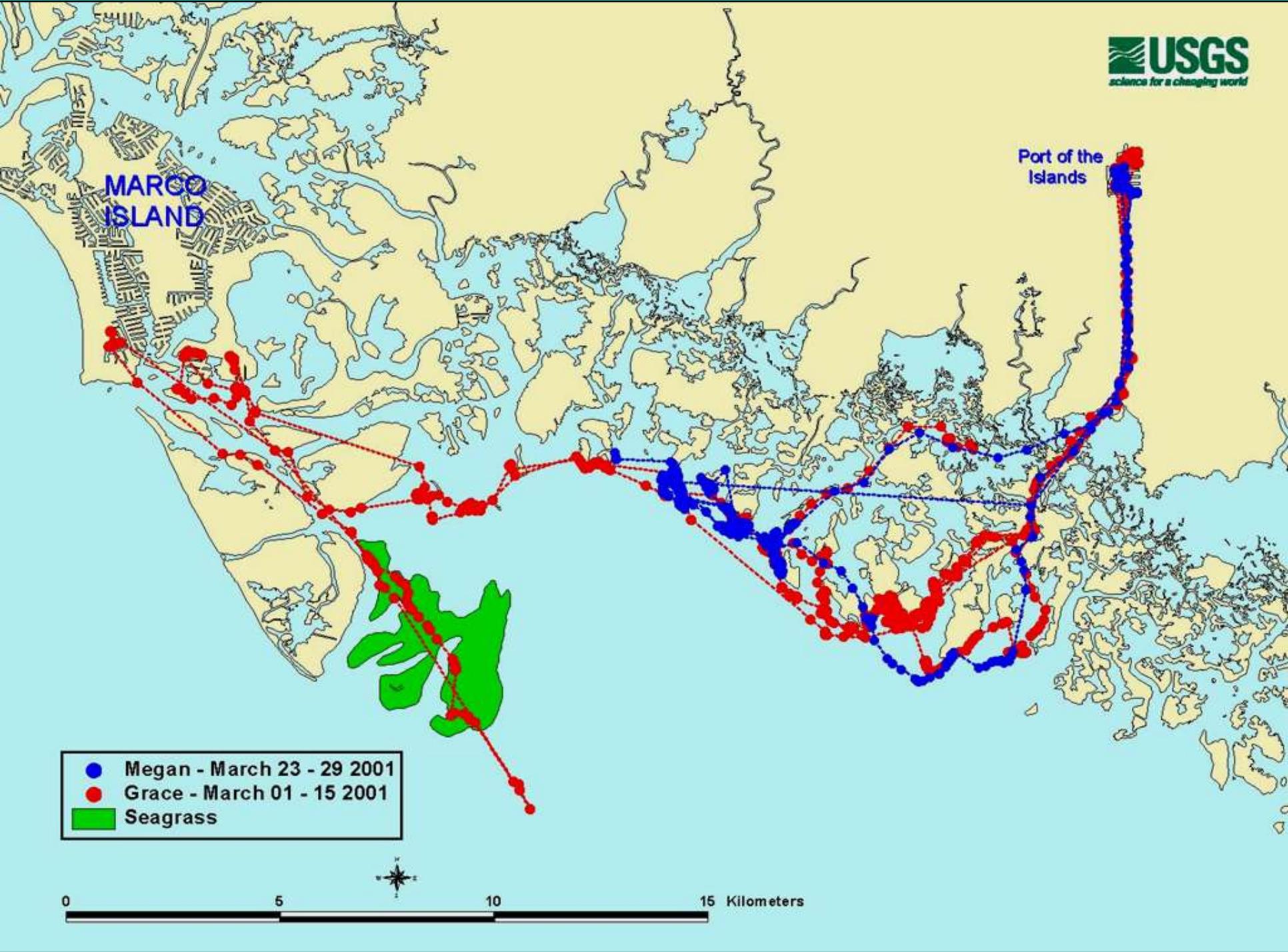
Port of the Islands

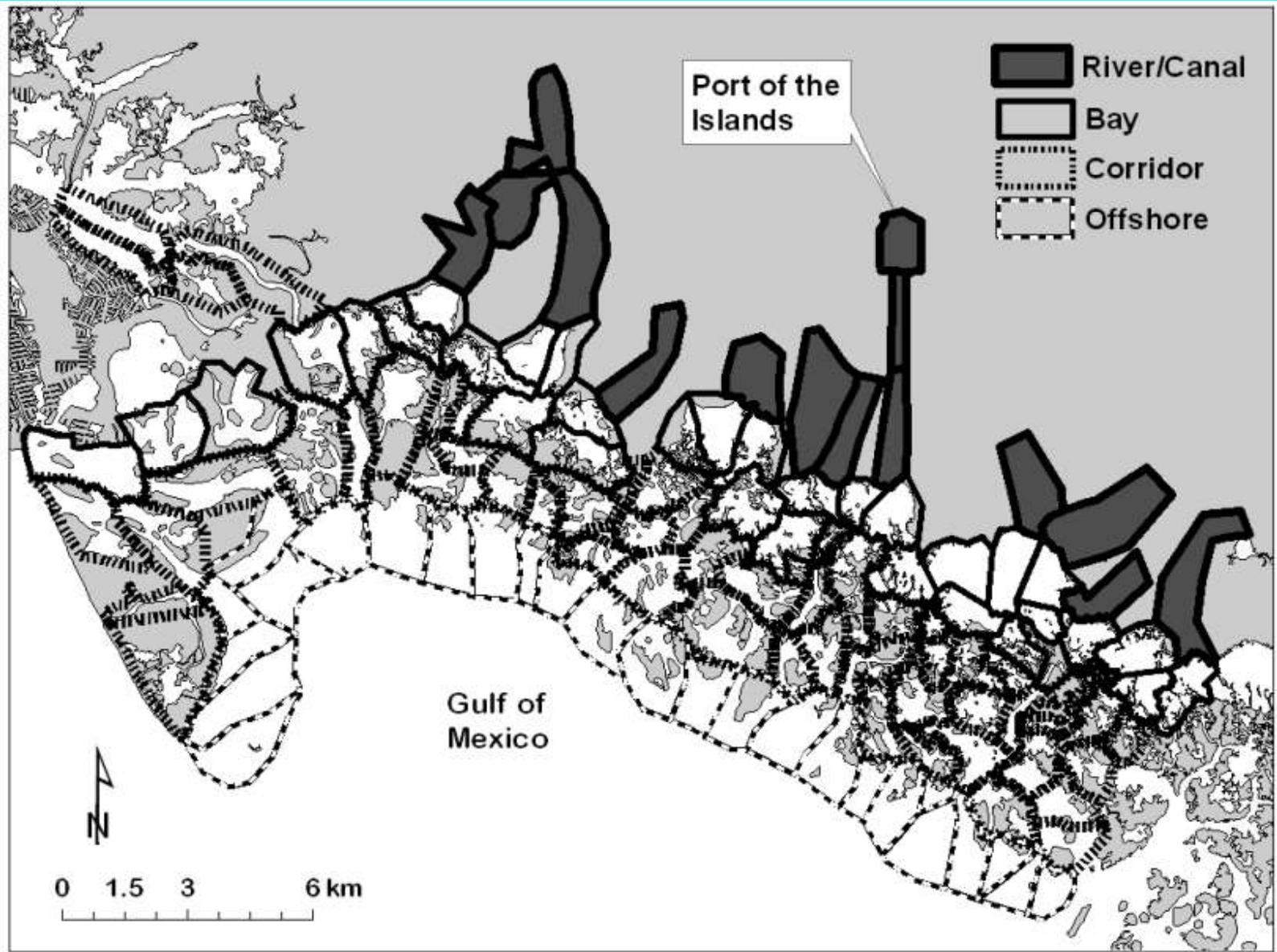


MARGO ISLAND

Port of the Islands

- Megan - March 23 - 29 2001
- Grace - March 01 - 15 2001
- Seagrass

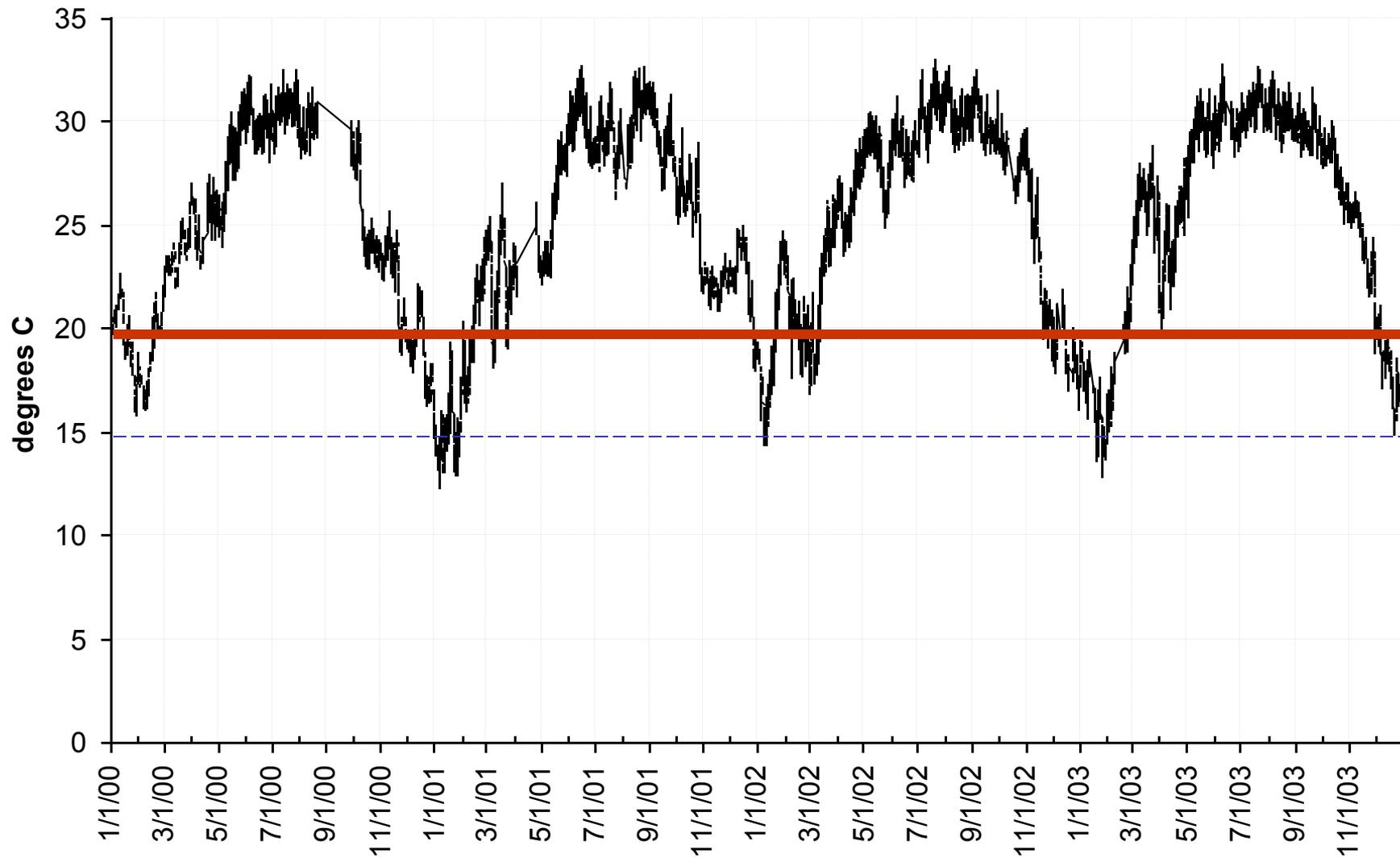




Findings from Radio Tracking

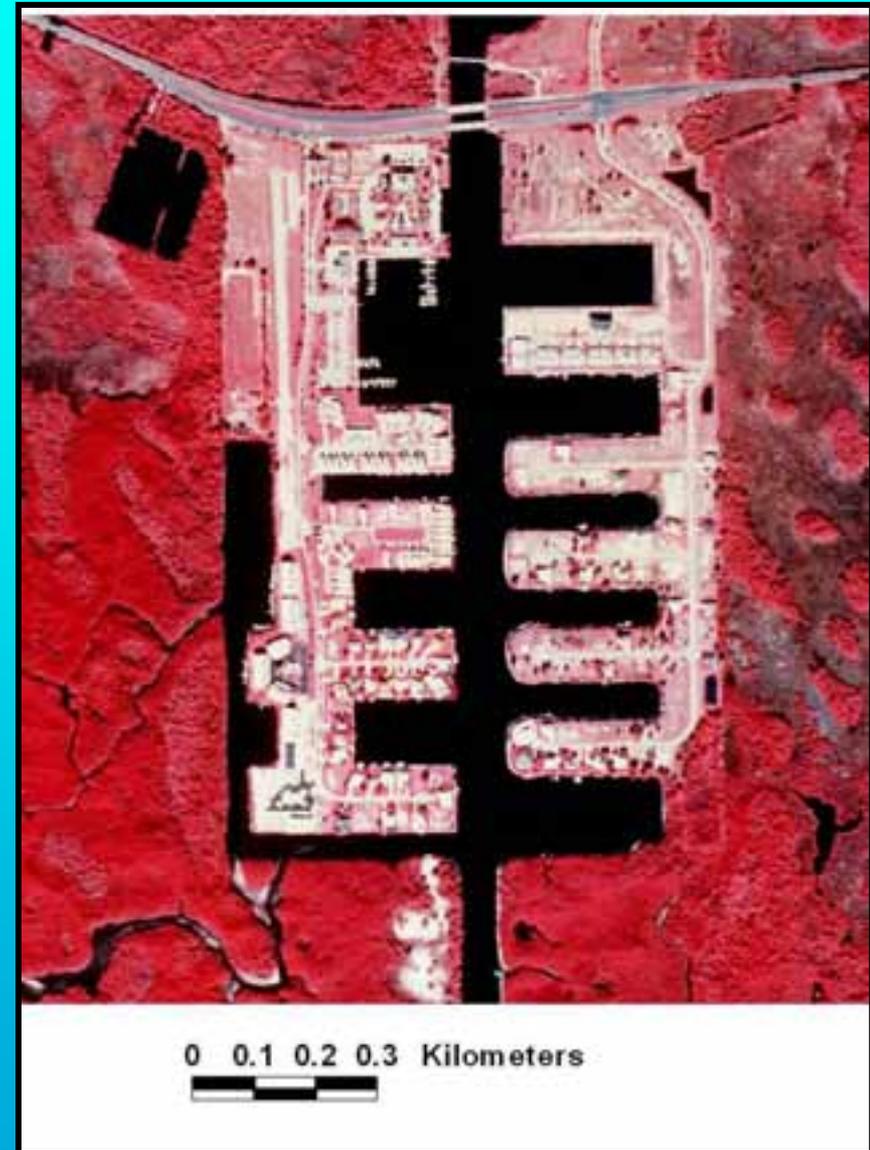
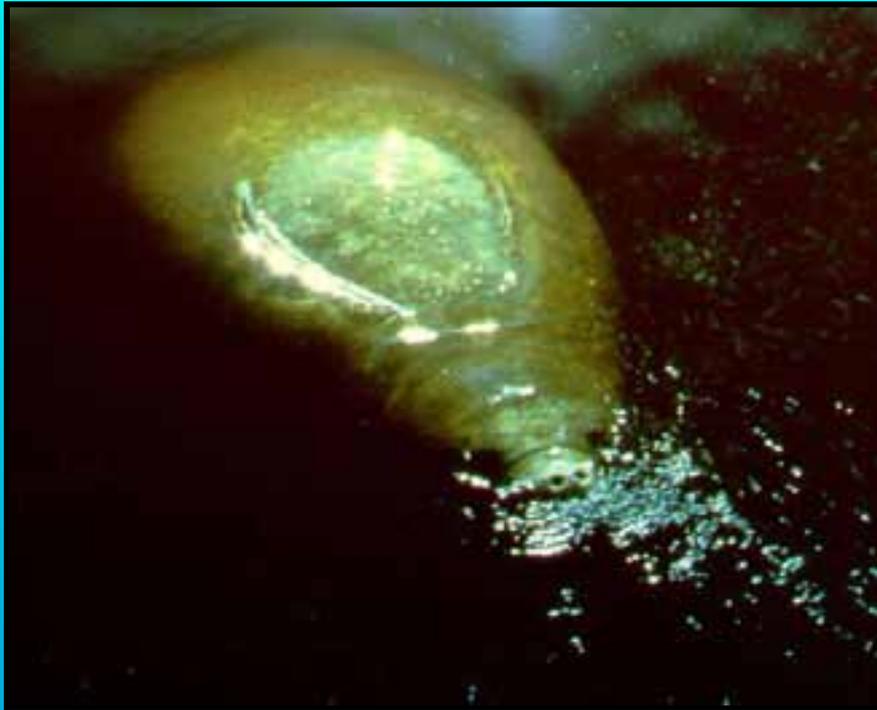
- Use of networks with destination points and travel corridors.
- Each animal has a unique home range size and location that includes a portion of network used.
- Multi-day foraging bouts (3 - 7 days) followed by rapid movements to freshwater drinking sources.

Naples Water Temp (Jan '00 - Dec '03)

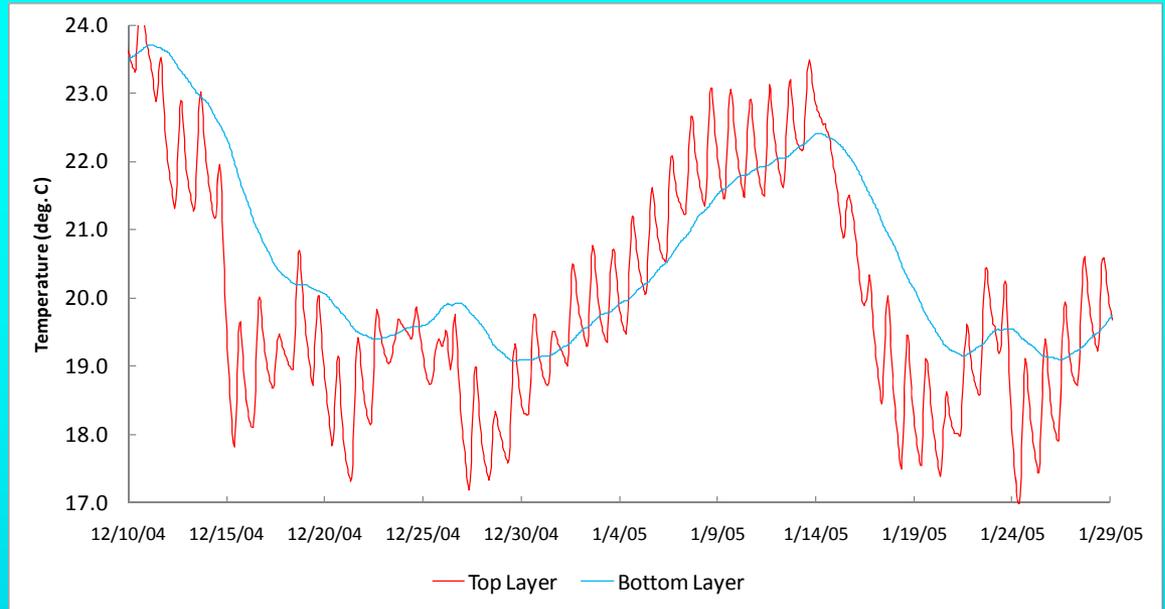


Port of the Islands

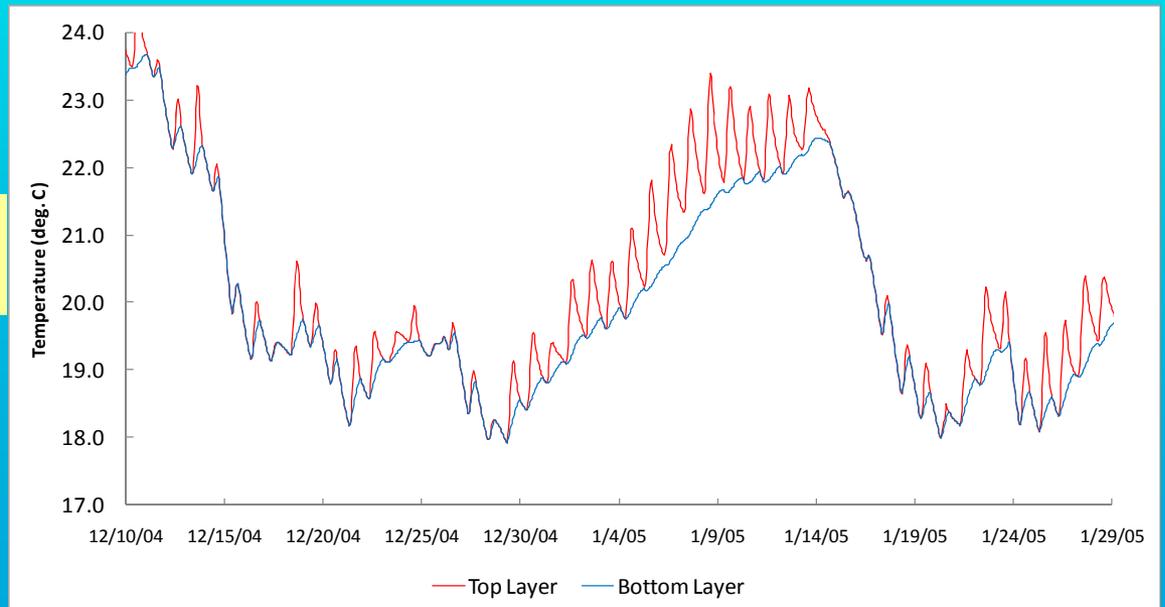
- **Passive thermal refuge**
- **Primary over-wintering site in the TTI**



**Salinity and Density Effects
Included in POI 3D Model**



**Salinity and Density Effects
Not Included in POI 3D Model**



Cooperators

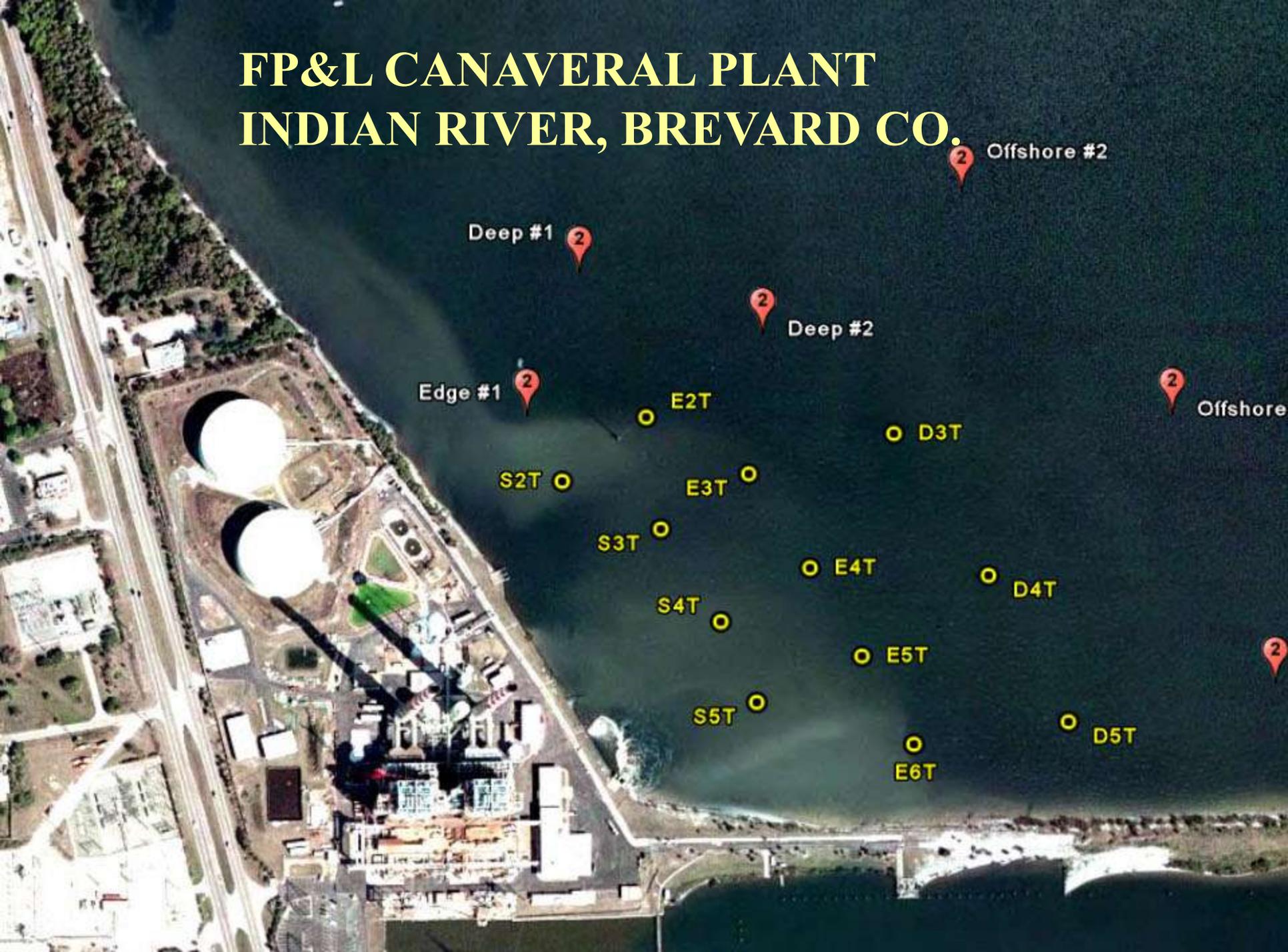
- **Everglades National Park**
- **U.S. Fish and Wildlife Service**
- **Ten Thousand Islands NWR**
- **Florida Marine Research Institute**
- **Rookery Bay National Estuarine Reserve**
- **Big Cypress National Preserve**

Ongoing Research



- **Continued development of CBM**
- **Temporal trends in scar acquisition**
- **Population assessment in TTI and ENP**
- **Continued development of genetic markers**
- **Southern Everglades habitat use**
- **Characterization of habitat and manatee use of North Florida springs**
- **Documentation of manatee response to change in availability of warm water**
- **Prediction of manatee response to climate change and sea level rise**

FP&L CANAVERAL PLANT INDIAN RIVER, BREVARD CO.



Deep #1

Offshore #2

Deep #2

Edge #1

Offshore

E2T

D3T

S2T

E3T

S3T

E4T

D4T

S4T

E5T

S5T

E6T

D5T