Support for Advancing SRP Work

US Army Corps
of Engineers

John Hickey and Chris Dunn
Water Resource Systems Division
IWR-HEC

HEC's Involvement in SRP

- Training Courses
- Interagency Personnel Agreement
- Modeling Tools and Support
- New Modeling Capabilities
- New Software Tools
- Corps' Research Programs?

Corps/TNC Training Courses at HEC

Water and the Watershed

…understanding of the physical nature of water in the watershed and the conceptual, technical, and institutional tools available for planning and management.

Hydrologic Analysis for Ecosystem Restoration

…understanding of the issues, policies, and analytical methods in restoration studies and insights into the applicability of a range of tools for the various hydrologic analyses necessary in restoration planning and design.


Interagency Personnel Agreement
between HEC and TNC
GA 0179 HS
GEORGIA
2003

Interagency Personnel Agreement

- Started February 9th, 2004

Through this IPA, John Hickey is to become an ambassador for the Sustainable Rivers Project. Work with the Corps and TNC to advance and increase the visibility of the SRP.

- Enhanced understanding of the SRP within the Corps
- Direct technical support to SRP sites
- Improved Corps and TNC software
- Improved training through HEC related to eco-restoration
- Expanded communications and technology transfer
- Promotion of Corps and TNC resources and capabilities

- 1-yr agreement. Savannah, New England…

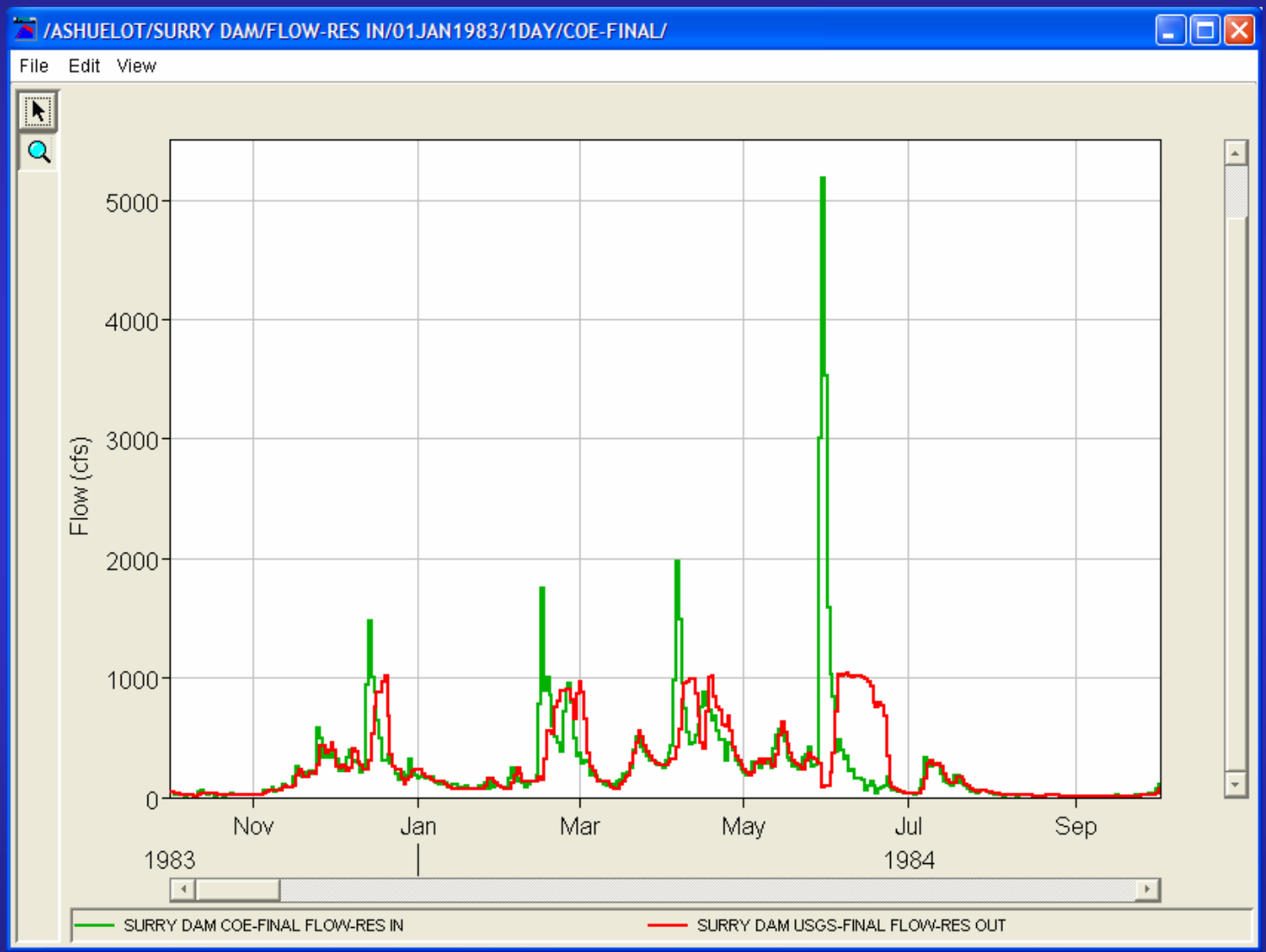
West and Ashuelot Rivers

- Surry and Otter Brook Reservoirs on the Ashuelot
- Ball Mountain and Townshend on the West

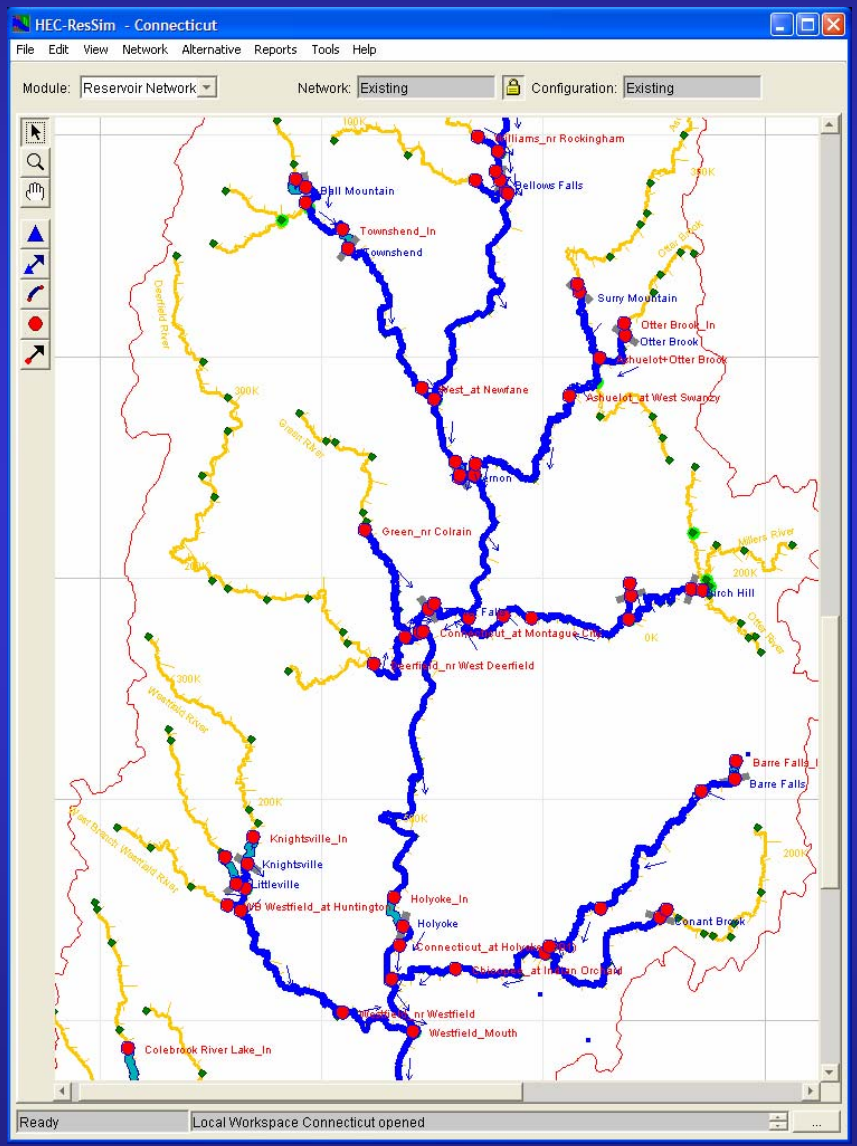
- Issues
  - Hydrology
  - Endangered Species
  - Fish Passage
  - Water Quality/Temperature

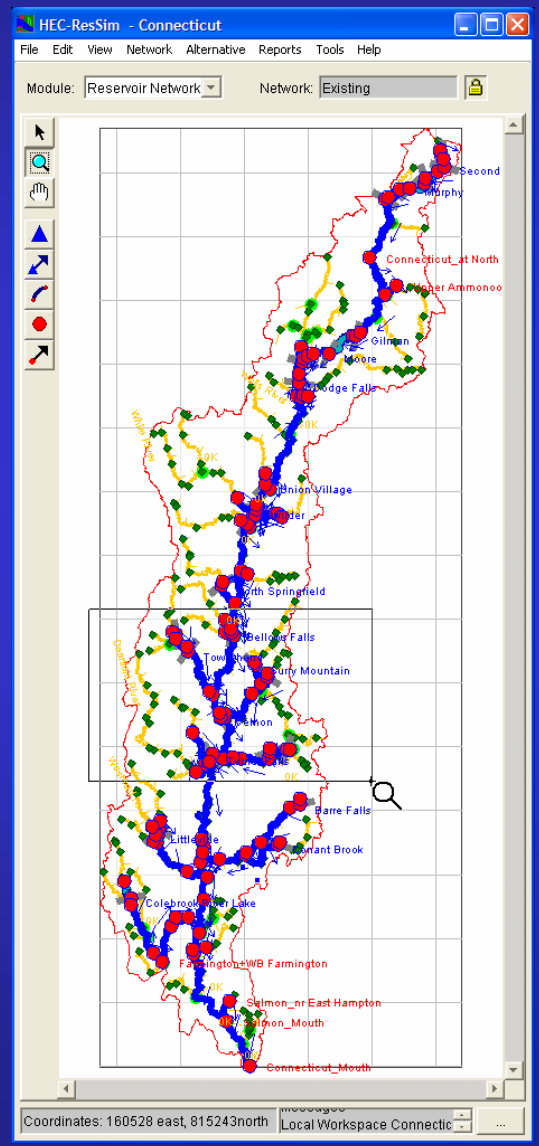
- Dwarf Wedge Mussel populations below Surry Dam

Ashuelot River Flows at Surry Dam

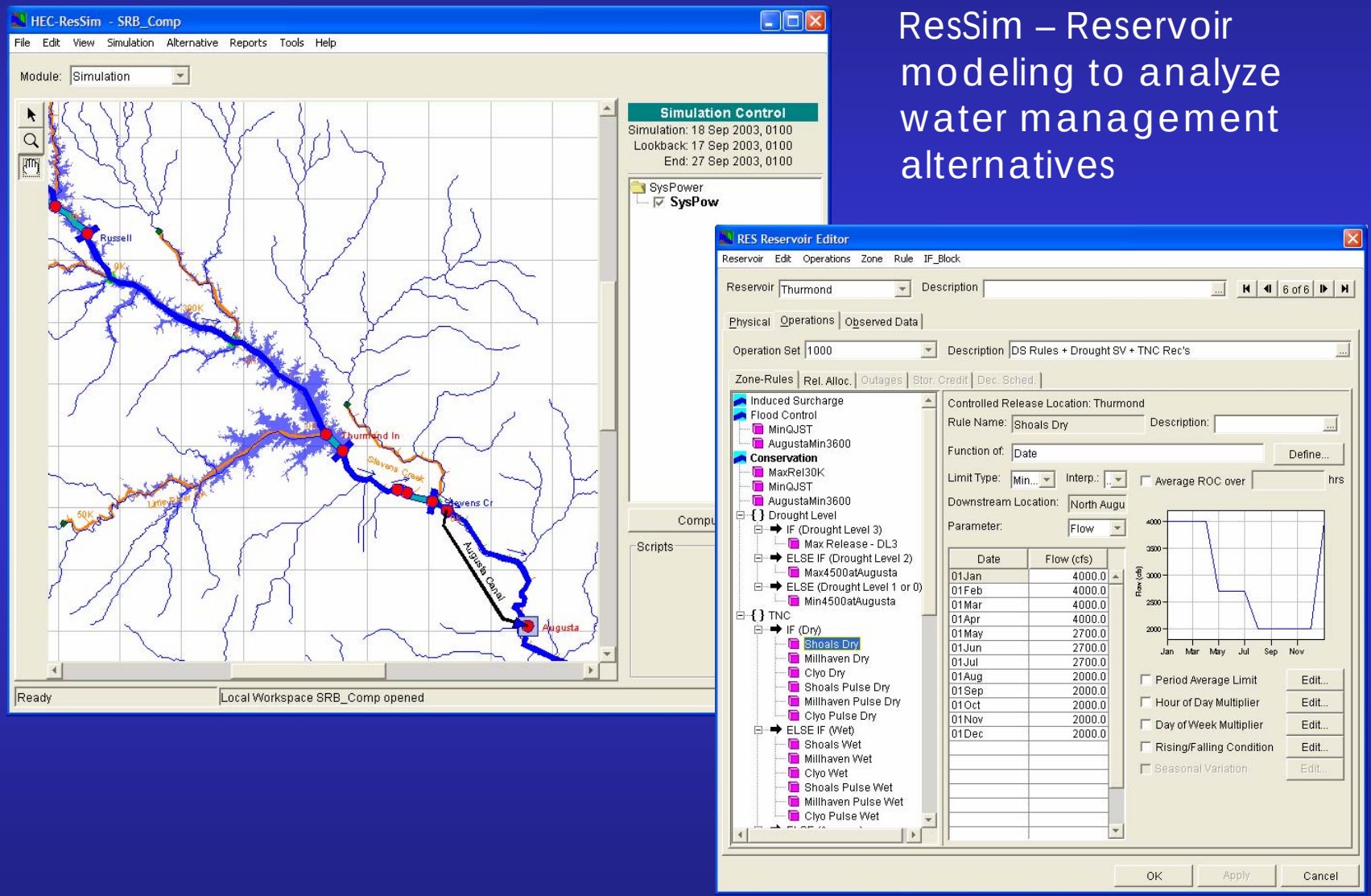


West and Ashuelot Rivers - ResSim



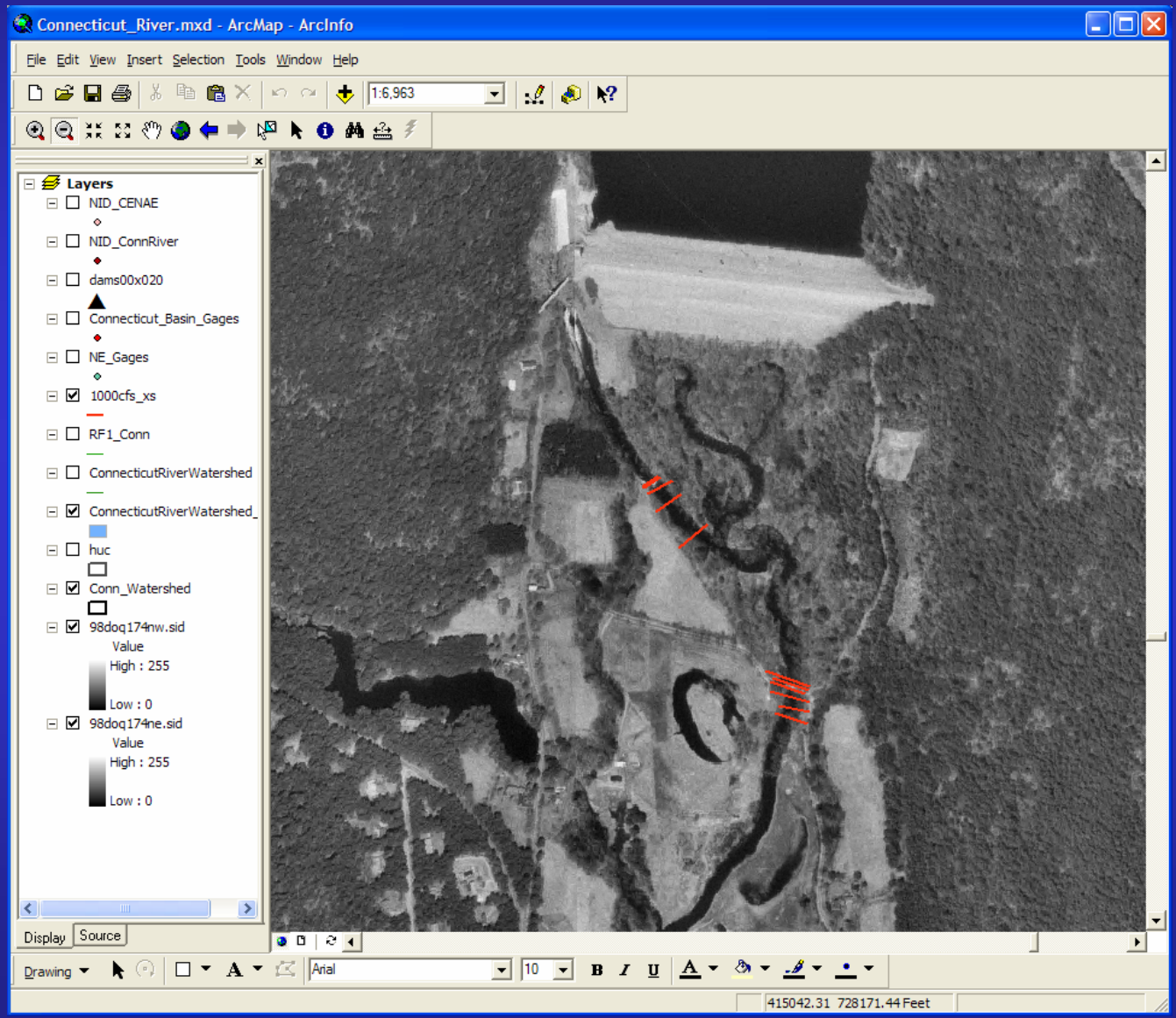


More on HEC-ResSim…

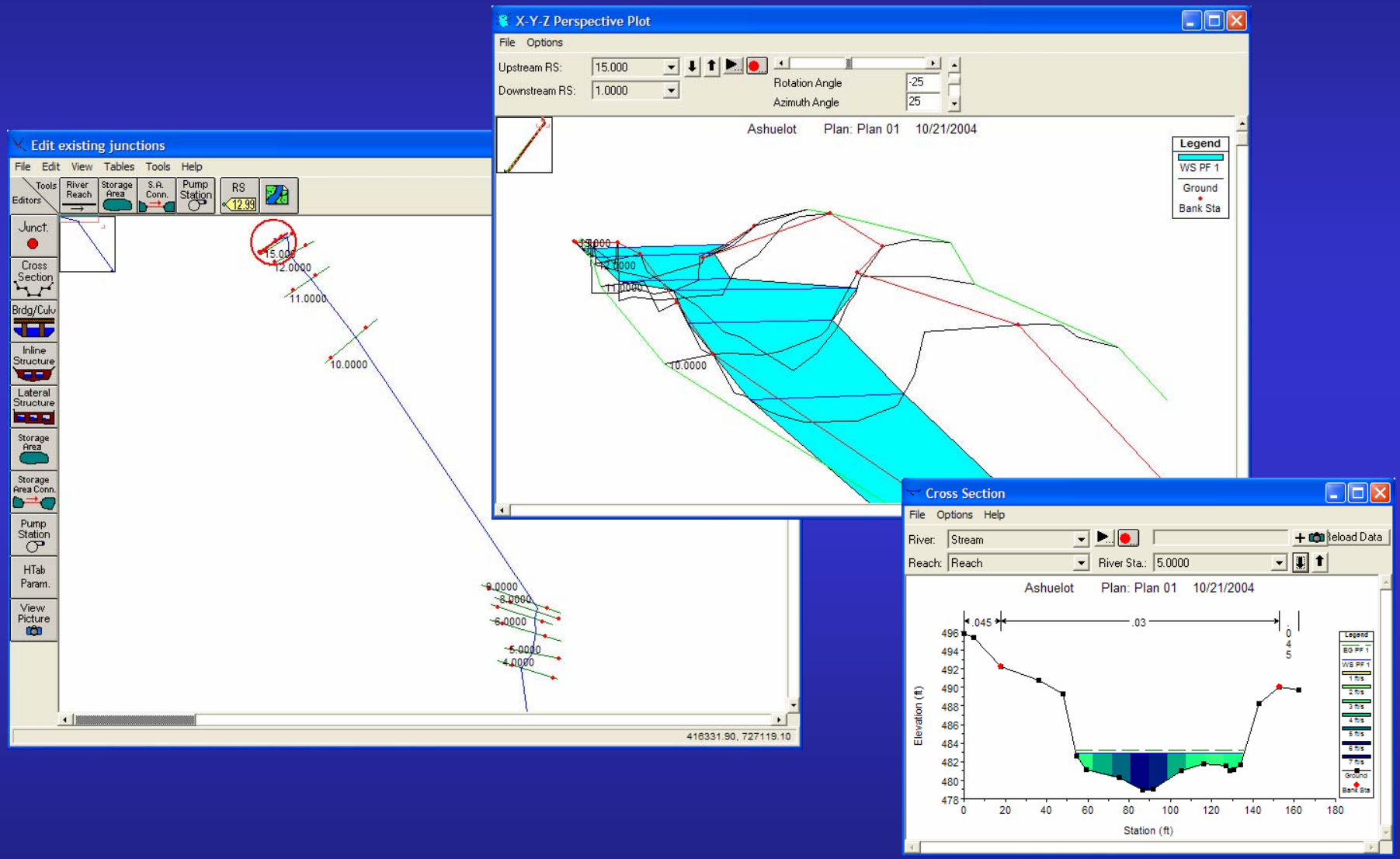


ResSim – Reservoir modeling to analyze water management alternatives

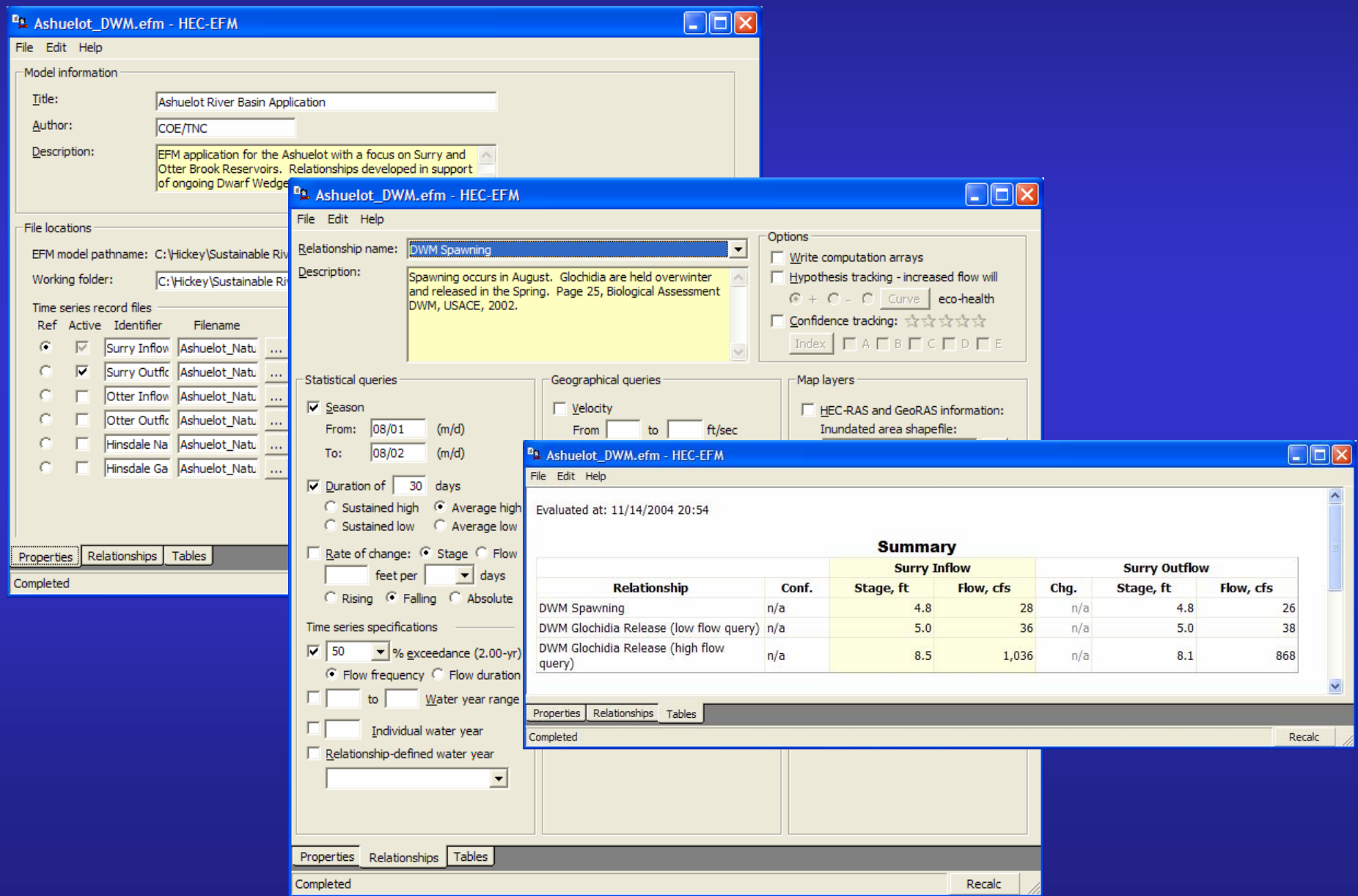
Ashuelot Monitoring Efforts



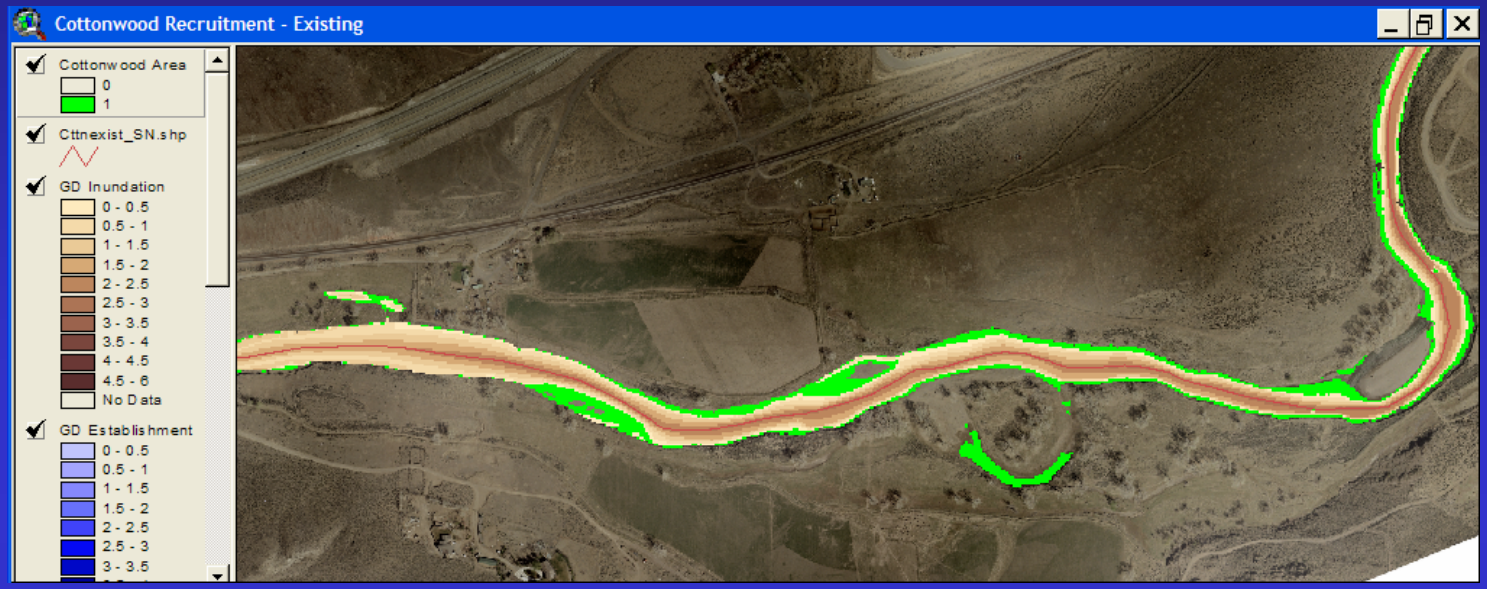
HEC-RAS – River Hydraulics



HEC-EFM – Ecosystem Model



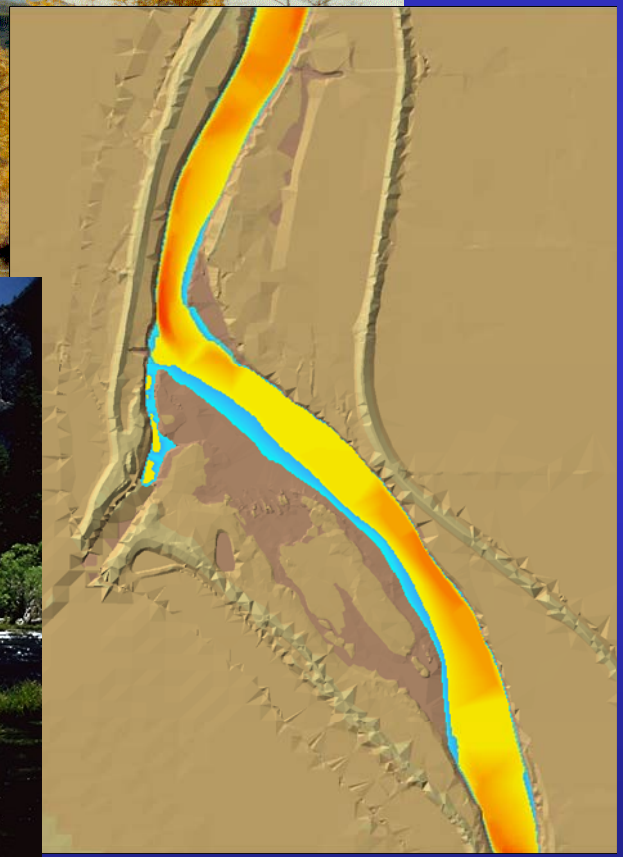
EFM and RAS – McCarran Ranch



Things to Consider in Modeling

- Triggers for Water Management
  - Thermal stratification/destratification
  - Fish surveys
- Outlet Retrofitting
- Eco-concerns Spanning Multiple Years
- Creation and Assessment of Ecosystem Flow Recommendations

Emerging Research



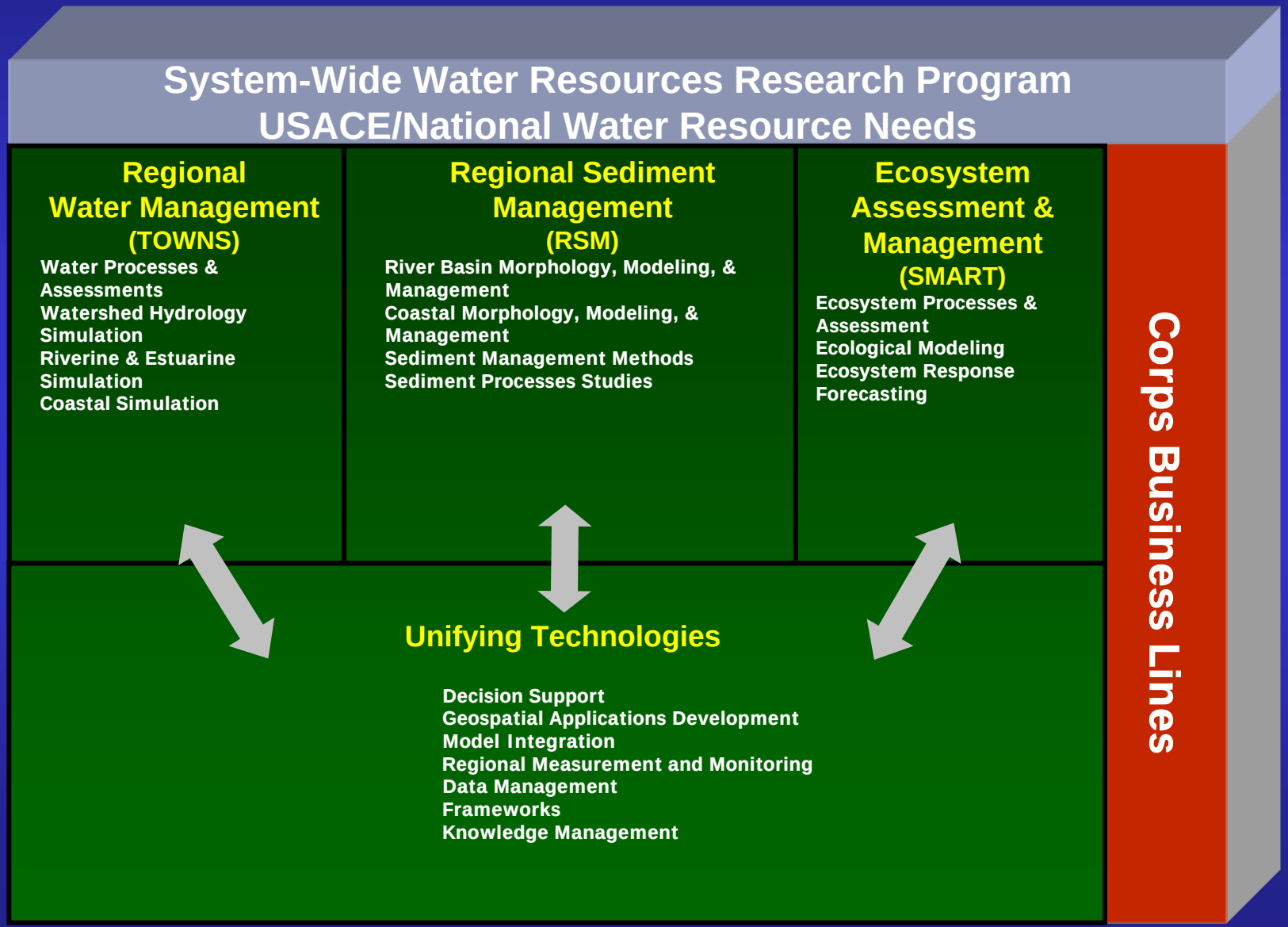
Where were we?

- SMART - System-wide Modeling, Assessment, and Restoration Technologies Program
- RSM – Regional Sediment Management
- TOWNS - Technologies and Operational Innovations for Urban Watershed Networks
- Environmental – Including the EMRRP - Ecosystem Management & Restoration Research Program
- Flood and Coastal
- Navigation
- Geospatial

Where are we?

- Navigation
- Environmental
- Flood and Coastal
- System-Wide Water Resources Program

Where are we?


System-Wide Water Resources Research Program
USACE/National Water Resource Needs
Regional Water Management (TOWNS)
Water Processes & Assessments
Watershed Hydrology Simulation
Riverine & Estuarine Simulation
Coastal Simulation
Regional Sediment Management (RSM)
River Basin Morphology, Modeling, & Management
Coastal Morphology, Modeling, & Management
Sediment Management Methods
Sediment Processes Studies
Ecosystem Assessment & Management (SMART)
Ecosystem Processes & Assessment
Ecological Modeling
Ecosystem Response Forecasting
Corps Business Lines
Unifying Technologies
Decision Support
Geospatial Applications Development
Model Integration
Regional Measurement and Monitoring
Data Management
Frameworks
Knowledge Management

Water Quality Enhancements

HEC-HMS

(software that uses advanced methodologies and numerical models for simulation of complex hydrologic processes)

Objectives:

- Sediment Washoff (lumped subarea washoff)
- Sediment Washoff (gridded washoff)
- Water quality simulation
  - Surface Washoff
  - Total Nitrogen
  - Total Phosphorous
  - Fecal Coliform

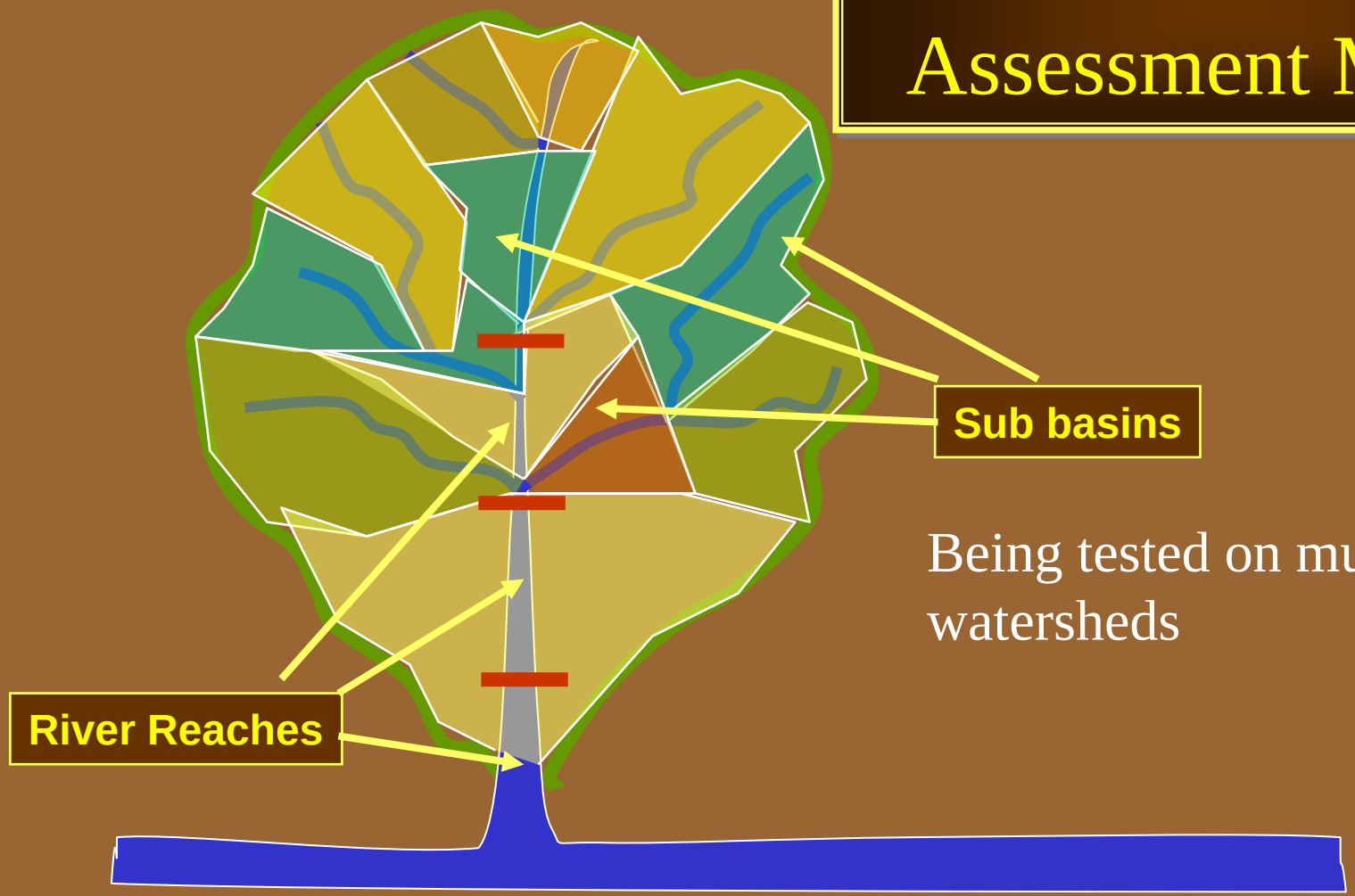
Sediment Transport for River Analysis

HEC-RAS

(software that uses a set of algorithms and guidance to analyze steady and unsteady flow and sediment transport)

- Through RSM
- This work will produce a new analysis algorithm for 1D sediment transport (movable bed calculations through scour and deposition).
- This algorithm will be included in HEC-RAS in order to provide a uniform set of tools within a single river analysis environment.

Sediment Impact Assessment Model



Being tested on multiple watersheds

Goal: Balance sediment system when sub-basin loadings change & predict resulting instabilities in downstream channel reaches.

Temperature & WQ
HEC-RAS

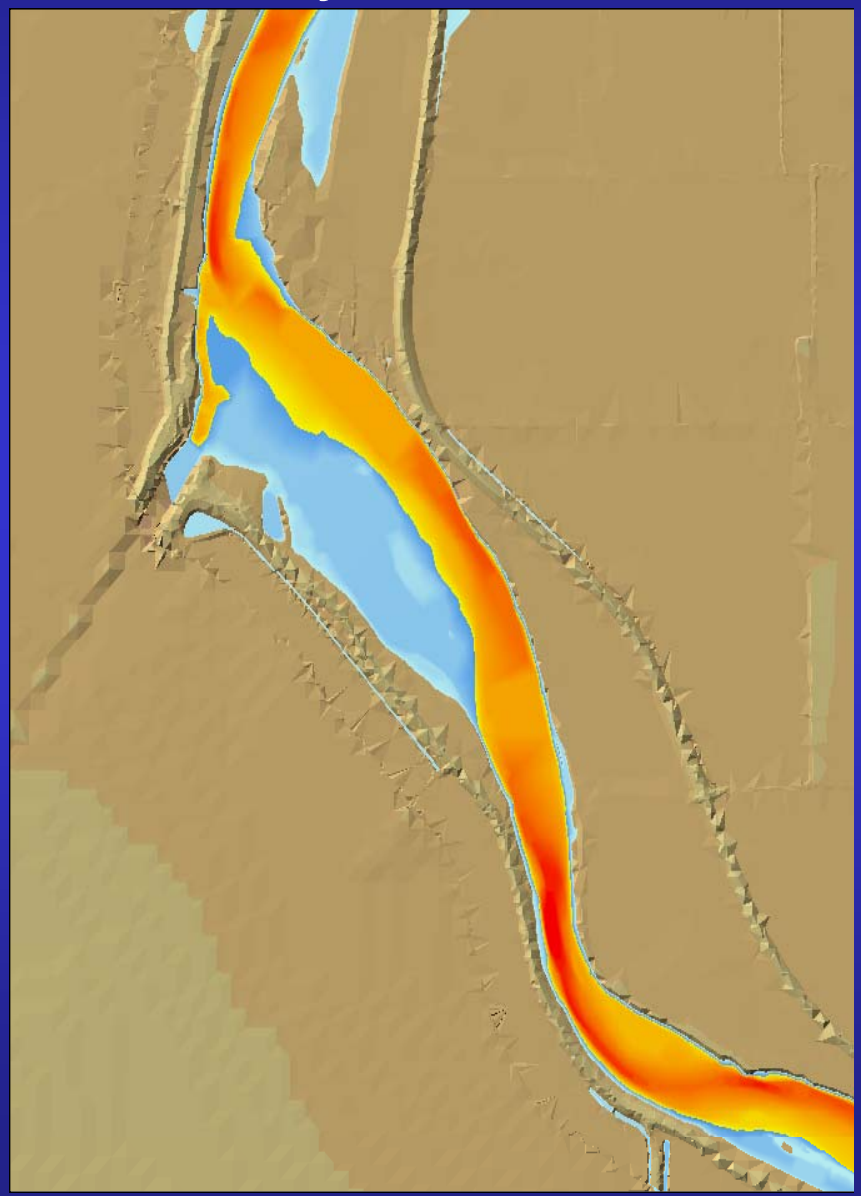
- Purpose: To add water temperature modeling to the HEC-RAS program
- Future Objective: To begin the process of adding water quality constituents to the HEC-RAS analysis process by incorporating the water quality computations of QUAL-RIV1 into HEC-RAS
  - Temperature
  - CBOD
  - ORG-N, NH3-N, NO3-N
  - ORG-P, ORTHO-P
  - Dissolved MN
  - Dissolved FE
  - DO
  - Coliform
  - Algae

Ecosystem Restoration Planning
HEC-EFM
(developed to perform system-wide ecosystem restoration planning)

- SWWRP Pillar: Ecosystem Assessment & Management
- Focus Area: Ecosystem Response and Forecasting
- Focus Area Goal: To develop innovative approaches for watershed assessments that can be implemented in the field and used for management decisions
- HEC Contributions:
- Application last year – Truckee River, McCarran Ranch Reach
- Application this year – Mill Creek, TN

System-Wide Integration

Ecosystem Assessment & Management Pillar



EFM Development

Landscape and Habitat Assessment Focus Area

- ✓revise User's Manual
- ✓improve indicator approach
- ✓enhance GIS coordination
- ✓Coordinate with ERDC's models
- ✓Initiate P-O-R approach

Reservoir Water Quality Enhancements
HEC-ResSim & CE-QUAL-W2

- ResSim a multi-objective reservoir simulation tool used for real-time operations & planning studies
- CE-QUAL-W2 a reservoir tool used for water quality and temperature studies
- Demand for water quality and temperature modeling for real-time and planning analyses
- Effort being considered in the Ecosystem Assessment & Management Pillar
- Looking to link both models rather than fund a major development effort
- Will provide in and downstream of the reservoir
  - Temperatures
  - Dissolved Oxygen
  - Other conservative constituents
  - Variable gate settings

Flow Prescription Tool
Reservoir Operations – Pulsinator
(software to improve interaction while defining ecosystem flow regimes)

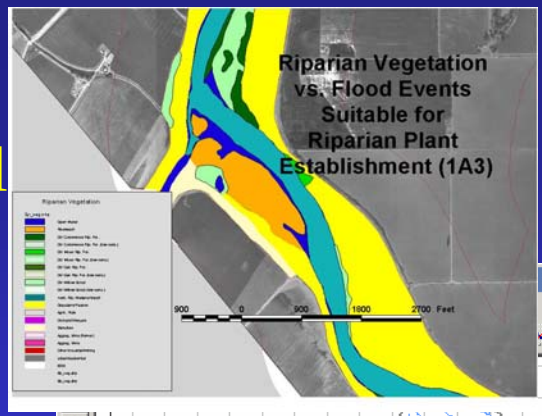
- Need identified as a direct result of the Corps and TNC's partnership on the Sustainable Rivers Project – Savannah River Comprehensive Study
- First piece of software jointly developed and financed through the SRP
- Will allow parties to:
  - Define wet, dry, or average flow years
  - script flow regimes to include flood, pulse, and base flows
  - Use with the EFM and ResSim to help make planning and operational decisions
  - Eventually could be used within ResSIM to make real-time operational decsions

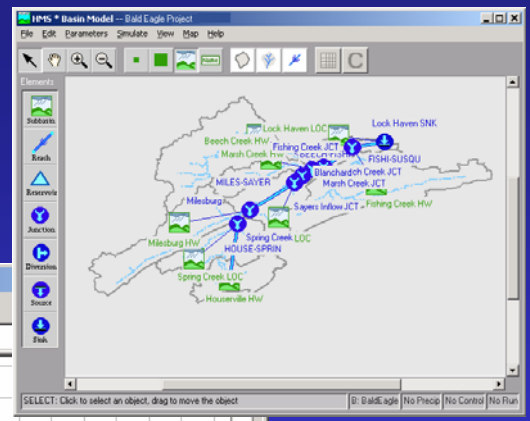
Integration of HEC Software for Watershed Studies

Watershed Analysis Tool - WAT

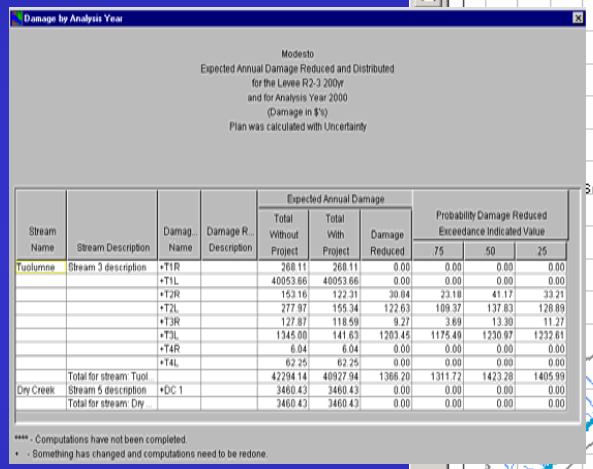
- Help districts perform watershed/system-wide studies
- By developing the capabilities needed to integrate the tools that are used by the districts during the analytical process
- It will improve coordination and communication across Project Delivery Teams
- Share data across models
- Involve modelers early in the study process
- Encourage a team approach

Environmental

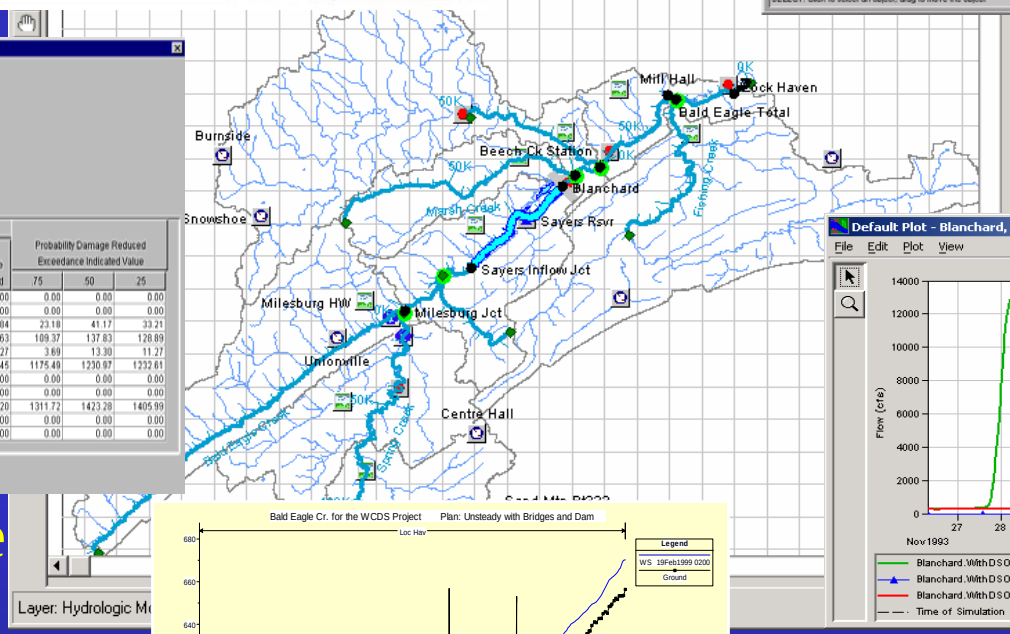


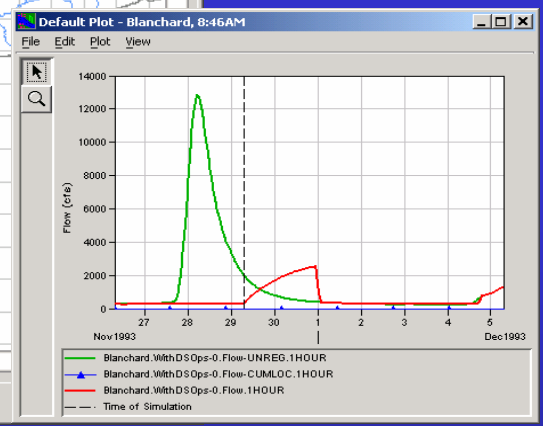


Hydrology



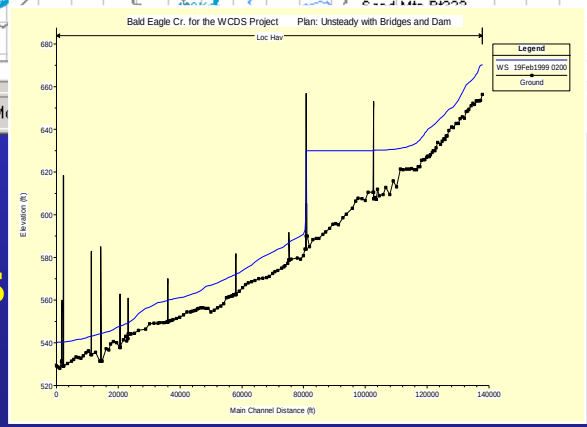
Flood Damage





Reservoir

Hydraulics

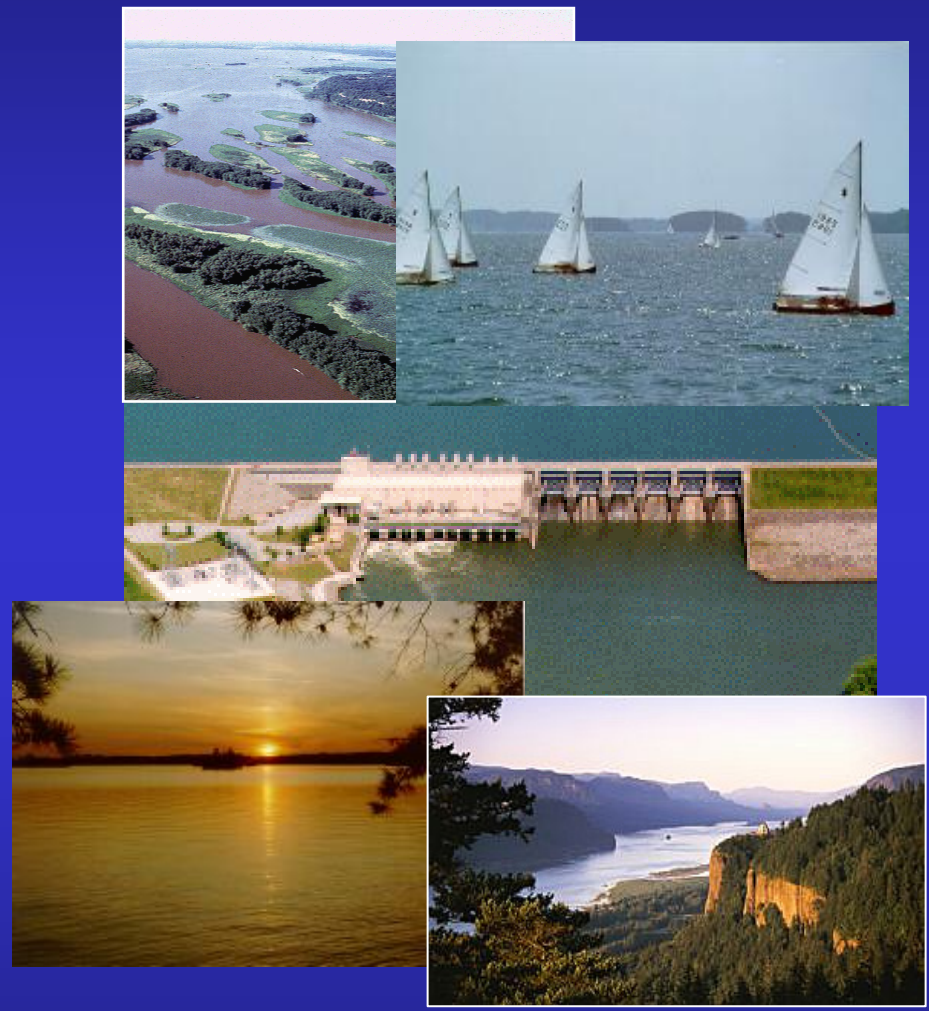


Water Operations Technical Support Program (WOTS)

Provide rapid direct technical assistance to CE projects in applying technology to solve water quality and other environmental problems

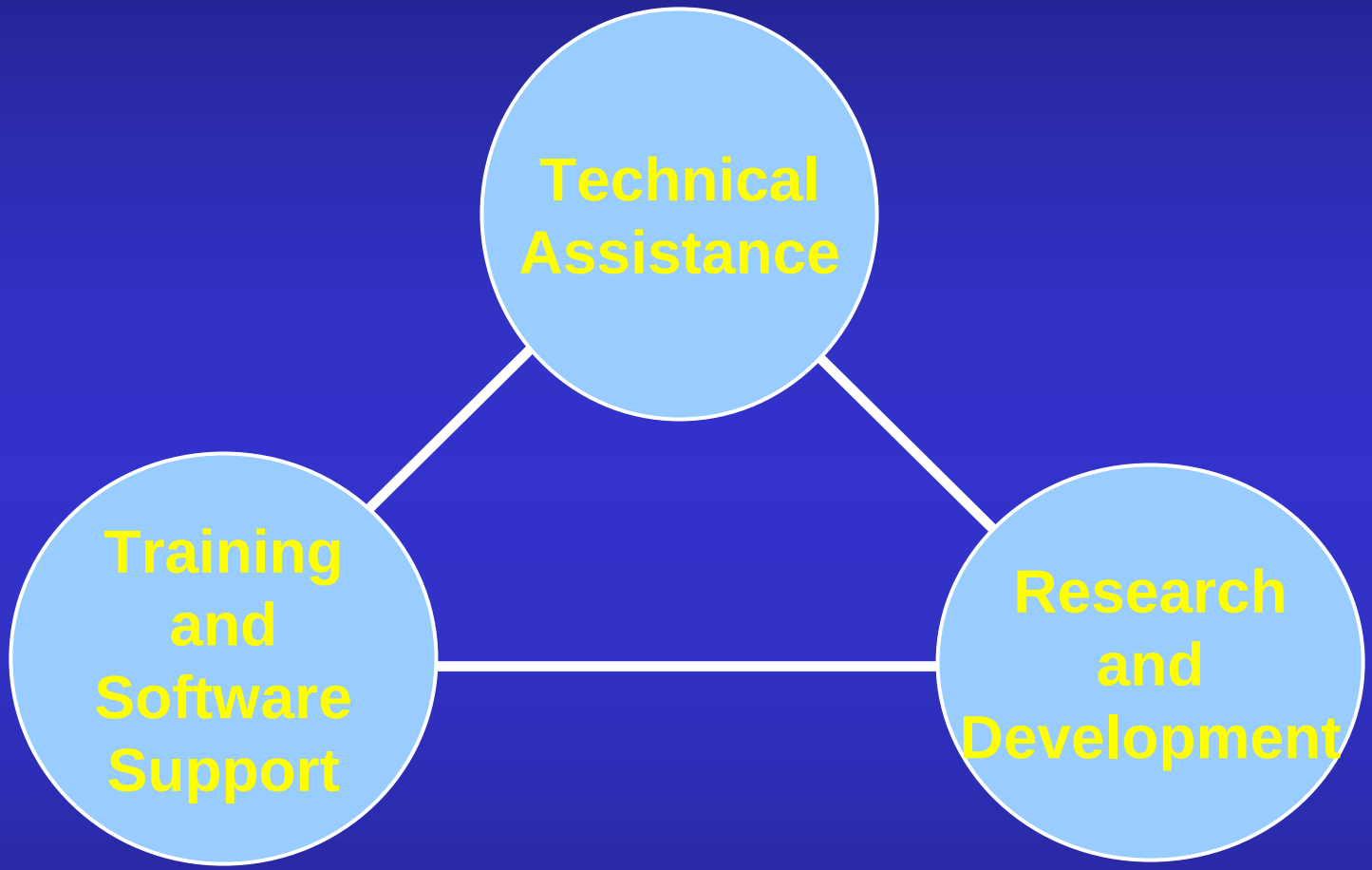
Assistance is provided at *no cost to the user*

Limited to 5 man-days, including travel



Web site – http://www.wes.army.mil/el/wots/wots.html

HEC's Continuing Roles



Center of expertise in hydrologic engineering and planning analysis executing a balanced program of technical assistance, special studies, training and research.