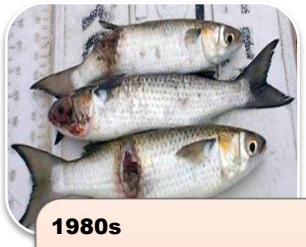
2009 State of the River Report for the Lower St. Johns River Basin:
Water Quality, Fisheries, Aquatic Life, & Contaminants

The *Lower St. Johns River Basin* in Northeast Florida has long been recognized as a treasured watershed - providing enormous ecological, recreational, socioeconomic, and aesthetic benefits. However, during recent years, it has also been recognized as a threatened watershed critically in need of resource conservation, water quality improvement, and careful management.

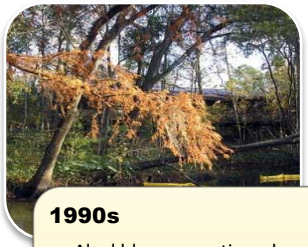
1970s

- Primary-treated effluent and raw sewage discharged directly into river.
- Algal blooms observed.
- 1972 -- "Year of the Environment" -- significant environmental legislation, including the Clean Water Act adopted.
- Municipal waste treatment initiated.



1980s

- Algal blooms continued.
- Fish sores from Lake George to mouth of river noted.
- State Legislature passed legislation to protect and restore river.
- City of Jacksonville Environmental Protection Board Regional Sewer Rule enacted.



1990s

- Algal blooms continued.
- Lower St. Johns River Summit led to 5-year River Agenda.
- Focus begun on poor water quality in tributaries, stormwater runoff, and septic tank failures.
- St. Johns River was designated as an American Heritage River.

2000s

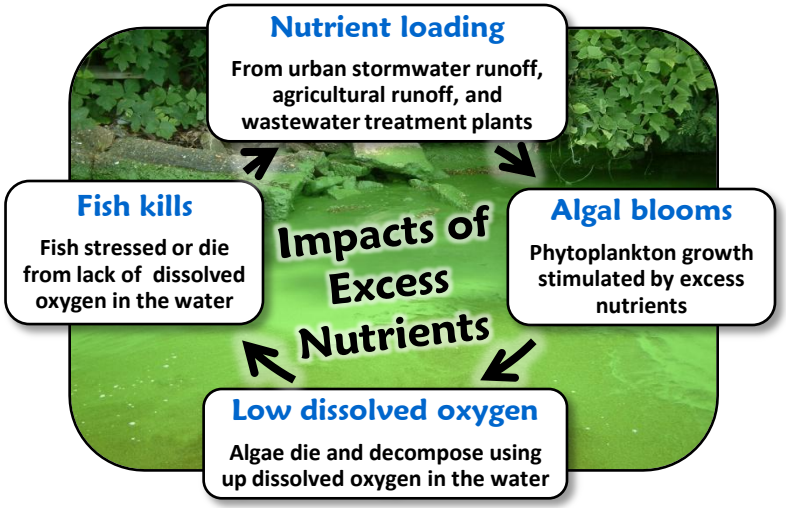
- Algal blooms continue.
- River Summit 2003 was held.
- 2005 algal bloom from Lake George to Mayport observed.
- 2006 River Accord – A Partnership for the St. Johns funded.
- New regulations address impaired water bodies.

Problems:

1. Excessive nutrients
2. Harmful algal blooms
3. Fecal coliform bacteria in tributaries
4. Low diversity of small, aquatic bottom-dwelling animals
5. Introduced exotic species increasing
6. Threatened and endangered species
7. Sediment contamination

Challenges:

Increasing urbanization and rising population pressures continue to impact the Lower St. Johns River Basin.



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Lower St. Johns River Health Indicators:

1) WATER QUALITY

1. Dissolved oxygen
2. Nutrients (phosphorus and nitrogen)
3. Turbidity
4. Algal blooms
5. Bacteria (fecal coliform)
6. Metals
7. Tributaries

2) FISHERIES

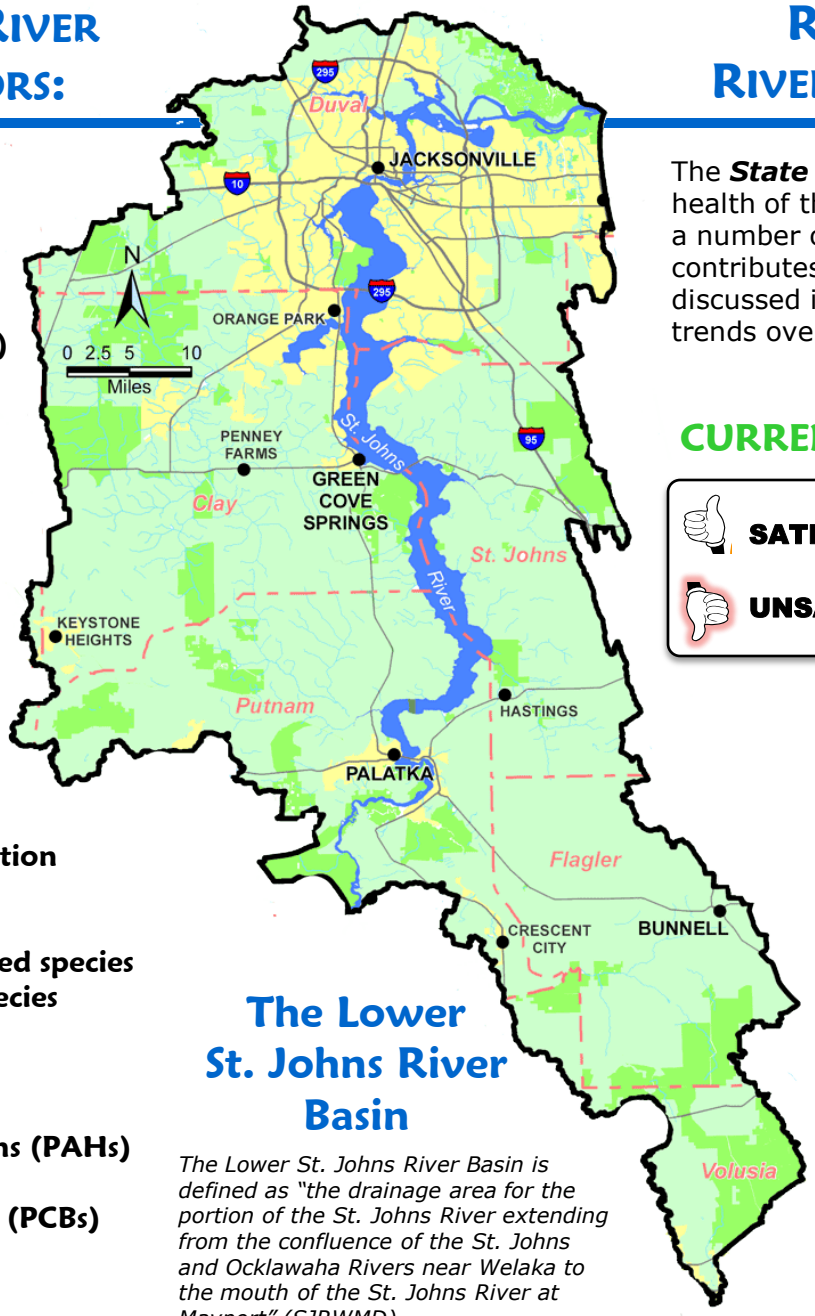
1. Finfish fisheries
2. Invertebrate fisheries

3) AQUATIC LIFE

1. Submerged aquatic vegetation
2. Wetlands
3. Macroinvertebrates
4. Threatened and endangered species
5. Nonindigenous aquatic species

4) CONTAMINANTS

1. Polyaromatic hydrocarbons (PAHs)
2. Metals
3. Polychlorinated biphenyls (PCBs)
4. Pesticides



The Lower St. Johns River Basin

The Lower St. Johns River Basin is defined as "the drainage area for the portion of the St. Johns River extending from the confluence of the St. Johns and Ocklawaha Rivers near Welaka to the mouth of the St. Johns River at Mayport" (SJRWMD).

Rating Scheme for River Health Indicators:

The ***State of the River Report*** describes the health of the Lower St. Johns River Basin based on a number of broad indicators. How each indicator contributes to, or signals, overall river health is discussed in terms of its current status in 2008 and trends over time.

CURRENT STATUS

- SATISFACTORY
- UNSATISFACTORY

The ***Current Status*** for each indicator is based on the most recent data records. This rating often considers whether the indicator meets State and Federal minimum standards and guidelines.

TREND

- CONDITIONS IMPROVING
- CONDITIONS STABLE
- CONDITIONS WORSENING
- UNCERTAIN

The ***Trend*** rating reflects only historical change derived from statistical analyses of the best available scientific data over the time period analyzed. The ***Trend*** rating does not consider initiated or planned management efforts that have not yet had a direct impact on the indicator.

water quality

Indicator	Current Status	Trend
Dissolved oxygen (DO) • Amount of oxygen in the water. • Essential to the survival of aquatic life. • Low DO stresses aquatic animals. • Very low DO kills aquatic animals. • Can be low when a lot of algae die and decompose.	Shallow areas and tributaries have particularly low DO levels in the summer.	The seasonal trend is stable. However, periodic, extremely low dissolved oxygen events will continue to occur in summer months, when temperatures are high, until nutrient, sediment, and industrial inputs are substantially reduced.
Nutrients (nitrogen and phosphorus) • Low levels needed for plants to grow. • Too much causes algal blooms. • Comes from agricultural and urban runoff of fertilizers, burning of fossil fuels, wastewater treatment plants, and faulty septic tanks.	Excessive levels of the nutrients (nitrogen and phosphorus) in the river and its tributaries have increased the frequency and intensity of algal blooms in recent decades and contributed to low DO concentrations.	Wastewater treatment plant improvements, expansion of reclaimed water systems, and the use of best management practices to control runoff from cities, agricultural lands, and homeowners may reduce the loading of nutrients to the river. However, conditions will remain favorable for harmful algal blooms until TMDL (Total Maximum Daily Load) nutrient reduction goals are met.
Turbidity • Causes the water to look cloudy. • Caused by suspended sediment (from construction sites, urban runoff, or heavy rains) and dense algal blooms. • High levels reduce light penetration needed by submerged aquatic vegetation.	• MAIN STEM – Satisfactory. Conditions are improving. • TRIBUTARIES – Tributaries are particularly prone to turbidity events after a heavy rainfall or dredging.	In spite of increasing development pressure, this water quality indicator is apparently improving, and should continue to do so. 

Aquatic Toxins Hotline **TO REPORT ANY ILLNESS FROM EXPOSURE TO HARMFUL ALGAE–**

Call: 1-888-232-8635.
Florida Fish and Wildlife Conservation Commission

Fish Kill Hotline **TO REPORT A FISH KILL–**

Call: 1-800-636-0511
Florida Fish and Wildlife Conservation Commission

Protected Species Hotlines

TO REPORT AN INJURED, DEAD, HARASSED, OR ORPHANED MANATEE –
Call: 1-888-404-FWCC, or
***FWC from any cell phone.**
Florida Fish and Wildlife Conservation Commission

TO REPORT AN INJURED, DEAD, HARASSED, OR ORPHANED DOLPHIN, PORPOISE, OR WHALE –
Call: 1-305-862-2850.
National Marine Fisheries Service

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water quality

Indicator	Current Status	Trend
Algal blooms • Caused by excess nutrients, warm temperatures, and intense summer sunlight. • Toxic algae can be harmful to people and/or animals.	Unsatisfactory – Excessive nitrogen and phosphorus concentrations in the river and its tributaries have increased the frequency and intensity of algal blooms significantly in recent decades and are not considered a natural condition.	This is an area where applied research can help our understanding of the external factors that trigger both the bloom and toxin creation by these organisms. Tributary data sampling is too infrequent to support tracking algal blooms in the tributaries.
Bacteria (fecal coliform) • Naturally present in the digestive systems and excreted in feces of free-roaming wild animals and domestic pets. • Often signals the presence of other harmful or deadly diseases (such as cholera). • Manmade sources: poor agricultural practices, failing septic tanks, sewer line breaks, and malfunctions of wastewater treatment plants.	• MAIN STEM – in compliance with fecal coliform standards. • TRIBUTARIES – many tributaries have unacceptably high fecal coliform counts.	Long term trends cannot be identified due to scarcity of historical data.
Metals in the water column • Naturally occurring trace metals such as copper, zinc and nickel are essential micronutrients required by all organisms; however, in excess these metals can be toxic. • Man-made contributions of excess metals in aquatic environments are generally greater than natural sources. • Human activities lead to increased levels of essential metals and non-essential metals, such as arsenic, cadmium, and silver.	• MAIN STEM – maximum values of most of the metals analyzed fluctuated above water quality criteria. Copper was particularly problematic. • TRIBUTARIES – Metal concentrations were elevated in many of the tributaries analyzed, particularly in Doctors Lake, Moncrief Creek, Arlington River, Trout River and Cedar Creek.	With the exception of arsenic concentrations, which have generally decreased since 2000 and are now within acceptable limits, the concentrations of all other metals tested continue to fluctuate above the water quality criteria values. However, the level of metal contamination does not appear to be increasing.

Fish consumption advisories

Due to the possible presence of mercury, limited consumption (1-8 meals per month) is advised for the following fish taken from certain areas in the LSJRB:

Atlantic croaker, Atlantic thread herring, Atlantic weakfish, Black drum, Brown bullhead, Redbreast sunfish, Bluegill, Black crappie, Gulf and Southern flounder, Jack crevalle, Hardhead catfish, Red drum, Sand seatrout, Sheepshead, Spotted seatrout, Southern kingfish, Striped and white mullet, Spot, Warmouth, Largemouth bass, Bowfin, and/or Gar.

Consumption of Shark or King mackerel is not advised.

NOTE: More restricted consumption recommended for children and pregnant/lactating women. Additional advisories exist for the Upper and Middle Basins of the St. Johns River. (See Florida Department of Health 2008, http://www.doh.state.fl.us/environment/medicine/fishconsumptionadvisories/index.html)

tributaries

- The water quality of 20 tributaries in the LSJRB were analyzed in detail in the full report.
- Tributaries were selected based on the following criteria:
  - if enough sampling sites and data points were available
  - presence on EPA's "impaired" (polluted) waters list as required by section 303(d) of the Clean Water Act
  - historically important or used frequently for recreation

Indicator	Current Status	Trend
Black Creek • Cadmium • Copper • Nickel • Silver	 • The maximum cadmium concentrations detected were more than threefold higher than the freshwater criterion. • In periods of higher salinity, elevated copper and nickel concentrations may be problematic, as they were detected at levels above the water quality criteria. • The maximum silver concentration detected in Black Creek was more than 100 times the freshwater criterion and also substantially elevated above the saltwater criterion. The concentrations of silver found have the potential for causing toxic effects to aquatic life in this area.	 Trends cannot be identified due to scarcity of data.
Deep Creek • Total Phosphorus • Total Nitrogen • Chlorophyll-a • Dissolved Oxygen	 • Total phosphorus and nitrogen concentrations have generally been above EPA-recommended water quality standards and fluctuate seasonally. • Likewise, chlorophyll-a concentrations fluctuate, with relatively elevated levels in the summer months. Dissolved oxygen concentrations in these areas reflect these conditions, with lower dissolved oxygen concentrations observed in the summer months.	 The average concentrations are currently stable.
Dunns Creek / Crescent Lake • Chlorophyll-a • Total Phosphorus • Total Nitrogen • Dissolved oxygen	 • High levels of chlorophyll-a, nitrogen and phosphorus in the tributary have been observed and contribute to its impairment. This could lead to eutrophication and the presence of algal blooms. • Dissolved oxygen varies significantly going upstream and into Crescent lake; however, average values have been within acceptable limits.	 The average concentrations are currently stable.
Hogans Creek • Fecal coliform	 The average fecal coliform levels at all stations in Hogan Creek exceed the state's critical level. At some stations, measurements have been observed above 10,000 cfu/mL, which is 25 times the state's maximum.	 A final TMDL has been approved, and management actions may reduce fecal coliform loading.
Pottsburg Creek • Fecal coliform	 Fecal coliform levels in this residential tributary were identified as impaired in 2004.	 Recent data indicates that levels have dropped since 2004, and the Creek is not currently impaired.
Rice Creek • Nitrogen • Dissolved Oxygen • Chlorophyll-a • Turbidity	 Relatively elevated levels of nitrogen, low levels of dissolved oxygen and elevated chlorophyll-a and turbidity levels have been measured suggesting the potential for eutrophication.	 The average concentrations are currently stable.

finfish fisheries

Indicator	Status	Trend
Red drum (recreational fishery only) 		 Recent increases in fishing pressure warrant constant monitoring and assessment to ensure long-term maintenance of populations.
Spotted seatrout 		 Recent regulations have contributed to decreased commercial landings. Close assessment necessary to ensure maintenance of populations.
Largemouth bass (recreational fishery only) 		 Not enough data to assess. However, fairly abundant in the upper sections of the river, and not likely to be overfished in the near future.
Freshwater catfish 		 Commercial landings decreasing in all areas of the river. Decreases in freshwater catfish may be influenced by recent increases in farm-raised catfish in the southeast United States.
Sheepshead 		 Populations appear healthy and sustainable into foreseeable future.
Striped mullet 		 Highly variable from year to year, but populations appear healthy and sustainable into foreseeable future.
Southern flounder 		 Fisheries managers need more information on life history characteristics to ensure maintenance of populations.

invertebrate fisheries

Indicator	Status	Trend
Blue crab 		 Highly variable from year to year. A lack of life history information results in uncertainty on whether populations are being overfished or not.
Shrimp 		 Highly variable from year to year. South Atlantic and Gulf of Mexico Fishery Management Councils have established management plans to help maintain shrimp populations.
Stone crab 		 The statewide landings are likely at the maximum level that can be harvested under current conditions. The Florida Legislature implemented a crab trap reduction program in 2002.

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aquatic vegetation, wetlands & macroinvertebrates

Indicator	Current Status	Trend
Submerged aquatic vegetation (SAV) • Plants and grasses that grow on the river bottom. • Major indicator of ecosystem health. • Most common SAV in LSJRB is Tape Grass *(Vallisneria).* • Important nursery areas for largemouth bass, catfish, blue crabs, shrimp, etc. • Adds oxygen to the water, takes up nutrients, reduces sediment suspension, and lessens shoreline erosion.	• Grass beds once existed near downtown Jacksonville, but now are most prevalent south of the Buckman Bridge to Palatka. • Abundance south of Palatka and in Crescent Lake increasing again. 	• SAV abundance fluctuates according to environmental conditions, and south Putnam and Crescent Lake highly influenced by runoff and resulting increase in color of the water. • Threats increasing – river bank armoring, sedimentation, nutrient-induced algal blooms, and pollutants. • Effects of water withdrawals and harbor deepening are unknown. SJRWMD and others have undertaken detailed research plans to evaluate the potential effects.
Wetlands • Absorb nutrients and other pollutants from uplands. • Provide nursery grounds and habitat for many aquatic and terrestrial animals. • Stabilize river banks and provide flood control. 	• <u>Total wetland acres in Florida</u>: An estimated 56% of Florida's wetlands documented in the early 1900s remained by the mid-1990s. Destruction of Florida's wetlands was highest during 1950s to 1970s. • <u>Total wetland acres in the LSJRB</u>: Cannot be calculated with certainty from available data due to a high margin of error associated with wetland maps.	• <u>Total wetland acreage</u>: Cannot be reliably determined from available data. • Wetland mapping classification codes do not differentiate between natural and manmade wetlands, such as ponds created for stormwater retention, golf courses, fishing, aesthetics, or aquaculture. • <u>Wetland vegetation types</u>: Notable shift over time from *forested* to *non-forested* wetlands. • <u>Wetland permits</u>: Acres of wetlands impacted and mitigated have both increased. Mitigation shift from wetlands creation and restoration to wetlands preservation.
Macroinvertebrates • Animals without a backbone that live on or in the sediment (including crabs, shrimp, snails, insects, worms, and barnacles). • Important part of the food web. • Affect the aeration and sediment size of river bottom. • Can signal river stress and pollution.	• Generally degraded in many areas within the LSJRB. • May be more pollution-tolerant species at main stem sites within the river that are dominated by fresh versus saltwater. • Particularly high environmental stress suggested with species encountered in the Cedar-Ortega River Basin and Julington Creek.	• Long-term trends cannot be reliably determined, because there is high natural variability in populations from year to year and among specific areas within the LSJRB. • Long-term, comparable datasets are needed to more accurately assess trends. 

Photo Credit: G. Fewless/UW, H. McCarthy, H. McCarthy

nonindigenous aquatic species

Indicator	Current Status	Trend
Nonindigenous aquatic species • Any species that is not native to LSJRB. • Consequences of exotic species are unpredictable, cumulative, irreversible, and potentially devastating. • Examples include water hyacinth, hydrilla, aquarium fish like tilapia, island applesnail, and a toxic, bloom-forming, blue-green algae.	• Total of 57 documented nonindigenous aquatic species in the LSJRB. • The Asian tiger shrimp *(Penaeus monodon)* was first sighted in the St. Johns River in 2008. 	The top two ways exotic species arrive in the LSJRB: 1. Humans (through the accidental or intentional release of exotic pets, for example). 2. Foreign ballast water and sediment from ships. Because both the number of humans and visiting ships are expected to increase, the rate of new introductions is expected to increase accordingly.

threatened & endangered species

Indicator	Current Status	Trend
Florida manatee (endangered)  A few manatees from the Blue Springs sub-population, which currently consists of a total of about 300 manatees, visit the LSJRB. Most manatees in the LSJRB (about 260) are members of the Atlantic sub-population, which was 2,153 manatees along the entire east coast of Florida (an increase of 741 animals since 2007).	• ATLANTIC SUB-POPULATION – Shows slight increase, and manatees are distributed throughout the LSJRB. • BLUE SPRINGS SUB-POPULATION – Shows significant increase in numbers, and some animals known to use the LSJRB.	• ATLANTIC SUB-POPULATION – Good: Significant threats increasing, including watercraft mortalities and habitat loss. • BLUE SPRINGS SUB-POPULATION – Good: Threats same as above including issues of reduced flow from Blue Springs.
 **Bald eagle (delisted 2007)** Numerous nests along the St. Johns River, where they feed mostly on fish.	Removed from Endangered Species List in 2007, because population numbers had increased significantly.	Good: Threats still exist, including harassment, electrocution and habitat loss.
 **Wood stork (endangered)**	Several colonies in LSJRB, with the Jacksonville Zoo colony being the most recent and rapidly growing.	Good: Threats include drought, adverse weather like hurricanes and changes in water levels.
 **Shortnose sturgeon (endangered)**	• Limited data available for LSJRB. • Few specimens caught over the years generally near Palatka.	• Virtually nonexistent. • Probably not reproducing in the LSJRB anymore.

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sediment contaminants

- Sediments attract contaminants that persist, bioaccumulate, and are toxic.
- History of contamination is reflected in sediments.
- Sediment organisms (base of the food chain) accumulate contaminants.
- Contaminants can then move up the food chain.

Indicator	Current Status	Trend
Metals • Mercury, lead, cadmium, copper, silver, zinc, and chromium were studied. • All occur naturally. • Levels increase from coal burning, industry, hazardous waste sites.	• Major contaminant stressor, especially mercury, lead, and zinc. • Elevated levels throughout basin. • Conditions worst in Cedar-Ortega, Rice Creek areas. • Organisms likely to be affected.	• Leveled off since 1990s. • Outlook uncertain without more information about sources of metals to the LSJRB.
Polyaromatic hydrocarbons (PAHs) • Over 100 chemicals • Occur naturally in the environment. • Levels increase from fossil fuel handling and burning, wood preservation (creosote).	• Major contaminant stressor throughout the basin. • Present in oysters in Chicopit Bay. • Petroleum and combustion are the primary current sources.	• NORTHERN LSJRB – Recovery from 1980s creosote contamination continues in north. • SOUTHERN LSJRB – Urbanization in south may be increasing some types.
Polychlorinated biphenyls (PCBs) • Includes 209 manmade chemicals. • Banned in 1970s. • PCBs primarily from the past, but still come from hazardous waste sites, dust from far-distant sites.	• Extraordinarily persistent. • In most sediment samples in LSJRB. • Low-level stressor in most areas. • High-level stressor in the Cedar-Ortega area and Rice Creek.	• No significant decline in last 20 years. • Long-term toxic stress in Cedar-Ortega area, but a stormwater treatment facility under construction should improve conditions.
Pesticides • Older pesticides, banned for general use in 1970s (e.g., DDT). • Degrade slowly and products are also toxic. • More information needed about modern pesticides in LSJRB.	• In most sediment samples, but at levels that affect only the most sensitive organisms. • Cedar-Ortega area is an exception with high-level stress from pesticides. • DDT and its degradation products most important.	• No discernible decline in toxic effects over 20 years, but pesticides are slowly transforming. • Will continue to contribute a small amount to overall toxic burden for foreseeable future. • Long-term toxic stress in Cedar-Ortega area, but a stormwater treatment facility under construction should improve conditions.

Photo Credit: L. Sonnenberg/JU


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

What's Being Done to Improve the St. Johns River:

Cedar River Regional Stormwater Treatment Facility

City of Jacksonville's septic tank phase-out program

1. **Total Maximum Daily Loads (TMDLs)** - State agencies were directed by EPA to establish the total amount of pollutants (i.e., Total Maximum Daily Loads) that can enter impaired water bodies so that water quality standards can be met. Those total amounts must then be fairly and cost-effectively distributed among industry, agriculture, and cities. The FDEP and SJRWMD have determined the reductions required for nutrients entering the LSJR main stem and fecal coliforms entering the tributaries. Agreements with stakeholders to achieve those reductions are being implemented. A mercury TMDL will also be established by 2012.

2. **Fertilizer and landscape irrigation** - Responsible fertilizer application and landscape irrigation is promoted, and sometimes regulated, throughout the LSJRB to reduce nutrients in water bodies and to reduce water consumption.

3. **Fecal coliform bacteria** - Fecal coliform bacteria assessment and remediation of tributaries is under way. The Septic Tank Removal Program is connecting Jacksonville neighborhoods to sewer lines in problem areas, and sewerage infrastructure is being improved throughout the lower basin.

4. **Restoration/remediation projects** - Water and sediment quality improvement of Deer Creek, Fishweir Creek, Fishing Creek, McCoys Creek, Moncrief Creek, Naval Air Station, and Cedar River is planned, in progress, or complete.

5. **Regional stormwater treatment facilities** - Several facilities in the LSJRB are constructed or planned to reduce the impact of surface runoff on water and sediment quality.

6. **Tri-County Agricultural Area (St. Johns, Putnam, and Flagler counties)** - Agricultural Best Management Practices have been implemented to reduce nutrients, suspended solids, and pesticides in runoff.

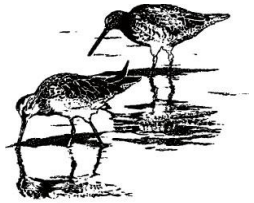
7. **Wastewater** - Upgrades in municipal wastewater treatment plants and reclamation facilities are under way in all counties in the LSJRB to reduce nutrients in water bodies.

Jacksonville University

UNF University of North Florida

The *State of the River Report* is the result of a consolidated effort directed by a team of academic researchers from Jacksonville University (JU), the University of North Florida (UNF), and Valdosta State University (VSU). This report has undergone an extensive review process including local stakeholders and an expert panel with the expertise and experience in various disciplines to address the multi-faceted nature of the data.

The *State of the River Report* was funded through the City of Jacksonville's Environmental Protection Board (EPB). It is one component of a range of far-reaching efforts initiated by Jacksonville Mayors John Delaney and John Peyton and the *River Accord* partners to inform the public about the current status and trends in the Lower St. Johns River Basin, Florida (LSJRB). *River Accord* partners include the City of Jacksonville, St. Johns River Water Management District (SJRWMD), JEA, Jacksonville Water and Sewer Expansion Authority (WSEA), the Florida Department of Environmental Protection (FDEP), and local governments and utilities.



Environmental Protection Board
Jacksonville, Florida

Jacksonville
Where Florida Begins.

Further information at:
http://www.SJRreport.com

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