An Overview of St. Lucie Estuary Watershed Model Development and Application

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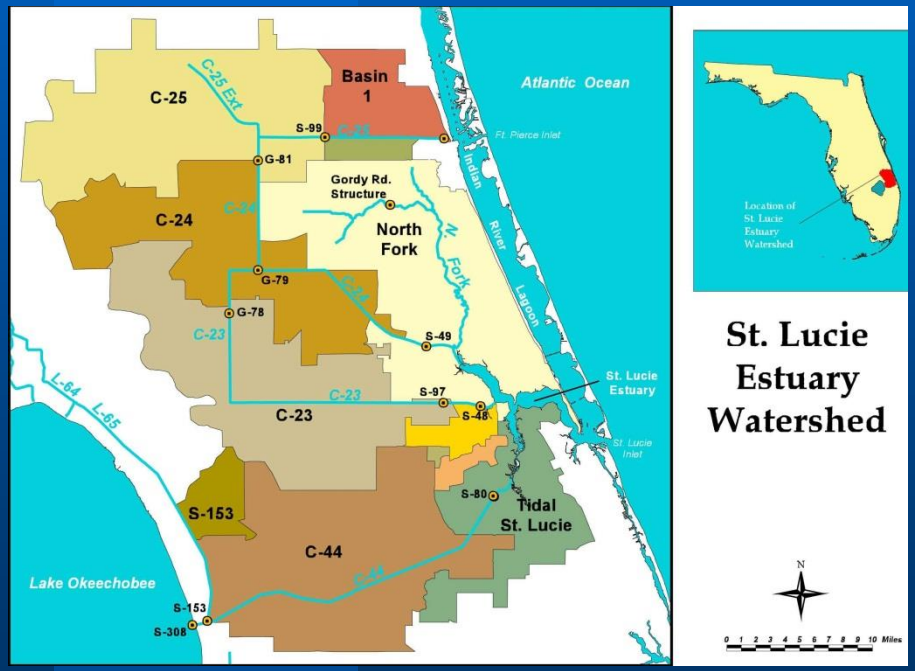
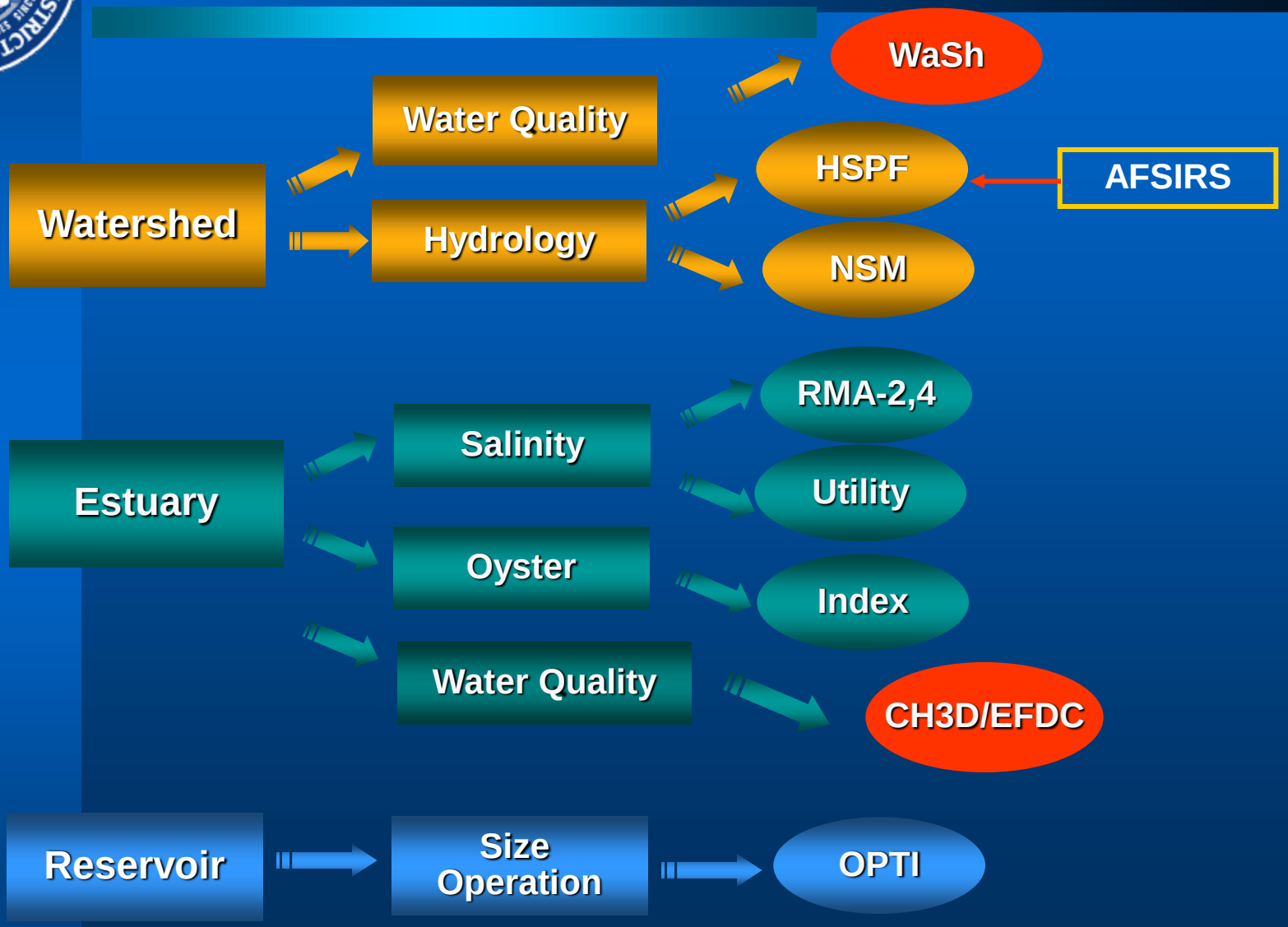
Coastal Ecosystems Section

Presentation Outline

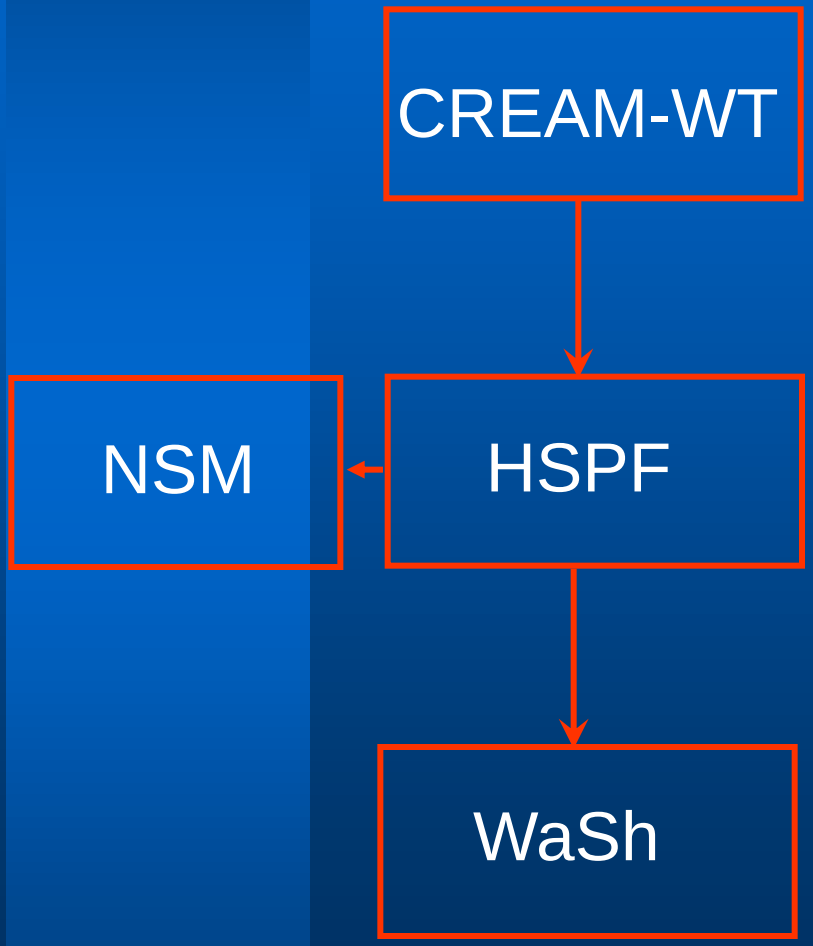


- The SLE watershed modeling history
- What is WaSh and why WaSh?
- Applications of WaSh
- Future update of WaSh

St. Lucie Estuary and Watershed Models



Watershed Models

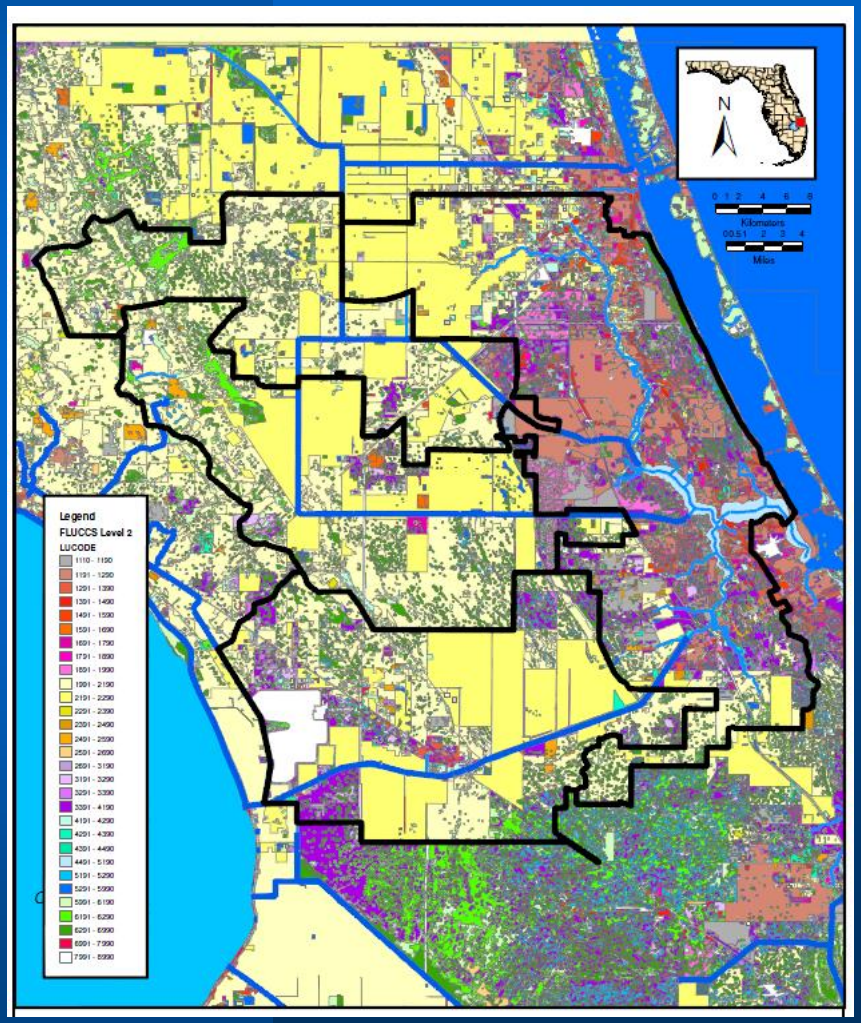


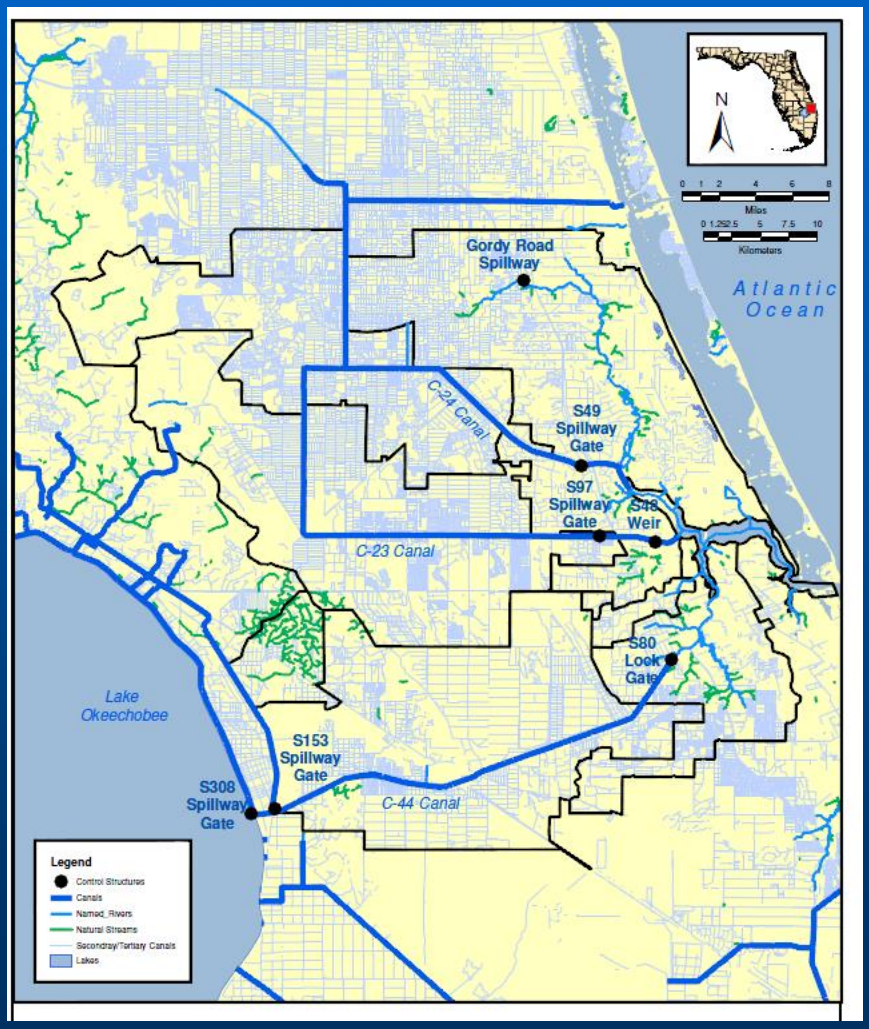
- No surface - ground water interaction
- Simple hydraulics of surface flow

- High water table algorithms allowing for surface ground water interaction
- Simple hydraulics of surface flow

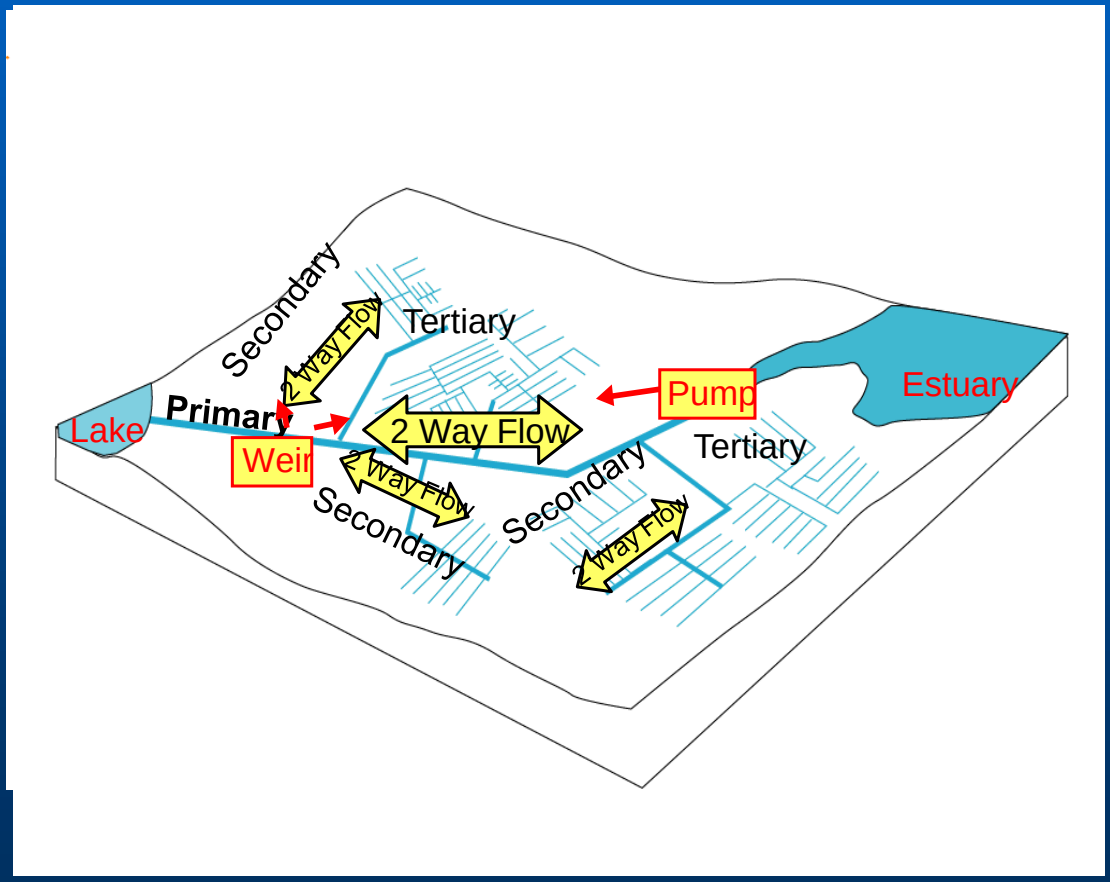
- Coupled surface and ground water model
- Complex hydraulics of surface flow
- Water quality capability

SLE Watershed: Spatial Variability



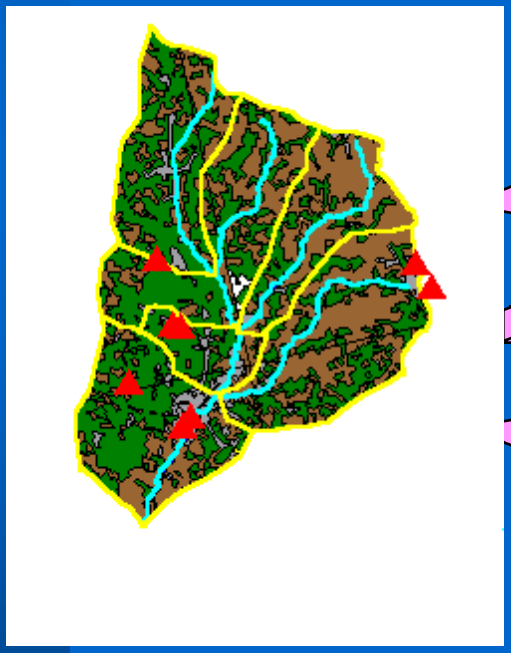


Basin Characteristics



Watershed Model: WaSh

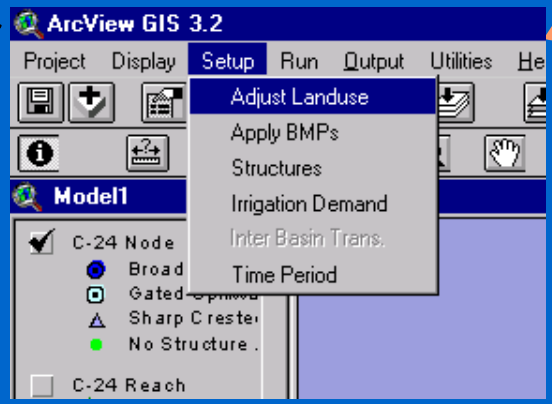
GIS data



Point Sources

Landuse Distribution

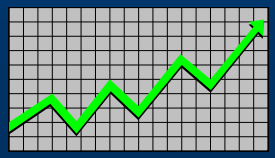
Stream Data



Meteorological Data

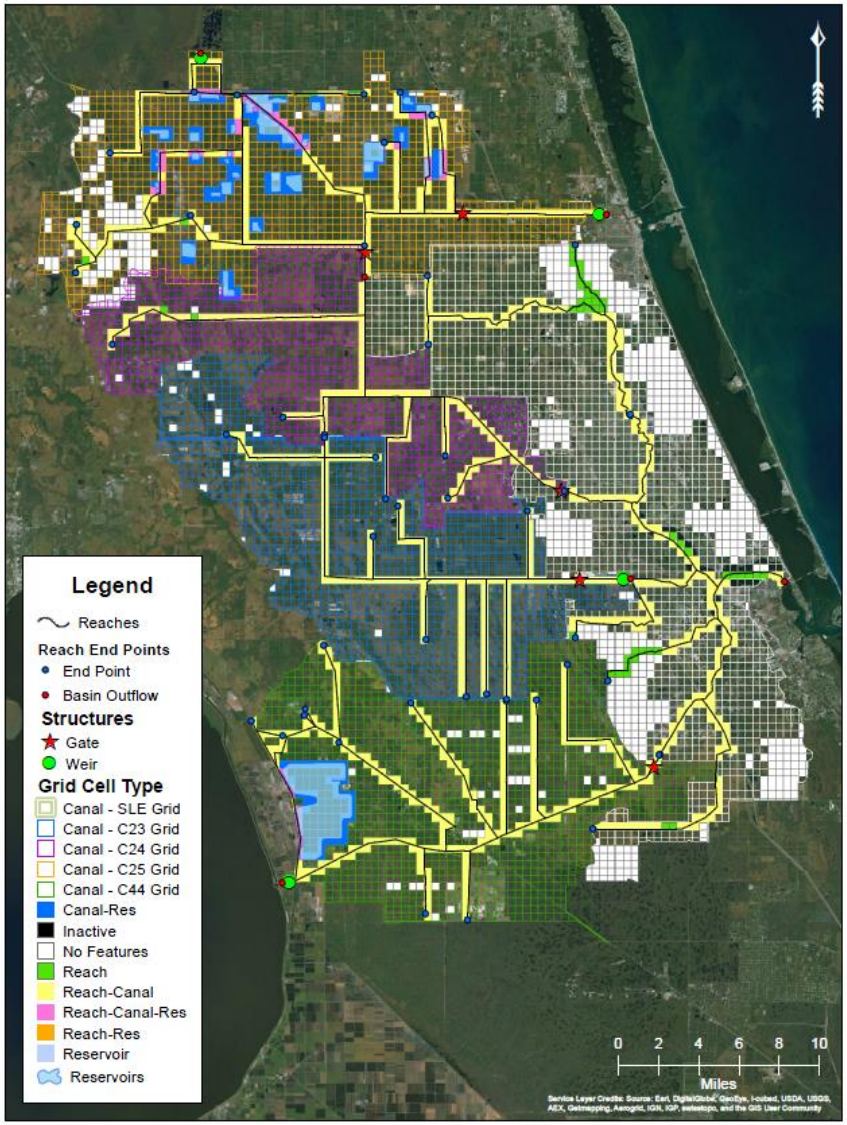
MODEL

Post Processing

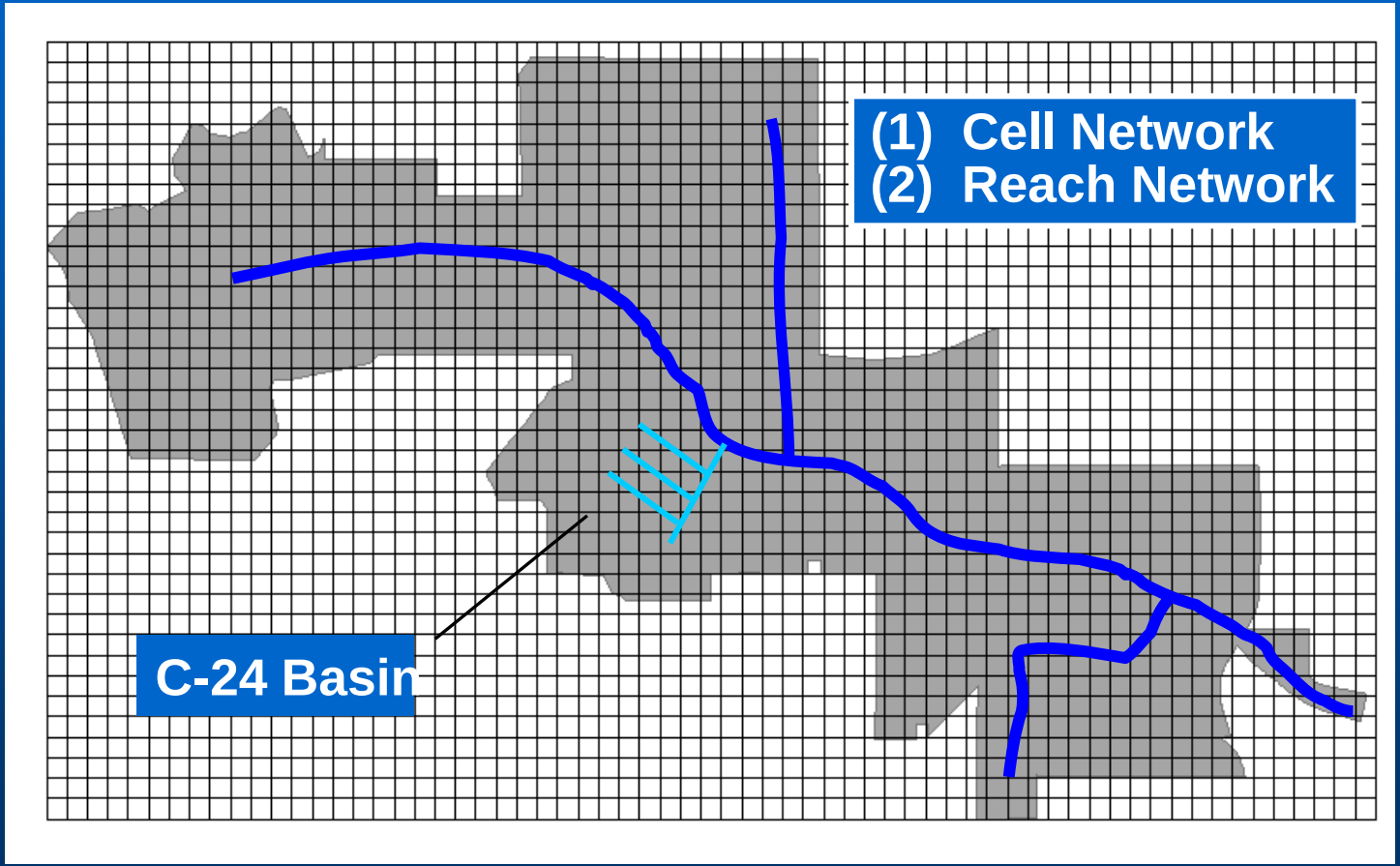


WaSh Model Domain

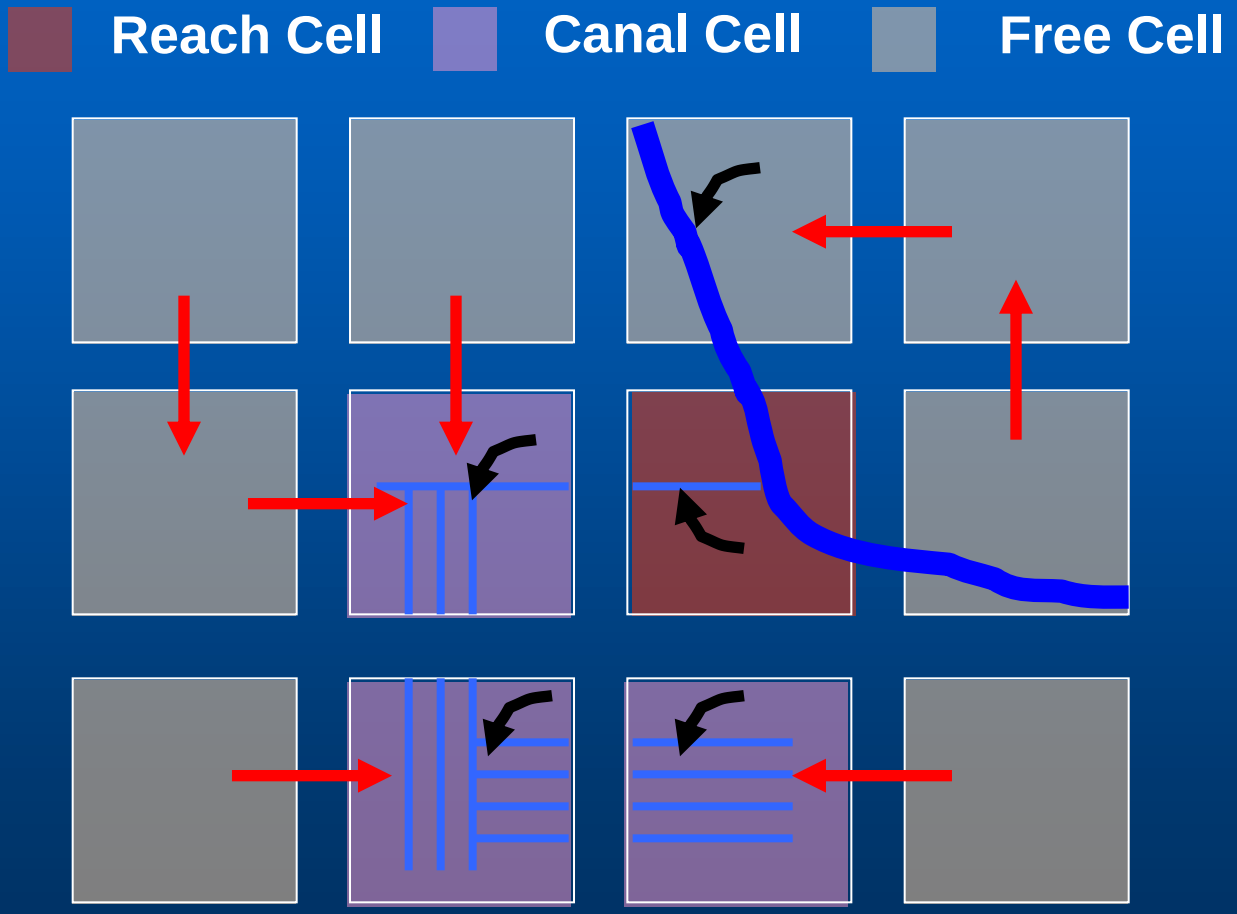
- C-44 Basin
- C-23 Bain
- C-24 Basin
- Basins 4-5-6
- North Fork
- South Fork



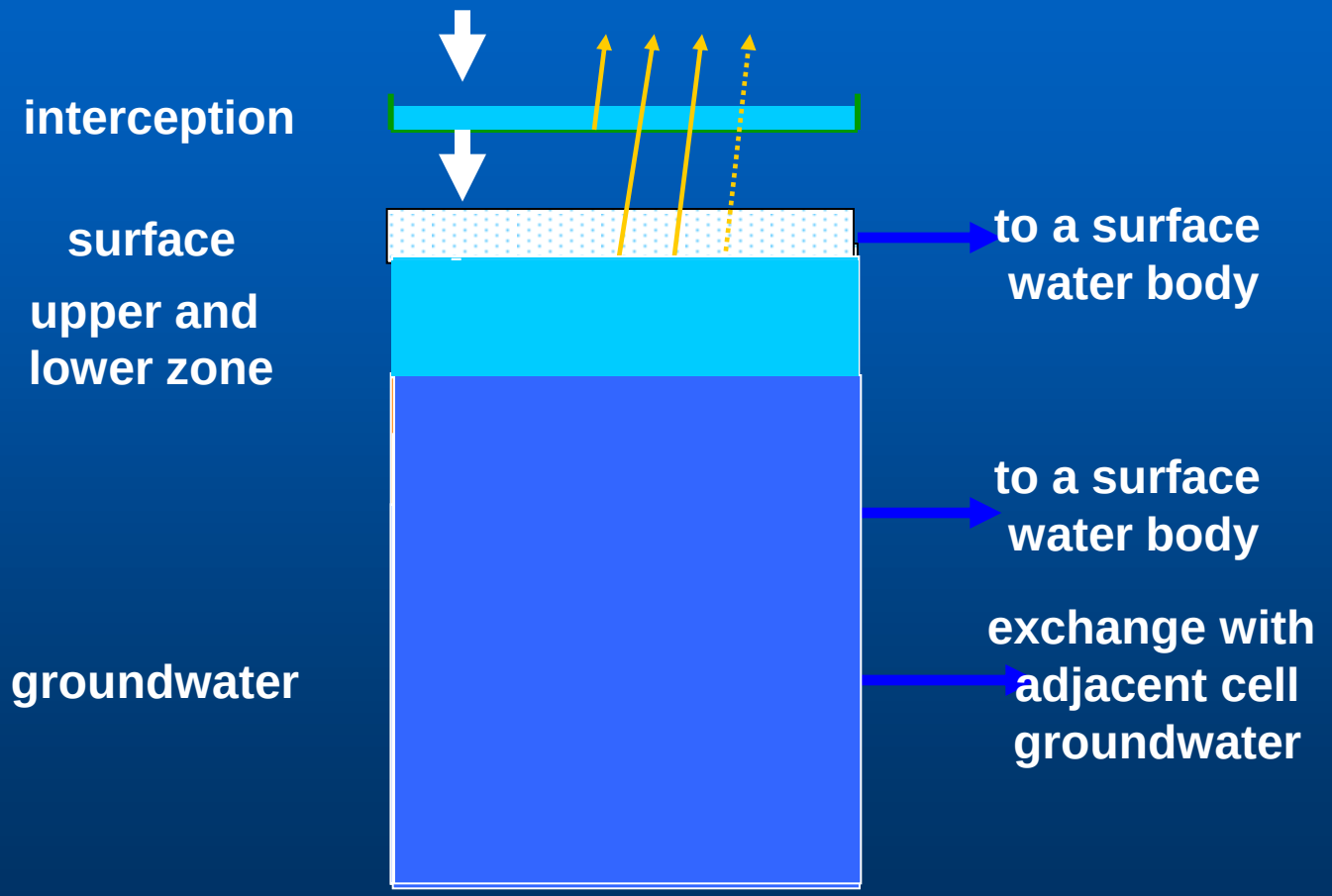
WaSh Model Elements



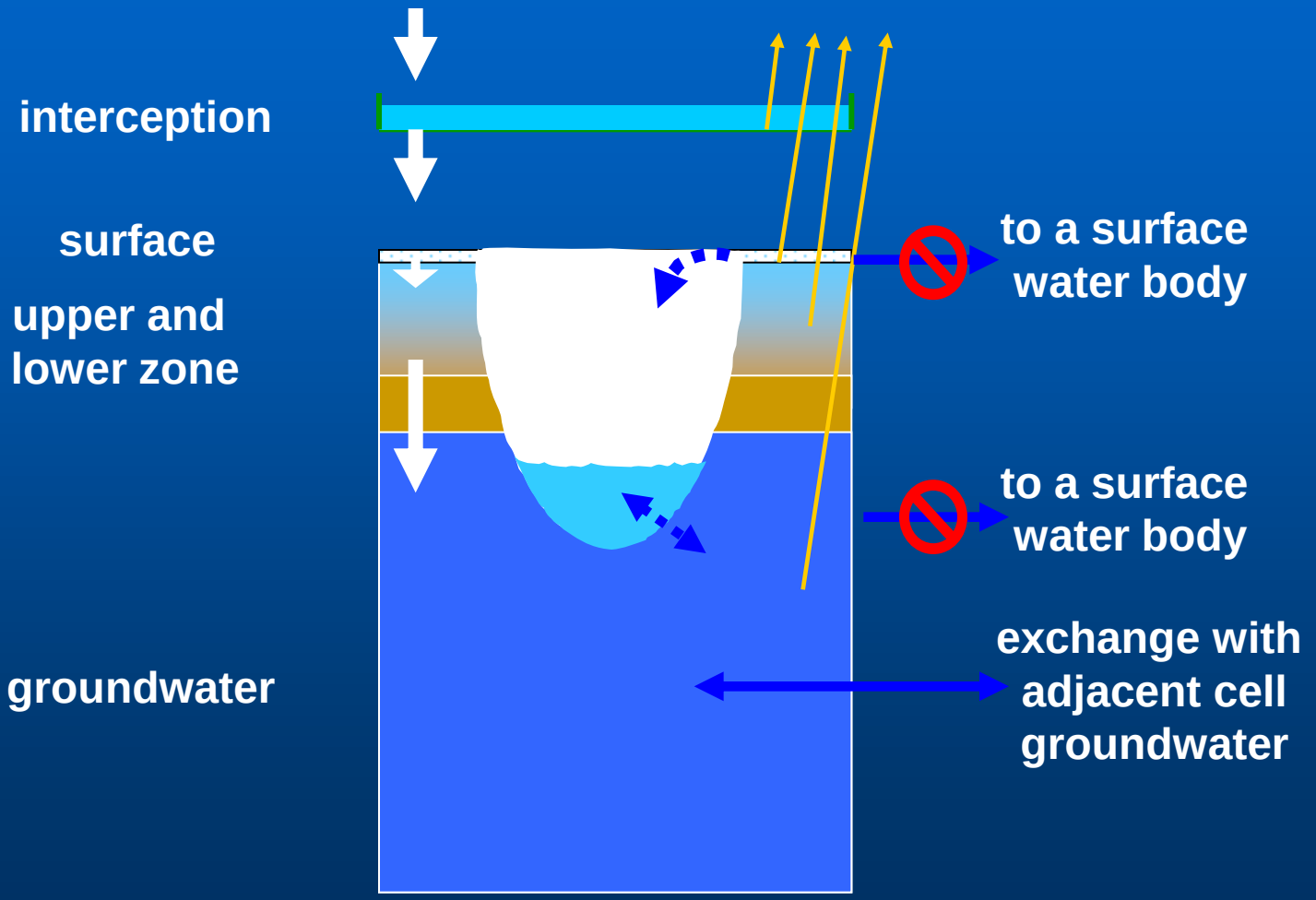
Cell Network - Routing



Cell System - High Water

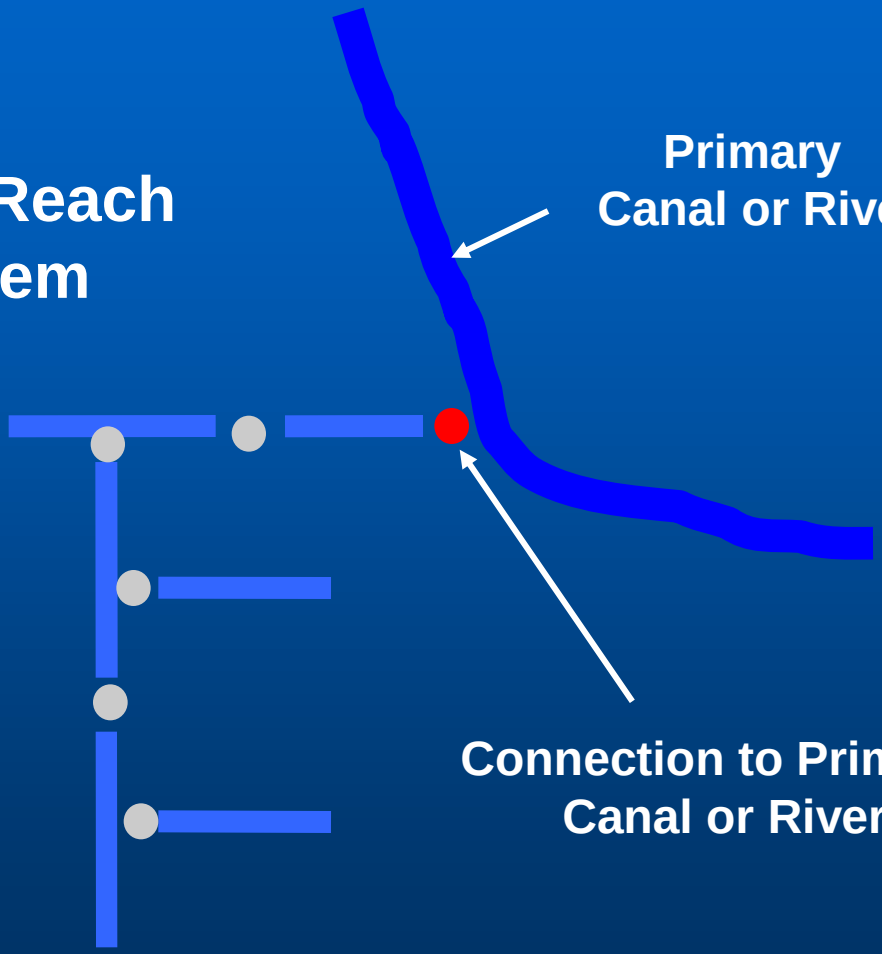


Cell Network - Canal Cells

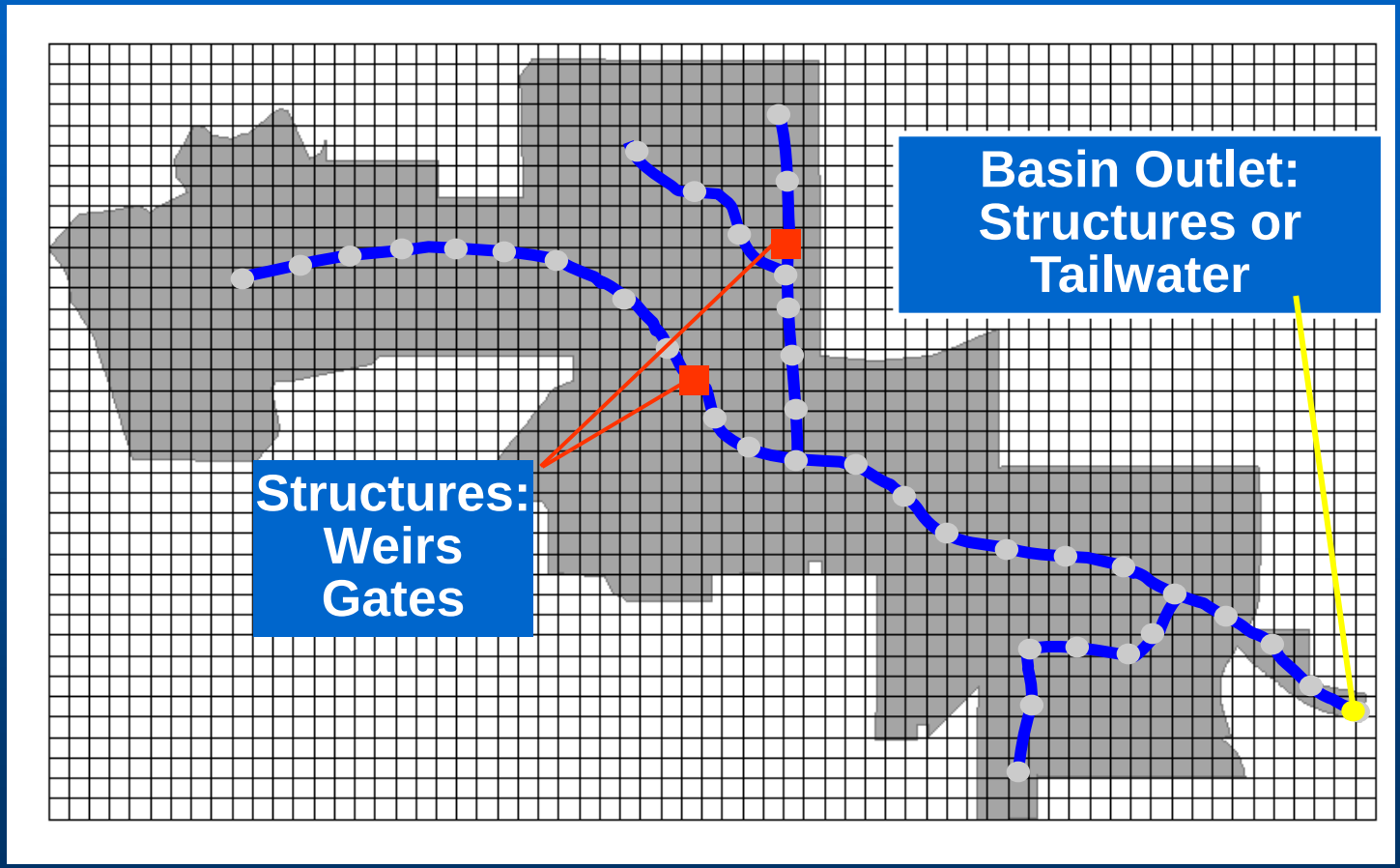


Reach Network

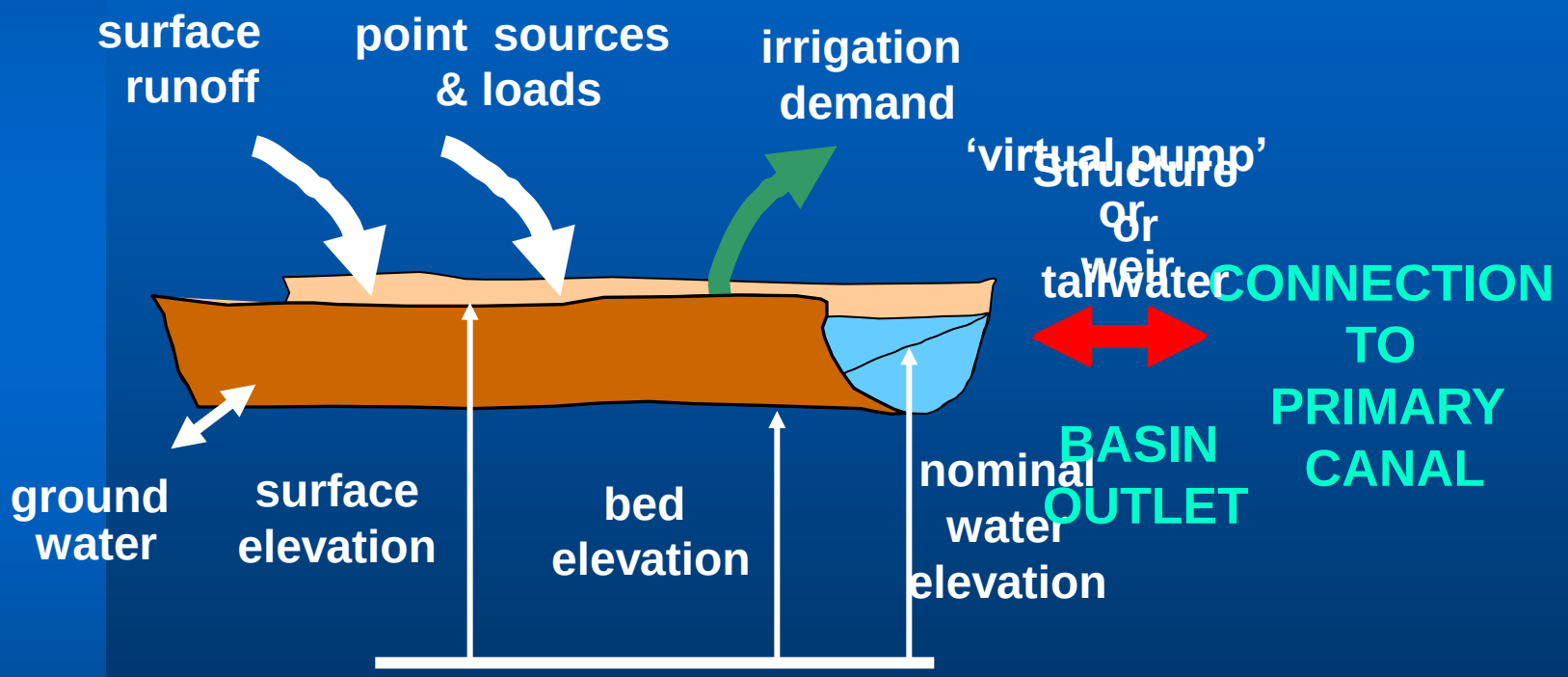
Node - Reach system



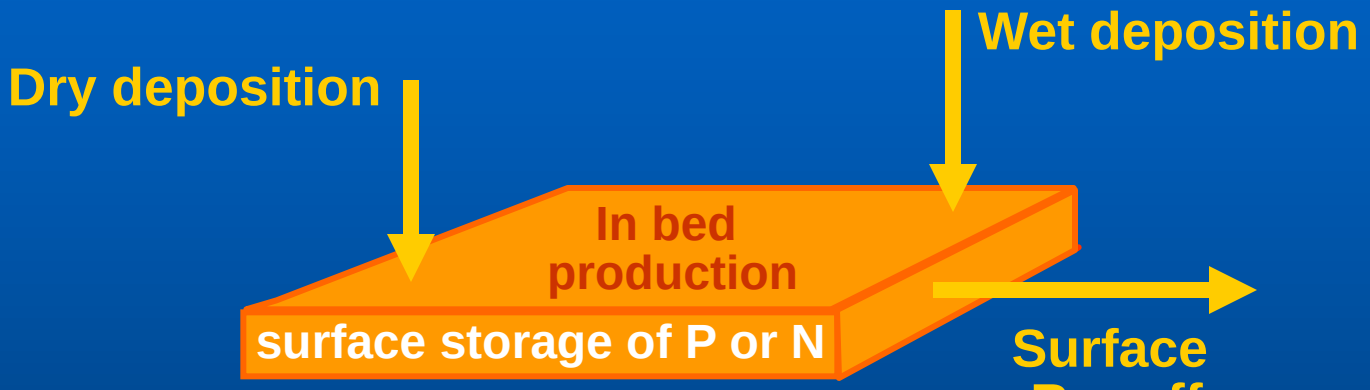
Reach Network - Structures

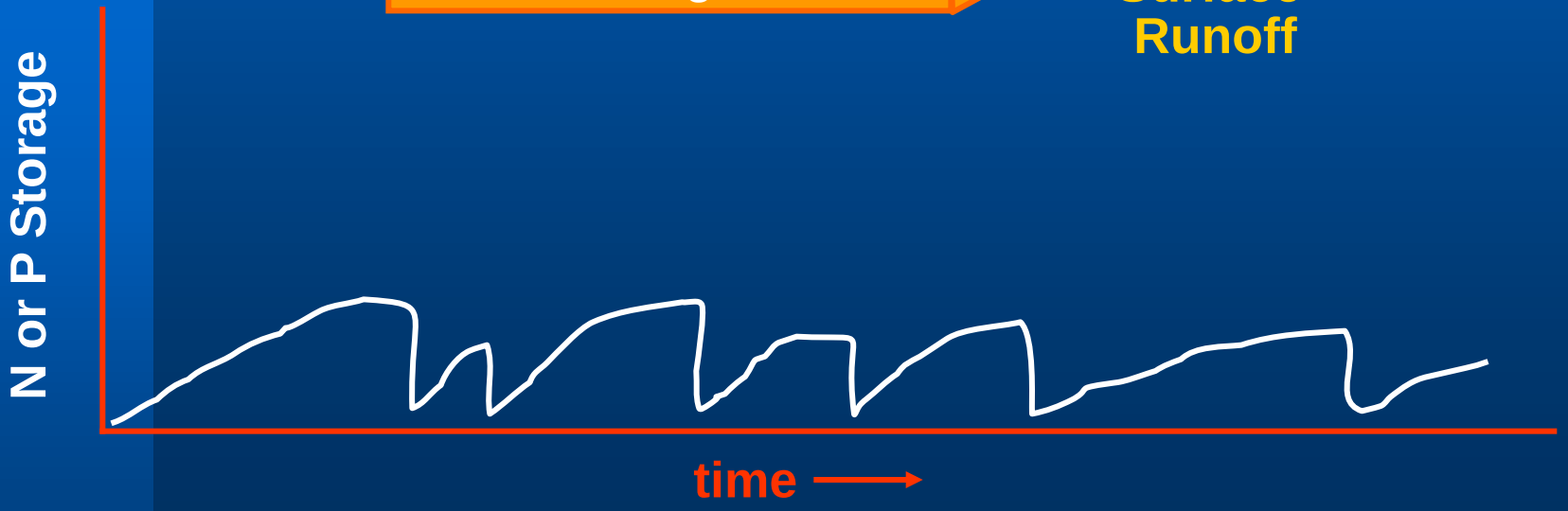


Channel Routing

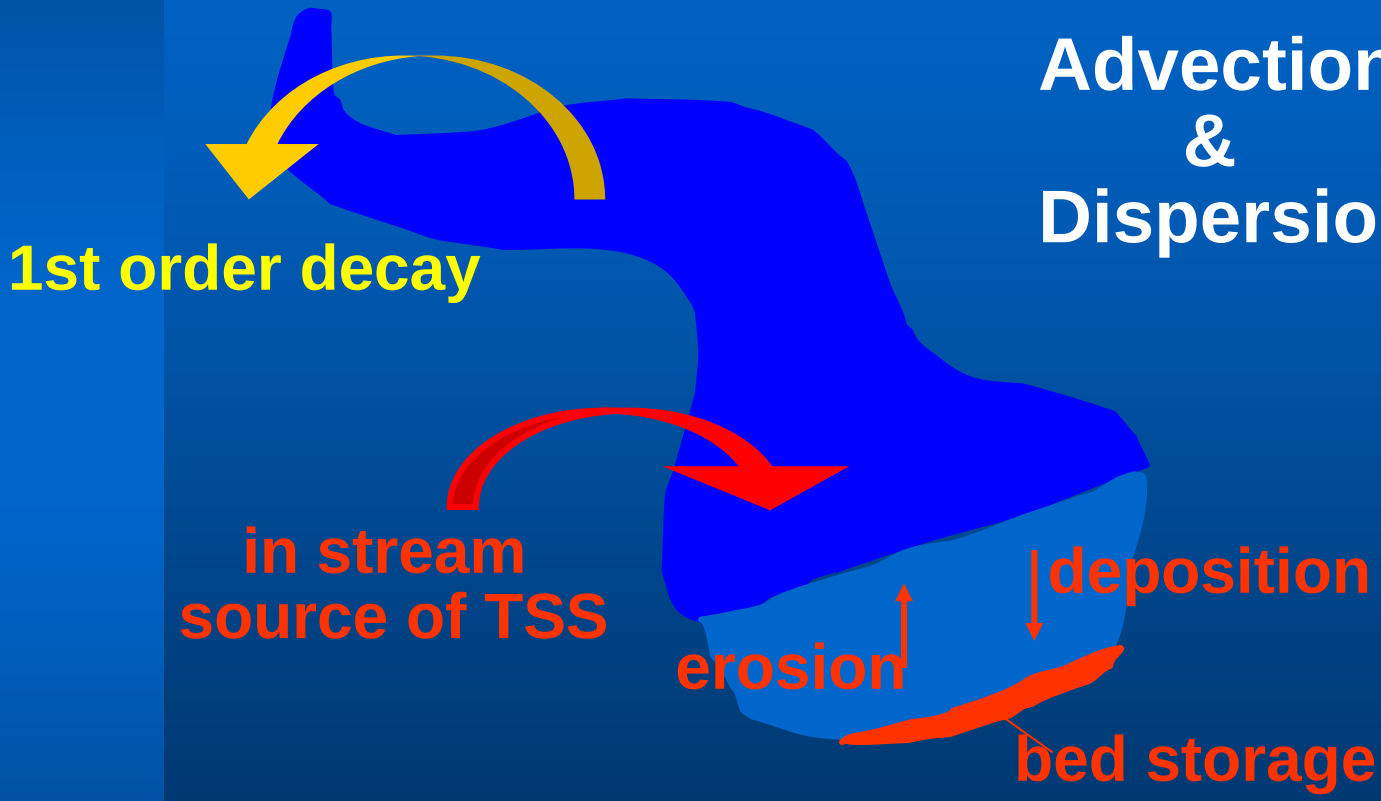


Water Quality - N and P

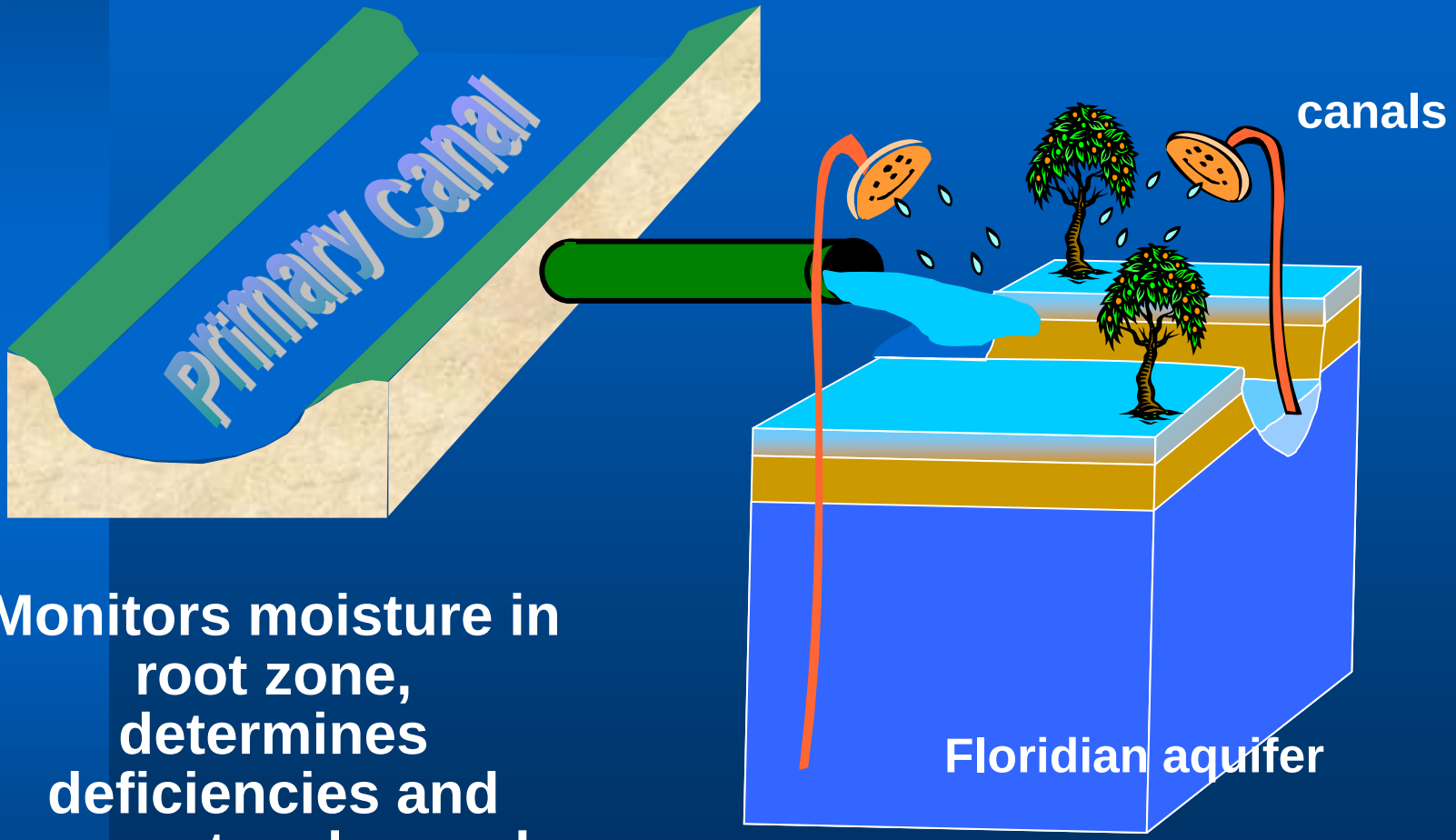




Water Quality - In Stream Processes



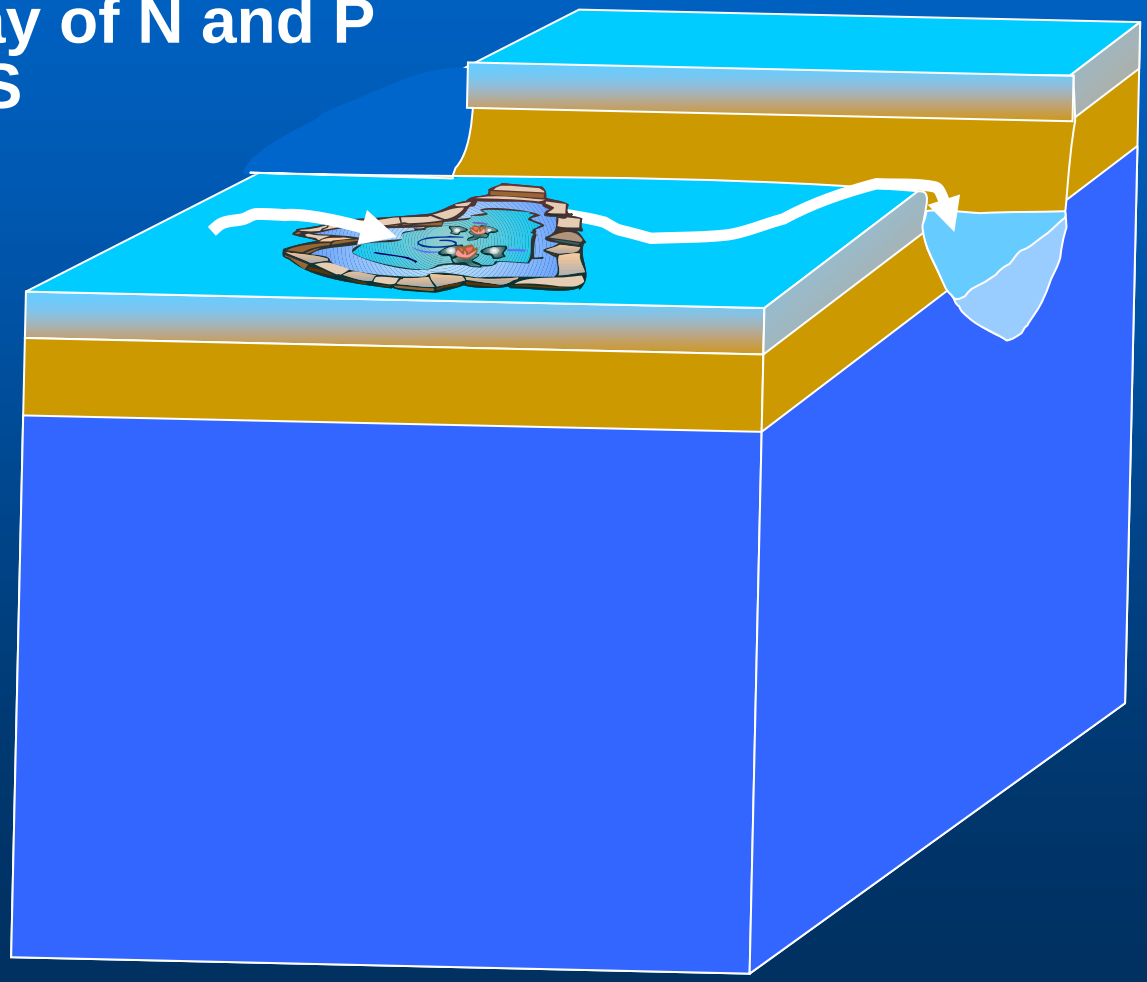
BMP: Irrigation Supply



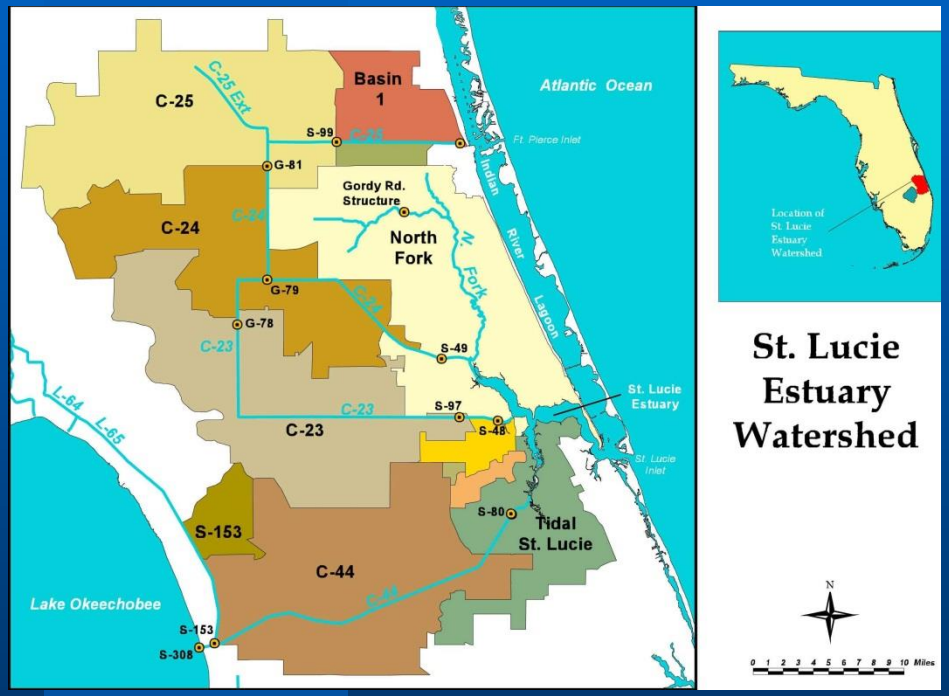
Monitors moisture in root zone, determines deficiencies and generates demand

BMP: Local Detention or Retention

1st order decay of N and P
Settling of TSS



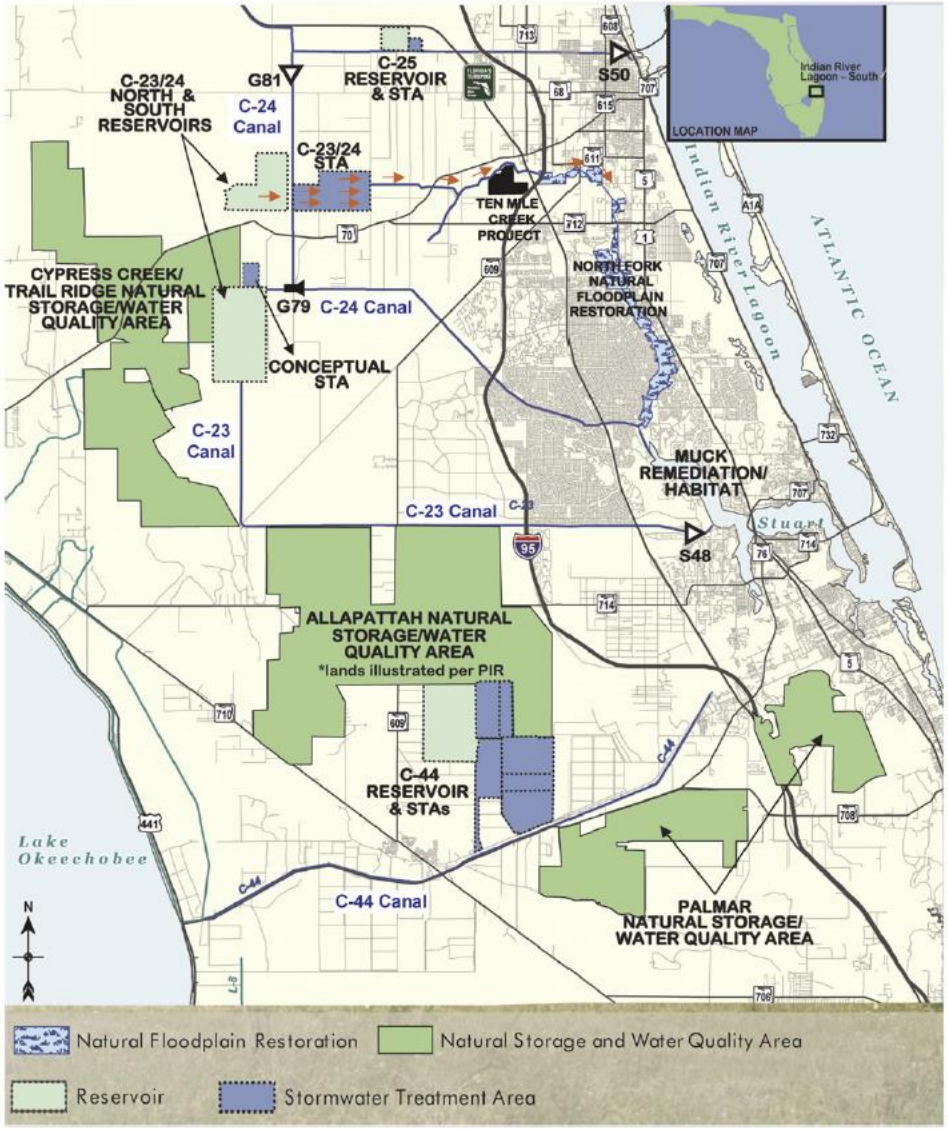
WaSh Model Applications



- Ungaged basins
- Land use changes
- Flexibility of spatial and temporal scales

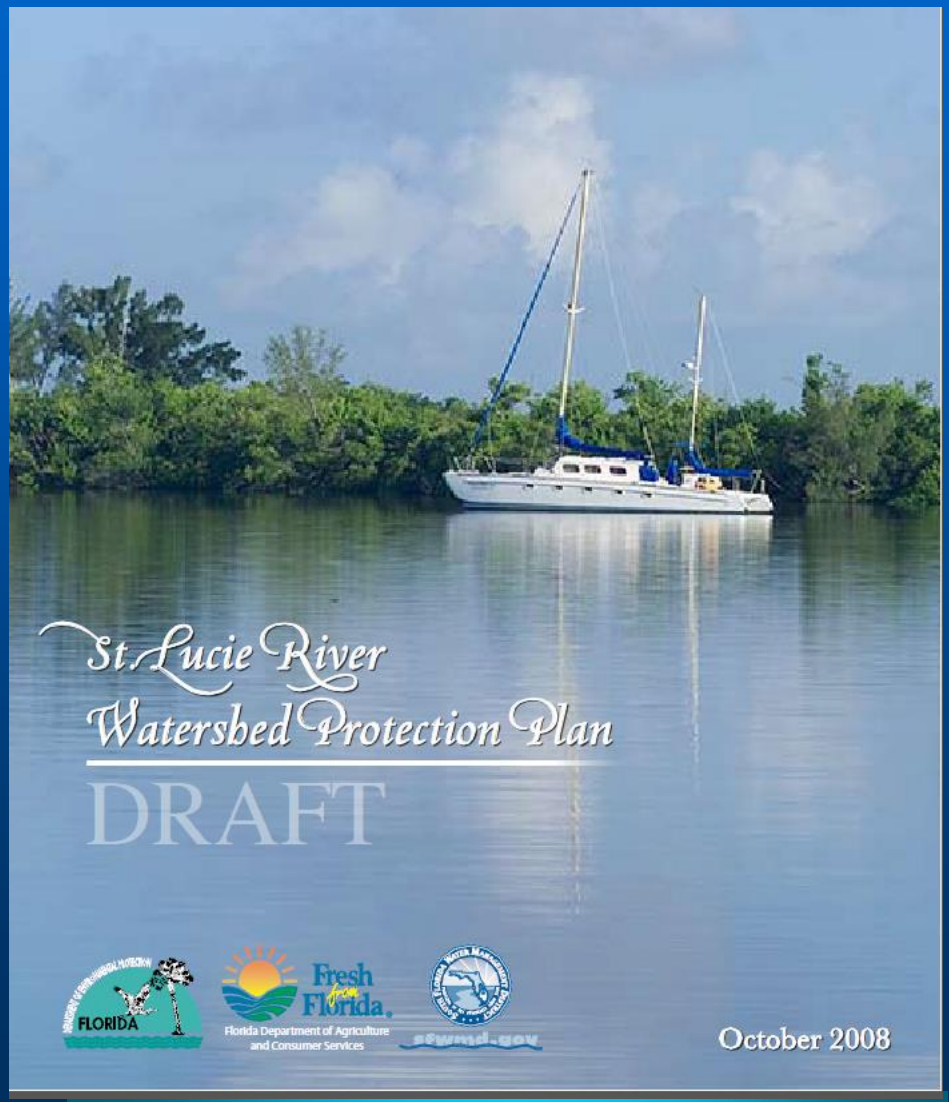
Modeling support for IRL-S/CERP

- Feasibility study
- Operation plan
- Design update
- Water reservation
- C-44 Reservoir



Modeling support for the Northern Everglades Program

- St. Lucie River Watershed Protection Plan
- Subsequent updates



Modeling support for TMDLs

- Hydrological simulations for the ungaged basins for load calculation
- BMAP (?)

Figure 5.9 Current and Target Average Annual Total Nitrogen Loads

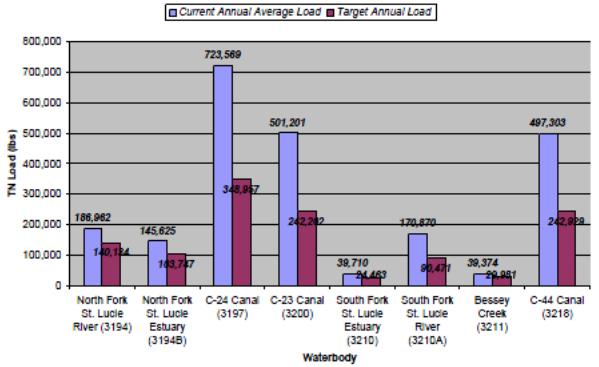
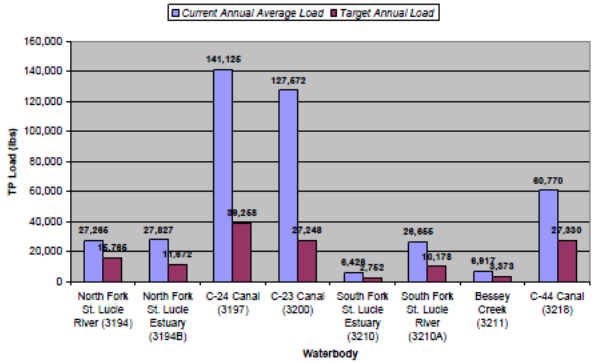
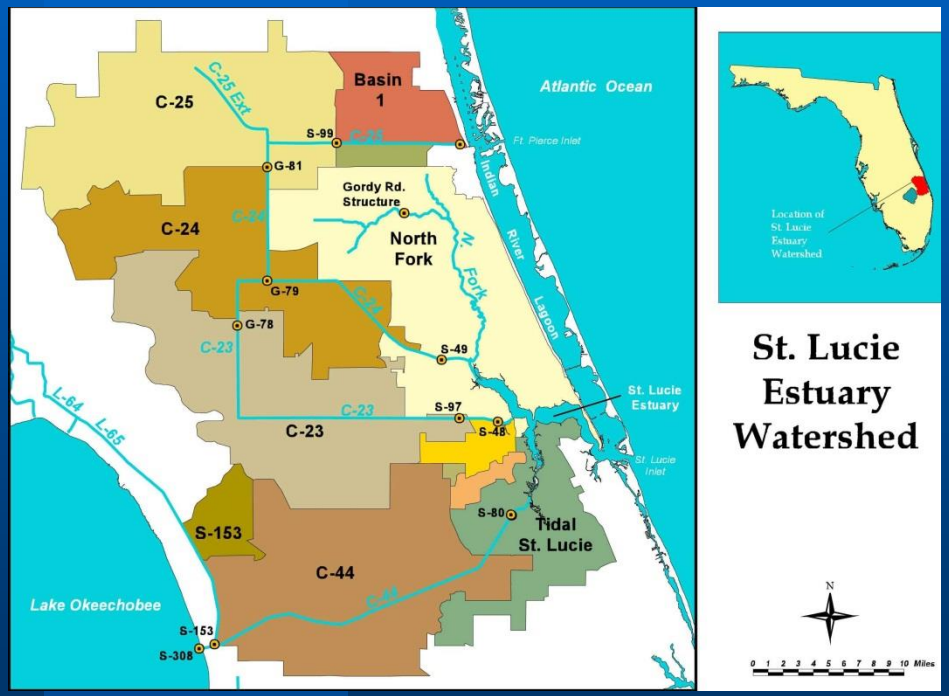


Figure 5.10 Current and Target Average Annual Total Phosphorus Loads



FDEP, 2008

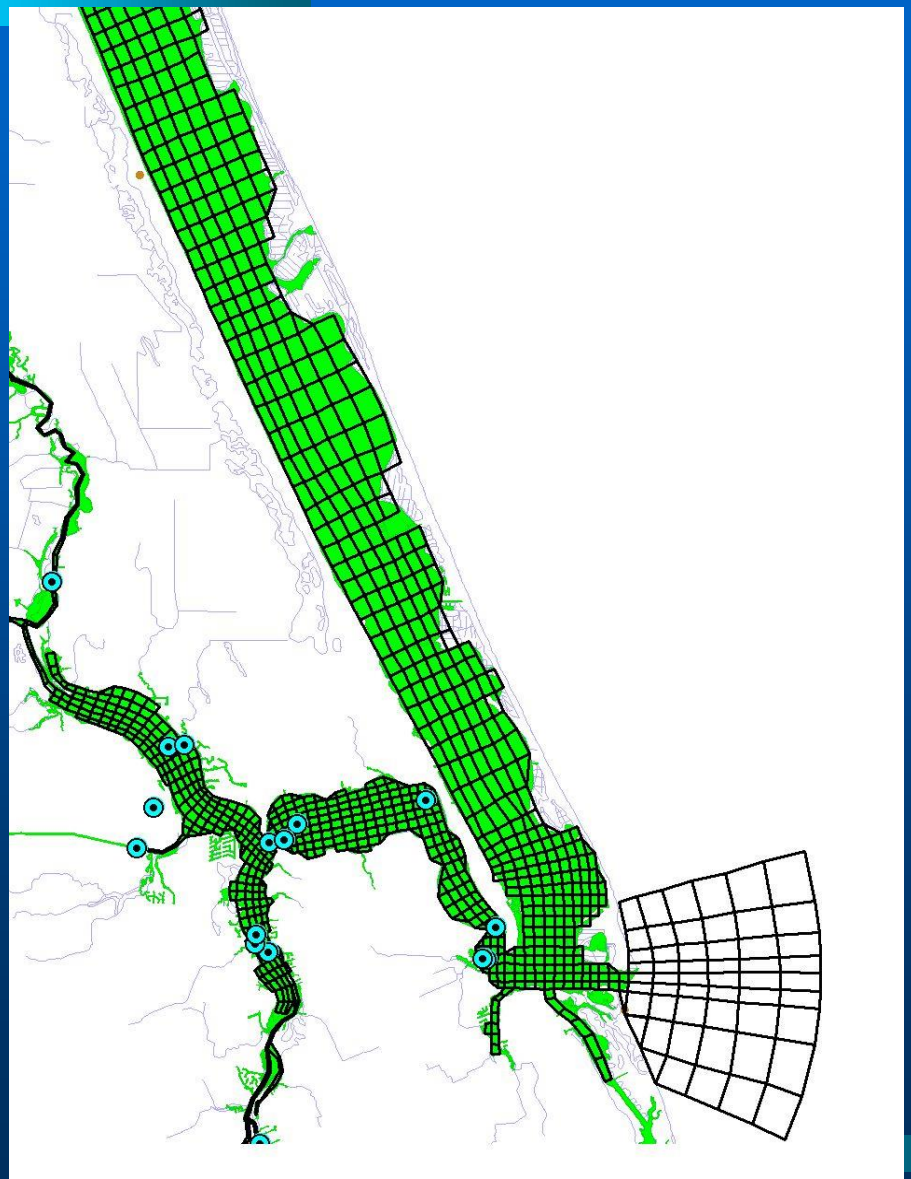
WaSh Model Updates



- Basin boundary
- GUI – ArcGIS 10
- Land use change
- Calibration/validation

Integration with the estuary model

- 3-D
- Hydrodynamic/salinity /water quality model
- 1161 grid cells: 40 to 400 m in SLE and up to 900 m in IRL.



Watershed Model - Estuary Model Interaction