State of the River Report for the Lower St. Johns River Basin

Water Quality, Fisheries, Aquatic Life, Contaminants

2014

Lower Basin of the St. Johns River Jacksonville, FL

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About the Report

- Funded primarily by COJ EPB
- Purpose
  - Inform the public about the LSJRB health
  - Provide independent assessments of status and trends
- First annual report in 2008
- Authors

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About the Report

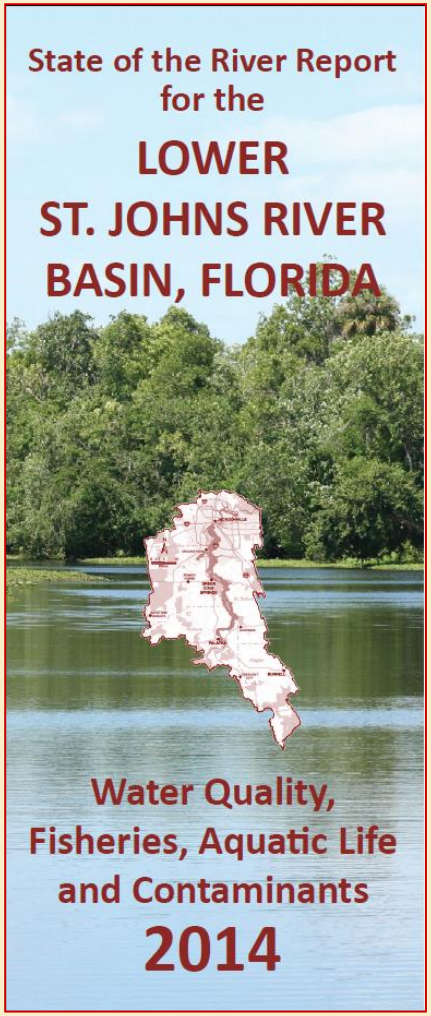
- Reviewers and Advisors:
  - SJRWMD
  - City of Jacksonville
  - FL Dept. of Health
  - JEA
  - St. Johns Riverkeeper
  - Middlebrook Company
  - The Nature Conservancy
  - FWRI
  - FL Sea Grant
  - National Park Service
  - Wildwood Consulting
  - UNF
  - JU
  - Valdosta State

- Special thanks to:
  - Dr. Ray Bowman
  - Dr. Quinton White
  - Dr. Dan McCarthy
  - Ms. Heather McCarthy
  - Dr. Pat Welsh

About the Report

- Topics
  - Background
  - Water Quality
  - Fisheries
  - Aquatic Life
  - Contaminants
- Full Report
- Appendices
- Digital archive of references
- Website
- Brochure
- Interactive tributaries

SJRreport.com



Brochure




Water Quality

DISSOLVED OXYGEN

- TRIBUTARIES
- MAINSTEM

NUTRIENTS

- NITROGEN
- PHOSPHORUS
- TURBIDITY
- ALGAL BLOOMS
- BACTERIA (fecal coliform)
- SALINITY

Fisheries

- RED DRUM
- SPOTTED SEATROUT
- LARGEMOUTH BASS
- FRESHWATER CATFISH
- SHEEPSHEAD
- STRIPED MULLET
- SOUTHERN FLOUNDER
- ATLANTIC CROAKER
- BAITFISH
- BLUE CRAB
- SHRIMP
- STONE CRAB

A red box indicated the status or trend has changed from last year's River Report. For detailed explanations and statistical analyses of status and trend ratings, please see the full technical report at www.sjrreport.com.

Aquatic Life

- SUBMERGED AQUATIC VEGETATION
- WETLANDS
- MACROINVERTEBRATES
- FLORIDA MANATEE (endangered)
- BALD EAGLE (delisted 2007)
- WOOD STORK (endangered)
- NONNATIVE AQUATIC SPECIES

Contaminants

TOXICS RELEASE INVENTORY: Point sources of contaminants in the Lower St. Johns River region.

- AIR EMISSIONS
- WATER DISCHARGES

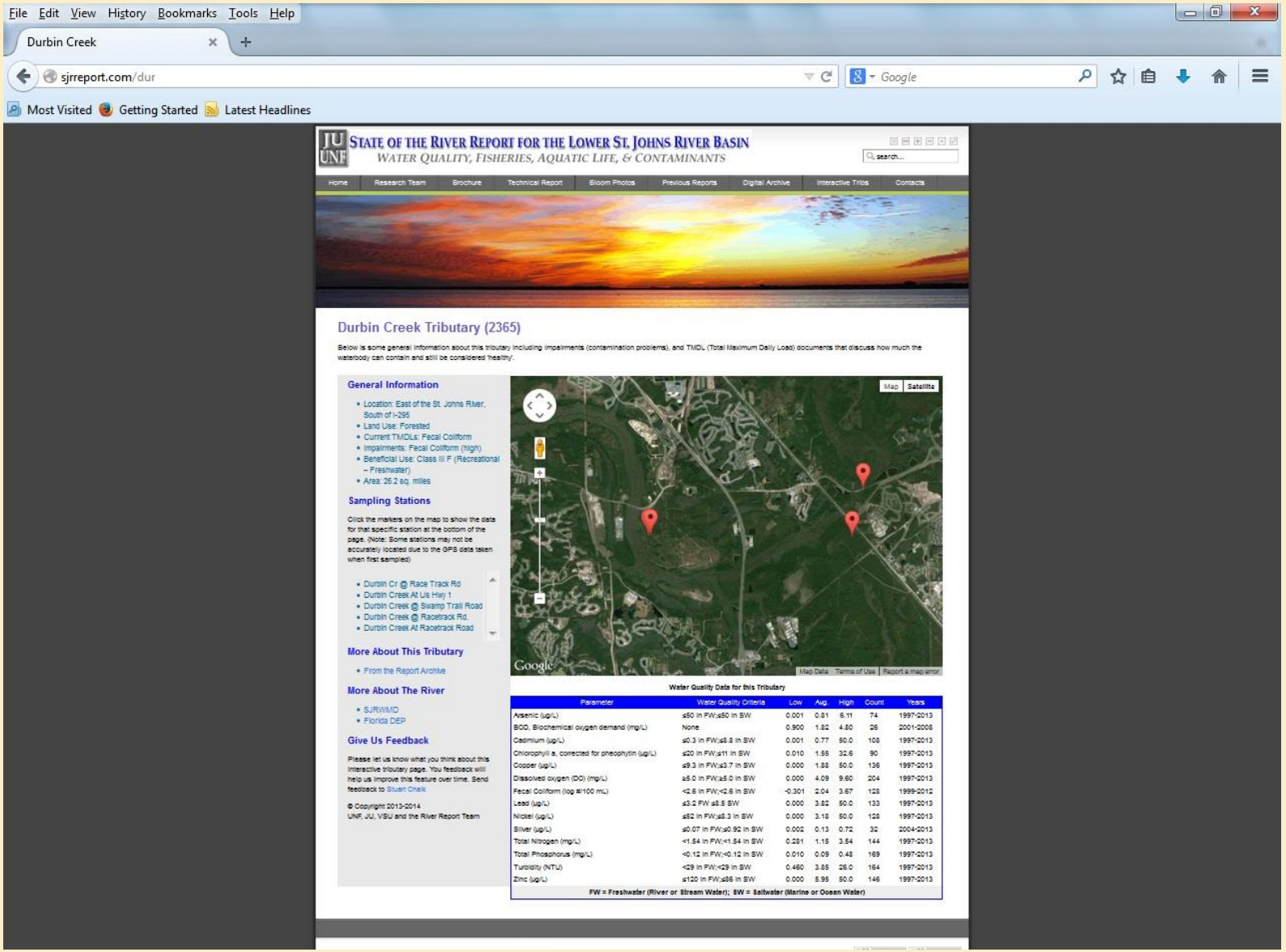
SEDIMENT POLYAROMATIC HYDROCARBONS (PAHs)

- NORTHERN LSJRB
- SOUTHERN LSJRB
- SEDIMENT POLYCHLORINATED BIPHENYLS (PCBs)
- SEDIMENT PESTICIDES
- SEDIMENT METALS

METALS IN THE WATER COLUMN

- arsenic, cadmium, nickel, zinc
- copper, lead, silver

Interactive Tributary Page

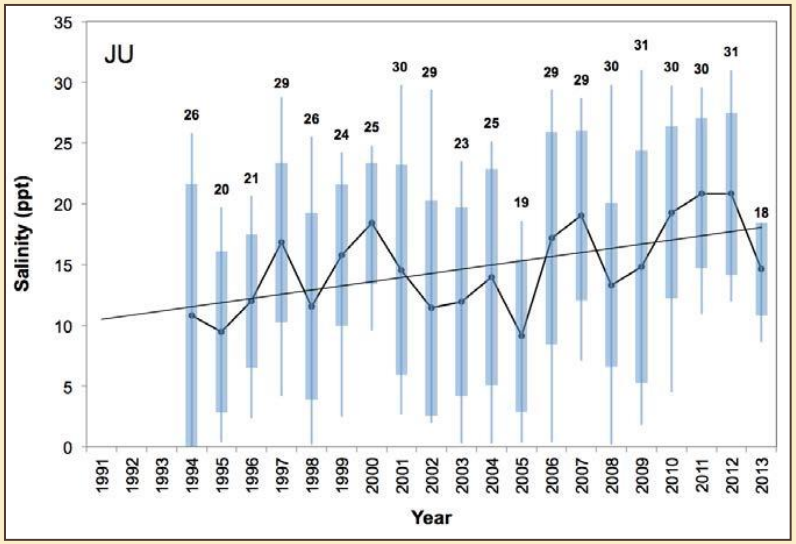


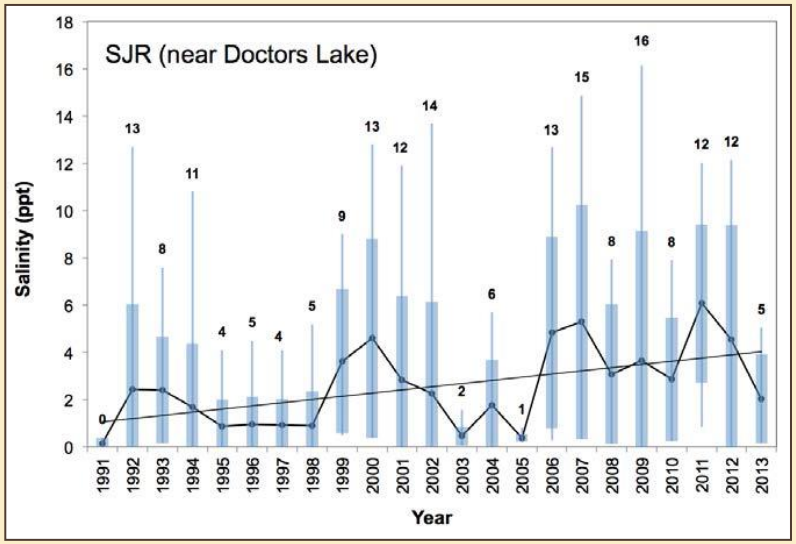
Water Quality

Indicator	Status	Trends
Salinity	Uncertain	Worsening
Fecal Coliform	Unsatisfactory	Uncertain
Turbidity	Satisfactory	Improving
Dissolved Oxygen	Unsatisfactory	Tributaries: Worsening Mainstem: Unchanged
Algal Blooms	Unsatisfactory	Unchanged
Nutrients	Nitrogen: Unsatisfactory Phosphorus: Unsatisfactory	Nitrogen: Improving Phosphorus: Unchanged

Salinity

- Episodic fluctuations with weather
  - Drought, hurricanes
- Daily fluctuations with tide up to Shands Bridge
- Increasing mean salinity in transition areas





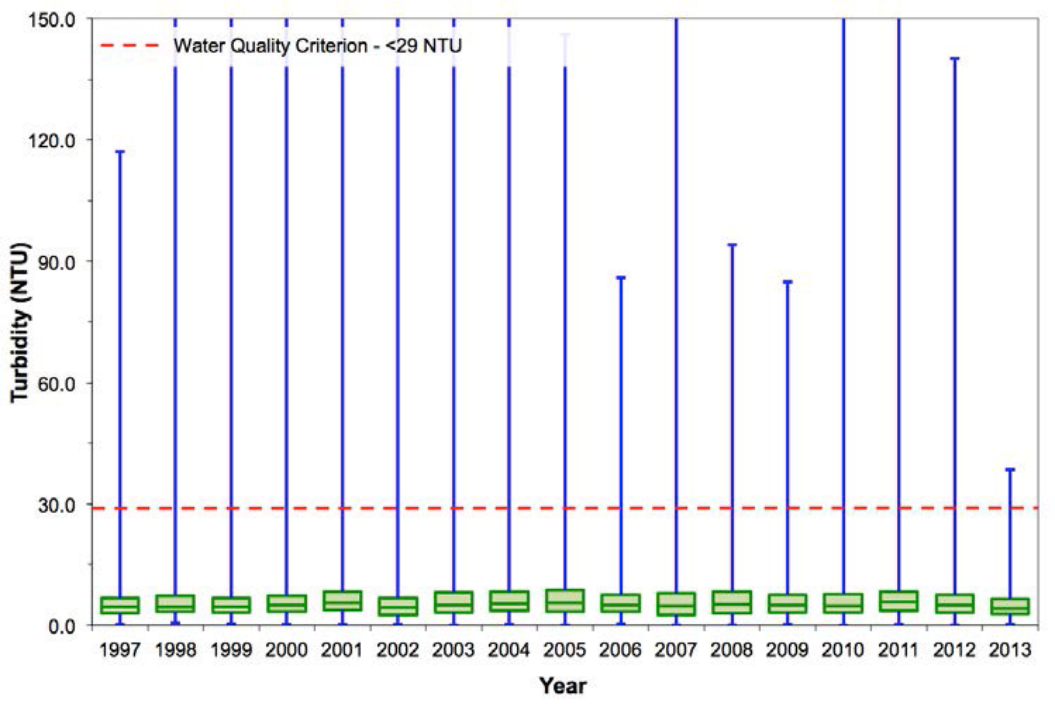
Salinity

- Potential impacts in the Lower basin
  - Movement south of transition zones between fresh and saltwater
  - Redistribution of salt and freshwater fish
  - Life-cycle disruption of organisms that need marine and freshwater habitats (e.g., crabs, shrimp)
  - Shifts in macroinvertebrate populations
  - Less SAV in the north, therefore less food and habitat
  - Loss of freshwater hardwood swamps in some areas

Fecal Coliform

- LSJRB tributaries impaired for fecal coliform: 57 total. Of those, 25 have final BMAPs.
- Of those 25, 17 have shown 50% or greater reduction in median FC value observed at time of TMDL determination.
  - Deer, Goodby's ,Hogan, Miramar, Newcastle, Blockhouse, Cormorant, Deep Bottom, Fishing, Greenfield, Lower Trout, McCoy, Middle Trout, Moncrief, Pottsburg, Sherman, Wills
- Eight have shown less than 50% reduction in median: Big Fishweir, Butcher Pen, Miller, Open, Terrapin, Craig, Hopkins, Williamson Creeks
- Despite reductions, FC levels in many tributaries exceed water quality criteria.

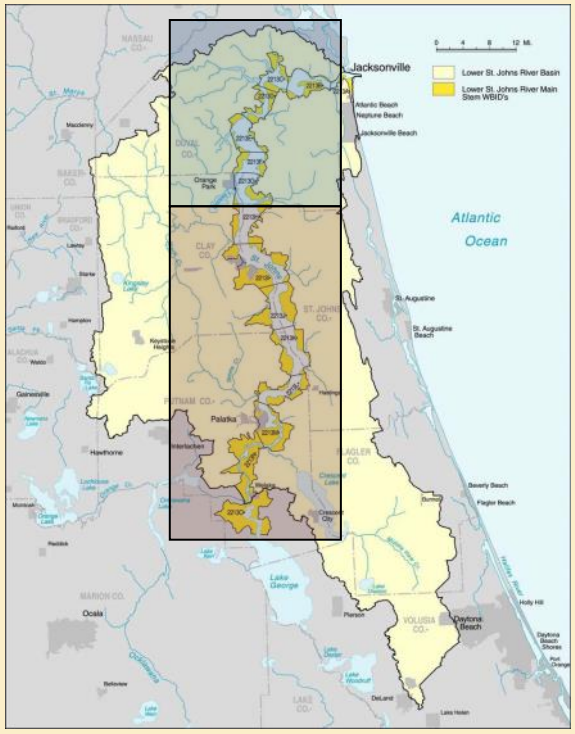
Turbidity

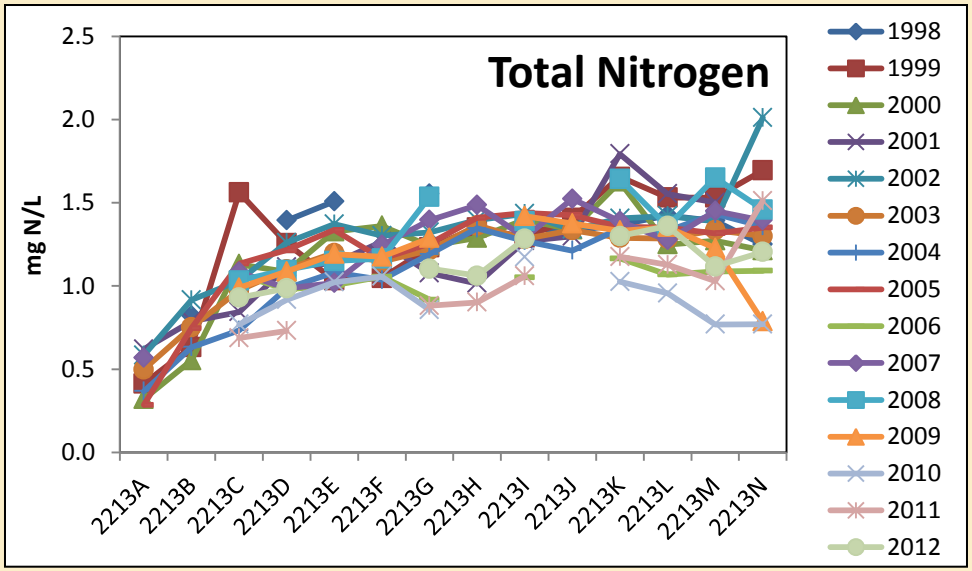


- Mean, maximum value, and minimum value are declining. In particular, minimum values are declining significantly.

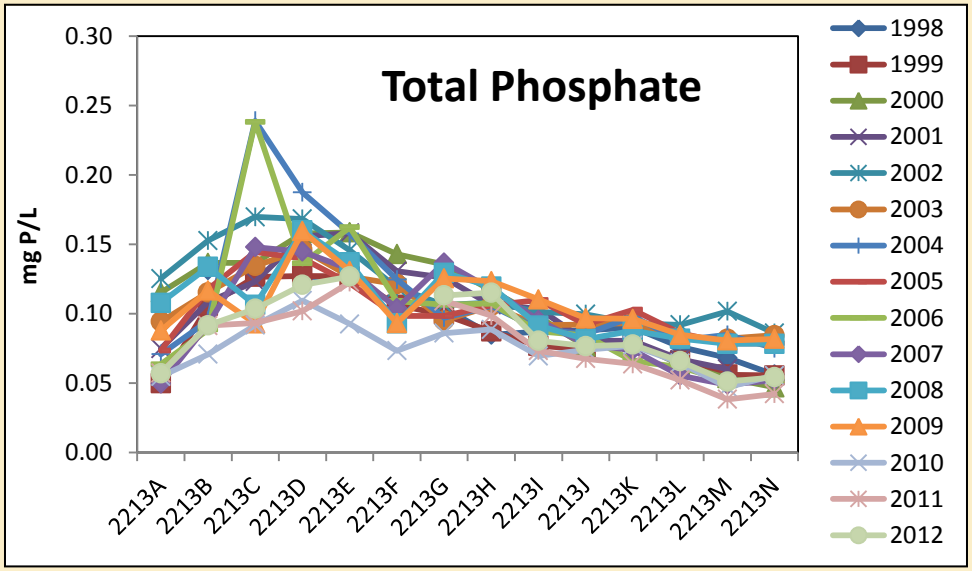
Nutrients

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



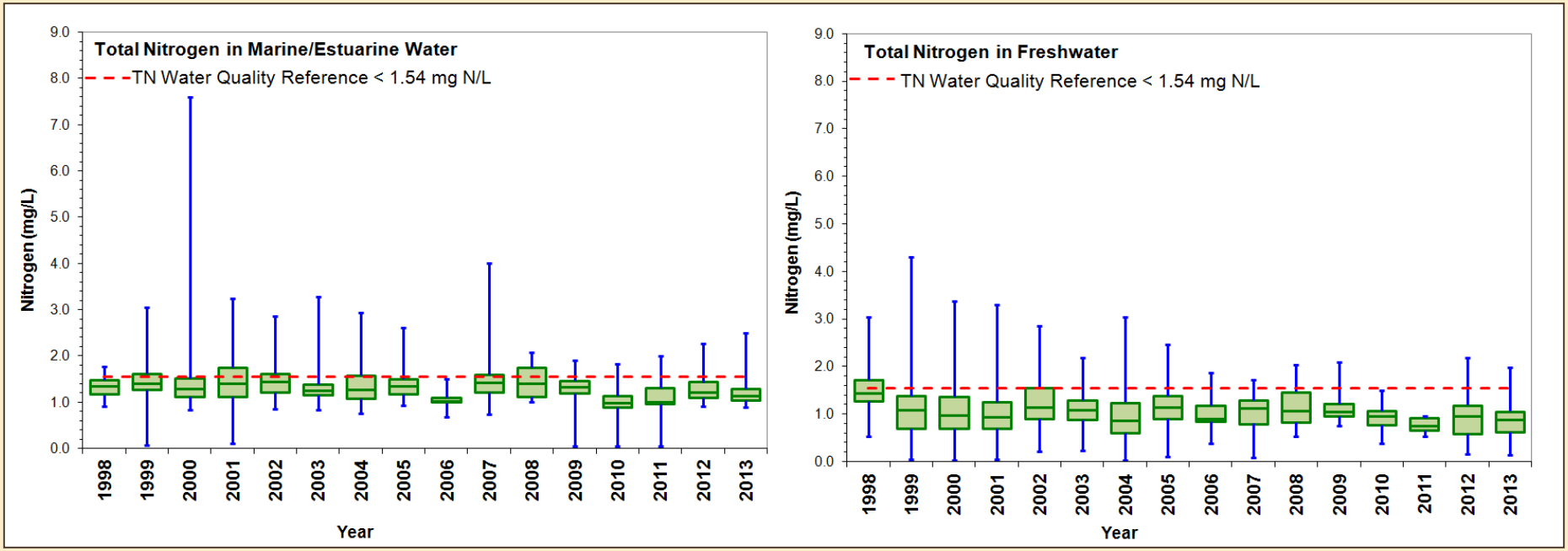


Marine → Freshwater



Nutrients

- Total Nitrogen Status



– Medians < WQR but maxima > WQR*

* WQR = Water Quality Criteria for Peninsular Florida

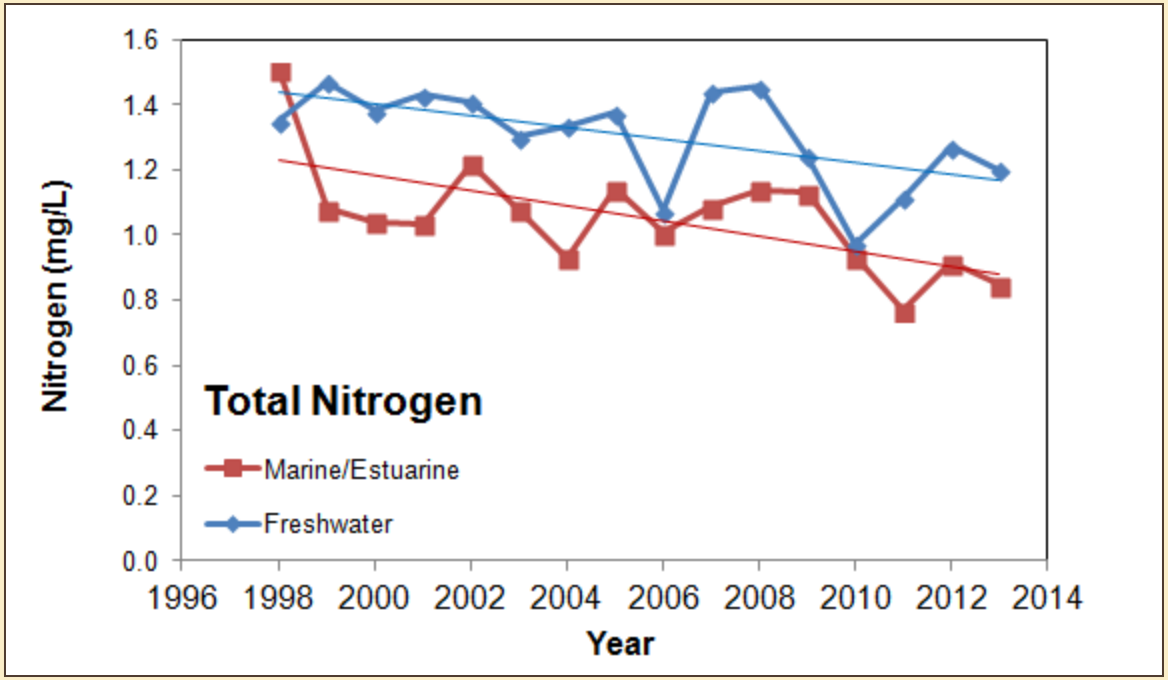
Based on reference streams

Total Nitrogen < 1.54 mg TN/L

"Implementation of Florida's Numeric Nutrient Standard", FDEP, September 2013

Nutrients

- Total Nitrogen Trend

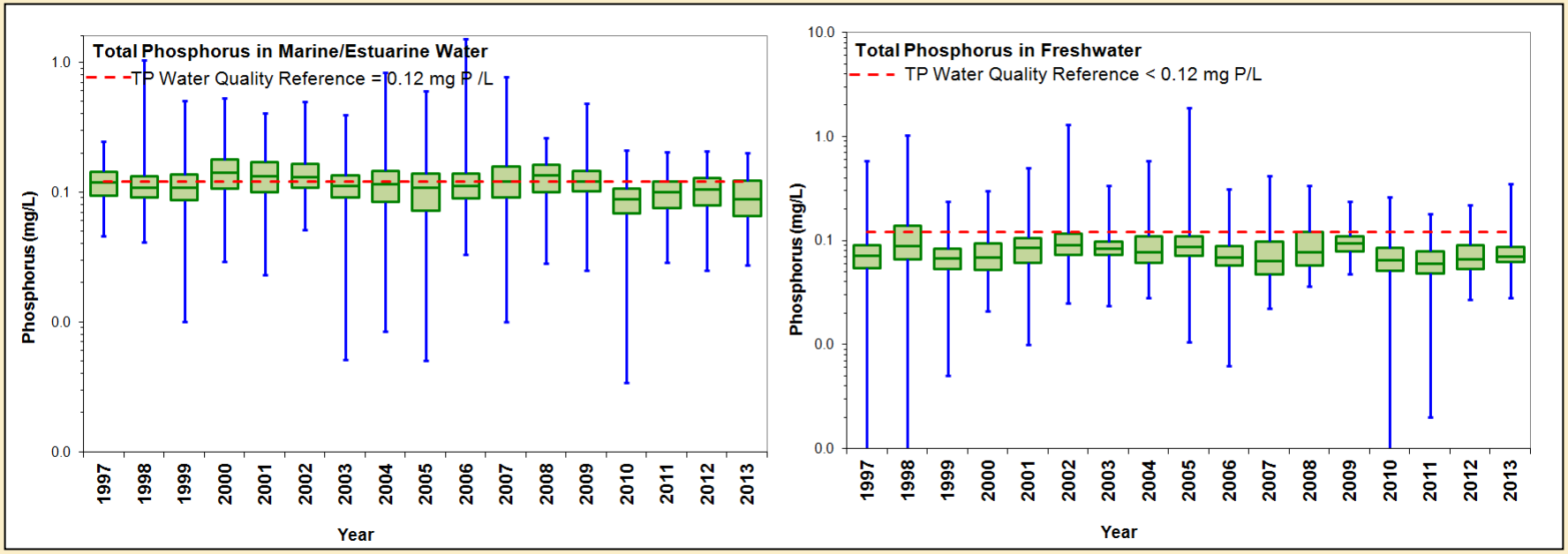


  - Annual average declining in fresh to marine water *(Spearman Rank p <0.05)*

INDICATOR	STATUS	TREND
Nitrogen	Unsatisfactory	Improving

Nutrients

- Total Phosphorus Status



– Medians < WQR but maxima > WQR*

* WQR = Water Quality Criteria for Peninsular Florida

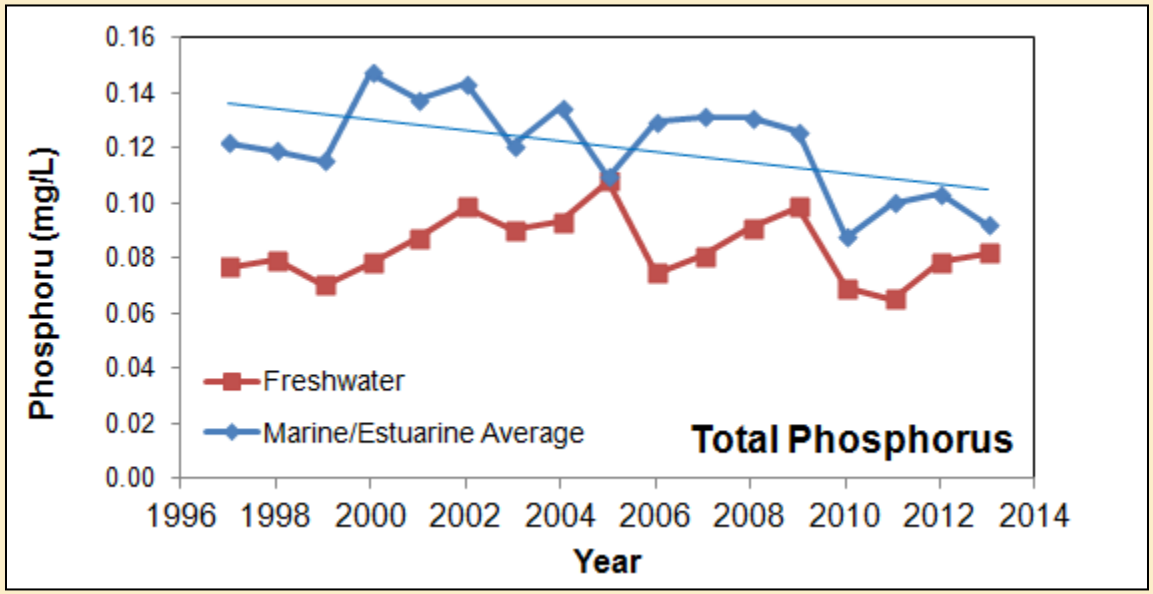
Based on reference streams

Total Phosphorus < 0.12 mg TP/L

"Implementation of Florida's Numeric Nutrient Standard", FDEP, September 2013

Nutrients

- Total Phosphorus Trend

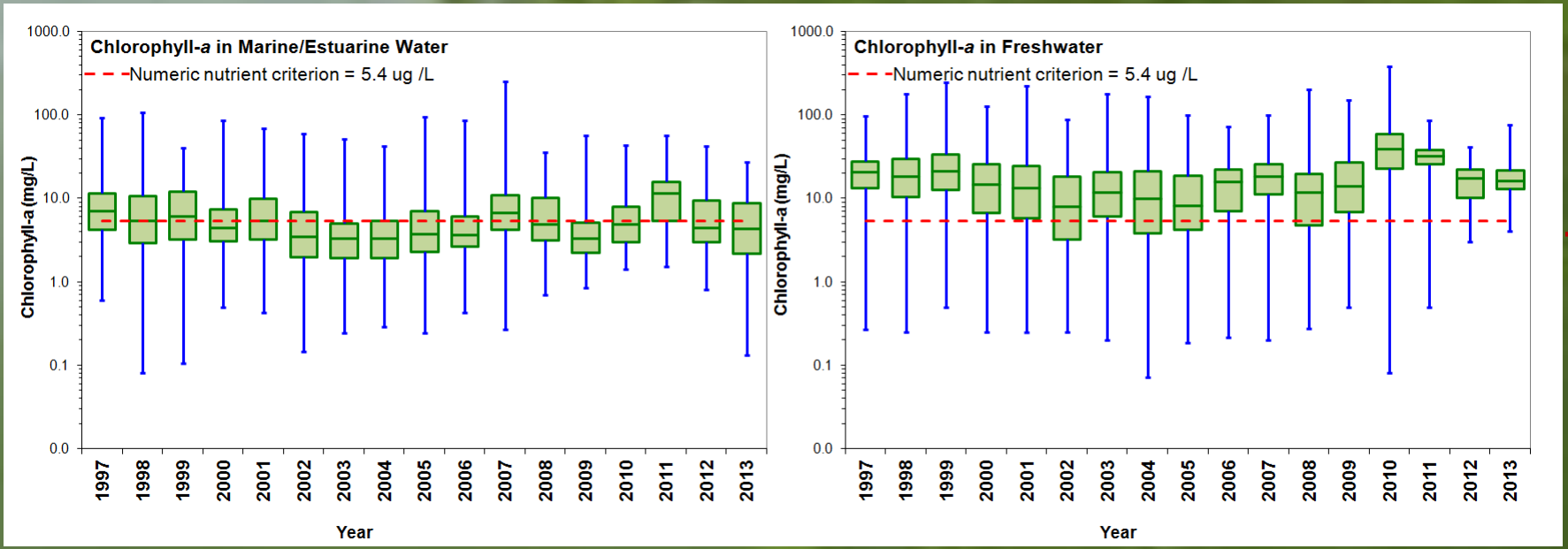


– Annual averages not decreasing freshwater, decreasing marine/estuarine *(Spearman Rank p > 0.05)*

INDICATOR	STATUS	TREND
Phosphorus	Unsatisfactory	Unchanged

Chlorophyll-*a*

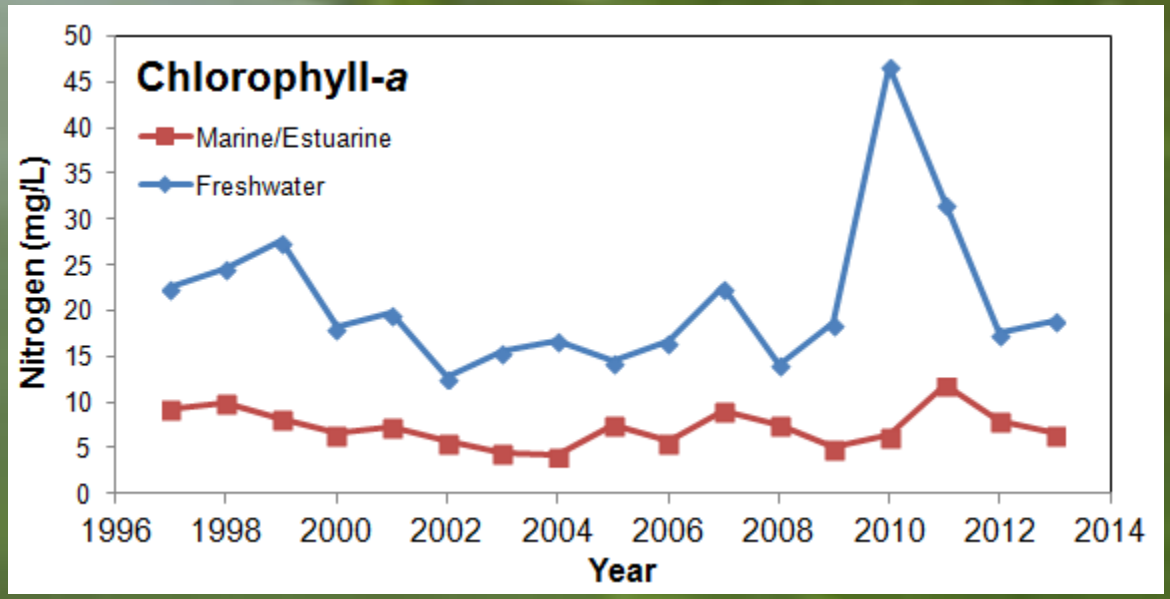
- Phytoplankton indicator used to assess blooms
- Pheophytin-corrected to indicate live organisms



- Stream impairment thresholds exceeded in 2013, especially in fresh water
- New 5.4 ug/L NNC will be exceeded by most samples

Chlorophyll-*a*

- Trend



— No trend in annual average *(Spearman Rank p >0.05)*
— Reports of elevated cyanotoxin levels in 2013
— Better assessments needed

INDICATOR	STATUS	TREND
Algal Blooms	Unsatisfactory	Unchanged

Fisheries

Spotted Seatrout
Cynoscion nebulosus

www.floridasportfishing.com/magazine/images

Atlantic Croaker
Micropogonias undulatus

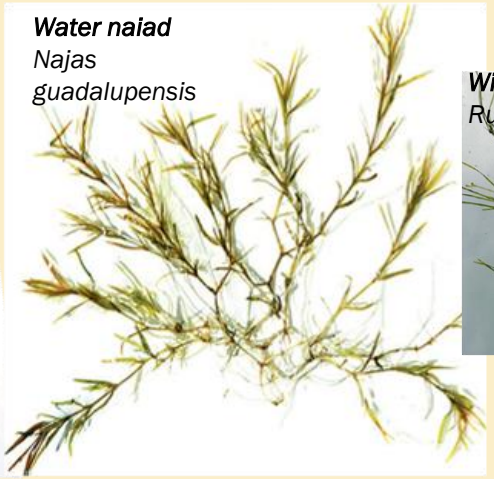
www.floridafishandhunt.com/.../atlcroaker.jpg

Aquatic Life

Indicator	Status	Trends
Submerged Aquatic Vegetation	Unsatisfactory	Uncertain
Wetlands	Unsatisfactory	Uncertain
Macroinvertebrates	Uncertain	Uncertain
Threatened and Endangered Species	Satisfactory	Improving, Unchanged
Nonnative Aquatic Species	Unsatisfactory	Worsening

SAV


Tape grass
Vallisneria americana


Water naiad
Najas guadalupensis


Widgeon grass
Ruppia maritima


Horned pondweed
Zannichellia palustris


Awl-leaf arrowhead
Sagittaria subulata

Significance

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

Critical Conditions

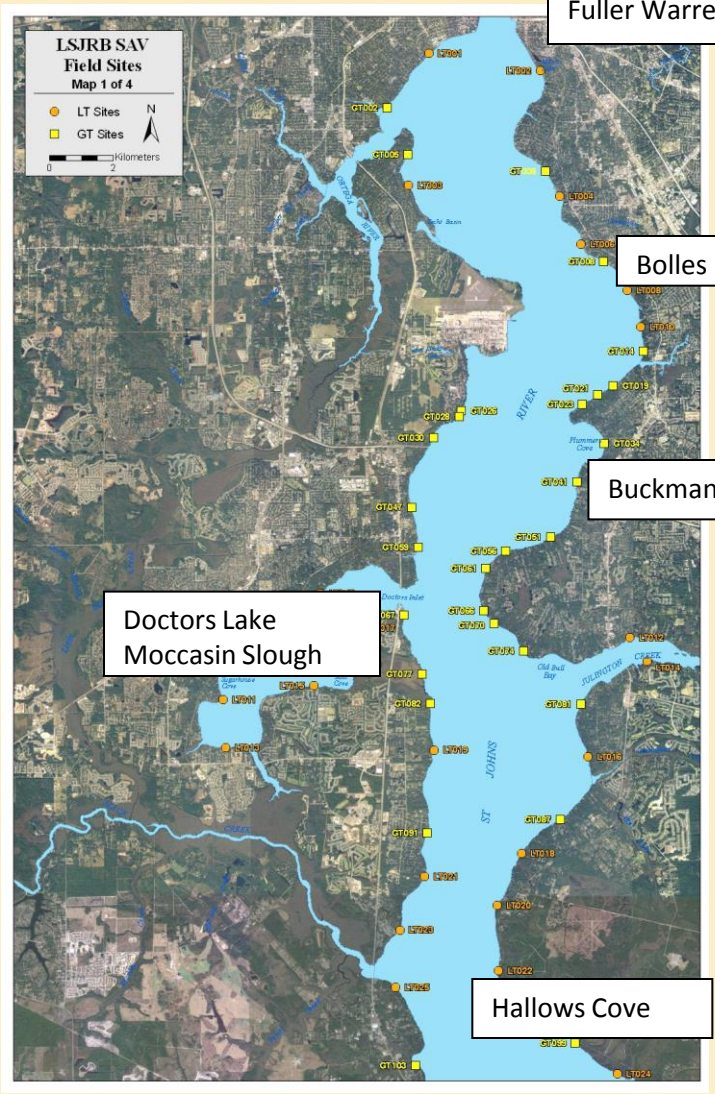
- Salinity
- Water clarity
- Shoreline condition
- Epiphytes

Data

- SJRWMD, 2000-2011
- Transects in 6 sections of LSJR
- Aerial observations 2008-2013

Photos by permission: SJRWMD 1998 Volunteer guide to aquatic plants in the LSJR

SAV



Fuller Warren Bridge

Tape grass
Widgeon grass
Horned pondweed
Water naiad

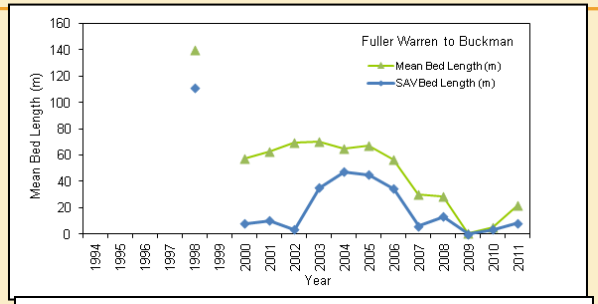
Bolles

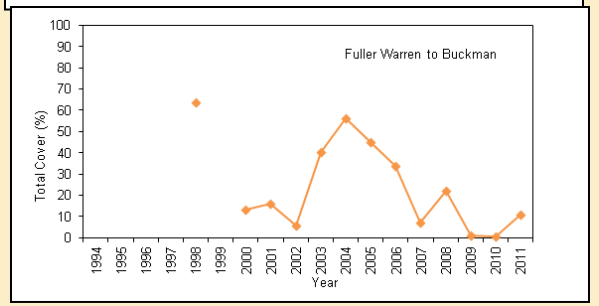
Buckman Bridge

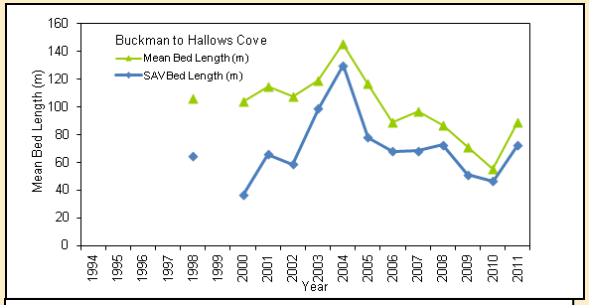
Doctors Lake
Moccasin Slough

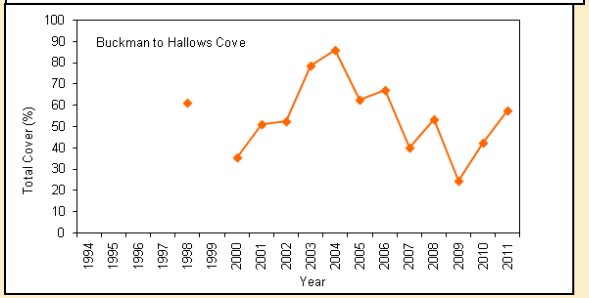
Tape grass
Widgeon grass
Water naiad

Hallows Cove









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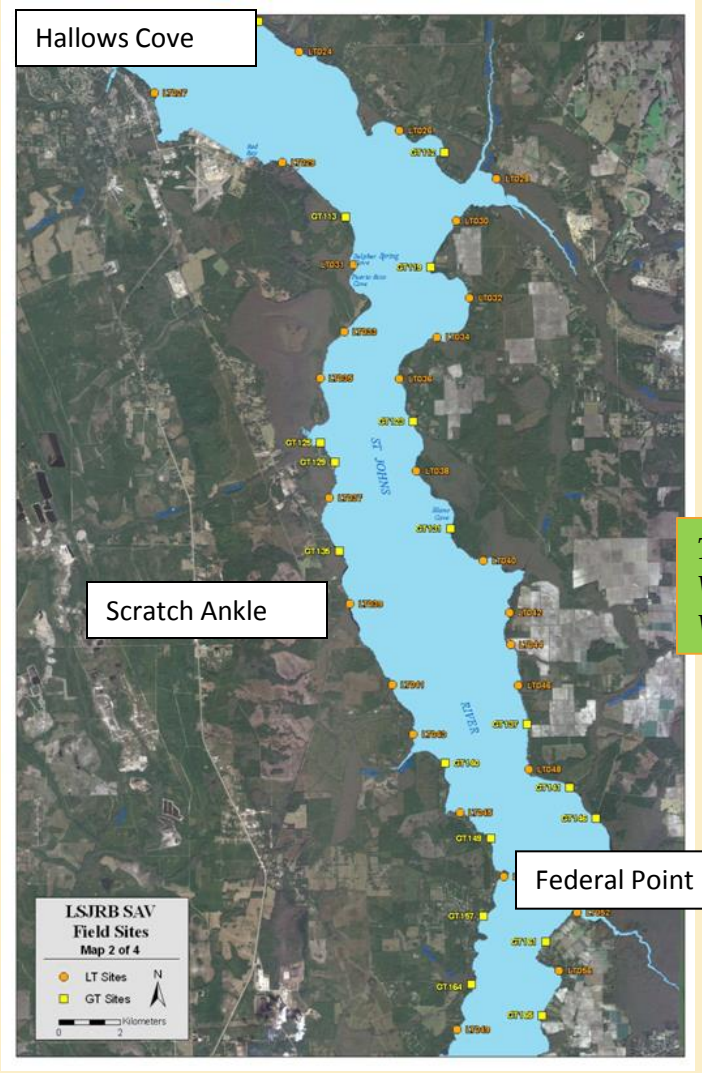
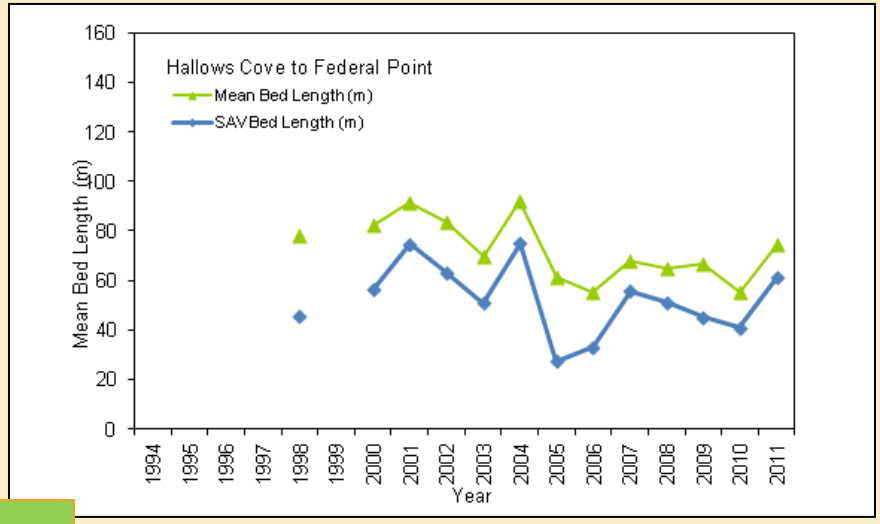
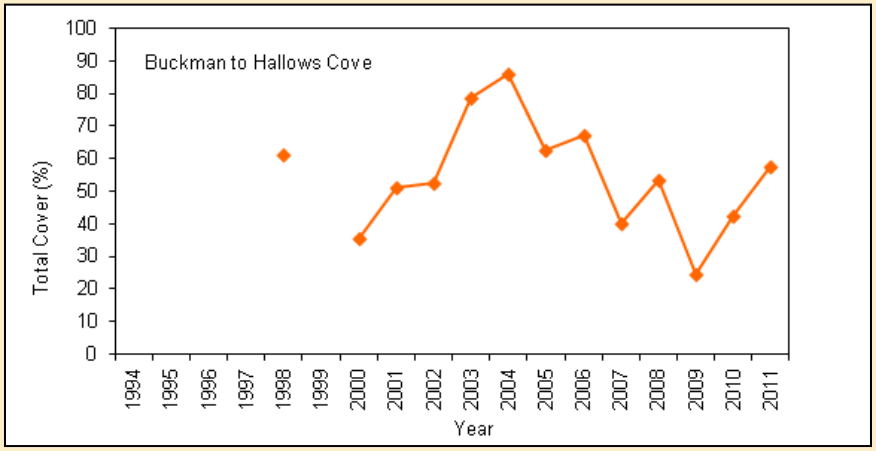




Tape grass
Widgeon grass
Water naiad



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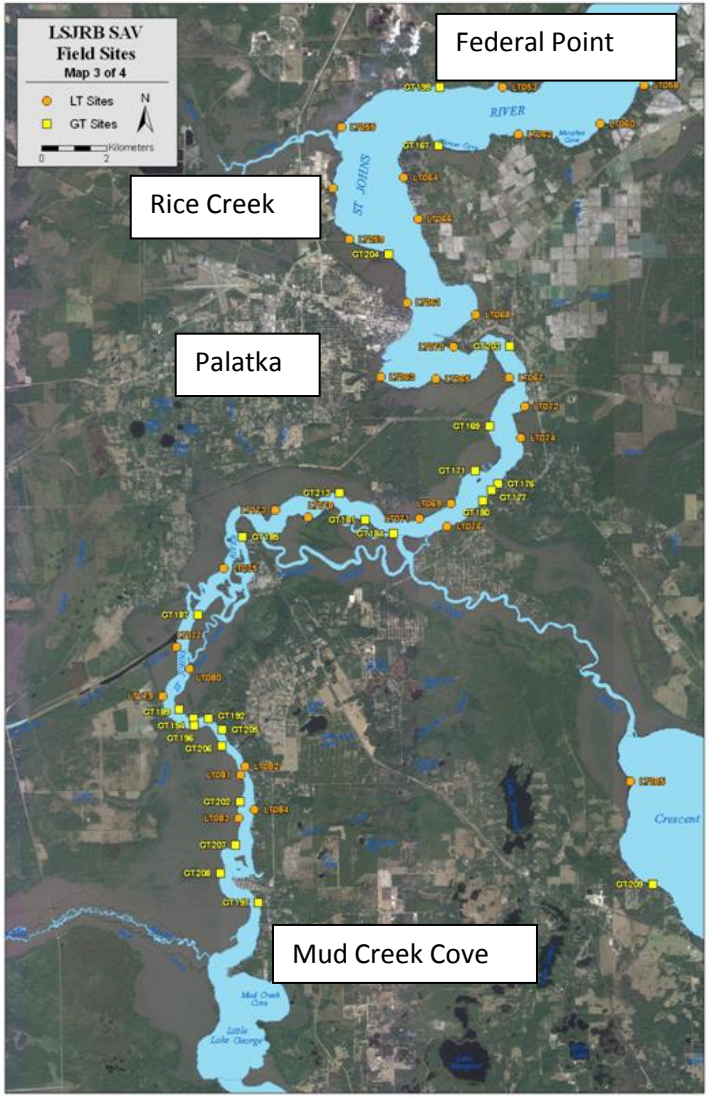
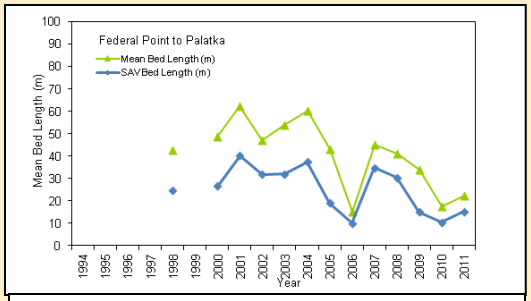
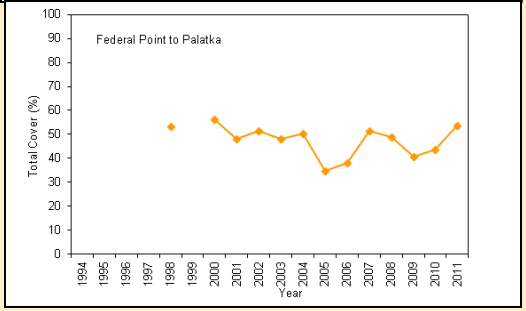
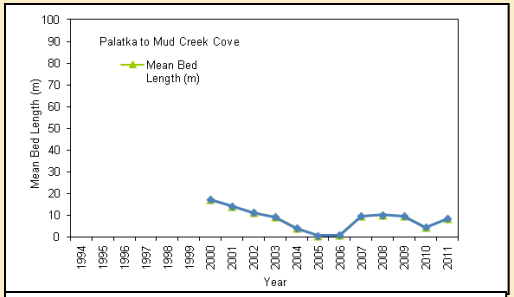


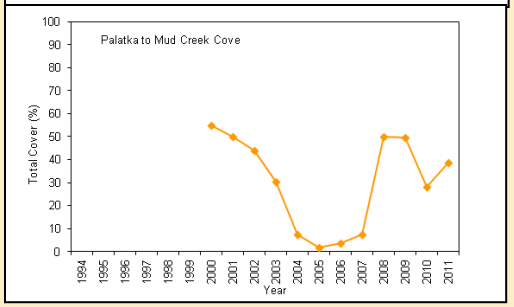
Tape grass
Water naiad





Tape grass
Water naiad
Awl-leaf arrowhead
Horned pondweed





SAV

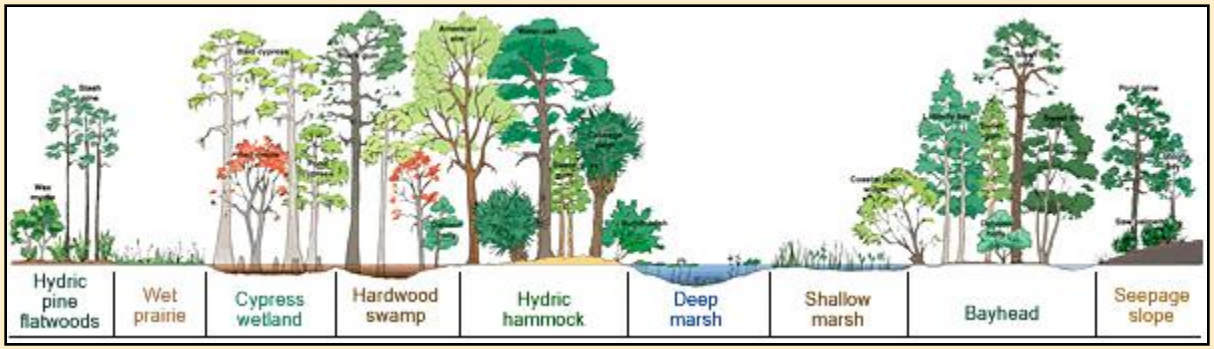
- Summary
  - Highly variable over time due to weather and other factors
  - Decline in grass bed coverage
  - Higher salinity, lower % total cover and % tape grass
  - End of monitoring in 2011 limits understanding of SAV dynamics at a critical time

INDICATOR	STATUS	TREND
Submerged Aquatic Vegetation	Unsatisfactory	Conditions worsening

Wetlands

- Significance
  - Nurseries
  - Habitat
  - Food for manatees, fish, invertebrates, etc.
  - Improves water quality
  - Provide flood control
  - Stabilize banks

Photos by Heather McCarthy

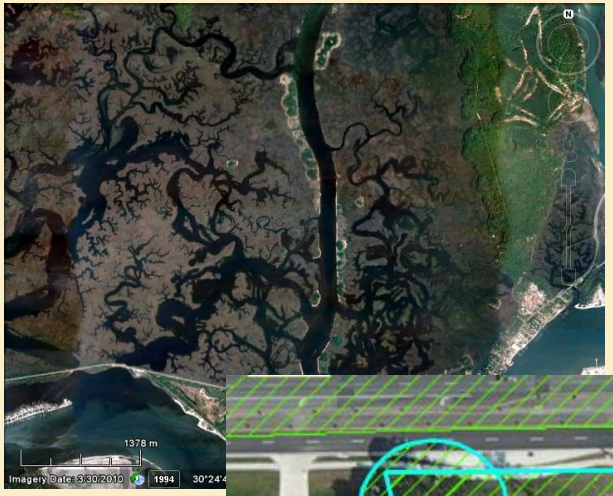


Wetlands

- Multiple stressors

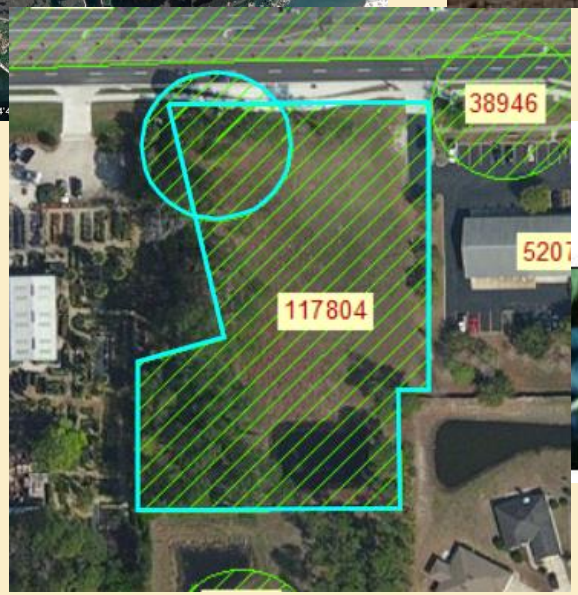
Pollutants

Sea level rise



Hydrology

Fragmentation



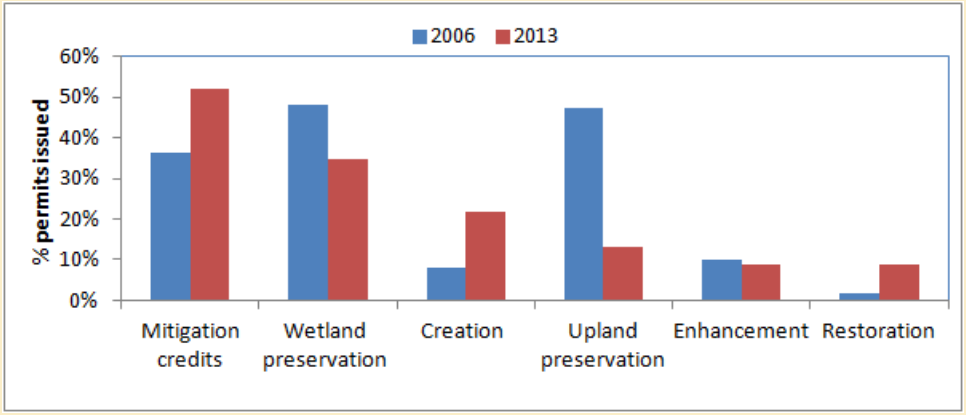
Invasive species

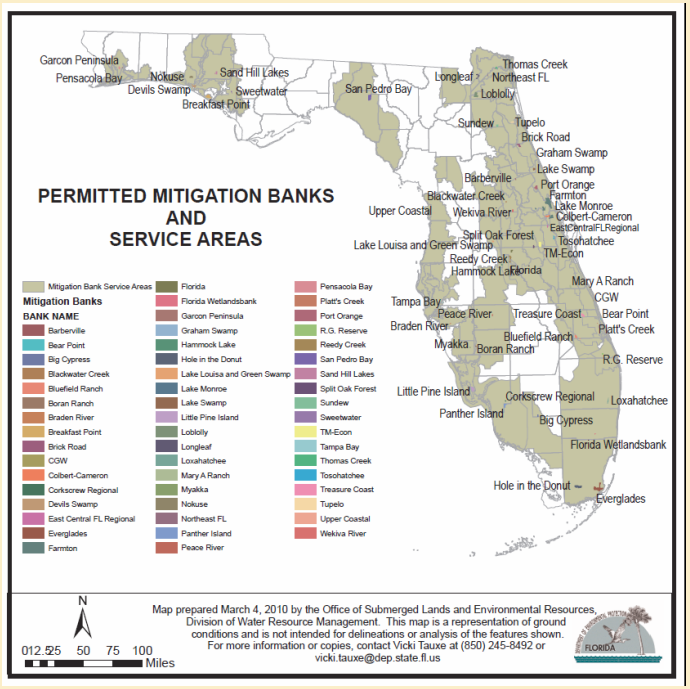
Development

http://www.nwrc.usgs.gov/topics/invasive_species/index.
htmwww.water.ncsu.edu
Sjrwmd permitting site

Wetlands

- Mitigation for destruction
  - Credits from banks, among other means
  - In 2013, credits were used in half the SJRWMD permits
    - Increased ~ 15% since 2006
- Mitigation Banks
  - 15 banks - USACE
    - ~ 50,000 acres
    - Most forested freshwater
  - 11 banks - SJRWMD
    - ~ 25,000 acres
    - Most palustrine forested
  - Serve areas with different wetland locales
- Concerns
  - Shift in wetland types in LSJRB
  - Banks may not function as intended (Reiss 2013)

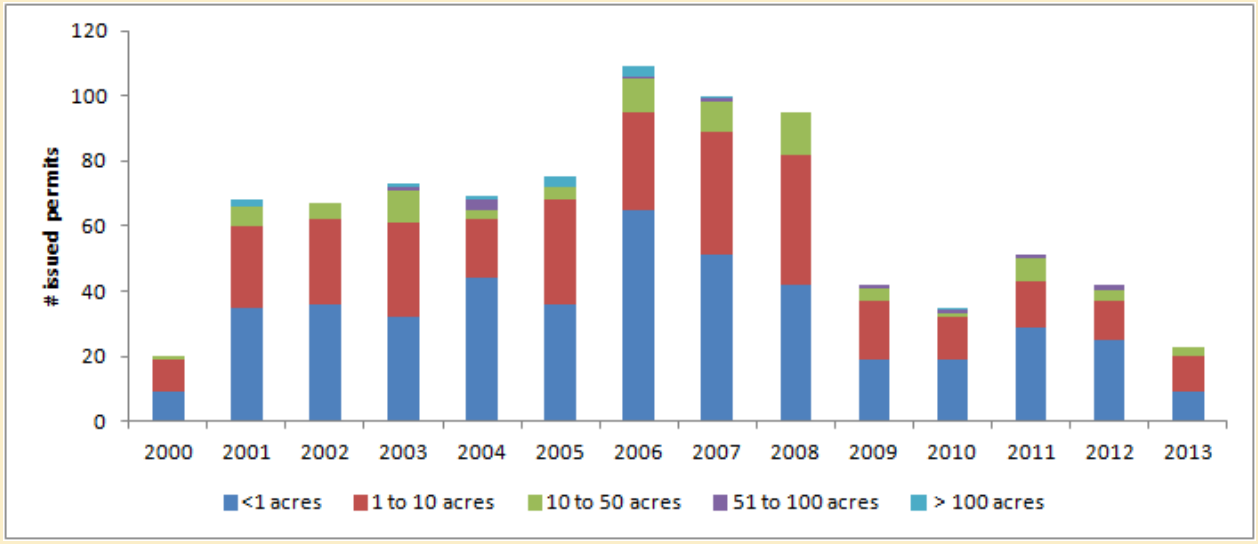




http://www.dep.state.fl.us/water/wetlands/docs/mitigation/perm_banks_msa.pdf

Wetlands

- Fragmentation
  - Continuity of wetlands essential
  - Small wetlands connect, including intermittent ones
  - Small altered wetlands may be unmitigated
  - Most SJRWMD permits for less than 10 acres



Wetlands

- Summary
  - Difficult to assess LSJRB wetlands status
  - Concerns:
    - Shifts in wetlands types from mitigation and salinity increases
    - Loss of coastal wetlands
    - Loss of function by connectivity disruptions

During 2004-2009, over one third of a million acres of US coastal wetlands were lost, a rate 25% higher than the prior 5 years
(Dahl and Stedman 2013)

INDICATOR	STATUS	TREND
Wetlands	Unsatisfactory	Uncertain

Nonnative Aquatic Species

- ~68 disparate species
  - Plants to mammals
- >65% of the species- freshwater
- Vectors
  - Ballast water
  - Aquarium trade
  - Escapees or release
- Climate change range expansions from southern Florida invasives

-species/lionfish/

INDICATOR	STATUS	TREND
Non-native Aquatic Species	Unsatisfactory	Conditions worsening

Contaminants

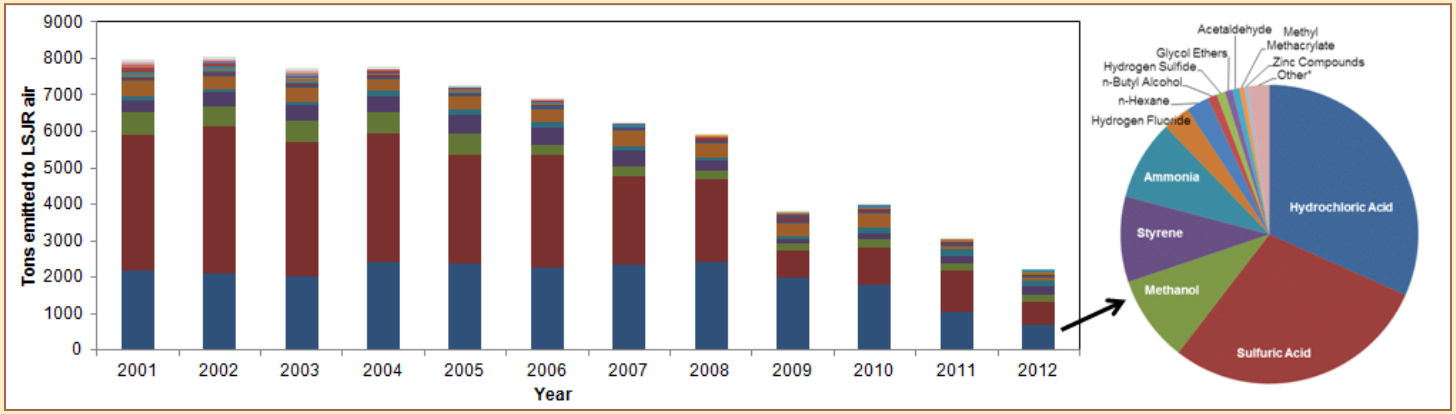
INDICATOR	STATUS	TREND
Chemical Releases (TRI)	Air – Satisfactory Water - Satisfactory	Air – Improving Water - Unchanged
Water Metals	Mixed	Conditions Unchanged
Sediment Metals	Unsatisfactory	Conditions Unchanged
Sediment Polyaromatic Hydrocarbons (PAHs)	Unsatisfactory	NORTHERN LSJRB – Improving SOUTHERN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

Contaminants

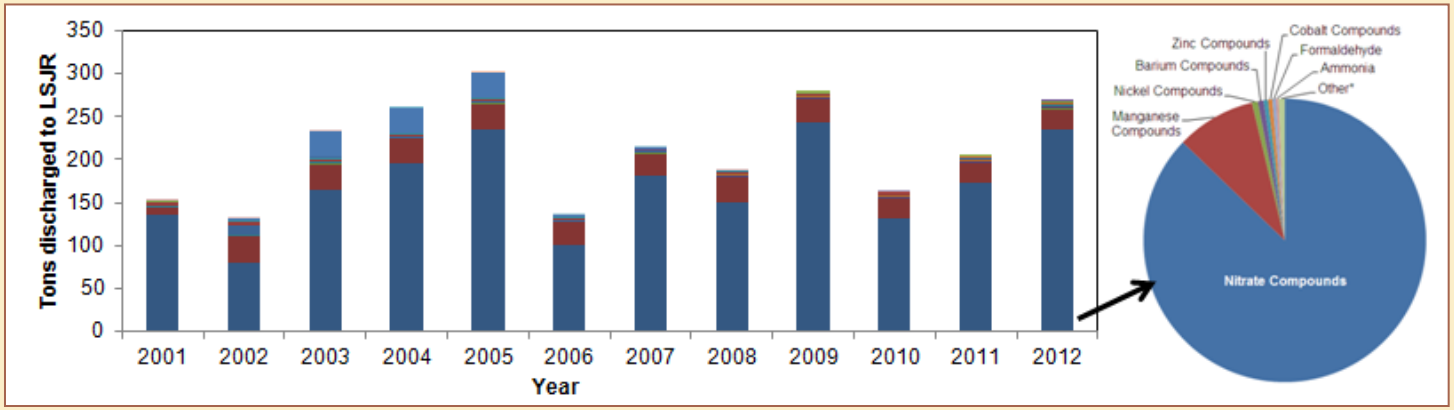
- Toxics Release Inventory

  Point sources of chemicals from permitted industries

– Total chemical releases to air



– Total Chemical releases to water

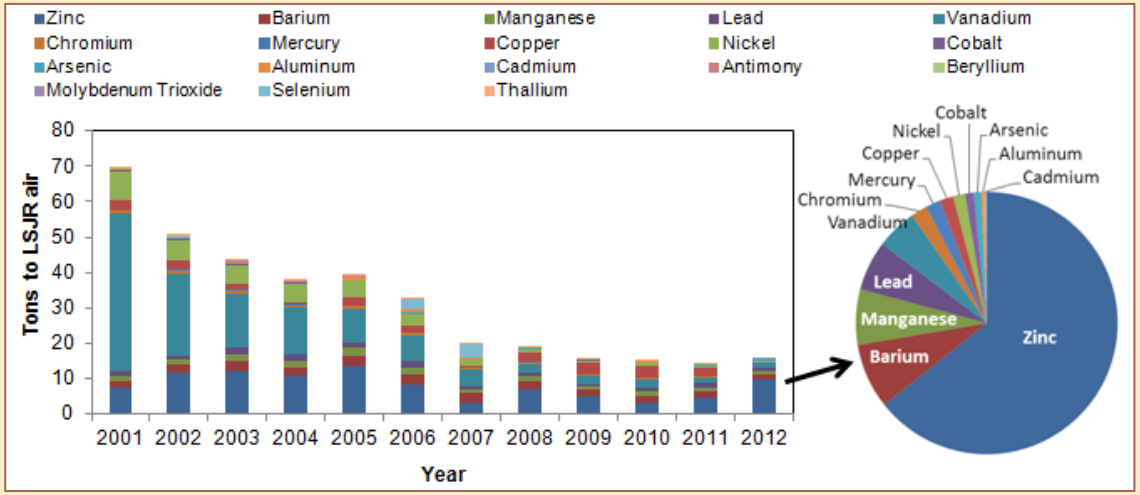


Contaminants

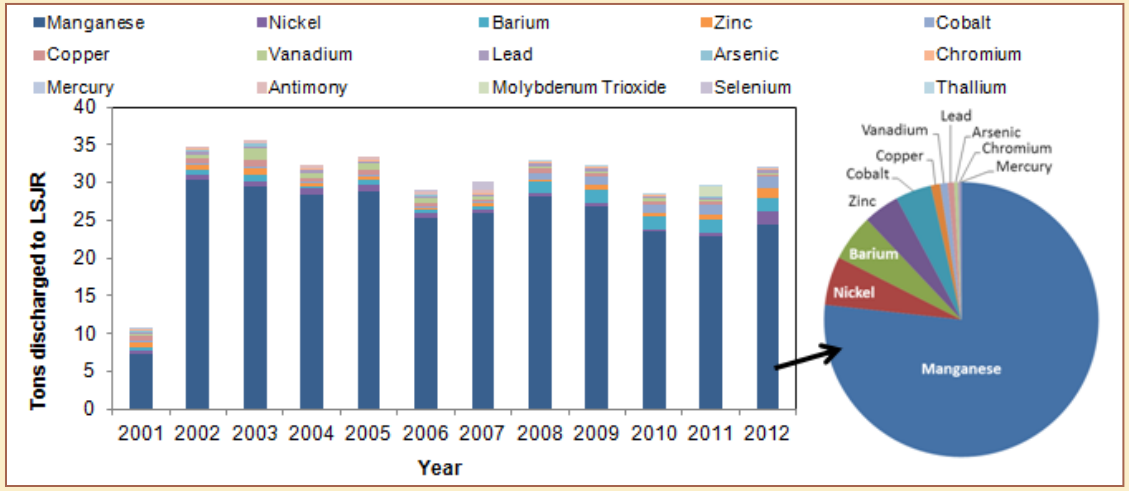
- Toxics Release Inventory

  Point sources of chemicals from permitted industries

  - Total metals released to air



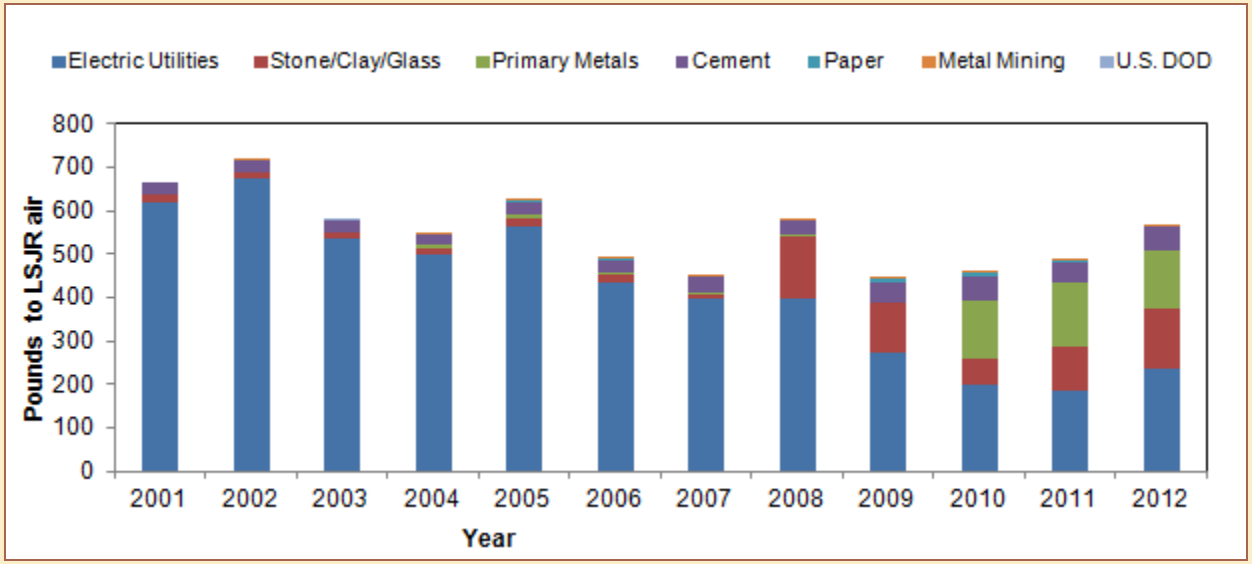
  - Total metals released to water



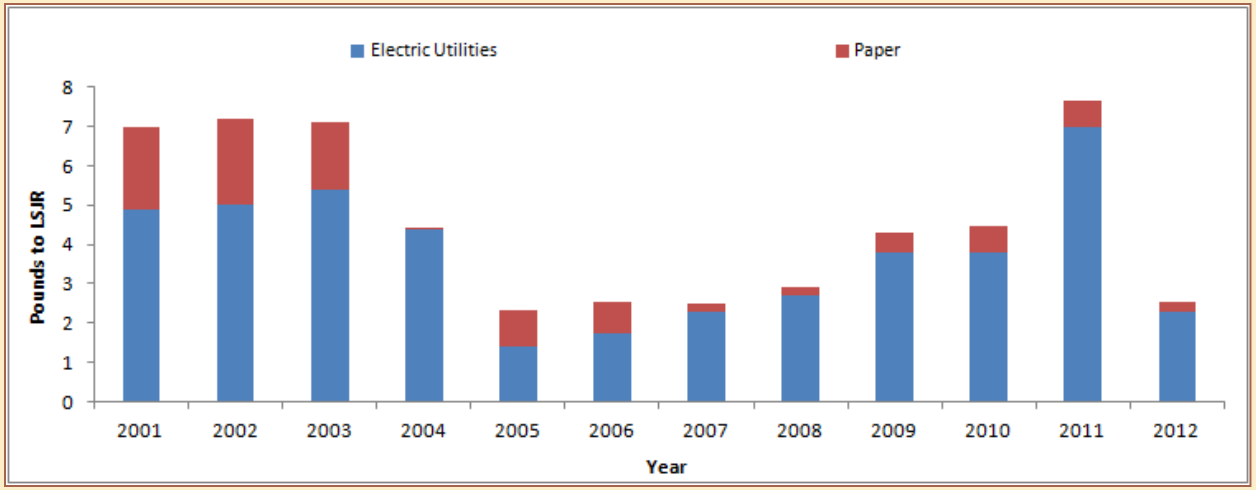
Contaminants

- Mercury in LSJRB

– Total mercury released to air

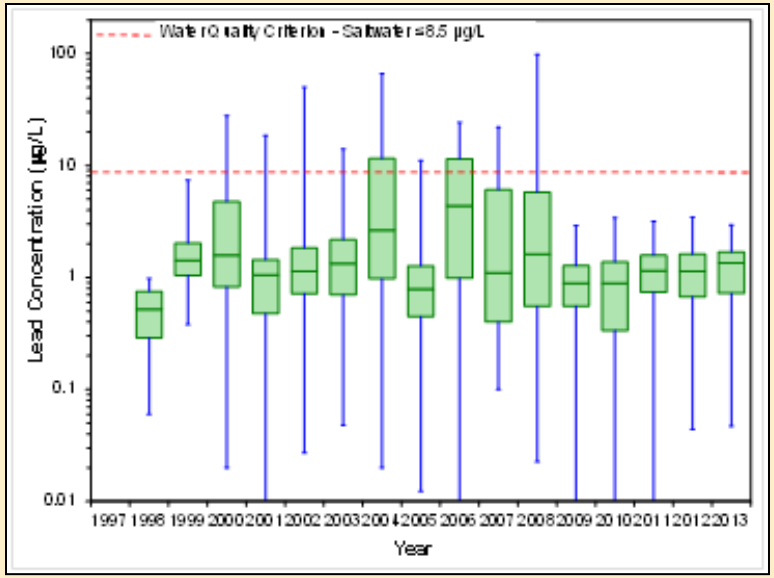


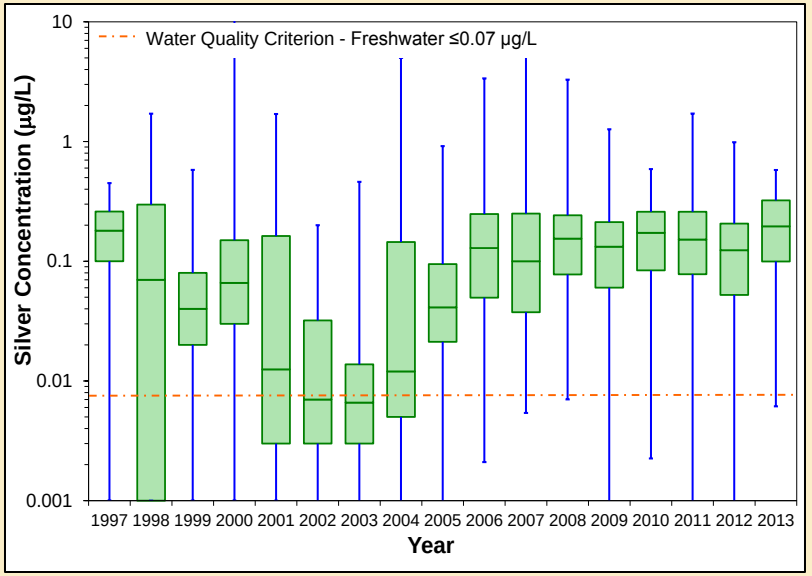
– Total mercury released to water



Contaminants

- Water column metals
  - Mainstem metals down since 2009
  - Most maxima below AWQ criteria
  - Silver in freshwater mainstem an exception
    - Low criterion
  - Some tribs have high levels of silver, lead and copper





By Heather McCarthy

Thank you! Questions?