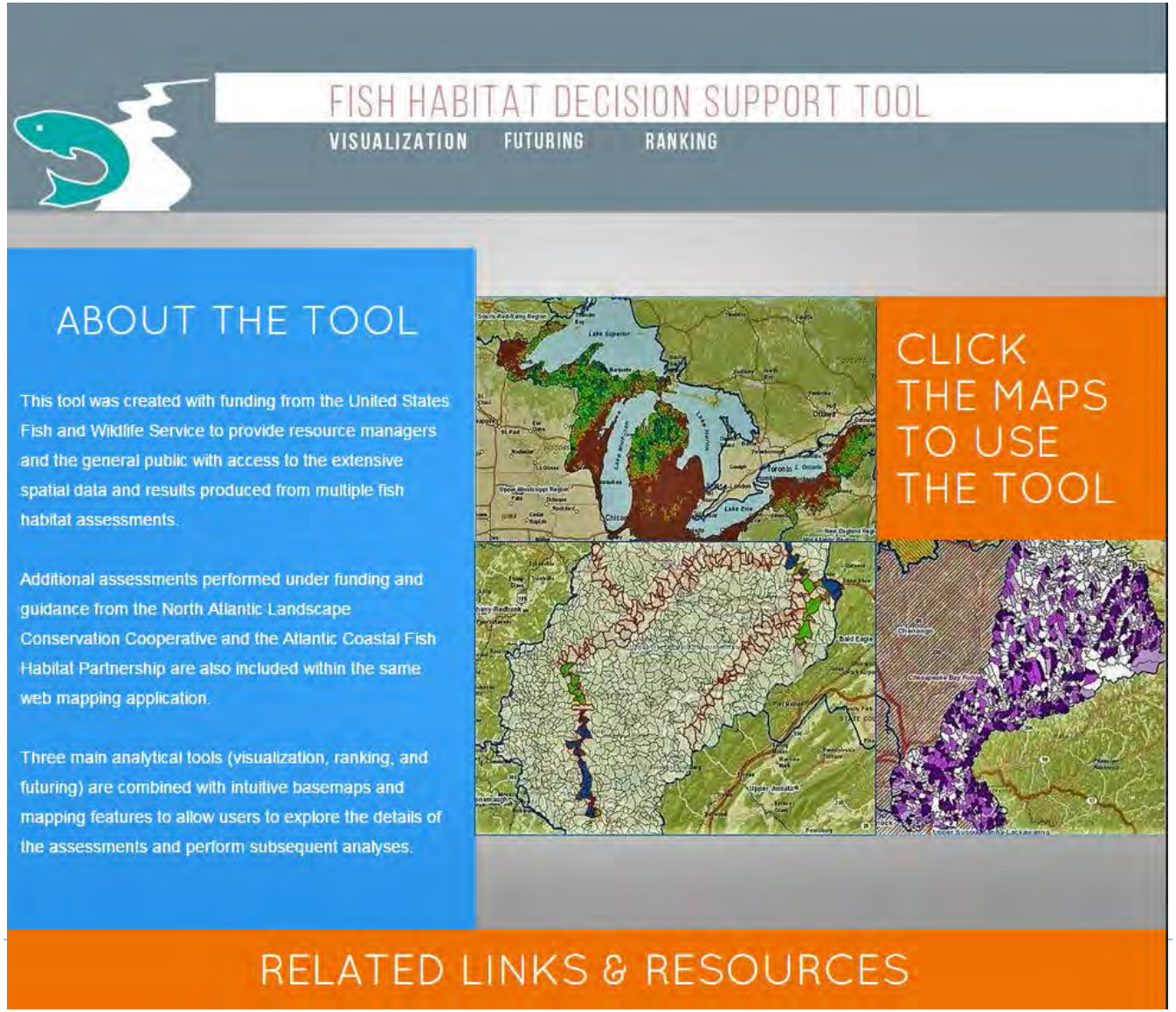
Fish Habitat Decision Support Tool

ACFHP, EBTJV, NALCC working with Downstream Strategies

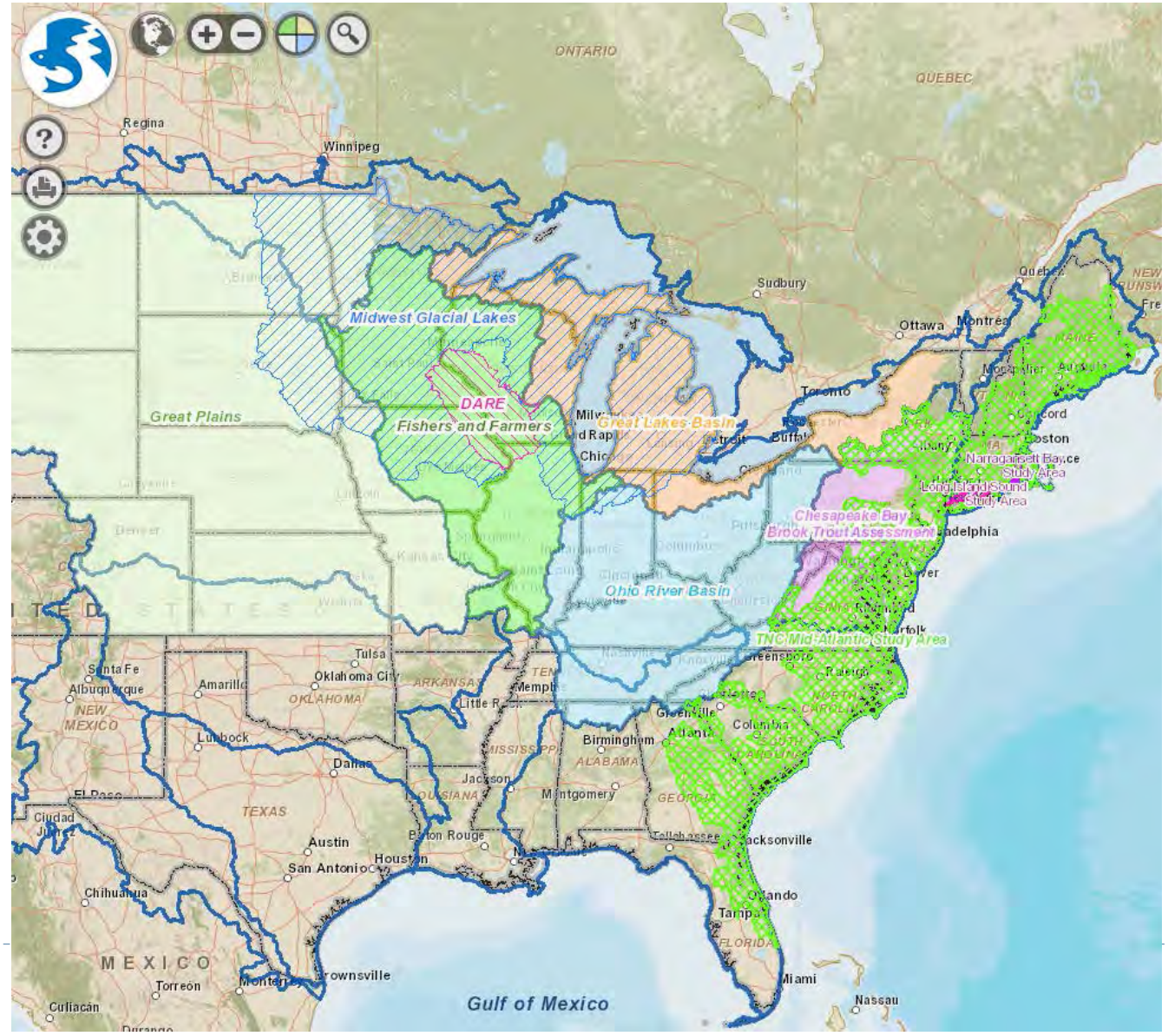
What is it and why?

- ACFHP took their priority of developing a habitat assessment to the NALCC (North Atlantic Landscape Conservation Cooperative)
  - Determine priority areas for fish habitat restoration and protection
- NALCC grouped this priority together with a EBTJV request
  - funding ~$280,000
- NALCC solicited proposals
- Downstream Strategies was chosen to do the work
- Pilot projects: Winter Flounder Habitat assessment in Narragansett Bay and Brook Trout habitat assessment in the Chesapeake Bay
- Later added Winter Flounder in Long Island Sound and TNC's Anadromous Fish Habitat Prioritization
- In cooperation with Midwest FHPs developed an on-line decision support tool

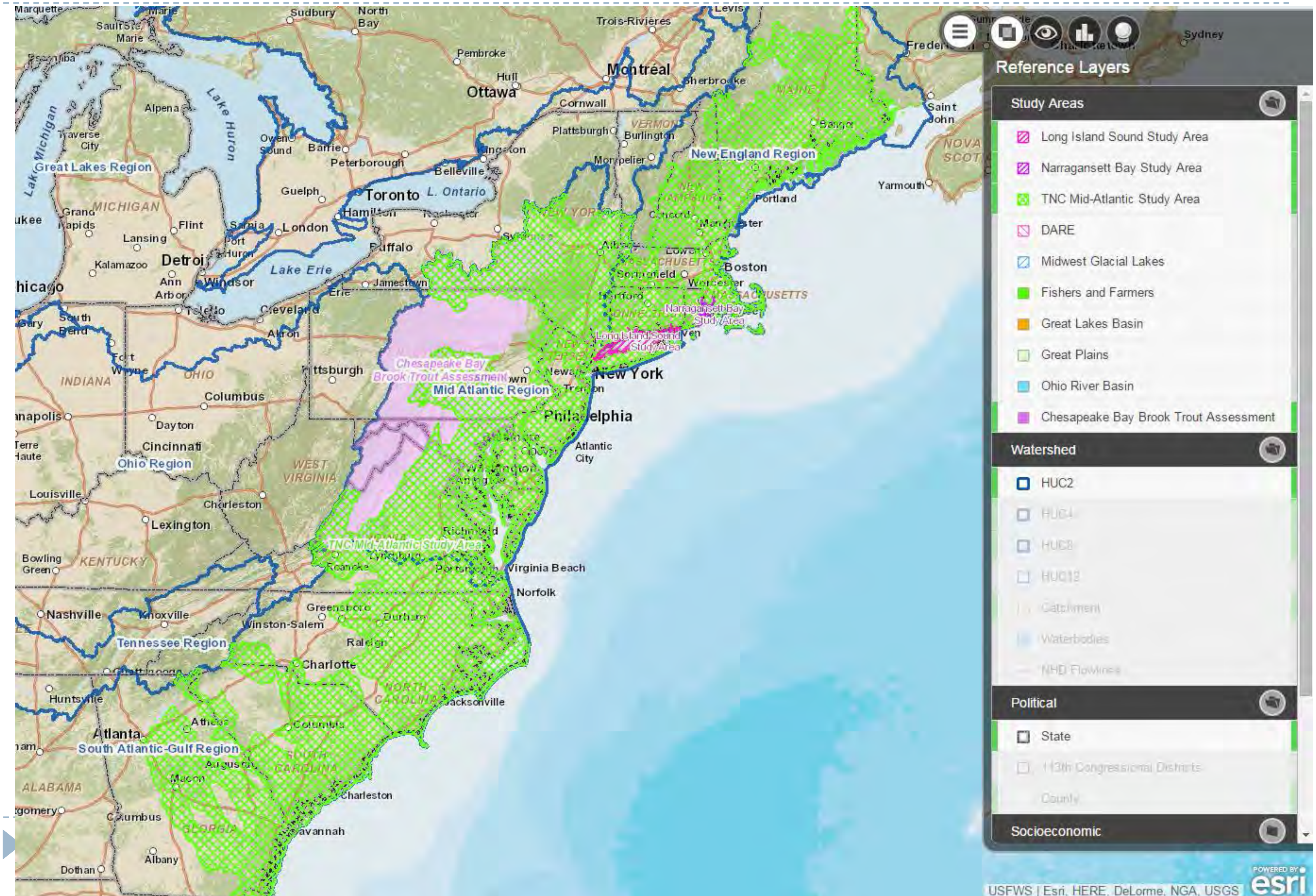
www.fishhabitattool.org



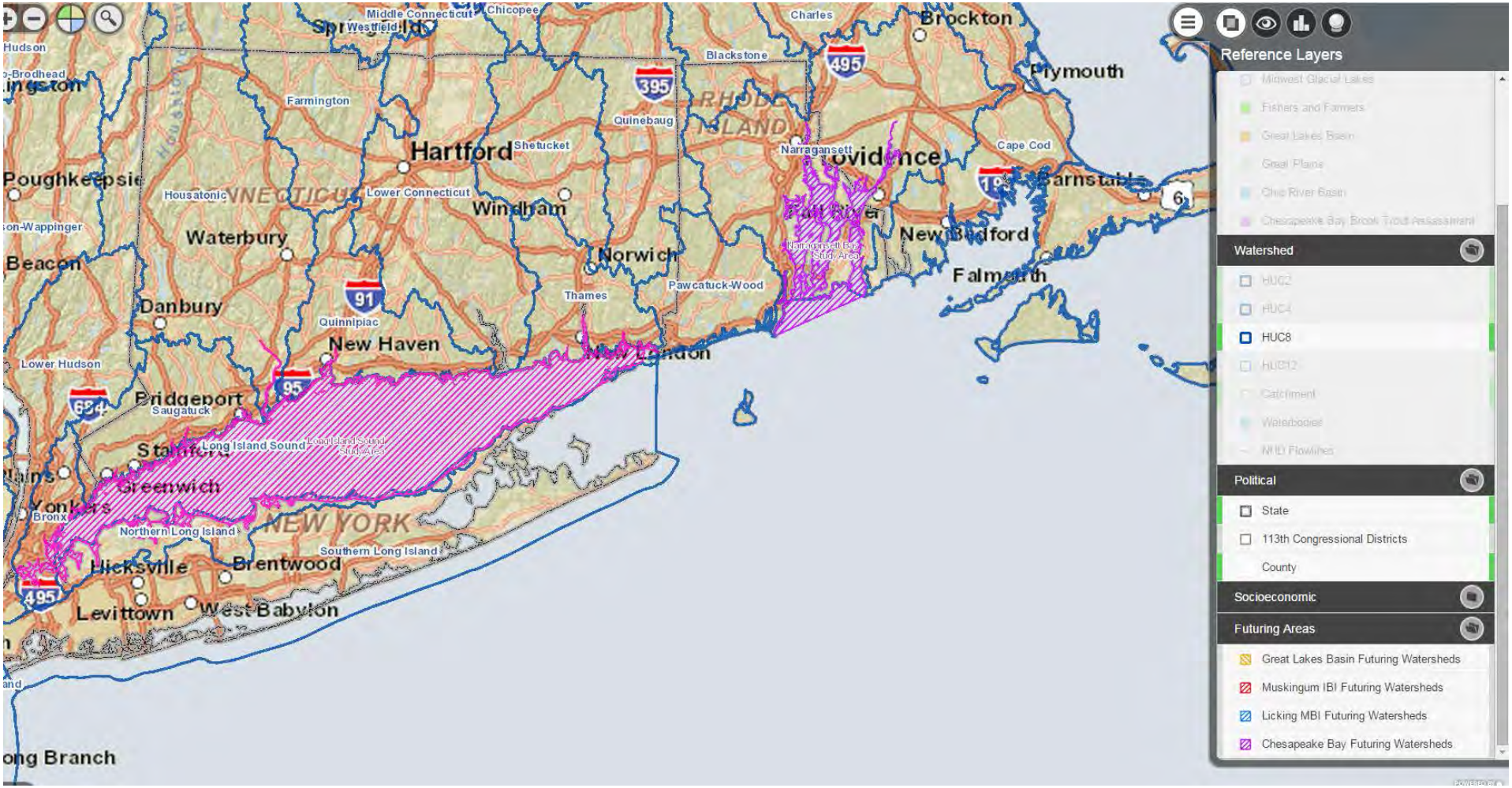
All FHP Habitat Assessments



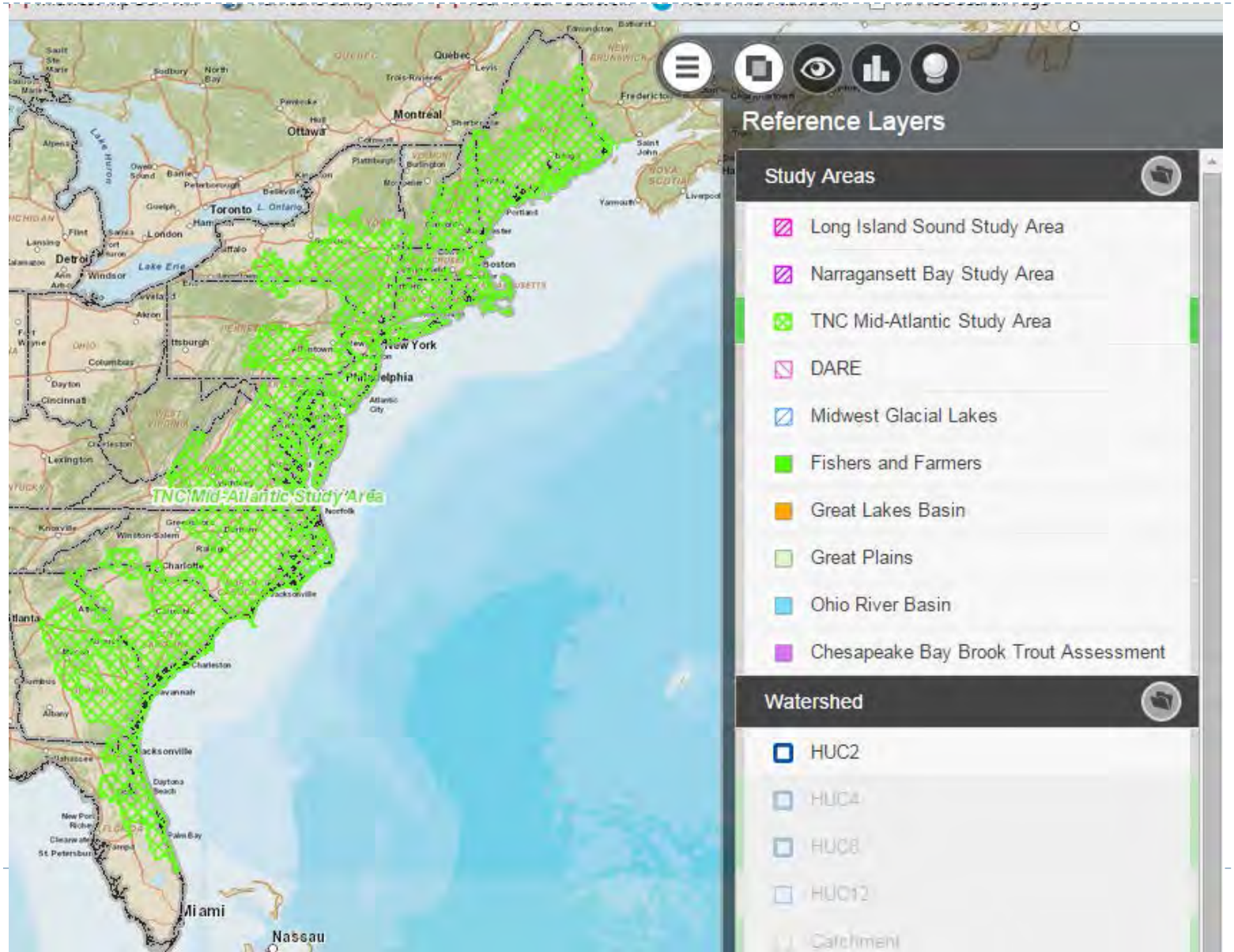
North Atlantic LCC - Ches Bay Brook Trout, Mid-Atlantic Anadromous, and Narragansett and Long Island Sound Winter Flounder



Winter Flounder in Narragansett Bay and Long Island Sound – predictive models

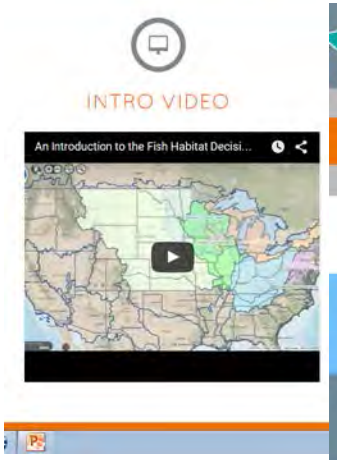


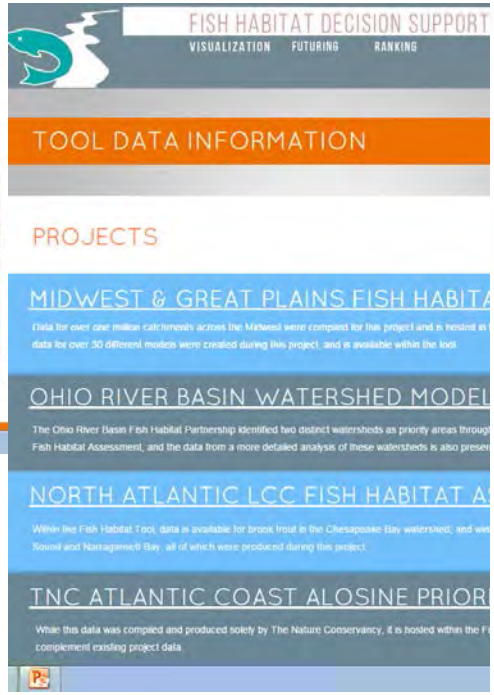
TNC Mid-Atlantic Anadromous



TNC weighting for anadromous fish prioritization

Lisa is setting up a webinar to review metrics





Assign Metric Weights

Metric Category	Metric Description	Alewife Scenario Weight	Blueback Scenario Weight	American Shad Scenario Weight
Population	Integrated presence / run count metric. Separate metric for each spp using spp specific data where: 0 = none documented 1 = historical presence documented 2 = current presence (no count) and count <=10,000 3 = count: >10,000	25	35	45
Habitat Quantity & Access	Area of Lakes and Ponds with no dams associated within each HUC	10	0	0
Habitat Quantity & Access	% of reaches within HUC12 that have connectivity (no barriers) to the ocean	10	10	5
Habitat Quantity & Access	% of Active River Area within each HUC that is occupied by NWI wetlands (any)	20	20	20
Habitat Quantity & Access	Area of estuarine emergent marsh within each HUC	10	10	5
Habitat Quantity & Access	Average anadromous scenario result for NE Aquatic Connectivity / SEACAP dams within HUC 12. HUC12s with no dams are assigned a mean score (10), to neither "help" nor "hurt" their score.	10	10	10
Water Quality	% of reaches in HUC whose cumulative watershed % impervious surface is >8%	10	10	10
Water Quantity	Dam storage - mean annual flow: % of flowlines within each HUC i>= 30%	5	5	5
	Sum of weights	100	100	100

Metric weighting as iterative process – calibrate draft results for each scenario to known priorities

Ranking

- Simple & transparent

1

Raw Values

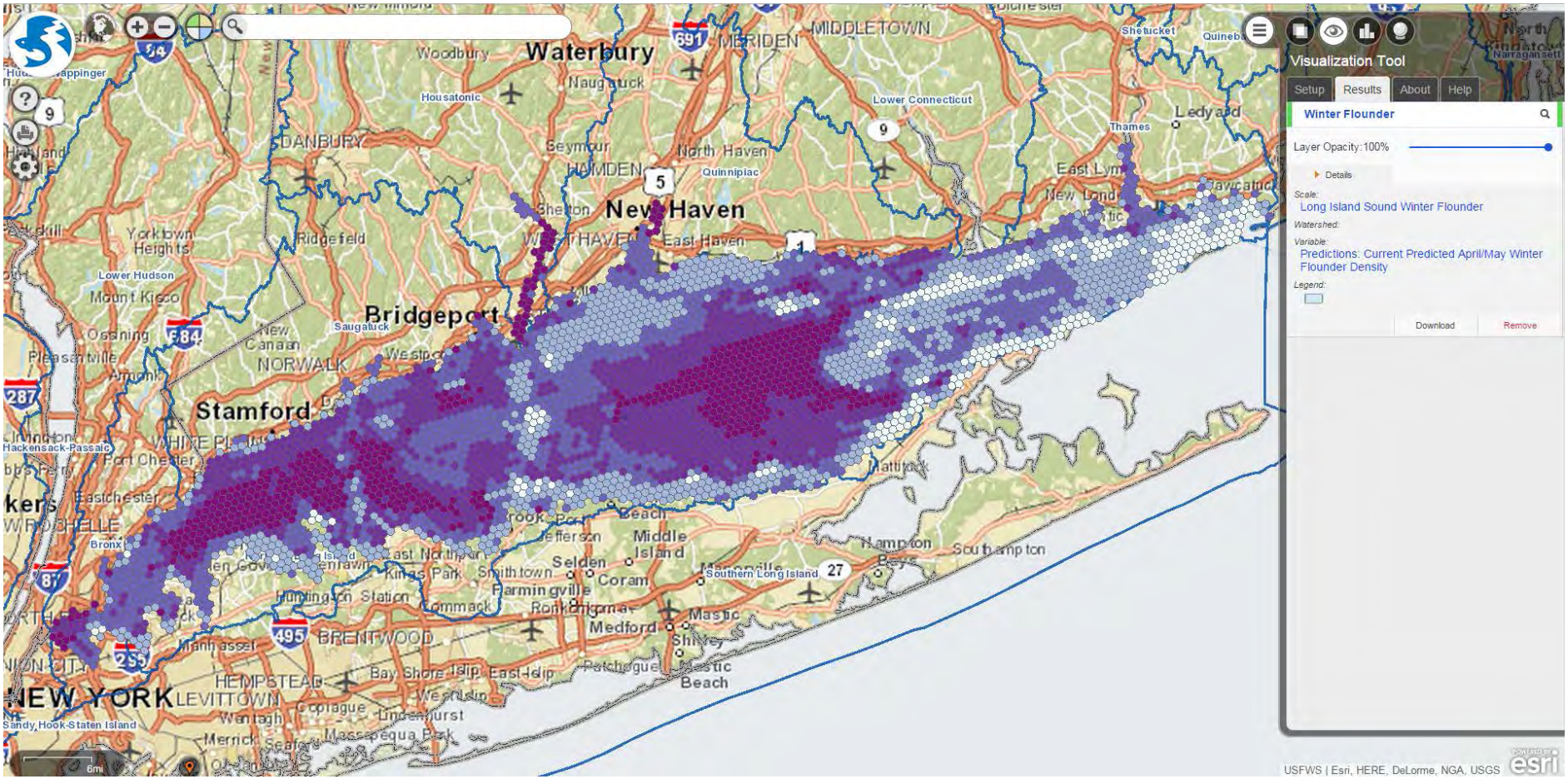
HUC12	Area Lakes Ponds (m²)	Area Estuarine Wetland (m²)
10101010101	239,541	2,572
10101010102	342,654	62,525
10101010103	572,594	6,233
10101010104	125,213	87,425

2

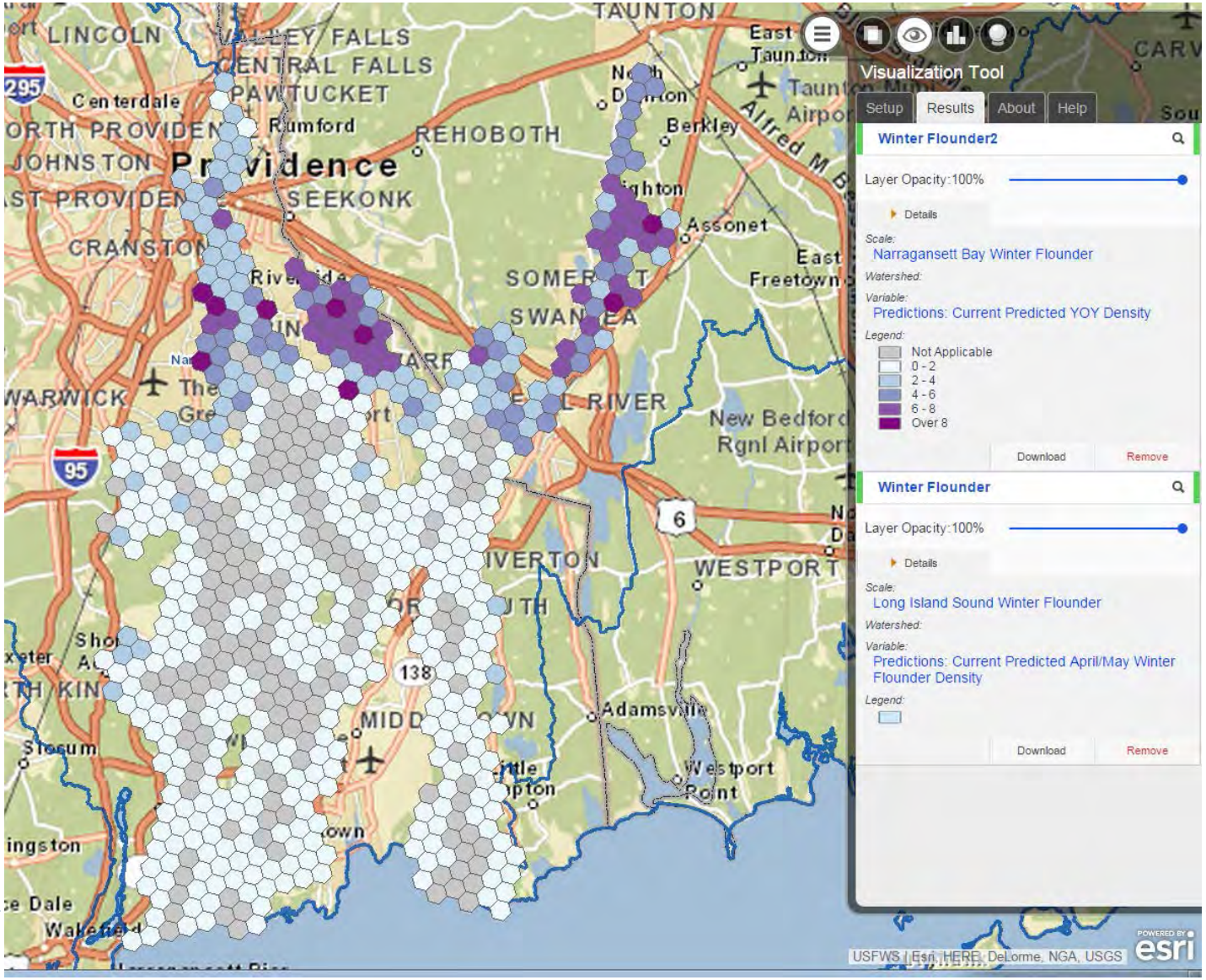
Ranked Values

HUC12	Area Lakes/ Ponds (rank)	Area Estuarine Wetland (rank)
10101010101	3	4
10101010102	2	2
10101010103	1	3
10101010104	4	1

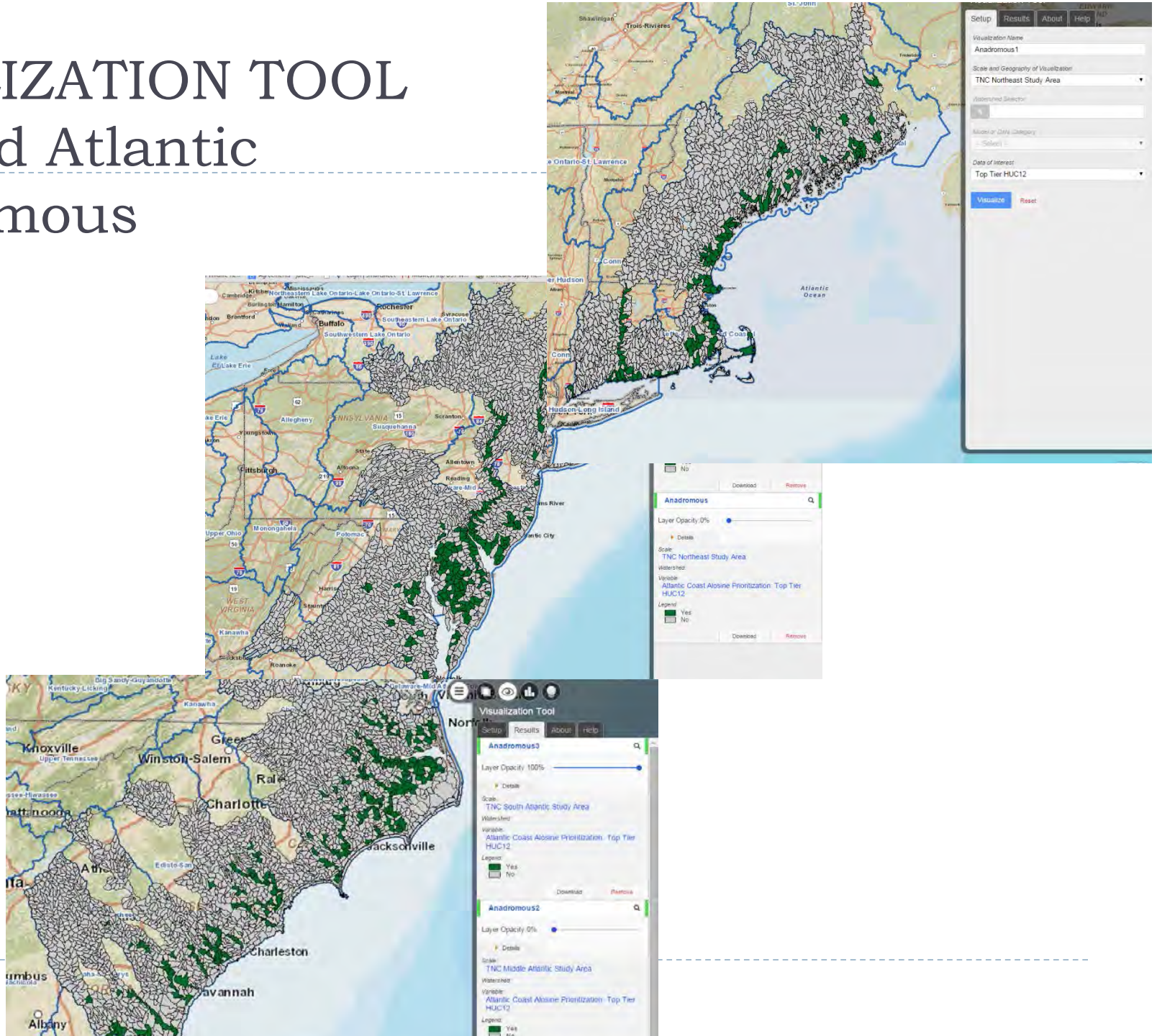
VISUALIZATION TOOL
Predicted Winter Flounder Density



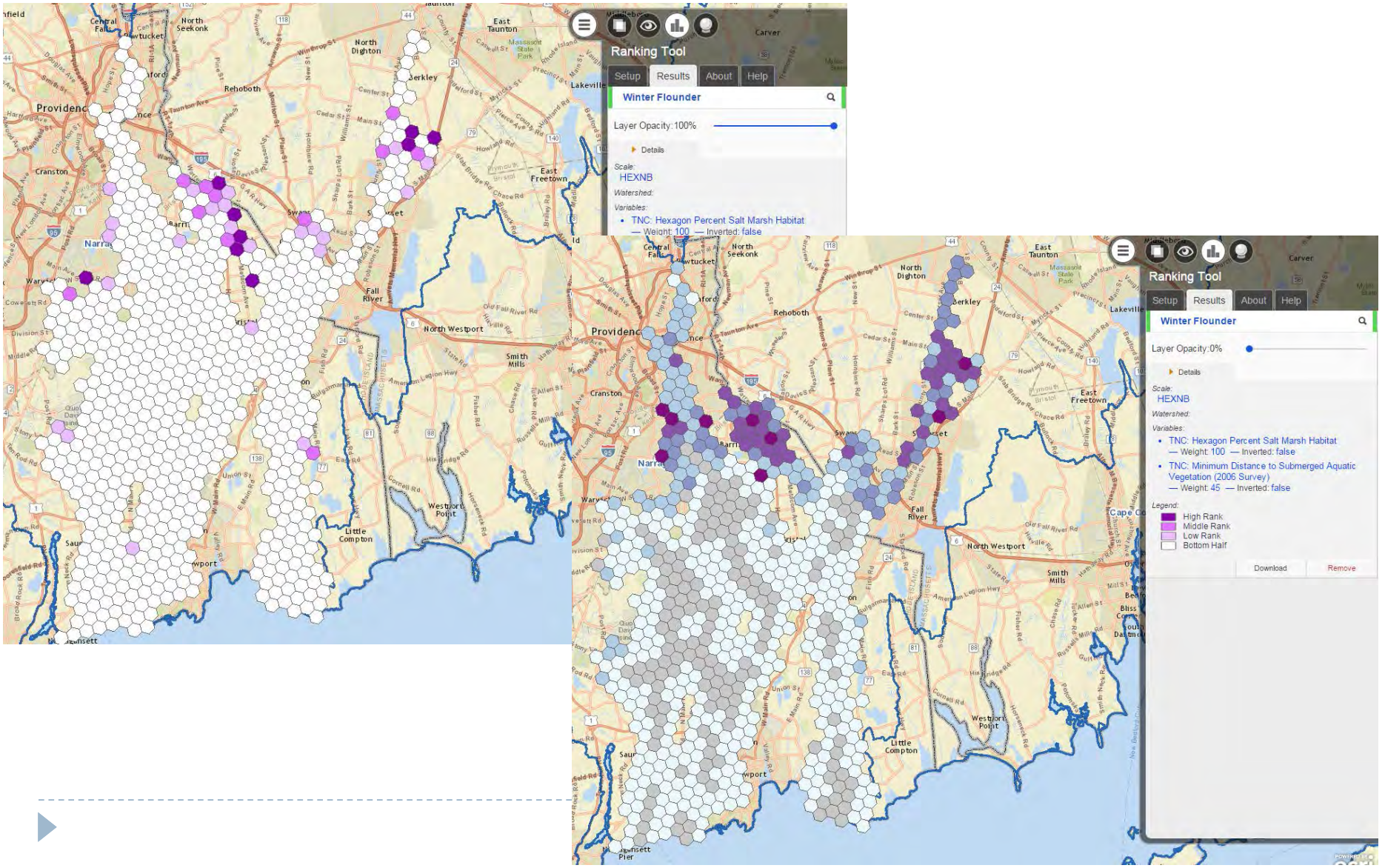
VISUALIZATION TOOL
Predicted Winter Flounder Density



VISUALIZATION TOOL
TNC Mid Atlantic Anadromous



RANKING TOOL
Narragansett Bay Winter Flounder

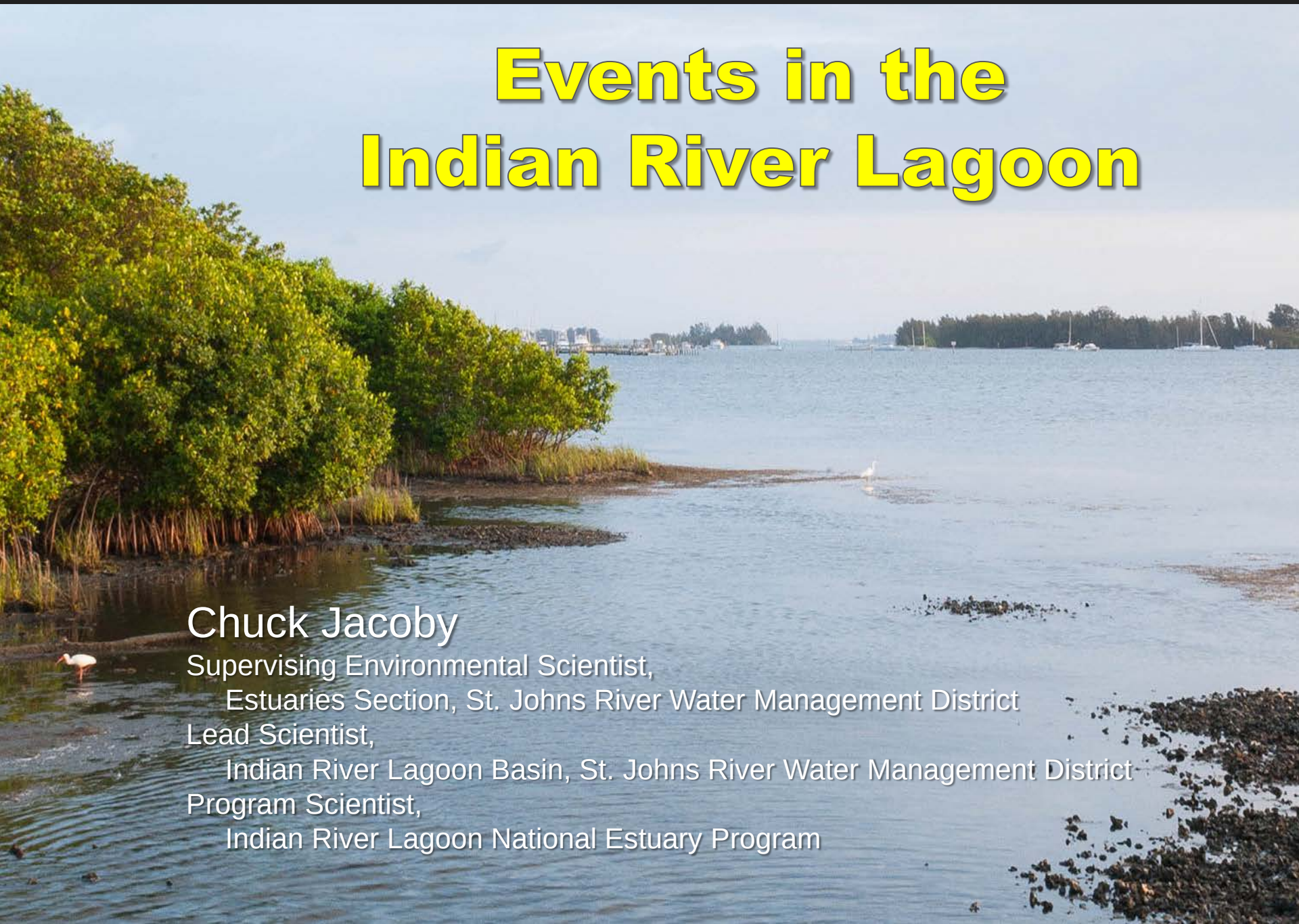



The ranking methodology implemented in this tool differs from the methodology used by The Nature Conservancy to produce the prioritized Tiers that are available for display via the Visualization tool. Therefore, it is not possible to regenerate the Prioritization Tiers, even if the same metrics are selected.
Model or Data Category
Select data category by m
what data is available in th
Data of Interest
-- Select --
Add Variable
Remov
Rank
Reset
TNC Mid-Atlantic Study Area
Bismarck
Minneapolis
Saint Paul
Pierre
Sioux Falls
Madison
Milwaukee
Grand Rapids
Lansing
Chicago
Sudbury
Ottawa
Toronto
Buffalo
Springfield
Indianapolis
Columbus
Pittsburgh
Cincinnati
Frankfort
Charleston
Nashville
Knoxville
Greensboro
Raleigh
Memphis
Columbia
Birmingham
Atlanta
Jackson
Montgomery
Austin
San Antonio
Houston
Baton Rouge
Jacksonville
Orlando
Tampa
Chihuahua
SOUTH DAKOTA
WISCONSIN
MICHIGAN
NEW YORK
ILLINOIS
INDIANA
OHIO
KENTUCKY
WEST VIRGINIA
TENNESSEE
ALABAMA
GEORGIA
TEXAS

Next Steps

- Assess TNC anadromous fish habitat prioritization
  - Webinar – late November or early December
  - Look at weights attributed to each habitat variable
  - Determine if more funding is needed to make any proposed changes
- Discuss how to get the word out about the decision support tool
  - Bi-weekly conference calls with the midwest FHPs
- How can ACFHP use decision support tool?
- How can on the ground practitioners use the tool?

Events in the Indian River Lagoon



Chuck Jacoby
Supervising Environmental Scientist,
Estuaries Section, St. Johns River Water Management District
Lead Scientist,
Indian River Lagoon Basin, St. Johns River Water Management District
Program Scientist,
Indian River Lagoon National Estuary Program

How can we characterize the lagoon?

Lagoon is:

- Sensitive
- Long (156 miles)
- Shallow
- Wind & tide driven
- Not a river (no flow)
- Segmented (flushing 2 wks–3 mos)
- Diverse
  - ecology
  - challenges

What is a shared challenge?

Nutrient impairment

- **Total Maximum Daily Load (TMDL) = safe load**

Nutrient impairment

- **Total Maximum Daily Load (TMDL) = safe load**
- **Loads + Margin of Safety > TMDL ⇒ reductions**

Nutrient impairment

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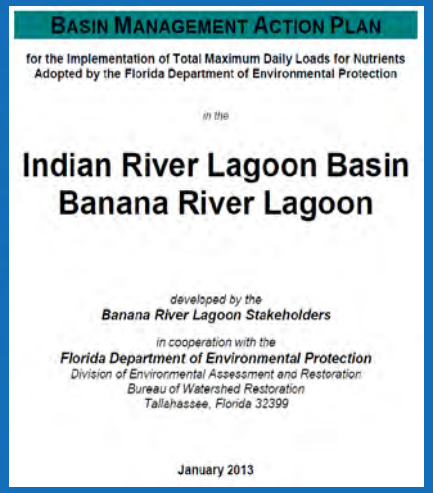
- **Loads + Margin of Safety > TMDL ⇒ reductions**
- **Adaptive approach to uncertainty**
  - **monitor (seagrass = a key indicator)**
  - **evaluate progress**
  - **adapt as needed**

Nutrient impairment

- **Total Maximum Daily Load (TMDL) = safe load**
- **Loads + Margin of Safety > TMDL ⇒ reductions**
- **Adaptive approach to uncertainty**
  - **monitor (seagrass = a key indicator)**
  - **evaluate progress**
  - **adapt as needed**
- **Summarize in Basin Management Action Plans**


BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients Adopted by the Florida Department of Environmental Protection

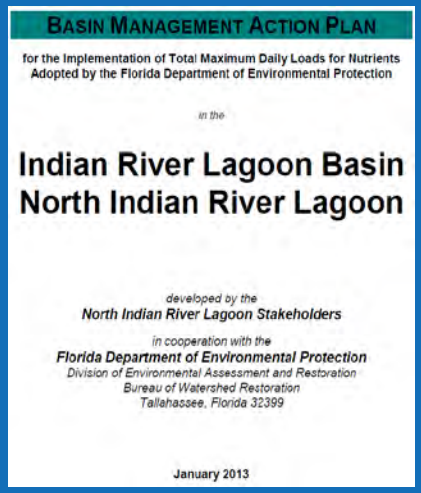
in the

Indian River Lagoon Basin
Banana River Lagoon

developed by the
Banana River Lagoon Stakeholders

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, Florida 32399

January 2013


BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients Adopted by the Florida Department of Environmental Protection

in the

Indian River Lagoon Basin
North Indian River Lagoon

developed by the
North Indian River Lagoon Stakeholders

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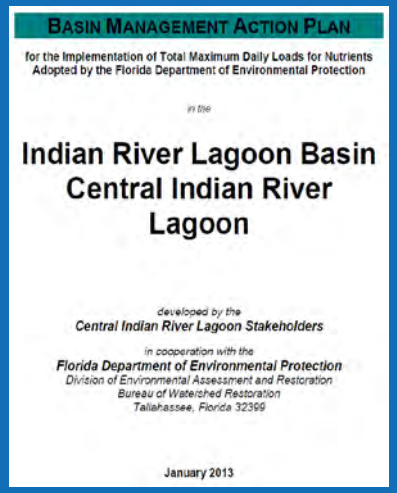
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, Florida 32399

January 2013


BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients Adopted by the Florida Department of Environmental Protection

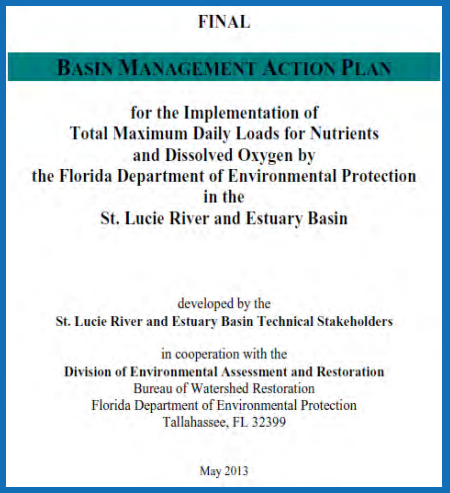
in the

Indian River Lagoon Basin
Central Indian River Lagoon

developed by the
Central Indian River Lagoon Stakeholders

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, Florida 32399

January 2013


FINAL

BASIN MANAGEMENT ACTION PLAN

for the Implementation of
Total Maximum Daily Loads for Nutrients
and Dissolved Oxygen by
the Florida Department of Environmental Protection
in the
St. Lucie River and Estuary Basin

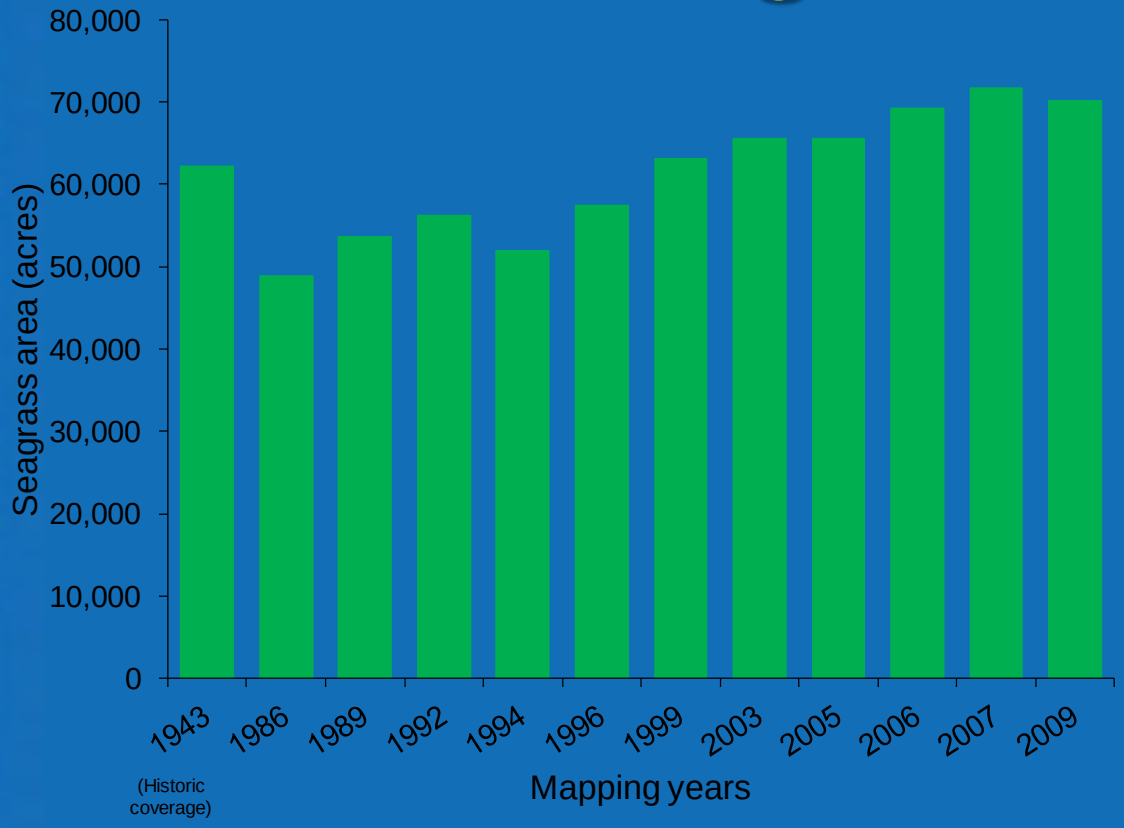
developed by the
St. Lucie River and Estuary Basin Technical Stakeholders

in cooperation with the
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Florida Department of Environmental Protection
Tallahassee, FL 32399

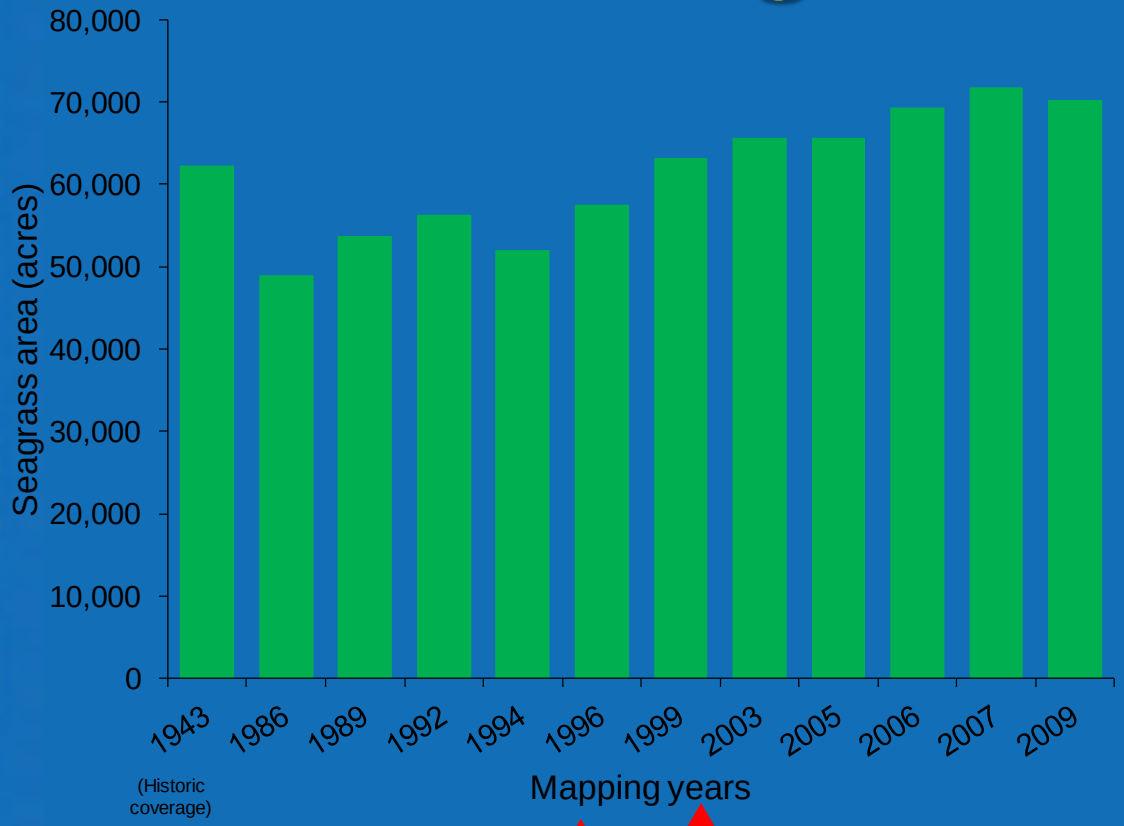
May 2013

How are we doing?

Seagrasses


80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Seagrass area (acres)
1943
1986
1989
1992
1994
1996
1999
2003
2005
2006
2007
2009
(Historic coverage)
Mapping years

Seagrasses



Drought &
Vero WWTP discharge ⇓

Mini-
drought

‘04 hurricanes
surge & flushing

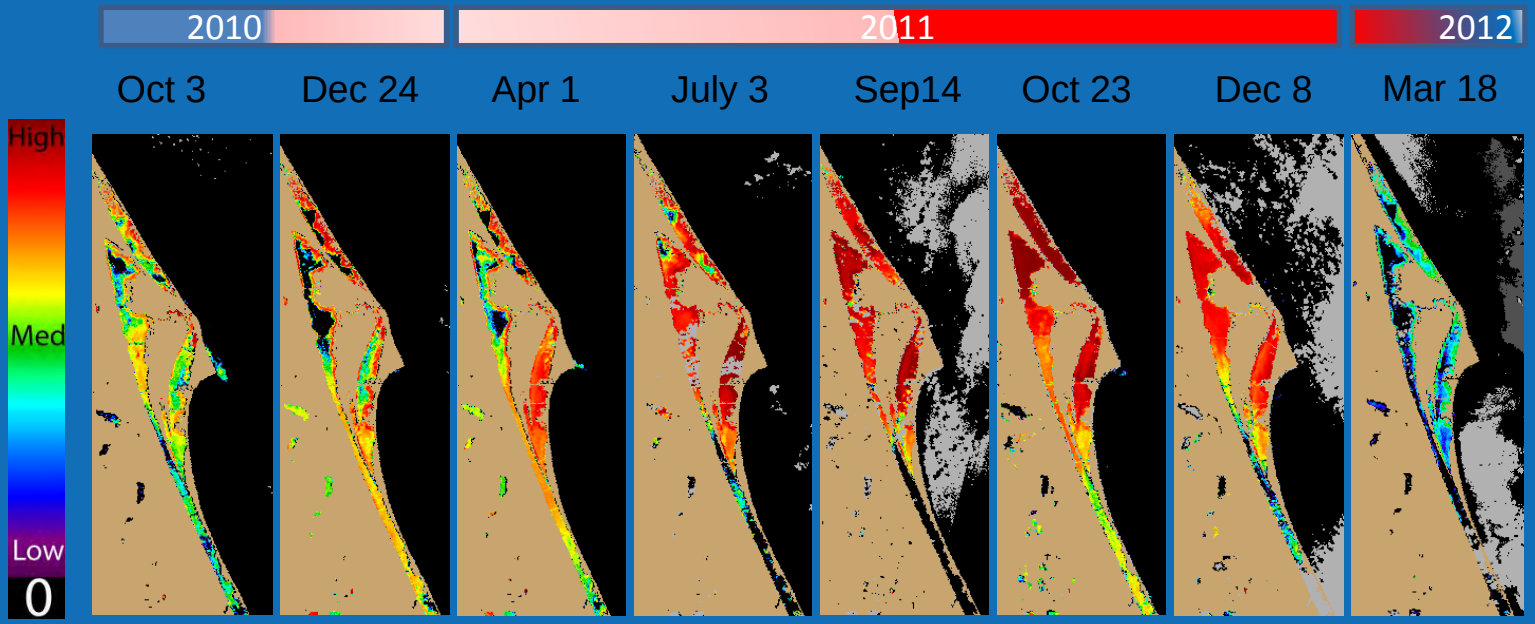
Drought &
IRFWCD discharge ⇓

TS Fay
flushing

Algal blooms

Algal blooms

Initially two phytoplankton (microalgal) blooms

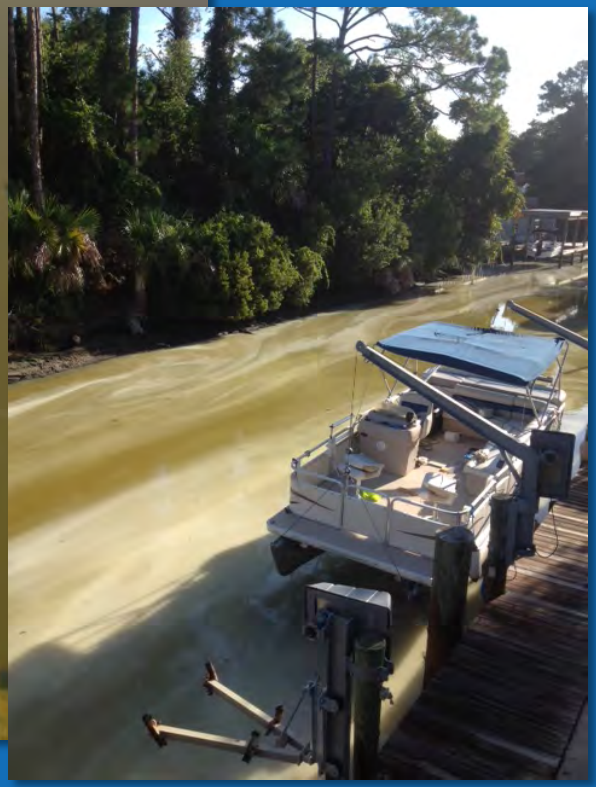


Superbloom in the north –
record magnitude & duration

Other bloom in CIRL –
lower magnitude & long duration

2012 Brown tide (*Aureoumbra lagunensis*)

D. Scheidt, IHA



K. Young, Volusia County

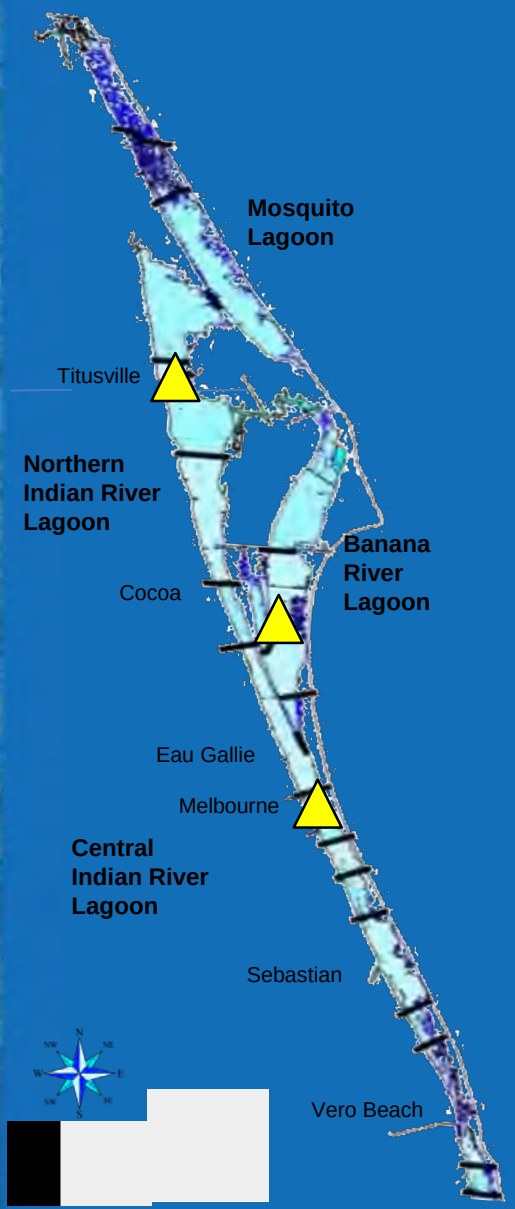
2013 Algal blooms

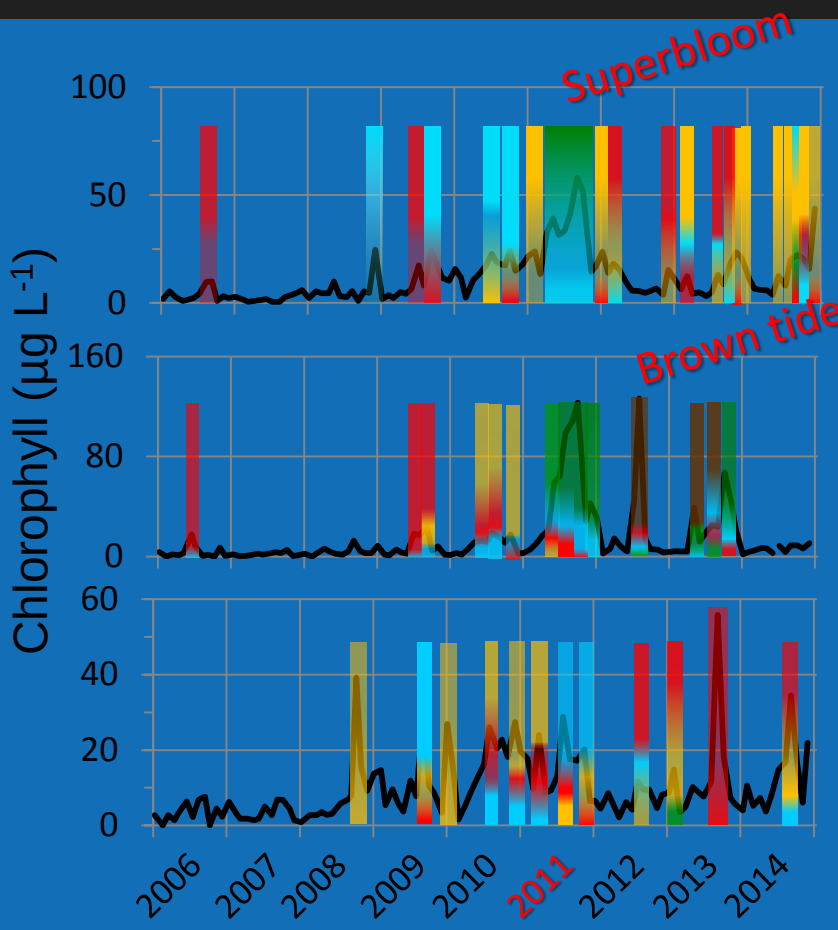
Mouth Banana Creek; 9/6/13; photo by T. Miller

IRL across from Turkey Creek; 9/20/13; photo by T. Miller

Banana River; 8/28/13; photo by D. Scheidt

IRL east shore by 528 Cswy; 9/6/13; photo by T. Miller





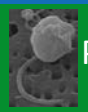
Banana River

Northern Indian River

Central Indian River

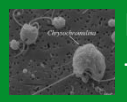

Pyrodinium bahamense

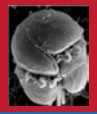

Pico-cyanobacteria


Pedinophyceae

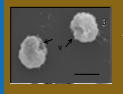

Mixed dino-flagellates


Filamentous cyano-bacteria


Mixed micro-flagellates

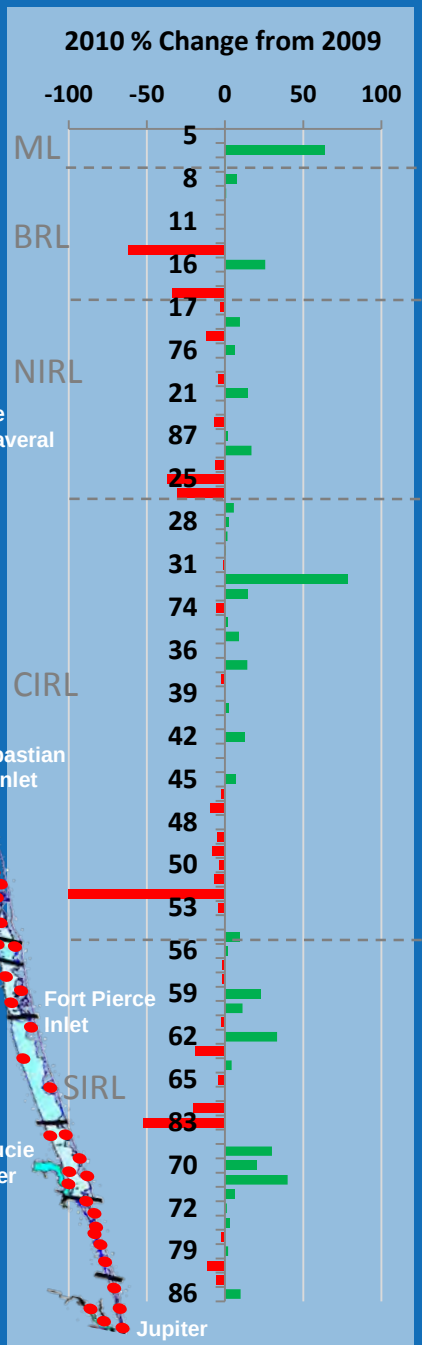

Takayama tasmanica

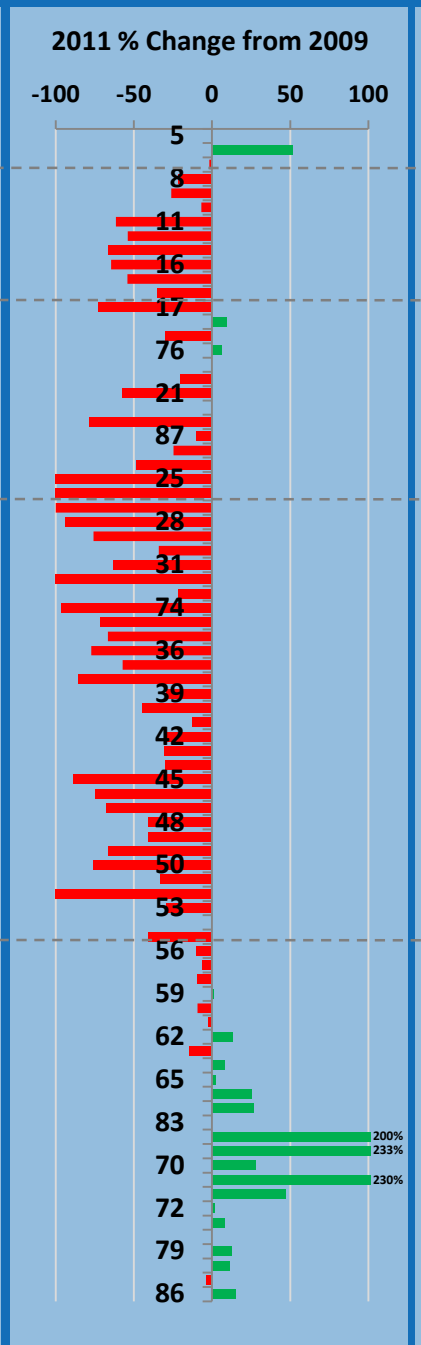

Diatoms

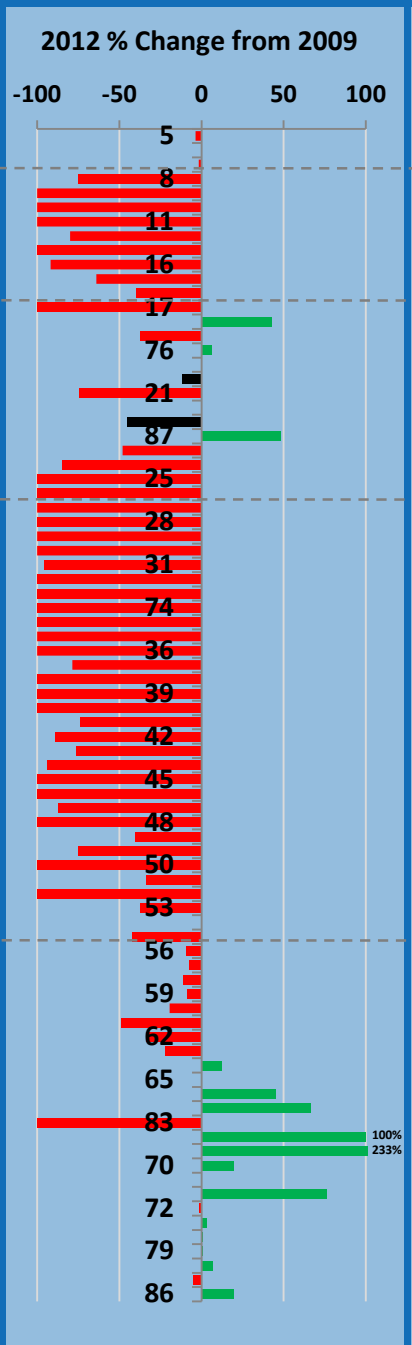

Aureoumbra (brown tide)

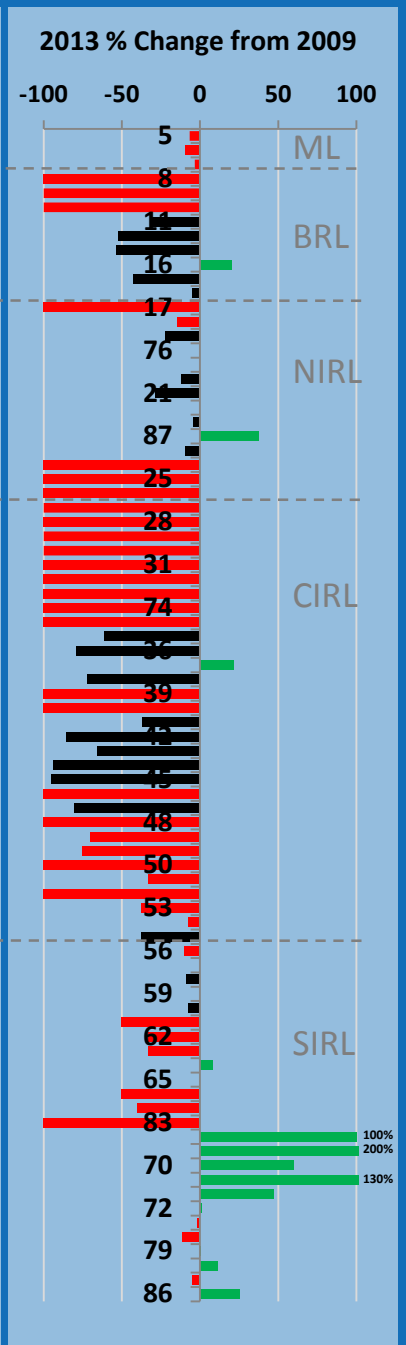
Change in Seagrass Transect Length

St. Johns River Water Management District



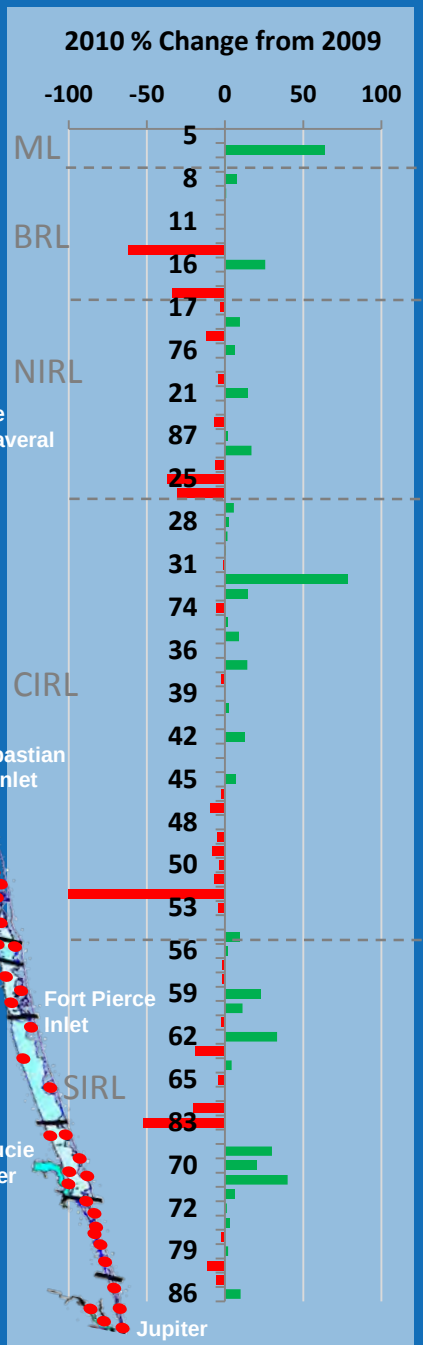


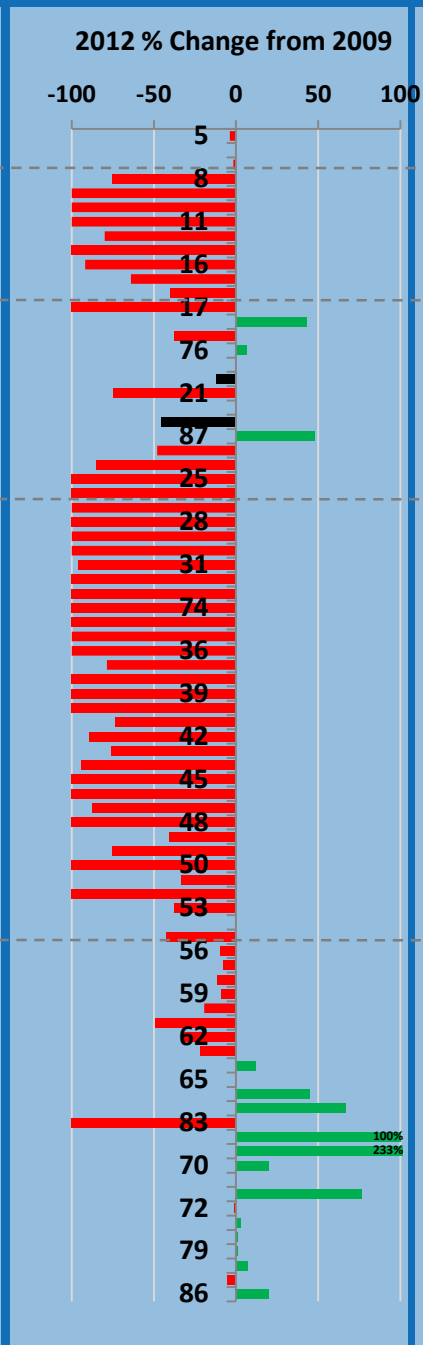


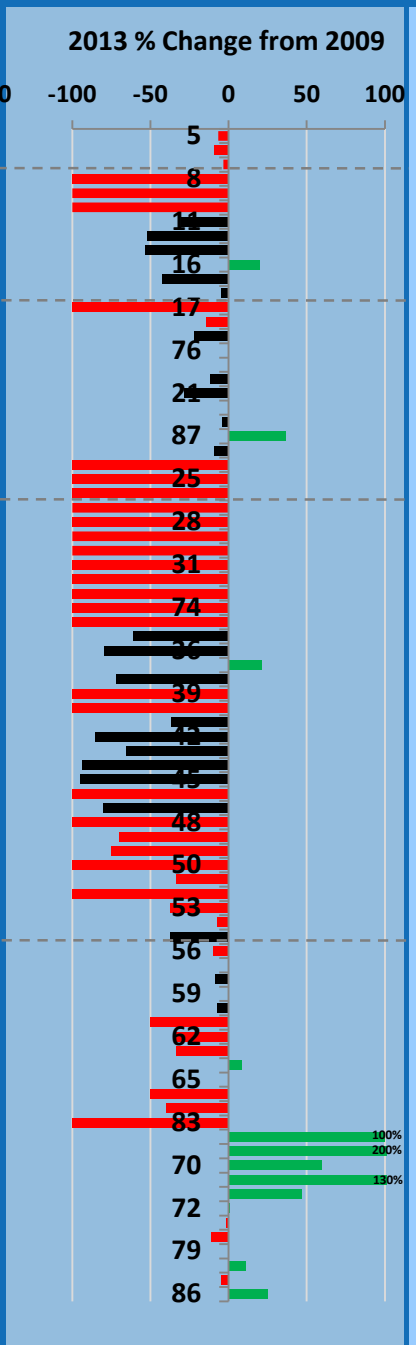


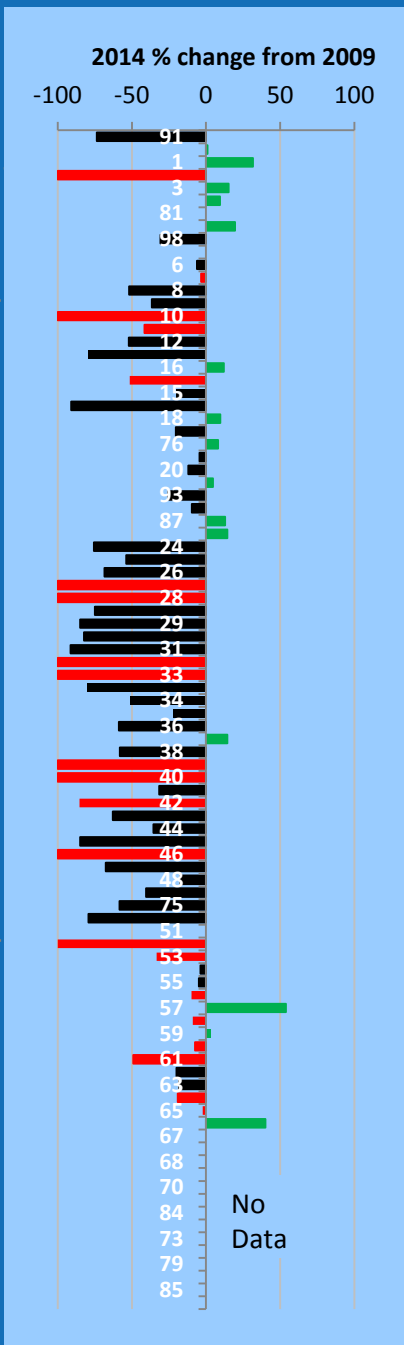
Change in Seagrass Transect Length

St. Johns River Water Management District

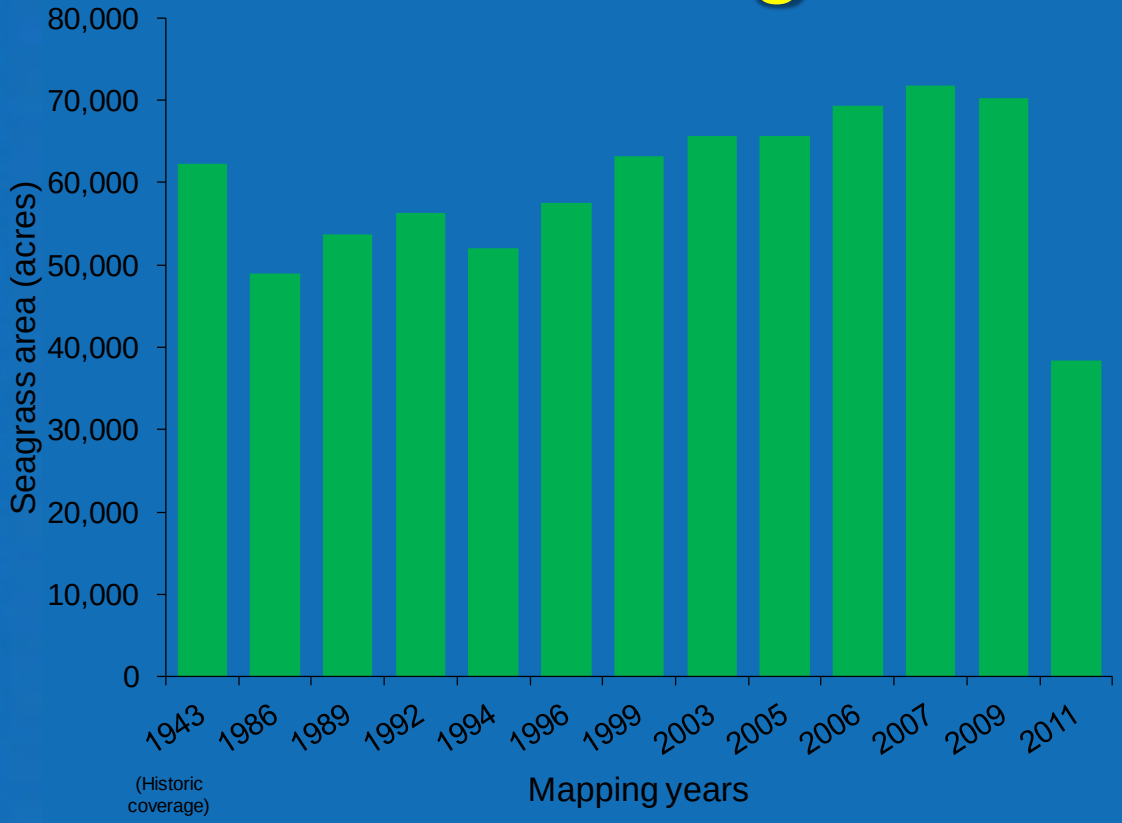






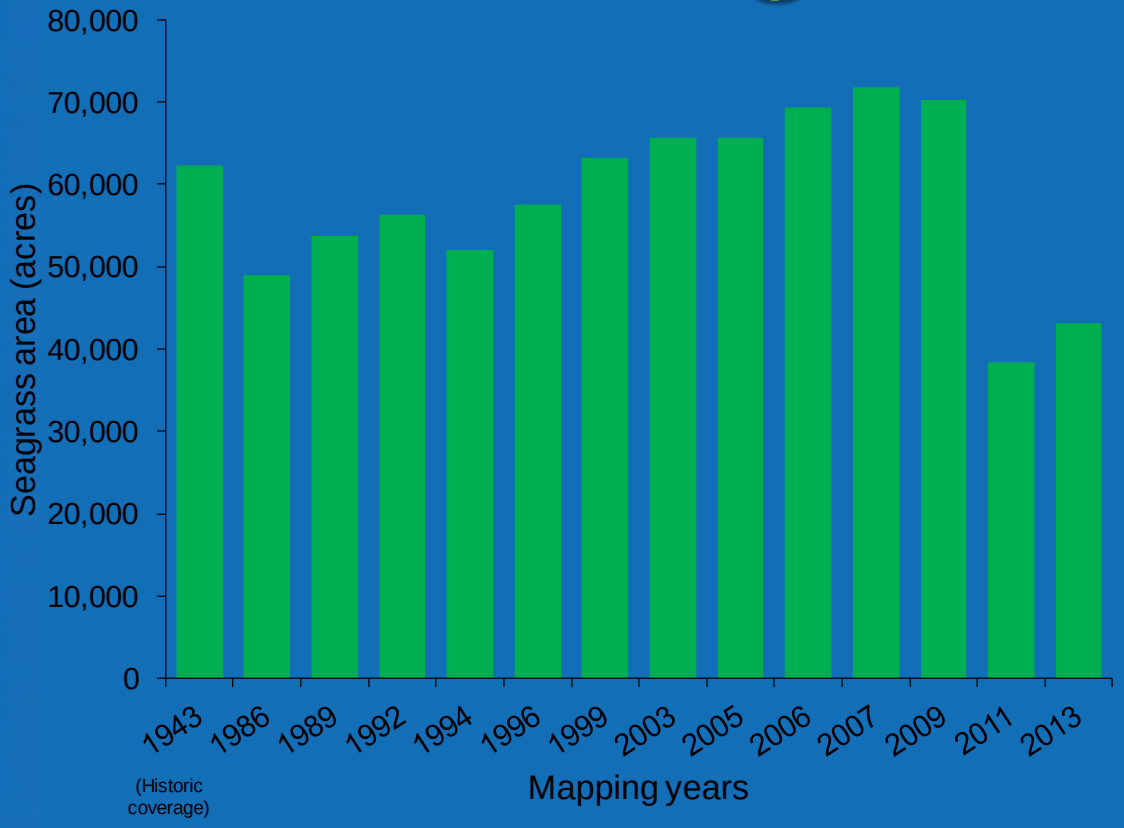


Seagrasses



Loss of ~30,000 acres
~45% of the acres mapped in 2009

Seagrasses



Some recovery in 2013

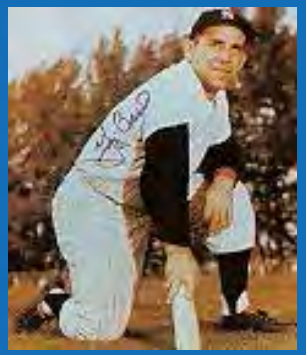
~12% gain from 2011 – not uniform

What happened?

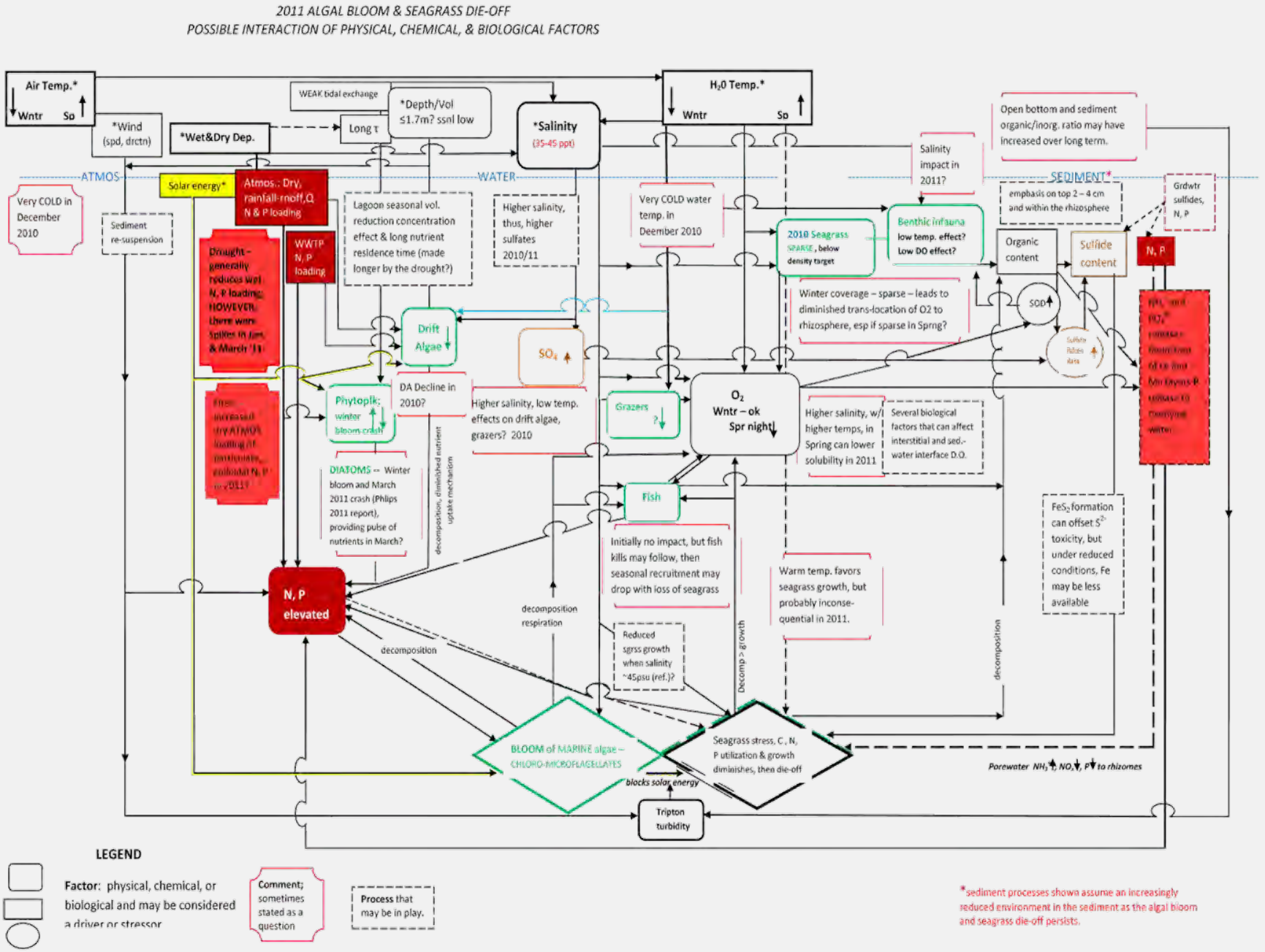
Caveats

"All models are wrong;
some models are useful."
(attributed to George Box)

"Ecosystems are not only more complex than we think,
they are more complex than we can think."
(Egler, Frank. 1977. *The nature of vegetation: its management and mismanagement*.
Aton Forest Publishers, Norfolk, Connecticut)



"It's tough to make predictions,
especially about the future."
(Yogi Berra)


2011 ALGAL BLOOM & SEAGRASS DIE-OFF
POSSIBLE INTERACTION OF PHYSICAL, CHEMICAL, & BIOLOGICAL FACTORS
Air Temp.*
Wntr Sp
*Wind (spd, drctn)
*Wet&Dry Dep.
WEAK tidal exchange
Long τ
*Depth/Vol ≤1.7m? ssnl low
*Salinity (35-45 ppt)
H2O Temp.*
Wntr Sp
ATMOS
WATER
SEDIMENT*
Solar energy*
Atmos.: Dry, rainfall-runoff,Q N & P loading
Very COLD in December 2010
Sediment re-suspension
Drought – generally reduces wtd N, P loading; HOWEVER, there were spikes in Jan. & March '11
WWTP N, P loading
Lagoon seasonal vol. reduction concentration effect & long nutrient residence time (made longer by the drought?)
Higher salinity, thus, higher sulfates 2010/11
Very COLD water temp. in Deember 2010
Salinity impact in 2011?
Open bottom and sediment organic/inorg. ratio may have increased over long term.
emphasis on top 2 – 4 cm and within the rhizosphere
Grdwtr sulfides, N, P
2010 Seagrass SPARSE, below density target
Benthic infauna low temp. effect? Low DO effect?
Organic content
Sulfide content
N, P
Winter coverage – sparse – leads to diminished trans-location of O2 to rhizosphere, esp if sparse in Sprng?
SOD
Drift Algae
SO4
Phytoplk; winter bloom crash
DA Decline in 2010?
Higher salinity, low temp. effects on drift algae, grazers? 2010
Grazers
?
O2 Wntr – ok Spr night
Higher salinity, w/l higher temps, in Spring can lower solubility in 2011
Several biological factors that can affect interstitial and sed.-water interface D.O.
DIATOMS -- Winter bloom and March 2011 crash (Phlips 2011 report), providing pulse of nutrients in March?
decomposition, diminished nutrient uptake mechanism
Fish
Initially no impact, but fish kills may follow, then seasonal recruitment may drop with loss of seagrass
FeS2 formation can offset S2- toxicity, but under reduced conditions, Fe may be less available
N, P elevated
decomposition respiration
decomposition
Reduced sgrss growth when salinity ~45psu (ref.)?
Decomp > growth
Warm temp. favors seagrass growth, but probably inconse-quential in 2011.
decomposition
BLOOM of MARINE algae – CHLORO-MICROFLAGELLATES
blocks solar energy
Seagrass stress, C, N, P utilization & growth diminishes, then die-off
Porewater NH4↑, NO3↓, P↑ to rhizomes
Tripton turbidity
LEGEND
Factor: physical, chemical, or biological and may be considered a driver or stressor
Comment; sometimes stated as a question
Process that may be in play.
*sediment processes shown assume an increasingly reduced environment in the sediment as the algal bloom and seagrass die-off persists.

Eutrophication progression scheme

Increased nutrient delivery

Binding
Uptake
Cycling
Grazing…

Enhanced growth phytoplankton & macroalgae

Increased shading & benthic respiration

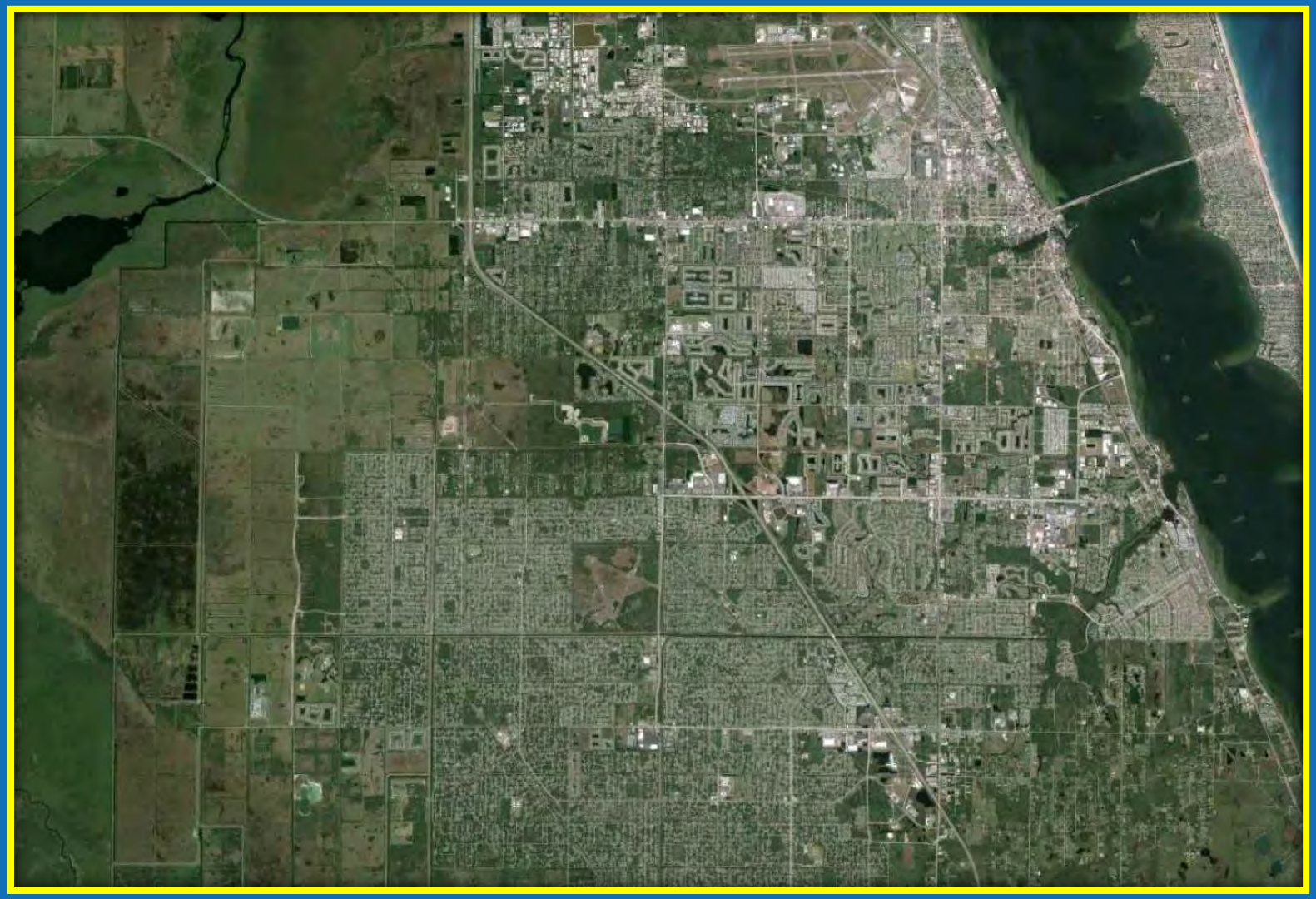
Seagrass loss

Adapted from
C.M. Duarte (1995)

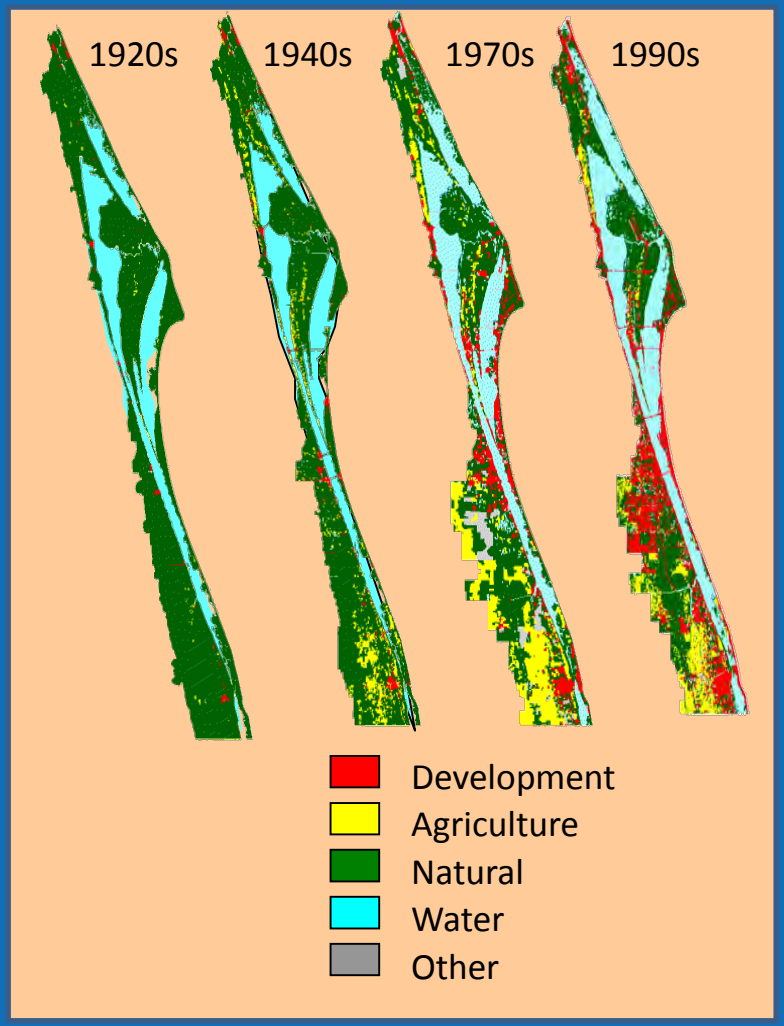
Does the model fit?

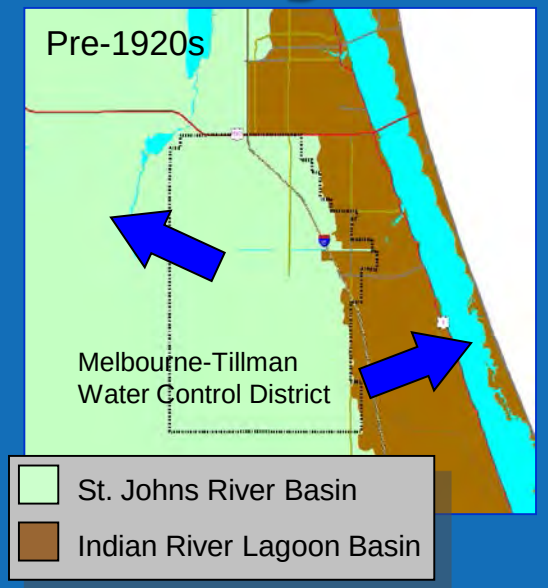
Melbourne ca. 1943

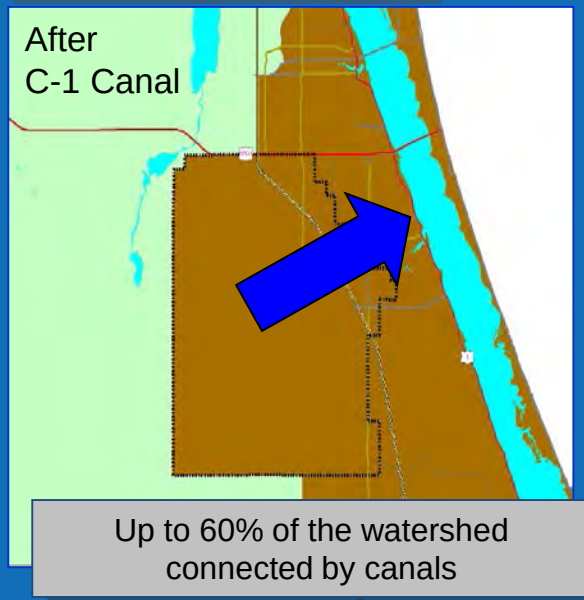
Melbourne ca. today



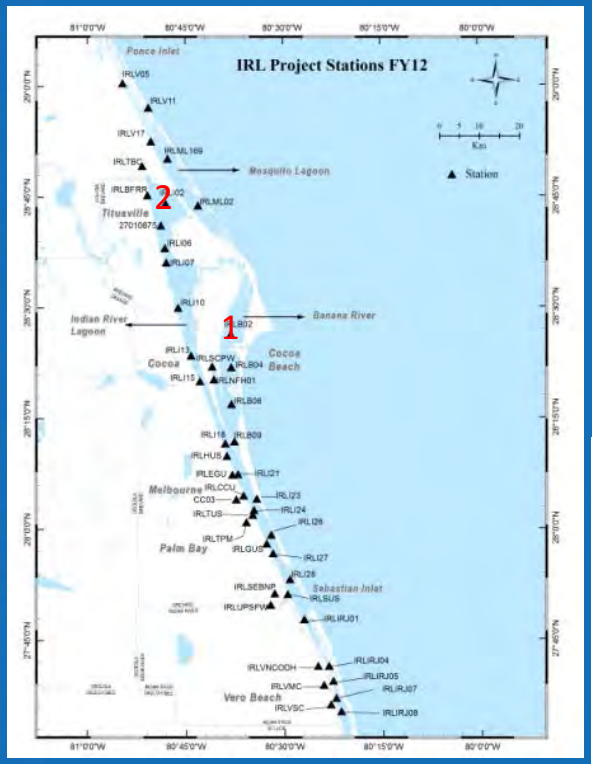
Nutrient delivery

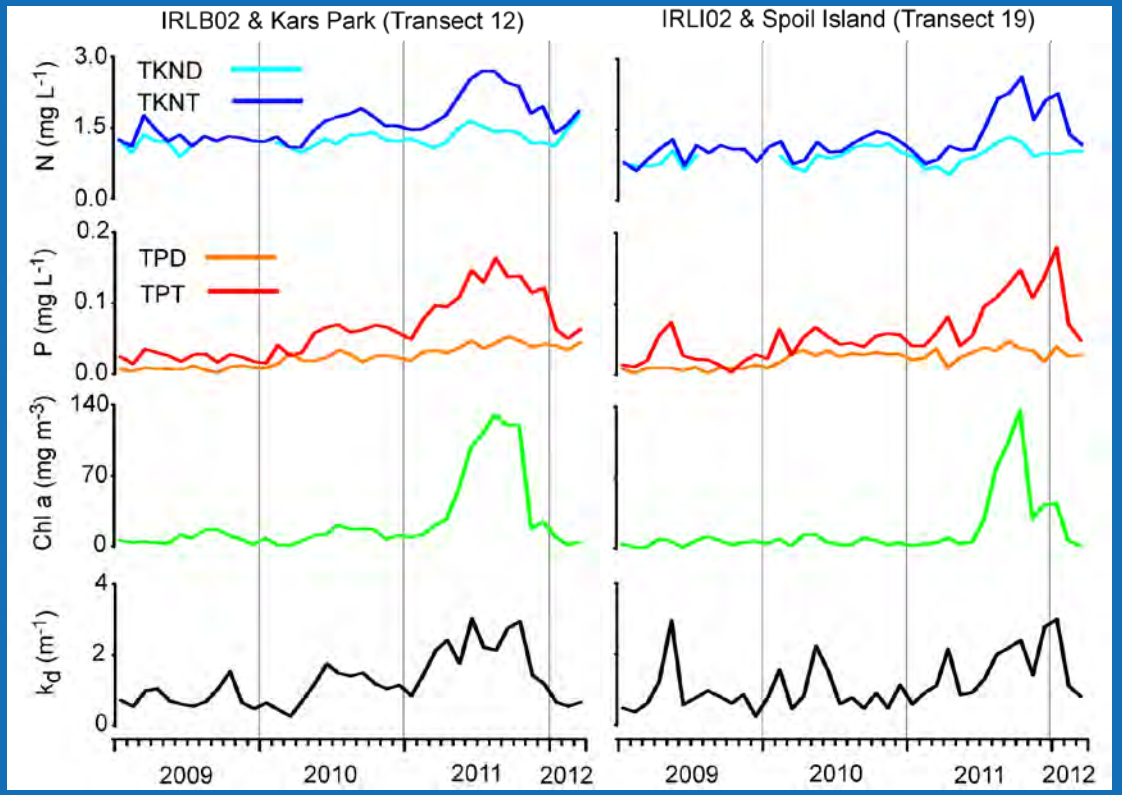






External nutrient loads





Uptake & cycling

Drift Macroalgae

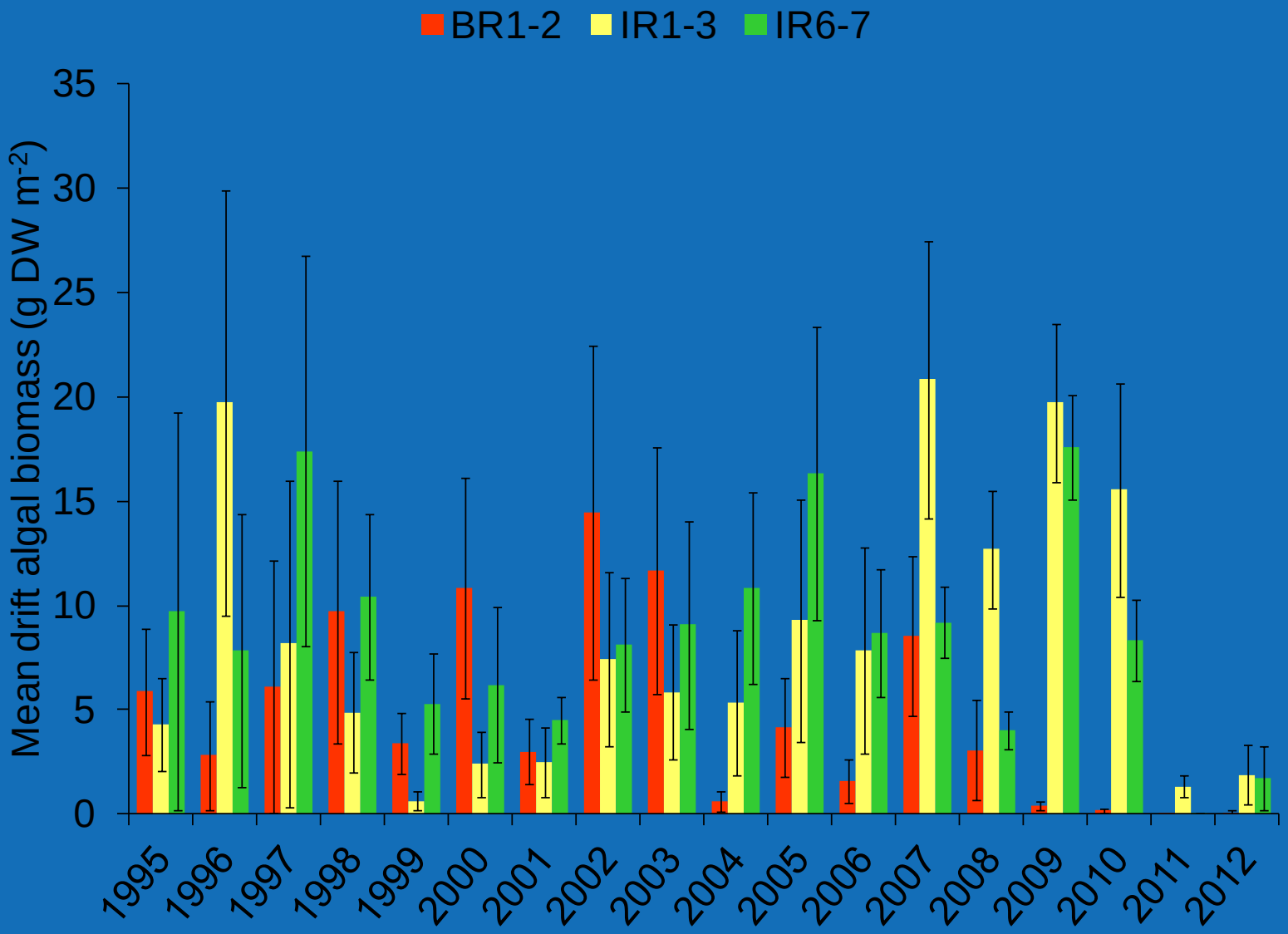
"Tumbleweed" of the Lagoon

Benefits: habitat, nutrient "sponge"

If overabundant, it can be a...

Detriment: outcompete seagrass, be a major source of nutrients

Uptake & cycling

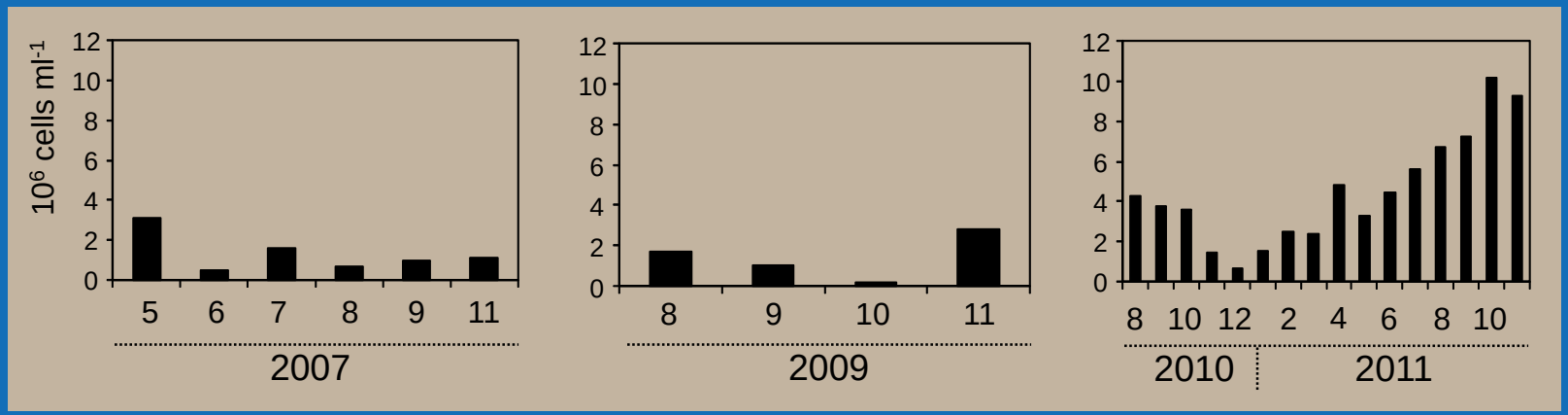


Cycling

Bacteria counts

Not bacterial contamination

Site 3 – Central Banana River

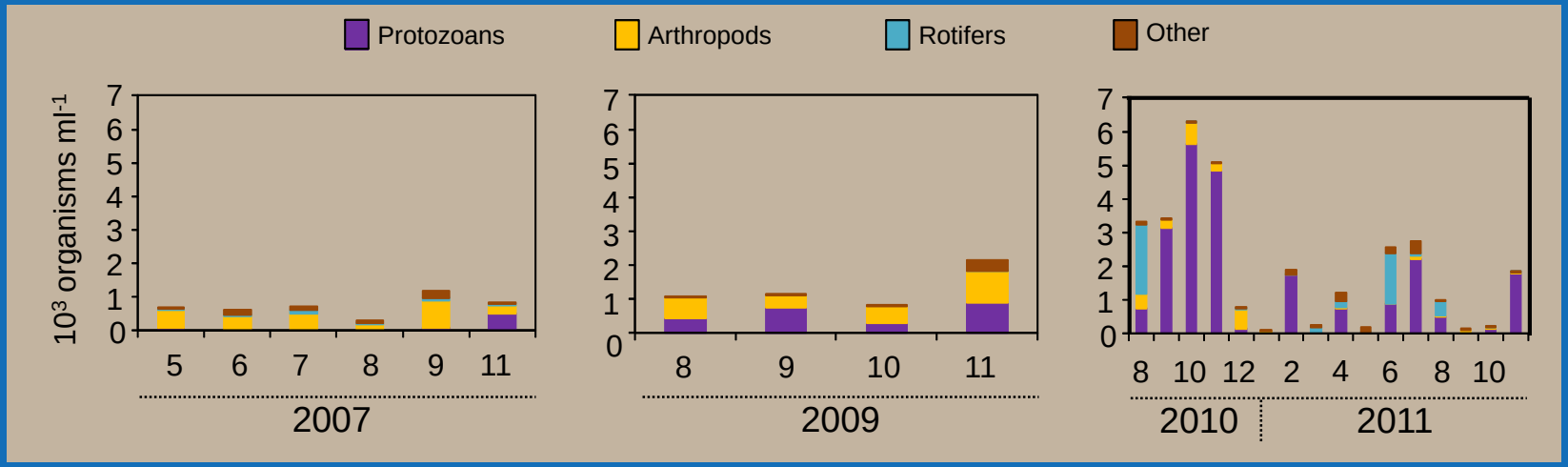


Bacteria cycle nutrients rapidly

Grazing

Zooplankton

Site 3 – Central Banana River



Protozoans & grazing increase

Salinity ⇒ decrease?

What will we do?

Indian River Lagoon Protection Initiative

St. Johns River Water Management District

Strategic Plan

April 2013 to October 2018

April 9, 2013

Strategic Initiatives

Initiative

Indian River Lagoon Protection

Objective

To restore the water quality and ecological habitat value of the Indian River Lagoon.

Background

The salient goal for restoration of the Indian River Lagoon is increased abundance of seagrasses. The lagoon has a thriving sport fishery, which is largely dependent on the health and abundance of seagrasses.

Current and ongoing focus

In 2011, an extensive and persistent phytoplankton bloom developed that decreased water clarity to historically low levels. During the bloom, seagrasses declined over large areas to levels lower than previously measured. The loss of seagrasses amounted to about 35,000 acres. Based on the minimum estimated annual value of seagrass beds, this equates to approximately a $175 million loss to commercial and recreational fisheries. A second phytoplankton bloom developed in 2012.

The ecological causes of these blooms are unknown. The blooms were not expected given the extensive reconnection and restoration of wetlands, an antecedent trend toward improved seagrass cover, and no concomitant and proportionate increase in pollutant and freshwater loadings. Lacking a better understanding of causation, it is unlikely that a cost-effective strategy for bloom prevention can be developed. This initiative would support the additional data collection, analysis, and modeling needed to deduce the fundamental causes of the blooms as a basis for development of an improved management plan.

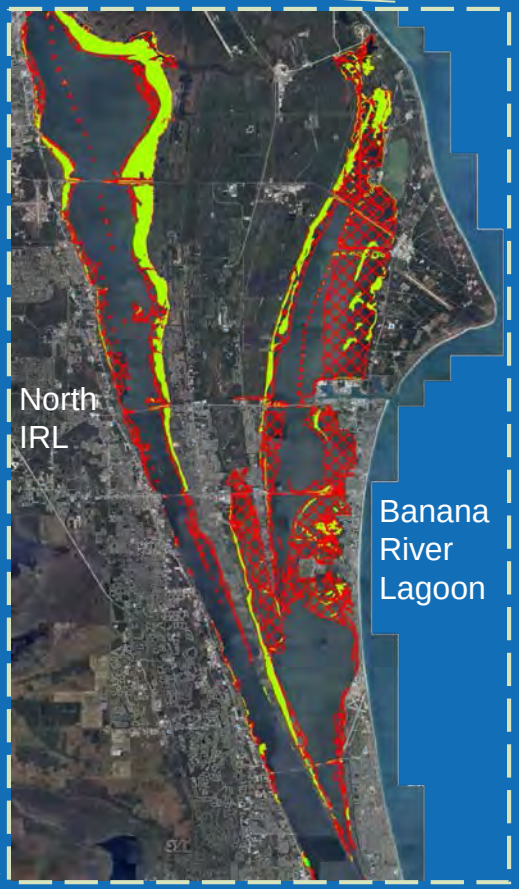
Sample Projects

1. Comprehensive Conservation and Management Plan implementation
2. Investigation of recent phytoplankton bloom
3. Coastal wetland rehabilitation projects (federal/SJRWMD cooperative funding)
4. Small projects funded by Indian River Lagoon license plate funds (Volusia, Brevard, and Indian River counties

Indian River Lagoon Algal Blooms Investigation

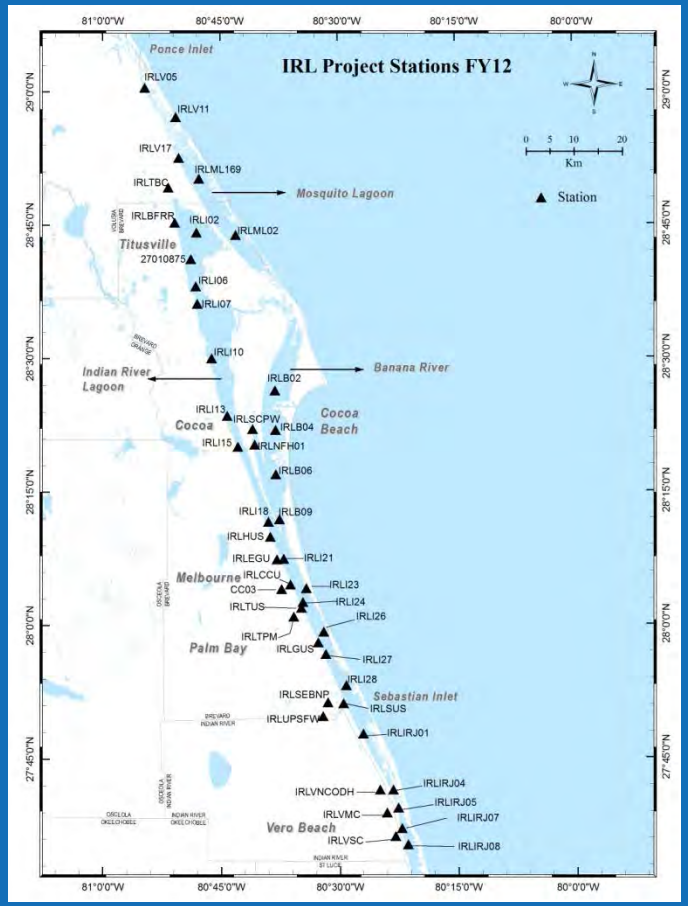
Project location =
2011 superbloom area
Timeframe =
4 years

Red hatching → *seagrass loss 2009–2011*



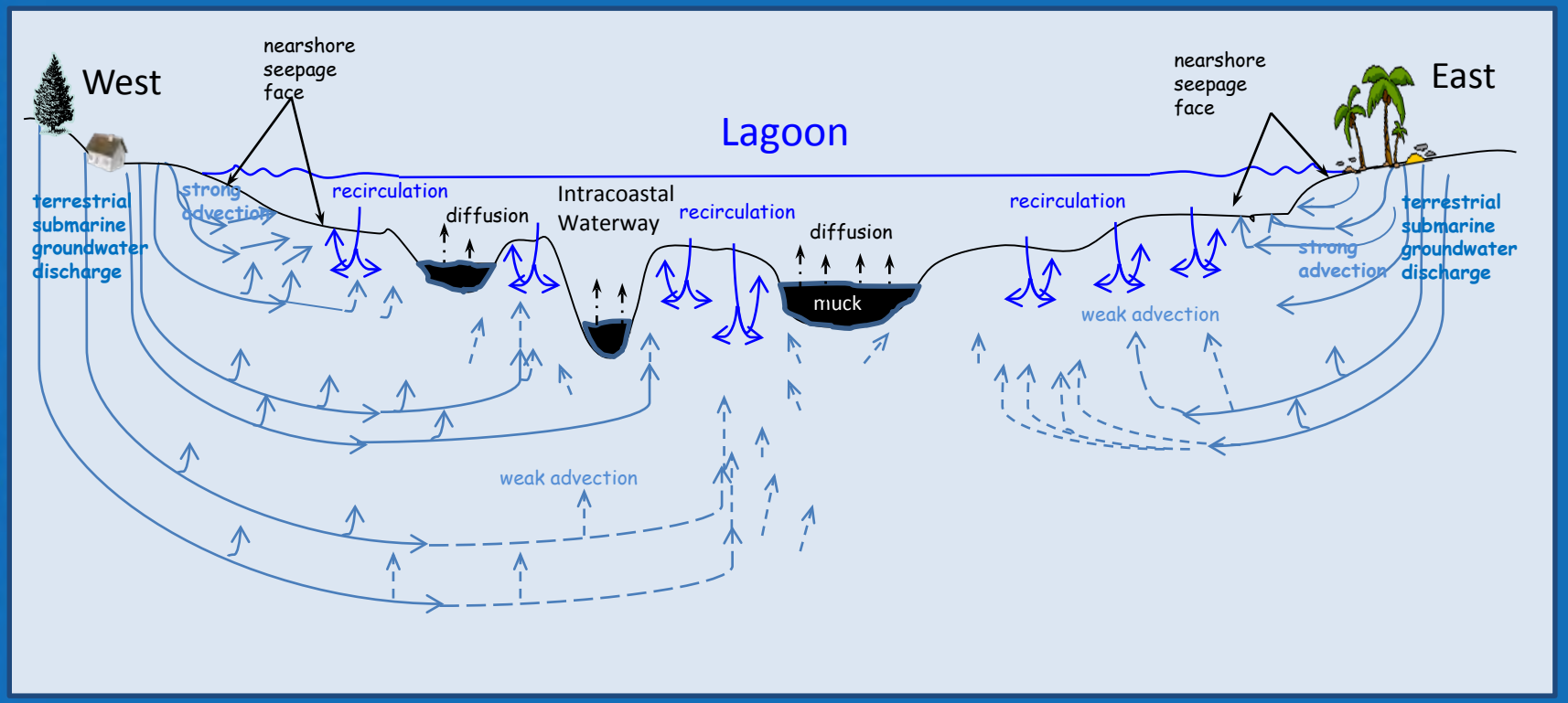
Blue Team

- **Enhanced sampling**
  - event sampling of inputs
  - atmospheric deposition
  - sensors for continuous data
  - bacterioplankton
  - phytoplankton
  - microzooplankton
- **Updated & enhanced models**
- **Nutrition for bloom species**
- **Grazing by microzooplankton**



Sand Team

- Sediment survey
- Groundwater model
- Internal nutrient budget (flux)



Green Team

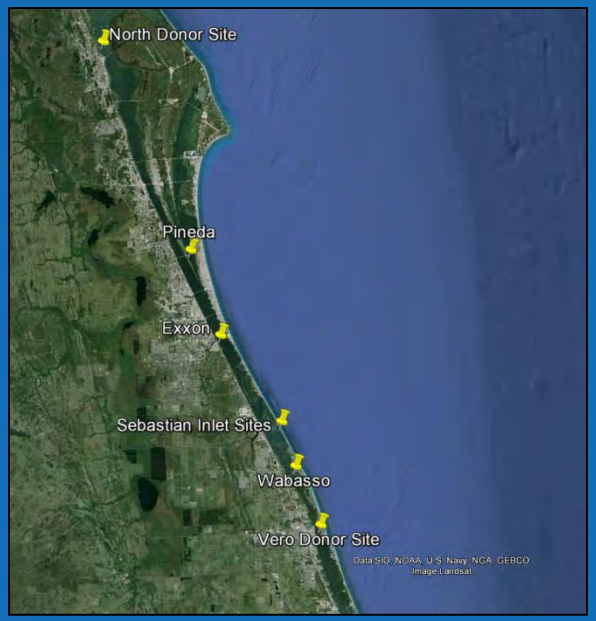
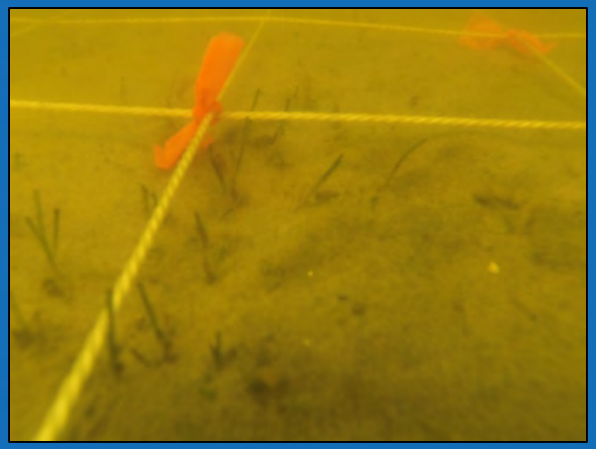


Figure 1. Map of donor and recipient sites in this study.

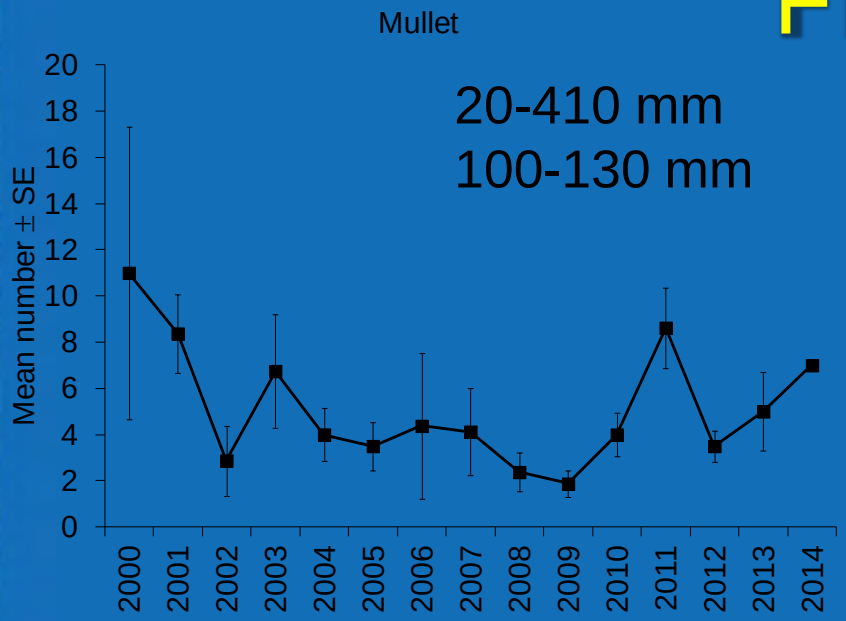


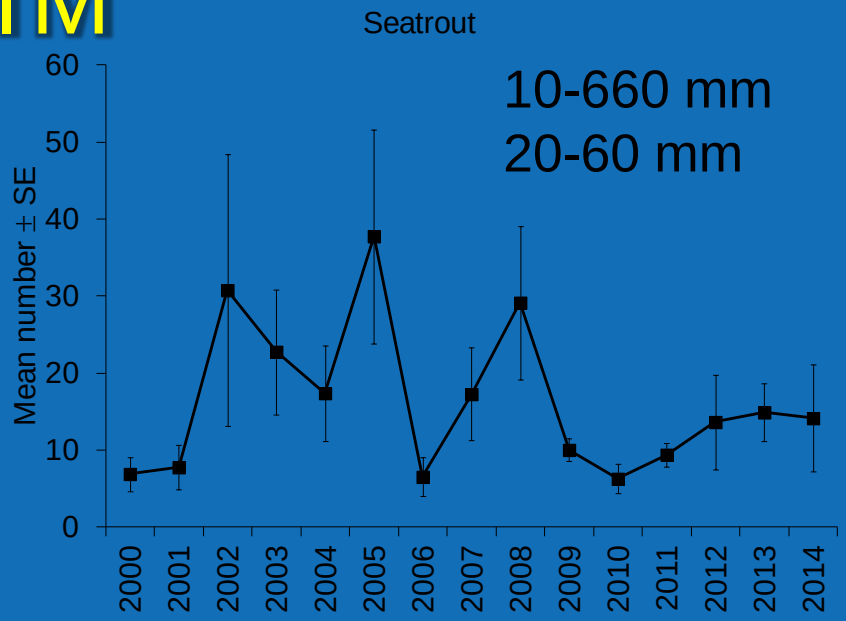
- **Seagrass transplanting**
- **Drift algae mapping**
- **Drift algae tolerance**
  - **temperature**
  - **salinity**
  - **light**
- **Nutrient content & release**
  - **drift algae**
  - **seagrasses**

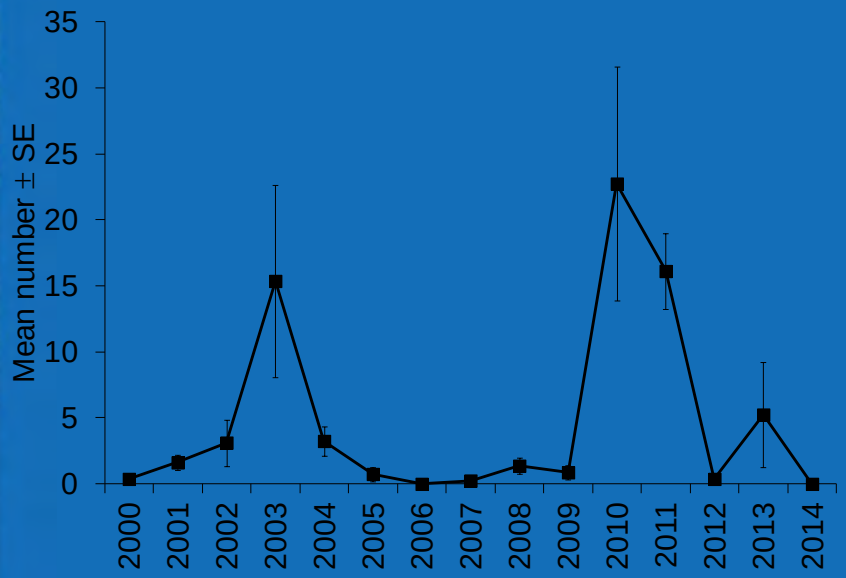
Orange Team

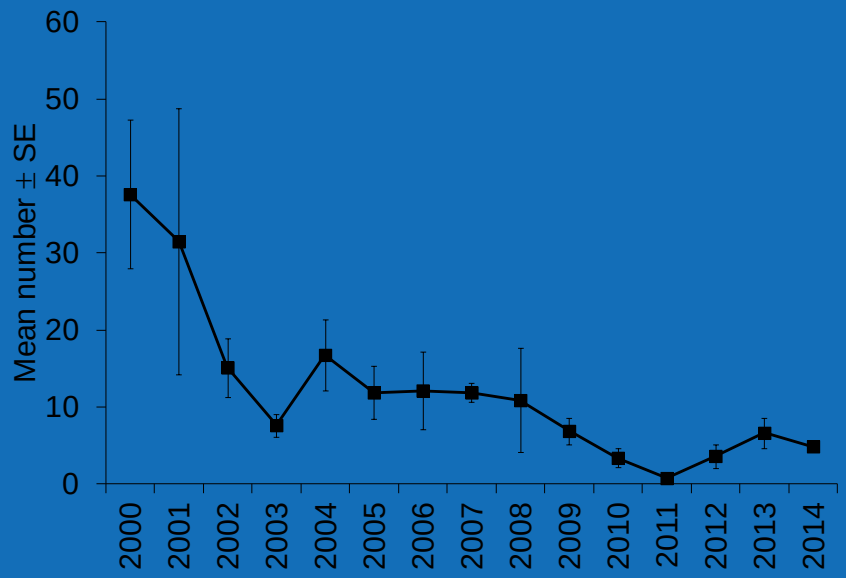
- **Enhanced sampling**
  - **fisheries independent monitoring**
  - **macrozooplankton**
  - **infauna**
  - **epifauna**
- **Grazing**
  - **macrozooplankton**
  - **infauna**
  - **epifauna**

FIM


Mullet
20-410 mm
100-130 mm
Mean number ± SE
0
2
4
6
8
10
12
14
16
18
20
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014


Seatrout
10-660 mm
20-60 mm
Mean number ± SE
0
10
20
30
40
50
60
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014


Pinfish
Mean number ± SE
0
5
10
15
20
25
30
35
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

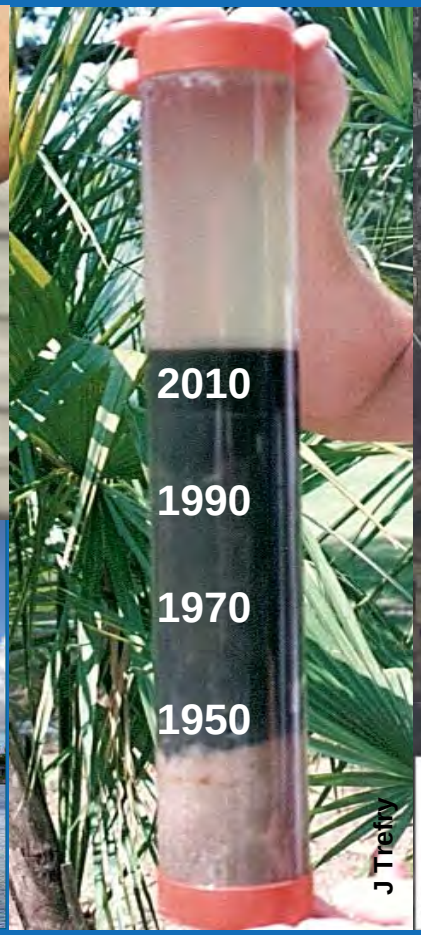

Pipefish
Mean number ± SE
0
10
20
30
40
50
60
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

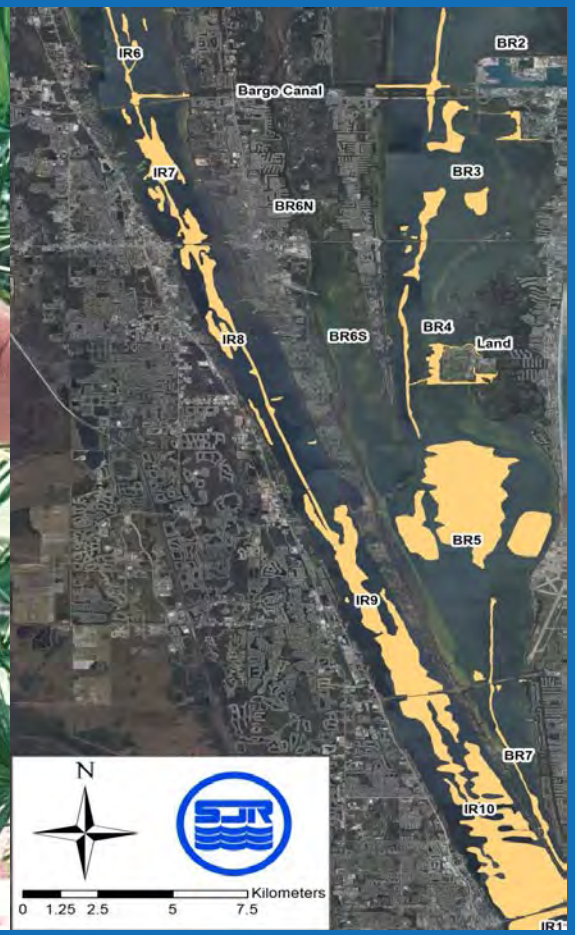
Goals

- **Understand**
  - **the lagoon's nutrient inventory & cycling**
  - **processes that regulate blooms**
- **Evaluate & recommend strategies**
  - **ameliorate blooms**
    - **magnitude**
    - **duration**
    - **frequency**
  - **facilitate seagrass growth & expansion**
  - **enhance diverse trophic structure**

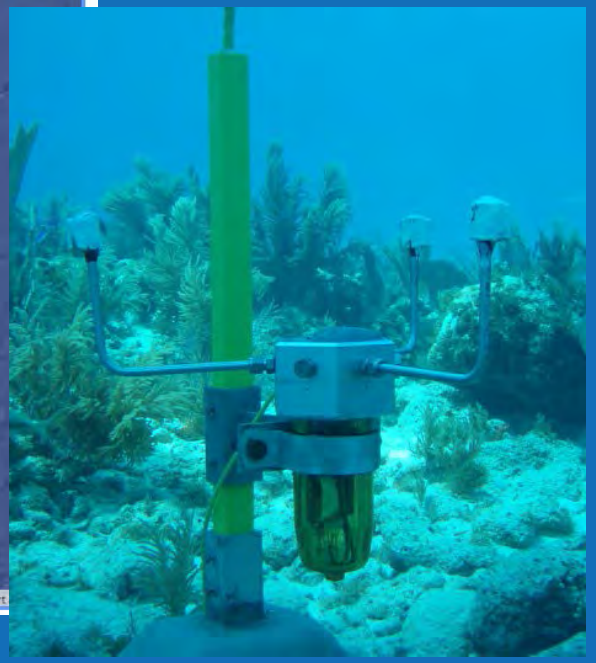
Brevard County and IRL Research Institute

- **Efficiency & effects of dredging**

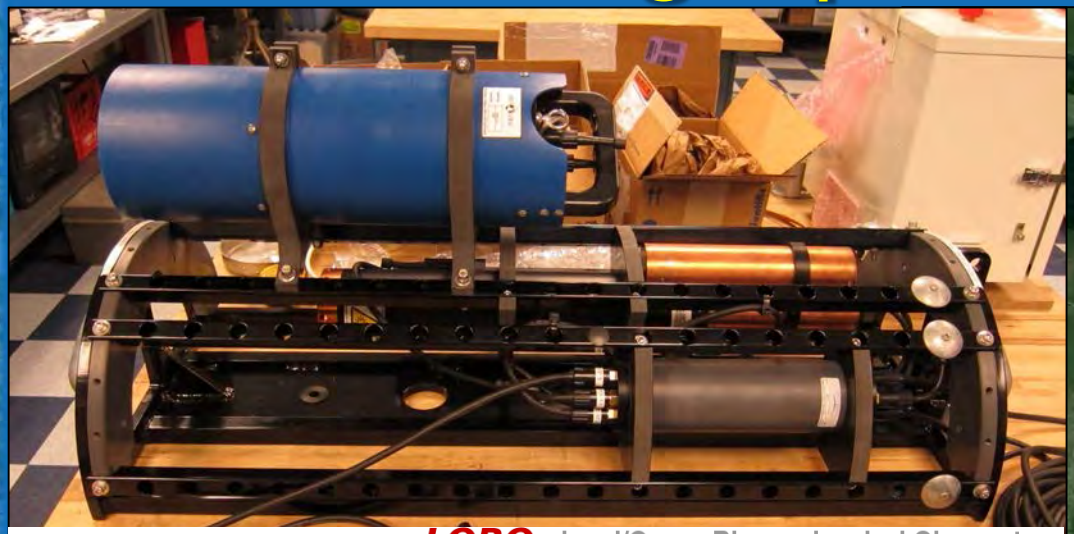


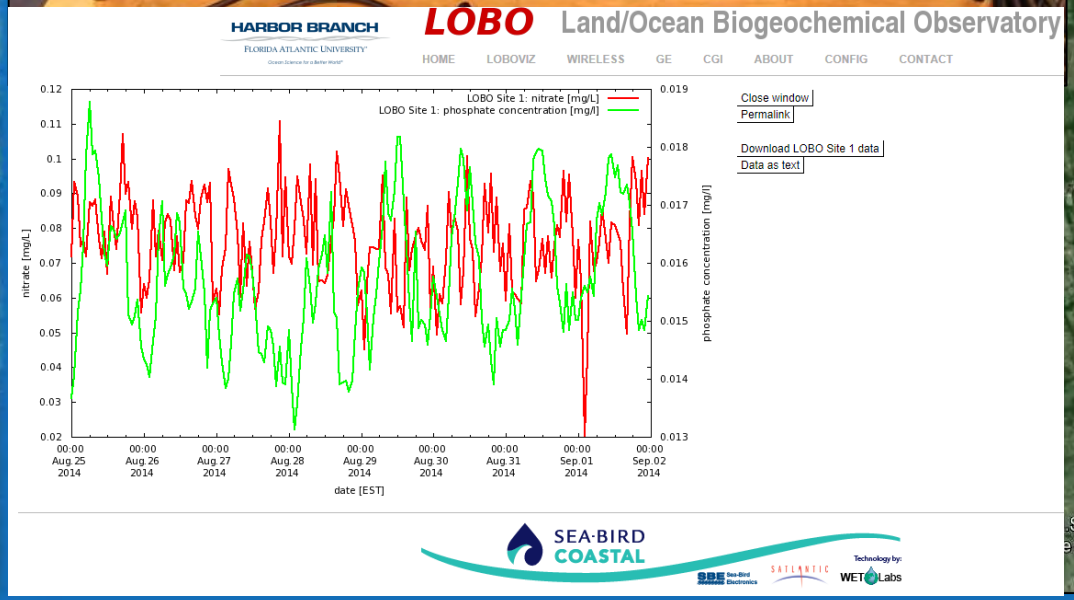


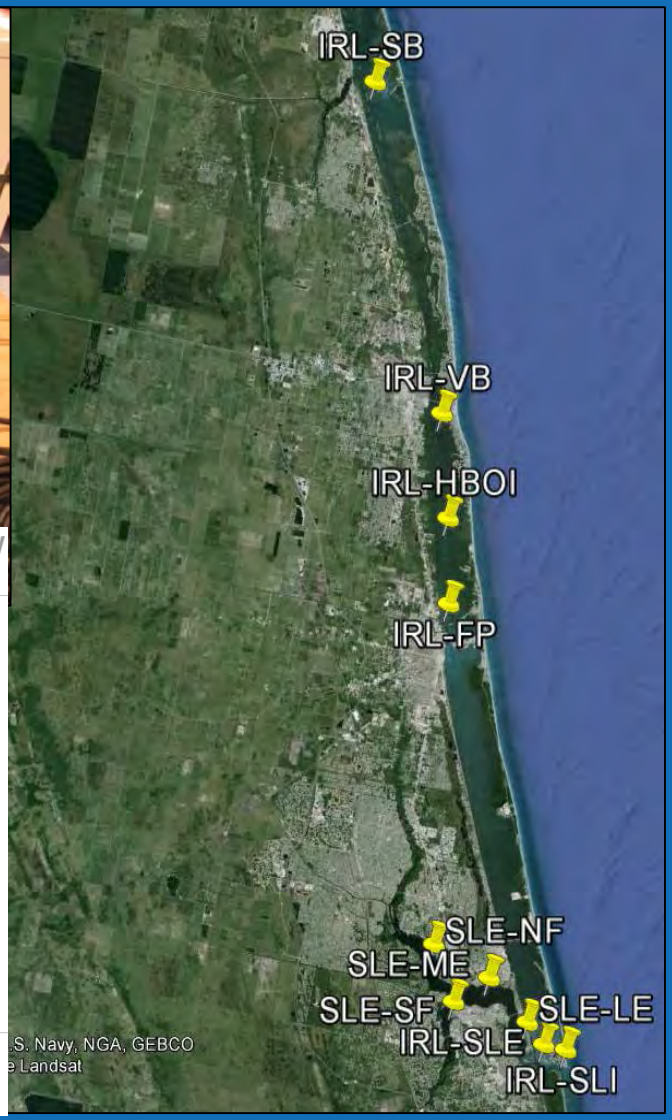
Ocean Research & Conservation Association



Harbor Branch Oceanographic Institute

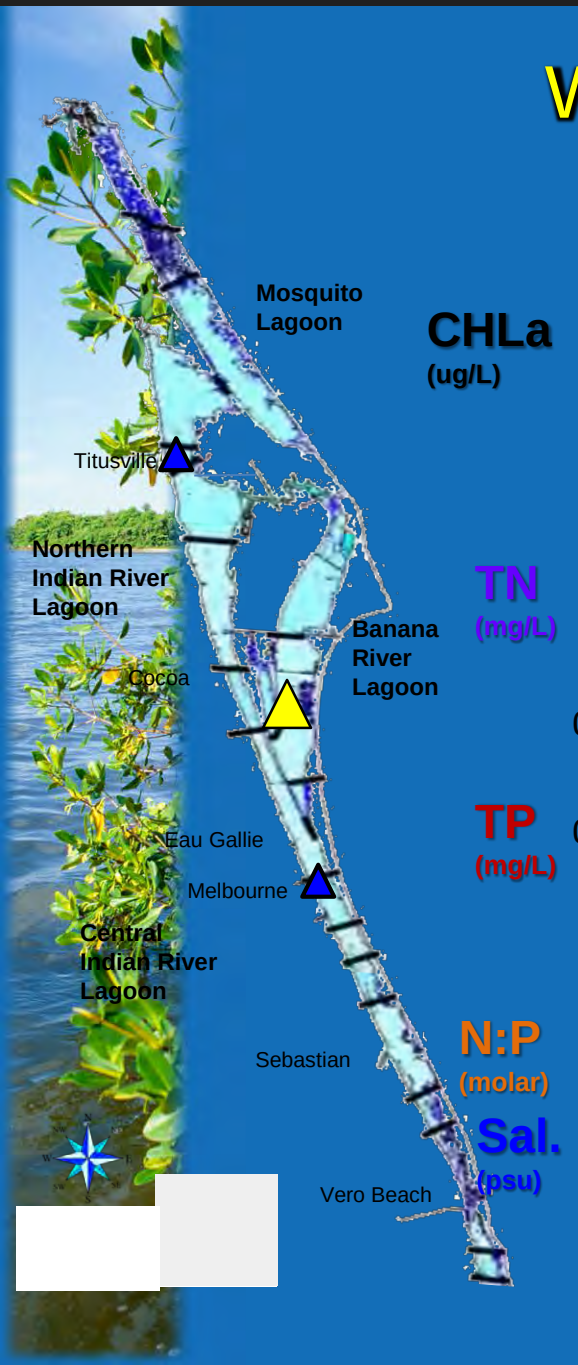


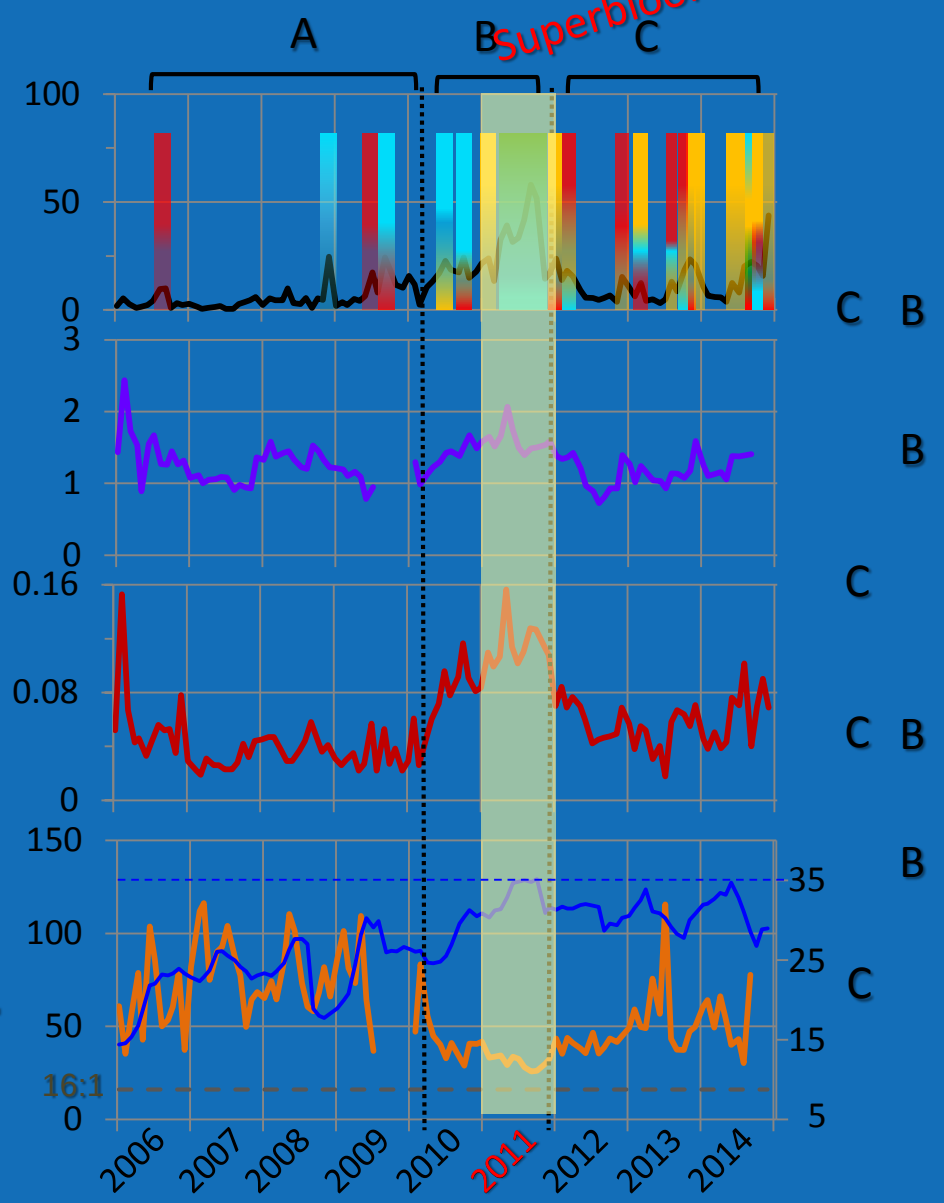


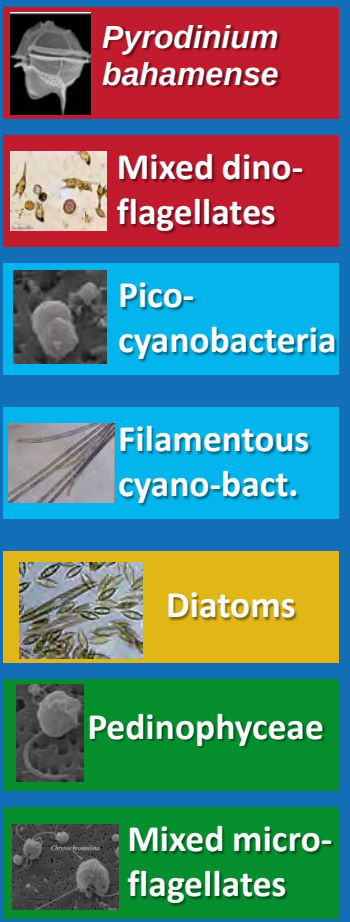


Thank you for your time

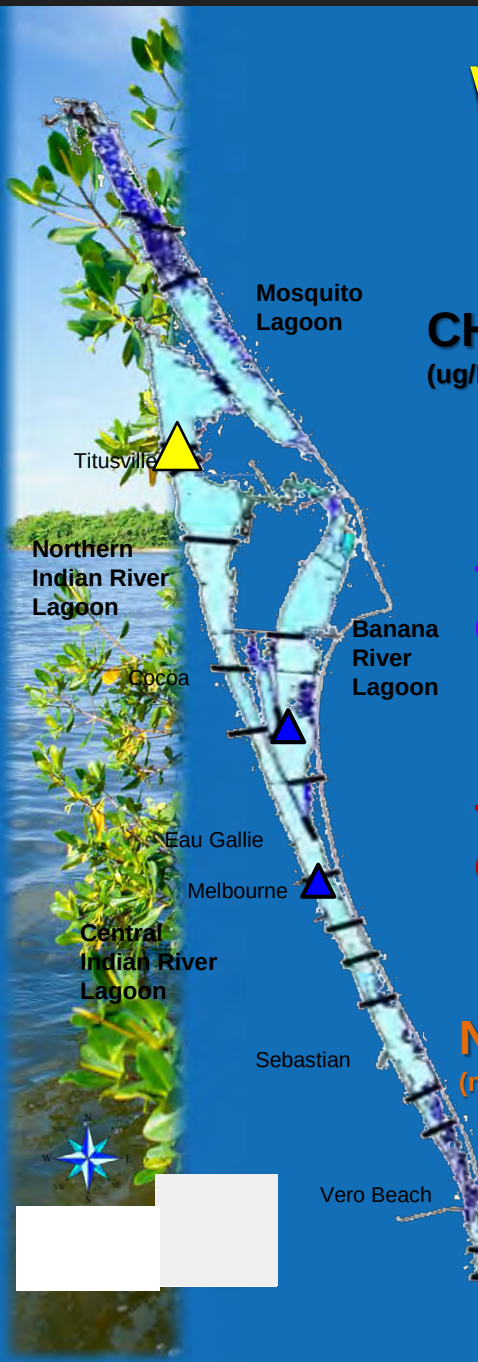
WQ Central Banana River

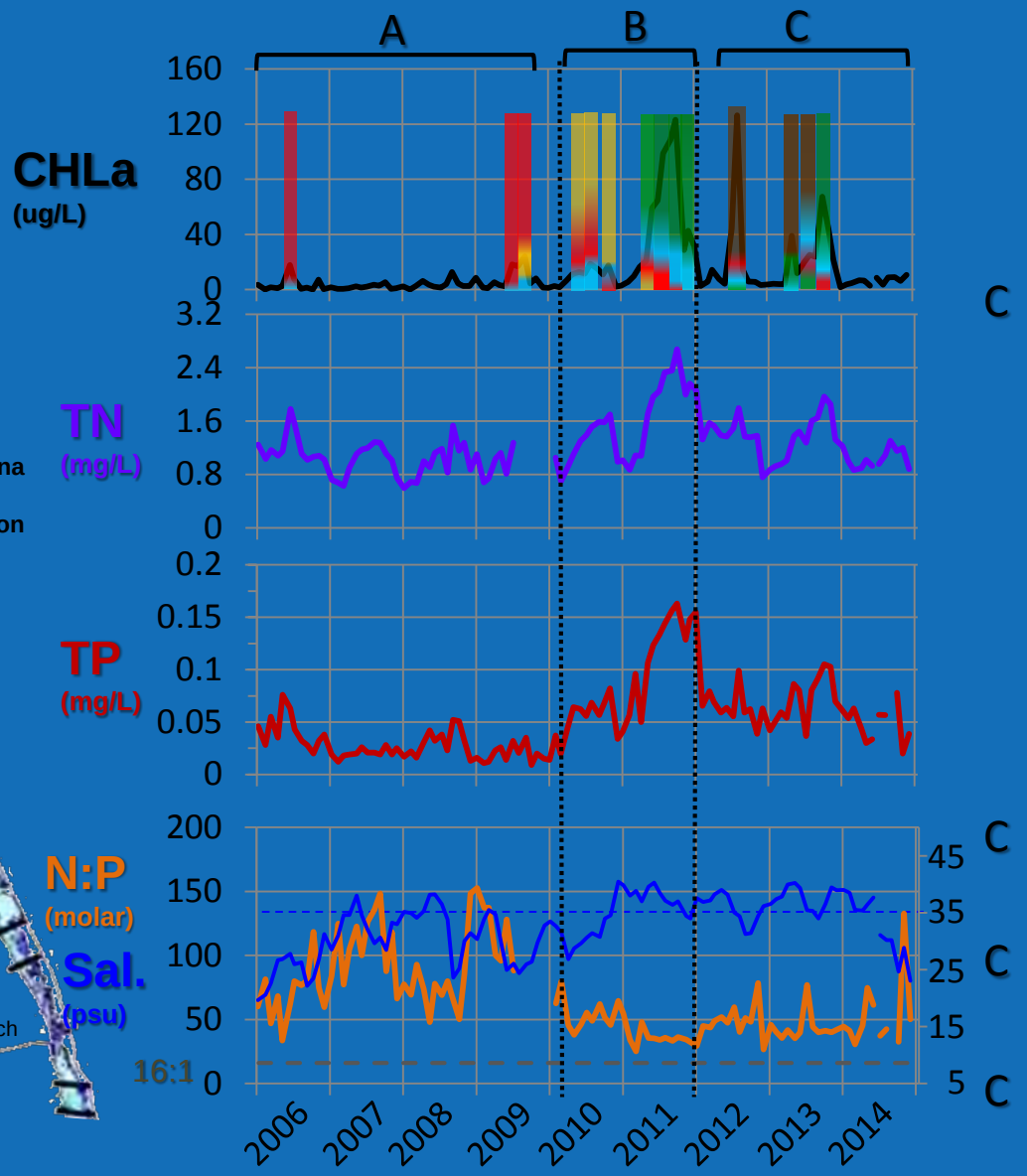


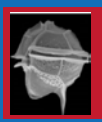




WQ North IRL – Titusville (IRLI06)





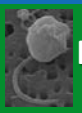

Pyrodinium bahamense

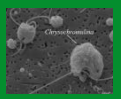

Mixed dino-flagellates

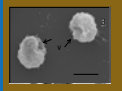

Pico-cyanobacteria


Filamentous cyano-bact.

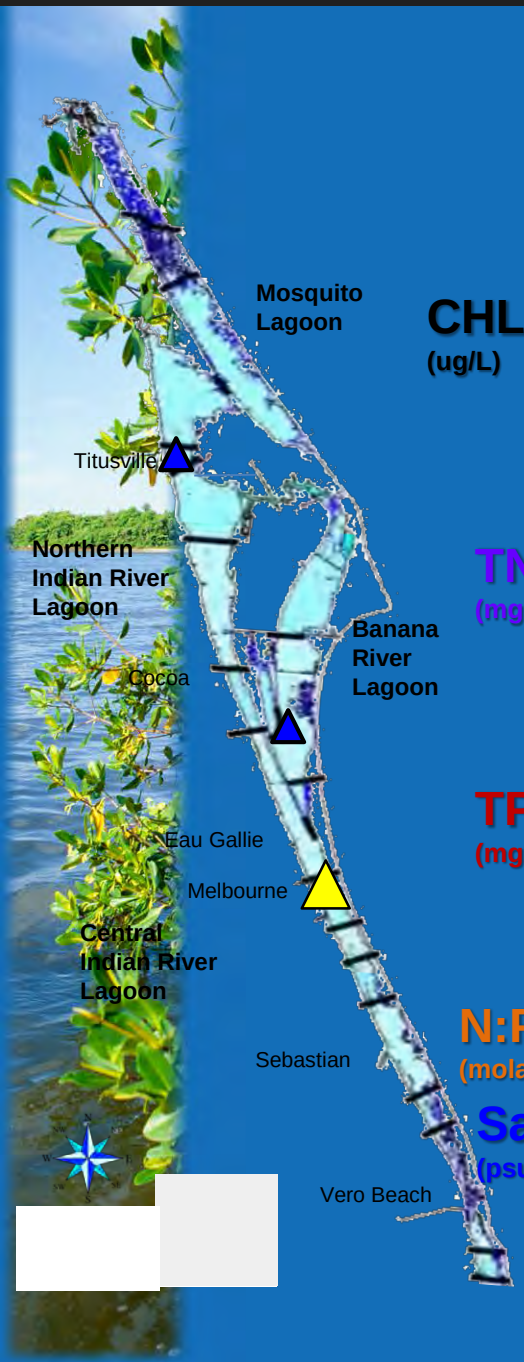

Diatoms

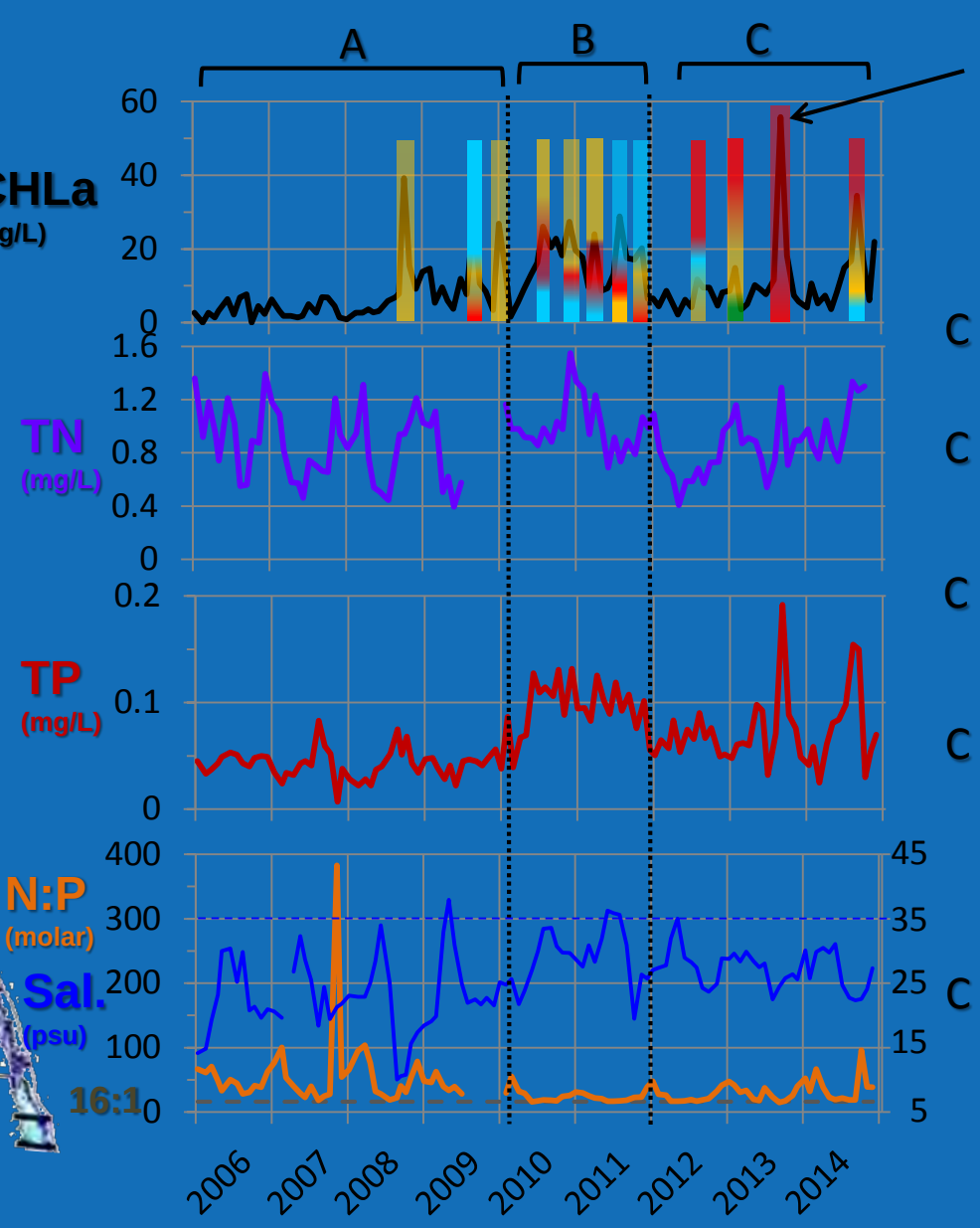

Pedinophyceae

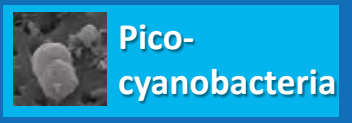

Mixed micro-flagellates


Aureoumbra (Brown Tide)

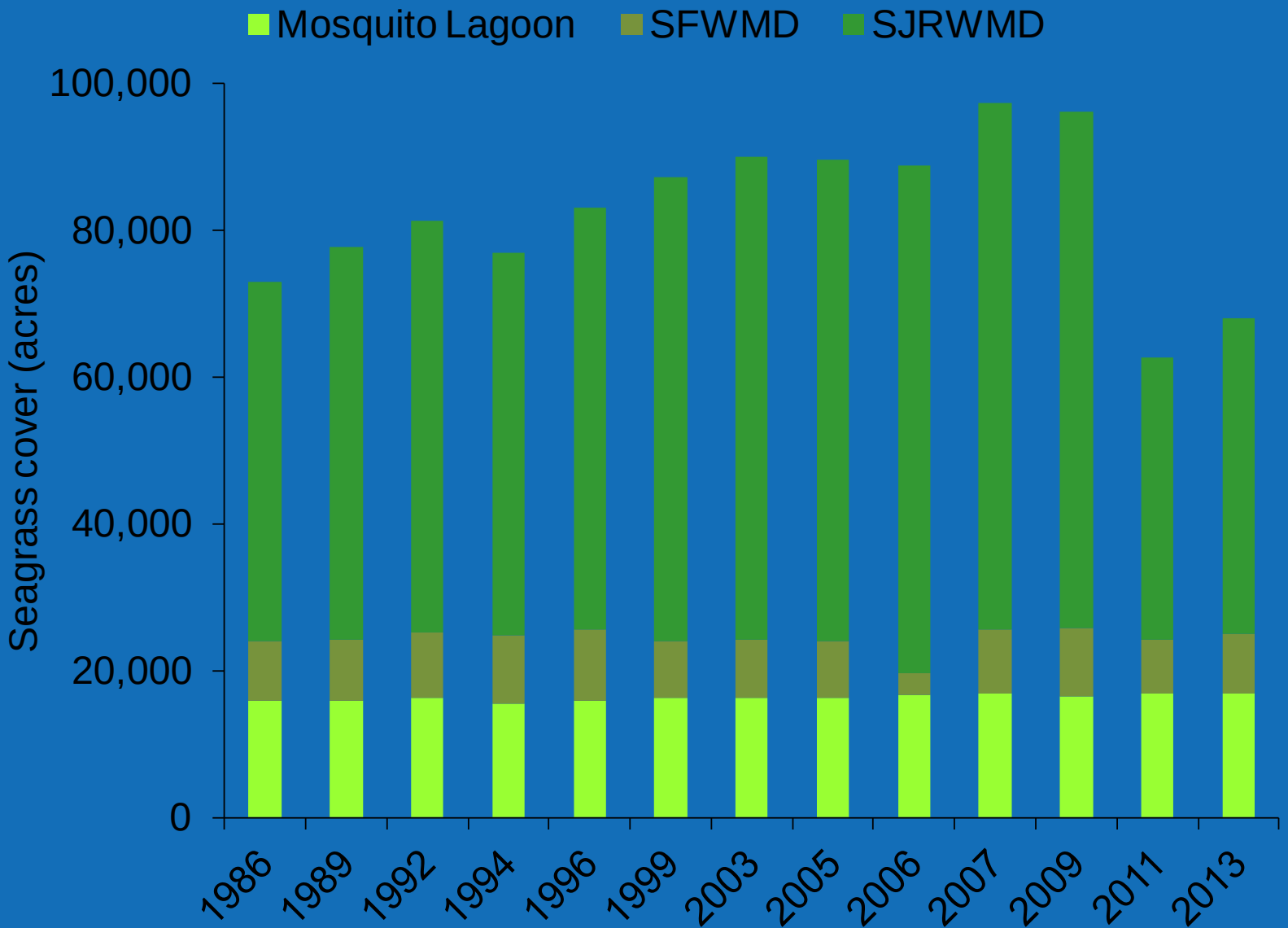
WQ Central IRL (Melbourne)

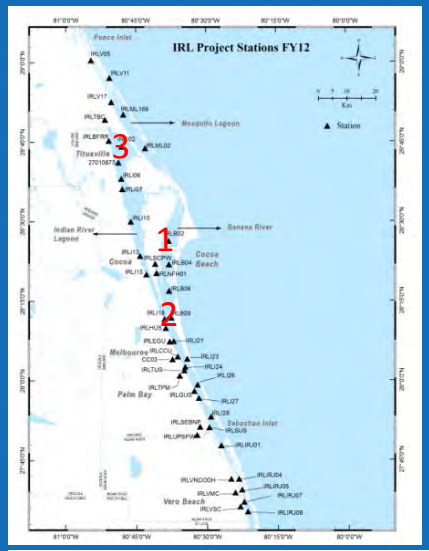




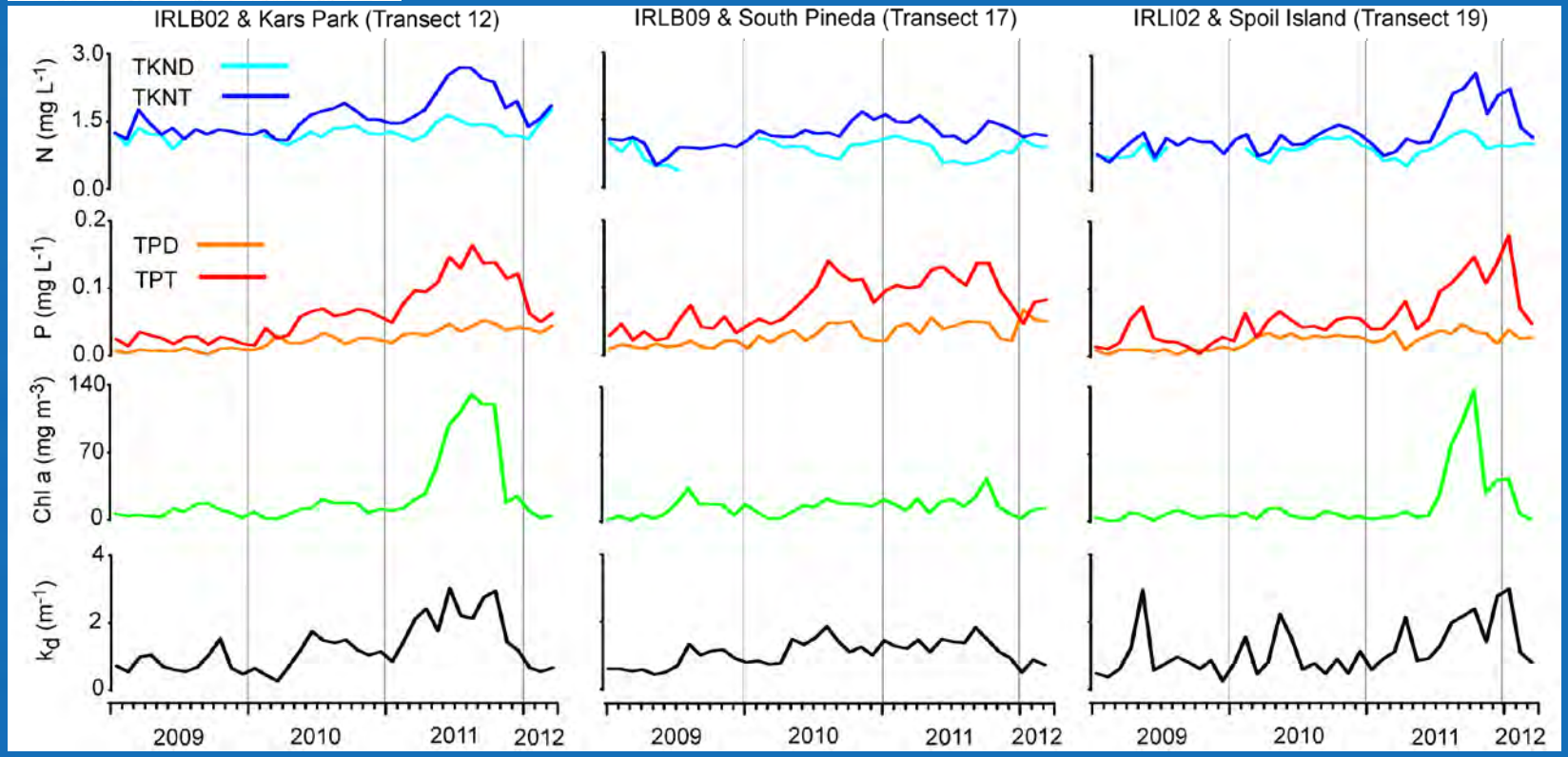


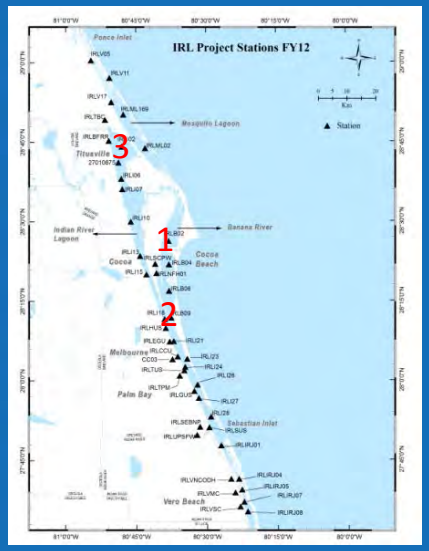
Seagrasses


Mosquito Lagoon
SFWMD
SJRWMD
Seagrass cover (acres)
100,000
80,000
60,000
40,000
20,000
0
1986
1989
1992
1994
1996
1999
2003
2005
2006
2007
2009
2011
2013

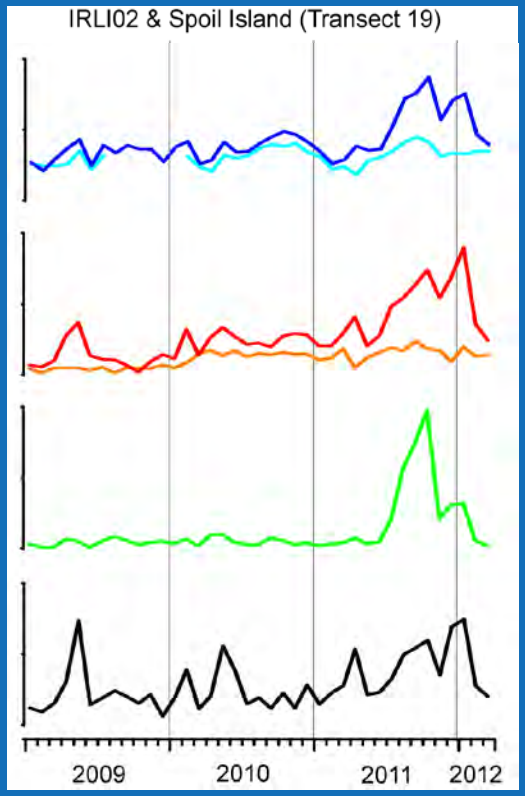


External nutrient loads





External nutrient loads



ACFHP SCIENCE AND DATA COMMITTEE WORKSHOP UPDATE

C. Shumway (Chair)
Marek Topolski (Vice-Chair)

Nov. 5, 2015

ACFHP Science/Data Tasks As We Know It

THE MATRIX

1. Create searchable database of species/habitat and references for matrix

2. Create map of species/habitats

WEB-BASED TOOL

1. Create decision-support tools that incorporate NALCC modeling, matrix, and assessment.
2. Consider adding impervious surfaces to Downstream Strategies decision support tool.

ASSESSMENT

1. Improve assessment of existing information; add regional info

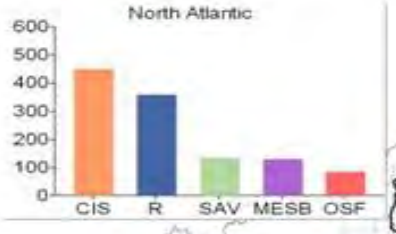
Other

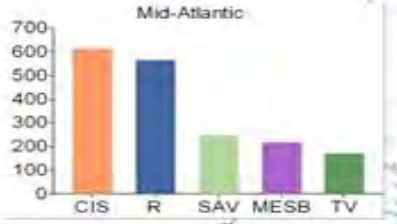
* Improve matrix, incorporating rarity/vulnerability to climate change/(seasonality ?)
  No time to address.

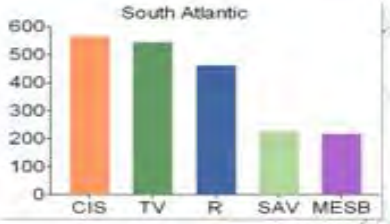
MATRIX HABITAT CATEGORIES & TYPES

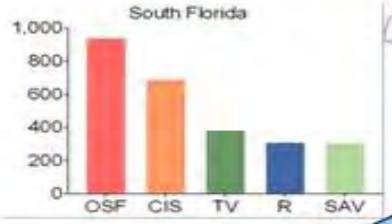
HABITAT CATEGORIES	HABITAT TYPES
Habitat Category	Habitat Type
Marine & Estuarine Shellfish beds	Oyster reef
	Scallop beds
	Hard Clam beds
	Dead shell accumulations
Other Sessile fauna	Primary coral reef architecture
	Patch reef, soft corals or anemones amidst soft sediment
	Live rock (inert hard bottom with hydroids, bryozoans, tube worms, sponges etc)
Macroalgae	Fucus, Laminaria, Ulva lactuca mats
SAV	Tidal fresh & Oligohaline *spp.*
	Mesohaline-Polyhaline *spp.*
Tidal vegetation	Saltwater/Brackish marsh
	Tidal FW marshes
	Mangrove
Coastal Inert substrate	Loose fine bottom (mud, silt, sand)
	Loose coarse bottom (gravel to cobble)
	Firm hard bottom (boulders to embedded rock)
	Structured sand habitat (shoals, capes, offshore bars, etc)
Riverine	High gradient headwater tributaries gravel-cobble dominate
	Lower gradient tributaries- sand, gravel and small cobble dominate
	Higher gradient large mainstem river-sand, gravel, and cobble dominant
	Lower gradient large mainstem river-fine sediments dominate (silt-mud-sand)
	1st order coastal streams
	non-tidal FW mussel beds
	Coastal headwater Ponds
	Non-tidal FW marshes

The Matrix









CIS - Coastal Inert Substrate

MESB - Marine & Estuarine Shellfish Beds

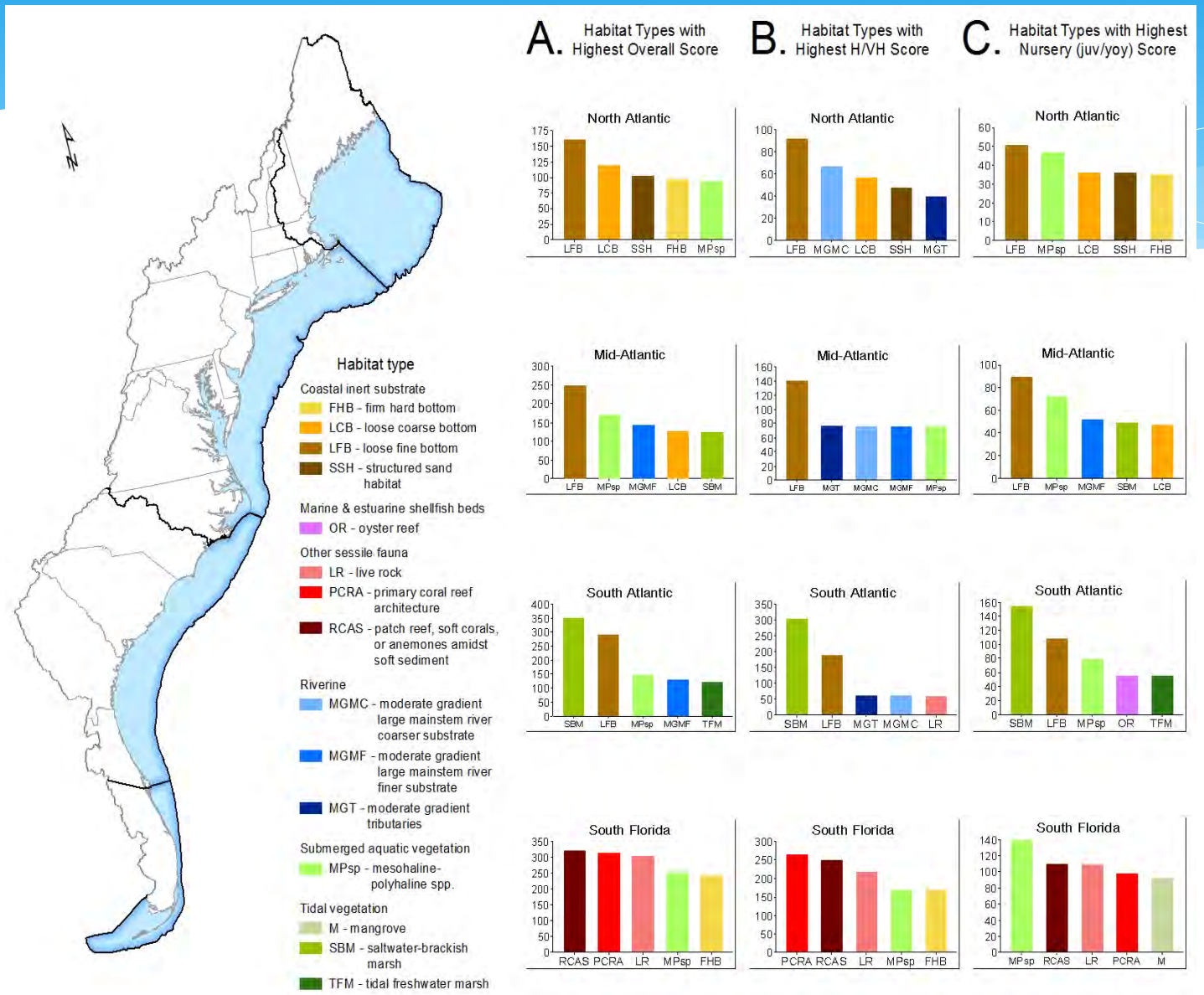
OSF - Other Sessile Fauna

R - Riverine

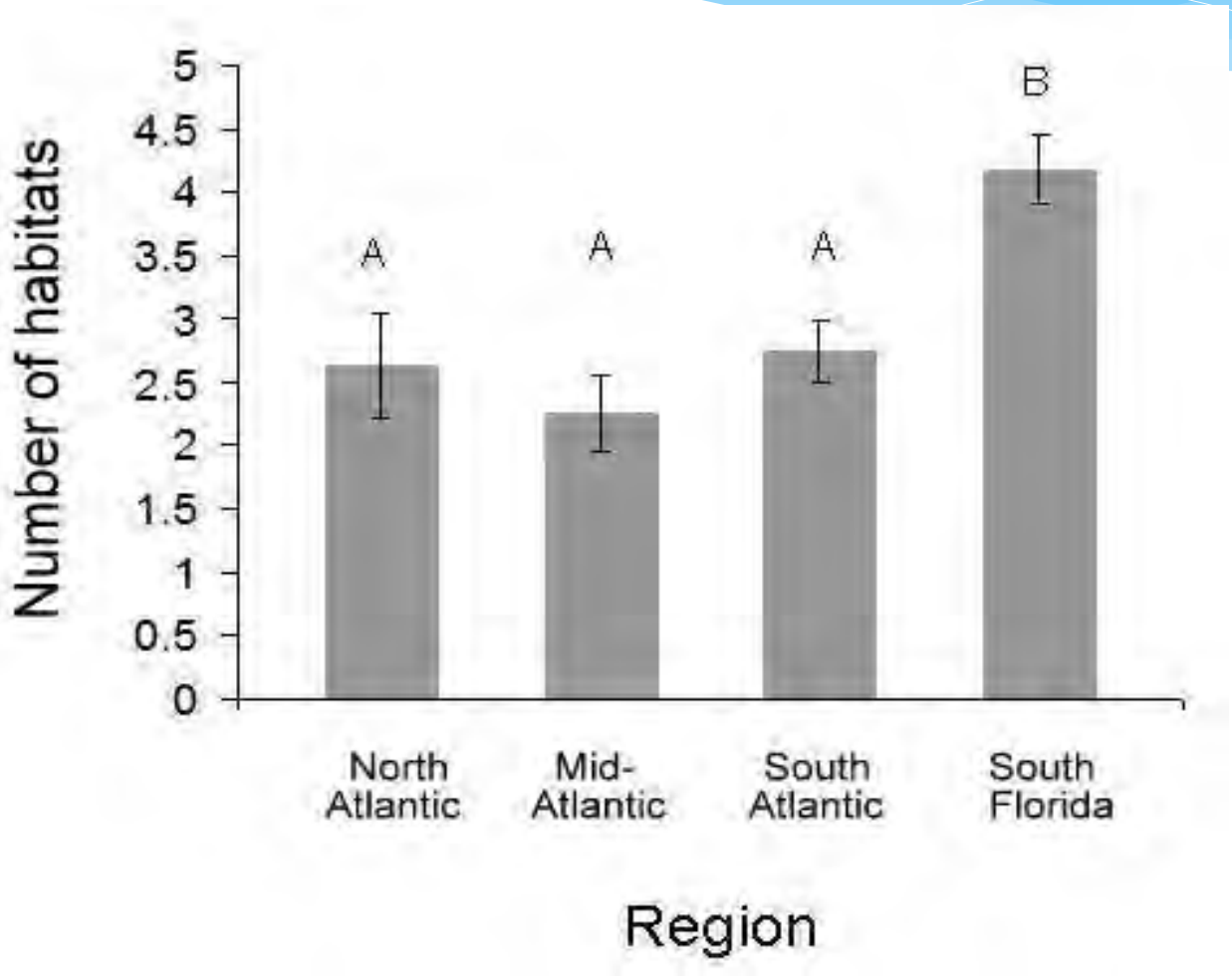
SAV - Submerged Aquatic Vegetation

TV - Tidal Vegetation

The Matrix (Fig.2)



The Matrix (Fig. 3)



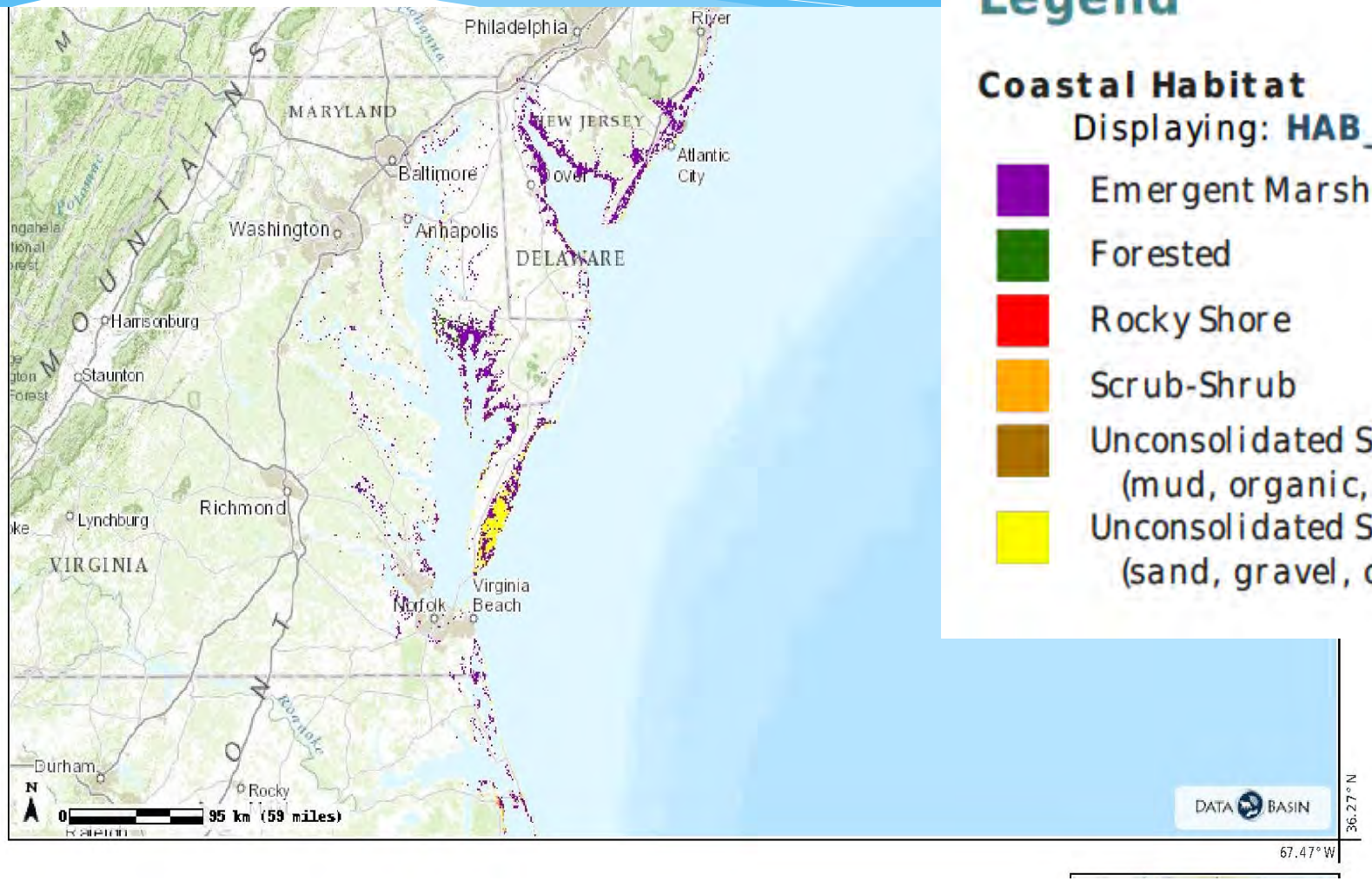
MATRIX HABITATS

HABITAT CATEGORIES	HABITAT TYPES
Habitat Category	Habitat Type
Marine & Estuarine Shellfish beds	Oyster reef
	Scallop beds
	Hard Clam beds
	Dead shell accumulations
Other Sessile fauna	Primary coral reef architecture
	Patch reef, soft corals or anemones amidst soft sediment
	Live rock (inert hard bottom with hydroids, bryozoans, tube worms, sponges etc)
Macroalgae	Fucus, Laminaria, Ulva lactuca mats
SAV	Tidal fresh & Oligohaline spp.
	Mesohaline-Polyhaline spp.
Tidal vegetation	Saltwater/Brackish marsh
	Tidal FW marshes
	Mangrove
Coastal Inert substrate	Loose fine bottom (mud, silt, sand)
	Loose coarse bottom (gravel to cobble)
	Firm hard bottom (boulders to embedded rock)
	Structured sand habitat (shoals, capes, offshore bars, etc)
Riverine	High gradient headwater tributaries gravel-cobble dominate
	Lower gradient tributaries- sand, gravel and small cobble dominate
	Higher gradient large mainstem river- sand, gravel, and cobble dominant
	Lower gradient large mainstem river- fine sediments dominate (silt-mud-sand)
	1st order coastal streams
	non-tidal FW mussel beds
	Coastal headwater Ponds
	Non-tidal FW marshes

SHOULD WE MAP HABITAT CATEGORIES OR TYPES?

DECISION: MAP HABITAT CATEGORIES

Coastal Habitat Types (NALCC)



Example of Web Page for Matrix

Choose Species	Aurora Rockfish	Common Name	Aurora Rockfish	Download Data
		Scientific Name	*Sebastes aurora*	

Species Category

FMP Groundfish *

Picture Credit

NMFS SWFSC Santa Cruz M Yoklavich

Eggs			Larvae			Juveniles			Adults		
	Absolute	Preferred		Absolute	Preferred		Absolute	Preferred		Absolute	Preferred

ACFHP Science/Data Decisions: Day 1

* **Putting the Species Habitat Matrix online**
- On website: drop-downs for geography (i.e., ACFHP region, subregions), habitat, species, life stage + downloadable data (easy to manipulate)
- Will not have comments box (email address for new references and will be reviewed annually)
- Subgroup: Marek, Lisa M. ,Caroly, Julie, Lisa H. (may include some steering committee)
- Timeframe: next 3 months
- Action: Follow-up with George Schuler (TNC) for pricing options.

ACFHP Science/Data Decisions: Day 1

Creating a Map of Matrix Habitat/Species

- We will map habitat categories.
- We will map only those habitat types that are already available.
- We considered use of existing maps for these habitat categories.
- We are considering asking NALCC/SALCC for funds to map riverine habitat types.

ACFHP Science/Data Tasks As We Know It

THE MATRIX

✓ 1. Create searchable database of species/habitat and references for matrix

2. Create map of species/habitats

WEB-BASED TOOL

1. **Create decision-support tools that incorporate NALCC modeling, matrix, and assessment.**

✓ 2. **Consider adding impervious surfaces to Downstream Strategies decision support tool.**

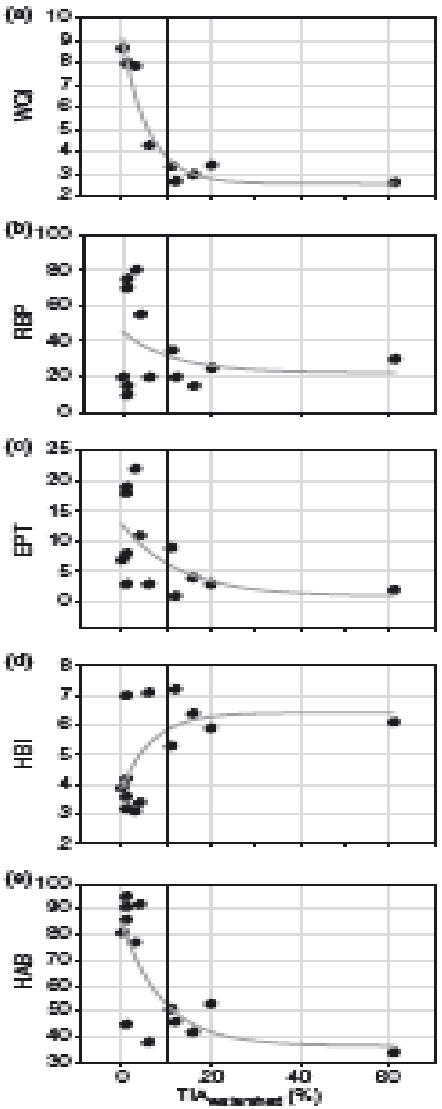
ASSESSMENT

✓ 1. Improve assessment of existing information; add regional info

Other

* Improve matrix, incorporating rarity/vulnerability to climate change/(seasonality ?)
  No time to address.

IMPERVIOUS SURFACE IMPACTS



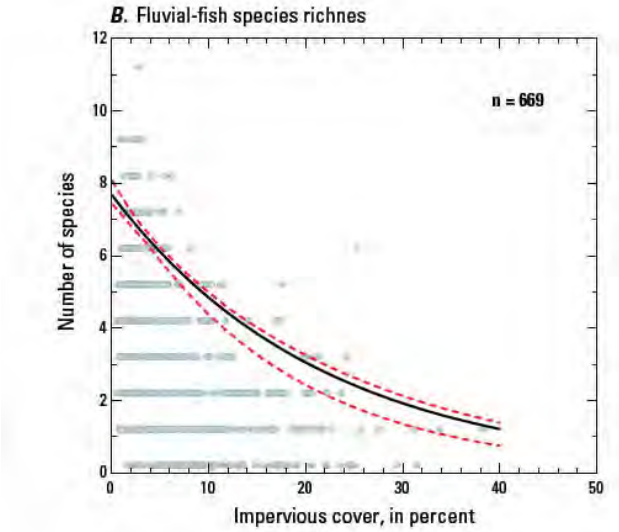


Figure. 2. Quantile regression relations between, fluvial-fish species richness and percent impervious cover for the contributing areas to selected fish-sampling sites on Massachusetts streams. CI, confidence interval; n, number of sites. Fish samples were collected from 1998 to 2008. From Armstrong (2011).

Schiff and Benoit, 2007

ACFHP Science/Data Tasks As We Know It

THE MATRIX

✓ 1. Create searchable database of species/habitat and references for matrix

2. Create map of species/habitats

WEB-BASED TOOL

1. Create decision-support tools that incorporate NALCC modeling, matrix, and assessment.

✓ 2. Consider adding impervious surfaces to Downstream Strategies decision support tool.

ASSESSMENT

✓ **1. Improve assessment of existing information; add regional info**

Other

* Improve matrix, incorporating rarity/vulnerability to climate change/(seasonality ?)
  No time to address.

Assessment of Existing Information on Atlantic Coastal Fish Habitat :

Database: **Bibliographic table, Assessment table (indicators, threats, actions) – both linked to base map. Exported to SQL Server for web development.**

GIS: **Basic ArcGIS project using NOAA's *Coastal Assessment Framework* and *Marine Cadastre* as starting point for spatial organization of information, exported to *ASP.net* and *GoogleEarth* for web development .**

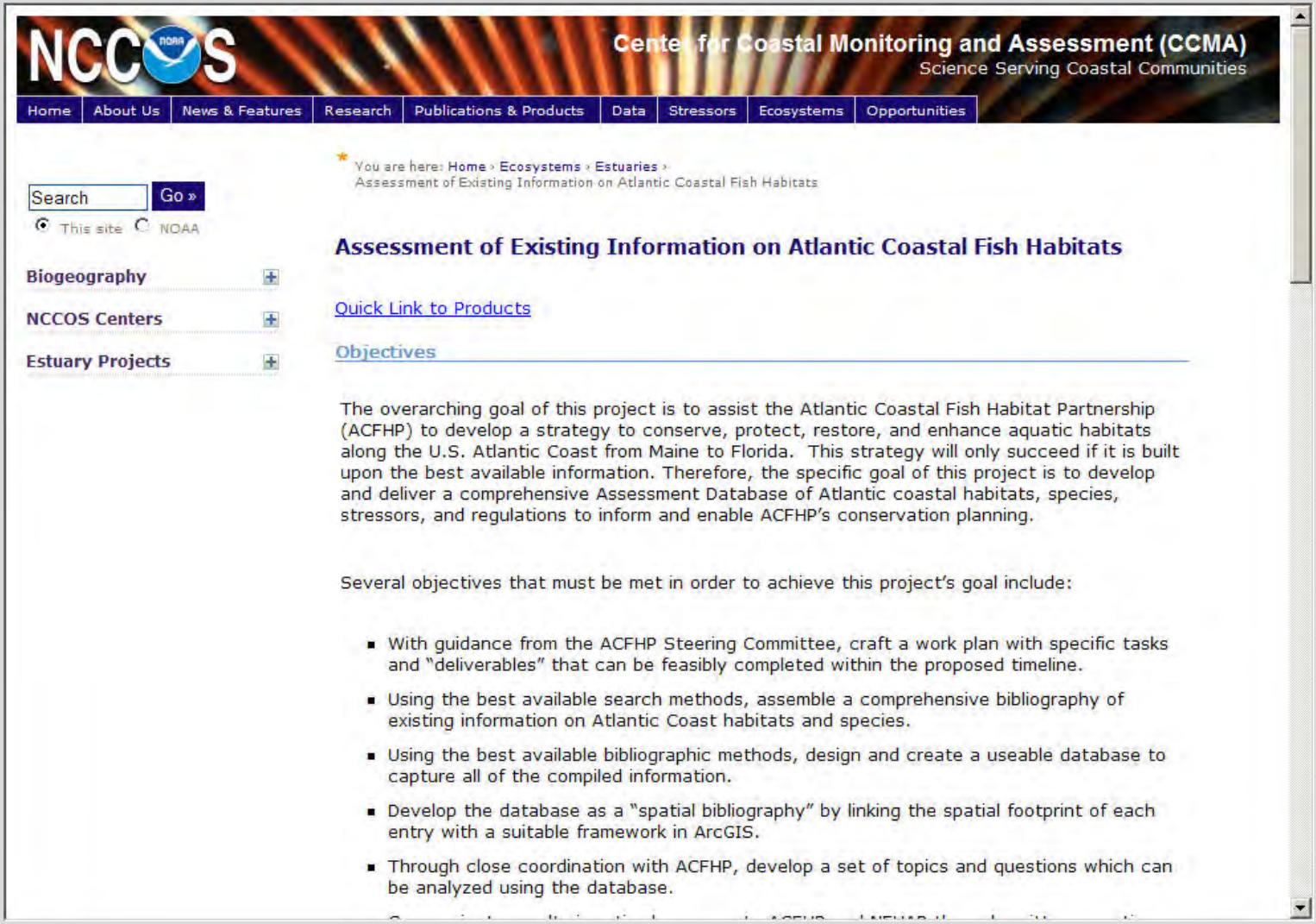
Document: **Project summary report published as NCCOS Tech. Memo. 103 (February 2010), with summaries of methods and results.**

Not a thorough bibliography, habitat assessment, IEA, or IMS!

Moving to the Web

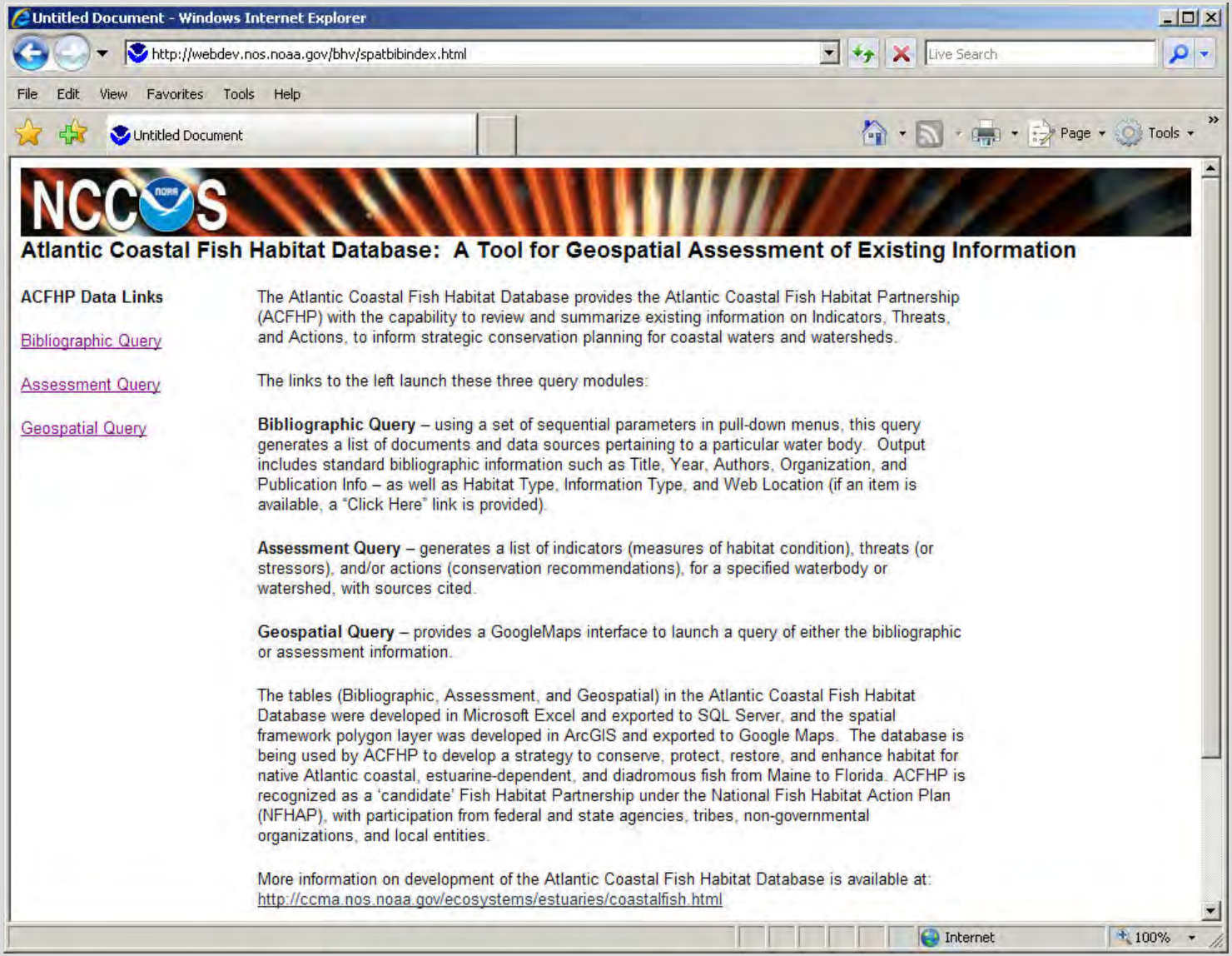
October 2008 –CCMA website hosts project page:

http://ccma.nos.noaa.gov/ecosystems/estuaries/coastalfish.html



Assessment Database on the Web

February 2010 – **http://www8.nos.noaa.gov/bhv/spatbibindex.html**



Bibliographic Data Table

Field Name	Notes
bibID	link to assessment table
Title	
Author(s)	
Year	
Organization	
Type of Document	
Publication Info	
Web Location	"click here" to access website and/or pdf
Filename	not for inclusion on web version
pdf available?	
electronic data available?	
Spatial Data? Rank: (0-1-2; no data-metadata-map)	
ACFHP Region(s)	link to geodatabase
State(s)	link to geodatabase
Waterbody(s)	link to geodatabase and assessment table
Type of Information	
ACFHP Species	link to species info
ACFHP Habitat Types	link to habitat info

500+ references compiled as of April 2009. Initial emphasis on regional synoptic assessments, local assessments and conservation plans.

Web-based application: bibliographic query scenario

http://www8.nos.noaa.gov/bhv/spatbibquery.aspx

Text-box query by region, zone, state, or waterbody –
within "Benthic Habitat Viewer app)

Output: All reference documents pertaining to a certain place

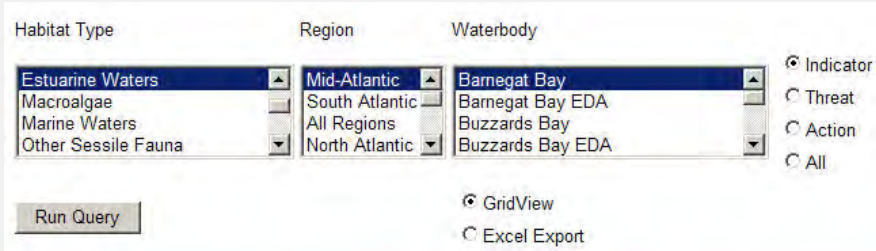
Title	Year	Authors	Organization	Publication Info	Habitat Type	Information Type	Web Location
Bay Barometer - A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008	2009	CBP	Chesapeake Bay Program	CBP/TRS 293-09 EPA-903-R-09-001 March 2009	Estuarine Waters	Habitat Assessment	Click Here
Buzzards Bay NEP GIS Data Exclusives	2009	Buzzards Bay NEP	Buzzards Bay National Estuary Program	Buzzards Bay National Estuary Program	Estuarine Waters	Habitat Data	Click Here
Executive Order - Chesapeake Bay Protection and Restoration	2009	The White House	The White House - Office of the Press Secretary	The White House - Office of the Press Secretary	Estuarine Waters	Conservation Plan	Click Here
Gulf of Maine - Tidal Restrictions Atlas	2009	Gulf of Maine Council on the Marine Environment	Gulf of Maine Council on the Marine Environment	Gulf of Maine Habitat Restoration Web Portal - Tidal Restrictions Atlas	Estuarine Waters	Habitat Data	Click Here
Gulf of Maine Habitat Restoration Web Portal	2009	Gulf of Maine Council on the Marine Environment	Gulf of Maine Council on the Marine Environment	Gulf of Maine Habitat Restoration Web Portal	Estuarine Waters	Habitat Data	Click Here
Gulf of Maine							

Web-based application: summarizing assessment info

http://www8.nos.noaa.gov/bhv/spatbibassessment.aspx

Map or text-box based query for an individual waterbody.

Output: Assessment information (indicators, threats, actions) for the location.



Title	Habitat Type	Waterbody Name	Parameter	Value	Parameter Type
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Overall Eutrophic Condition	high	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Chlorophyll a - Overall Expression	high	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Dissolved Oxygen - Overall Expression	no problem	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Secchi Depth - Overall Expression	unknown	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Macroalgae - Overall Expression	high	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Algal Blooms - Overall Expression	high	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Eutrophication - Impact to SAV	moderate	indicator
Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change	Estuarine Waters	Barnegat Bay	Eutrophication - Impact to Living Resources	considerably	indicator
National Estuary Program - Coastal Condition Report	Estuarine Waters	Barnegat Bay	Water Quality Index	4 = Good/Fair	indicator
National Estuary Program - Coastal Condition Report	Estuarine Waters	Barnegat Bay	Sediment Quality Index	4 = Good/Fair	indicator
National Estuary Program - Coastal Condition Report	Estuarine Waters	Barnegat Bay	Benthic Index	3 = Fair	indicator
National Estuary Program - Coastal Condition Report	Estuarine Waters	Barnegat Bay	Fish Tissue Contaminants Index	3 = Fair	indicator

Capturing Assessment Information

Subset of assessment information (indicator, threat, action) as reported for one waterbody (Delaware Bay) from several sources. Information is linked to the bibliographic table via Reference Number, and to the base map via Waterbody Number. Reference documents: Bricker et al. 2007, EPA 2006, Kimbrough et al. 2008

Waterbody Name	Reference Number	Waterbody Number	Indicator/Threat/Action	Parameter	Value
Delaware Bay	152	26	indicator	Water Quality Index	1 = Poor
Delaware Bay	143	26	indicator	Overall Eutrophic Condition	moderate
Delaware Bay	143	26	indicator	Chlorophyll a - Overall Expression	high
Delaware Bay	143	26	indicator	Dissolved Oxygen - Overall Expression	low
Delaware Bay	143	26	indicator	Secchi Depth - Overall Expression	high
Delaware Bay	143	26	indicator	Macroalgae - Overall Expression	no problem
Delaware Bay	143	26	indicator	Algal Blooms - Overall Expression	no problem
Delaware Bay	143	26	indicator	Eutrophication - Impact to SAV	no problem
Delaware Bay	143	26	indicator	Eutrophication - Impact to Living Resources	no impact
Delaware Bay	152	26	indicator	Sediment Quality Index	4 = Good/Fair
Delaware Bay	152	26	indicator	Benthic Index	1 = Poor
Delaware Bay	152	26	indicator	Fish Tissue Contaminants Index	1 = Poor
Delaware Bay	152	26	indicator	Dissolved Inorganic Nitrogen (DIN)	Poor
Delaware Bay	152	26	indicator	Dissolved Inorganic Phosphorus (DIP)	Fair
Delaware Bay	152	26	indicator	Chlorophyll a	Fair
Delaware Bay	152	26	indicator	Water Clarity	Fair
Delaware Bay	152	26	indicator	Dissolved Oxygen	Good
Delaware Bay	152	26	indicator	Sediment Toxicity	Poor
Delaware Bay	152	26	indicator	Sediment Contamination	Good
Delaware Bay	152	26	indicator	Sediment Total Organic Carbon (TOC)	Good
Delaware Bay	152	26	indicator	Overall Condition	1.75 = Poor/Fair
Delaware Bay	157	26	indicator	Contaminants - Metals Status in Oysters	Medium
Delaware Bay	157	26	indicator	Contaminants - Metals Trends in Oysters	Stable
Delaware Bay	157	26	indicator	Contaminants - Organics Status in Oysters	Low
Delaware Bay	157	26	indicator	Contaminants - Organics Trends in Oysters	Stable

ACFHP Science/Data Decisions: Day 1

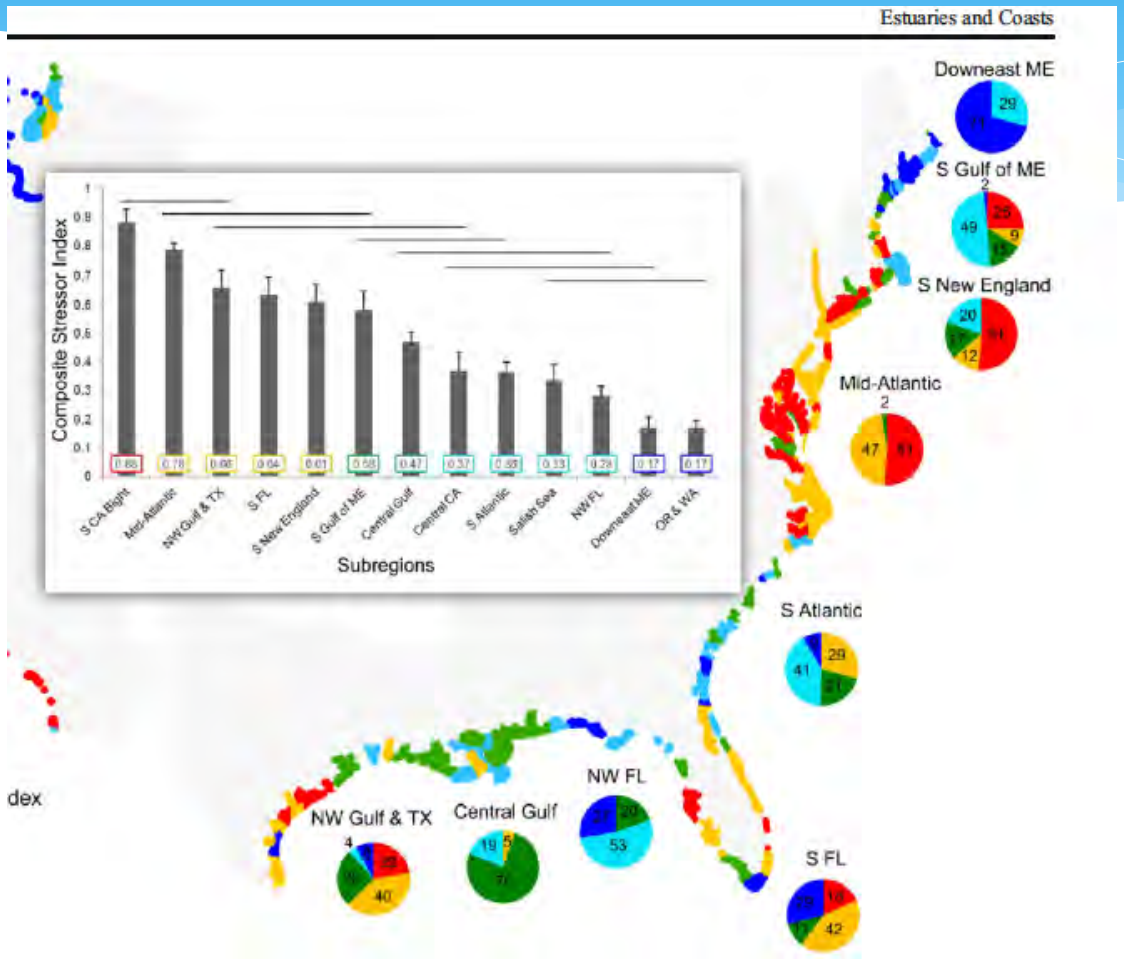
* **Updating the Assessment of Existing Information**
- We will separate the South Atlantic and South Florida data.
- We will ask the Steering Committee if they need an update for the next Conservation Strategic Plan (2017-2021).
- Add current climate change information, marine spatial planning data portals and landscape conservation tool references as necessary.
- We will remove the bibliographic links (users can google the title, year, and agency to find the documents.
- We are considering removing the spatial tool, as doesn't work consistently.
- Subgroup: Moe will work with Mike Johnson and Jon Hare (Caroly and Lisa H. will assist as needed).

Overview of Habitat Needs: What do We Want?

NOTES ON ACFHP HABITAT PRIORITY ASSESSMENT

ACFHP's SPECIES OF CONCERN	THREATS	INDICATORS	PRESENCE/ ABSENCE DATA	HABITAT MAPS/ HABITAT PRIORITIES
	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE
1. Diadromous Fish	TNC NE/SE Connectivity (dams only)	NALCC Dec Support Tool (based on TNC work)	NALCC Dec Support Tool (based on TNC work)	NALCC Dec Support Tool (based on TNC work)
2. Estuarine Fish	NFHAP Greene et al. '14	NFHAP Greene et al. '14		Could be reflective of threat map?
3. Coastal Component for Marine Fish Spp.	EPA: CCAP?			NOAA: ESI
	OTHER POSSIBILITIES	OTHER POSSIBILITIES	OTHER POSSIBILITIES	OTHER POSSIBILITIES
	USGS Coastal Vulnerability Index NOAA Eutrophication NOAA CCAP EPA Coastal Condition Report NROC/MARCO		AquaMaps (FishBase) TNC NAM-ERA OBIS Seagrass.net NROC/MARCO	NALCC TNC NAM-ERA Seagrass.net NROC/MARCO EPA ESI maps

NFHAP Estuarine Stressors Map



Greene et al. '14

Indicators

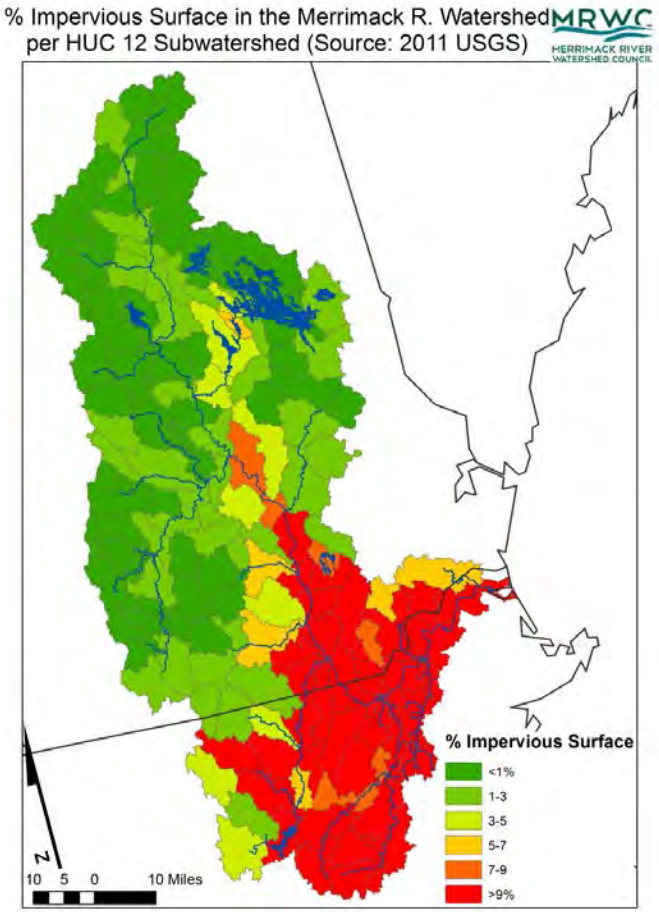
Mapping the Indicator Information in ArcGIS:

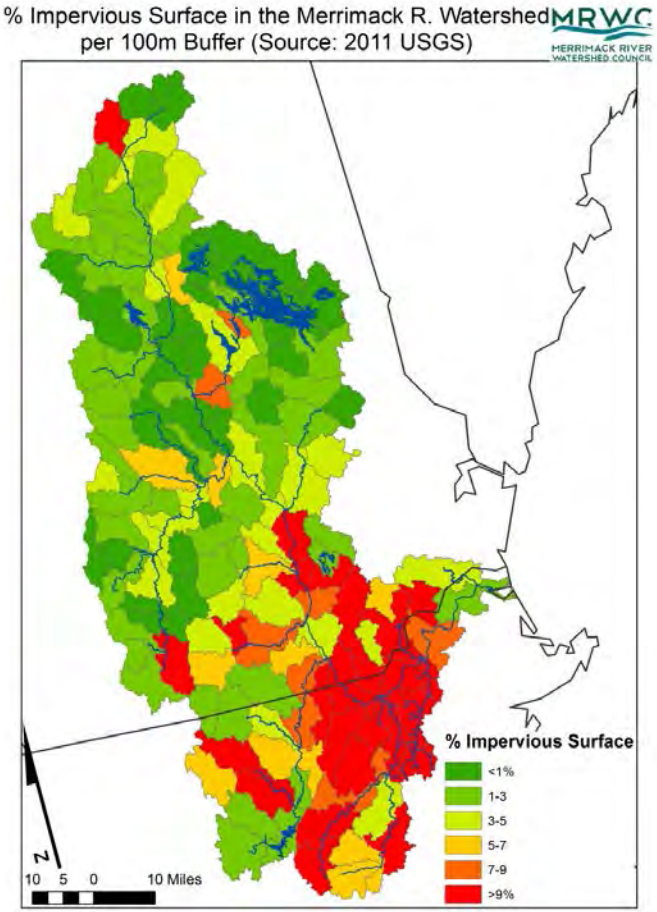
Overall Eutrophic Condition for 64 U.S. Atlantic coastal estuaries (Bricker et al. 2007)

Parameters available:

Overall Eutrophic Condition
Chlorophyll a - Overall Expression
Algal Blooms - Overall Expression
Dissolved Oxygen - Overall Expression
Eutrophication - Impact to Living Resources
Eutrophication - Impact to SAV
Macroalgae - Overall Expression
Secchi Depth - Overall Expression

Example of Co-Occurrence Scoring: MRWC: Imp. Surface %s in the Watershed and 100m Buffer





Current Scoring

#	Name	State	Protection or Restoration (R)?	ImpSurf(b)	ImpSurf(f)	303(d)	Phosphorus	Nitrogen	Pop Δ Projected 2015-2025	R&E Sp.	ORW (MA); Designated Rivers (NH)	Cold Water Fishes (Brook Trout)	Important Forest Blocks	Forest Importance to Surface Drinking Water	Development Threat to Forests Important to Surface Drinking Water	TNC Freshwater Resilience	SPNHF Tier 1	Score
119	South Branch Piscataquog R	NH		3.4	1	10	0	10	10	10	10	6	5	7.5	7.5	10	5	91.0
88	Merrimack River Drainage	NH		3.2	8.1	10	10	10	0	10	7.5	3	0	2.5	0	10	5	68.0
22	Powwow River	NH/MA		4	6.1	15	0	10	0	10	10	3	0	2.5	0	0	10	60.5
68	Hancock Brook	NH		4.1	1	0	10	10	10	0	0	6	10	0	0	10	-	56.0
111	Sand Brook	NH		3.6	2.2	0	0	10	10	0	7.5	3	5	5	5	10	0	55.5
82	Lower Piscataquog River	NH	R	6.1	6.6	10	0	10	5	0	5	3	0	5	0	10	5	53.0
103	Plymouth/Ashland Tribs	NH		3.1	2.8	10	0	0	5	0	7.5	6	5	7.5	0	10	-	51.0
28	Squannacook River	MA		3.4	3.6	10	0	10	0	0	10	6	0	2.5	0	10	0	48.5
83	Lower Suncook River	NH		3.4	2	0	0	10	0	10	0	3	0	2.5	0	10	10	45.5
78	Little Suncook River	NH		3.7	1.4	10	0	10	0	0	0	3	0	7.5	0	10	5	45.5
56	Contoocook River Mouth	NH	R	5.7	3	0	0	10	0	0	7.5	3	0	5	0	10	10	45.5
70	Hop Dam to Blackwater R	NH		4	3	0	0	10	0	0	7.5	3	5	5	0	10	5	45.5
84	Lower Warner River	NH	R	6.2	1.5	10	0	0	0	0	0	3	5	7.5	0	10	10	45.5
41	Arlington Mill Reservoir	NH		6.7	6.1	10	0	10	0	10	0	0	0	2.5	0	0	10	42.5
40	Andrew Brook	NH		3.6	0.6	0	0	0	5	0	0	6	0	10	10	10	-	41.0
128	Temple Brook	NH	R	5.1	1.6	10	0	0	0	0	7.5	3	0	7.5	7.5	0	5	40.5
72	Hopkinton Lake	NH		4.2	2	10	0	0	0	0	7.5	3	0	5	0	10	5	40.5
1	Assabet-Eliz Br to m	MA	R	7.3	8.4	10	10	10	5	0	0	3	0	0	0	0	0	38.0
35	Whitman River	MA	R	6.5	4.7	10	10	10	0	0	0	3	0	2.5	0	0	0	35.5
16	Nashua-Cata to Squanna	MA	R	5.5	9.2	10	10	10	0	0	0	3	0	0	0	0	0	33.0
66	Great Brook-Antrim Tribs	NH		3.2	1.4	0	0	0	0	0	7.5	3	5	7.5	10	0	0	33.0
125	Stony Brook - NH	NH		4.4	0.8	0	0	0	0	0	0	3	5	7.5	10	0	5	30.5
143	Winnisquam Lake	NH		3.1	3.5	10	0	10	5	0	0	3	0	2.5	0	0	-	30.5
42	Baboosic Brook	NH		3.6	4.6	10	0	0	5	10	0	3	0	2.5	0	0	0	30.5
65	Glover Brook	NH		4.4	1.7	0	0	0	5	0	0	9	5	0	0	10	-	29.0
6	Golden Brook	NH		5	8.9	0	0	10	0	10	0	0	0	2.5	0	0	5	27.5
48	Black Brook	NH		3.2	2.2	0	0	0	5	0	0	3	0	7.5	0	0	10	25.5
122	Squam River	NH	R	5.4	1.2	0	0	0	0	0	0	3	0	7.5	5	10	-	25.5
141	Wentworth-Warren Tribs	NH		4.1	0.5	0	0	0	0	0	0	6	0	0	0	10	-	16.0
85	Mad River	NH		3.4	0.7	0	0	0	0	0	0	6	5	0	0	0	-	11.0

Threats

Top three classified threats by zone and region, based on instances within Assessment Table (n=1260)

Region / Zone	Watersheds	Estuaries	Marine (S+F)
North Atlantic	**Dams and Passage (37)** Water Quality (28) Water Withdrawals (14)	**Water Quality (55)** Contaminants (23) Dredging Issues (16)	**Dredging Issues (13)** Climate Change (11) Fishing Gear (8)
Mid-Atlantic	**Dams and Passage (32)** Impervious Surfaces (25) Water Quality (16)	**Water Quality (70)** Contaminants (28) Invasive Species (19)	**Climate Change (23)** Fishing Gear (11) Dredging Issues (9)
South Atlantic + South Florida	**Dams and Passage (31)** Impervious Surfaces (17) Water Quality (7)	**Water Quality (40)** Fishing Gear (31) Dredging Issues (26)	**Climate Change (18)** Fishing Gear (12) Dredging Issues (4) Boating Issues (4)

Threats and Actions

Top three classified threats and actions combined, based on a tally of instances wi

Region / Zone	Watersheds	Estuaries	Marine (State+Federal)
North Atlantic	***Threats:*** **Dams and Passage (37)** Water Quality (28) Water Withdrawals (14) ***Actions:*** **Improve Fish Passage (38)** Watersheds - Conserve and Restore (24) Riparian Buffers - Conserve and Restore (21)	***Threats:*** **Water Quality (55)** Contaminants (23) Dredging Issues (16) ***Actions:*** **Wetlands - Protect and Restore (38)** Area Designation (27) Monitoring and Assessment (25)	***Threats:*** **Dredging Issues (13)** Climate Change (11) Fishing Gear (8) ***Actions:*** **Area Designation (15)** Wetlands - Protect and Restore (7) Monitoring and Assessment (7)
Mid-Atlantic	***Threats:*** **Dams and Passage (32)** Impervious Surfaces (25) Water Quality (16) ***Actions:*** **Riparian Buffers - Conserve and Restore (55)** Water Quality - Protect and Restore (45) Improve Fish Passage (30)	***Threats:*** **Water Quality (70)** Contaminants (28) Invasive Species (19) ***Actions:*** **Control Invasive Species (61)** Water Quality - Protect and Restore (60) SAV - Protect and Restore (59)	***Threats:*** **Climate Change (23)** Fishing Gear (11) Dredging Issues (9) ***Actions:*** **Area Designation (33)** Monitoring and Assessment (28) Fishery Regulation (12)
South Atlantic + South Florida	***Threats:*** **Dams and Passage (31)** Impervious Surfaces (17) Water Quality (7) ***Actions:*** **Improve Fish Passage (29)** Area Designation (28) Conserve Species (13)	***Threats:*** **Water Quality (40)** Fishing Gear (31) Dredging Issues (26) ***Actions:*** **Area Designation (55)** Fishery Regulation (33) Dredging Regulation (15)	***Threats:*** **Climate Change (18)** Fishing Gear (12) Dredging Issues (4), Boating Issues (4) ***Actions:*** **Area Designation (59)** Fishery Regulation (12) Monitoring and Assessment (7)

Threats

Dams and Passage

Water Quality/Quantity (imp surfaces, withdrawal (303d)

Dredging

Climate Change

Contaminants (EPA CCR, Mussel Watch, Superfund sites)

Fishing Gear on bottom habitat (derelict, active) Moe

Invasive Species

Actions

- **Improve fish passage**
- **Protect and Restore Wetlands**
- **Protect and Restore Riparian Buffers**
- Protect and Restore SAV (TNC SAV maps and prioritization, Ches. Bay, Ind. R. lagoon, TNC LIS?, check with Lisa)
- Restore bottom habitat rivers (Ask NALCC/SALCC funds, are maps of James River (VIMS/USGS, Ches. Bay)
- Restore hydrological function (water quality/quantity, e.g., watershed lands/improve land use practices, etc.)
- Protect and restore shellfish beds
- Protect and restore hard bottom habitats
- Incorporate Climate Change Resilience considerations NOW

NEXT STEPS

ADD MATRIX DATA TO WEBSITE : 3 mos: Sept-Dec. 2015

UPDATE ASSESSMENT OF EXISTING INFORMATION: Moe: Sept – Dec. 2015

ADD MATRIX MAPS

HABITAT PRIORITIZATION

* Compile the maps: Caroly/Moe/Lisa
* ID subgroups for separate priorities
* Subgroups develop priority scoring method or agree to use existing prioritizations
* Price the cost of adding mapping of riverine habitat types to TNC's existing stream classification (or other) **by end of January**.
* Reconvene 2-day workshop **February 2016**
* Consider the use of focal species (migratory we have; coastal consider/review TNC priorities, estuarine focal – we need ACFHP subgroup. Check out NOAA's Gulf of Mexico modeling coastal/estuarine modeling.
* Review at in-person **Spring 2016** Meeting ACHFP Science and Data Committee
* Vet priorities through ACFHP Steering Committee
* Desired output:
  * Priority maps wetland habitats, SAV habitats, etc.

RECOMMENDATIONS

* Sci and Data Committee recommends funding for ACFHP GIS person and analysis (person or time)

* Revisit discrepancy between matrix priority habitats and ACFHP priorities during next Conservation Strategic Plan review.

North Atlantic
Estuarine

Threats: **Water Quality**
Contaminants
Dredging Issues

Actions: **Wetlands – Protect and Restore**[Look at how joint ventures are prioritizing wetlands, Chesapeake Habitat map, consider regional map(s) of stressors (NFHP, break into stressors)), EPA Coastal Condition report, TNC's Coastal Data and prioritization]

North Atlantic
Riverine

Threats: **Dams and Passage**
Water Quality/Water Withdrawal **should change to water hydrology/flashiness

Actions**: Improve Fish Passage** [TNC connectivity maps (NEACC, NAACC)]. Consider Dauwalter (TU).
Watersheds
Riparian Buffers

North Atlantic Coastal

Threats: **Dredging Issues (? Do we want to revisit this threat?) Marine cadastre ocean disposal sites, sand mining (ACOE?)**

Climate Change

Fishing Gear

Actions: **Area Designation (e.g., EFH, HAPC, NERRs, MPAs, state protected areas) – ignore, not approp for ACFHP**

Wetlands – Protect and Restore

Mid Atlantic Riverine

Threats: **Dams and Passage (see N Atl)**

Impervious Surface

Water Quality

Actions: **Riparian Buffers (Conserve & Restore):** Impervious surface data by watershed and river buffer, Appalachian LCC riparian tool for local prioritization)

Water Quality (Protect & Restore)

Improve Fish Passage [TNC connectivity maps (NEACC, NAACC, CCAP)]

Mid-Atlantic
Estuarine

Threats: **Water Quality**
Contaminants
Invasive Species

Actions: **Control Invasive Species** [Lisa M. will check, distribution of phragmites maps available, which invasive species do we pay attention to?]
Water Quality
SAV

Mid-Atlantic Coastal

Threats: **Climate Change (incl. acidification).**
NOAA (Moe et al.), SERC, Caroly will check maps ?
Fishing Gear
Dredging Issues

Actions: **Area Designation (ignore)**
Monitoring and Assessment
Fishery Regulation

South Atlantic/South Florida Riverine

Threats: **Dams and Passage**

Impervious Surfaces

SFLA: **Water Quality**

Actions: **Improve Fish Passage**

Area Designation

Conserve Species

*Water quality and quantity (altered hydrology) most important for SoFla, not fish passage

South Atlantic/South Florida Estuarine

Threats: **Water Quality**
Fishing Gear
Dredging Issues

Actions: Area Designation
Fishery Regulation
Dredging Regulation

*New action for SoFla to address water quality: TMDLs in bays to help improve H2O quality, CERP (comprehensive everglades restoration plan), our Florida reefs program summarized threats from Martin County to Dade

South Atlantic/South
Florida
Coastal

Threats: **Climate Change**
Fishing Gear
Dredging Issues, Boating Issues

Actions: **Area Designation**
Fishery Regulation
Monitoring and Assessment

ACFHP

Conservation Strategic Plan
November 5, 2015

The Nature Conservancy

PURPOSE

- Broad coast-wide strategy for determining and addressing the threats affecting habitats important for all life stages of Atlantic coast diadromous, estuarine-dependent, and coastal species.
- Designed to address **actions that the Partnership can take to improve the condition of Atlantic coast fish habitats** over the next five years…

ACFHP
CONSERVATION STRATEGIC PLAN

MISSION

To accelerate the conservation, protection, restoration, and enhancement of habitat for native Atlantic coastal, estuarine dependent, and diadromous fishes through partnerships between federal, tribal, state, local, and other entities.

VISION

Healthy, thriving habitats of sufficient quantity and quality to support all life stages of Atlantic coastal, estuarine-dependent, and diadromous fishes

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Geographic Profile

Partnership Boundary

Geographic Range
Maine to the Florida Keys

Inland Extent
Headwaters of coastal rivers

Marine Extent
Offshore to the edge of the continental shelf

Subregion Boundaries

ACFHP utilizes subregional boundaries for the purposes of habitat prioritization. Subregions represent ecologically distinct units and were derived from Marine Ecoregions of the World (as established by the World Wildlife Fund and The Nature Conservancy). These include the Gulf of Maine, Virginian, Carolinian, and Floridian ecoregions which correspond to ACFHP subregions North Atlantic, Mid-Atlantic, South Atlantic, and South Florida, respectively. While these subregions are unique to ACFHP, the Partnership will work collaboratively with the appropriate partners to ensure optimal success.

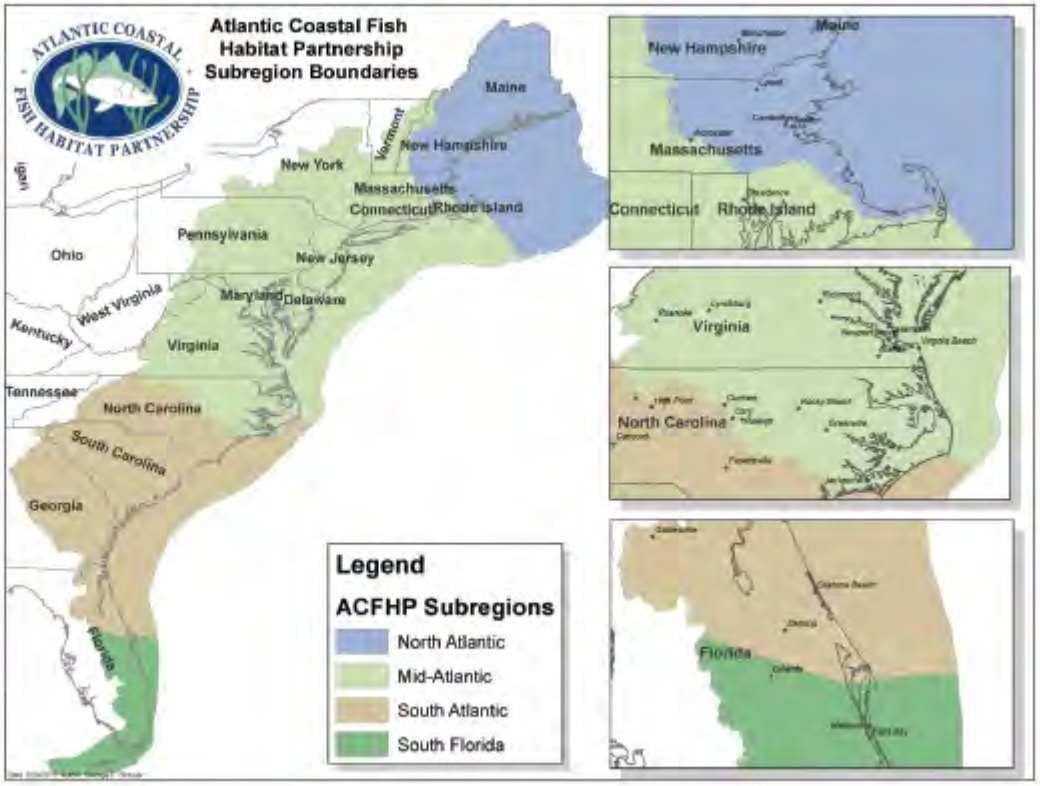

Figure 1. Atlantic Coastal Fish Habitat Partnership and Subregion Boundaries

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PRIORITY HABITATS

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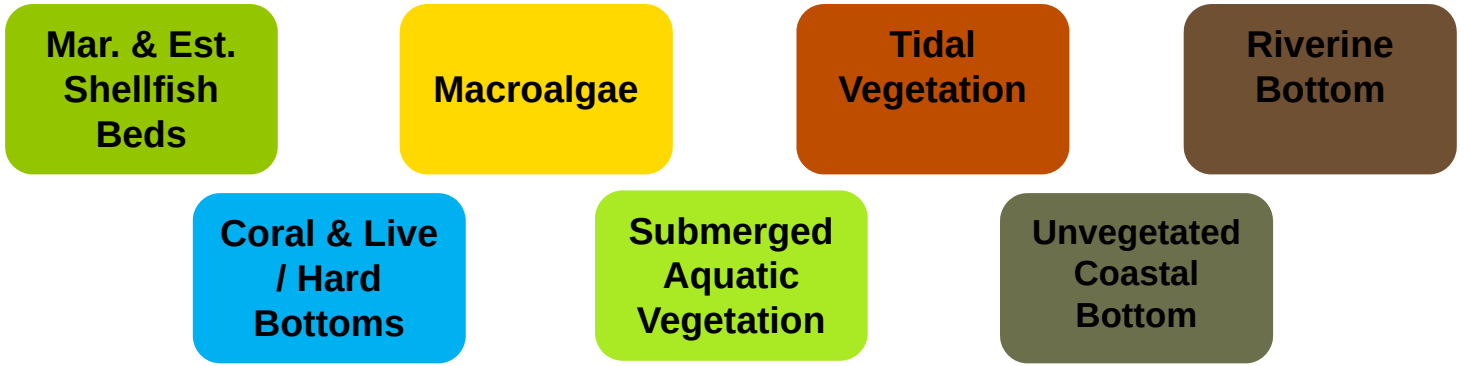
PRIORITY HABITATS



- 7 broad habitat categories
- 25 specific habitat types
- Reflects early drafts of the Species-Habitat Matrix

PRIORITY HABITATS BY SUBREGION*

North Atlantic
- Riverine Bottom
- SAV
- Marine & Est. Shellfish Beds

South Atlantic
- Marine & Est. Shellfish Beds
- Riverine Bottom
- Tidal Vegetation

Mid-Atlantic
- Riverine Bottom
- SAV
- Tidal Vegetation

South Florida
- Coral & Live/Hard Bottom
- SAV
- Mangrove

*Informed by the ***Species-Habitat Matrix***

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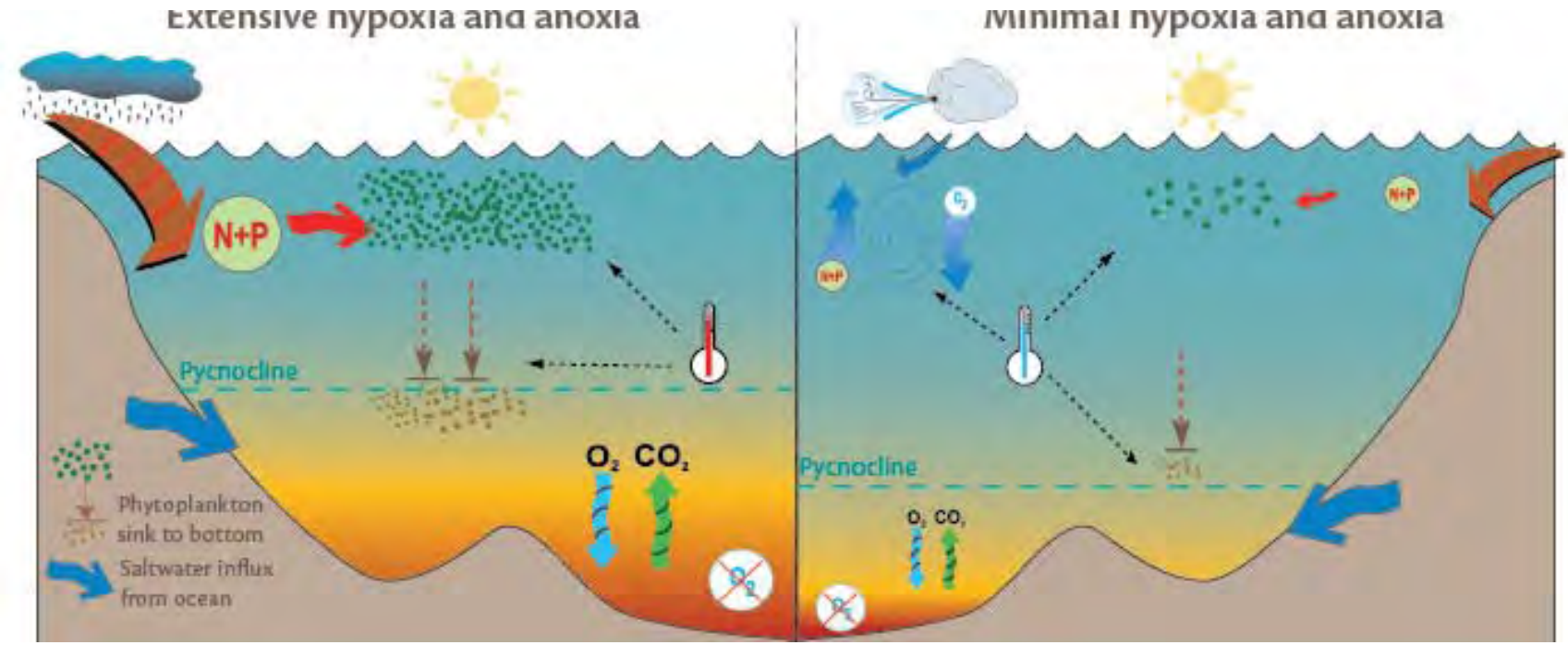
PRIORITY THREATS



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PRIORITY THREATS*

- Obstructions to Fish Movement
- Dredging and Coastal Maintenance
- Water Quality Degradation and Eutrophication
- Consumptive Water Withdrawal
- Sedimentation
- Vessel Operation Impacts
- Contamination of Water (ground and surface) and Sediment
- Invasive Species
- Climate Change
- ***Other Threats***

Verified by the results of the **Assessment of Existing Habitat Information*

PRIORITY THREATS

Assessment Classified Threat	# of Instances	ACFHP Priority Threat
Water Quality	225	Water Quality Degradation and Eutrophication; Climate Change; Consumptive Water Withdrawal
Dams & Passage	106	Obstructions to Fish Movement/Habitat Connectivity
Climate Change	97	Climate Change
Dredging Issues	89	Dredging and Coastal Maintenance
Contaminants	84	Contamination of Water (ground and surface) and Sediments
Impervious Surfaces	64	Sedimentation

GOALS & OBJECTIVES

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GOALS*

- **Protect and maintain intact and healthy aquatic systems** for native Atlantic coastal, estuarine-dependent, and diadromous fishes.
- **Prevent further degradation of fish habitats** that have been adversely affected
- **Restore the quality and quantity of aquatic habitats** to improve the overall health of fish and other aquatic organisms (especially those habitats that play an important role in critical life history stages of fish species, e.g. nursery and spawning areas).
- Restore aquatic habitats to **aid in recovery of threatened or endangered species** (state and federal).
- **Enhance the quality and quantity of aquatic habitats** that support a broad natural diversity of fish and other aquatic species.

Modeled after **NFHAP goals*

OBJECTIVES

- Considered the human drivers (indirect and direct) and the key opportunities to address Priority Threats.
- Assessed the constraints it must work within as well as its operational needs
- An overarching objective of protecting and restoring aquatic habitat, on a coast-wide scale.

OBJECTIVES

Protection objectives are proactive … highlight the need to address priority threats that are adversely impacting aquatic habitats along the Atlantic coast *before the habitats are in need of restoration*.

Restoration objectives highlight the need to restore aquatic habitats along the Atlantic coast that have *already been impacted by various human activities*.

PROTECTION OBJECTIVE 4

- Minimize or reduce adverse impacts to Subregional Priority Habitats associated with coastal development and water dependent activities (e.g. recreational boating, and marine transportation).

THREATS
1. Vessel Operation Impacts;
2. Dredging and Coastal Maintenance;
3. Sedimentation

HABITATS

1. Marine and Estuarine Shellfish Beds;
2. Riverine Bottom;
3. Coral and Live/Hard Bottom;
4. SAV
5. Tidal Vegetation
6. Riverine Hard Bottom

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EVIDENCE

- Conservation moorings project replaced traditional chain moorings that scour surrounding eelgrass with elastic conservation moorings in order to ***minimize impacts to the seafloor, enable restoration of 29 m^2 of eelgrass*** & preserve habitat essential to critical life stages of trust species (**HABITAT Submerged Aquatic Vegetation**)

RESTORATION OBJECTIVE 1

- Restore and enhance ***hydrological or physical connections*** between Subregional Priority Habitats to promote fish utilization and improve overall aquatic health.

HABITATS

1. Marine and Estuarine Shellfish Beds;
2. Riverine Bottom;
3. Tidal Vegetation

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EVIDENCE

1. The removal of Pond Lily Dam will ***open 2.6 miles of the West River*** and ***76 acres of Konold's Pond*** to spawning river herring. It will also improve water quality, decrease water temperature, and enhance riparian habitat (**HABITAT: Riverine Bottom**)
2. The Great Dam was removed on the Exeter/Squamscott River, connecting ***8 miles of river***. Additionally, streambed enhancements in the form of a gravel shoal removal ***increased viable spawning habitat in the area by 20,000 ft^2*** (**HABITAT: Riverine Bottom**).
3. Shorey's Brook dam removal and replacement of a failing perched culvert (ME) restored connectivity to in-stream and upstream riverine and coastal inert substrata and riverbed integrity, including ***800 ft of habitat for diadromous fish and opened 4.3 miles of river upstream*** (**HABITAT: Riverine Bottom**).
4. Longbranch Creek Culvert project (SC) replaced undersized pipes with wider box culverts. Sediments were stabilized, upstream shorelines were enhanced, and improved tidal flow increased the vitality of the marshes and oyster reefs in the area (**HABITATS: Marine and Estuarine Shellfish Beds and Tidal Vegetation**).

RESTORATION OBJECTIVE 2

- Restore Subregional Priority Habitats, such as replanting eelgrass beds or restoring oyster beds, in locations where threats have been minimized or removed (does not include dam or other barrier removal)..

HABITATS

1. Marine and Estuarine Shellfish Beds
2. Coral and Live/Hard Bottom
3. Submerged Aquatic Vegetation
4. Tidal Vegetation
5. Riverine Bottom

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EVIDENCE

1. Ashepo-Coosaw Cutoff Restoration projct (SC) stabilized shoreline by ***adding 0.06 acres of oyster habitat*** to protect 100 m of shoreline, ***creating 0.15 acres of adjacent tidal marsh*** over time (HABITAT: Tidal Vegetation)

2. James River Atlantic Sturgeon project (VA) increased the spawning grounds of Atlantic sturgeon and other anadromous fish in the James River by constructing an artificial spawning reef using 2,500 tons of broken granite (HABITAT Riverine Bottom).

3. Lake Worth Lagoon project (FL) capped 30,000 yd^3 of muck sediments and restored ***18.8 acres of seagrass*** and ***0.61 acres of mangroves***, plus planted an additional ***1.5 acres of salt marsh***, ***0.51 acres of tidal flat habitat***, and ***0.93 acres of oyster/artificial reef habitat*** (HABITAT: SAV and Tidal Vegetation/Mangroves)

4. Peconic Estuary project (NY) planted eelgrass and widgeon grass where historic beds used to thrive. This project will stabilize the sediment, provide fish habitat, and improve water clarity (HABITAT SAV).

5. Guana Peninsula project restored and enhanced fish habitat by preventing shoreline erosion and promoting shoreline accretion via the planting of mussel and oyster shells, and Spartina grass. It ***restored over 1,000 feet of shoreline*** and improved water quality (HABITATS: Marine and Estuarine Shellfish Beds, Tidal Vegetation).

6. Indian River Lagoon invasives removal project (FL) removed ***5 acres of invasive plants*** and ***planted over 8,500 linear ft of shoreline with native species*** such as mangroves and Spartina grass to create new fish nursery habitat. Mangroves will reduce erosion and filter stormwater runoff, improving conditions for seagrass (HABITATS: Mangroves and Submerged Aquatic Vegetation).

RESTORATION OBJECTIVE 4

- Maintain or increase the resiliency of Subregional Priority Habitats to the impacts of climate change through restoration activities.

HABITATS

1. Marine and Estuarine Shellfish Beds
2. Coral and Live/Hard Bottom
3. Submerged Aquatic Vegetation
4. Tidal Vegetation
5. Riverine Bottom

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EVIDENCE

1. Could argue all restoration projects to-date have increased resiliency (?)
2. Not Available (?)

SCIENCE & DATA OBJECTIVES

1. Support ongoing research related to identifying or assessing fish habitat conservation activities and the threats to fish habitats.
2. Work to achieve ACFHP science & data needs and fulfill science and data responsibilities for NFHAP.

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EVIDENCE

1. Most of our progress in Science & Data has been to achieve ACFHP needs
2. Little support for research (?)

COMMUNICATIONS & OUTREACH OBJECTIVES

1. Develop or maintain physical or virtual information or avenues for communicating information to partners and the broader conservation community.
2. Develop or maintain relationships with partners and the broader conservation community.

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LESSONS LEARNED

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+/PLUS

(*What were we good at? What did we get/guess right?*)

△ /Change

(What would we change? Are there gaps?)

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DISCUSSION

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Implementation Task Update

Restoration Objective 2: Restore Subregional Priority Habitats, such as replanting eelgrass beds or restoring oyster beds, in locations where threats have been minimized or removed (does not include dam or other barrier removal).

B.2.1 Strategic Action: Restore Subregional Priority Habitats in each subregion where:

(a) they have been damaged or destroyed by past declines in water quality or human activities, such as dredging, filling, development, or vessel operation; AND

(b) conditions for restoration of habitats exist; AND

(c) goal(s) of habitat restoration can be maintained.

Tasks:

(1) Compile list of restoration partners/practitioners (e.g. NEPs, state management plans, NGO's, ACFHP MOU signatories, etc.)

(2) Survey them regarding the focus and priorities in their planning area (e.g., priority habitats, priority threats, and priority implementation actions).

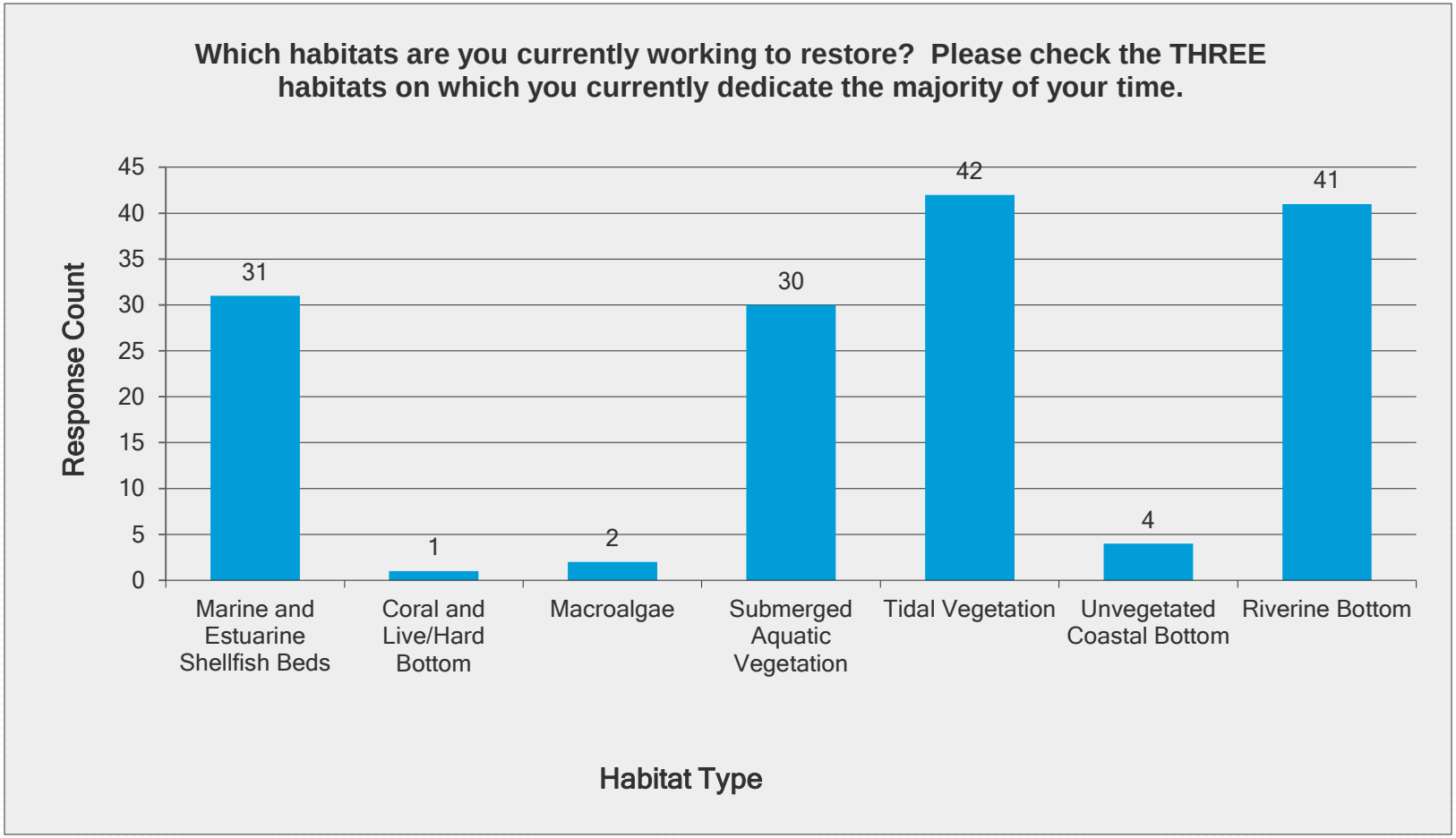
Why:

Assist strategic planning so as to steer the partnership toward gaps in habitat types in need of restoration, geographic areas in need of restoration and, significant threats not being addressed and partner goals.

Lead to a better understanding of priorities and ways to focus our efforts on a regional or coastal scale.

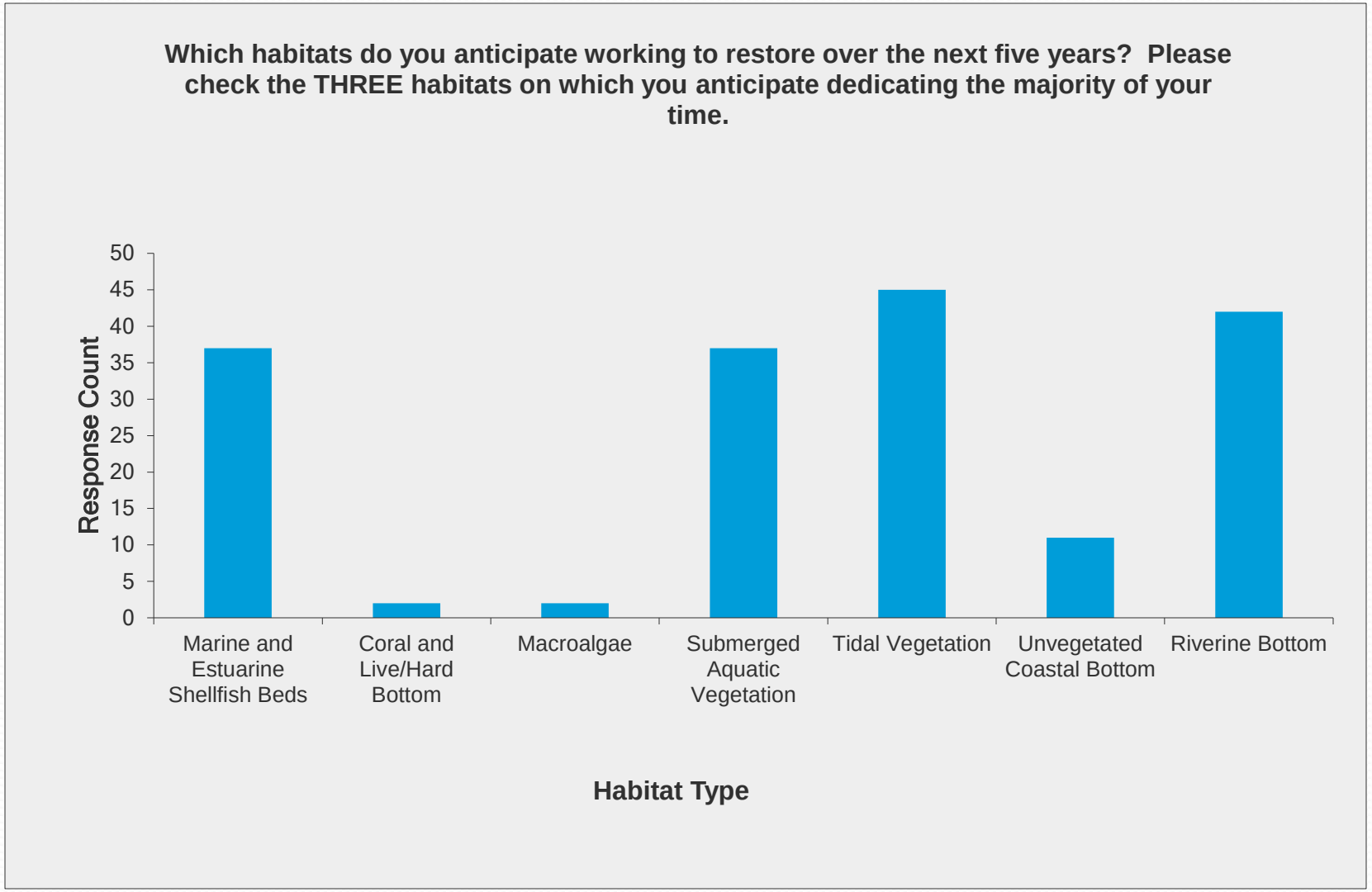
Status

- Gathered information from 261 restoration practitioners from 13 states
- Practitioners were contacted to participate in the survey in September and October of 2014.
- 81 responses (30% response rate).
- Draft report of results

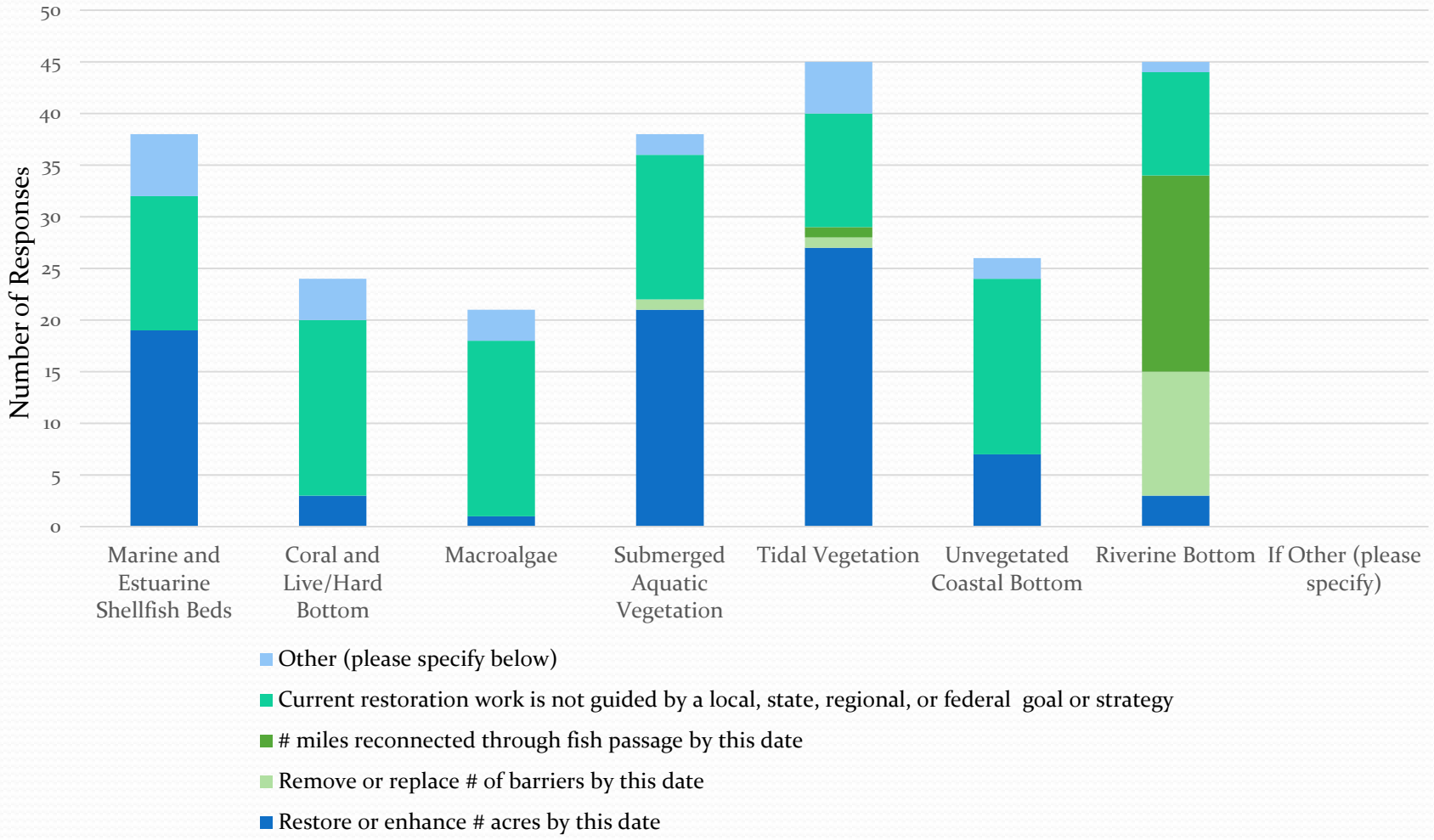

Which habitats are you currently working to restore? Please check the THREE habitats on which you currently dedicate the majority of your time.
Response Count
45
40
35
30
25
20
15
10
5
0
31
1
2
30
42
4
41
Marine and Estuarine Shellfish Beds
Coral and Live/Hard Bottom
Macroalgae
Submerged Aquatic Vegetation
Tidal Vegetation
Unvegetated Coastal Bottom
Riverine Bottom
Habitat Type

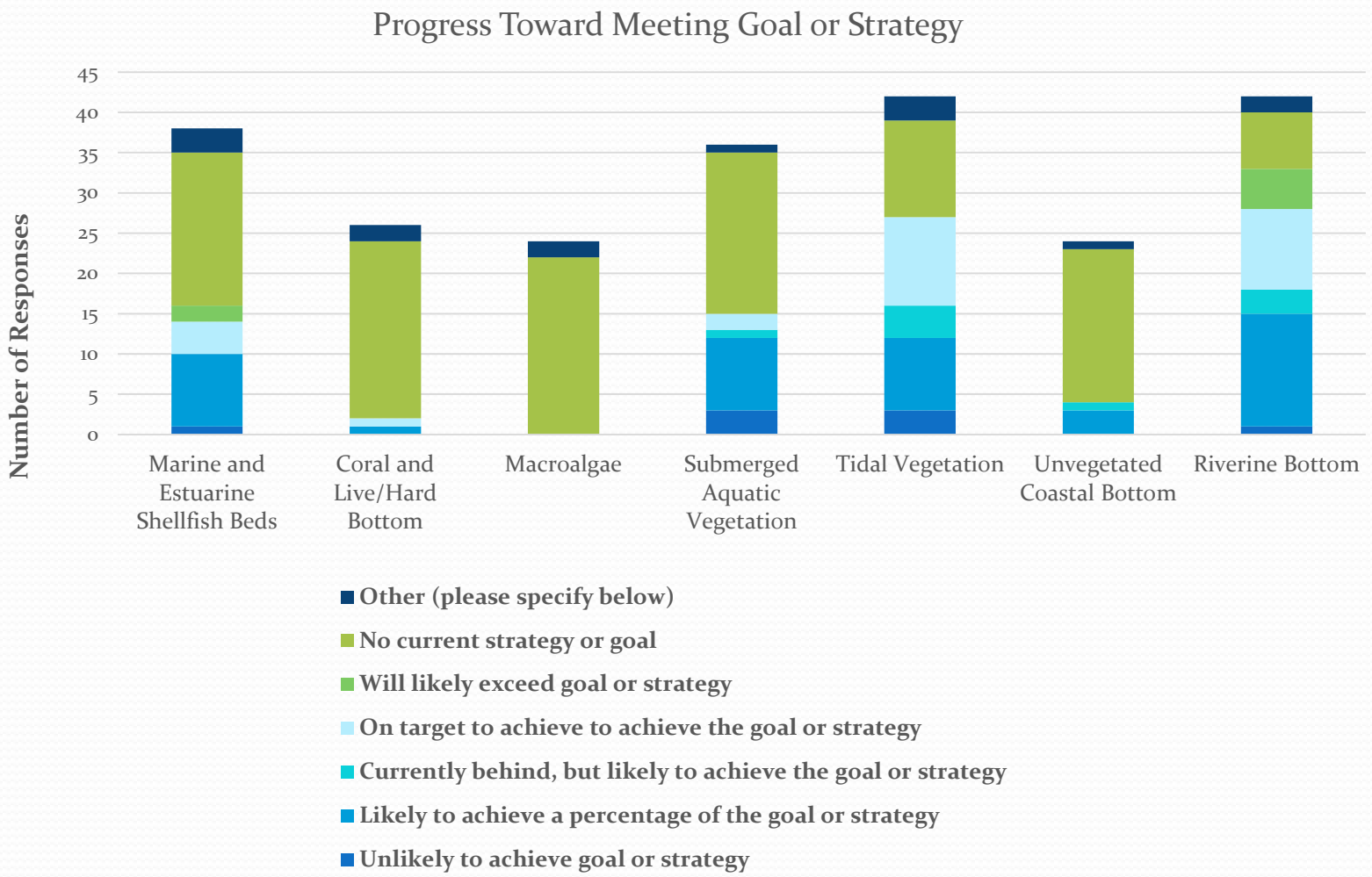
Habitat Focus by Region

	Marine and Estuarine Shellfish Beds	Macroalgae	Submerged Aquatic vegetation	Tidal Vegetation	Unvegetated Coastal Bottom	Riverine Bottom
North Atlantic	2	1	7	7	1	11
Mid-Atlantic	10		11	14	2	19
South Atlantic	4			2		
Florida	3		3	4	1	3

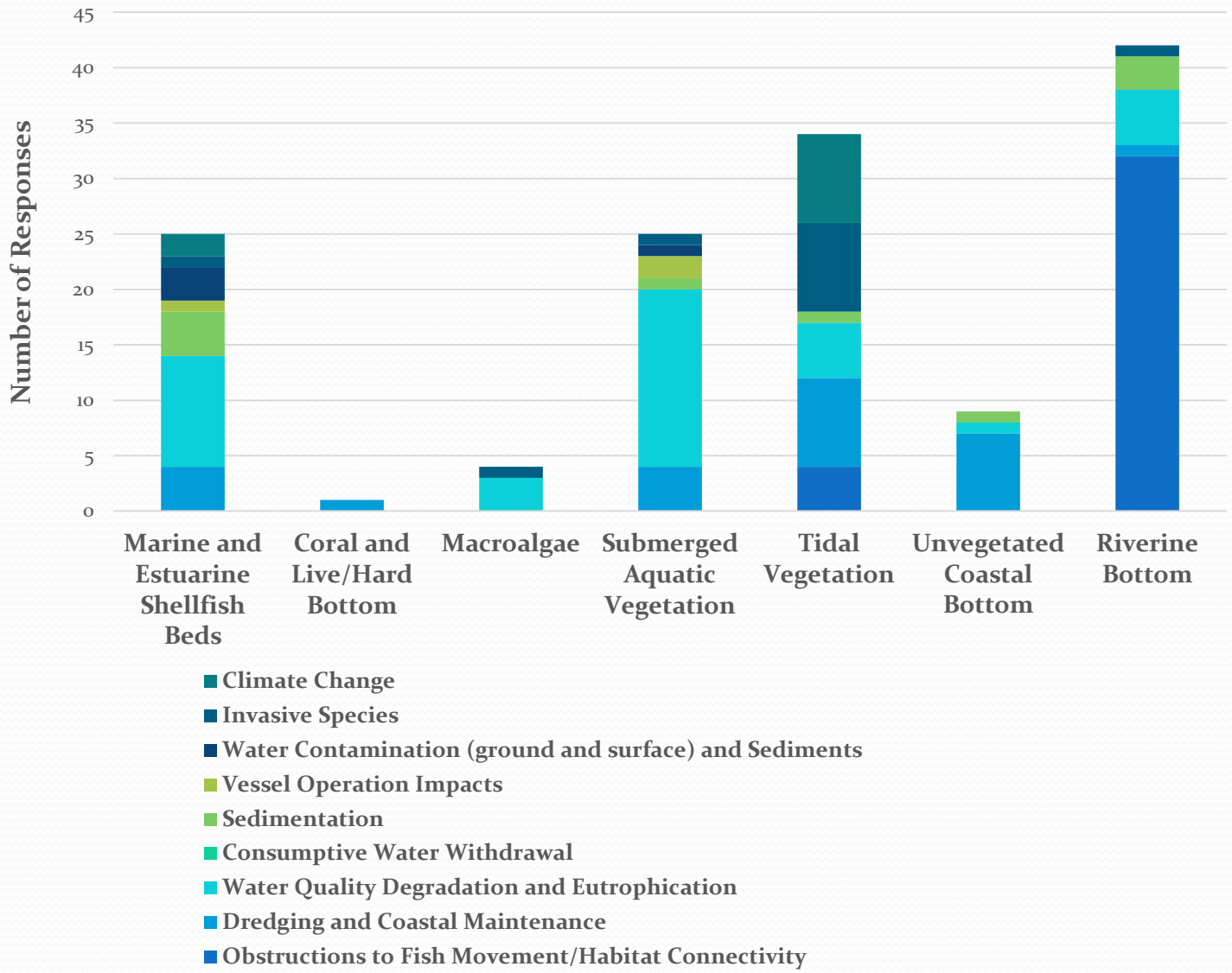

Which habitats do you anticipate working to restore over the next five years? Please check the THREE habitats on which you anticipate dedicating the majority of your time.
Response Count
50
45
40
35
30
25
20
15
10
5
0
Marine and Estuarine Shellfish Beds
Coral and Live/Hard Bottom
Macroalgae
Submerged Aquatic Vegetation
Tidal Vegetation
Unvegetated Coastal Bottom
Riverine Bottom
Habitat Type

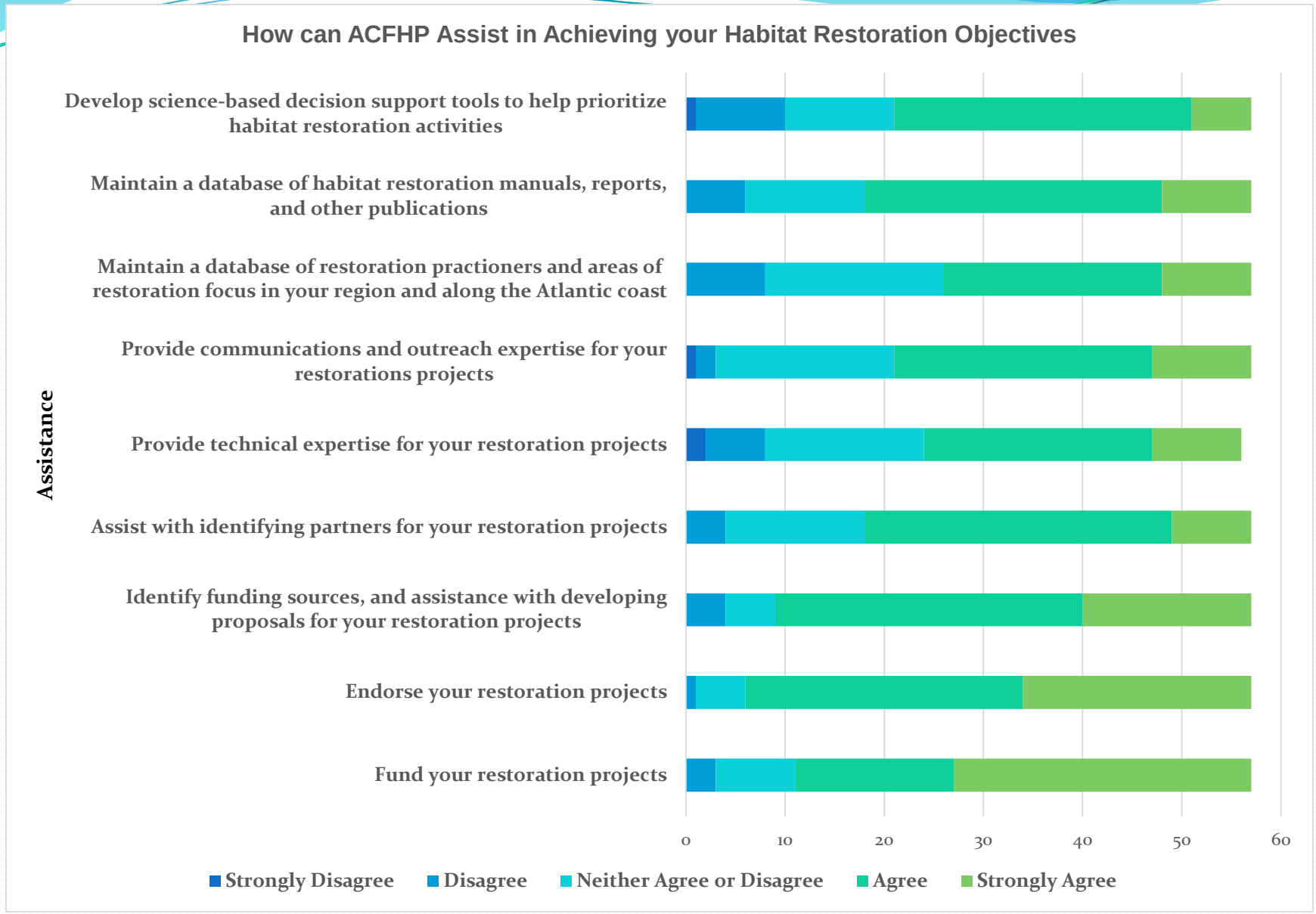
Which Local, State, Regional or Federal Restoration Strategy or Goal are You Primarily seeking to Achieve




Progress Toward Meeting Goal or Strategy
Number of Responses
45
40
35
30
25
20
15
10
5
0
Marine and Estuarine Shellfish Beds
Coral and Live/Hard Bottom
Macroalgae
Submerged Aquatic Vegetation
Tidal Vegetation
Unvegetated Coastal Bottom
Riverine Bottom
Other (please specify below)
No current strategy or goal
Will likely exceed goal or strategy
On target to achieve to achieve the goal or strategy
Currently behind, but likely to achieve the goal or strategy
Likely to achieve a percentage of the goal or strategy
Unlikely to achieve goal or strategy

Which Threats are you Focusing on for Each Habitat Type?




How can ACFHP Assist in Achieving your Habitat Restoration Objectives
Assistance
Develop science-based decision support tools to help prioritize habitat restoration activities
Maintain a database of habitat restoration manuals, reports, and other publications
Maintain a database of restoration practioners and areas of restoration focus in your region and along the Atlantic coast
Provide communications and outreach expertise for your restorations projects
Provide technical expertise for your restoration projects
Assist with identifying partners for your restoration projects
Identify funding sources, and assistance with developing proposals for your restoration projects
Endorse your restoration projects
Fund your restoration projects
0
10
20
30
40
50
60
Strongly Disagree
Disagree
Neither Agree or Disagree
Agree
Strongly Agree

In your opinion, what are the particular habitats in need of restoration or threats in need of correction, explain.

Top three threats not currently being addressed were:
fish passage, water quality, and sea level rise.

Top three habitats not being addressed were: buffers, salt marshes, and shellfish beds.

The question was worded such that responses could not be broken down by region. The question asked, “in your region or on a coast wide basis,”

What did this information tell us?

- We don't do a very good job of writing survey questions.
- Does the regional data generated help us prioritize focal habitat types? Will we talk about importance of buffers at some point?
- What are we doing about macroalgae and unvegetated coastal bottom, these are not common focal areas for restoration efforts. What about corals?
- Is the data about practitioners meeting their goals in this survey going to help ACFHP focus their efforts?
- It appears that practitioners are interested in specific types of assistance. Do we de-emphasize or not do some of them?
- Is ACFHP doing anything to address the focal threats of high priority (from this survey)?

NFHP Funding for ACFHP projects

FY15 funded and FY16 proposed

Project Title	Funds Requested	Direct	Indirect	Partner Funds	Total Cost
Atlantic Coastal Fish Habitat Partnership Operations FY15	$42,857	$30,000	$12,857	$65,000	$107,857
Renewing Diadromous Fish passage, Patten Stream, Surry, ME, NFHP ACFHP	$78,987	$55,291	$23,696	$179,972	$258,959
Cotton Gin Mill Dam Removal and Fish Passage Project, Satucket River, East Bridgewater, MA	$71,429	$50,000	$21,429	$451,308	$522,737
Cape Fear River Fisheries Enhancement Project	$42,857	$30,000	$12,857	$227,369	$270,226
Total	$236,130	$165,291	$70,839	$923,649	$1,159,779

On-The-Ground Projects

Spotlight on Renewing Diadromous Fish Passage in Patten Stream

Project Partners

Town of Surry

Blue Hill Heritage Trust

Maine Department of Transportation

Maine Coastal Program

Maine Department of Naturay Resources

National Oceanic and Atmospheric Administration

Gulf of Maine Council

US Fish and Wildlife Service

Atlantic Coastal Fish Habitat Partnership

The Upper Patten Stream
a thriving commercial alev
species. While many fact
physical barrier of the Rou
movement in the area. R
upper drainage and is local
undersized, but cove
channel in the bedrock
was historically used
migrations. As a
Patten Stream's alewif
nearly extirpated, su
mainly due to volu
who carry fish over
barriers in nets so
may reach spawning ha

This project will restore
to 20 stream miles and
alewife spawning acres in
Stream through the install
of a nature-like rock weir
configuration of the rock w
with higher flows that may
Primary and secondary nc
flows, and the modular des
elevation if warranted.

Species such as blueback h
Atlantic salmon will also b
and downstream freely.

The U.S. Fish and Wildlif
Partnership with conserv
project, including supplies
Community events, schoo
planned during the course

Project text provided by the Town of Su

On-The-Ground Projects

Spotlight on Cape Fear River Fisheries Enhancement Project

Project Partners

Cape Fear River Watch

National Atmospheric and Oceanic Administration

Southeast Aquatic Resources Partnership

Martin Marietta Aggregates

Dial Corby and Associates

US Fish and Wildlife Service

Atlantic Coastal Fish Habitat Partnership

The Cape Fear River was one of the most pro
American shad in North Carolina at the beginning
commercial landings are 87% lower than histori
and reduced access to spawning habitat have be
structures located between Wilmington and Fay
completed rock arch ramp, allowing volitional fish

However, 70% of fish are unable to pass the Lock and Dam 2 barrier, and until fish passage is improved, habitat restoration downstream of the dam remains the priority. Clean, hardbottom habitats with interstitial spaces are preferred spawning habitat for many riverine and diadromous fish species. Unfortunately, much of this preferred habitat in the Cape Fear river is inaccessible and is buried under sediment from numerous natural and anthropogenic sources.

Lock and
placed ap

This project restored 0.5 acres of preferential spaw
and sturgeon downstream of Lock and Dam 2, fac
habitat between Lock and Dams 1 and 2. To compe
historical spawning habitat due to fish passage ba
rock were placed in the river, and monitored for sp
Thirty volunteers directly assisted in the restoratio
beginning and final substrate placements, which w
shad and Atlantic and shortnose sturgeon, and inc
spawning habitat for striped bass and river herring

The U.S. Fish and Wildlife Service provided
Habitat Partnership with conservation dollars to fu
biological monitoring as well as a side-scan sonar
is stable. Both efforts are essential for ensuring th
enhancement project.

Project text and photos provided by Cape Fear River Watch. Lock and Dam

For more information on the Partnership visit us

On-The-Ground Projects

Spotlight on Cotton Gin Mill Dam Removal and Fish Passage Project

Project Partners

The Nature Conservancy

Massachusetts Division of Ecological Restoration

US Fish and Wildlife Service

Atlantic Coastal Fish Habitat Partnership

The Cotton Gin Mill Dam in East Bridgewater, Massachusetts was built in the mid-1800's, and since then has blocked flow of the Satucket River. The dam has hindered natural river processes, such as sediment transport and temperature regulation. It also acts as a barrier to passage for diadromous fishes including river herring (*Alosa pseudoharengus, A. aestivalis*) and American eel (*Anguilla rostrata*).

The Nature Conservancy will work with partners to remove the dam, allowing fish access to 124 acres of spawning habitat, with potential for 528 more acres. It will also restore 4.4 river miles upstream. The dam currently blocks passage from Narragansett Bay to the river upstream and Robbins pond, both of which provide suitable nursery habitat for river herring.

Cotton Gin Mill Dam, looking upstream.

The effectiveness of this project in restoring migratory fish passage will be measured in the short term through changes in the length of connected river network and in characteristics of physical habitat. Fish counts will be conducted for at least five years following removal, and the project team is collaborating with the Massachusetts Division of Marine Fisheries to conduct fish monitoring at other dam removal sites in the watershed.

Removing the Cotton Gin Mill Dam, restoring river processes in the Satucket River, and restoring riparian habitat will improve system health and resilience to stresses such as increased temperature and more intense storm events due to climate change. Increased habitat available to migratory fish will minimize the chance that stochastic events will wipe out all spawning or juvenile survival in a given year.

The U.S. Fish and Wildlife Service provided the Atlantic Coastal Fish Habitat Partnership with conservation dollars to fund a portion of the dam removal.

Project text and photo provided by The Nature Conservancy. Photos by Cathy Bozek.

For more information on the Partnership visit us at: www.atlanticfishhabitat.org

FY16 Review of applications for NFHP funding

- Changes in application and review process
  - Coordination deadline – 3 weeks before application deadline
  - ACFHP is not soliciting research projects or feasibility, design, and engineering projects
  - Living shoreline projects asked to demonstrate how it would benefit fish
  - Test run on using tools
    - Northeast Aquatic Connectivity, SEACAP, Ches Bay Habitat and Ches Bay Fish Passage

FY16 Review of applications for NFHP funding

- Review Team
  - Mark Rousseau – MA
  - David O'Brien – NOAA – VA
  - Kent Smith – FL
  - Jimmy Johnson – NC
  - Jaclyn Daly – NOAA – SC
  - Dawn McReynolds – NY
  - Julie Devers – USFWS - MD

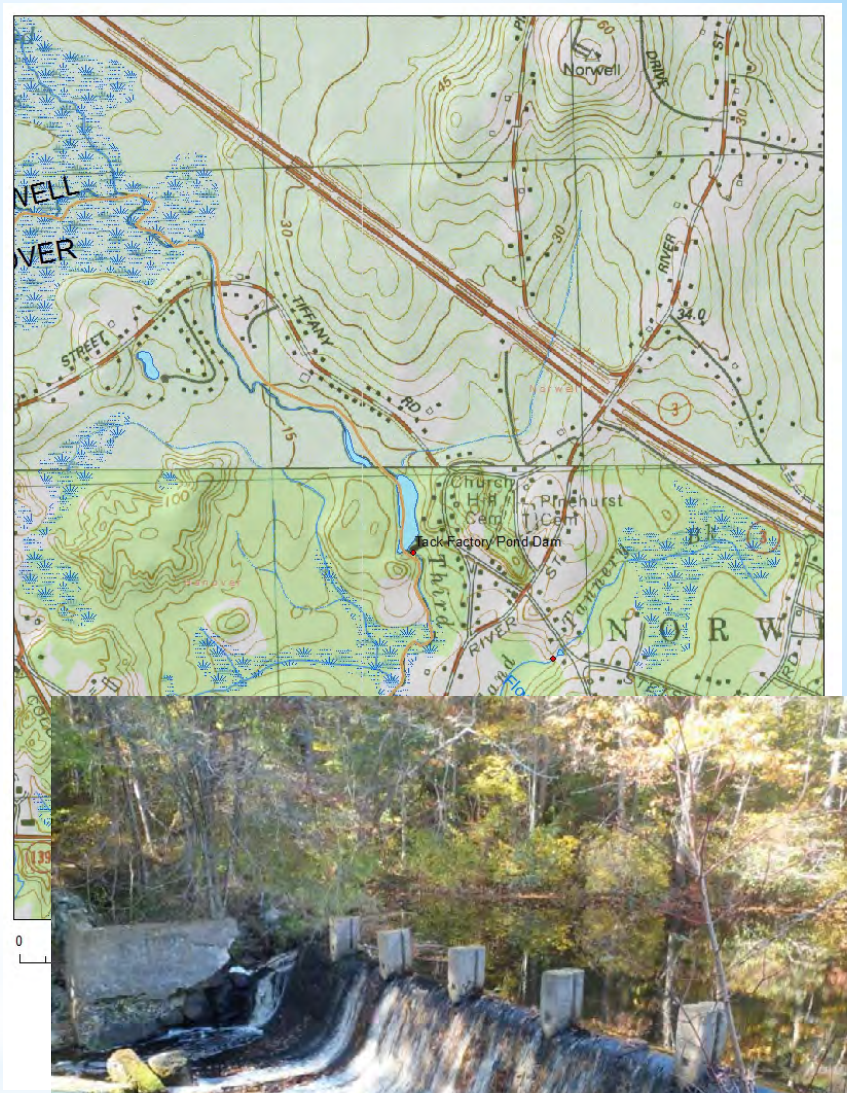
Average score	Project Name	Sub-Region	Amount Requested	Total Cost of Project
187.9	Improving Fish Passage Through the Removal of the Bradford Dam, Pawcatuck River, RI	Mid-Atlantic	$50,000	$1,187,650
187.6	Third Herring Brook Restoration, Tack Factory Dam Removal, MA	North Atlantic	$50,000	$413,000
184.2	Lower Bog Dam Removal and Stream Restoration, Coonamesset River, MA	Mid-Atlantic	$50,000	$290,000
169.3	Restoring the Mangroves of the Three Sisters Island, Indian River Lagoon, FL	South Florida	$49,960	$101,175
146.4	Creation of Shellfish-based "Living Shoreline" for Fish Habitat Restoration and Water Quality Improvement in the Mid-Atlantic, NY	Mid-Atlantic	$49,799	$99,660
129.3	Fish Passage Restoration Project, Big Millpond, MD	Mid-Atlantic	$50,000	$175,000
117.5	Eelgrass Protection and Restoration, Fishers Island, NY	Mid-Atlantic	$50,000	$177,440
65.6	Saxis Pier Reef Project, VA	Mid-Atlantic	$35,500	$77,000

Improving Fish Passage Through the Removal of the Bradford Dam, Pawcatuck River, RI

- Third of 6 mainstem dams
- Receiving Sandy Funding
- Questions:
  - Will it be a full dam removal or a nature like fishway?
  - Timeframe

*Third Herring Brook Restoration, Tack Factory Dam Removal, MA

- First barrier
- Tier 1 – Northeast Aquatic Connectivity
- Questions:
  - How will you deal with low flow issues?
  - Upstream Dam
  - Funding

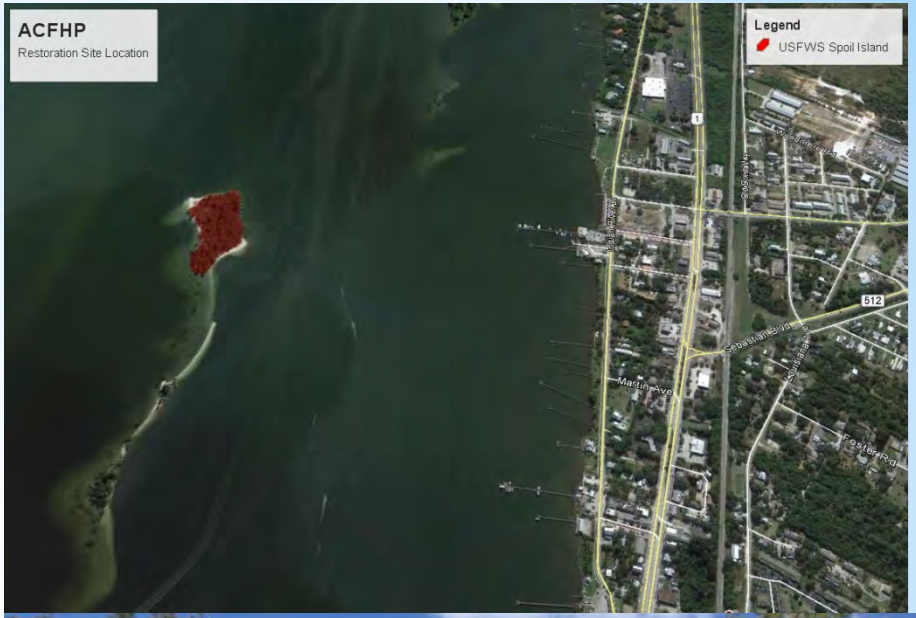


Lower Bog Dam Removal and Stream Restoration, Coonamesset River, MA

- First Barrier
- Being taken out by the town
- Questions:
  - Funding
  - Timeframe

*Restoring the Mangroves of the Three Sisters Island, Indian River Lagoon, FL

- Pelican Island National Wildlife Refuge
- Brazilian Pepper Removal
- Mangrove Planting
- Questions:
  - Offshore water break
  - Funding for invasive removal through FWC
  - How will salary funds be used?



*Creation of Shellfish-based "Living Shoreline" for Fish Habitat Restoration and Water Quality Improvement in the Mid-Atlantic, NY

- Coir logs will be used to create a living shoreline
- Questions:
  - Will the coir logs work?
  - How will funding for personnel be use?