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

Water Quality, Fisheries, Aquatic Life, Contaminants

2015

Radha Pyati, Ph.D.
Lucy Sonnenberg, Ph.D.

About the Report

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

Dr. Radha Pyati, UNF
Dr. Stuart Chalk, UNF
Dr. Gretchen Bielmyer, VSU
Dr. Peter Bacopoulos, UNF
Dr. Brian Zoellner, UNF
Dr. Lucy Sonnenberg, JU
Dr. Gerry Pinto, JU
Dr. Nisse Goldberg, JU
Dr. Andy Ouellette, JU
Brochure Design: David Smith, JU

About the Report

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

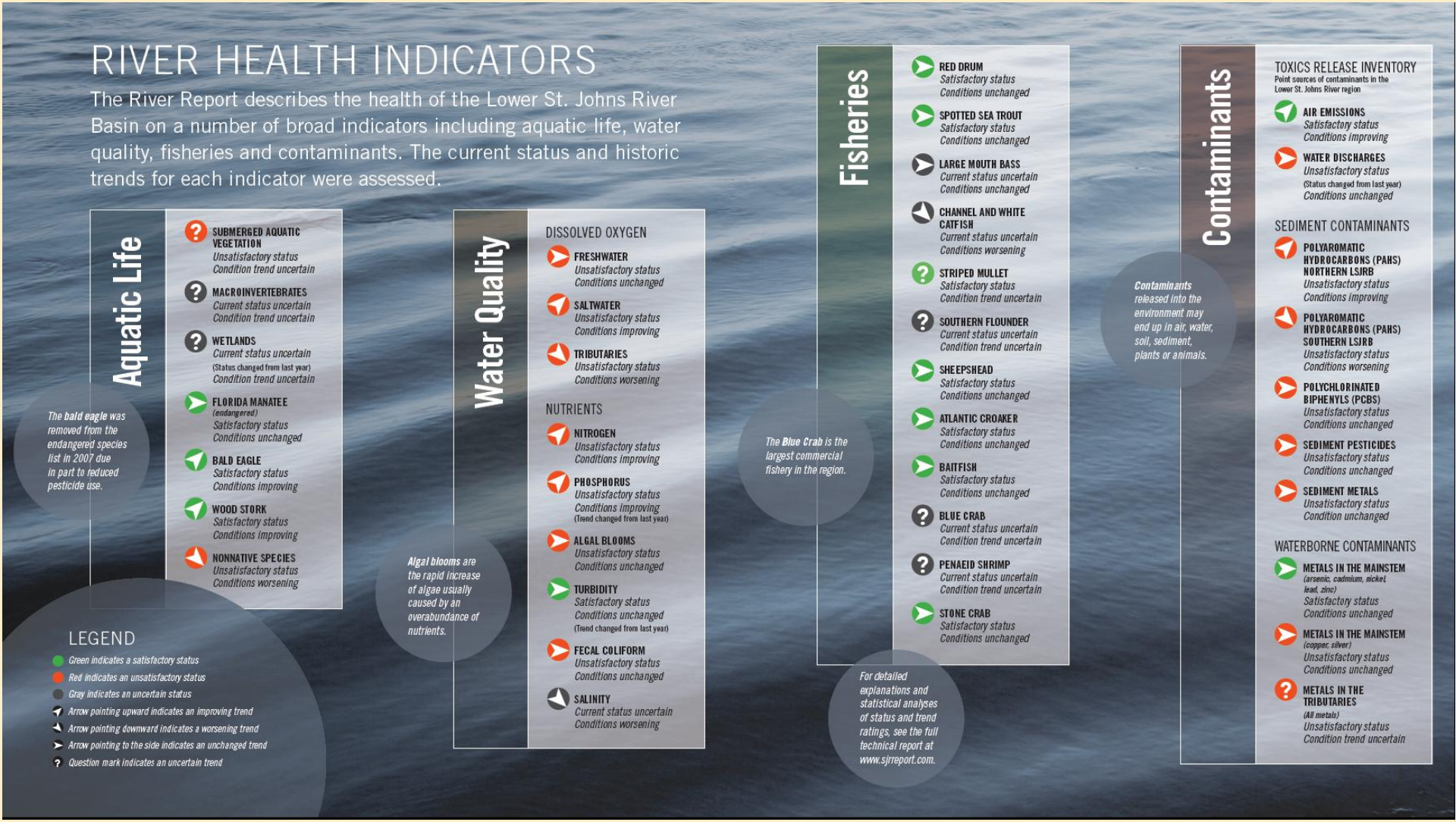
- Special thanks to:
  - Dr. Ray Bowman
  - Dr. Quinton White
  - Dr. Dan McCarthy
  - Ms. Heather McCarthy
  - Dr. Pat Welsh

About the Report

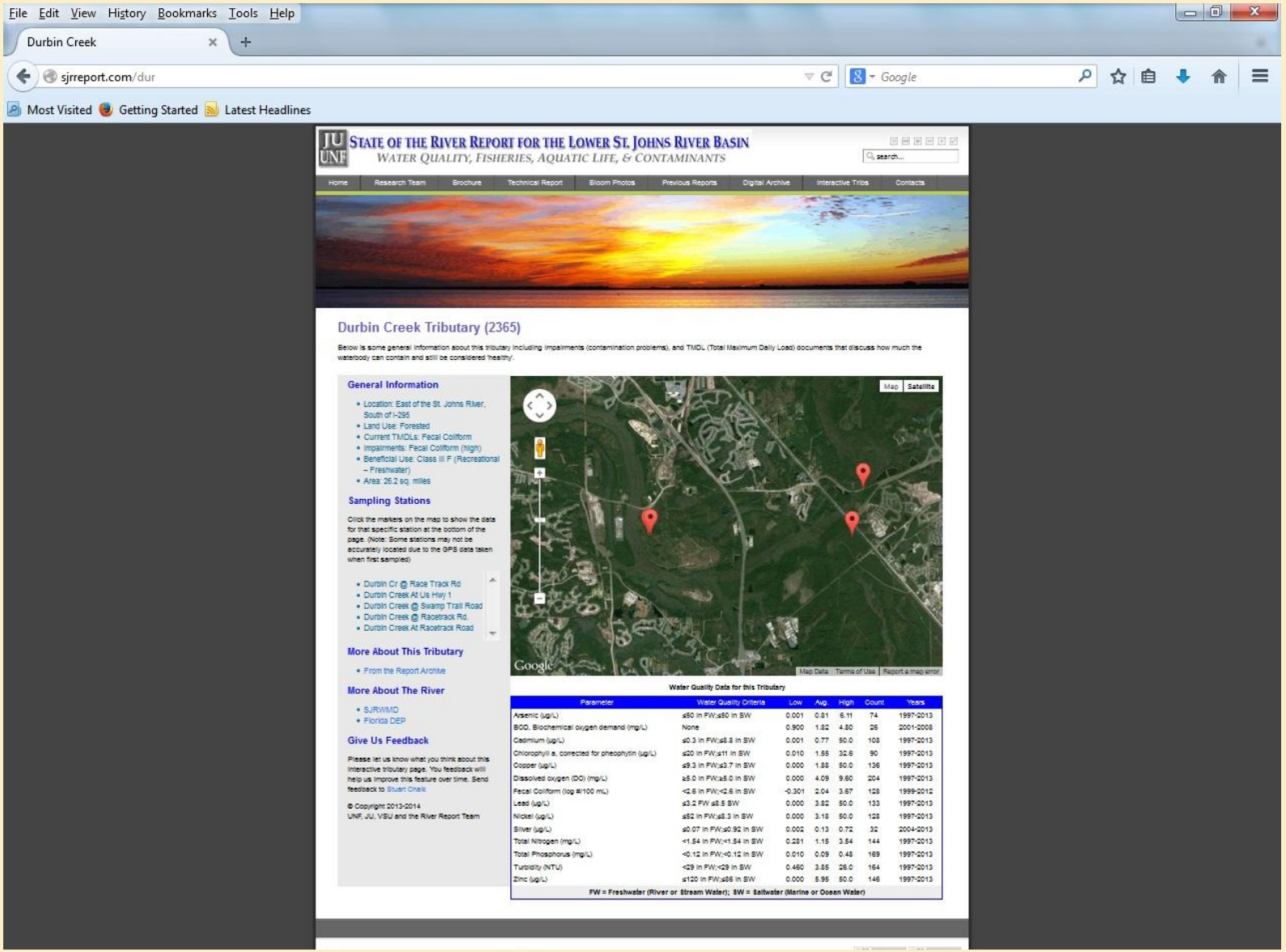
SJRreport.com

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

Brochure


RIVER HEALTH INDICATORS
The River Report describes the health of the Lower St. Johns River Basin on a number of broad indicators including aquatic life, water quality, fisheries and contaminants. The current status and historic trends for each indicator were assessed.
Aquatic Life
SUBMERGED AQUATIC VEGETATION
Unsatisfactory status
Condition trend uncertain
MACROINVERTEBRATES
Current status uncertain
Condition trend uncertain
WETLANDS
Current status uncertain
(Status changed from last year)
Condition trend uncertain
FLORIDA MANATEE
(endangered)
Satisfactory status
Conditions unchanged
BALD EAGLE
Satisfactory status
Conditions improving
WOOD STORK
Satisfactory status
Conditions improving
NONNATIVE SPECIES
Unsatisfactory status
Conditions worsening
The bald eagle was removed from the endangered species list in 2007 due in part to reduced pesticide use.
Water Quality
DISSOLVED OXYGEN
FRESHWATER
Unsatisfactory status
Conditions unchanged
SALTWATER
Unsatisfactory status
Conditions improving
TRIBUTARIES
Unsatisfactory status
Conditions worsening
NUTRIENTS
NITROGEN
Unsatisfactory status
Conditions improving
PHOSPHORUS
Unsatisfactory status
Conditions improving
(Trend changed from last year)
ALGAL BLOOMS
Unsatisfactory status
Conditions unchanged
TURBIDITY
Satisfactory status
Conditions unchanged
(Trend changed from last year)
FECAL COLIFORM
Unsatisfactory status
Conditions unchanged
SALINITY
Current status uncertain
Conditions worsening
Algal blooms are the rapid increase of algae usually caused by an overabundance of nutrients.
LEGEND
Green indicates a satisfactory status
Red indicates an unsatisfactory status
Gray indicates an uncertain status
Arrow pointing upward indicates an improving trend
Arrow pointing downward indicates a worsening trend
Arrow pointing to the side indicates an unchanged trend
Question mark indicates an uncertain trend
Fisheries
RED DRUM
Satisfactory status
Conditions unchanged
SPOTTED SEA TROUT
Satisfactory status
Conditions unchanged
LARGE MOUTH BASS
Current status uncertain
Conditions unchanged
CHANNEL AND WHITE CATFISH
Current status uncertain
Conditions worsening
STRIPED MULLET
Satisfactory status
Condition trend uncertain
SOUTHERN FLOUNDER
Current status uncertain
Condition trend uncertain
SHEEPSHEAD
Satisfactory status
Conditions unchanged
ATLANTIC CROAKER
Satisfactory status
Conditions unchanged
BAITFISH
Satisfactory status
Conditions unchanged
BLUE CRAB
Current status uncertain
Condition trend uncertain
PENAEID SHRIMP
Current status uncertain
Condition trend uncertain
STONE CRAB
Satisfactory status
Conditions unchanged
The Blue Crab is the largest commercial fishery in the region.
For detailed explanations and statistical analyses of status and trend ratings, see the full technical report at www.sjrreport.com.
Contaminants
Contaminants released into the environment may end up in air, water, soil, sediment, plants or animals.
TOXICS RELEASE INVENTORY
Point sources of contaminants in the Lower St. Johns River region
AIR EMISSIONS
Satisfactory status
Conditions improving
WATER DISCHARGES
Unsatisfactory status
(Status changed from last year)
Conditions unchanged
SEDIMENT CONTAMINANTS
POLYAROMATIC HYDROCARBONS (PAHS) NORTHERN LSJRB
Unsatisfactory status
Conditions improving
POLYAROMATIC HYDROCARBONS (PAHS) SOUTHERN LSJRB
Unsatisfactory status
Conditions worsening
POLYCHLORINATED BIPHENYLS (PCBS)
Unsatisfactory status
Conditions unchanged
SEDIMENT PESTICIDES
Unsatisfactory status
Conditions unchanged
SEDIMENT METALS
Unsatisfactory status
Condition unchanged
WATERBORNE CONTAMINANTS
METALS IN THE MAINSTEM
(arsenic, cadmium, nickel, lead, zinc)
Satisfactory status
Conditions unchanged
METALS IN THE MAINSTEM
(copper, silver)
Unsatisfactory status
Conditions unchanged
METALS IN THE TRIBUTARIES
(All metals)
Unsatisfactory status
Condition trend uncertain

Interactive Tributary Page



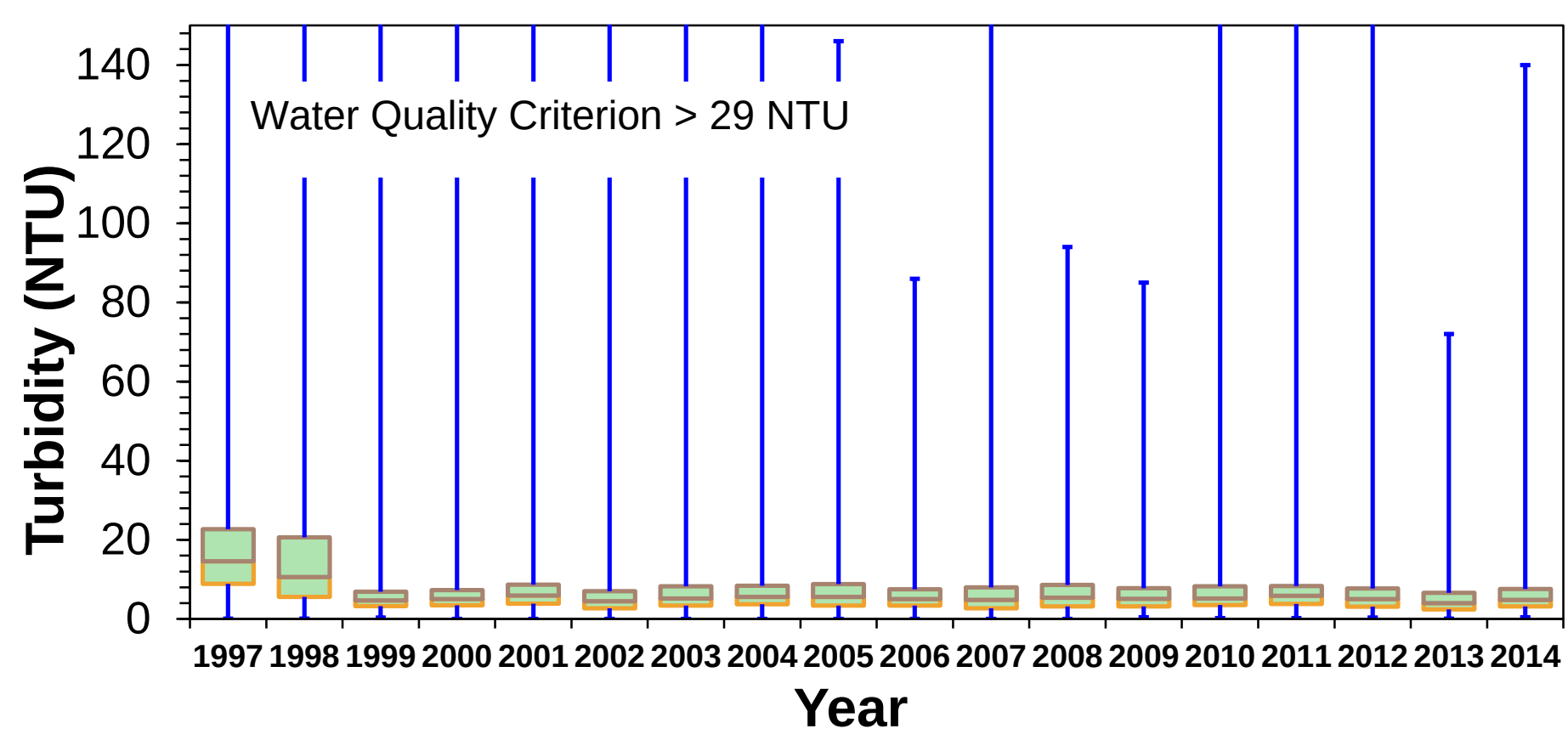
Water Quality

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

Fecal Coliform

- LSJRB tributaries impaired for fecal coliform: 75 total as of 2014. Of those, 25 have final BMAPs.
- Of those 25, in 2013, 17 showed 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 showed less than 50% reduction in median: Big Fishweir, Butcher Pen, Miller, Open, Terrapin, Craig, Hopkins, Williamson Creeks
- Methodology for evaluating FC levels is changing for 2015 onward.

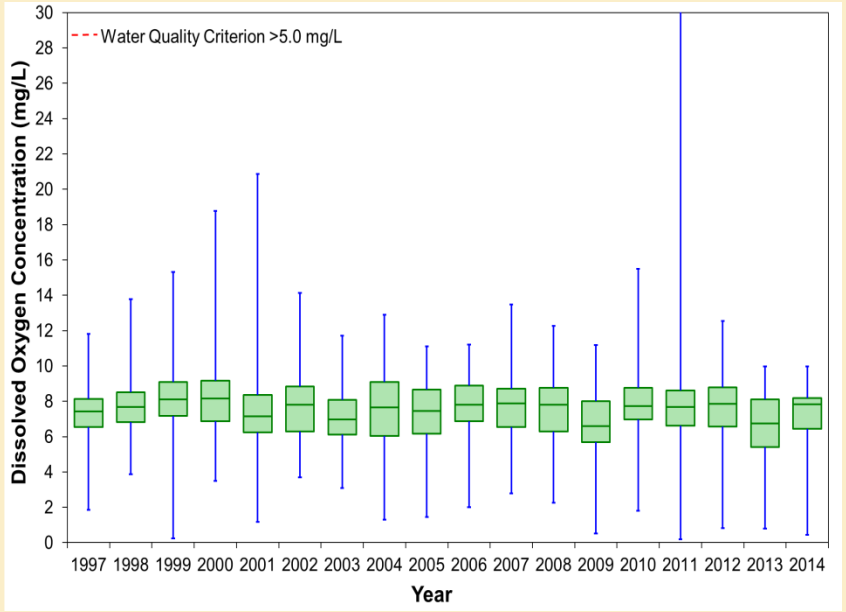
Turbidity



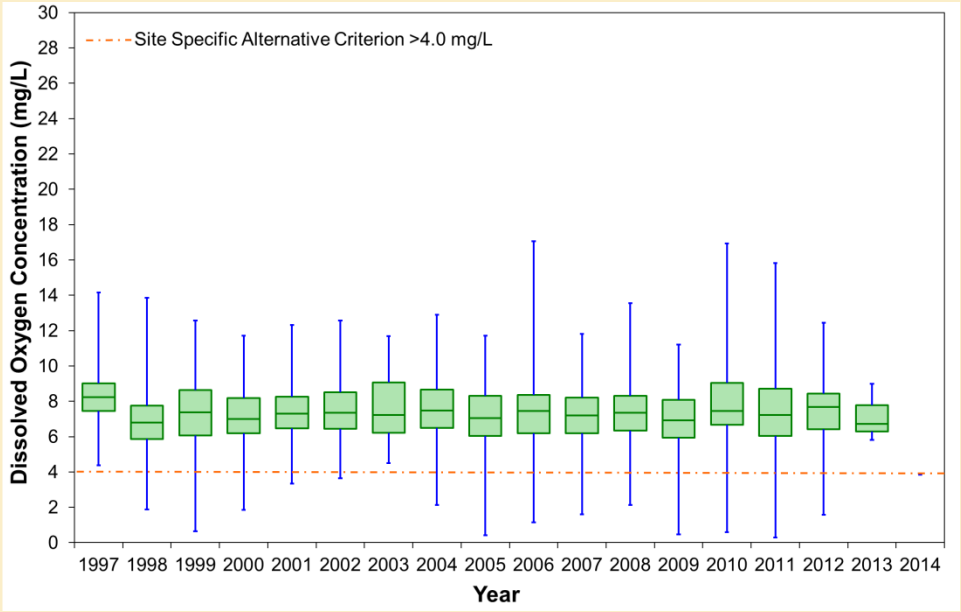
- Median, maximum value, and minimum value are holding steady.

Dissolved Oxygen

Freshwater



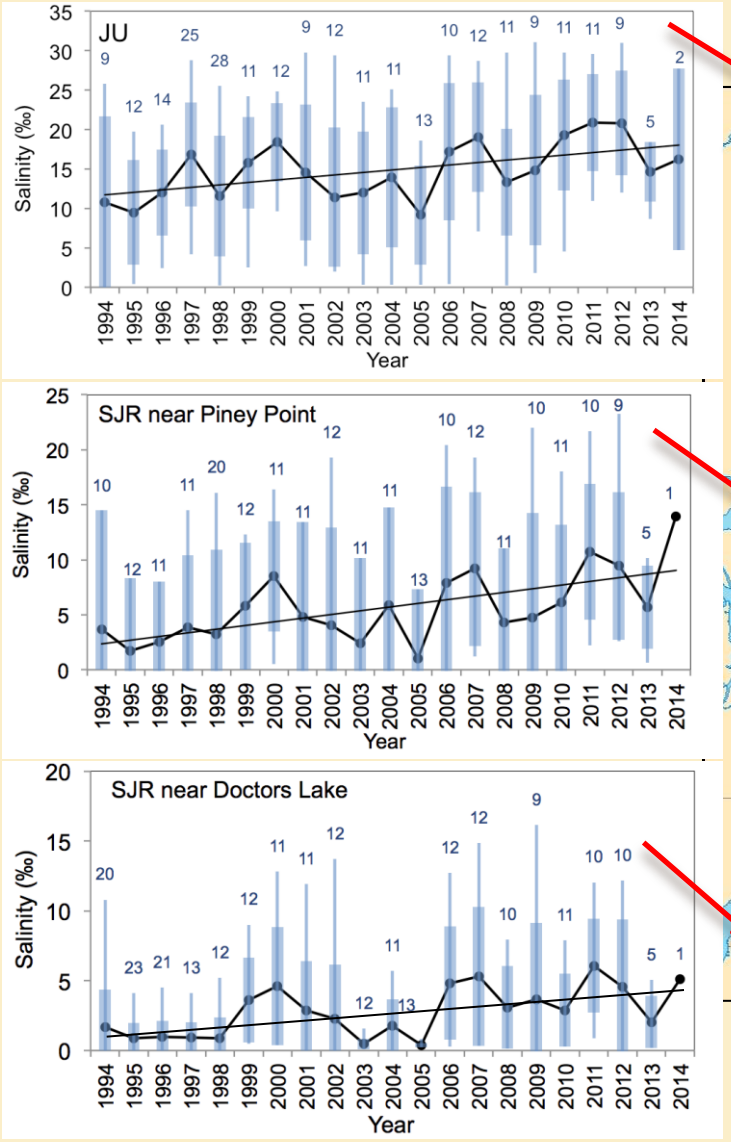
Saltwater



- Saltwater minima are increasing, indicating improvement. Freshwater minima are not.

Salinity

- Fluctuations with weather
  - Drought
  - Hurricanes
- Daily fluctuations with tide up to Shands Bridge
- Increasing mean salinity

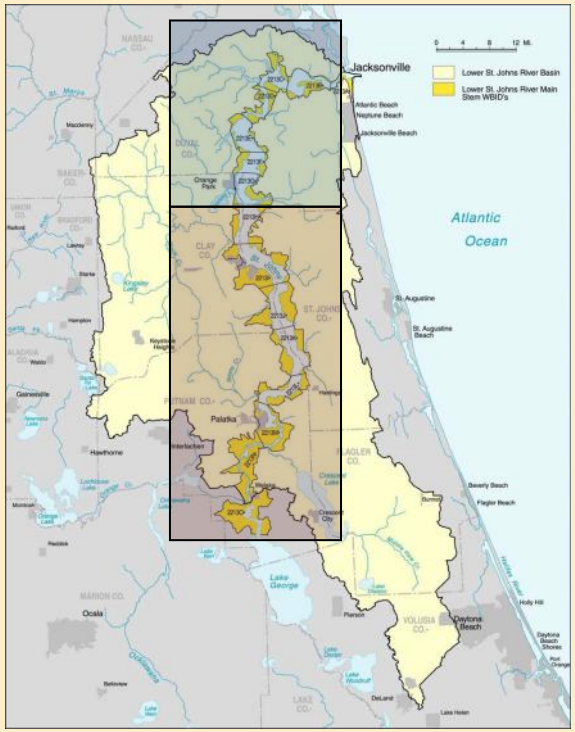


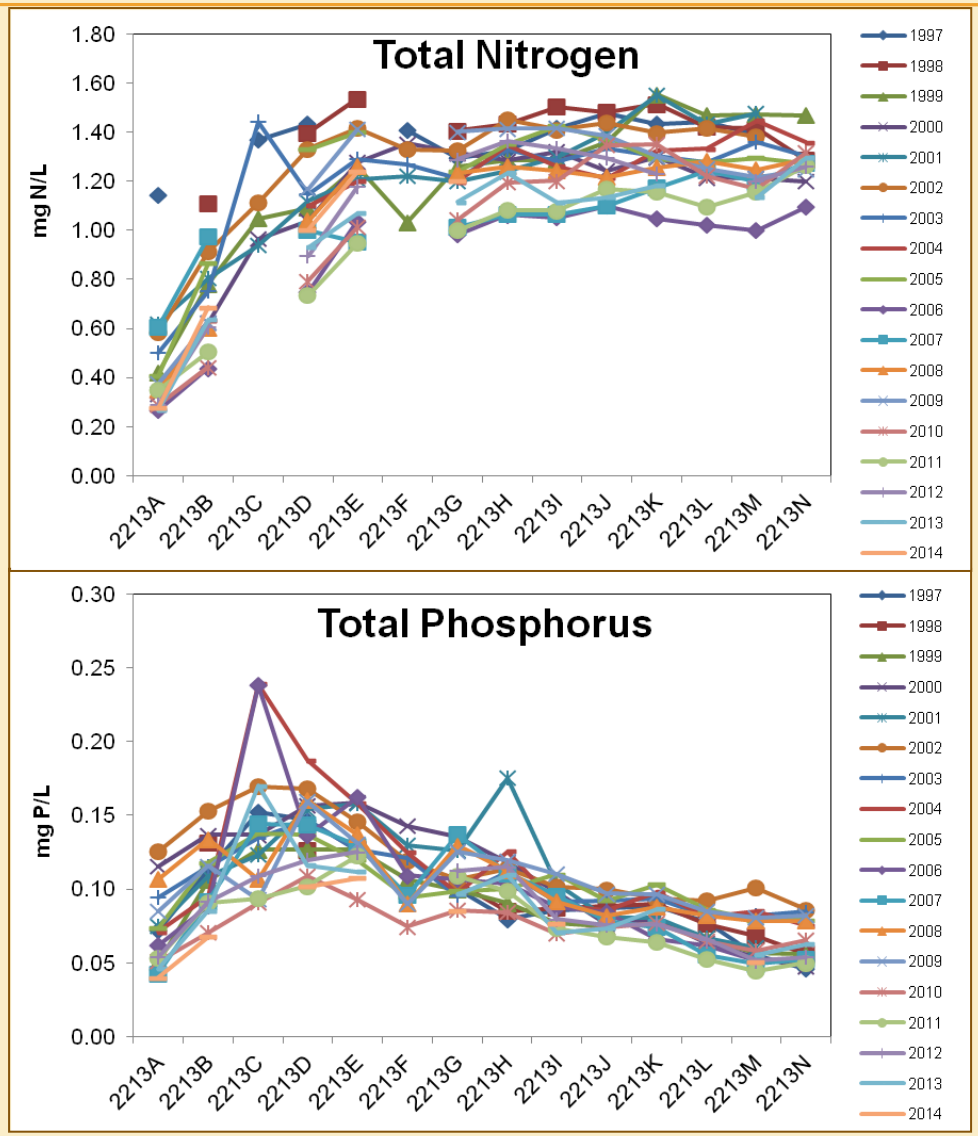
Salinity

- Potential impacts in the Lower Basin
  - Movement south of transition zones
  - 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
  - Less freshwater hardwood swamps in some areas

Nutrients

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

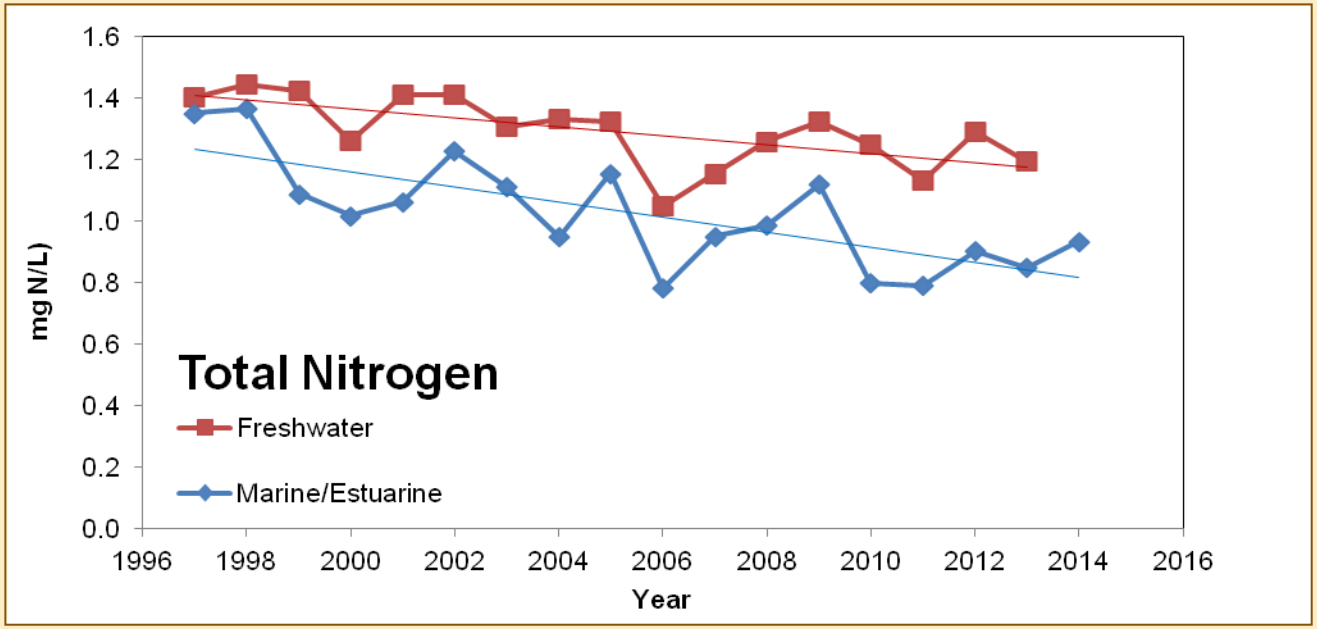




Salt Water ---------- Fresh Water

Nutrients

- Total Nitrogen Trend

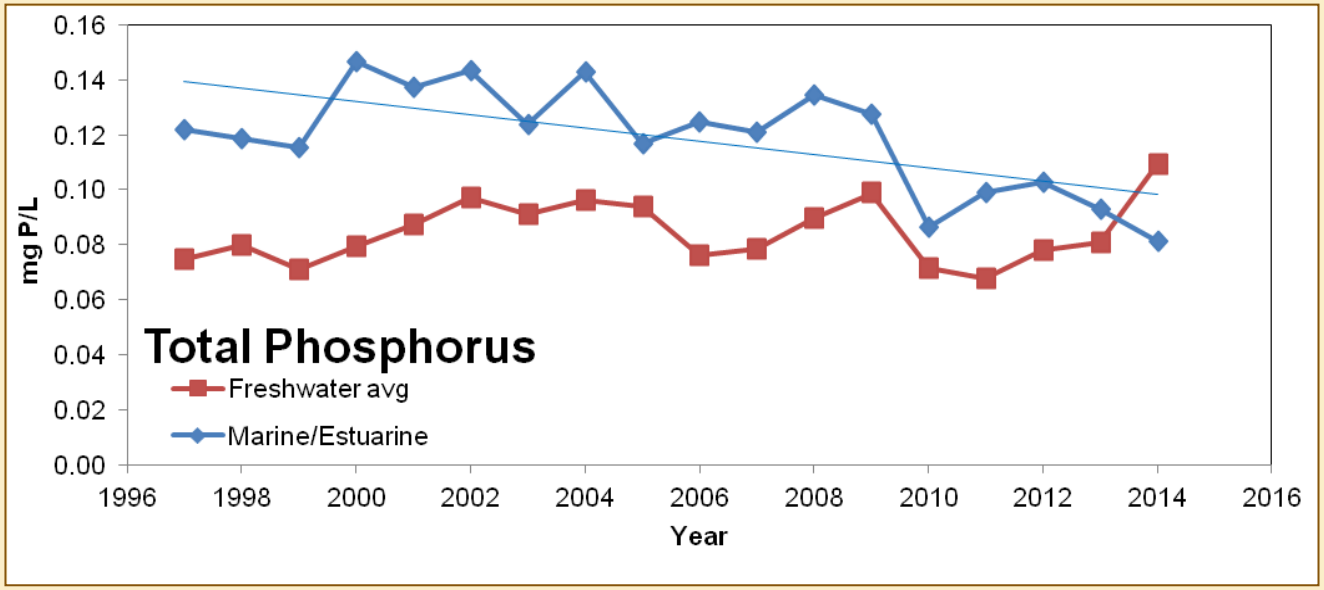


– Annual average declining in fresh to marine water
(Spearman Rank p <0.05)

INDICATOR	STATUS	TREND
Nitrogen	Unsatisfactory	Improving

Nutrients

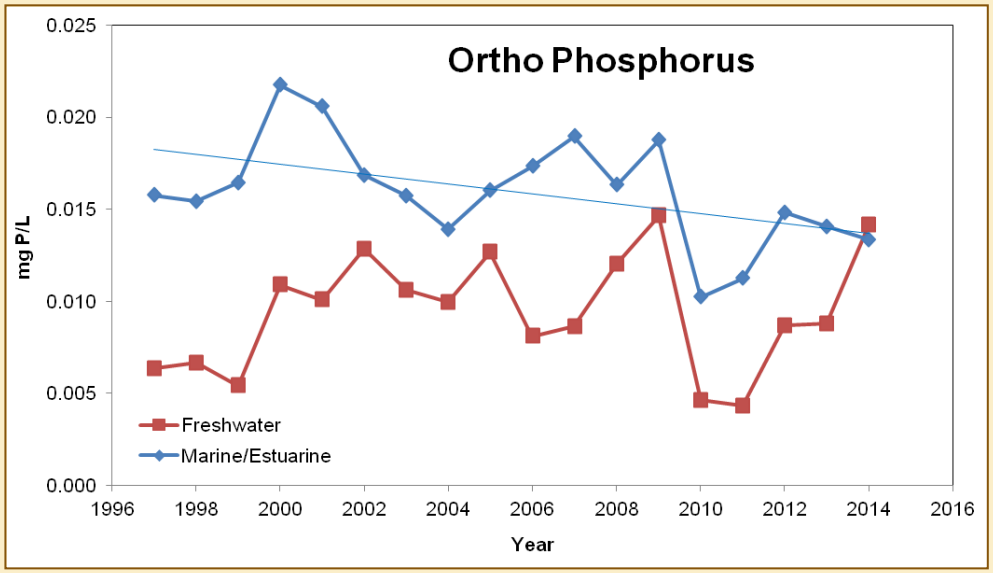
- Total Phosphorus Trend



  - Annual TP averages decreasing in marine/estuarine, freshwater unchanged *(Spearman Rank $p > 0.05$)*

Nutrients

- Ortho phosphate

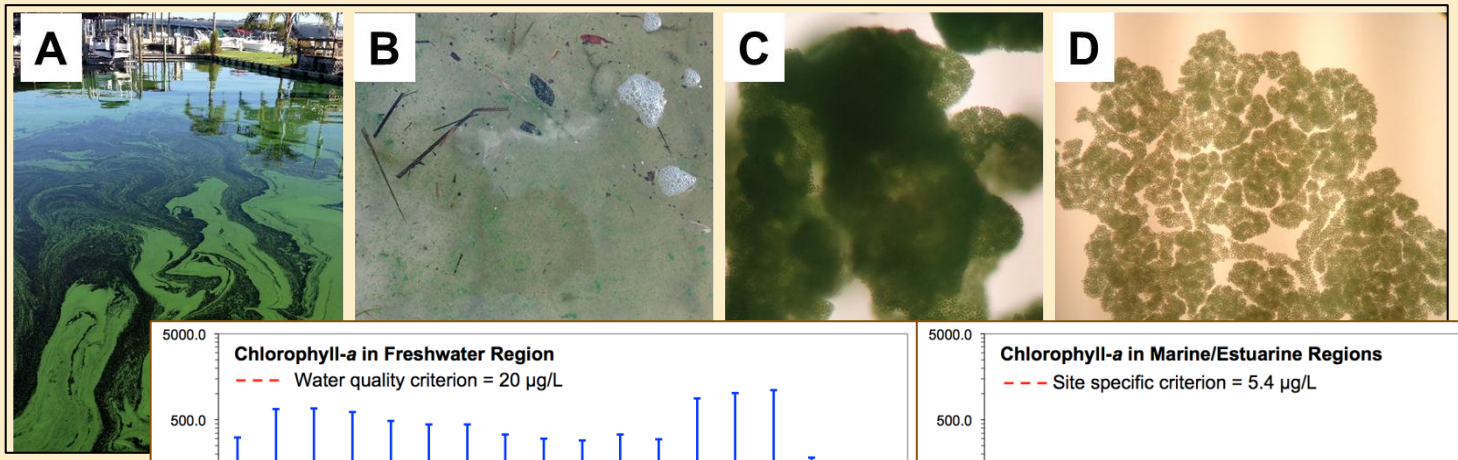


  - Annual OP averages decreasing in marine/estuarine, freshwater unchanged *(Spearman Rank $p > 0.05$)*

INDICATOR	STATUS	TREND
Phosphorus	Unsatisfactory	Improving

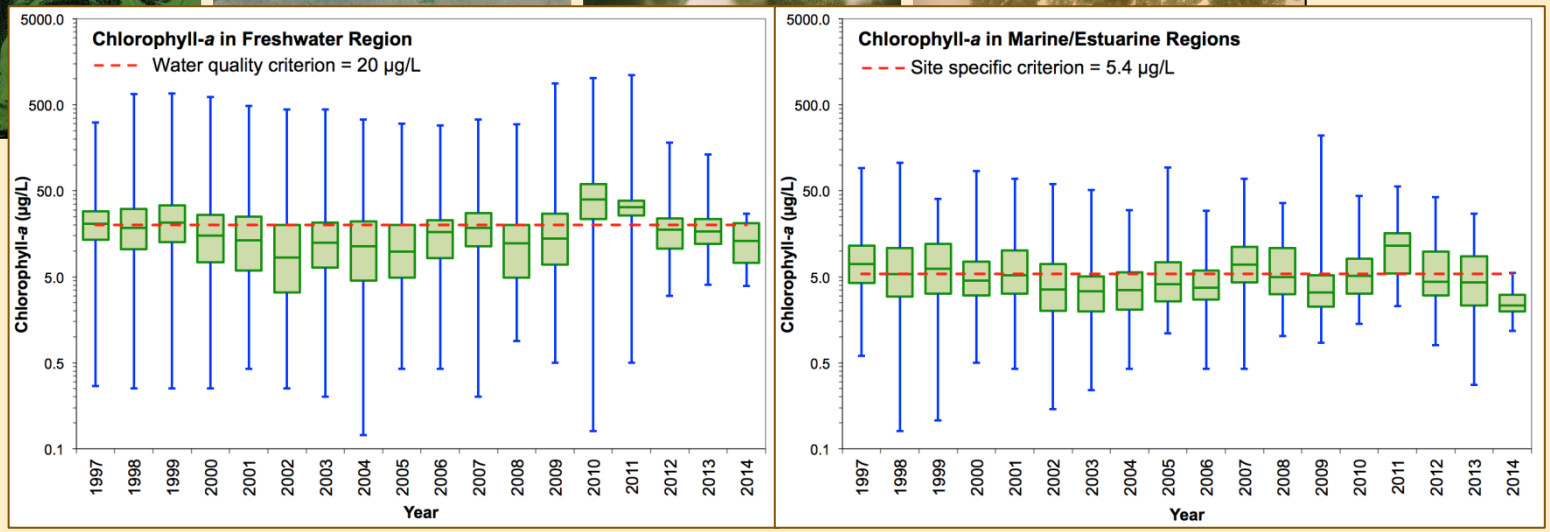
Chlorophyll-*a*

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



A. Doctors Lake
B. Lions Club Park
C. Microcystis
D. Microcystis

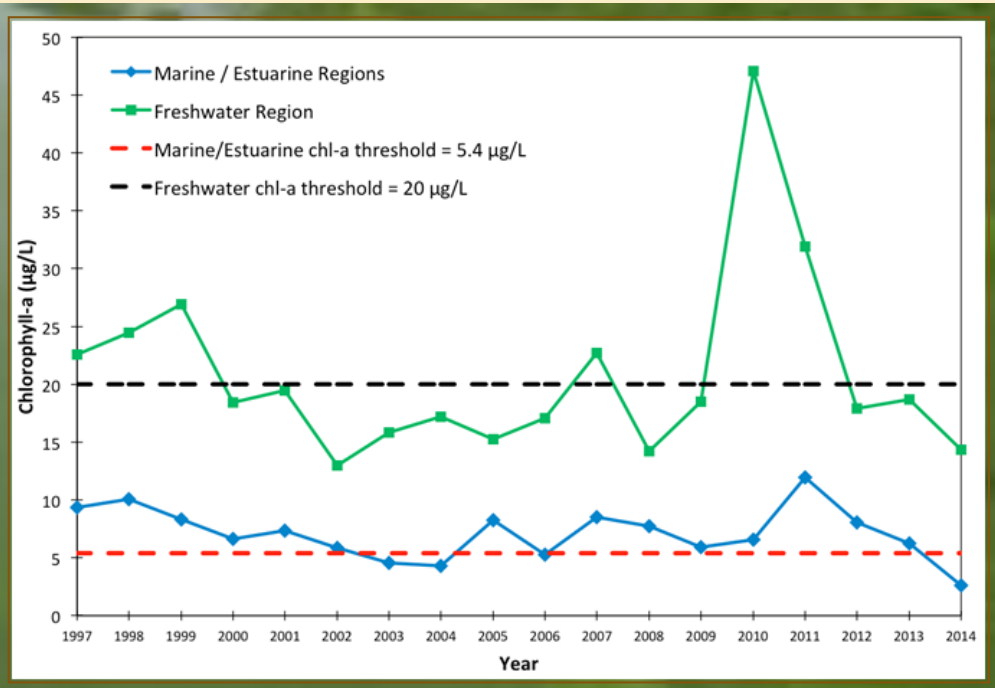
Photos: Rhea Derke



- Stream impairment thresholds exceeded in FW in 2014
- Data limited in 2014

Chlorophyll-*a*

- Trend



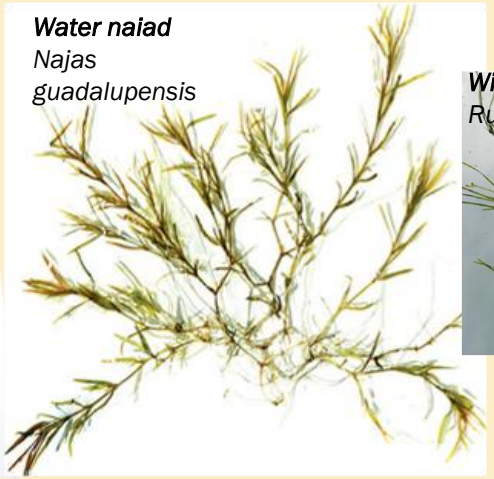
— **No trends in annual average *(Spearman Rank p >0.05)***
— **Not all blooms are sampled, miss reported toxic events**
— **Better assessments needed**

INDICATOR	STATUS	TREND
Algal Blooms	Unsatisfactory	Unchanged

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

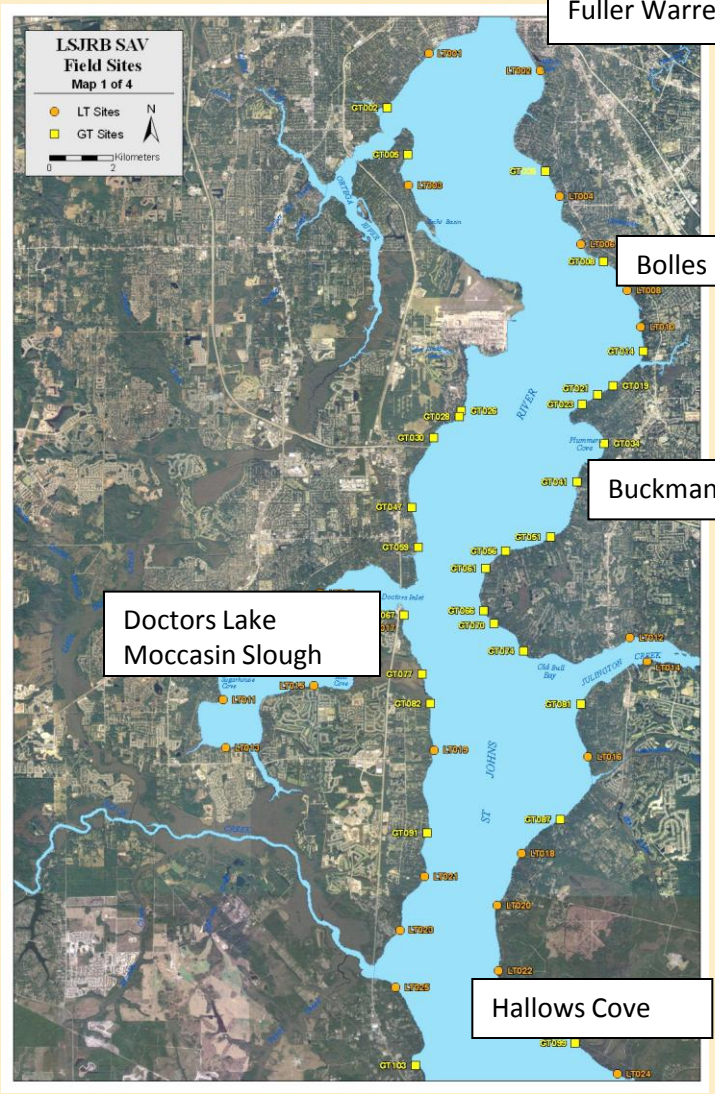
SAV



- **Significance**
  - Nurseries
  - Food
  - 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 2008-2015

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

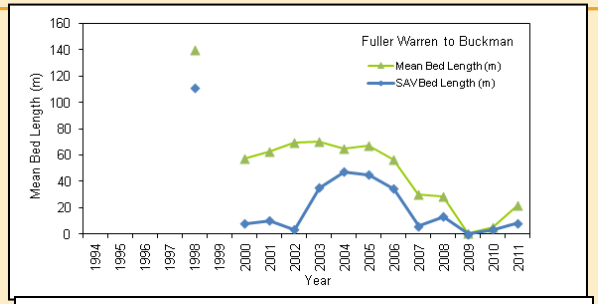
Bolles

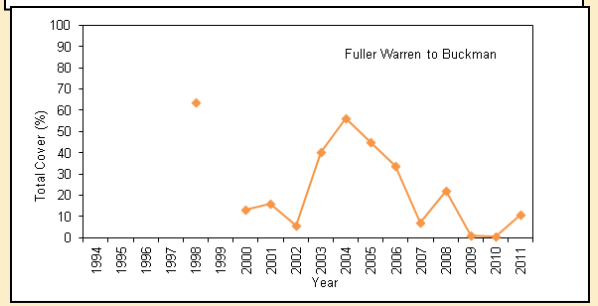
Buckman Bridge

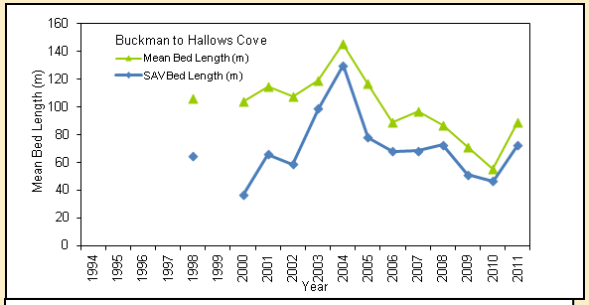
Doctors Lake
Moccasin Slough

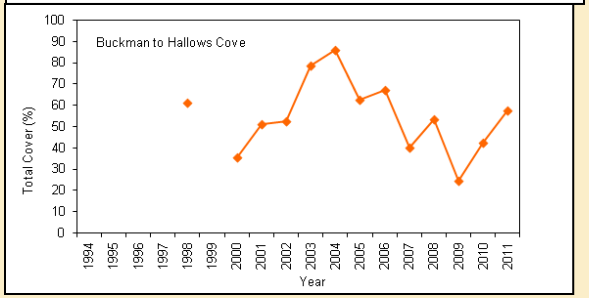
Tape grass
Widgeon grass
Water naiad

Hallows Cove









SAV

- Summary
  - Highly variable over time due to weather and other factors
  - Decline in grass bed coverage
  - 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
  - Improve water quality
  - Stabilize banks
  - Provide flood control
- **Stressors**
  - Pollutants
  - Sea Level Rise
  - Hydrology changes
  - Invasive Species
  - Fragmentation

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

Wetlands

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

Photos by Heather McCarthy

INDICATOR	STATUS	TREND
Wetlands	Unsatisfactory	Uncertain

Contaminants

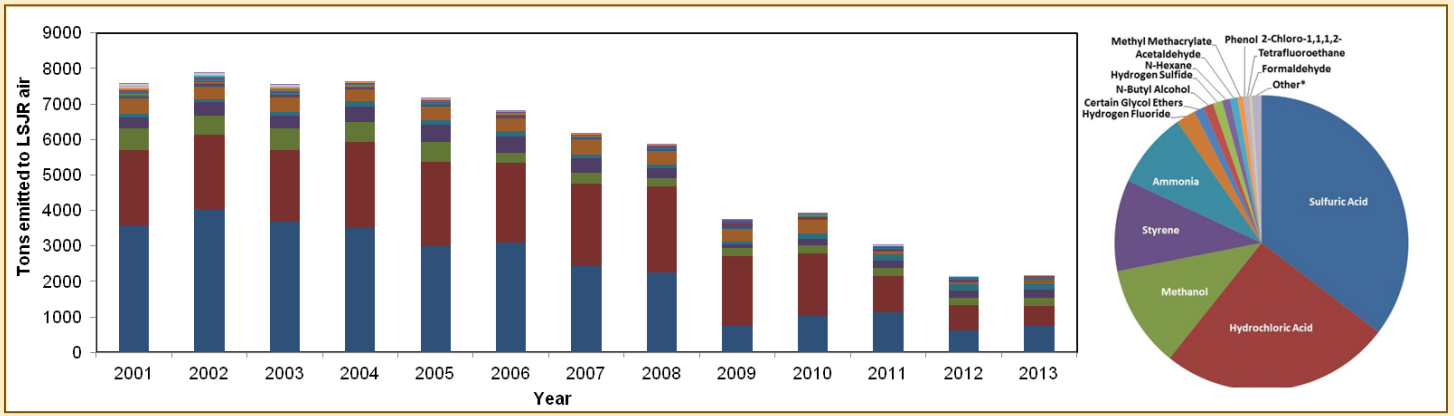
INDICATOR	STATUS	TREND
Chemical Releases (TRI)	Air – Satisfactory **Water - Unsatisfactory**	Air – Improving Water - Unchanged
Water Metals	Mixed	Conditions Unchanged
Sediments	Unsatisfactory	Conditions Unchanged

Contaminants

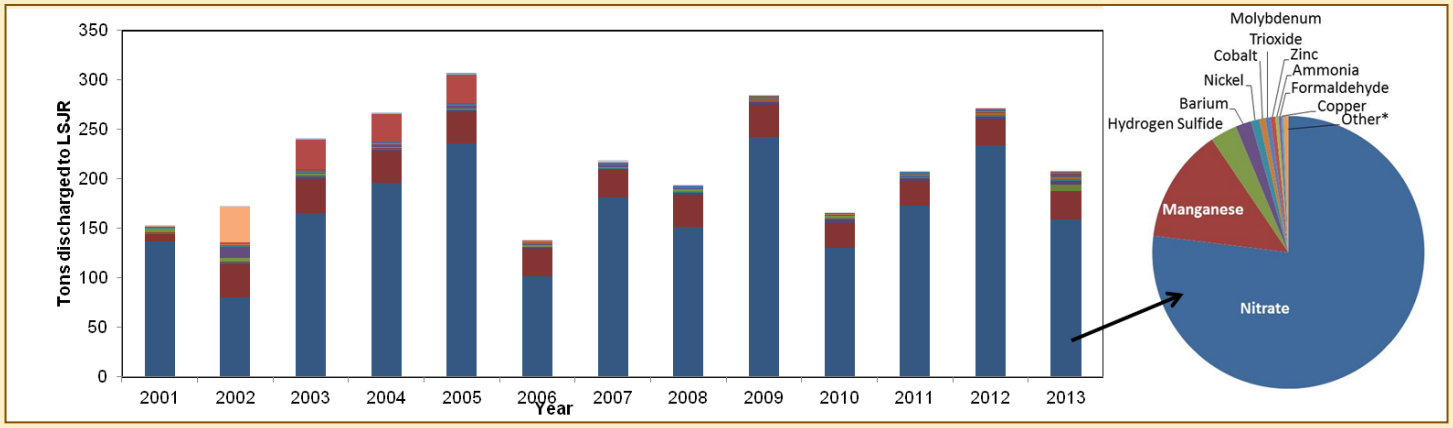
- Toxics Release Inventory

  Point sources of chemicals from permitted industries

  - Total chemical releases to air



  - Total chemical releases to water

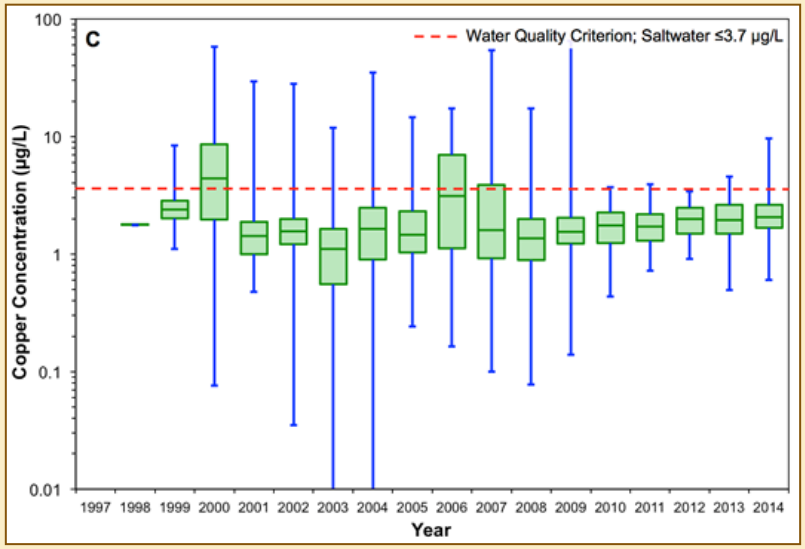


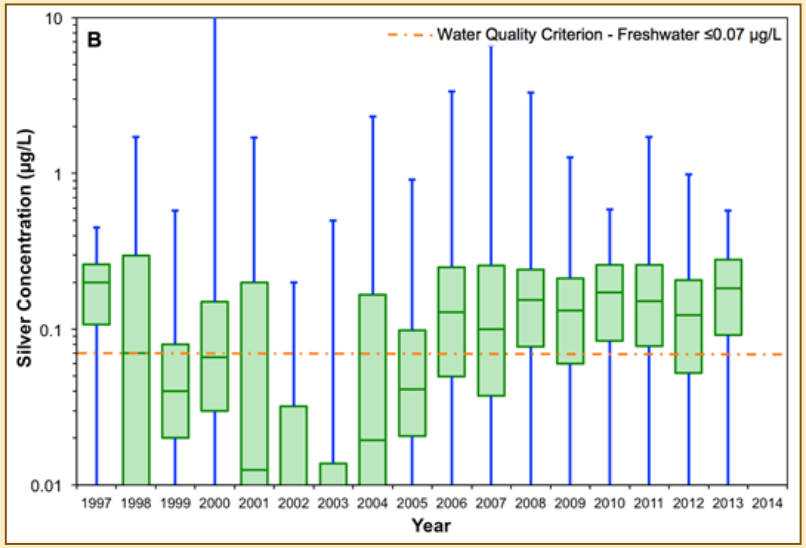
Contaminants

- Metals in water

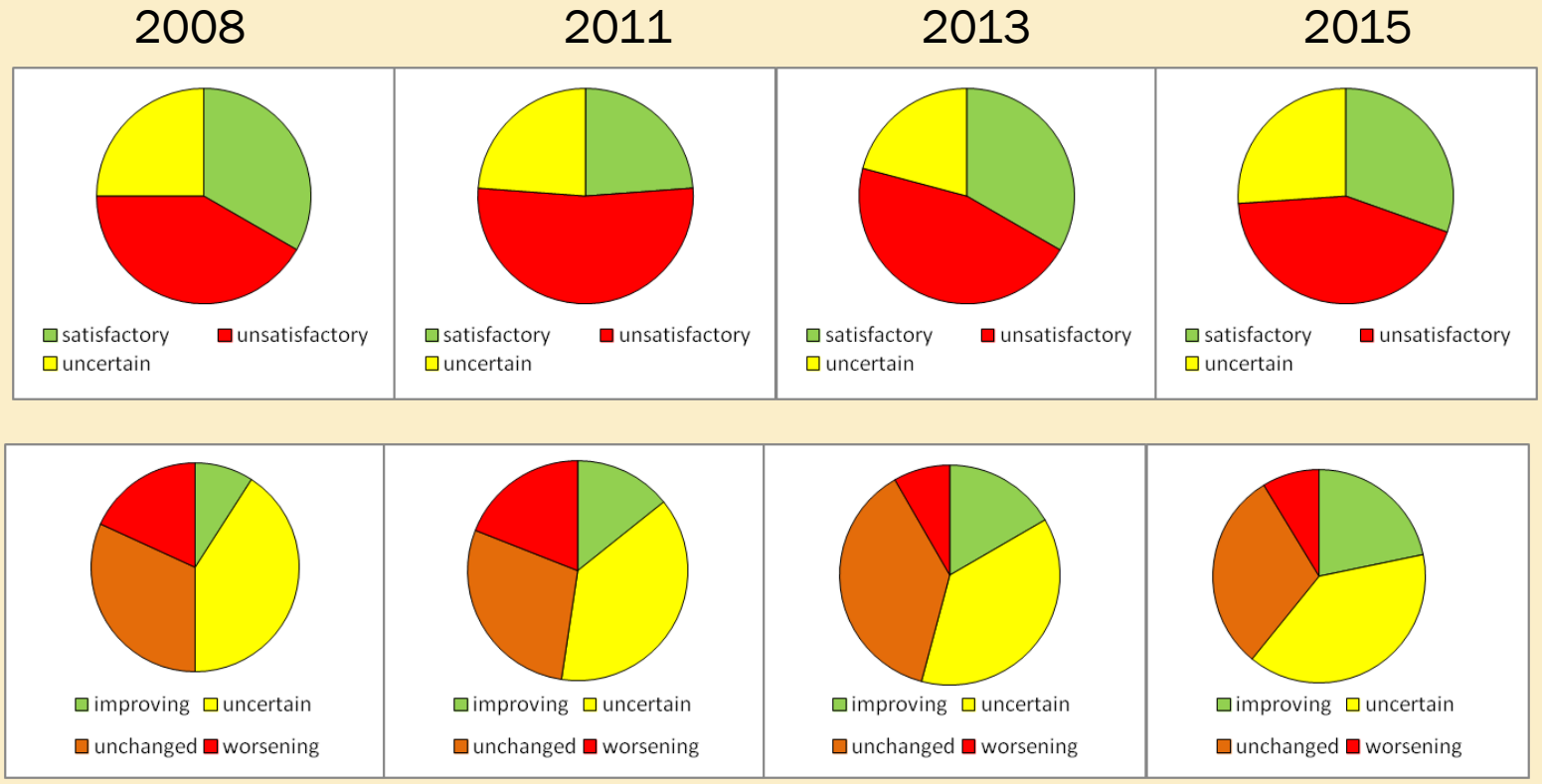
  Arsenic, cadmium, copper, lead, nickel, silver, zinc

  - Mainstem
    - Maxima, medians down since 2009 for many
    - Most below AWQC except copper in seawater, silver in freshwater
  - Tributaries
    - Copper biggest problem
    - Cedar River, Doctor's Lake, Moncrief Creek, McCoy Creek , Hogan Creek and Big Fishweir Creek exceeded AWQC
    - Too few data for recent trend analysis

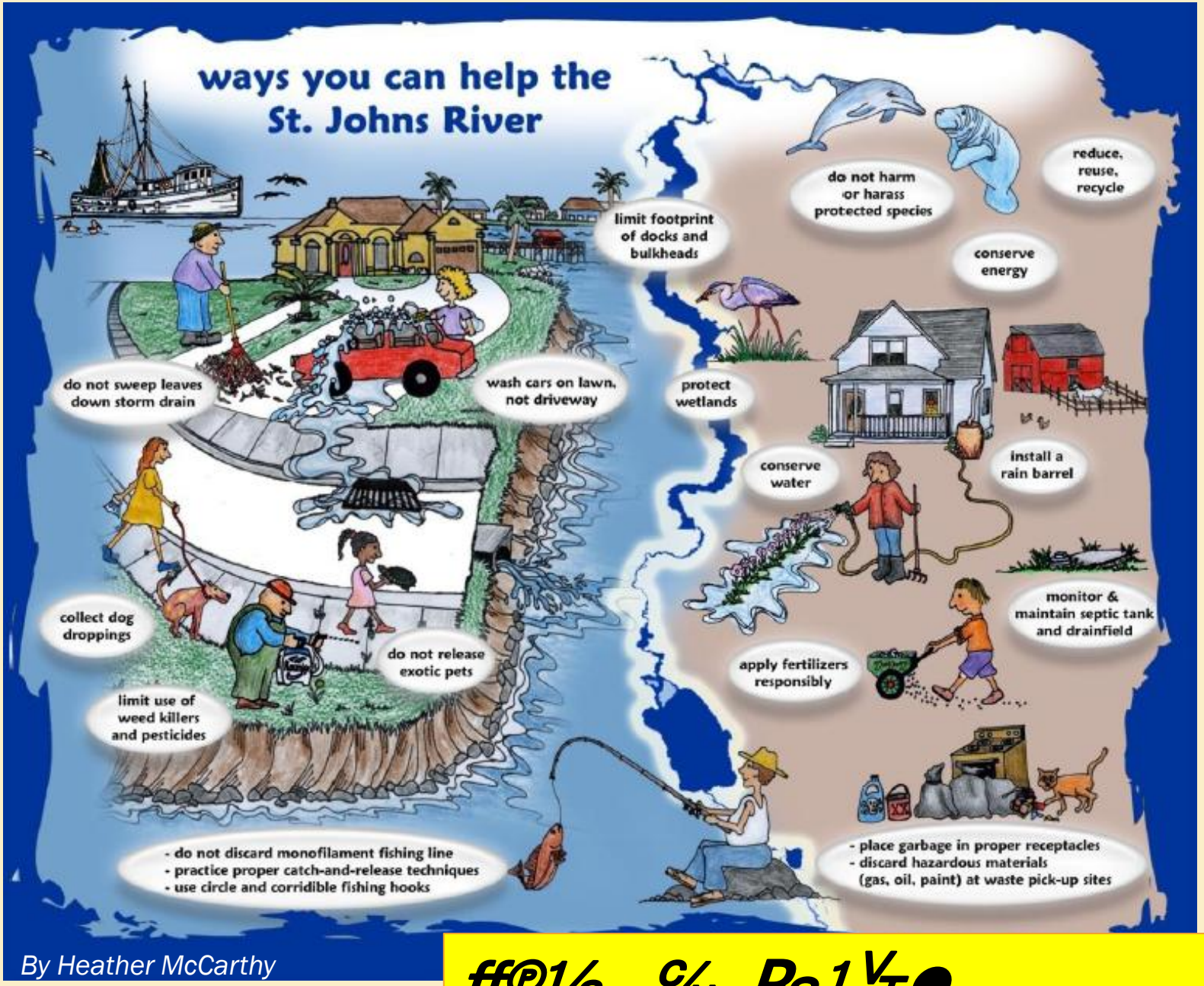




Summary

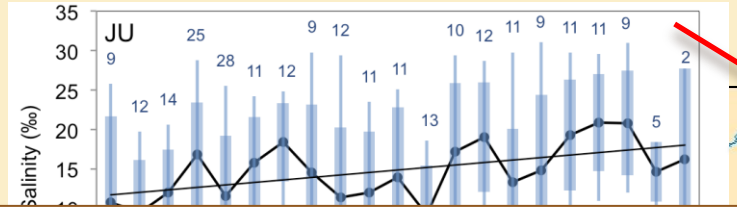


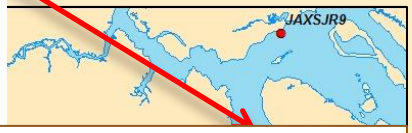
- Status
  - Much uncertainty
  - Not much movement to satisfactory status
- Trends
  - Much uncertainty
  - Possibly more improvement
  - Possibly less worsening

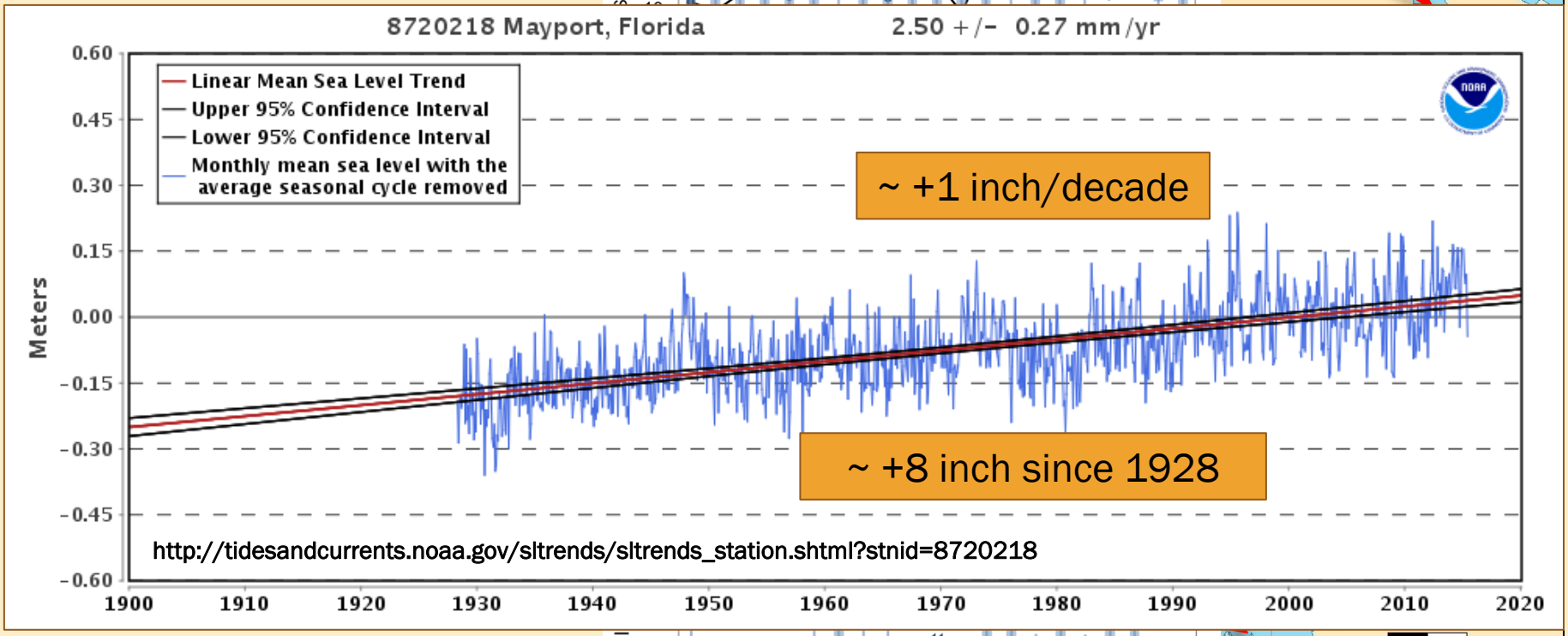

ways you can help the St. Johns River
limit footprint of docks and bulkheads
do not harm or harass protected species
reduce, reuse, recycle
conserve energy
do not sweep leaves down storm drain
wash cars on lawn, not driveway
protect wetlands
conserve water
install a rain barrel
collect dog droppings
do not release exotic pets
monitor & maintain septic tank and drainfield
apply fertilizers responsibly
limit use of weed killers and pesticides
- do not discard monofilament fishing line
- practice proper catch-and-release techniques
- use circle and corridible fishing hooks
- place garbage in proper receptacles
- discard hazardous materials (gas, oil, paint) at waste pick-up sites
By Heather McCarthy

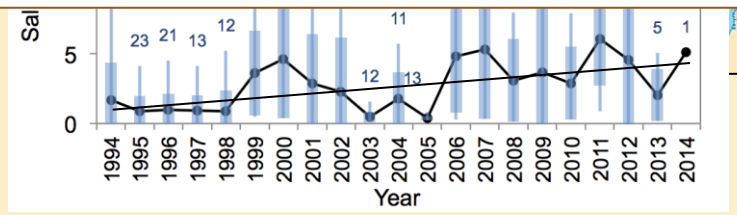
ff©⅓—℅u Rs¹ᵛT●

Salinity


JU
Salinity (‰)
35
30
25
20
15
9 12 14 25 28 11 12 9 12 11 11 13 10 12 11 9 11 11 9 2 5


JAXSJR9


8720218 Mayport, Florida
2.50 +/- 0.27 mm/yr
Linear Mean Sea Level Trend
Upper 95% Confidence Interval
Lower 95% Confidence Interval
Monthly mean sea level with the average seasonal cycle removed
~ +1 inch/decade
~ +8 inch since 1928
http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8720218
Meters
0.60
0.45
0.30
0.15
0.00
-0.15
-0.30
-0.45
-0.60
1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020


Sal
5
0
23 21 13 12 12 11 13 5 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
Year


JAXSJR34A