

# Louisiana Coastal Area Blind River Freshwater Diversion Project

Restore America's Estuary Conference  
November 16, 2010

Hydrodynamic, Sediment, and Water  
Quality Modeling Evaluations of the  
Maurepas Swamp

Silong Lu, Ph.D. P.E.

Christina Petersen, Ph.D. P.E.



**CDM**



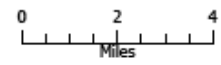
# EFDC Hydrodynamic and Water Quality Model

- ◆ **2-D & 3-D Flow Through Wetlands, Channels, and the Blind River**
  - ◆ **Depths/Elevations, Velocities**
  - ◆ **Travel and Residence Times**
- ◆ **Water Quality Simulation with Focus on TSS, TN, and TP**
  - ◆ **Sediment Distribution**
  - ◆ **Resultant Water Quality**
- ◆ **Coordinated with WVA, HEC HMS-RAS and Operations Evaluations**

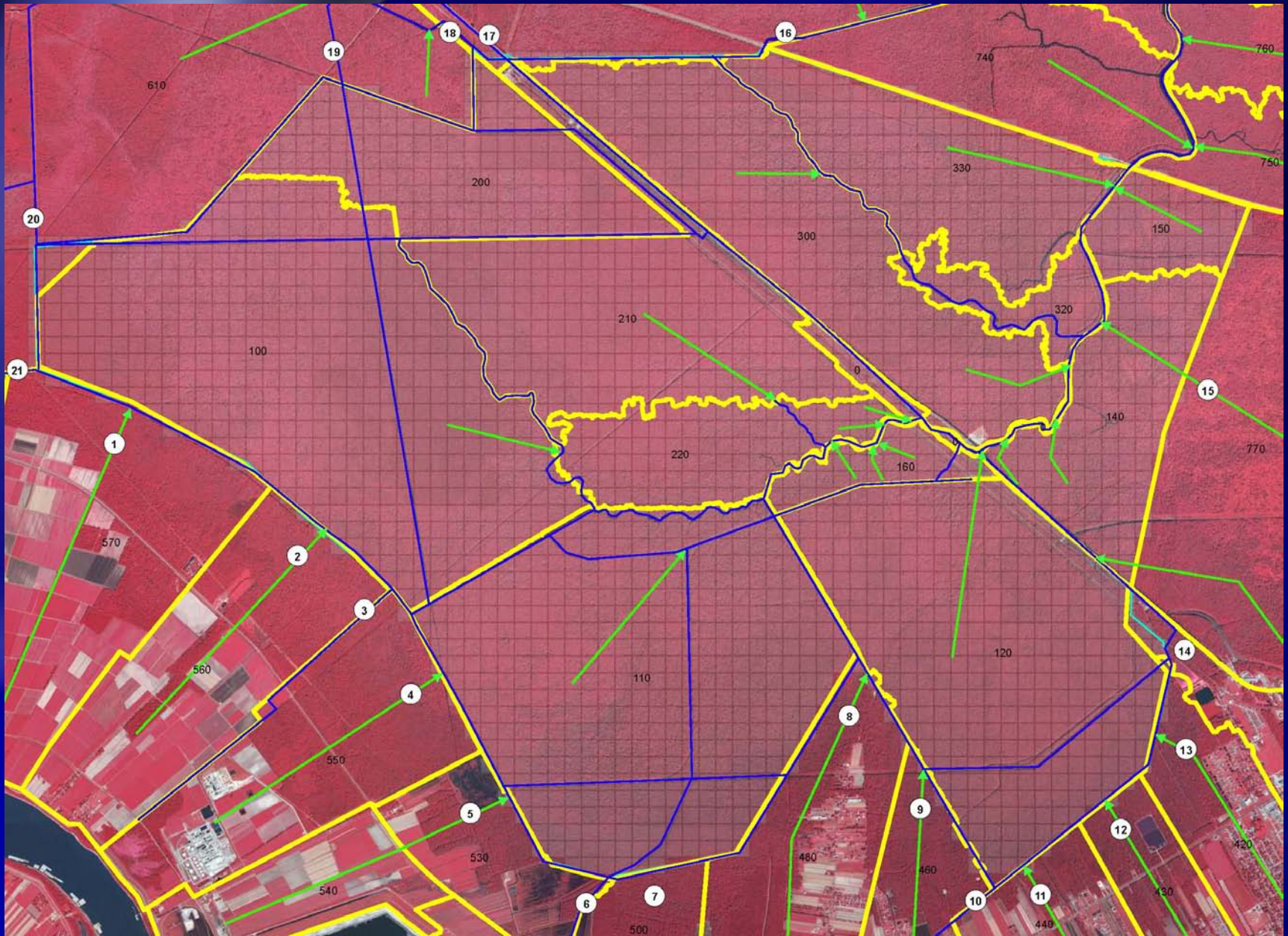


**CDM**

Figure 4-2  
Location Map  
Small Diversion at Romeville/Blind River Project

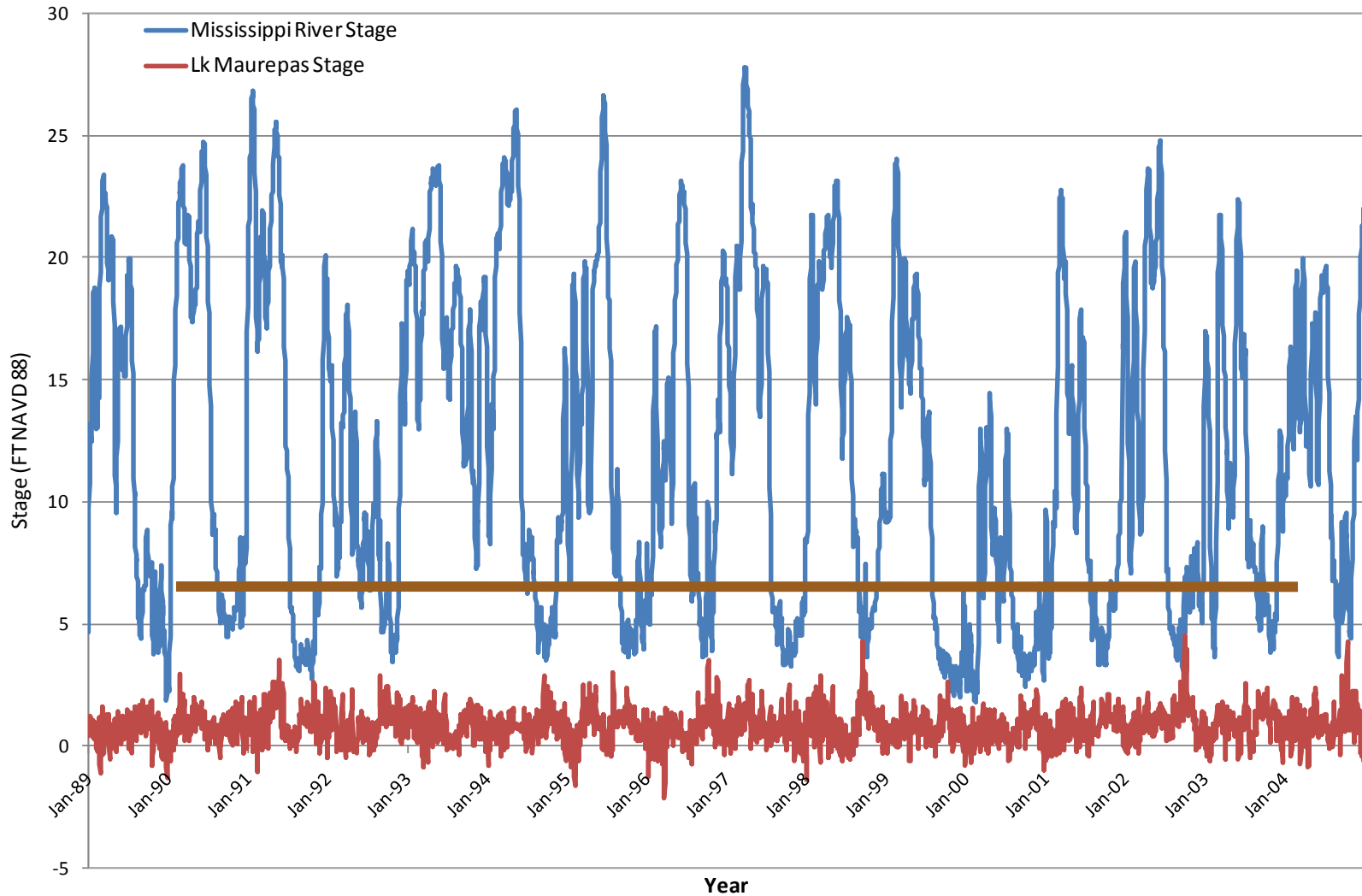


# EFDC Model Schematic



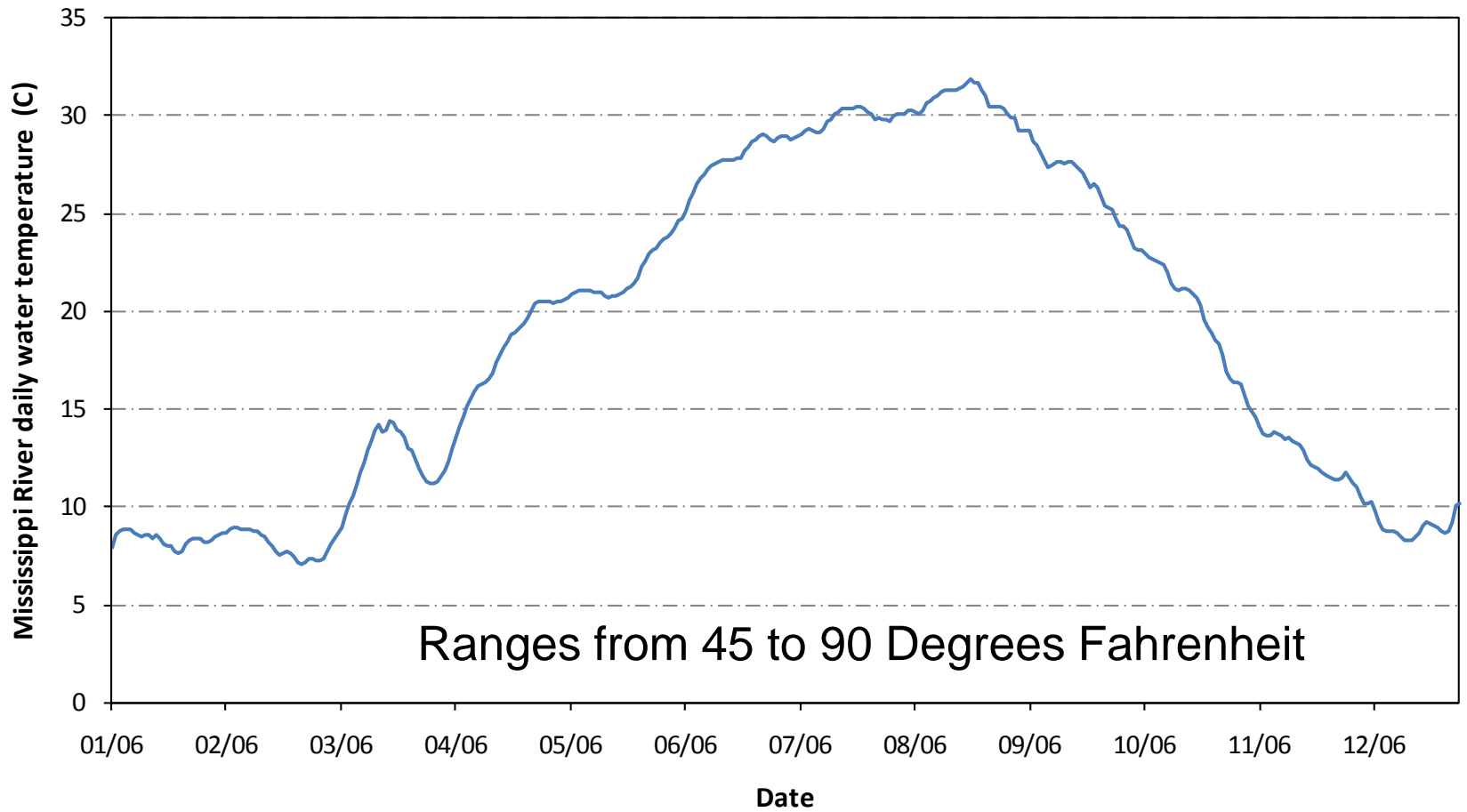
# Boundary Condition Water Stages

Mississippi River and Lake Maurepas Stage Summary (1989-2004)

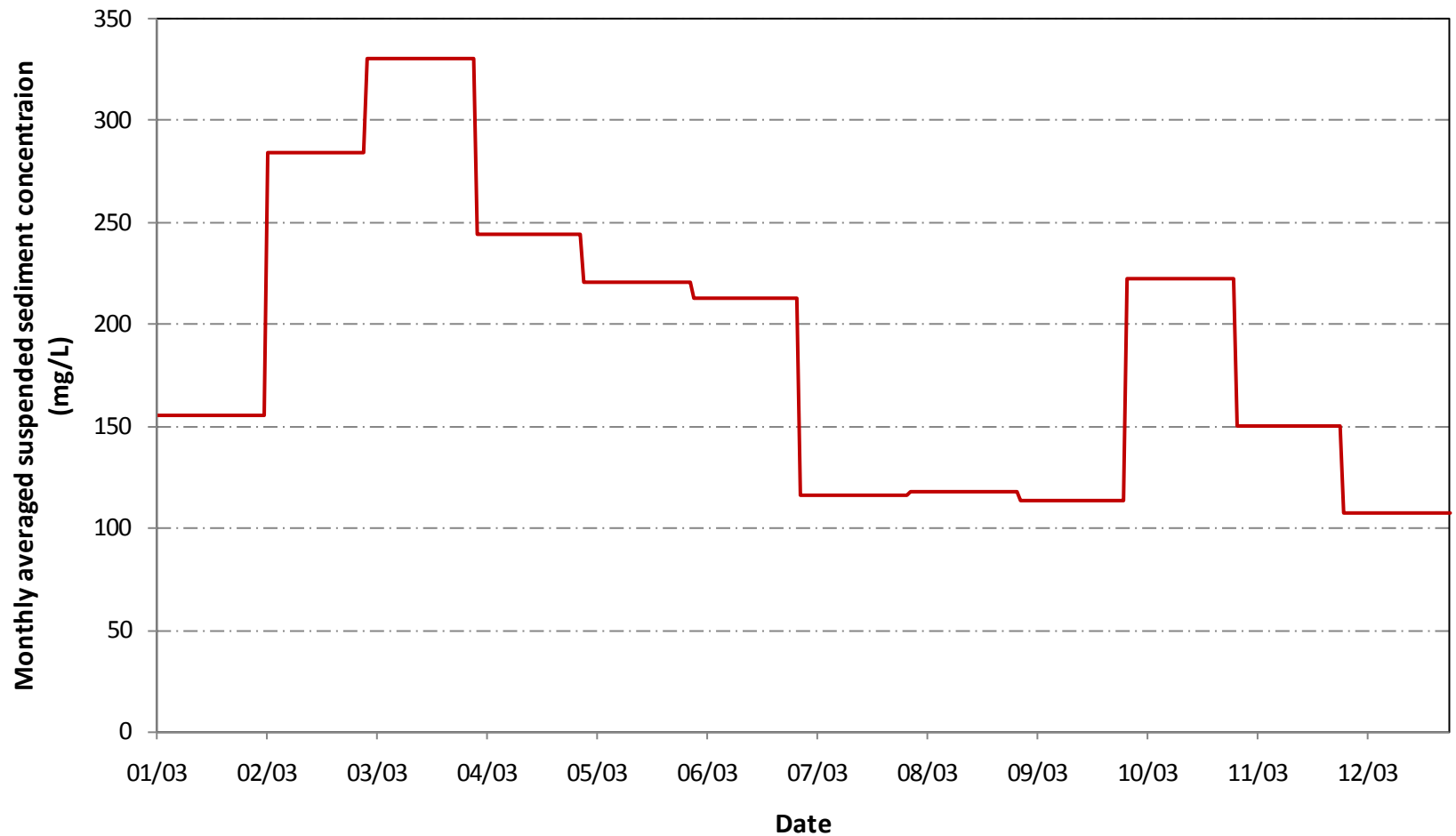




# River Temperature Variation



# River Sediment Variation



# River Water Quality

<b>Constituent</b>	<b>Belle Chasse Average (mg/l)</b>	<b>Baton Rouge Average (mg/l)</b>	<b>Average Value Used for Model Input (mg/l)</b>
<b>BOD5</b>	<b>3.60</b>	<b>1.97</b>	<b>2.79</b>
<b>Organic Carbon - Dissolved</b>	<b>3.89</b>	<b>3.68</b>	<b>3.79</b>
<b>Organic Carbon - Particulate</b>	<b>3.39</b>	<b>3.15</b>	<b>3.27</b>
<b>Dissolved Ammonia</b>	<b>0.04</b>	<b>0.02</b>	<b>0.03</b>
<b>Organic Nitrogen - Dissolved</b>	<b>0.35</b>	<b>0.35</b>	<b>0.35</b>
<b>Organic Nitrogen - Particulate</b>	<b>0.28</b>	<b>0.25</b>	<b>0.27</b>
<b>Nitrate + Nitrate - Dissolved</b>	<b>1.58</b>	<b>1.51</b>	<b>1.55</b>
<b>Total Phosphorus</b>	<b>0.27</b>	<b>0.23</b>	<b>0.25</b>
<b>Organic Phosphorus - Dissolved</b>	<b>0.01</b>	<b>0.01</b>	<b>0.01</b>
<b>Organic Phosphorus - Particulate</b>	<b>0.17</b>	<b>0.14</b>	<b>0.16</b>
<b>Total Nitrogen</b>	<b>2.35</b>	<b>2.23</b>	<b>2.29</b>

# Wetland Vegetation

## Legend

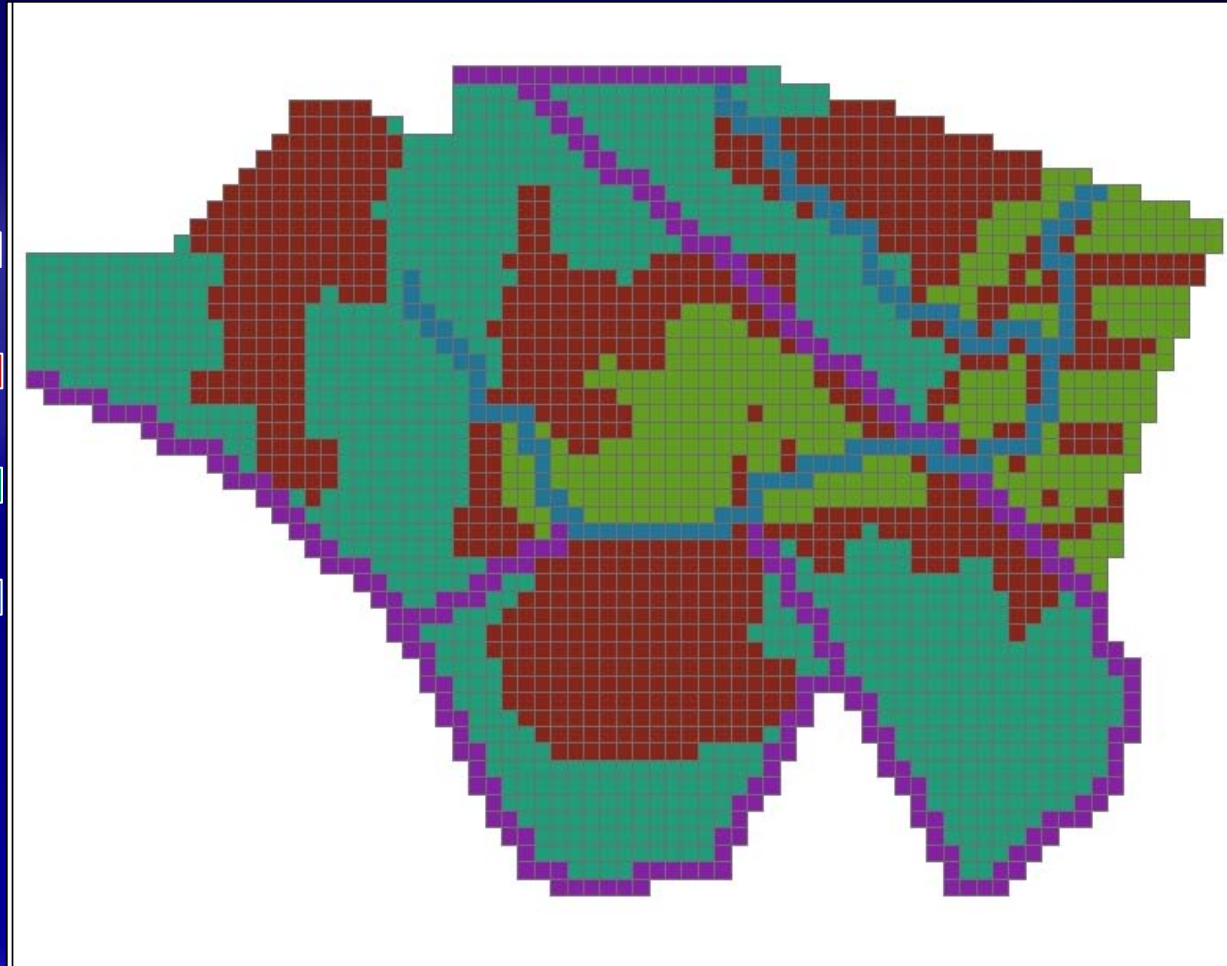
20-30 Yrs to Swamp ■

30-50 Yrs to Swamp ■

>50 Yrs to Swamp ■

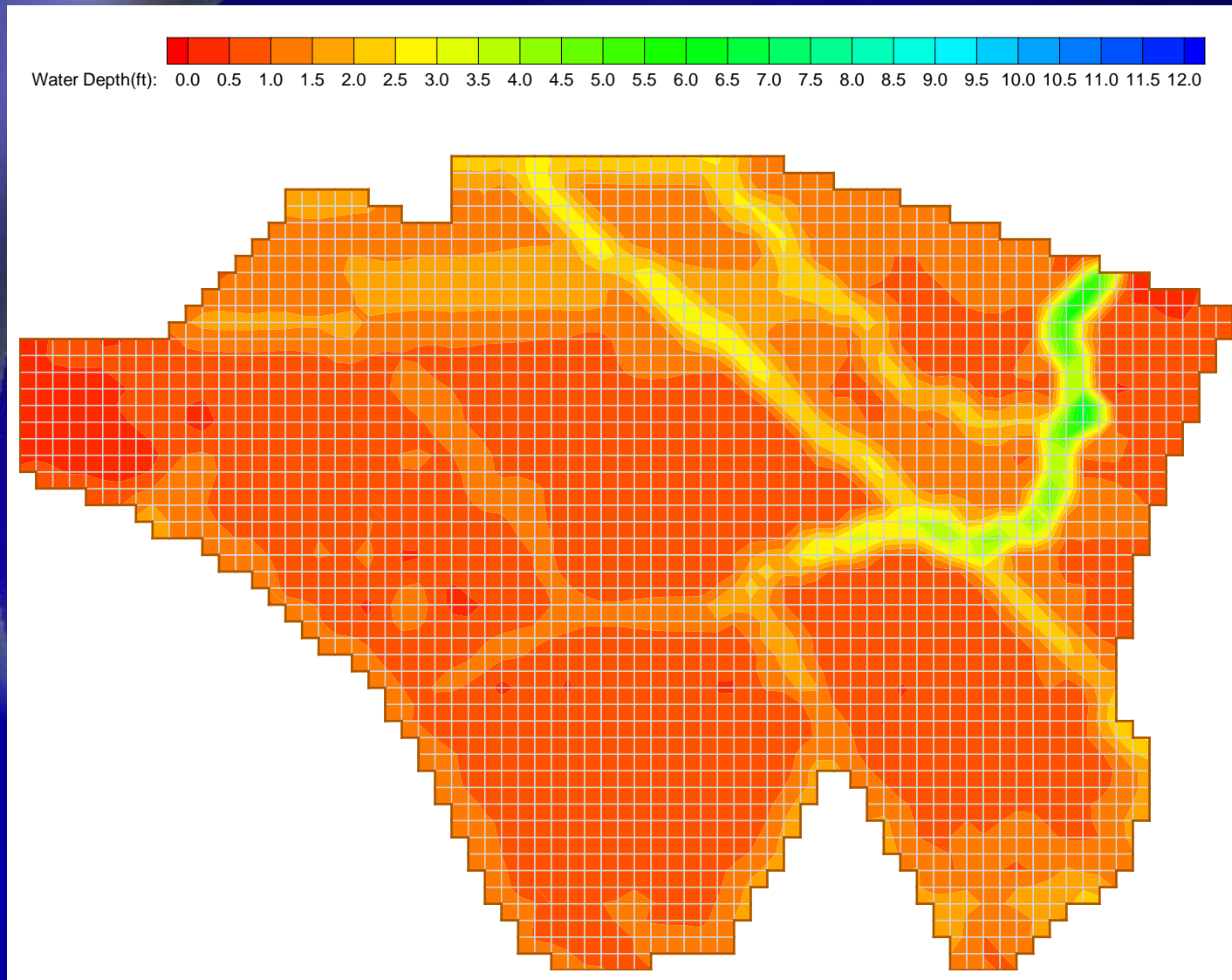
Distribution Canal ■

Blind River ■

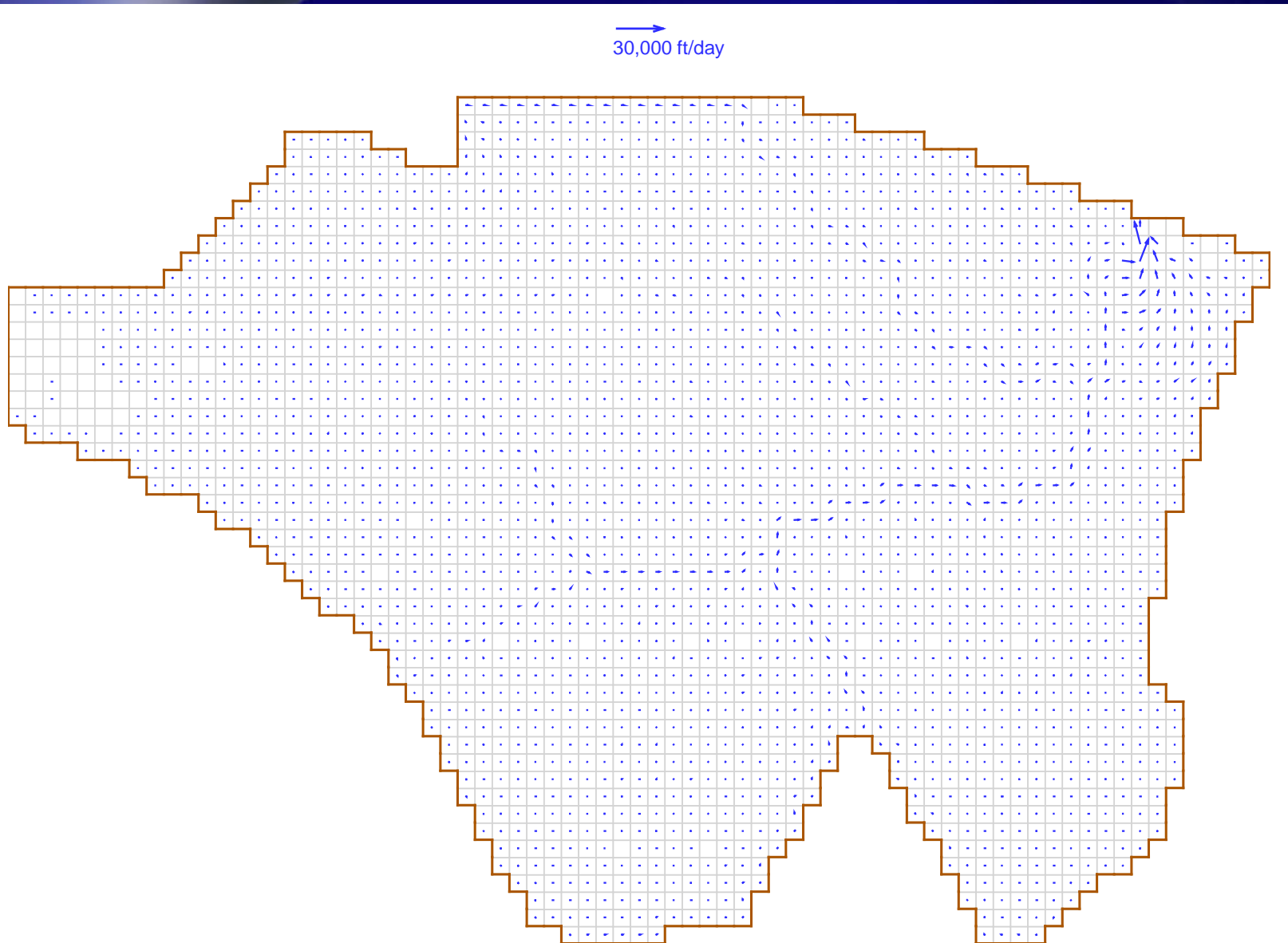


**Use to Estimate Flow Roughness Factors and Nutrient Uptake**

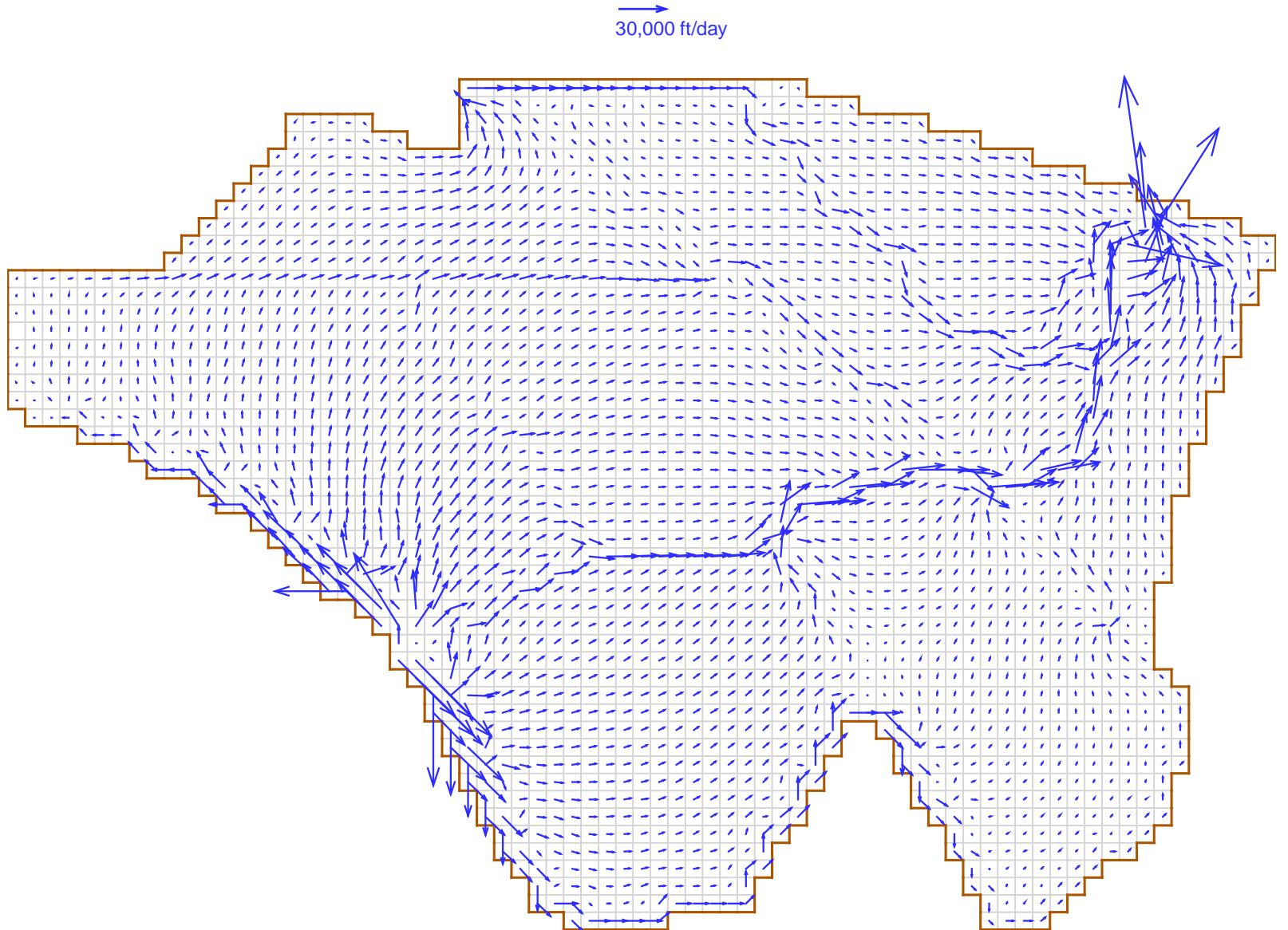
# Existing Conditions Depths



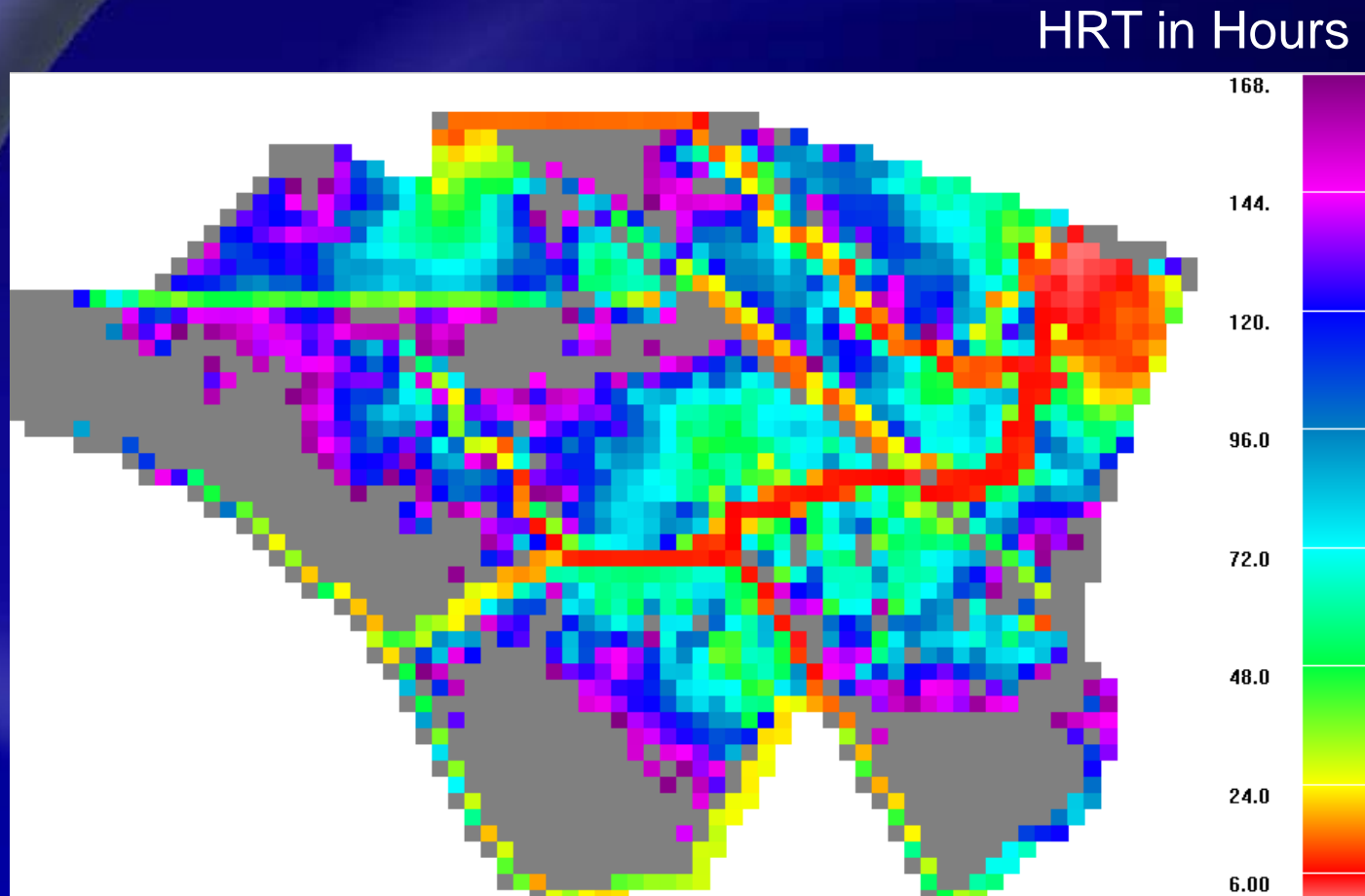
# Existing Conditions Velocities



# Diversion Conditions Velocities

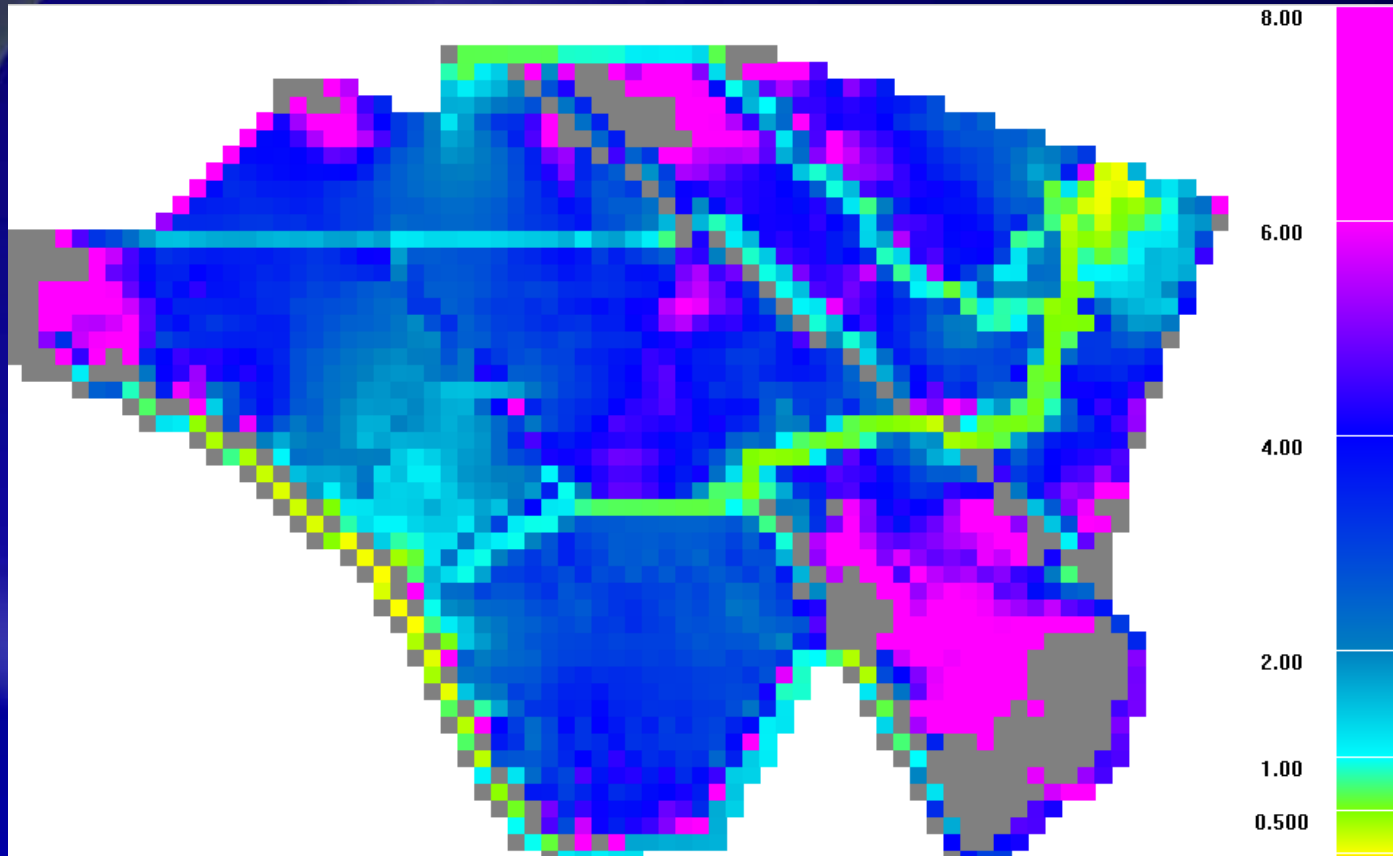


# Existing Conditions Residence Times



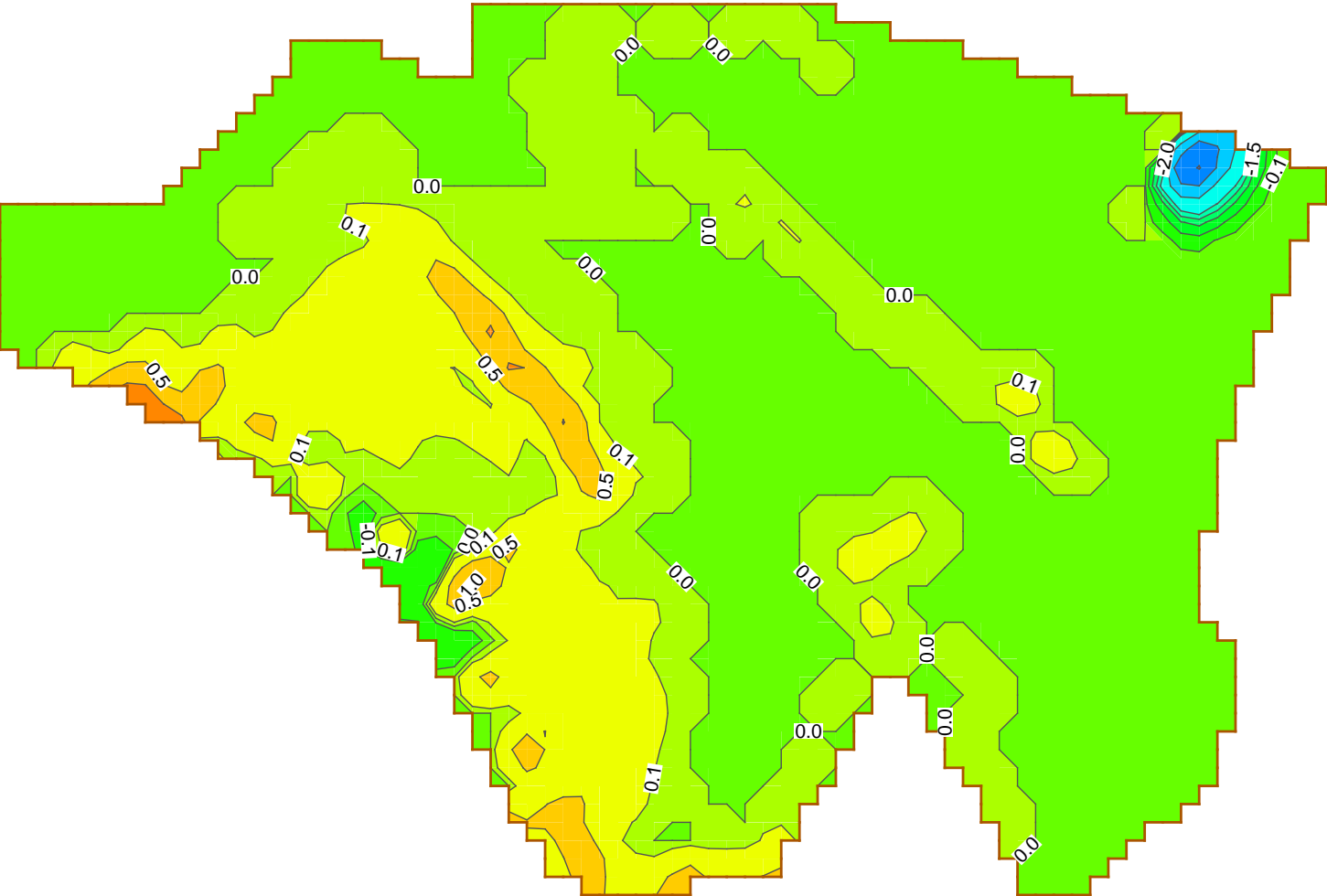
# Diversion Conditions Residence Times

HRT in Hours



# Sediment Distribution

Sediment Erosion(-)/Deposition(+) Depth (inch): -36.0 -24.0 -12.0 -6.0 -2.0 -1.5 -1.0 -0.5 -0.1 0.0 0.1 0.5 1.0 1.5 2.0



# Conclusions - Diversions Will:

- ◆ **Restore Hydrology - Increase Distribution of Flows, Stages, and Velocities**
- ◆ **Reduce Residence Times and Stagnant Water Zones**
- ◆ **Increase Sediment and Nutrient Distribution for Swamp Building and Regeneration**
- ◆ **Assist With Sea Level Rise Protection**

