

Discussion on the EFDC Model and KAC's Comments

SEG Meeting – October 4, 2005

USACE Savannah District
Tetra Tech, Inc.

From KAC Executive Summary, May 2005

“Even with the stability problems, the Enhanced Grid model appears to represent a significant improvement over the TMDL model. It has the potential to become an extremely useful tool in studying the lower Savannah River. However, the inability to conduct seven year test runs is a source of serious concern with respect to the suitability of the model for predictive purposes. Therefore, Kinetic Analysis Corporation does not recommend the operational use of the Enhanced Grid model for predictive modeling of bathymetric changes until the stability issues can be resolved.”

From minutes of 20 June 2005 Review Panel Meeting

“UA/SA Analysis: The group concluded that the inability of the model to run over the entire 7-year period of data does not reflect on the structure of the model or its performance, and should not be a consideration of the model’s usefulness for its intended purposes of predicting impacts of the Savannah Harbor Expansion Project, developing a dissolved oxygen TMDL, or permitting point source discharges.”

Tetra Tech's Response

- Model is stable – Tt performed stability and mass balance tests with the model and presented to the technical review group.
- Model crashing during mid-December is not a *stability* issue, it is a *reality* issue.
- Sections of the Back and Little Back Rivers go dry during extremely low flows and low tide range (as documented in Dec 2000).

EFDC Model

- Model crashed because there is not enough water in the Little Back River during this event.
- High tide on Dec 17, 2000 is only 4 feet (compared to usual 6 to 8 feet) = low high tide
- Low tide on Dec 19, 2000 is -2 feet (compared to usual 0 to -1 feet) = low low tide
- TMDL grid ran through this period because the Back and Little Back Rivers were deeper (we updated the bathymetry based on the 2004 USGS survey data).

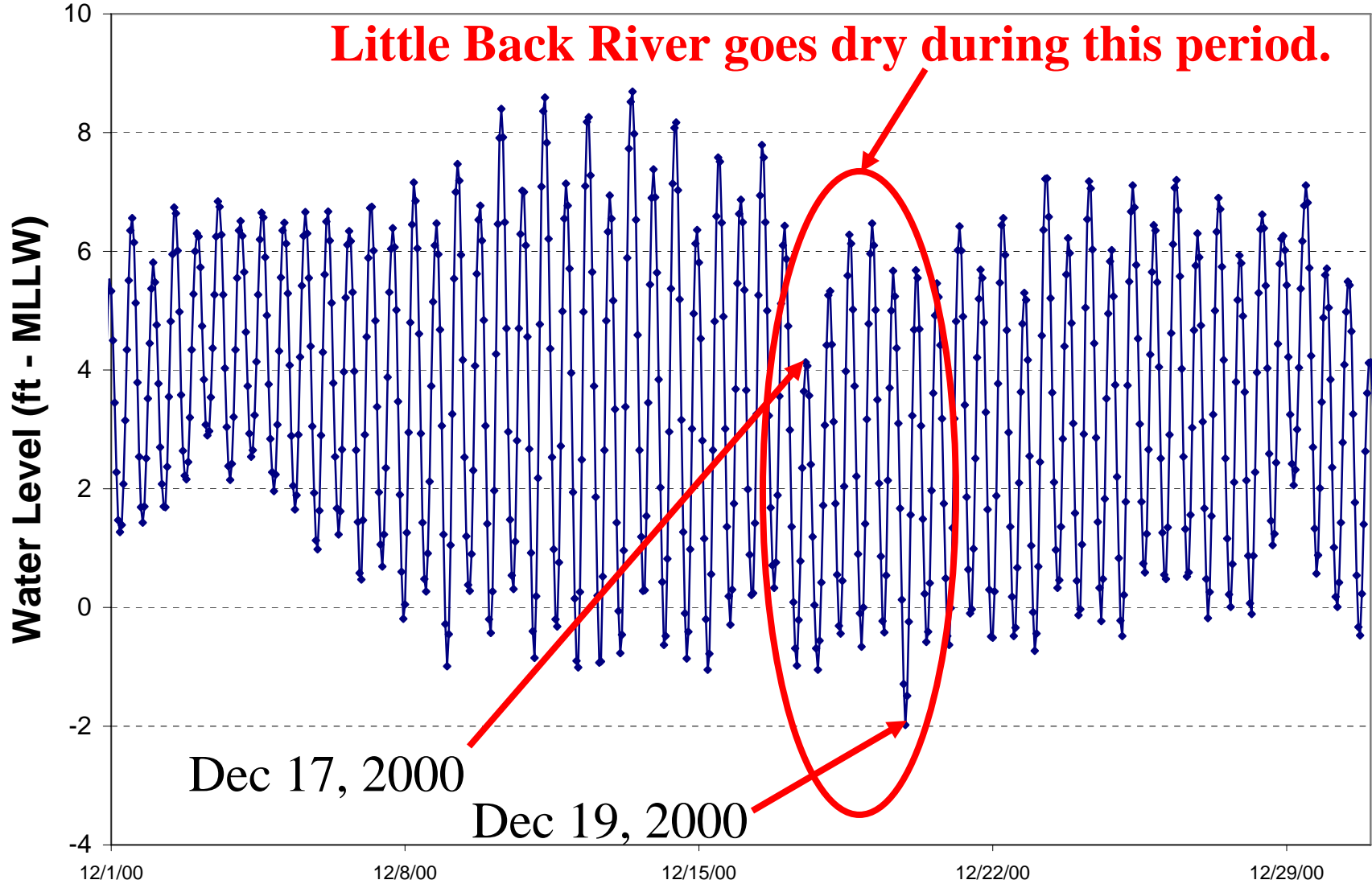
Re-Examination of Water Surface Elevation Data

- The EFDC model 7-year run “crashed” during December 2000.
- Water level (tide) data used at the ocean boundary to run the model.
- At first, it appeared the dataset used in the model had a “gap” during that time period.
- USGS re-pulled the data and verified the data are real for that time period.

Results of Data Review

- USGS gave Tetra Tech Fort Pulaski data from 1994 through 2005.
- Tetra Tech pulled data from a nearby gage at the St Simons Island:
 - Real event on Dec 17, 2000 (low high tide)
 - Real event on Dec 19, 2000 (low low tide)
- Proves this was a real phenomenon in the ocean boundary.

Water Level Data - 8677344 St.Simons Island, GA

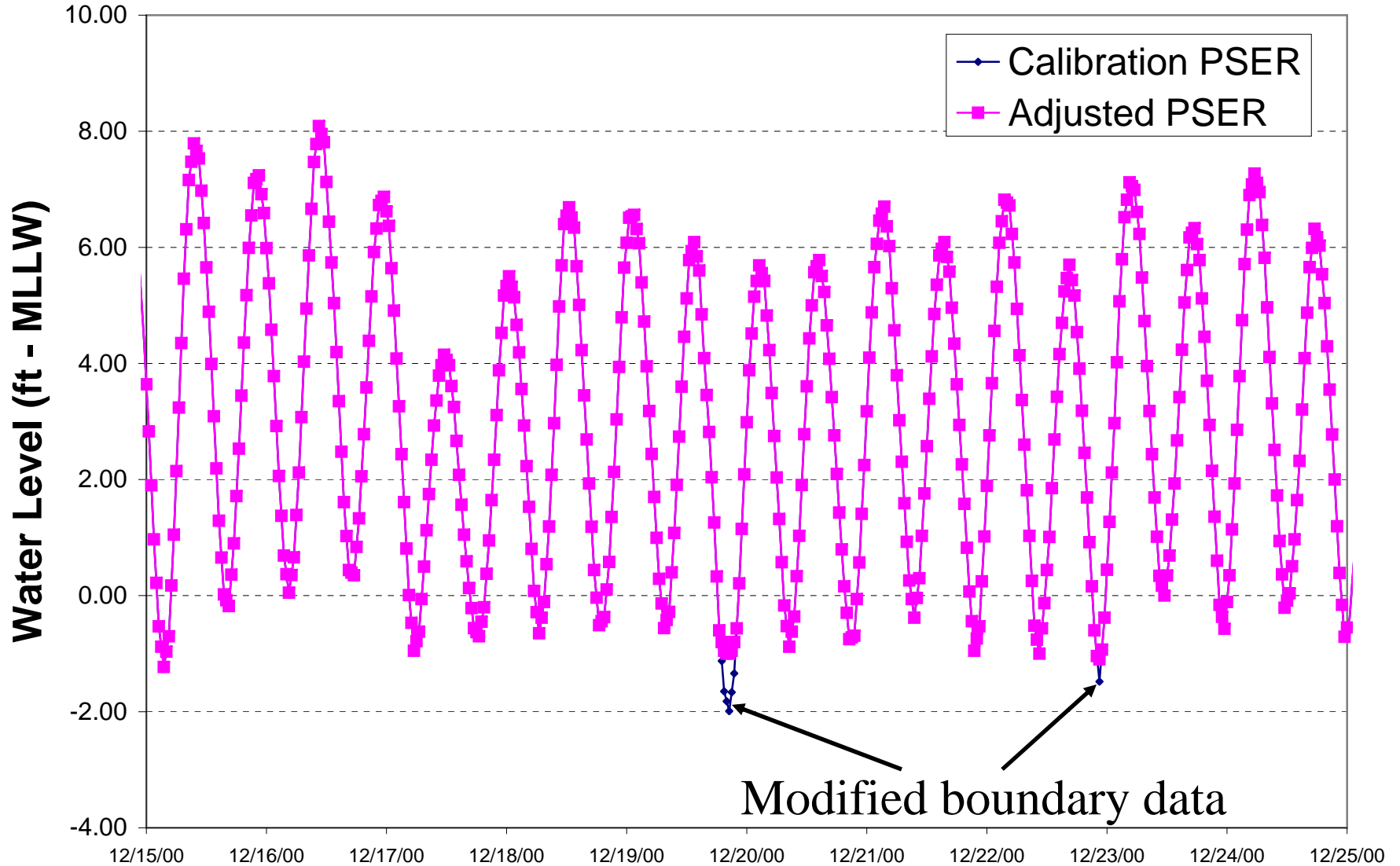


Modified Approach and Update

- Adjusted the water level data (Fort Pulaski) for the model boundary during these 2 days.
- Modified 10 out of 245,280 points (**0.004%**).
- Dec 2000 is not a critical period for the modeling scenarios, so this was justified.
- Model runs for 7 years and does not go dry.
- Model is still stable and a useful tool as determined by the modeling technical review group.

Modified Boundary Data for the Model

Water Level Data - 02198980 Ft. Pulaski (Savannah), GA



Agency replies to my e-mail requesting
reconsideration/verification of position on 7-year simulation

US EPA, Jim Greenfield, 22 Sep 2005

Tetra Tech 7 year run is a great
verification of the Savannah Harbor
hydrodynamics - a one day problem in a 7
year run is no big deal - we are spending
too much resources even considering this
so called issue

US F&W, Ed EuDaly, 26 Sep 2005

We were aware of the seven year simulation issue prior to our most recent model review and considered it in formulating our comments. Therefore, our agency position remains as stated in our letter. We still anticipate that the additional sensitivity runs and other issues raised by the Service and the USGS in the model review will be addressed in the final model report.

USGS, Paul Conrads, 26 Sep 2005

I concurred with Ed's email earlier today. The USFWS letter noted concerns with the simulated flows in this region of the model where often the net streamflow may be well simulated but the tidal magnitude may not be. There is a convergence of events in late December 2000 between flows, water levels, and tidal ranges that causes computation cell(s) to go dry in the Little, Middle, and/or Back Rivers. The inability of the model to simulate through this period may be symptomatic of some of the flows issues addressed in the USFWS letter.

Georgia EPD, Paul Lamarre, 28 Sep 2005

Given the new information, there is no change in EPD's position as stated in our previous comment letter. Accordingly, we still concur with the summary of the June 20, 2005 review meeting, which stated that the reviewers did not believe that the uncertainty report issues with the 7-year simulation were a significant concern.

South Carolina DHEC, Wade Cantrell, 29 Sep 2005

I don't think the model has to run through the December 2000 period to be useful for evaluating impacts. But I don't think it's true to say it does not reflect on the structure of the model on the Little Back River. I think the issue needs to be explained ("A") and kept in mind ("B").

EFDC/WASP Post-Processor Output Examples

- These output displays are intended as demonstrations of the capabilities of the output processing and viewing routines.
- Results shown are preliminary.

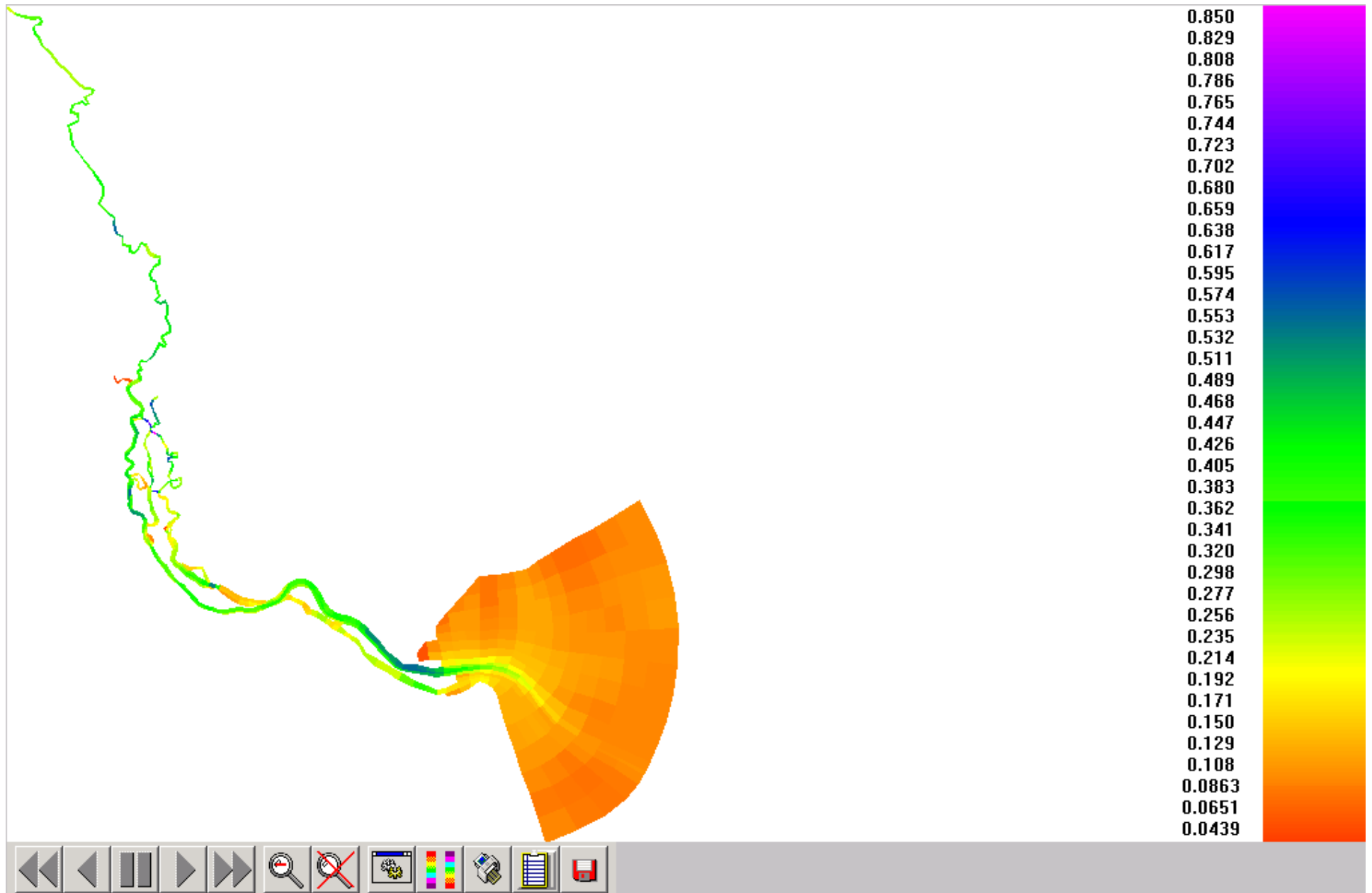
Savannah EFDC/WASP Post-Processor

Post-Processor has 5 main components:

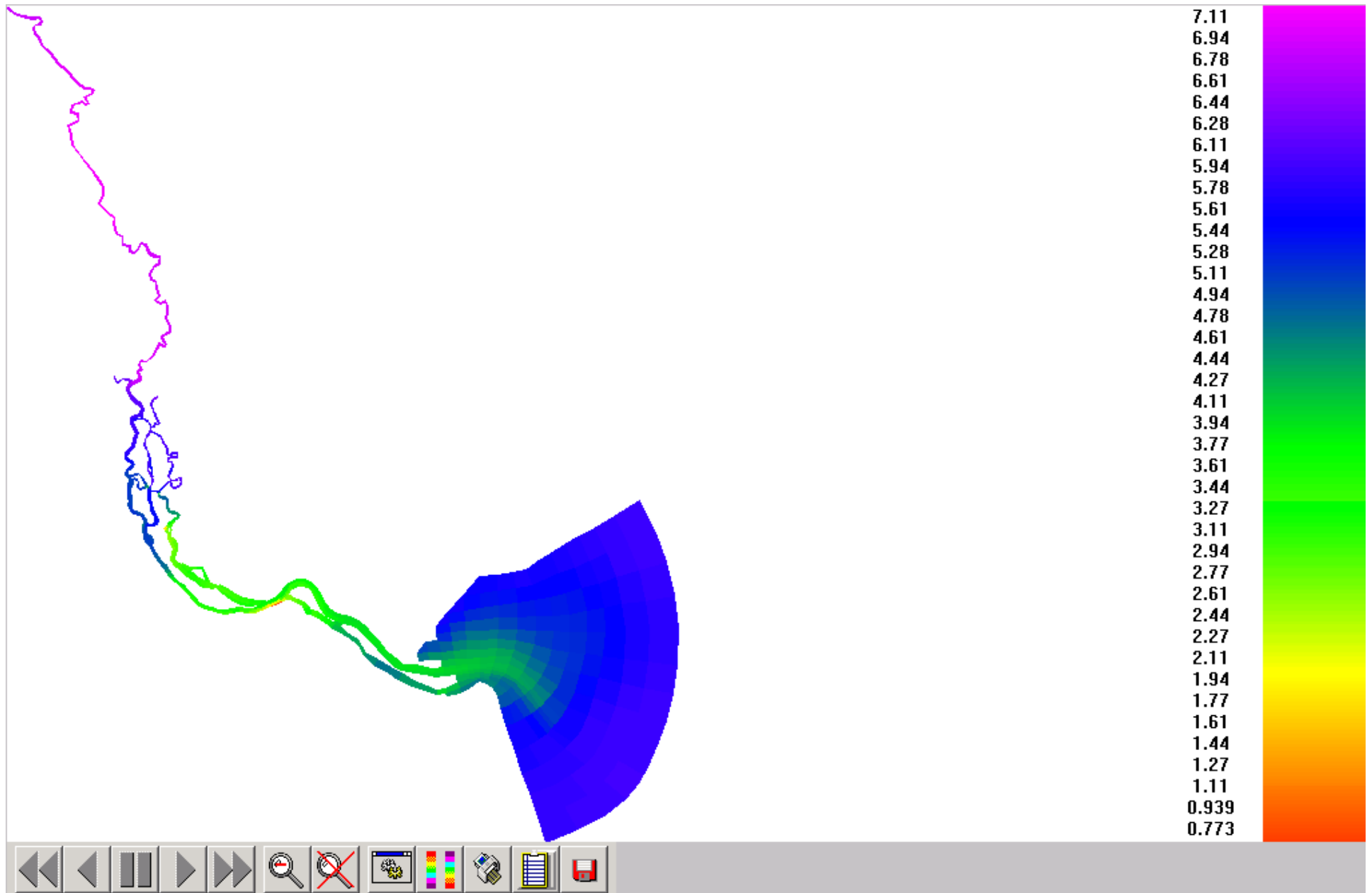
- Habitat Analysis
- Deepening Analysis
- TMDL Analysis
- M2M (Model to Marsh) Output
- Delta Analysis (Base – Projected)

Each component has a series of tables, figures, contour plots, and animations that are generated.

Maximum Bottom Velocity (m/s)

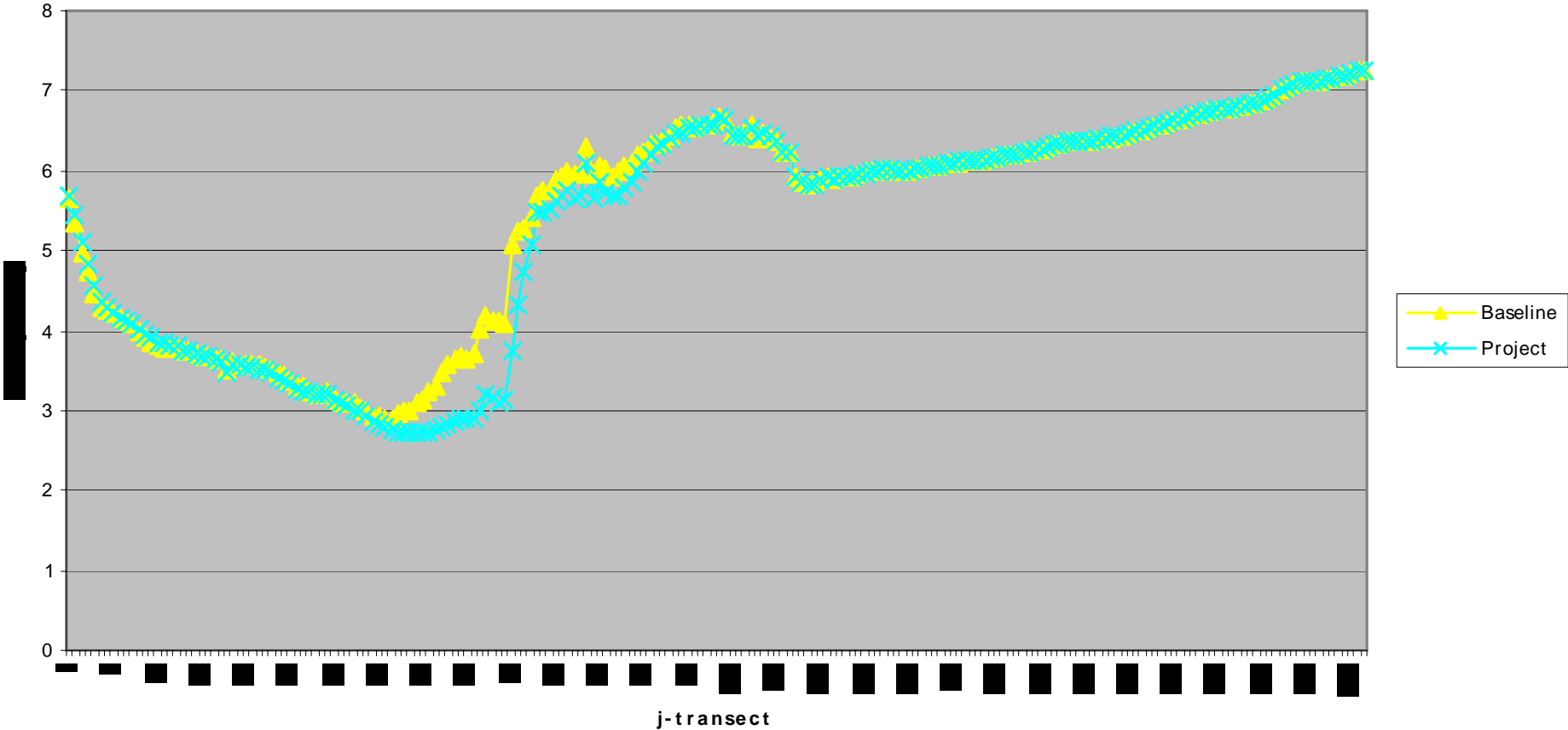


Minimum Surface DO (mg/L)

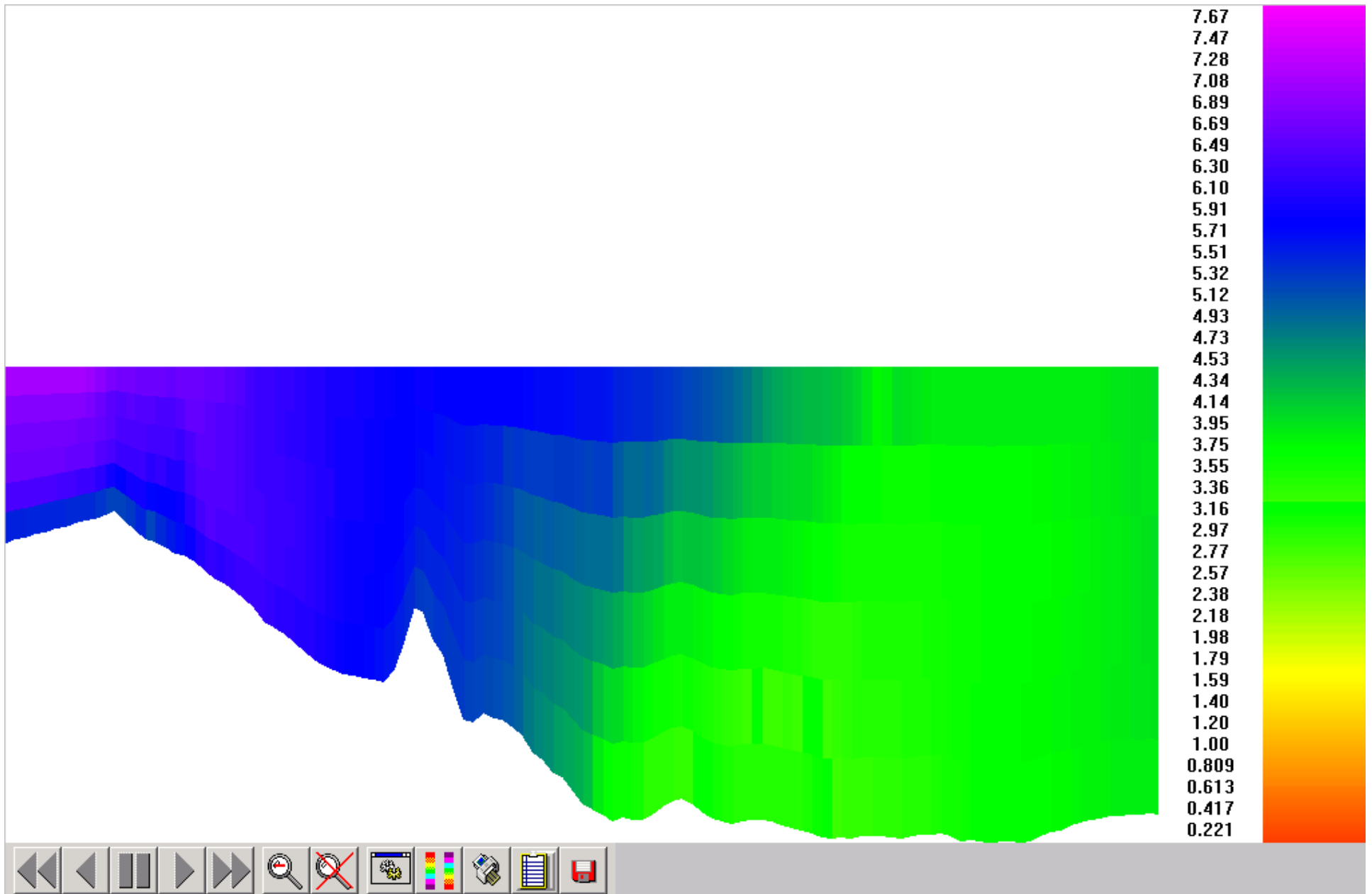


Longitudinal DO (mg/L) Delta

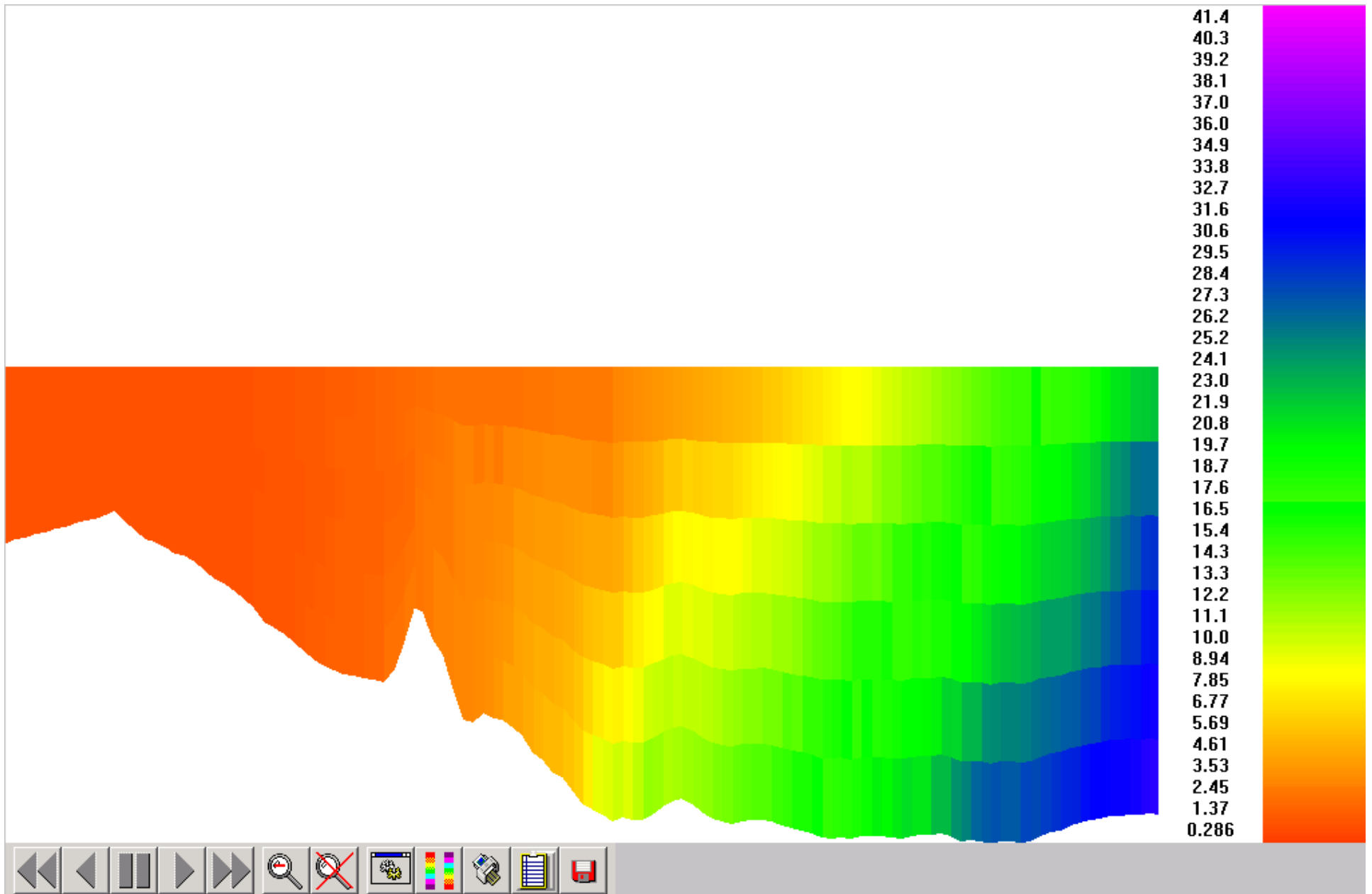
Distribution of 90 %-tile of Bottom D.O. along Ship Channel



1-Day Avg DO (mg/L) in Channel



1-Day Avg Salinity (ppt) in Channel



Southern Flounder – Suitable Habitat

