**≈EPA** United States
Environmental Protection Agency

LINKING WATER QUALITY AND AQUATIC LIFE WITH AQUATOX 3.2

AQUATOX is an ecosystem simulation model that predicts the environmental fate of pollutants, such as excess nutrients and organic chemicals, and their effects on aquatic ecosystems, including fish, invertebrates, and aquatic plants. AQUATOX has been used across the US and the world in a wide variety of ecological risk assessments. EPA has released AQUATOX Release 3.2, which extends the existing AQUATOX estuarine version to include improved capabilities for situations encountered in the nearshore marine environment. In addition, the graphical user interface was updated and modernized to add capabilities and to increase user-friendliness.

Background

One of the biggest challenges to protecting or restoring our nation's waters is adequately understanding the relationships between the environment and the organisms that live there. Ecosystems are complex, with natural variations over time, and multiple interactions among components. The health of biological communities in many water bodies is impaired, but the causes of the impairment may not be obvious due to numerous environmental stressors. It is difficult to predict how the aquatic community will respond to changes in pollutants or environmental conditions using simple methods of analysis, especially if those methods address only one stressor at a time. A complex simulation model like AQUATOX may be more effective.
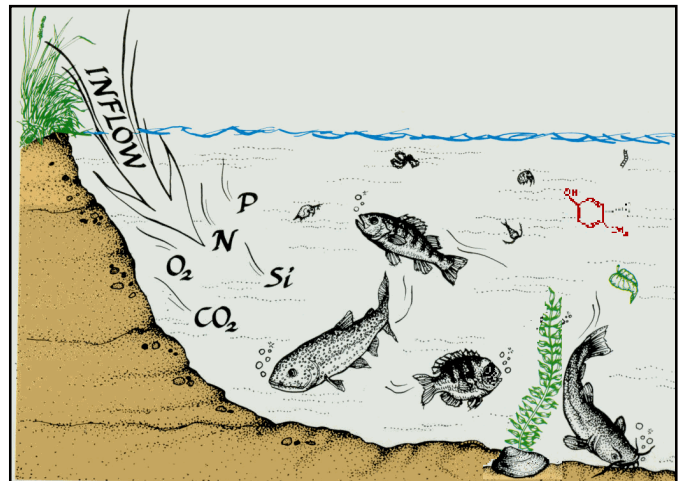

About AQUATOX

- Simulation model for aquatic ecosystems and impacts on aquatic organisms
    - Streams, rivers, lakes, reservoirs, estuaries
    - Effects on algae, plants, invertebrates, and fish
- Predicts responses of aquatic life to multiple stressors
    - Nutrients, organic loadings, sediments, organic chemicals, and temperature
    - Bioaccumulation of organic chemicals
- Flexible and versatile
    - General or site-specific application
    - Can model just the species and scenarios you need to understand
    - Spatial options for linked segments and vertical stratification
    - Contains sophisticated uncertainty and sensitivity analysis tools
    - Includes many example studies and data libraries
- PC-based, available at no cost on EPA web site
- Open source software
- User-friendly interface, with built-in Help files to lead users through required model input

Applications

AQUATOX can be used to better understand the processes relating the chemical and physical environment to the biological community. You can use AQUATOX to:
- Develop and evaluate numeric nutrient targets based on desired biological endpoints.
- Evaluate which of several stressors is causing observed biological impairment.
- Predict effects of pesticides and other toxic substances on aquatic life.
- Predict recovery of ecosystems with reduced nutrient loading.
- Predict effects of land use on aquatic life by linking to watershed models.
- Estimate time to recovery of fish tissues to safe levels after reducing pollutant loads.

AQUATOX links water quality to biological endpoints
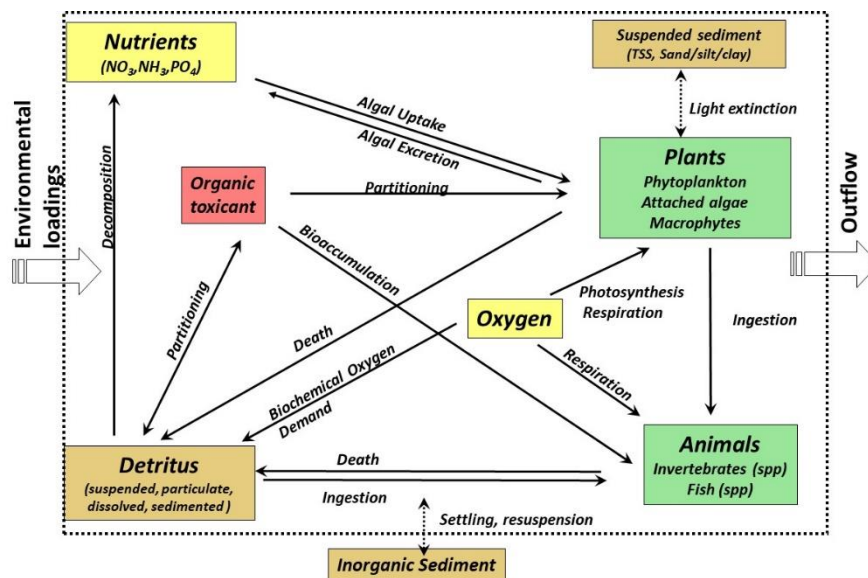
What's New

AQUATOX Release 3.2 contains many new enhancements including:
- Additional equations to model the physical complexity of oyster reefs and the marsh-edge environment
- The capability to model size-classes of oysters and crabs within the model
- New invertebrate-modeling capabilities including allometric bioenergetics equations and refuge from predation through burrowing
- Reorganized animal guilds to better represent marine-biology conventions, the guilds used by AQUATOX to characterize these state variables have been reorganized.
- A modernized database management system that now uses SQLite databases
- Capability to write all model inputs and outputs in ASCII format
- Addition of a command-line version option, which allows users to execute and manipulate the model using a DOS command prompt or batch file.

Additional information

Additional information on AQUATOX is available at https://www.epa.gov/ceam/aquatox You may also contact Brenda Rashleigh in the EPA National Health and Environmental Effects Laboratory at Rashleigh.Brenda@epa.gov or 401-782-3014.