

Lower Boise River  
AQUATOX Model Primer

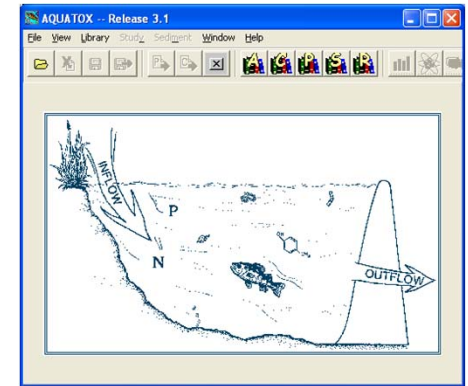
September 2013

# Introduction

- An AQUATOX model of the lower Boise River (LBR) has been created
  - 13 Segments
- Model has been updated with 2012 through April 2013 data
- These slides provide a summary of the associated model files and use related to the model
- This model is consider representative but not fully calibrated
- This model is publically available for comment

# AQUATOX MODEL

- Requires software
- Use Release 3.1
- <http://water.epa.gov/scitech/datait/models/aquatox/index.cfm>



**AQUATOX - Linking water quality and aquatic life**

AQUATOX is a simulation model for aquatic systems. AQUATOX predicts the fate of various pollutants, such as nutrients and organic chemicals, and their effects on the ecosystem, including fish, invertebrates, and aquatic plants. This model is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments for aquatic ecosystems. Although incorporating constructs from classic ecosystem and chemodynamic models, AQUATOX was developed from the beginning as an applied model for use by environmental analysts.

Release 3.1 of AQUATOX is now available. Release 3.1 contains several enhancements over previous releases that improve the model's interface and utility. For example, the sediment diagenesis model has a "steady-state" mode that increases model speed dramatically. Other categories of refinements include floating-plants refinements, bioaccumulation and toxicity modeling improvements, and improved sensitivity and uncertainty analyses.

**AQUATOX**  
Release 3.1  
(Build Number 3.1-bld.050)

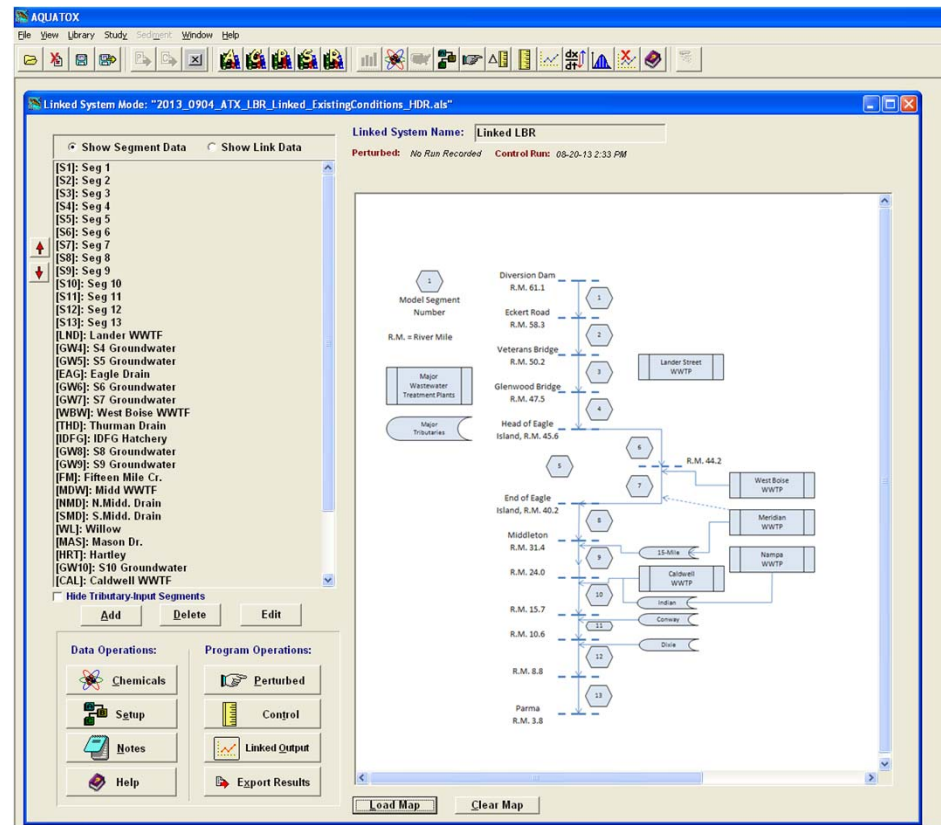
Richard A. Park and Jonathan S. Clough  
Eco Modeling 2012

This software and associated files are distributed "as is" without any warranties of performance or fitness for any particular purpose. No warranties are expressed or implied.

Source Code License Exit

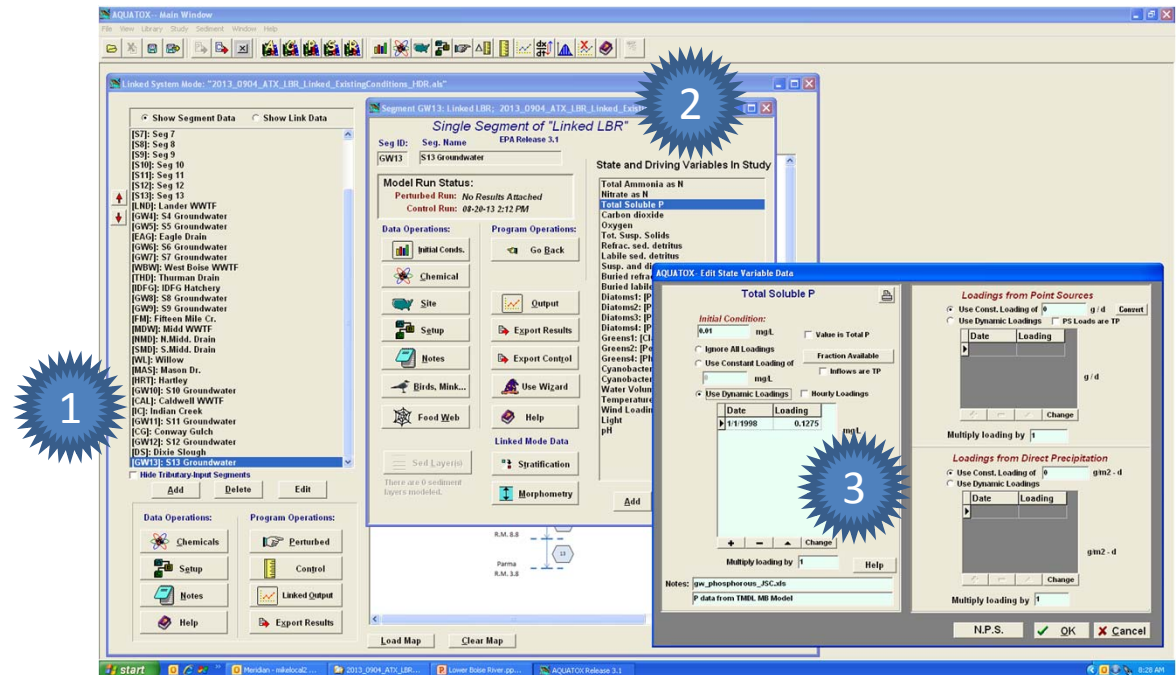
# LBR AQUATOX MODEL

- The model file is
  - 2013\_0904\_ATX\_LBR\_Linked\_ExistingConditions\_HDR.als
- Open file in AQUATOX
- User may
  - Change an inputs
  - Simulate model (Control button)
  - Look at output graphs (Linked Output button)
  - Export data (Export Results button)



# EXAMPLE INPUT CHANGE

- Change groundwater phosphorus concentration
  - 1) Select Input
  - 2) Select constituent
  - 3) Edit concentration



# DOCUMENTATION REQUEST

- If you intend to share a model simulation and results, please follow the following guidelines
  - Use the naming protocol convention
    - yyyy\_mmdd\_ATX\_LBR\_FileDescriptor\_Condition or Scenario\_User
    - Where:
      - yyyy\_mmdd = year, month, and day the file was created (e.g. 2012\_0625.)
      - ATX = AQUATOX
      - LBR = Lower Boise River
      - FileDescriptor = description of file (e.g. Linked, Results, Import, etc.)
      - Condition = the condition depicted in the analyses (e.g., ExistingCondition, etc.)
      - Scenario = the scenario depicted in the analyses (e.g. Points350 = point sources at 350 ug/l,, NonPoint100 = nonpoint sources at 100 ug/l, etc.)
      - User = Agency, consultant, or other identifying name
  - Document what changes were made to the model
  - Provide the model file
  - Provide associated spreadsheets used
  - Document processing of results and findings

# ALTERNATIVE METHOD TO CHANGING MODEL INPUTS

- Use the import spreadsheet
  - 2103\_0904\_ATX\_LBR\_Linked\_EC\_Import\_HDR.xls
- File contains
  - Five tabs with initial conditions, flows, water quality, groundwater, and observed data
  - Times series and associated data
- Load the data into the \*.als file by using Study, Add Timeseries from Excel

# IMPORT SPREADSHEET

- Do NOT change layout of the tabs and data
  - LBR Template: Initial Conditions, Flows, WQ
  - LBR Template (2): Additional Water Quality
  - LBR Template (3): Forcing Data
  - Groundwater: Flow and Water Quality
  - Observed Import: Monitoring Data shown on Graphs
- Various data sources used, see DEQ documentation, primarily USGS data
- Time series of data may be edited (changed or added to) and then read into the model



# EXAMPLE INTUT CHANGE USING IMPORT SPREADSHEET

- Change groundwater phosphorus concentration
  - 1) Locate the constituent
  - 2) Find the location
  - 3) Edit concentration

The screenshot shows an Excel spreadsheet with the following data structure:

Date	TSP (mg/L)	Date	TSP (mg/L)	Date	TSP (mg/L)
01/01/12	0.14	01/01/12	0.14	01/01/12	0.14
01/02/12	0.14	01/02/12	0.14	01/02/12	0.14
01/03/12	0.14	01/03/12	0.14	01/03/12	0.14
01/04/12	0.14	01/04/12	0.14	01/04/12	0.14
01/05/12	0.14	01/05/12	0.14	01/05/12	0.14
01/06/12	0.14	01/06/12	0.14	01/06/12	0.14
01/07/12	0.14	01/07/12	0.14	01/07/12	0.14
01/08/12	0.14	01/08/12	0.14	01/08/12	0.14
01/09/12	0.14	01/09/12	0.14	01/09/12	0.14
01/10/12	0.14	01/10/12	0.14	01/10/12	0.14
01/11/12	0.14	01/11/12	0.14	01/11/12	0.14
01/12/12	0.14	01/12/12	0.14	01/12/12	0.14
01/13/12	0.14	01/13/12	0.14	01/13/12	0.14
01/14/12	0.14	01/14/12	0.14	01/14/12	0.14
01/15/12	0.14	01/15/12	0.14	01/15/12	0.14
01/16/12	0.14	01/16/12	0.14	01/16/12	0.14
01/17/12	0.13	01/17/12	0.13	01/17/12	0.13
01/18/12	0.13	01/18/12	0.13	01/18/12	0.13
01/19/12	0.13	01/19/12	0.13	01/19/12	0.13
01/20/12	0.13	01/20/12	0.13	01/20/12	0.13
01/21/12	0.13	01/21/12	0.13	01/21/12	0.13
01/22/12	0.13	01/22/12	0.13	01/22/12	0.13
01/23/12	0.13	01/23/12	0.13	01/23/12	0.13
01/24/12	0.13	01/24/12	0.13	01/24/12	0.13
01/25/12	0.13	01/25/12	0.13	01/25/12	0.13
01/26/12	0.13	01/26/12	0.13	01/26/12	0.13
01/27/12	0.13	01/27/12	0.13	01/27/12	0.13
01/28/12	0.13	01/28/12	0.13	01/28/12	0.13
01/29/12	0.13	01/29/12	0.13	01/29/12	0.13
01/30/12	0.13	01/30/12	0.13	01/30/12	0.13
01/31/12	0.13	01/31/12	0.13	01/31/12	0.13
02/01/12	0.13	02/01/12	0.13	02/01/12	0.13
02/02/12	0.13	02/02/12	0.13	02/02/12	0.13
02/03/12	0.13	02/03/12	0.13	02/03/12	0.13
02/04/12	0.13	02/04/12	0.13	02/04/12	0.13
02/05/12	0.13	02/05/12	0.13	02/05/12	0.13
02/06/12	0.13	02/06/12	0.13	02/06/12	0.13
02/07/12	0.13	02/07/12	0.13	02/07/12	0.13

# CHARTS OF IMPORT DATA

- Separate spreadsheet with charts of inputs
  - 2013\_0904\_ATX\_LBR\_Linked\_EC\_InputGraphs\_HDR.xlsx
- Useful for visualizing the data
- Organization by segment
  - Inflows
  - Forcing data
  - Tributaries and drains
  - Groundwater
  - Withdrawal (inflow to next segment)

# FLOW BALANCE

- AQUATOX uses an external flow balance
  - 2013\_0904\_ATX\_LBR\_Linked\_EC\_FlowSetup\_HDR.xlsx
- File contains
  - Six tabs including flow data (cfs), edits (cfs) and conversion ready for AQUATOX (cms)
- Changes to the flow balance must then be copied into the import spreadsheet and then uploaded into AQUATOX
  - Use caution if editing the flow balance!
    - Interrelated equations are complex
    - Not simple addition flows, routing included

# MODEL RESULTS STATISTICS

- Separate spreadsheet to calculate statistics and provide graphs
  - 2013\_0904\_ATX\_LBR\_Linked\_EC\_OutputCharts\_HDR.xlsx
- Use Export data button in AQUATOX
  - Add constituents
    - NH3 & NH4+
    - NO3
    - Tot. Sol. P
    - Oxygen
    - Phyto Chlorophyll
    - Peri. Chlorophyll
    - TP
    - CBOD5
  - Other constituents may be selected but will not fit into the preformatted spreadsheet!
  - Export Results spreadsheet is basically an archive file used in the OutputCharts
- Cut and paste results into first two tabs
- Statistics on tab Targets
- Charts on tab Graphs