Lower St. Johns River Basin

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Objectives

Total Maximum Daily Load (TMDL)

Site Specific Alternative Criteria (SSAC)

Definitions:

TMDL - maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses.

SSAC – Pursuant to Rule 62-302.800, Florida Administrative Code, when a waterbody does not meet ambient water quality criterion for its classification, upon petition by an affected party or upon initiation by DEP, a more appropriate site specific alternative criterion can be established when an affirmative demonstration is made.

Definitions:

BMAP – Basin Management Action Plan is a document that describes implementation actions, specific load and wasteload allocations, as well as stakeholder efforts to achieve an adopted TMDL.

Point Source – means an identifiable and discrete conveyance such as a pipe from a wastewater facility to surface waters.

Non-Point Source – means diffuse runoff of stormwater to surface waters through a pipe, ditch, channel, or other such conveyance.

Is the Lower St. Johns River (LSJR) impaired?

See for yourself…

Microcystis Bloom - I-295 (north view) over mid-channel St. Johns River - 08.19.05 - 2:43pm

LSJR Basin Facts

- **Main stem segments of the LSJR between Ocklawaha River and the mouth at Mayport**
  - **101 river miles**
  - **Water surface area of 115 square miles**
  - **Three ecological zones:**
    1) predominantly fresh,
    2) alternately fresh and marine, and
    3) predominantly marine
- **Essentially flat**


Jacksonville
Macclenny
Green Cove Springs
St. Augustine
Palatka
Bunnell
Daytona
DUVAL
BAKER
CLAY
BRADFORD
ST. JOHNS
PUTNAM
ALACHUA
FLAGLER
Atlantic Ocean
N

What's the major impairment of the LSJR Basin?

- **Primarily Excess Nutrients**
  - **– algal blooms**
  - **– resultant low Dissolved Oxygen**
  - **– lower transparency and resultant loss in submerged aquatic vegetation**

Water Quality Criteria for Nutrients

Current:

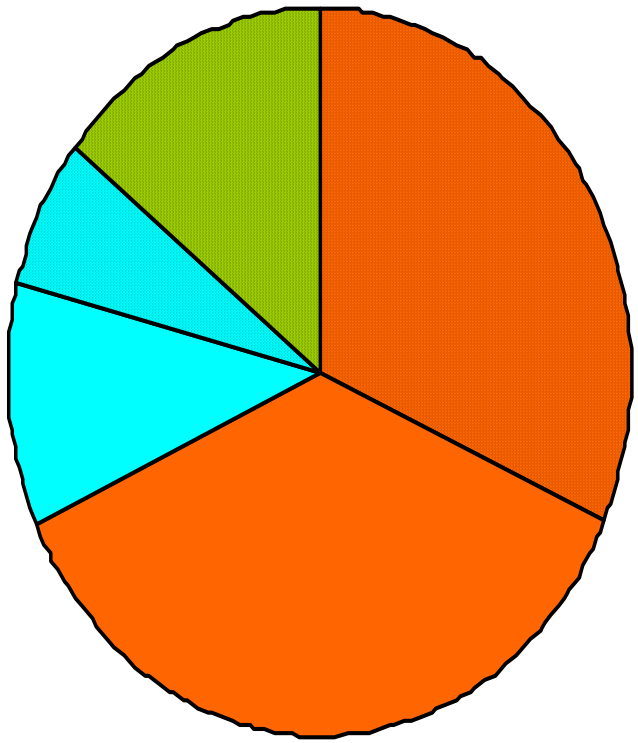
nutrient concentrations of a body of water shall not be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.

Future:

nutrient based loading allocation for Point and Non-Point Dischargers.

Where are the loads coming from?

Lower St. Johns River Nitrogen Load Summary
1995-99

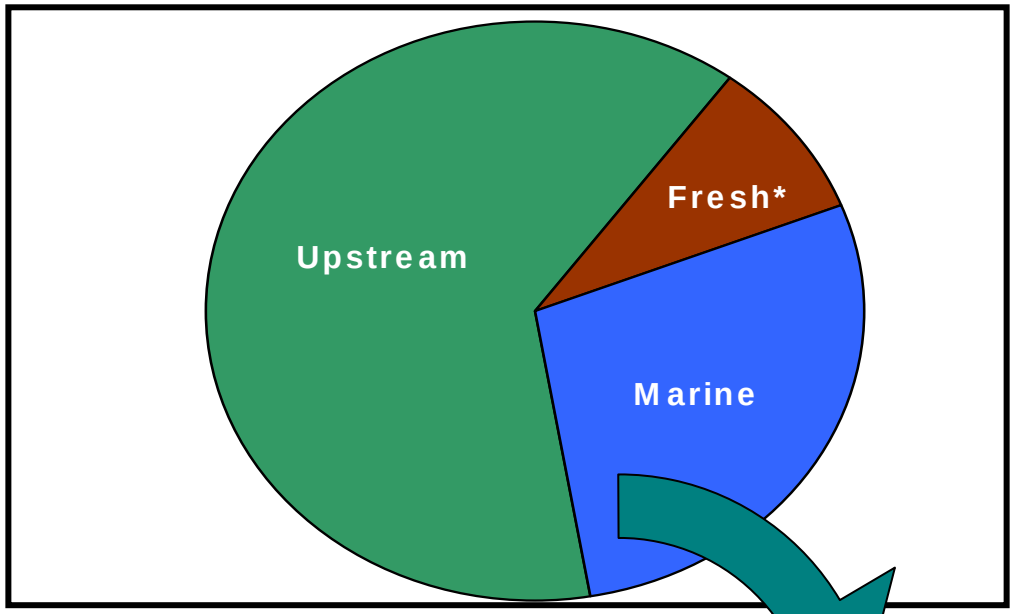


- Upstream (Middle St. Johns, Ocklawaha and Crescent Lake
- LSJR Basin Non-point Source
- LSJR Basin Point Source

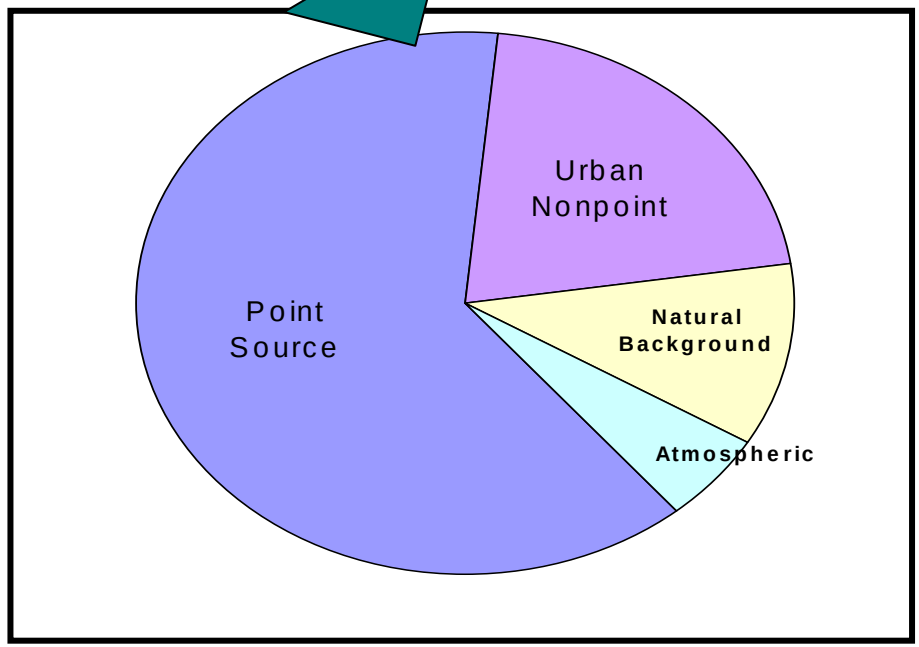
Dotted - Anthropogenic
Clear - Natural Background

Determination of Current Loading

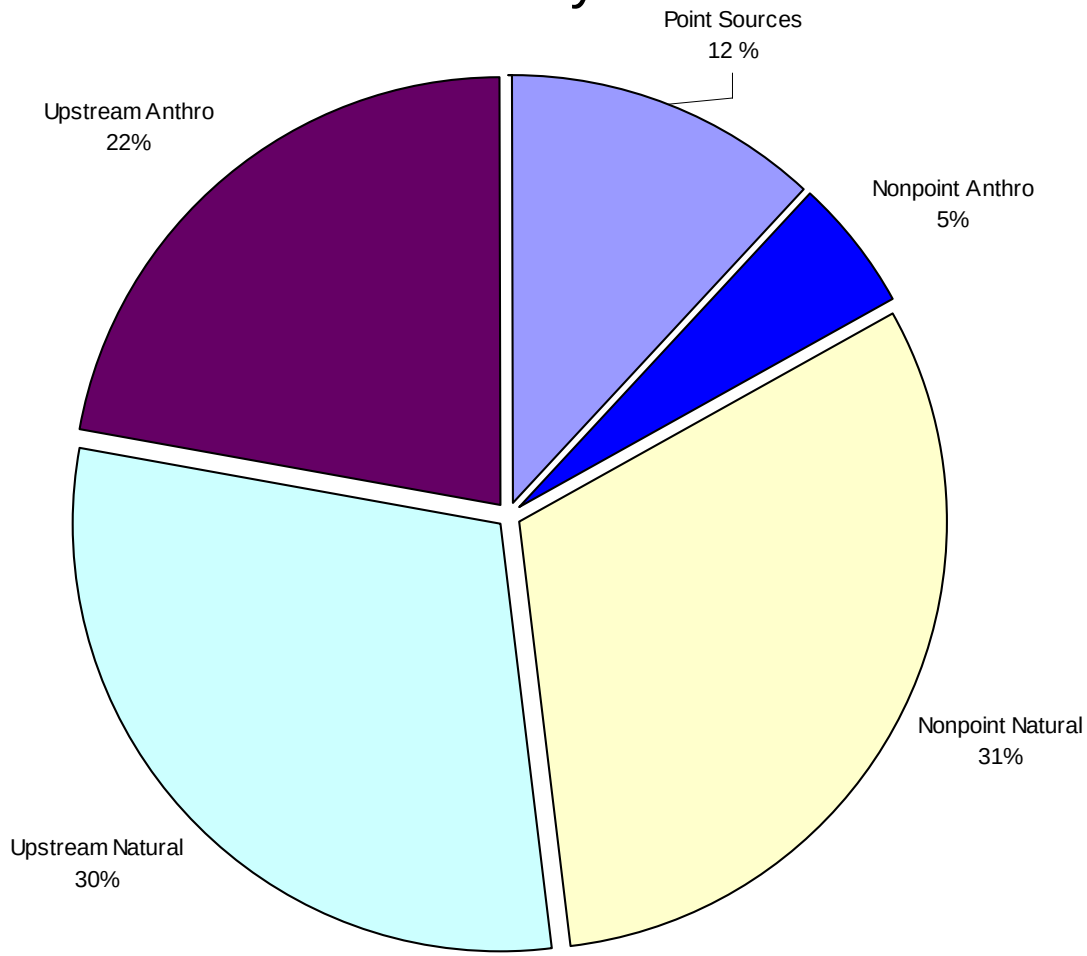
- **Point Sources**
  - **36 permitted wastewater treatment facilities that discharge directly into the LSJR**
  - **Loads calculated for each facility based upon monitoring data, statistical extrapolation, and data from similar facilities**
- **Non-Point Sources (NPS)**
  - **Pollution Load Screening Model (PLSM) for landscape**
  - **Atmospheric deposition on water surface based on NADP monitoring data**



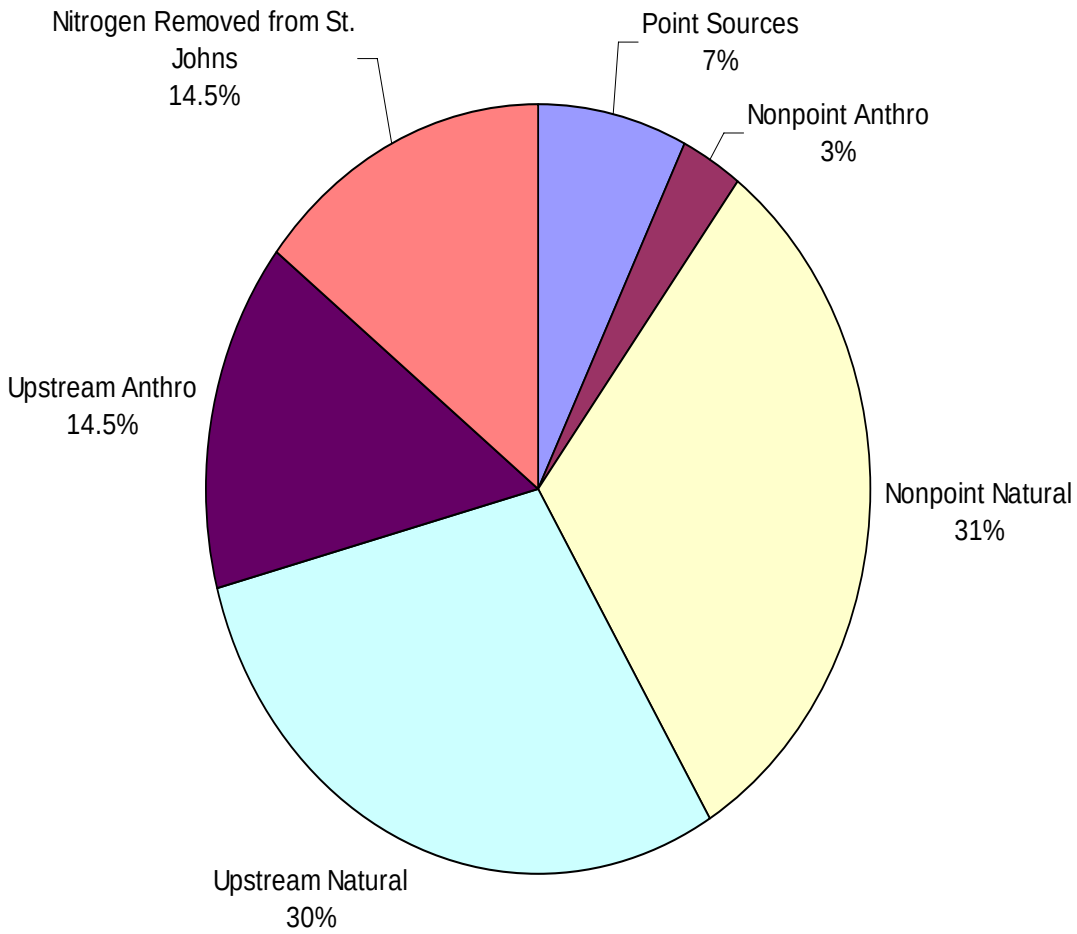
Point vs. Non-Point Nutrient Loads



Marine Portion of LSJR Nitrogen Load Summary 1997-98



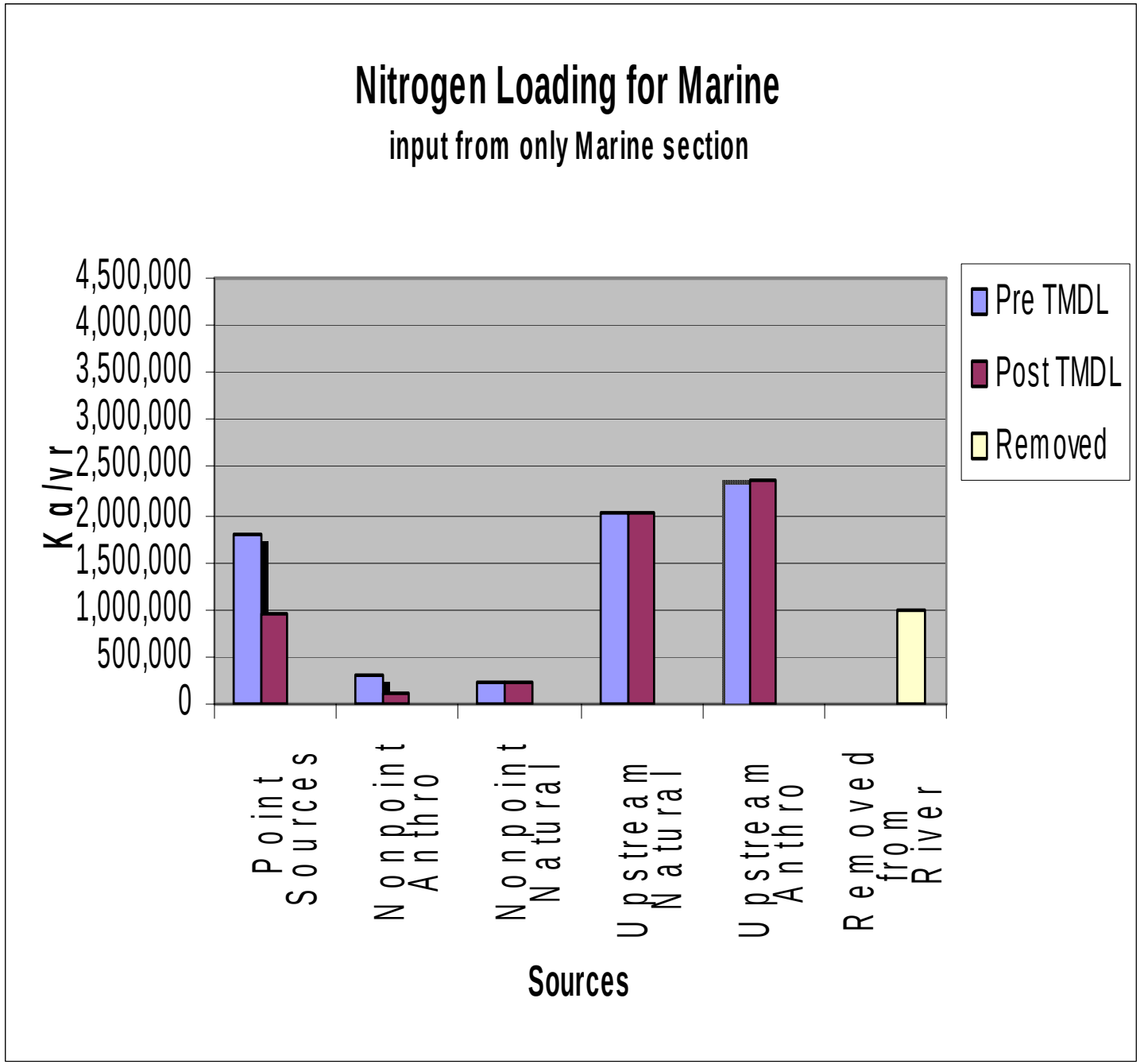
Lower St. Johns River Nitrogen Load Summary based Curent version
FDEP TMDL May 2, 2006



Myth vs. Reality

MYTH "The standards DEP is proposing would allow additional nutrients to be poured into the river each year."

REALITY: Wrong! DEP's restoration proposal calls for an estimated 50 percent reduction beyond current levels, or 1.0 to 1.3 million pounds, of nitrogen every year in the marine portion.


Nitrogen Loading for Marine
input from only Marine section
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Kg/yr
Pre TMDL
Post TMDL
Removed
Point Sources
Nonpoint Anthro
Nonpoint Natural
Upstream Natural
Upstream Anthro
Removed from River
Sources

To Address Impairment DEP Must Establish a Nutrient TMDL for the LSJR!

HOW???

Science (Modeling) / Consensus / Permitting

TMDL Process Overall Objective

- **Identify and quantify all Point and NPS loadings for <u>each pollutant</u> impairing water quality**
- **Use computer modeling to estimate NPSs and establish assimilative capacity**
- **TMDL is then <u>allocated</u> to all sources**
  - **Includes a Margin of Safety**
  - **Follow recommendations in 2001 Allocation TAC Report**

TMDL Success from Stakeholder Participation

- **Monthly TMDL Executive Committee meetings – late 2002**
  - **TAC meetings since 80s**
  - **Critical for consensus**
  - **wanted to foster flexibility during development of TMDL implementation phase**

Where are we now?

- **EPA approved DEP adopted TMDL in 2004, Riverkeeper wanted greater reductions and identified a valid legal loophole: DEP did not complete promulgation of SSAC before promulgation of TMDL – hence, litigation.**

- **EPA remanded process to themselves (October 2005), and promulgated a new TMDL (January 23, 2006) that comports with the default water quality criteria for Dissolved Oxygen.**

- **EPA acknowledges that DEP will pursue SSAC, and that EPA will review and consider it when that work is completed – this could establish another TMDL target.**

Water Quality Criteria for Dissolved Oxygen (DO) Class III Marine Waters

- **Current criterion is comprised of two components:**

  1. **an absolute minimum DO concentration of 4.0 mg/L (below 4.0 mg/L adverse impacts can be expected)**

  2. **a minimum daily average DO concentration of 5.0 mg/L (above daily minimum no adverse impacts expected)**

Proposed DO SSAC for the Marine Portion of LSJR

- **Proposed DO SSAC for the LSJR is comprised of four components:**
  - **Two components from current DO criterion:**
    1. **an absolute minimum DO concentration of 4.0 mg/L.**
    2. **a daily average DO concentration of 5.0 mg/L above which no adverse impacts expected.**

Proposed DO SSAC for the Marine Portion of LSJR

- **Two components used to interpret DO levels between 4.0 and 5.0 mg/L.**
  3. **Curve based on larval recruitment/survival response of sensitive species.**
  4. **Curve based on larval growth response of single most sensitive species.**
- **Based on EPA derivation for Virginian Province (EPA 2000) which uses measured response of sensitive organisms to low DO levels to establish allowable exposure durations.**

Species Used by EPA to Derive DO Criteria Minimum Concentration (CMC) of 2.3 mg/L

Species	Common Name	Life Stage	GMAV LC50	GMAV LC5	GMAV LC5/LC50	GMAV Rank[b]
Carcinus maenus	Green Crab	Juvenile/Adult	<0.34			1
Spisula solidissima	Atlantic Surf Clam	Juvenile	0.43	0.70	1.63	2
Rithropanopeus harrisii	Harris Mud Crab	Juvenile	0.51			3
Prionotus carolinus	Northern Sea Robin	Juvenile	0.55	0.80	1.45	4
Eurypanopeus depressus	Flat Mud Crab	Juvenile	0.57			5
Leiostomus xanthurus	Spot	Juvenile	0.7	0.81	1.16	6
Tautoga onitis	Tautog	Juvenile	0.82	1.15	1.40	7
Palaemonetes vulgaris	Marsh Grass Shrimp	Juvenile	0.86	1.24	1.44	8
Ampelisca abdita	Amphipod	Juvenile	<0.9			9
Scopthalmus aquosus	Windowpane Flounder	Juvenile	0.9	1.20	1.33	10
Apeltes quadracus	Fourspine Stickleback	Juvenile/Adult	0.91	1.20	1.32	11
Homarus americanus	American Lobster	Juvenile	0.91	1.60	1.76	12
Crangon septemspinosa	Sand Shrimp	Juvenile/Adult	0.97	1.60	1.65	13
Callinectes sapidus	Blue Crab	Adult	<1.0			14
Brevoortia tyrannus	Atlantic Menhaden	Juvenile	1.12	1.72	1.54	15
Crassostrea virginica	Eastern Oyster	Juvenile	<1.15			16
Stenotomus chrysops	Scup	Juvenile	1.25			17
Americamysis bahia	Mysid	Juvenile	1.27	1.50	1.18	18
Paralichthys dentatus	Summer Flounder	Juvenile	1.32	1.57	1.19	19
Pleuronectes americanus	Winter Flounder	Juvenile	1.38	1.65	1.20	20
Morone saxatilis	Striped Bass	Juvenile	1.58	1.95	1.23	21
Syngnathus fuscus	Pipe Fish	Juvenile	1.63	1.90	1.17	22

Shaded (14 of 22) species are known to be indigenous to the Lower St. Johns River.

Application of Proposed DO SSAC for the LSJR

- The DO range between 4.0 and 5.0 mg/L partitioned into 0.2 mg/L increments.
- For each 0.2 mg/L increment, the allowable exposure duration (days/year) was determined based on the applicable portions of the larval recruitment/survival and larval growth response curves.

DO Range	Allowable Exposure Duration
4.0 – <4.2	16 days
4.2 – <4.4	21 days
4.4 - <4.6	30 days
4.6 - <4.8	47 days
4.8 - <5.0	55 days

- Allowable exposure duration decreases as level of stress increases (i.e., as DO levels decrease, organisms can be exposed for shorter periods of time without adverse impacts).
- Since the biological effect of low DO exposure is cumulative across the DO intervals, the fractional exposures within each range would be summed as proposed by EPA (2000).

Application of Proposed DO SSAC

Since the biological effect of low DO exposure is cumulative across the DO five intervals, the fractional exposures within each range would be summed according to the following equation.

$$\left(\begin{array}{c}\text{Total Fractional} \\ \text{Exposure}\end{array}\right) = \frac{\begin{array}{c}\text{Days between} \\ 4.0 - < 4.2\,\text{mg/L}\end{array}}{16\,\text{day Max}} + \frac{\begin{array}{c}\text{Days between} \\ 4.2 - < 4.4\,\text{mg/L}\end{array}}{21\,\text{day Max}} + \frac{\begin{array}{c}\text{Days between} \\ 4.4 - < 4.6\,\text{mg/L}\end{array}}{30\,\text{day Max}} + \frac{\begin{array}{c}\text{Days between} \\ 4.6 - < 4.8\,\text{mg/L}\end{array}}{47\,\text{day Max}} + \frac{\begin{array}{c}\text{Days between} \\ 4.8 - < 5.0\,\text{mg/L}\end{array}}{55\,\text{day Max}}$$

To satisfy the criterion, the Total Fractional Exposure for each year must not be greater than 1.

Myth vs. Reality

MYTH: "The DEP has elected to lower water quality standards for the St. Johns River, violating its own rules, to serve the interests of polluters."

REALITY: The DEP has not lowered water quality standards. Rather, the Department has identified the site specific alternative criterion for dissolved oxygen necessary to protect fish and wildlife and restore the river in full accordance with state law and the federal Clean Water Act.

Application of Proposed DO SSAC

The proposed SSAC would be utilized to assess the ambient DO status of the waters in the LSJR. Permitted discharges would continue to be required to achieve a minimum DO concentration of 4.0 mg/L and an average of 5.0 mg/L.

Next Steps

- **New TMDL and Allocation (BMAP)**
  - ➢ **Update Model to achieve DO SSAC**
  - ➢ **Complete BMAP process**
  - ➢ **TMDL to EPA (Sept. 2006)**
  - ➢ **BMAP Spring 2007**
- **Extensive Monitoring Network – DO SSAC**
  - ➢ **Collaborate**
  - ➢ **Implement**

Next Steps

- **Facilities upgrade to AWT**
- **Reuse, Reuse, Reuse**
- **Tributary TMDL & BMAP – 51**
- **Pollutant Trading**


INDEPENDENT LIFE