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WATER QUALITY MODELING RESEARCH

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LTG 3 Poster 02

Science Questions

What additions and updates to models are most needed for the TMDL process for priority stressors?

What combination of experiments, model development and testing is most effective at addressing the current needs for load allocation and restoration tools?

What science and technology is most promising for comprehensive evaluation of cost/benefit (economic) analysis and optimal BMP placement for whole watershed assessments over the long term?

How Research Addresses the Water Quality MYP Goals

Where do we want to go?

An active collaboration between researchers, model developers and model users nationwide

How far along are we?

ORD and Region IV partnership, Office of Water support for Center, and an Internet portal with supporting documentation

How does everything fit?

With a few exceptions (e.g., sediment nutrient flux and oxygen demand), ORD research is incorporated into the commonly used EPA models for the TMDL community of clients

Next Step?

Strengthen connection between ORD/Regional models and best management practices (BMPs) research for TMDLs

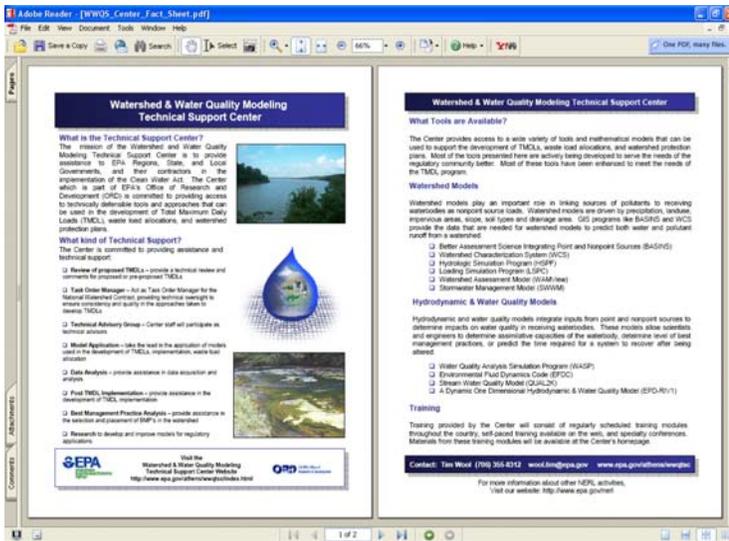
Research Objectives

Investigation, testing and application of state-of-the-science watershed and water quality simulation tools

- > Mercury biogeochemistry, transport and exposure processes
- > Aerobic and anaerobic denitrification in surface waters
- > Sediment nutrient flux and sediment oxygen demand
- > Best Management Practices (BMP) effectiveness
- > Nutrient processes in headwater streams (trace gases and stable isotopes)
- > Groundwater/surface water interactions

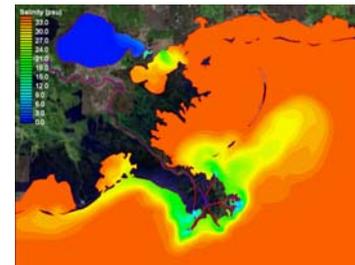
Research Methods & Collaboration

Process Research → Model Update and Evaluation → Technical Support



Research Results

Model Name	Last Updated	Model Type	2005 Downloads
Generalized Sediment Transport for Alluvial Rivers (GSTAR-1D)	Feb 2005	1-Dimensional cohesive/noncohesive sediment transport in low order streams.	NA
Watershed Characterization System (WCS)	Aug 2004	Add in component to EPA's BASIN Tool for doing watershed characterizations and reporting tools	310
Loading Simulation Program C++ (LSPC)	Dec 2004	Advanced version of the HSPF runoff module. Programmed in C++ for performance and larger watersheds	243
Watershed Assessment Model (WAMView)	Jul 2004	Grid based watershed model with GIS interface. Model is based upon GLEAMS	1102
One Dimensional Hydrodynamic/Water Quality Model (EPDRIV1)	Jan 2004	One dimensional hydrodynamic and water quality model for conventional pollutants and critical flow. Based upon the Corps of Engineers CE-QUAL-RIV1	786
Stream Water Quality Model (QUAL2K)	Dec 2004	Excel spreadsheet version of the EPA QUAL2E model. Modernized to include sediment diagenesis, periphyton, pH	9752
Environmental Fluid Dynamics Code (EFDC)	Oct 2003	Multi dimensional hydrodynamic and sediment transport model	859
WASP	Oct 2003	Multi pollutant, multi dimensional water quality model	11543
WhAEM/BAEM	Apr 2005	Ground-water modeling system; well to basin scale; capture zone design	7921
Visual Plumes	Dec 2005	Mixing zone and transport models for outfall design and assessment	6652



Interactions with Customers

Training Courses

- 5 Water Quality Modeling Course w/WASP
- 1 Hydrodynamic/Sediment Transport w/EFDC

Technical Reviews

- LA Harbor TMDL Scope of Work
- New Hampshire Estuary TMDL Development
- e-mail inquires (approximately 100/week)

How Research Contributes to Outcomes

Work collaboratively with Office of Water, Regions and their clients

- Technical Support
- > Model Development, Enhancement and Maintenance
- > Testing with Case Studies
- Training
- Technical Guidance
- Nutrient Criteria Implementation

Connection of the critical feedback loop from the model users to those who update and maintain the science that underpins regulation