St. Johns River Water Supply Impact Study (WSIS)

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The Water Supply Impact study is the most comprehensive and rigorous investigation of the St. Johns River ever conducted.

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Major Conclusions

- **The St. Johns River can be used as an alternative water supply source with no more than negligible or minor effects.**
- **Future land use changes, completion of the Upper St. Johns River Basin Project, and sea level rise reduce the effects of water withdrawals.**
- **Potential for environmental effects varies along the river's length.**
- **The study provides peer-reviewed tools for use by the District and others.**

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National Academy of Sciences National Research Council (NRC) Peer Review

- **Three-year process working with the NRC peer review committee.**
- **Committee consisted of nine experts.**
- **Six multi-day meetings, field trips and numerous teleconferences.**
- **NRC–105 page report, December 2011**

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NRC Concluding Comment

“The overall strategy of the study and the way it was implemented were appropriate and adequate to address the goals that the District established for the WSIS.”

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The first step:
- Understand hydrology and hydraulics and predict the changes
- Resulting from potential water withdrawals.

- **Watershed hydrology models predict inflows into the river.**
- **River hydrodynamic model predicts river flow, level, and salinity.**

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Baseline Scenario

- 1995 Landuse
- Water Supply Planning Base Year
- Good Data set 1995-2006
- Stable USJ Project Conditions
- Use for Calibration of Models

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Forecast Scenarios

- 2030 Land-Use
- Complete Upper SJR Projects
  - Fellsmere,
  - C1- Sawgrass Lakes
  - Three Forks Marsh
- Conservative Sea Level Rise (14 cm)
- Withdrawal Scenarios - 77.5 mgd, 155 mgd, & 262 mgd

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Watershed Models

- Hydrologic Simulation Program – Fortran (HSPF)
  - 90 separate models
  - 11 in-house modelers
  - External Peer Review
- Model for Upper SJR Basin
- 55 mgd - near Lake Poinsett

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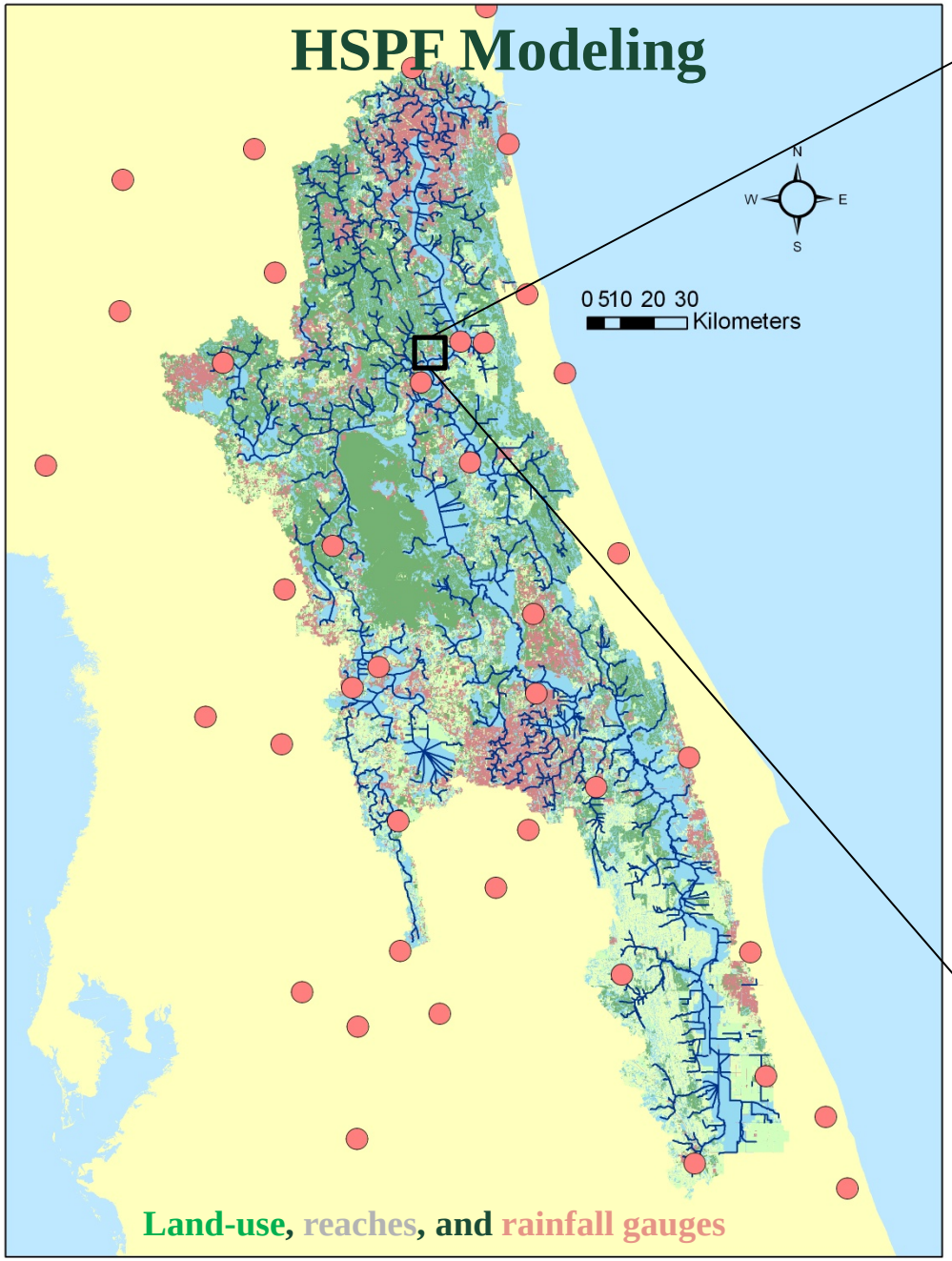
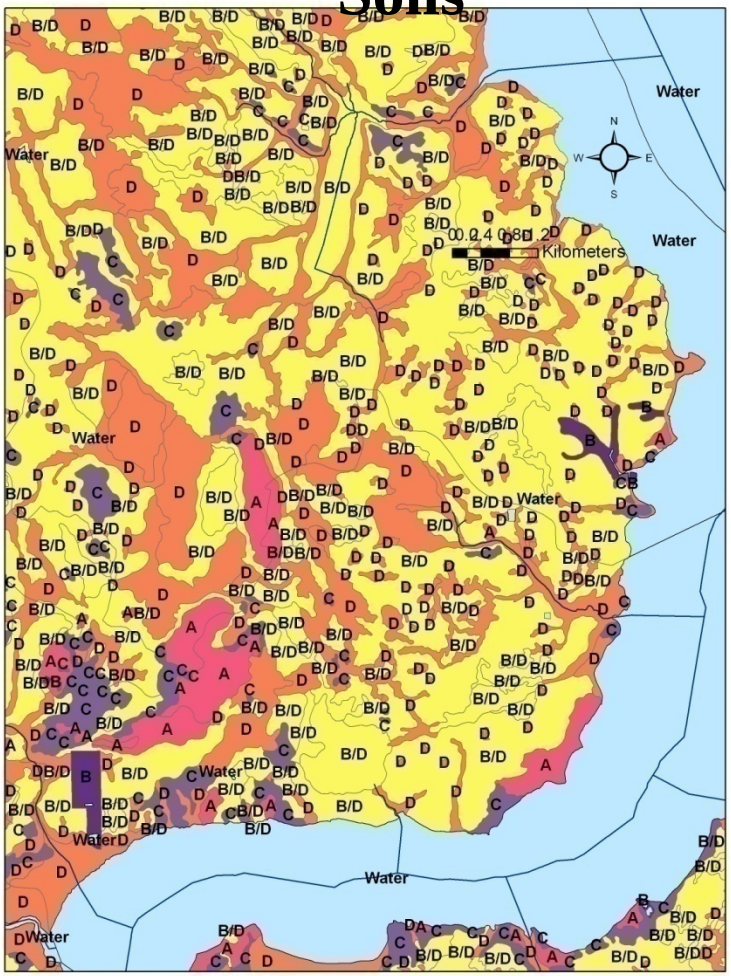
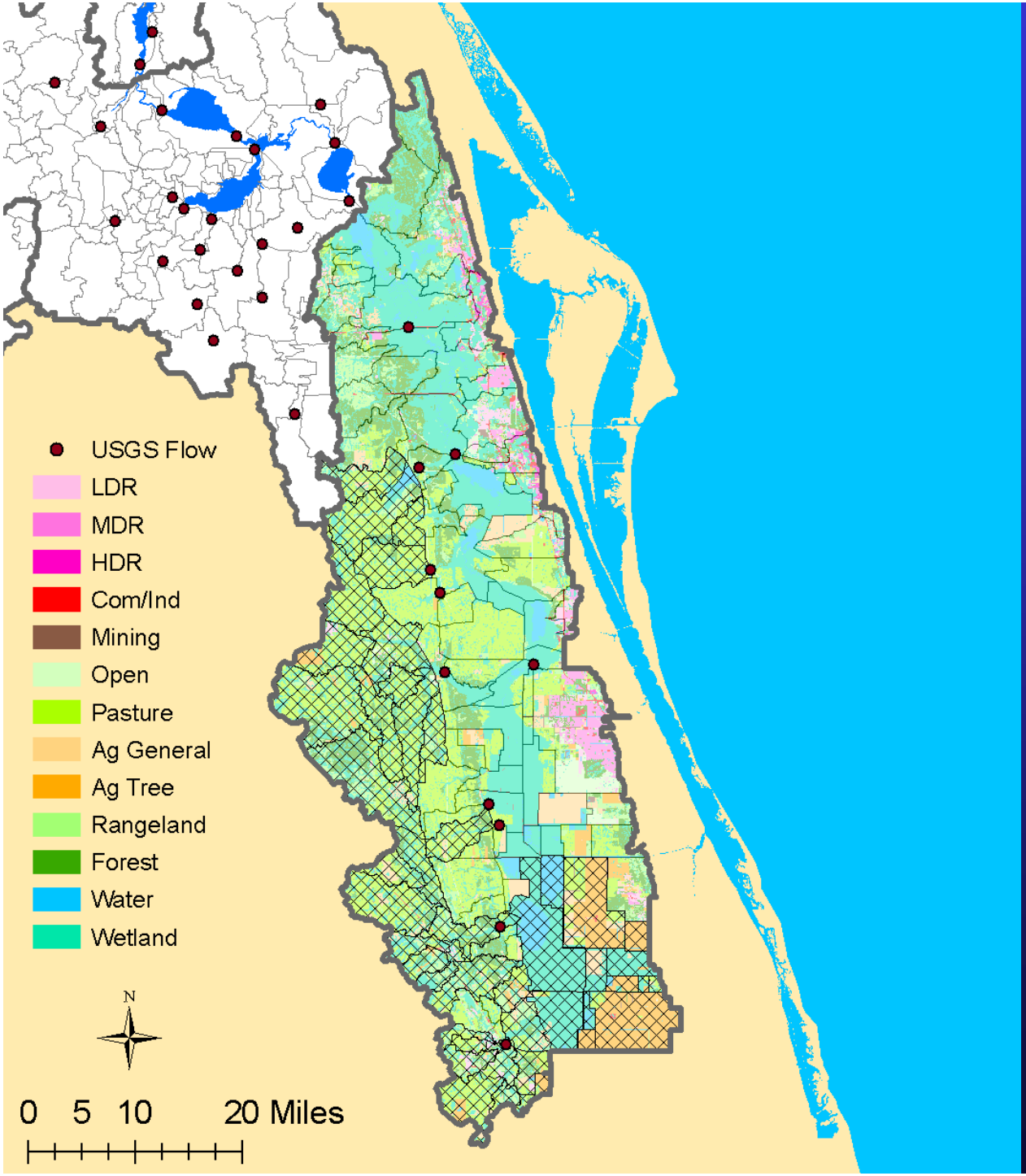
HSPF Modeling



Soils



D.E.M Land Cover Soils



Upper St. Johns River Basin

- 1,780 square miles
- Average 663 mgd
- Sub-watersheds
- USGS flow gages
- Calibrated tributaries

Slide 11

t1 Watershed + EFDC model domain + discharge stations + shaded calibrated models + subwatersheds + land use

"Red/Green" map
Structures
Operation
Projects (operational, planned)
tcera, 9/6/2009

River Hydrodynamics

- Environmental Fluid Dynamics Code (EFDC)
  - 3,000 horizontal x 6 vert. grids
  - 7 in-house modelers,6 outside experts
- 55 mgd Lake Poinsett
- 50 mgd Yankee Lake
- 50 mgd Lake Jesup
- 107 mgd Ocklawaha River

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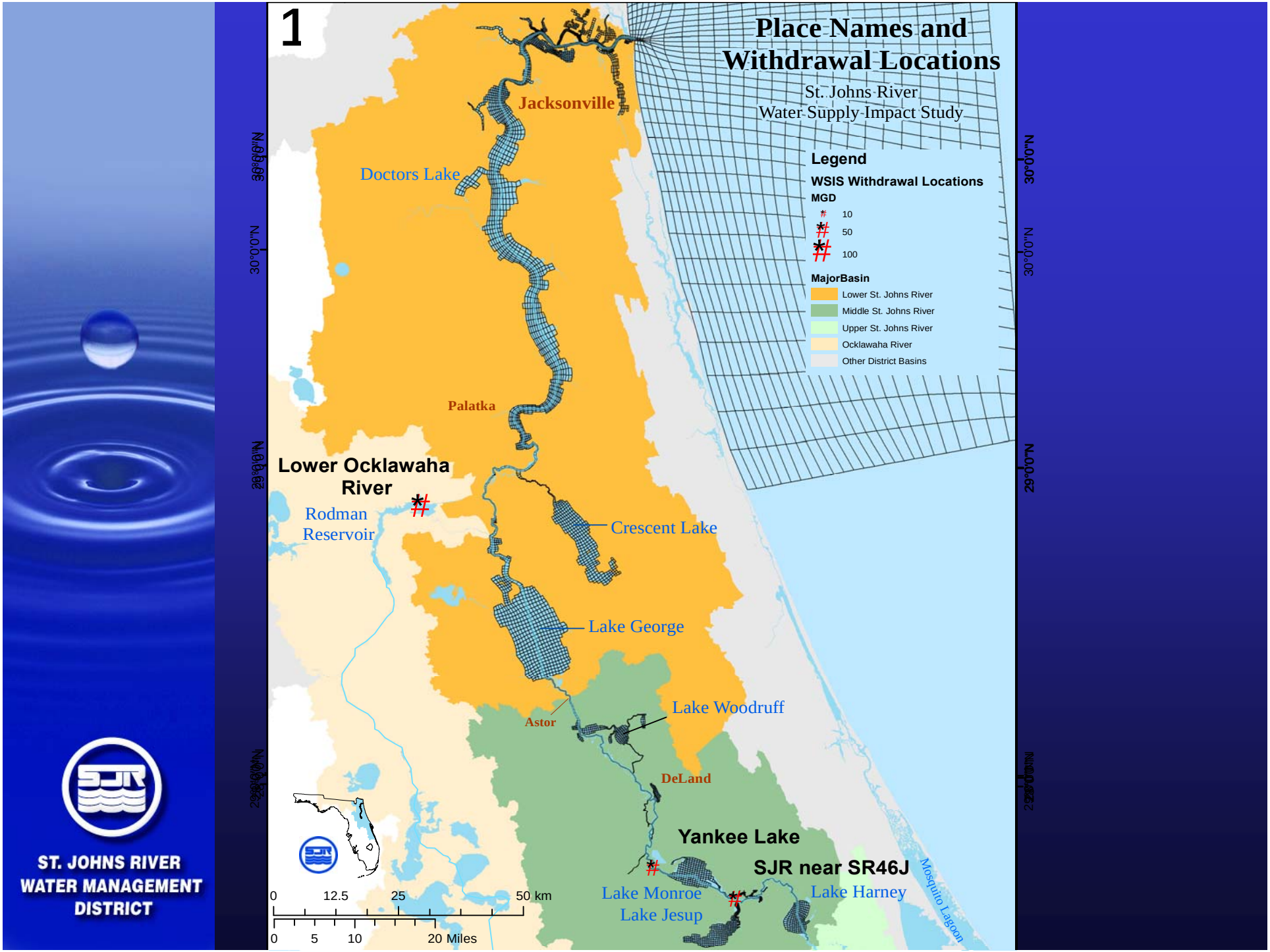
1
Place Names and Withdrawal Locations
St. Johns River Water Supply Impact Study
Legend
WSIS Withdrawal Locations
MGD
10
50
100
MajorBasin
Lower St. Johns River
Middle St. Johns River
Upper St. Johns River
Ocklawaha River
Other District Basins
Jacksonville
Doctors Lake
Palatka
Lower Ocklawaha River
Rodman Reservoir
Crescent Lake
Lake George
Lake Woodruff
Astor
DeLand
Yankee Lake
SJR near SR46J
Lake Monroe
Lake Jesup
Lake Harney
Mosquito Lagoon
0 12.5 25 50 km
0 5 10 20 Miles
30°0'0"N
29°0'0"N
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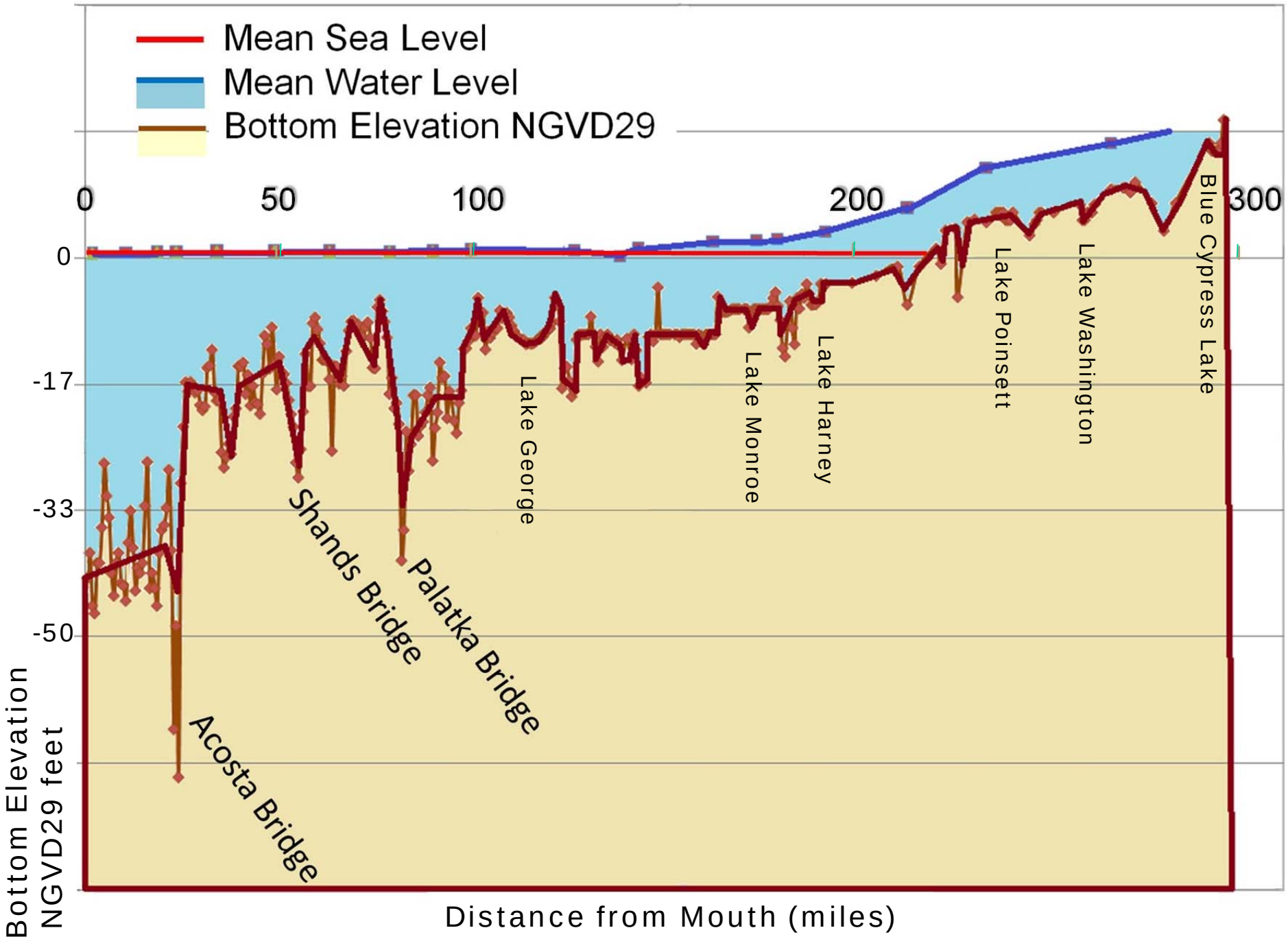
Mean Sea Level
Mean Water Level
Bottom Elevation NGVD29
0
50
100
200
300
0
-17
-33
-50
Bottom Elevation
NGVD29 feet
Distance from Mouth (miles)
Acosta Bridge
Shands Bridge
Palatka Bridge
Lake George
Lake Monroe
Lake Harney
Lake Poinsett
Lake Washington
Blue Cypress Lake

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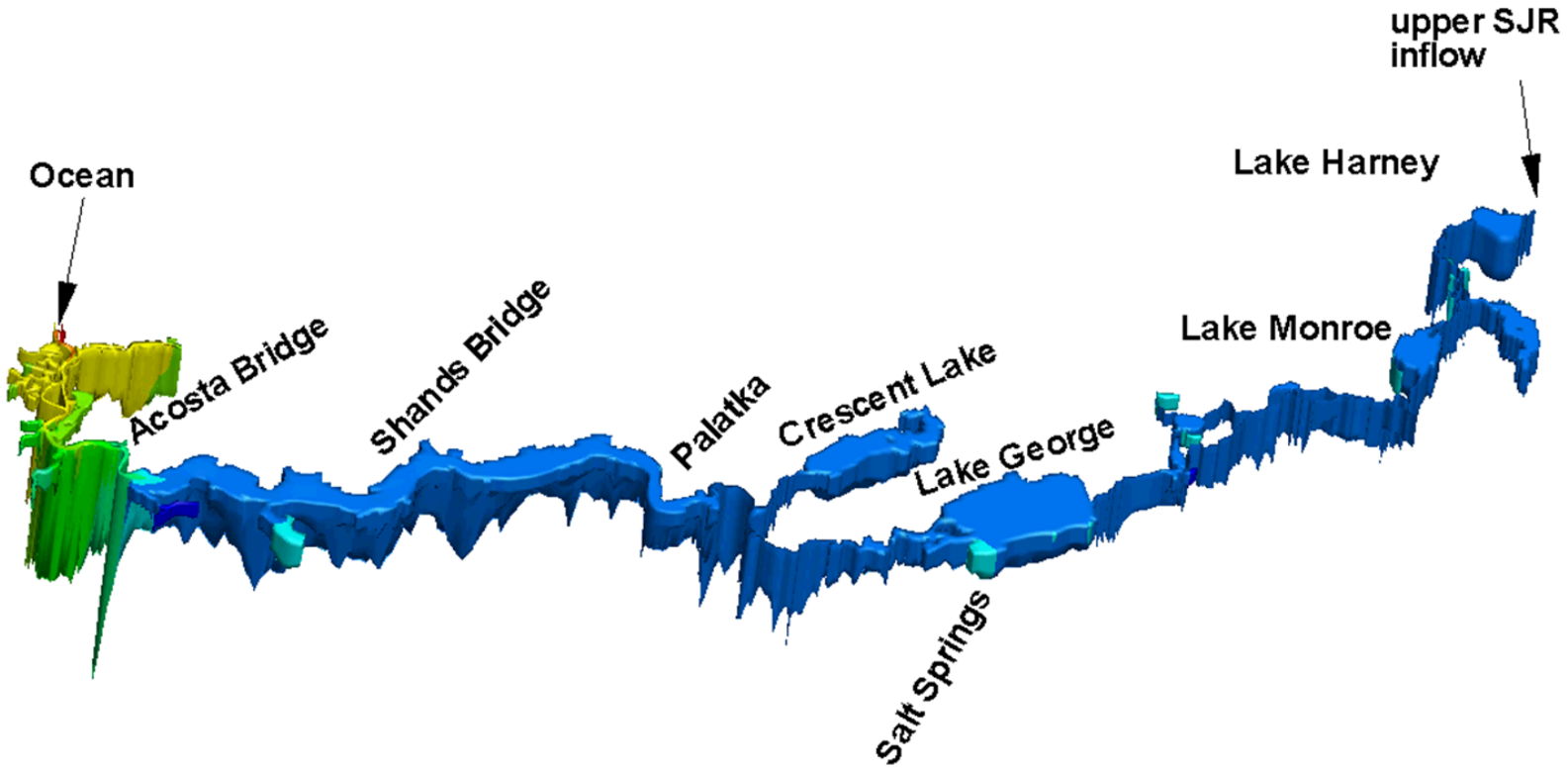

Salinity

0.1 0.5 1 5 10 17 30 34

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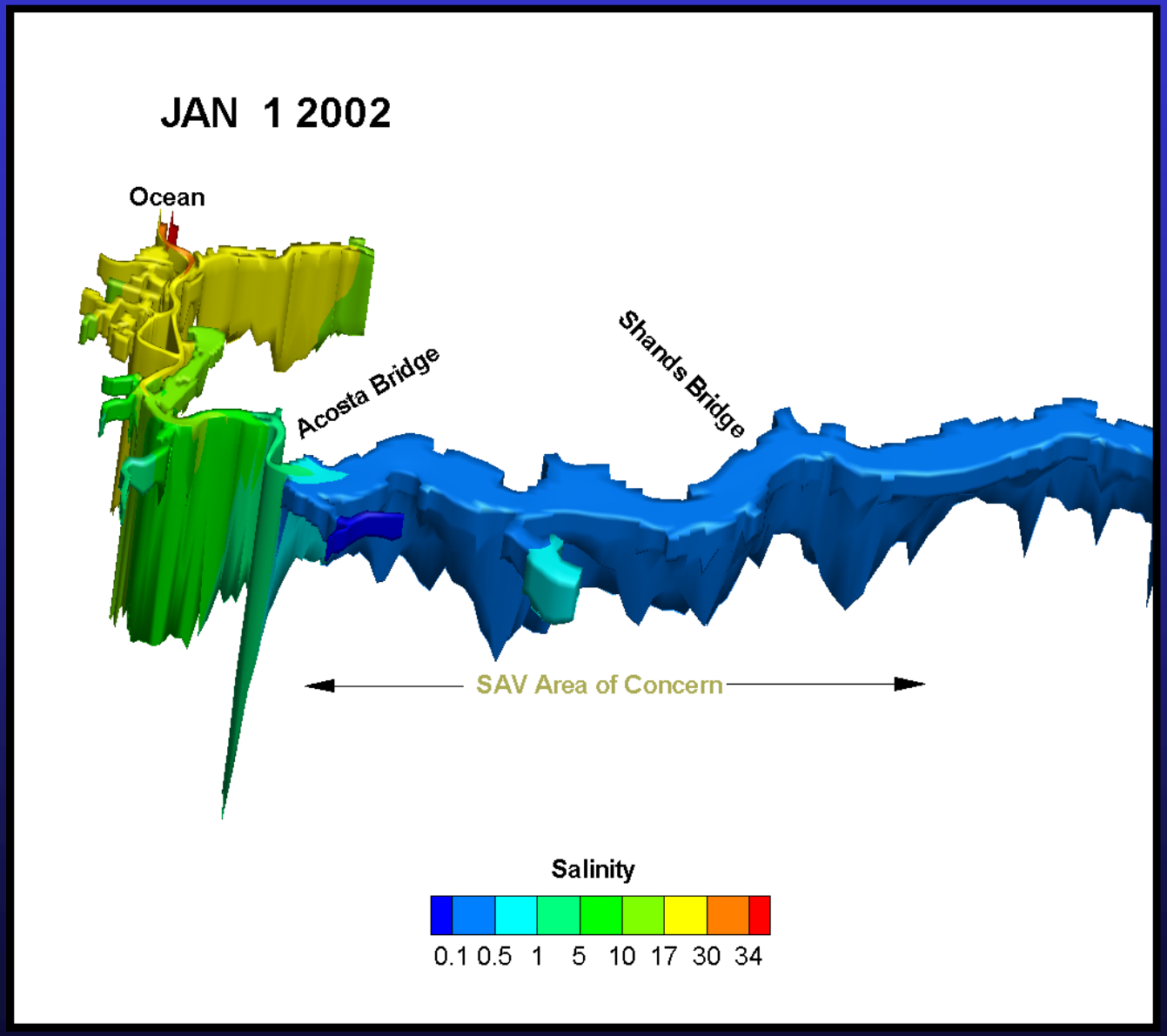
St. Johns River Salinity
January 2002



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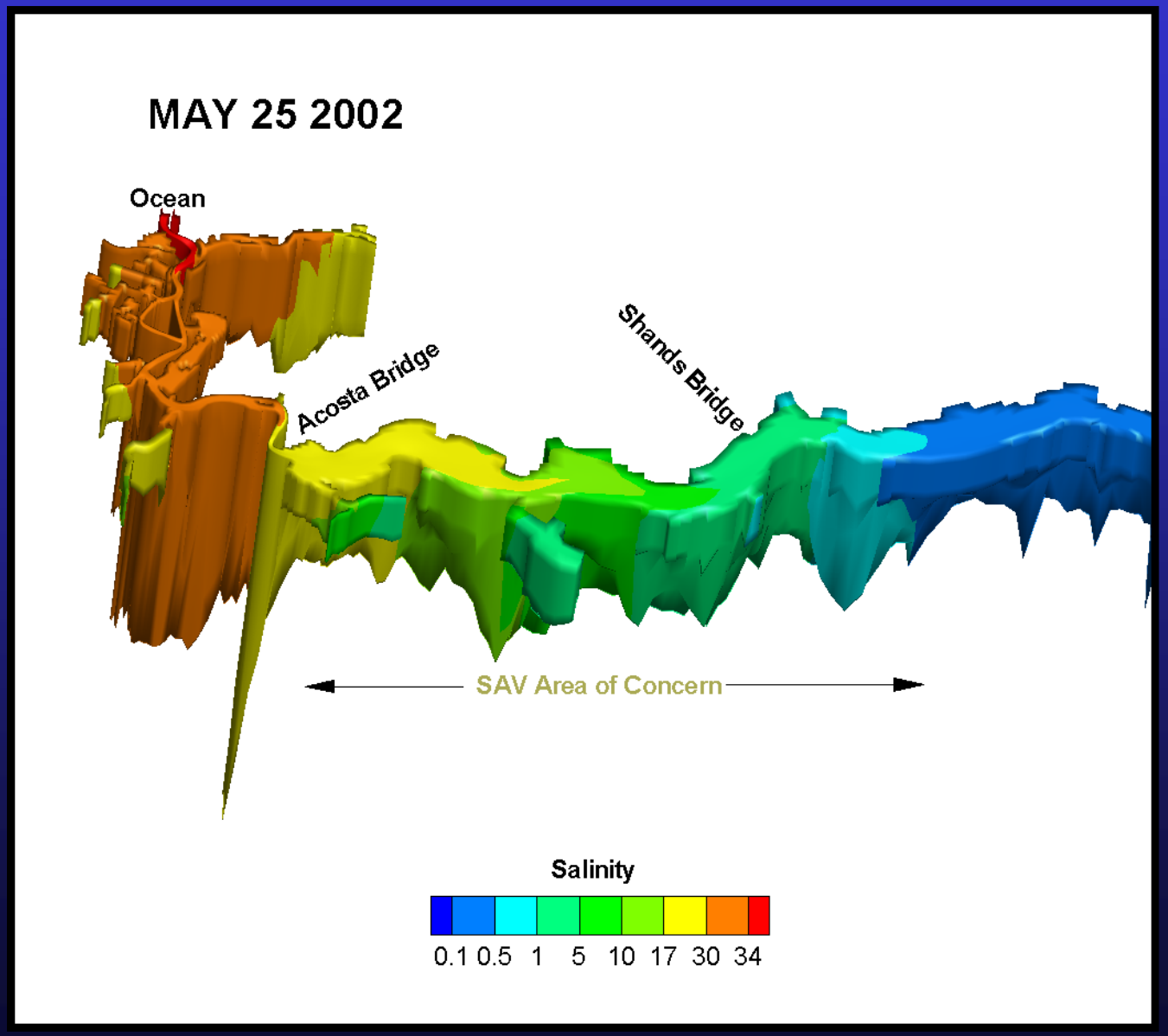
St. Johns River Salinity
May 2002



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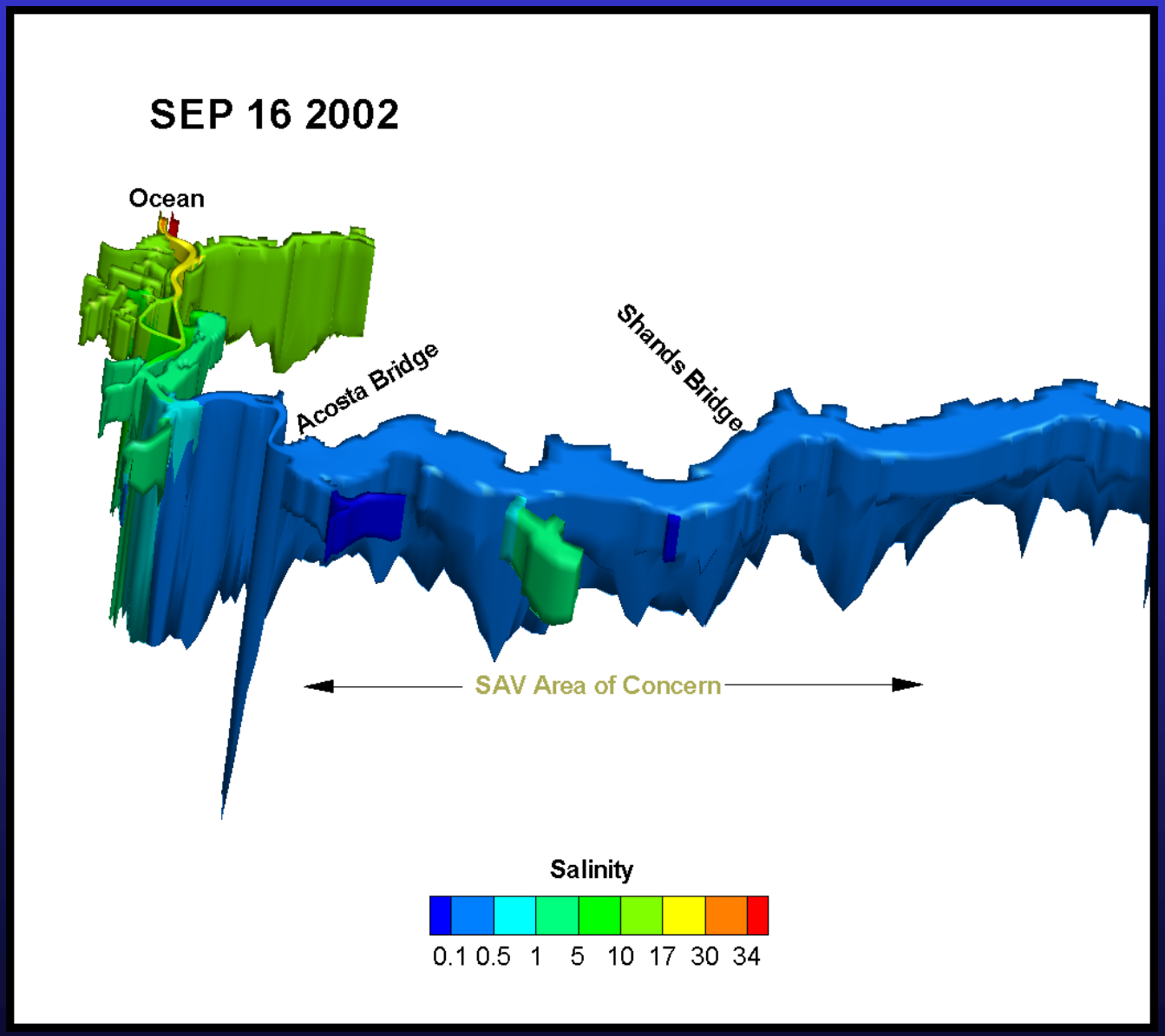
St. Johns River Salinity
September 2002



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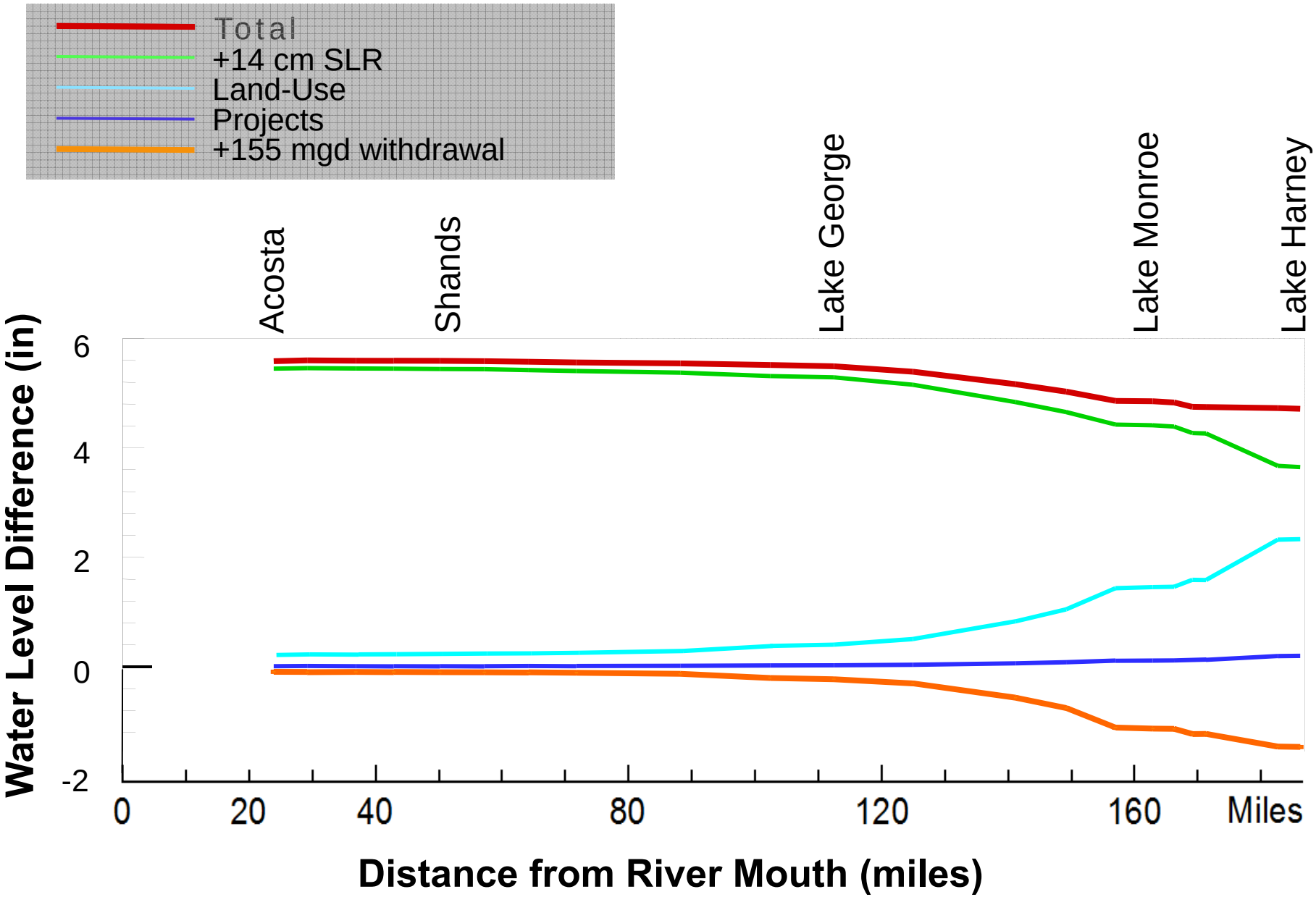
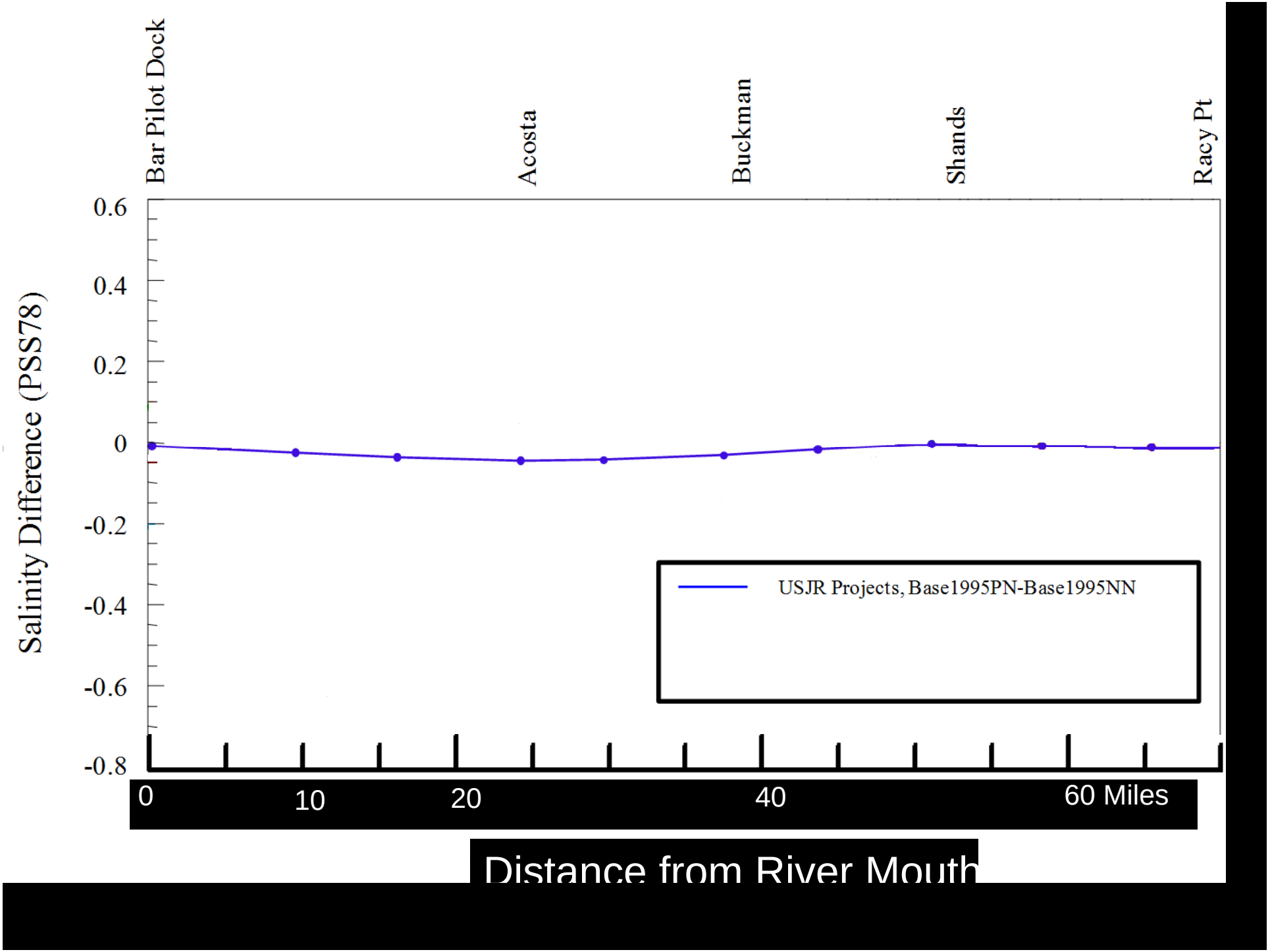
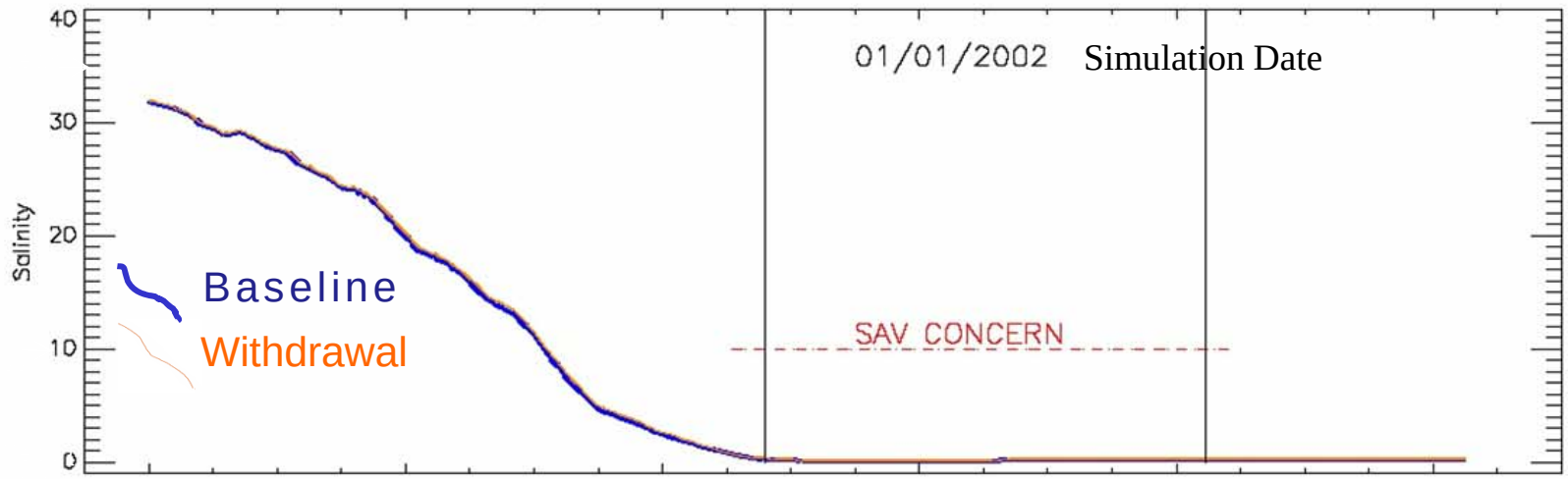
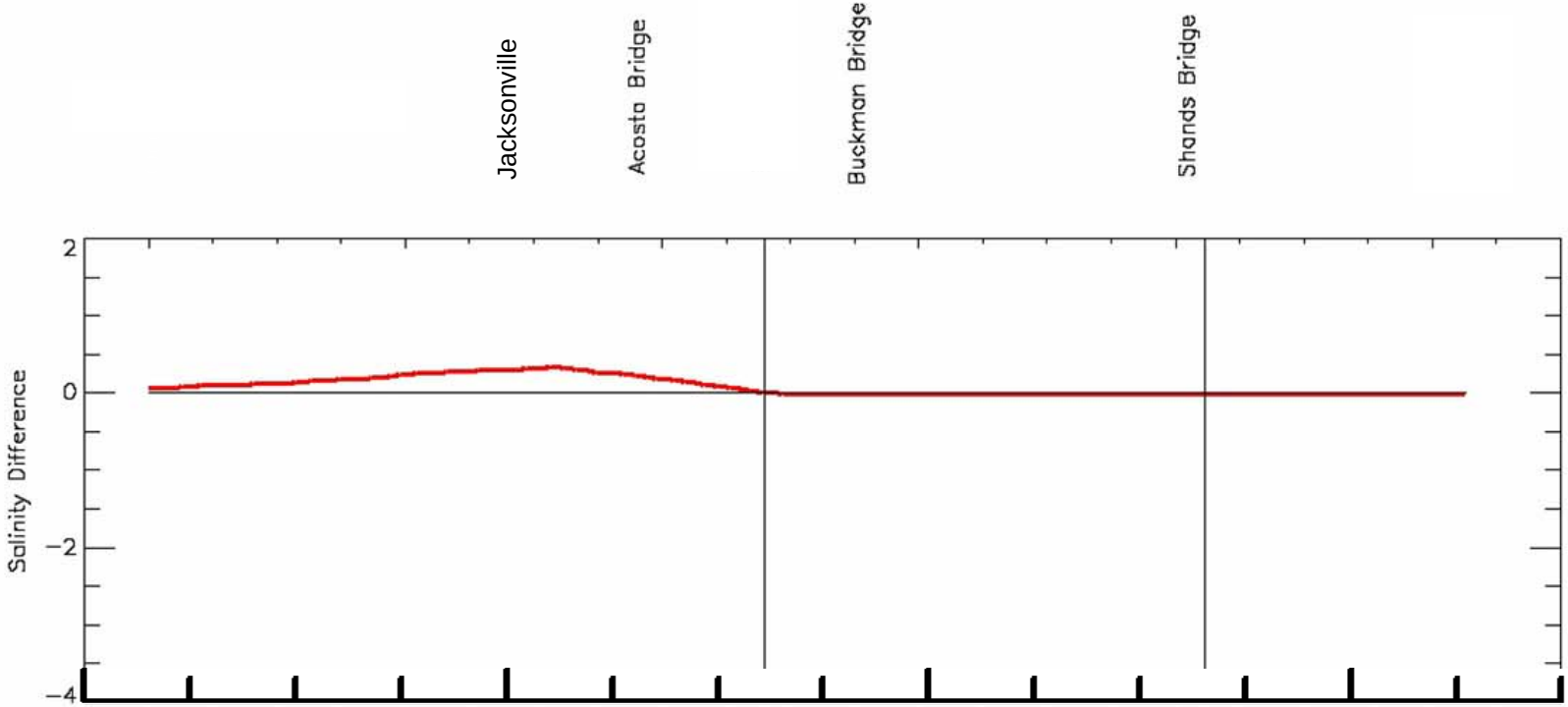
Water Level differences for Forecast Scenarios




Bar Pilot Dock
Acosta
Buckman
Shands
Racy Pt
Salinity Difference (PSS78)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
USJR Projects, Base1995PN-Base1995NN
0
10
20
40
60 Miles
Distance from River Mouth

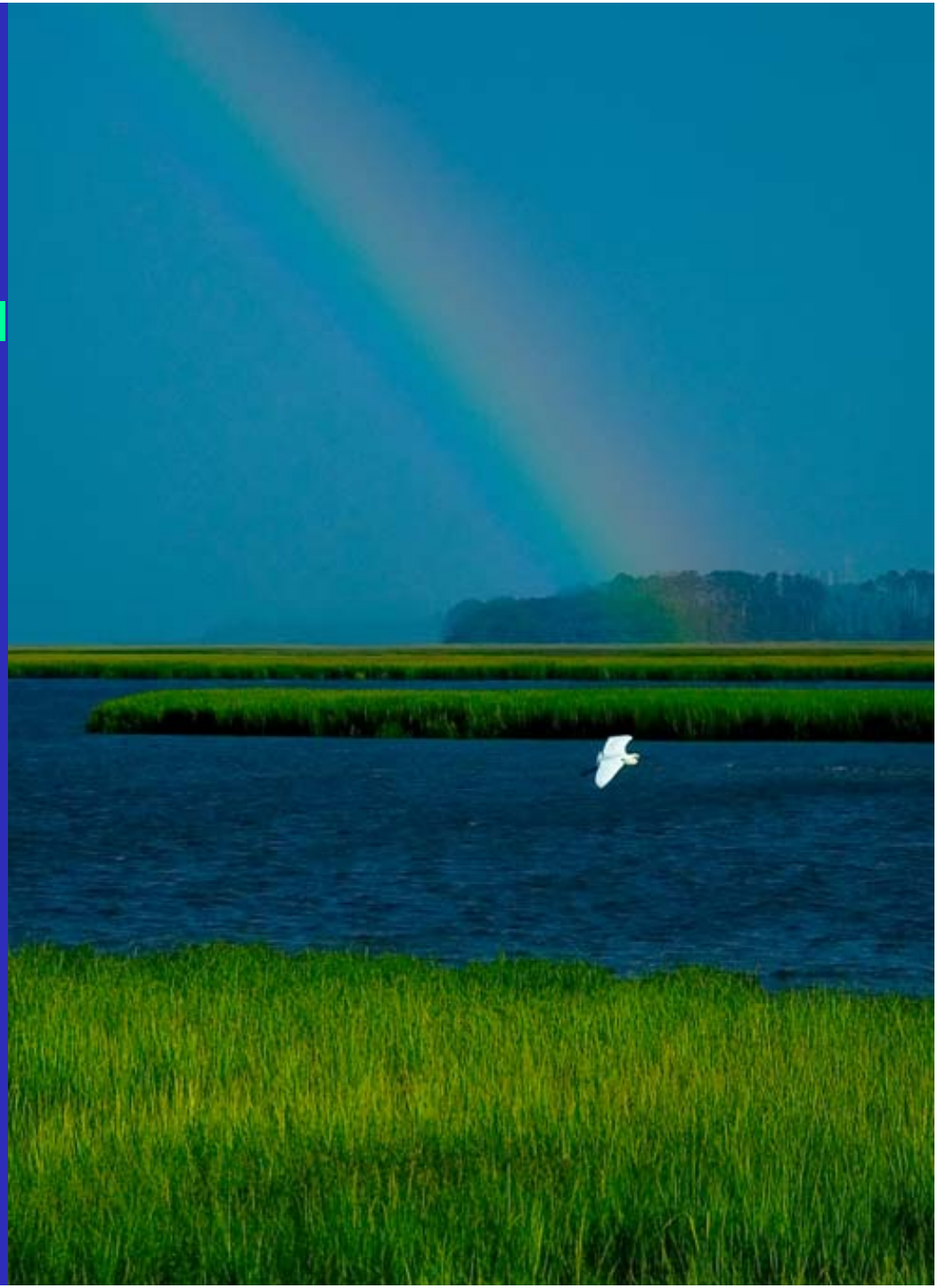


Effect of 155 mgd withdrawal compared to Baseline



The Next Step Was to Evaluate Hydroecological Effects

Assessing ecological change resulting from changes in river flows and levels



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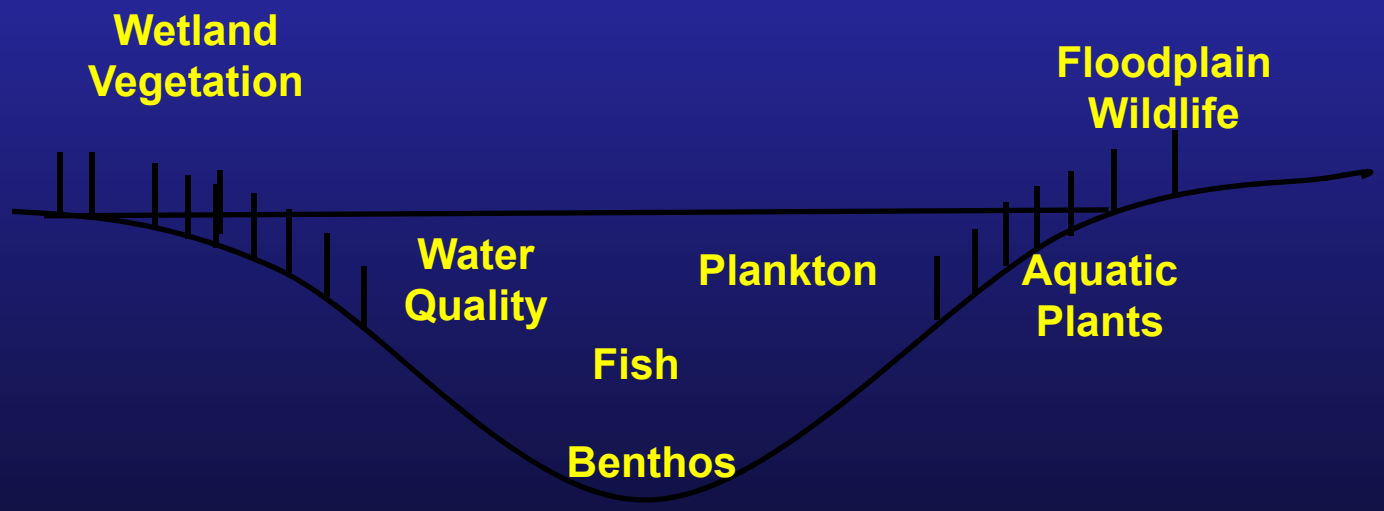
The WSIS evaluated the potential ecological effects of water withdrawals on all major components of the river ecosystem.



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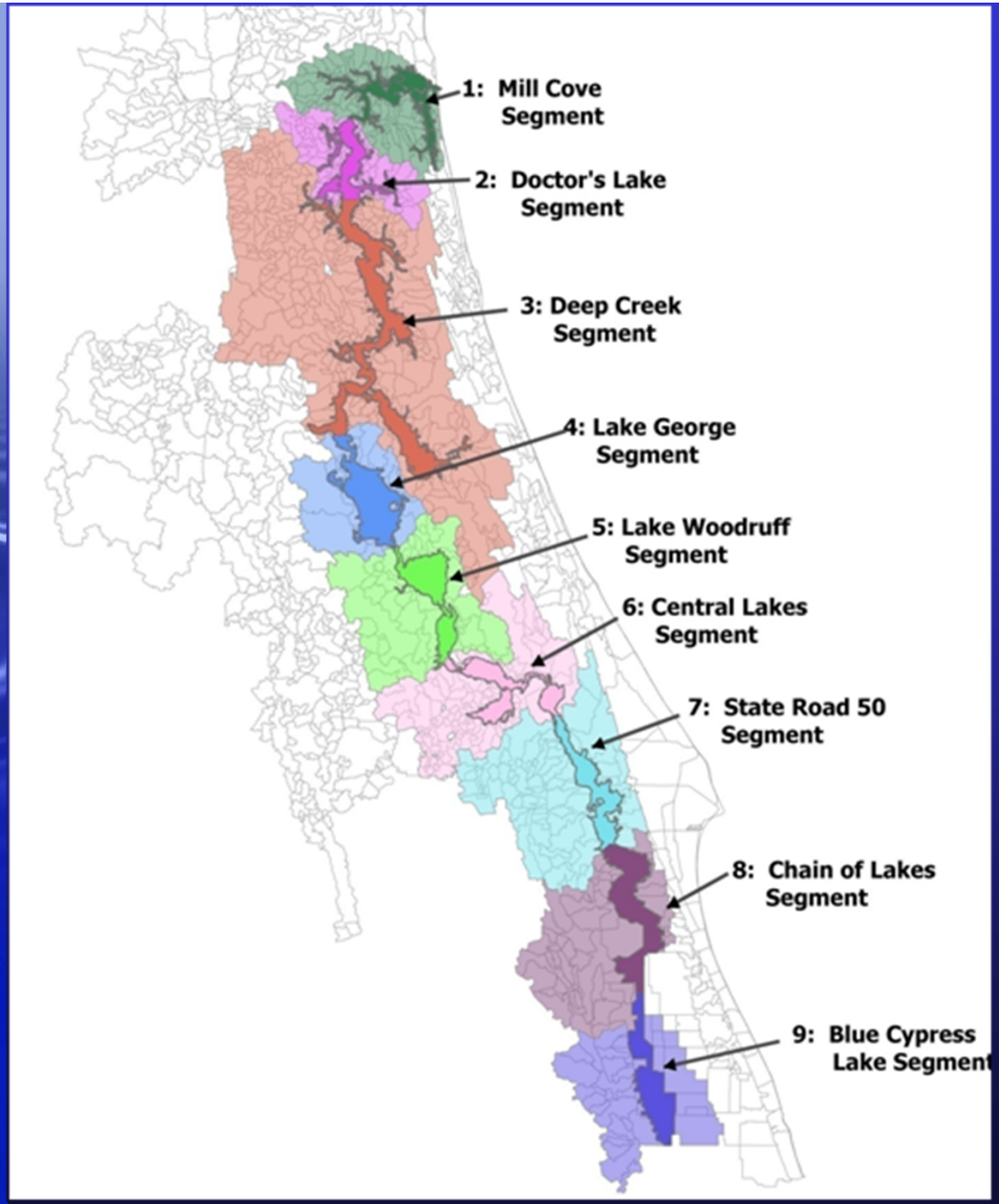

WSIS river segments

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Ecological effects: Negligible to Minor effects for the two most likely scenarios.

River Segment	Hindcast 155 mgd	Hindcast 77.5 mgd	Forecast 262 mgd	Forecast 155 mgd	Forecast 77.5 mgd
1					
2					
3					
4					
5					
6					
7					
8					

- Negligible effect
- Minor effect
- Moderate effect
- Major effect
- Extreme effect

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Potential Uses of the New WSIS Models

- **Evaluate specific water withdrawal proposals.**
- **Improve operation of District projects.**
- **Evaluate impacts of channel dredging**
- **Evaluate impacts of sea level rise.**
- **Using as foundation for enhanced water quality models - for loading and TMDLs.**

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