

STATE OF THE RIVER REPORT 2013
FOR THE LOWER ST. JOHNS RIVER BASIN:
WATER QUALITY, FISHERIES, AQUATIC LIFE,
and CONTAMINANTS

Jacksonville University

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Origins of the State of the River Report

Purpose

- To inform the public about health of the Lower St. Johns River Basin, Florida (LSJRB).

Funding

- Environmental Protection Board (EPB) of the City of Jacksonville
- Jacksonville City Council
- River Branch Foundation

History

- First report was issued in 2008
- 2013 is the sixth report

Topical Coverage of the Report

- The report describes the health of the LSJRB based on a number of broad indicators.
 1. **WATER QUALITY**
 2. **FISHERIES**
 3. **AQUATIC LIFE**
 4. **CONTAMINANTS (integrated with Aquatic Toxicology)**
- How each indicator contributes to, or signals, overall river health is discussed in terms of its current status in 2013 and trends over time.

Seven Components of the Report

Full Report with Glossary
Appendix

Website: <http://www.sjrreport.com>

Brochure (released August 23, 2013)

Digital archive of all references

Available September 30, 2013

New this year:

Online interactive format for selected tributaries

K-12 curriculum development – multiyear process

Digital Archive – Browse Page

Items - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://chalk.coas.unf.edu/sjrda/items

Most Visited Getting Started Latest Headlines

The River Report Digital Library

HOME BROWSE SEARCH STATISTICS ADMIN LOGIN

COLLECTIONS

- 2012 River Report
 - Section 1: Background (2012)
 - Section 2: Water Quality (2012)
 - Section 3: Fisheries (2012)
 - Section 4: Aquatic Life (2012)
 - Section 5: Contaminants (2012)
 - Section 6: Aquatic Toxicology (2012)

Items in the Library

Click on a letter below to show titles starting with that letter

A B C D E F G H I J K L M N O P Q R S T U V W Y Z

- A 2005 Update of the Stock Assessment for the Striped Mullet, *Mugil cephalus*, in Florida (Report)
- A Description of East-Florida, with a Journal kept by John Bartram of Philadelphia, Botanist to his Majesty for the Floridas; Upon a Journey from St. Augustine up the river St. John's as far as the Lakes. With Explanatory Botanical Notes. (Book)
- A Final Report for St. Johns River Ichthyofaunal Survey (Report)
- A Grammar and Dictionary of the Timucua Language (Book)
- A Guide to the Interpretation of Metal Concentrations in Estuarine Sediments (Report)
- A Guidebook of Introduced Marine Species in Hawaii (Report)
- A Reanalysis of Data Related to Submerged Aquatic Vegetation Within the Lower St. Johns River: 1996-2005 (Report)
- A Review of Sediment Analysis, Management Techniques and Sediment Quality Data for the Lower St. Johns River Basin: Vol. 5 (Report)
- A Stage-Based Model of Manatee Population Dynamics (Journal Article)
- A Stock Assessment for the Blue Crab, *Callinectes sapidus*, in Florida Waters (Report)
- A Stock Assessment of Red Drum, *Sciaenops ocellatus*, in Florida: Status of Stocks Through 2007 (Report)
- A Survey of Algal Epiphytes from *Vallisneria americana* Michx. (Hydrocharitaceae) from the Lower St. Johns River, Florida (Journal Article)
- Accumulation of Polycyclic Aromatic Hydrocarbons by *Neocalanus* copepods in Port Valdez, Alaska (Journal Article)
- Adaptations of the Polychaete *Nereis diversicolor* to Estuarine Sediments Containing High Concentrations of Heavy Metals. I. General Observations and Adaptations to Copper (Journal Article)
- Adopted Verified Lists of Impaired Waters for the Group 2 Basins: Lower St. Johns River (Report)
- Adopted Verified Lists of Impaired Waters for the Group 2 Basins: Lower St. Johns River (Report)

Online September 30th 2013

Members of the Team



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*Submerged aquatic vegetation, fisheries, and
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Wetlands, nonnatives

Kimberly Mann
Macroinvertebrates

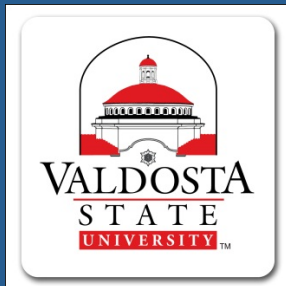


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*Co-Principal Investigator
Background and bacteria*

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Aquatic Life

Submerged Aquatic Vegetation

Tape grass



Water naiad



Widgeon grass



Muskgrass



Spikerush



Water thyme



Baby's-tears



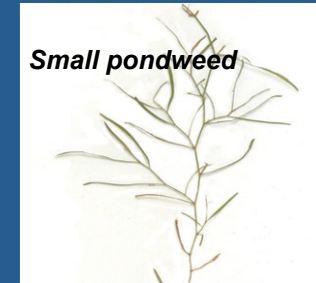
Sago pondweed



Horned pondweed



Small pondweed



Awl-leaf arrowhead



Significance

- Nurseries
- Food for manatees, fish, invertebrates
- Improves water quality
- Reduces erosion

Critical Conditions

- Salinity
- Water clarity
- Shoreline condition
- Epiphytes

Aquatic Life

Submerged Aquatic Vegetation

| INDICATOR | STATUS | TREND |
|------------------------------|----------------|-----------|
| Submerged Aquatic Vegetation | Unsatisfactory | Uncertain |

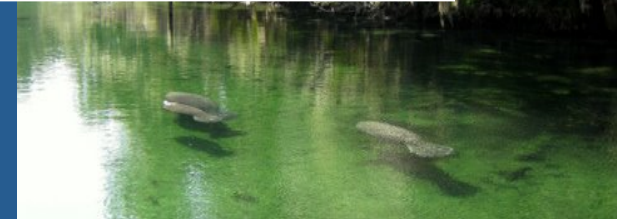
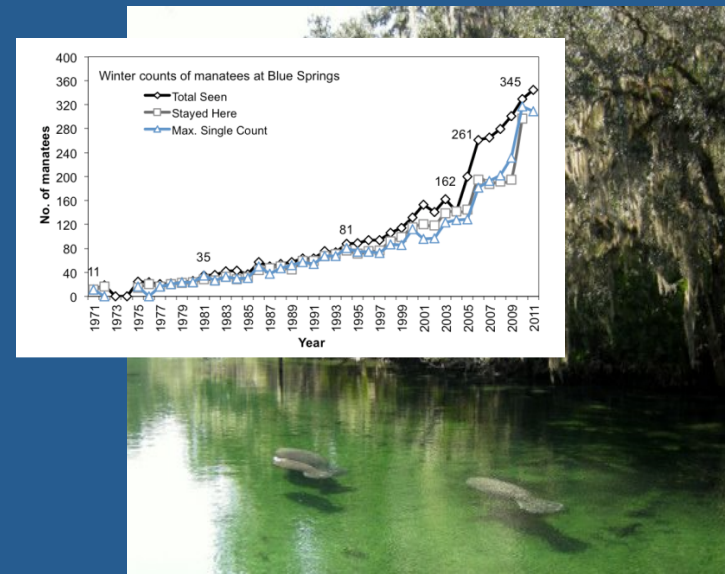
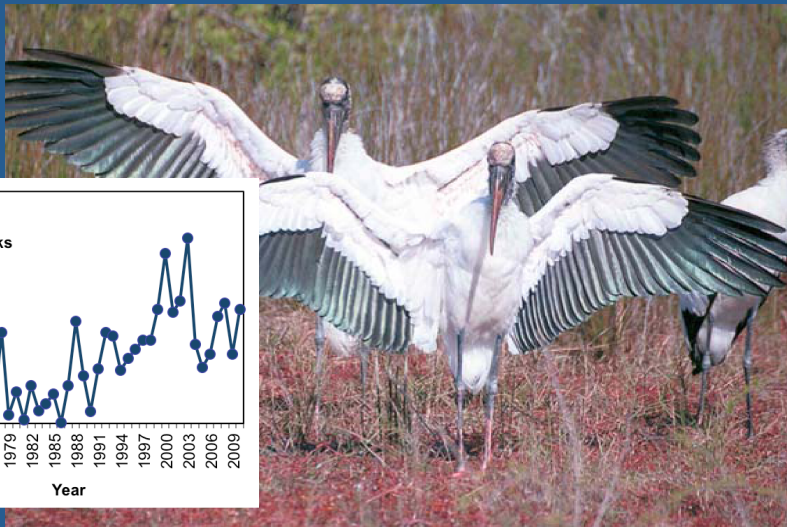
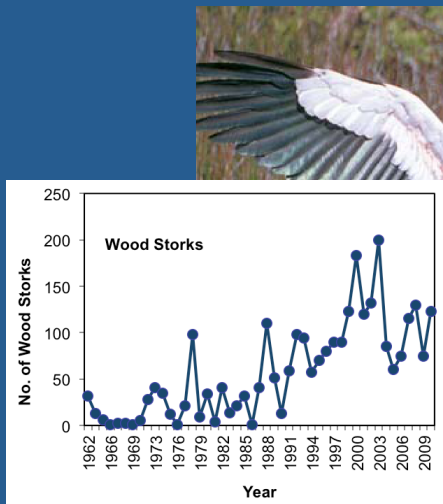
Results

- Highly variable
- Decline in grass bed coverage north of the Buckman Bridge
- Higher salinity, lower % total cover and % tape grass
- Some increase in rainfall in 2011 may suggest a slowing in decline of SAV

Aquatic Life

Federally Threatened & Endangered Species

| INDICATOR | STATUS | TREND |
|--------------------|--------------|---|
| Florida manatee | Satisfactory | Atlantic sub-population: stable Blue Springs sub-population: improving |
| Bald eagle | Satisfactory | Improving |
| Wood storks | Satisfactory | Improving |
| Shortnose sturgeon | Satisfactory | Uncertain |
| Piping plover | Uncertain | Uncertain |



Fisheries



- 12 freshwater, estuarine and marine species
- Two long-term data sets analyzed
 - Fisheries Independent Monitoring data (FIMS) from FWRI (2001- 2012)
 - Commercial landings for LSJR counties (FWRI) (1994 – 2012)

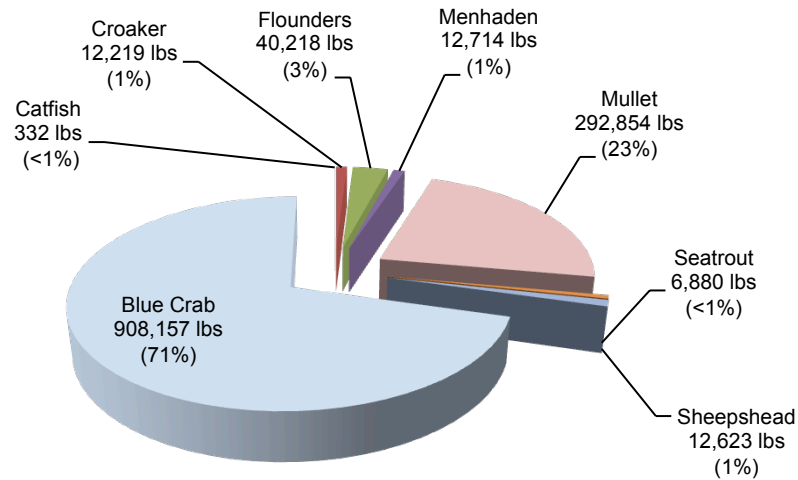


Photo: A.Q. White

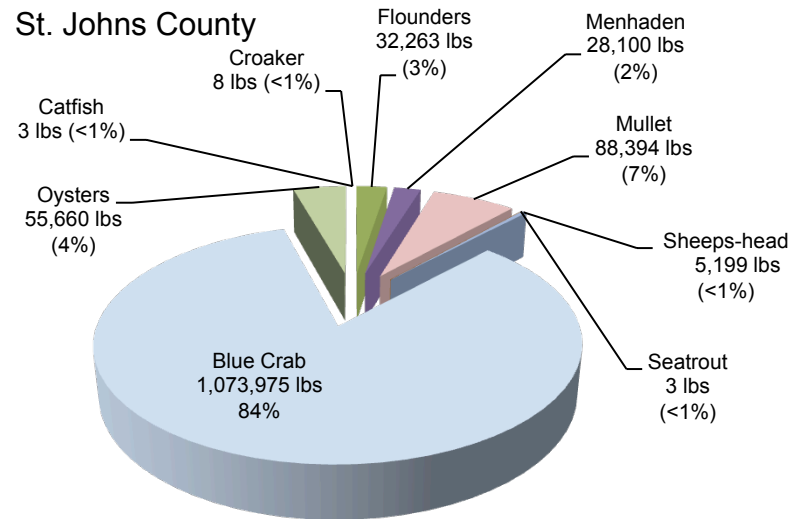
Fisheries

Landings in 2012

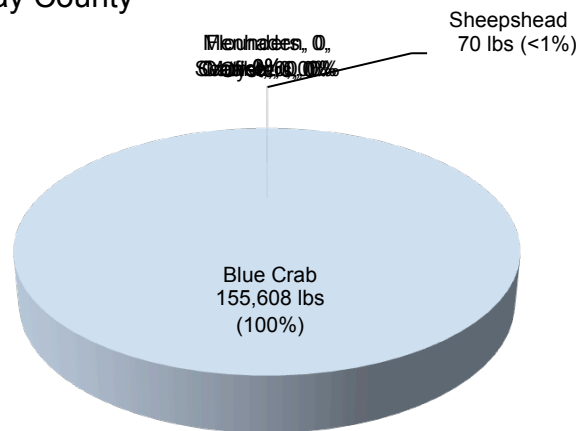
Duval County



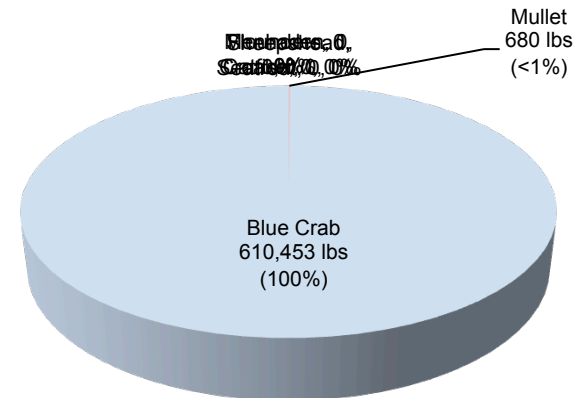
St. Johns County



Clay County



Putnam County



Fisheries

| INDICATOR | STATUS | TREND |
|--------------------|--------------|----------------------|
| Red drum | Satisfactory | Stable |
| Sheepshead | Satisfactory | Stable |
| Spotted seatrout | Satisfactory | Stable |
| Largemouth bass | Uncertain | Stable |
| Freshwater catfish | Uncertain | Conditions Worsening |
| Striped mullet | Satisfactory | Uncertain |
| Southern flounder | Uncertain | Uncertain |
| Stone crab | Satisfactory | Stable |
| Blue crab | Uncertain | Uncertain |
| Shrimp | Uncertain | Uncertain |

Fisheries

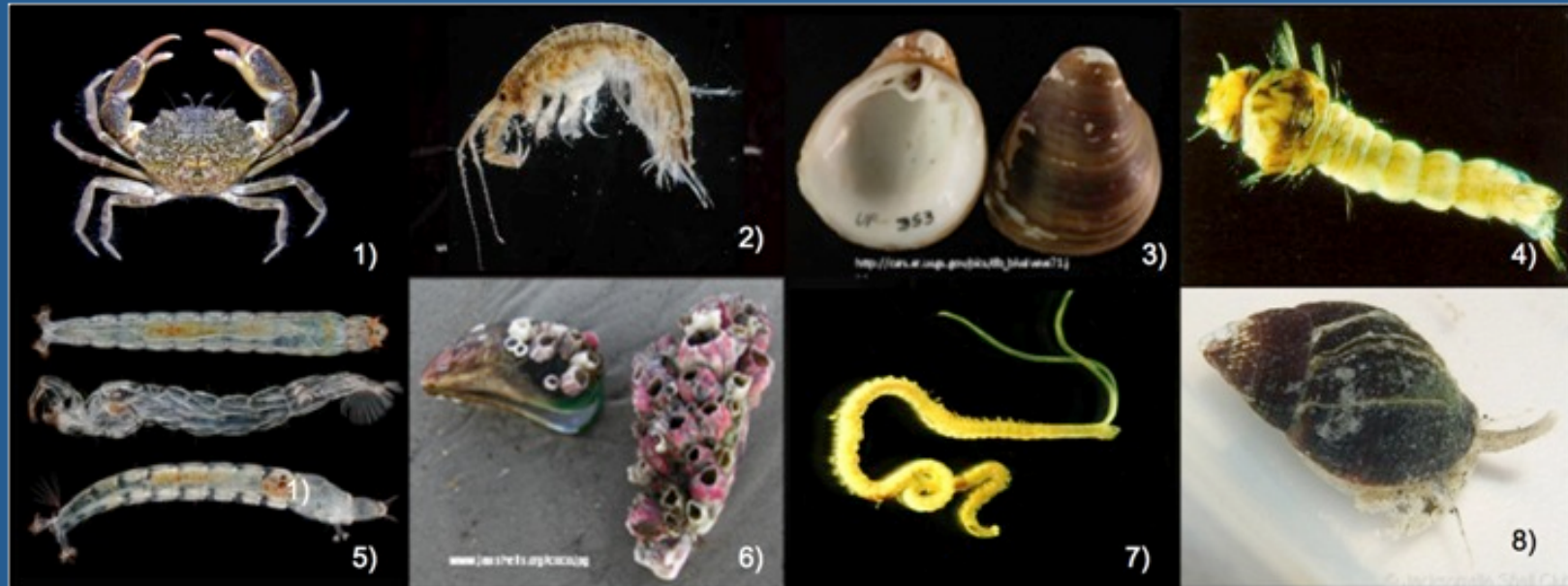
- Finfish

- Many of the species in the LSJR today (~ 170 species total) were present in the 1960s
- Changes in salinity regimes may change their relative abundance in different zones of the river at different times

Atlantic Croaker
Micropogonias undulatus



Aquatic Life Macroinvertebrates



- Animals without a backbone that live on or in the sediment
- Important part of the food web
- Affect the aeration and sediment size of river bottom
- Can signal river stress and pollution

Aquatic Life Macroinvertebrates

- Generally degraded in many areas within the LSJRB
- More pollution-tolerant species at main stem sites in fresher regions.
- Salinity affects types of organisms making up macroinvert communities.

| INDICATOR | STATUS | TREND |
|----------------------------|-----------|-----------|
| Macrobenthic Invertebrates | Uncertain | Uncertain |

Aquatic Life Macroinvertebrates

| INDICATOR | STATUS | TREND |
|----------------------------|-----------|-----------|
| Macrobenthic Invertebrates | Uncertain | Uncertain |

- More data needed for certain assessment
- New section with descriptions of 16 groups in the LSJR

4.3.1.1. Jellyfish, Sea Anemones, and Hydrozoans (Phylum Cnidaria)

All the species in this phylum have stinging cells called nematocysts. They have two basic body forms – medusa and polyp. Medusae are the free-moving, floating organisms such as jellyfish. Polyps are the opposite, they are stationary organisms residing on the sea floor bed such as the hydrozoans (**Myers 2001c**). In the LSJR, most species seen are hydrozoans with a few jellyfish and sea anemones.



Tubularian Hydroid (Tubularia crocea)
Photo by Bob Michelson from
<http://stellwagen.noaa.gov>



Sea Anemone (Order Actiniaria) from
<http://digitalmedia.fws.gov>



Jellyfish (Class Scyphozoa) from
<http://digitalmedia.fws.gov>

Aquatic Life

Non-native Aquatic Species

| INDICATOR | STATUS | TREND |
|----------------------------|----------------|----------------------|
| Non-native Aquatic Species | Unsatisfactory | Conditions worsening |

- 68 nonnative species recorded this year; increase from 64 species last year.
- Introduced through release of exotic pets, ship ballast, interconnected water bodies.

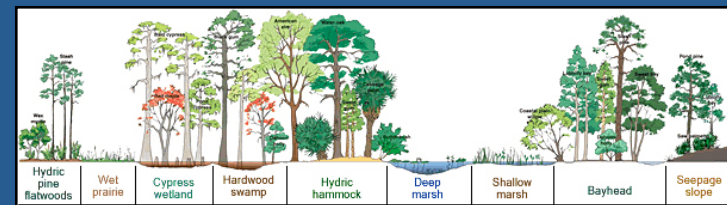
Aquatic Life Non-native Aquatic Species

| INDICATOR | STATUS | TREND |
|----------------------------|----------------|----------------------|
| Non-native Aquatic Species | Unsatisfactory | Conditions worsening |

- ~68 non-native species established in LSJRB
- Introduced through release of exotic pets, ship ballast, interconnected water bodies.
- In 2012: invasive old world climbing fern and Cuban tree frog in St Johns and Duval counties from southern FL

Aquatic Life Wetlands

- 29% of land use along LSJR is residential
 - *high impact land use (Reiss and Brown 2007)*
- 15 mitigation banks serving LSJRB
 - *most away from tidal wetlands*
- High number permits <100 acres
 - *Fragmentation effects possible*
- Swamps & transitional species affected by salinity changes
 - *Wetlands between Fuller Warren and Shands Bridges vulnerable*



| INDICATOR | STATUS | TREND |
|-----------|----------------|-----------|
| Wetlands | Unsatisfactory | Uncertain |

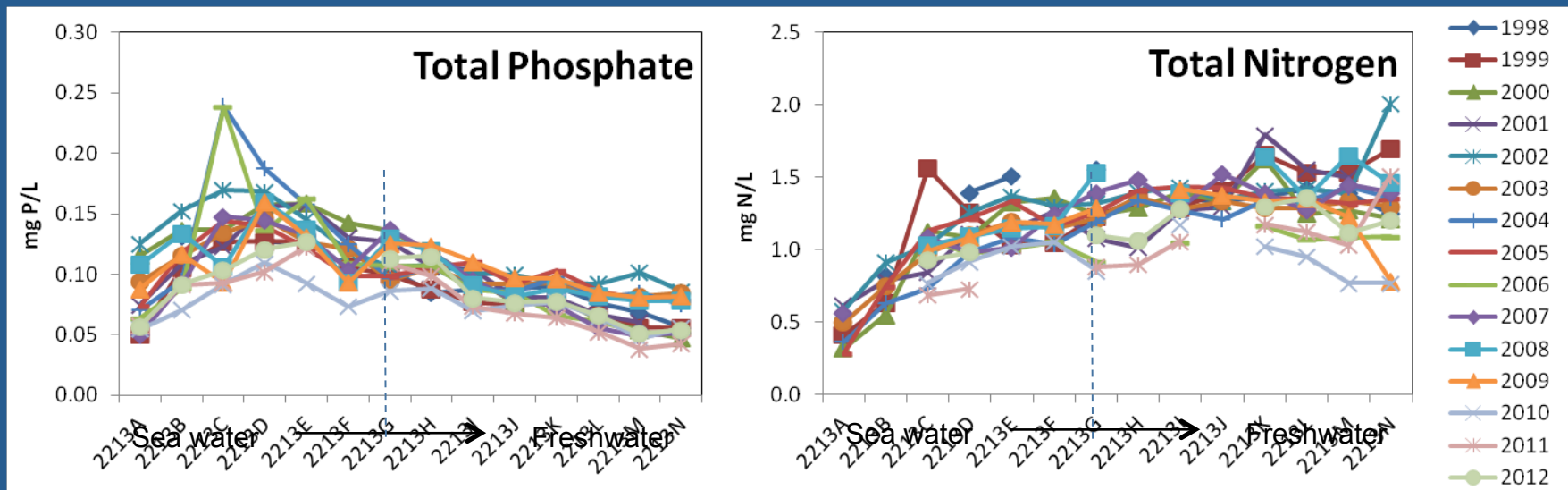
Water Quality

| INDICATOR | STATUS | TREND |
|------------------|--|--------------------------------|
| Nutrients | Nitrogen: Unsatisfactory Phosphorus: Unsatisfactory | <i>N: Conditions improving</i> |
| | | <i>P: Conditions unchanged</i> |
| Algal Blooms | Unsatisfactory | <i>Conditions unchanged</i> |
| Dissolved Oxygen | Unsatisfactory | Conditions unchanged |
| Fecal Coliform | Main Stem: Satisfactory Tributaries: Unsatisfactory | Conditions improving |
| Turbidity | Satisfactory | Conditions improving |

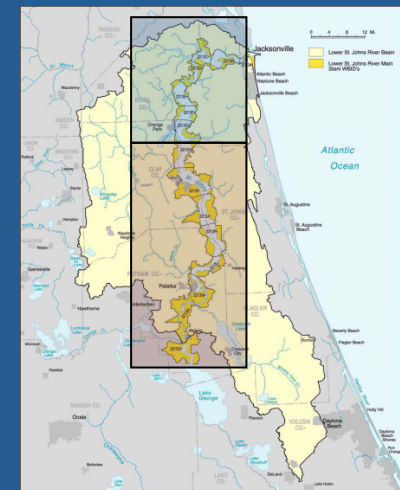
Water Quality

Sea Water to Spring Water

- TP and TN

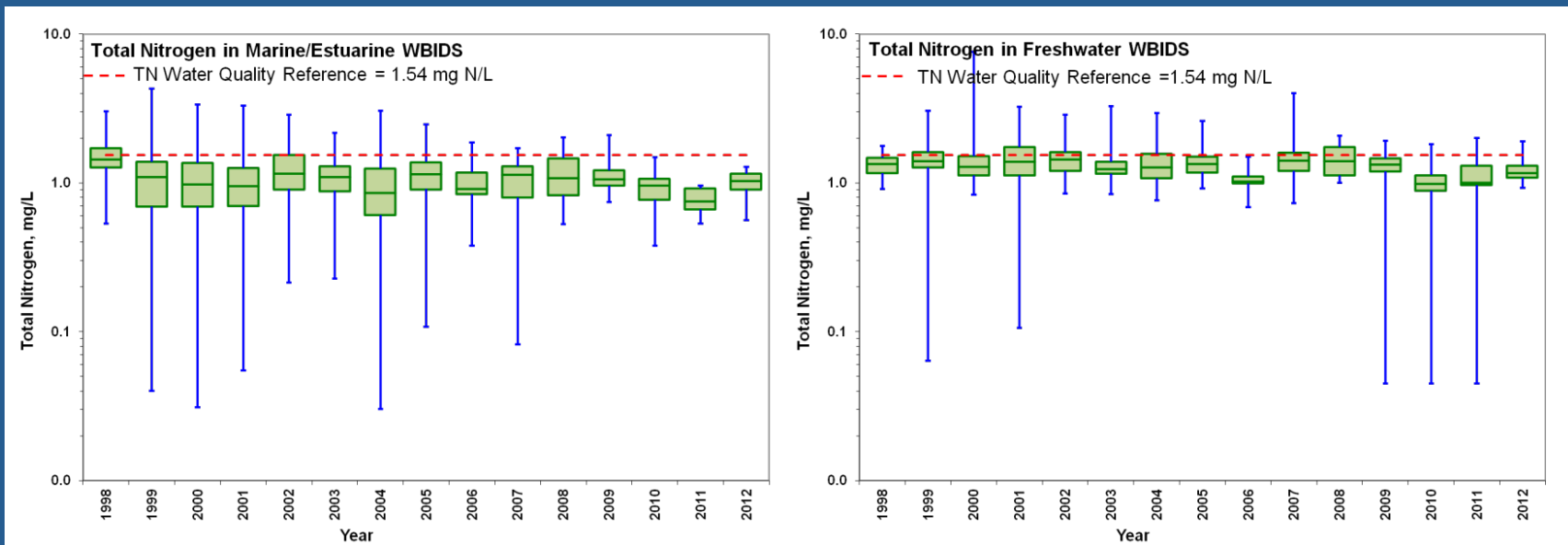


- Nutrient levels vary with distance to mouth
- Data divided into marine/estuarine and freshwater regions



Water Quality Total Nitrogen (TN)

- TN versus Year for LSJR Mainstem

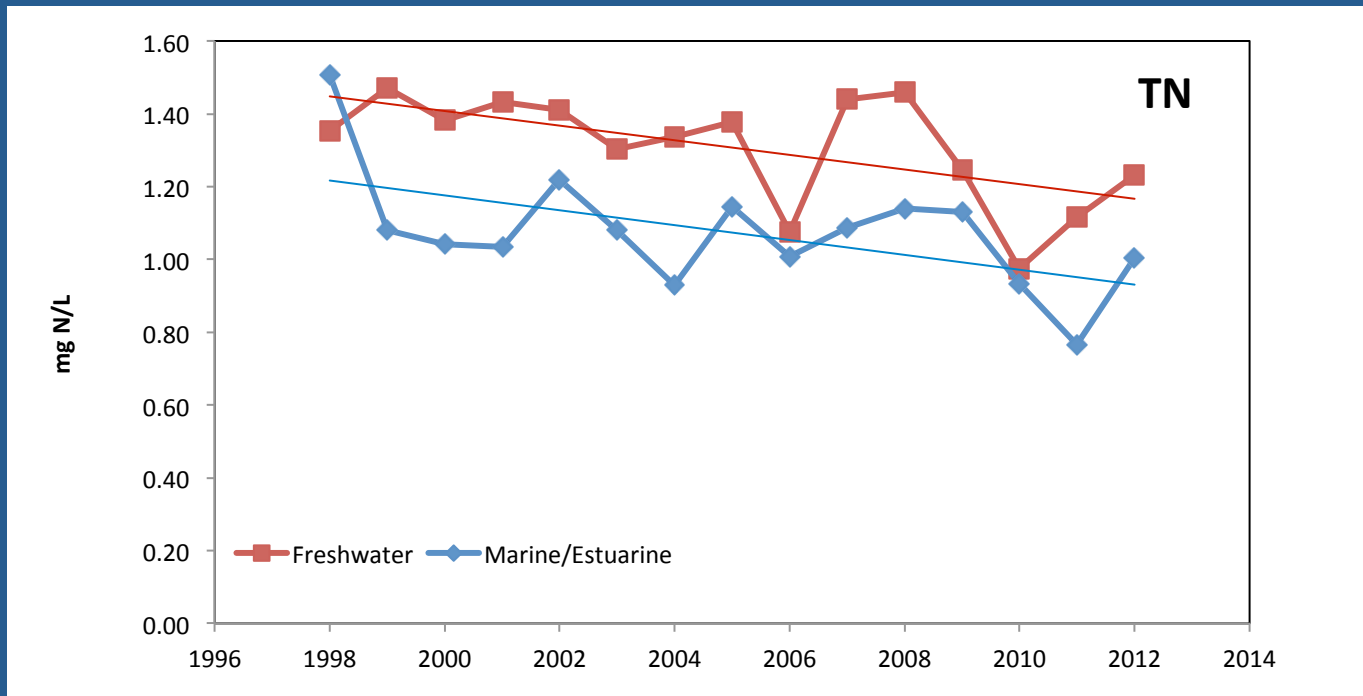


- Levels remain low but maxima exceed WQC in freshwater.

Water Quality

Total Nitrogen (TN)

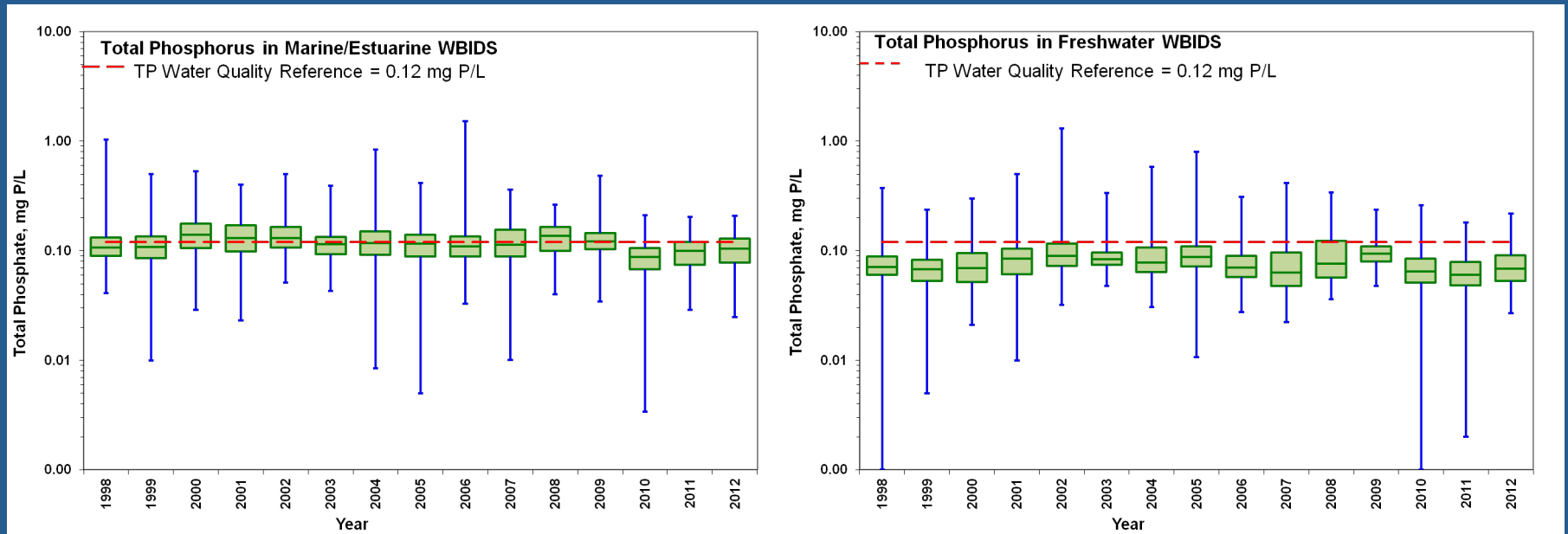
- TN annual average trends



- Annual average nitrogen concentrations going down in both regions of the river.

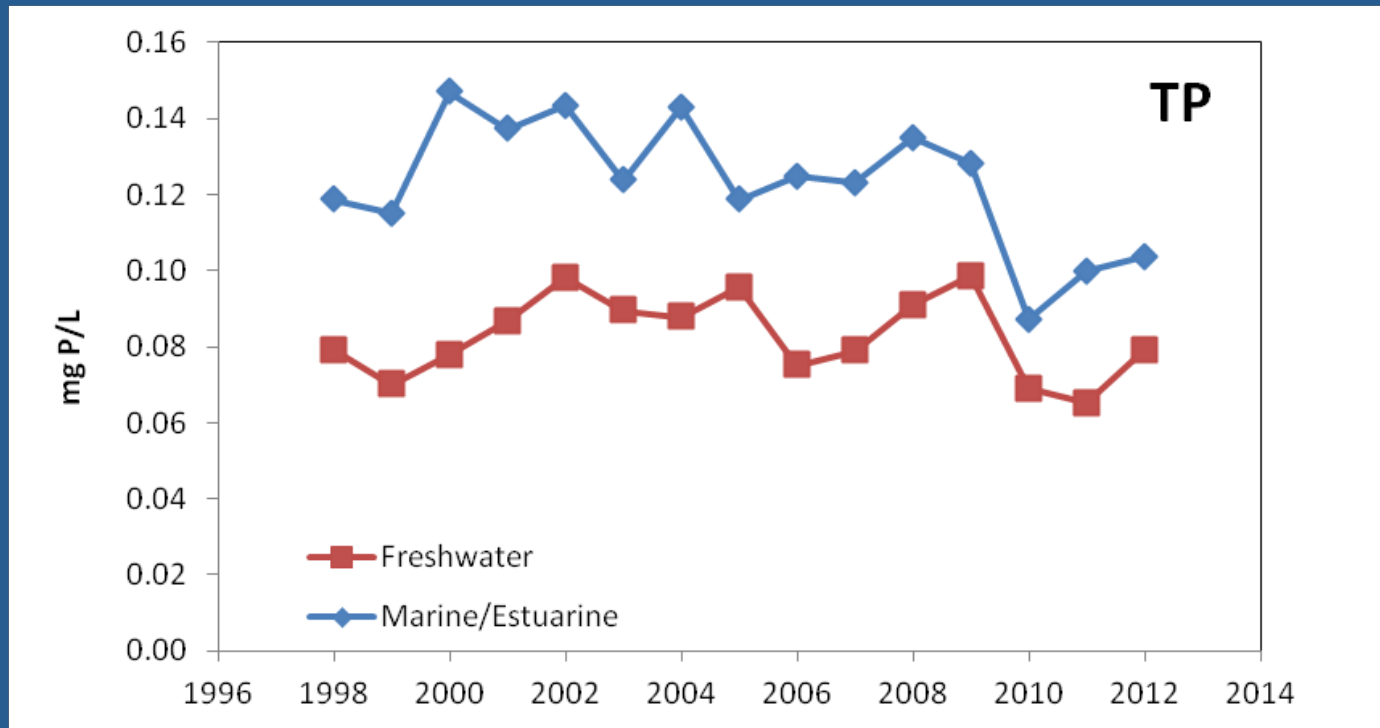
Water Quality Total Phosphorus (TP)

- TP versus Year for LSJR Mainstem



Water Quality Total Phosphorus (TP)

- TP annual average trends

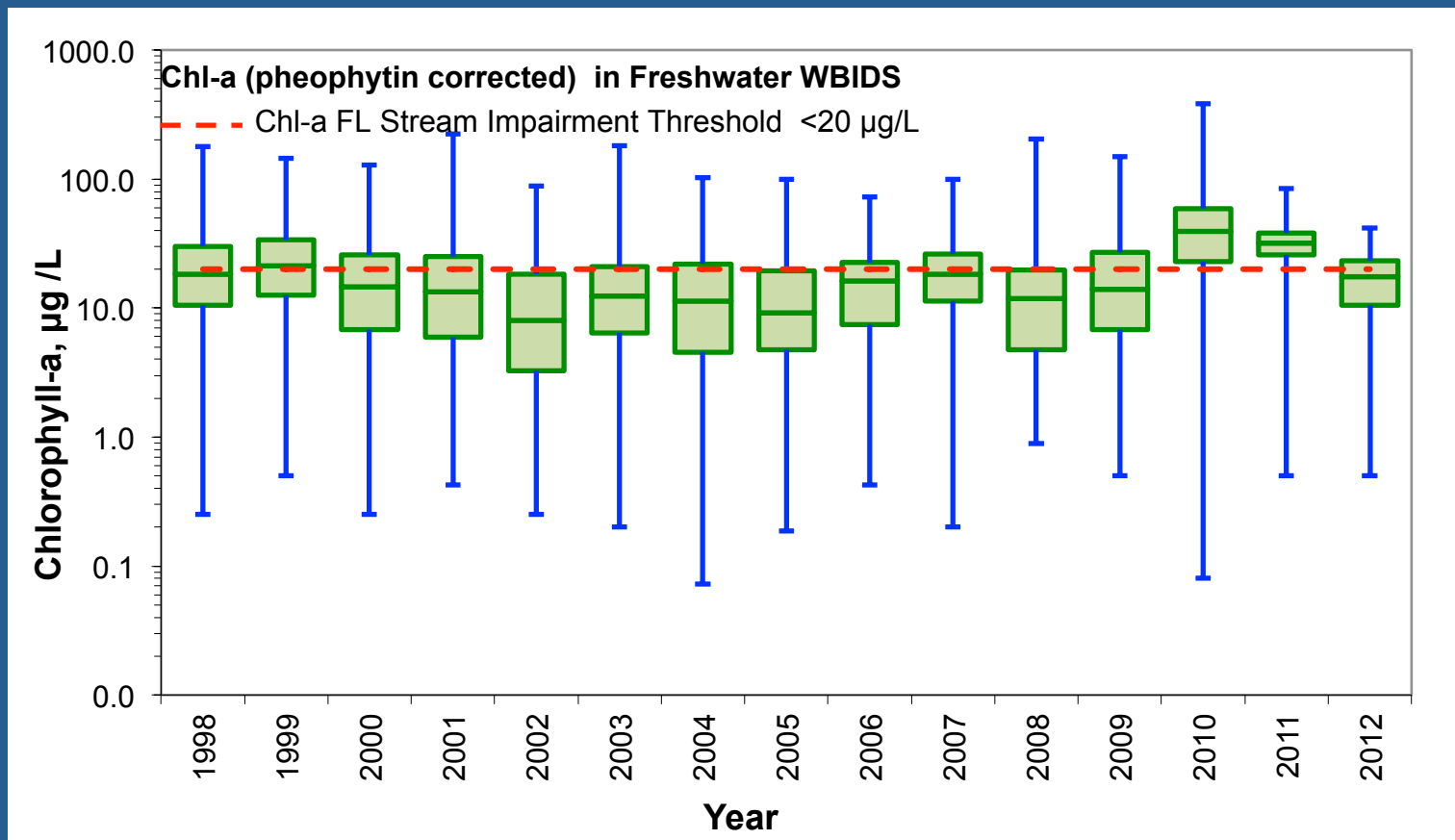


- Phosphorus concentrations not changing.

Water Quality

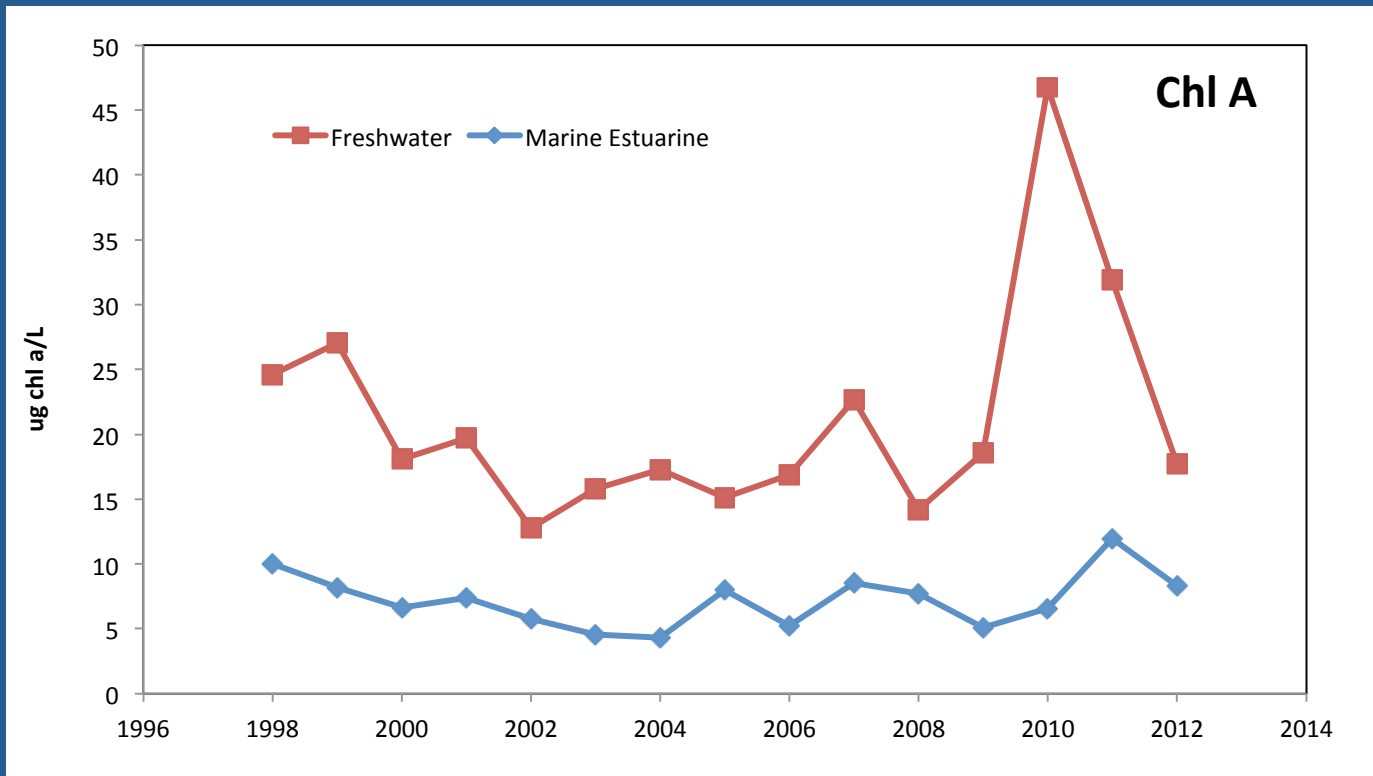
Harmful Algal Blooms

- Chlorophyll-a – phytoplankton indicator



Water Quality Harmful Algal Blooms

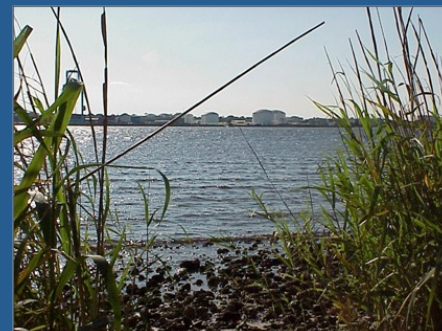
- Chlorophyll-a annual average trends



- No significant change in HABs indicator
- Better assessment methods coming soon

Contaminants

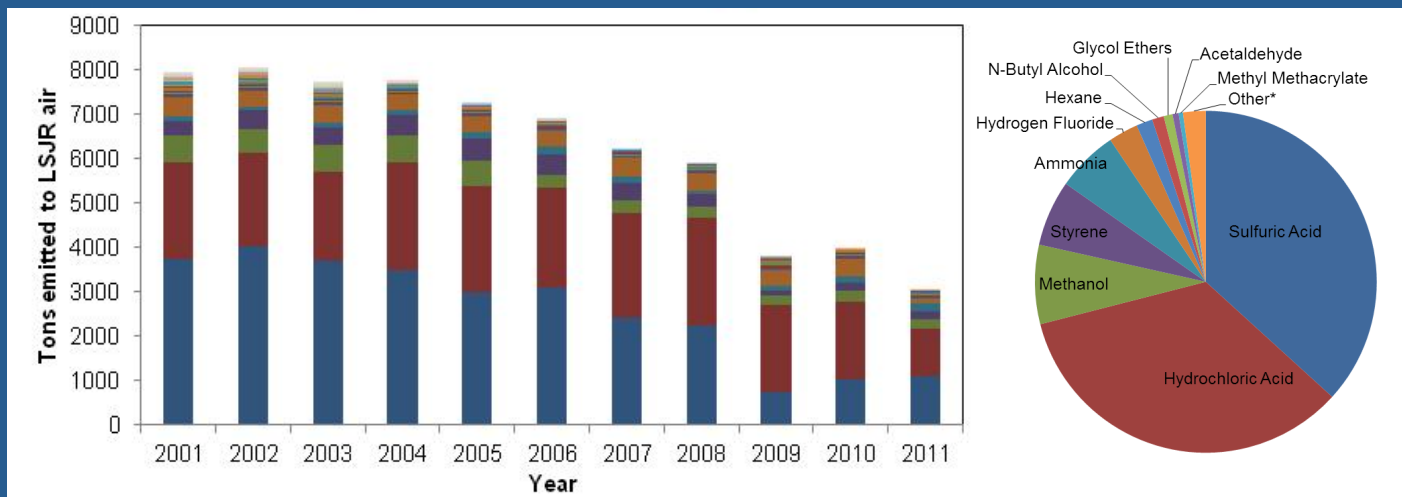
- Releases into the LSJR environment:
TRI
 - Toxics Release Inventory (USEPA)
Reports annual releases into air,
water, and land by industries
- Water column metals concentrations
- Sediment concentrations and toxicity
 - Four types of contaminants examined
 - Concentrations compared to toxic effect
levels for sediment organisms



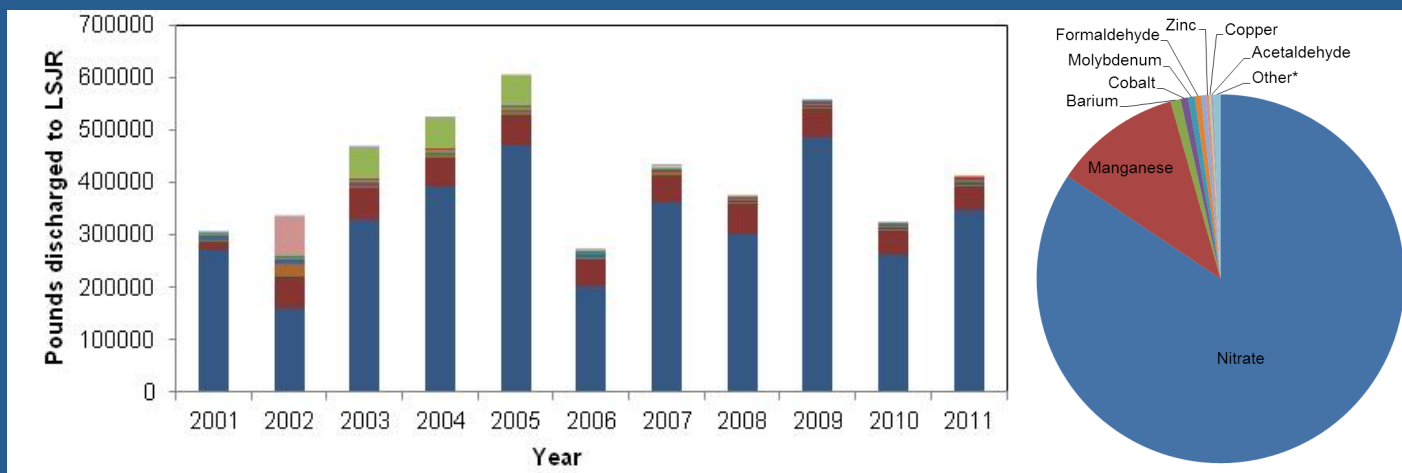
Contaminants

Toxics Release Inventory: Point Sources

- Total releases to air



- Total releases to water



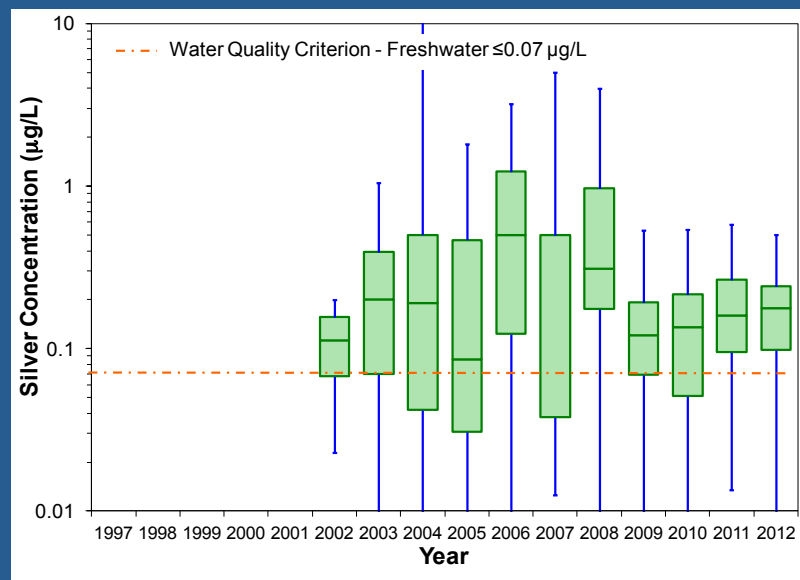
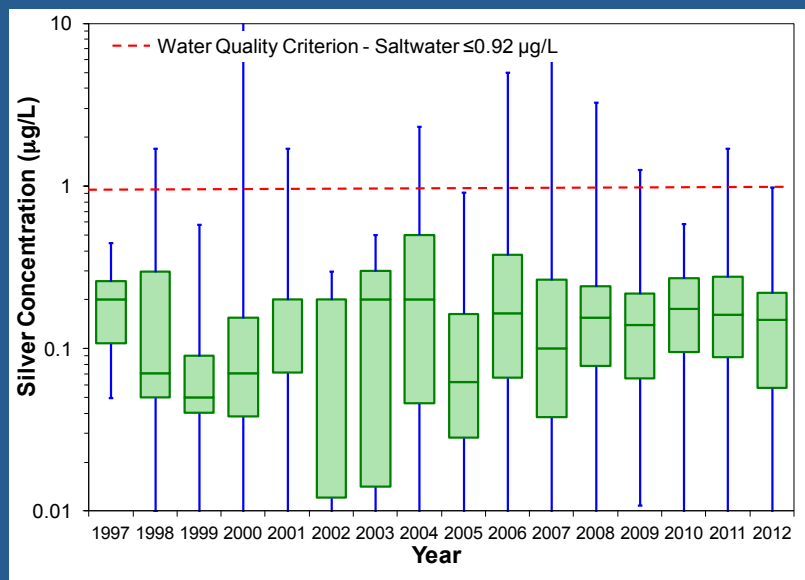
Contaminants

| INDICATOR | STATUS | TREND |
|---|--|--|
| Chemical Releases (TRI) | Air – Satisfactory Water - Satisfactory | Air – Improving Water - Unchanged |
| Water Metals | Mixed | Conditions Unchanged |
| Sediment Metals | Unsatisfactory | Conditions Unchanged |
| Sediment Polyaromatic Hydrocarbons (PAHs) | Unsatisfactory | NORTHERN LSJRB – Improving SOUTHERN LSJRB - Uncertain |
| Sediment Polychlorinated Biphenyls (PCBs) | Unsatisfactory | Conditions Unchanged |
| Sediment Pesticides with Chlorine | Unsatisfactory | Conditions Unchanged |

Contaminants

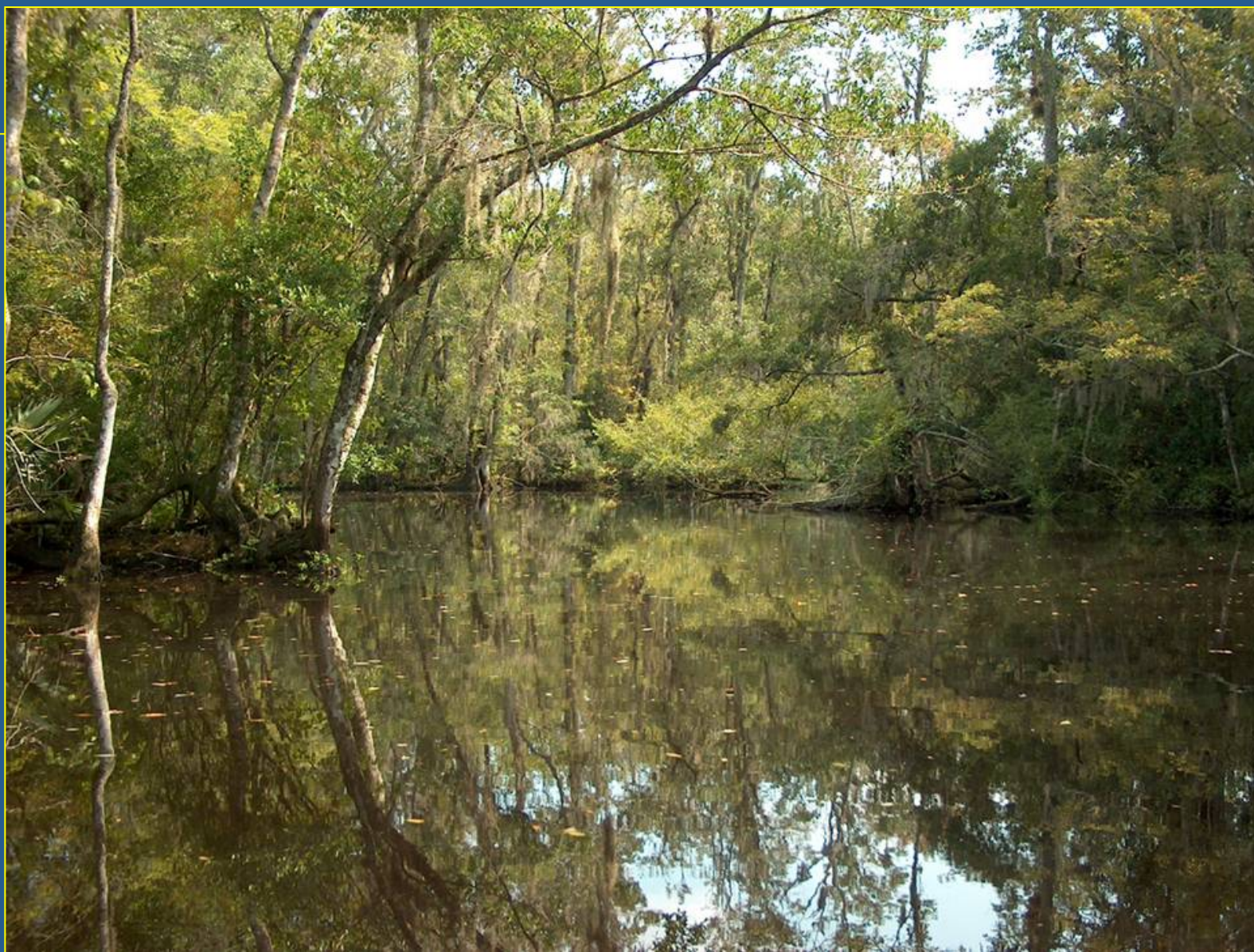
Metals in Water

- Arsenic, cadmium, nickel and zinc levels acceptable
- Copper, lead, silver potential problems



The Future

- Continue the report each year
- Tiered K-12 project with buy-in from local schools
- Development of online interactive format
- Salinity information added



Thank you.