

Quick Guide for the CE-QUAL-W2 Post Processor W2_Post

July 2012 Updates June 2016

W2_Post

A post-processor for CE-QUAL-W2 Version3/4 that provides the user with a broad range of visualization and analyses of the model results. W2_Post provides for rapid visualization and assessment of W2 model results. W2_Post uses a binary file generated by the CE-QUAL-W2 (i.e. the "W2L" file extension) for all of its model data analysis. No need to output multiple types of output from W2. The post-processor provides extensive model calibration / measured data comparison tools and statistics. The following are summaries of each major type of post-processing available.

- 1) Model Grid Visualizations
 - a) Plan View
 - i) Normal View (i.e. using model input angles and widths)
 - ii) Simple View (simplified block view of grid)
 - iii) Line View
 - b) Longitudinal Profiles by Branch
 - c) Segment Profiles
 - d) Cells colored by connection and type
 - e) Google Earth KML, metafile and bitmap outputs
- 2) Animations
 - a) Animations time interpolate model stored results (in the W2L file) to user specified interval to speed up/slow down animations.
 - b) Compare up to four separate model runs within a single animation. Mix and match parameters.
 - c) Up to four parameters from a single run can be animated.
 - d) User control of min/max color ranges.
 - e) User control of axis formats and types (i.e. segment/layer labels or distance/elevation units)
- 3) Vertical Profiles
 - a) View profile of any segment at any time (@ W2L intervals) for any parameter.
 - b) Automatic comparison of model and measured data with various statistics.
 - c) Various output formats.
- 4) Contours
 - a) View any branch longitudinal profile for any constituent.
 - b) Rapidly scroll through time.
 - c) Color filled and/or line contours.
 - d) Branch/Longitudinal Profile calibration statistics.
 - e) Various output formats.
- 5) Time Series
 - a) Point and click interface to select cells to plot.
 - b) Get a time series of any cell (if inundated) for any parameters for all or some of the modeled times.
 - c) Wide range of graph formatting options.

- d) Various output options.
- 6) Velocity Vectors
 - a) View 2D velocity patterns for any branch/longitudinal profile.
 - b) Rapidly scroll through time.
 - c) Various arrows formatting options.
 - d) Various output formats.
- 7) 2D Plan View
 - a) View 2D plan view concentrations at:
 - i) A specified layer
 - ii) Top active layer for each segment
 - iii) Volume weighted average for each segment
 - b) Rapidly scroll through time.
 - c) Use real world coordinates
 - d) If the model is using UTM, then Google Earth KML export option is available

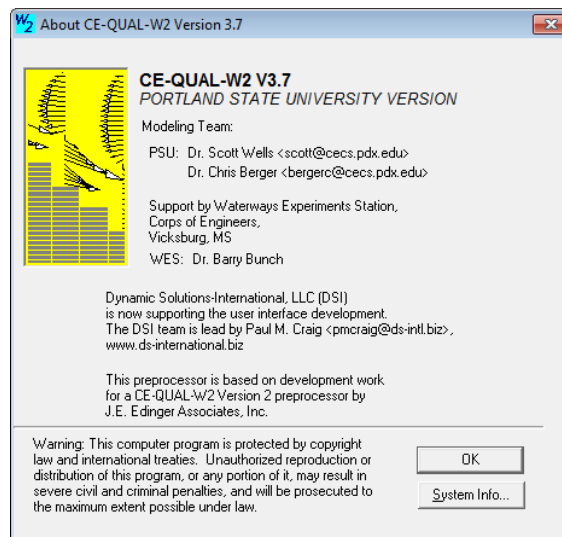
W2_Tool/W2_Post Specific Files

W2P The “W2P” file is the extension used by the W2_Tool utilities to define and retain non-model specific information and user interface settings. This file is optional for W2_Post, however, it is strongly recommended to save your project and use it for loading your projects.

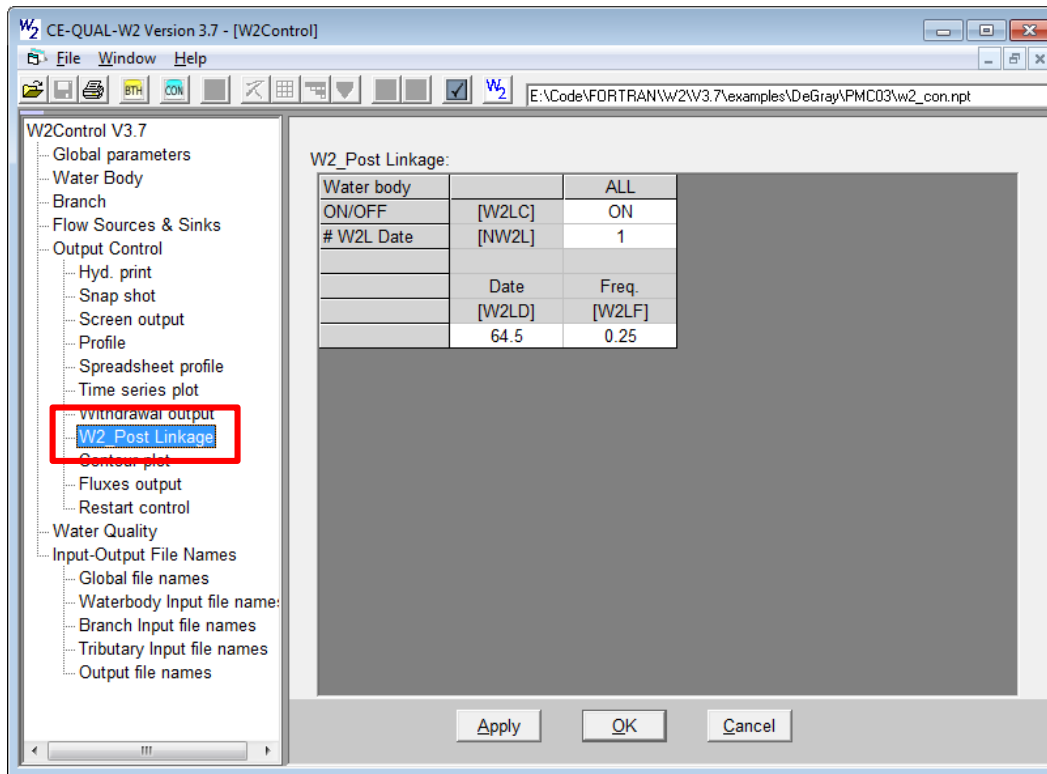
W2L A binary file that W2 creates during the model run. The W2L file contains all of the data necessary to post-process the model results. However, it does not contain the scales and formatting that, once set, streamlines the post-processing.

Setting up the W2_Post Linkage

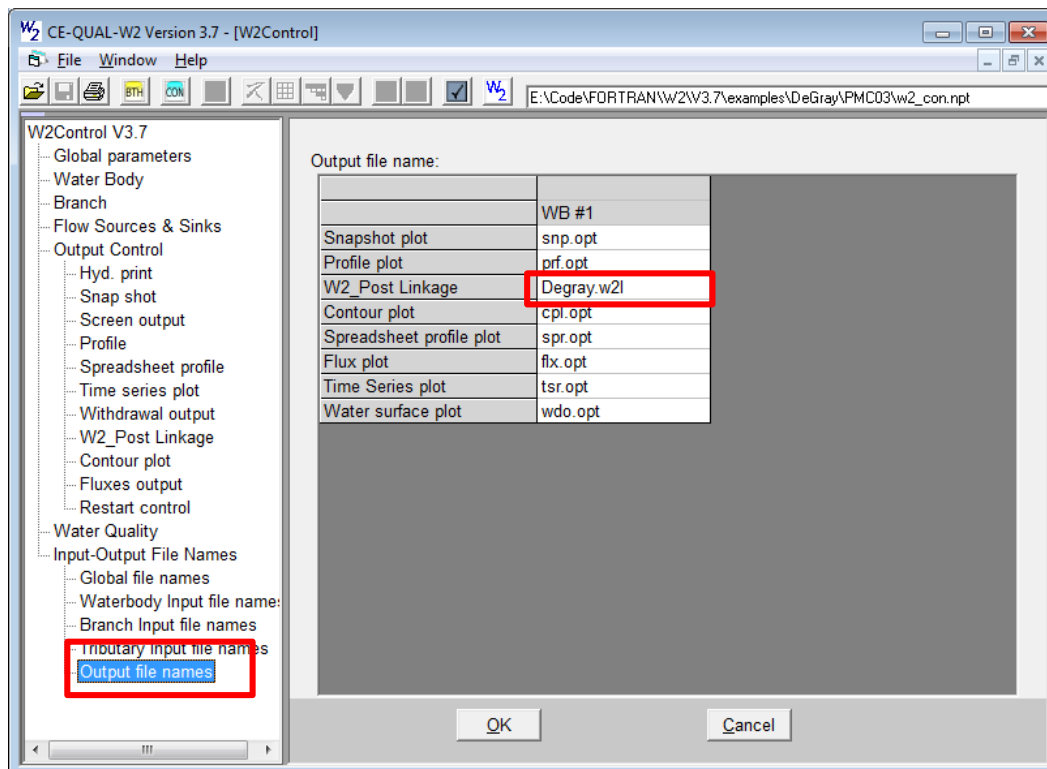
- Run the W2Control preprocessor for W2.



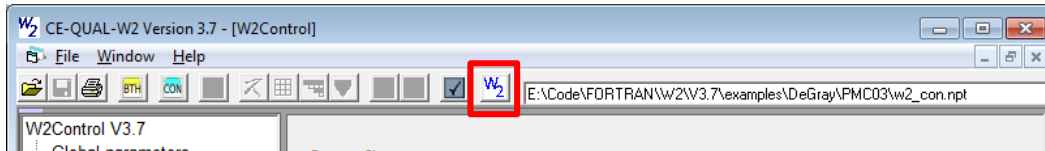
- Turn on the W2_Post Linkage and define the snapshot timing.



- Define the W2L file name

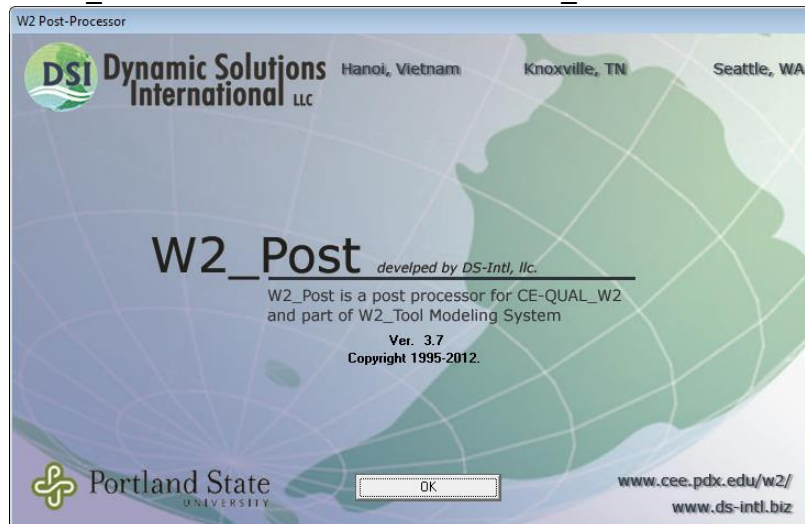


- Save the model, then
- Run the Model

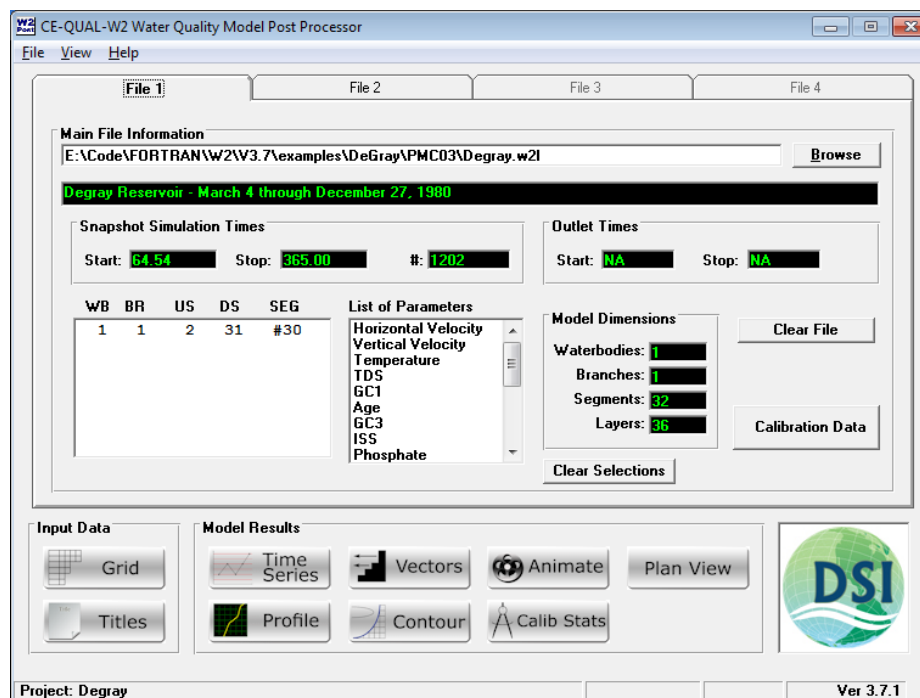


Run W2_Post

- The default W2_Post executable file name: W2Tool_Post3.exe



- The W2_Post main form:



Degray Reservoir Example

CE-QUAL-W2 Water Quality Model Post Processor

File View Help

File 1 File 2 File 3 File 4

Main File Information

E:\Code\FORTRAN\W2\V3.7\examples\DeGray\PMC03\Degray.w2l Browse

Degray Reservoir - March 4 through December 27, 1980

Snapshot Simulation Times

Start: 64.54 Stop: 365.00 #: 1202

Outlet Times

Start: NA Stop: NA

| WB | BR | US | DS | SEG |
|----|----|----|----|-----|
| 1 | 1 | 2 | 31 | #30 |

List of Parameters

- Horizontal Velocity
- Vertical Velocity
- Temperature
- TDS
- GC1
- Ame
- GC3
- ISS
- Phosphate

Model Dimensions

Waterbodies: 1

Branches: 1

Segments: 32

Layers: 36

Clear File

Calibration Data

Clear Selections

Input Data

Grid

Titles

Model Results

Time Series

Vectors


Animate

Plan View

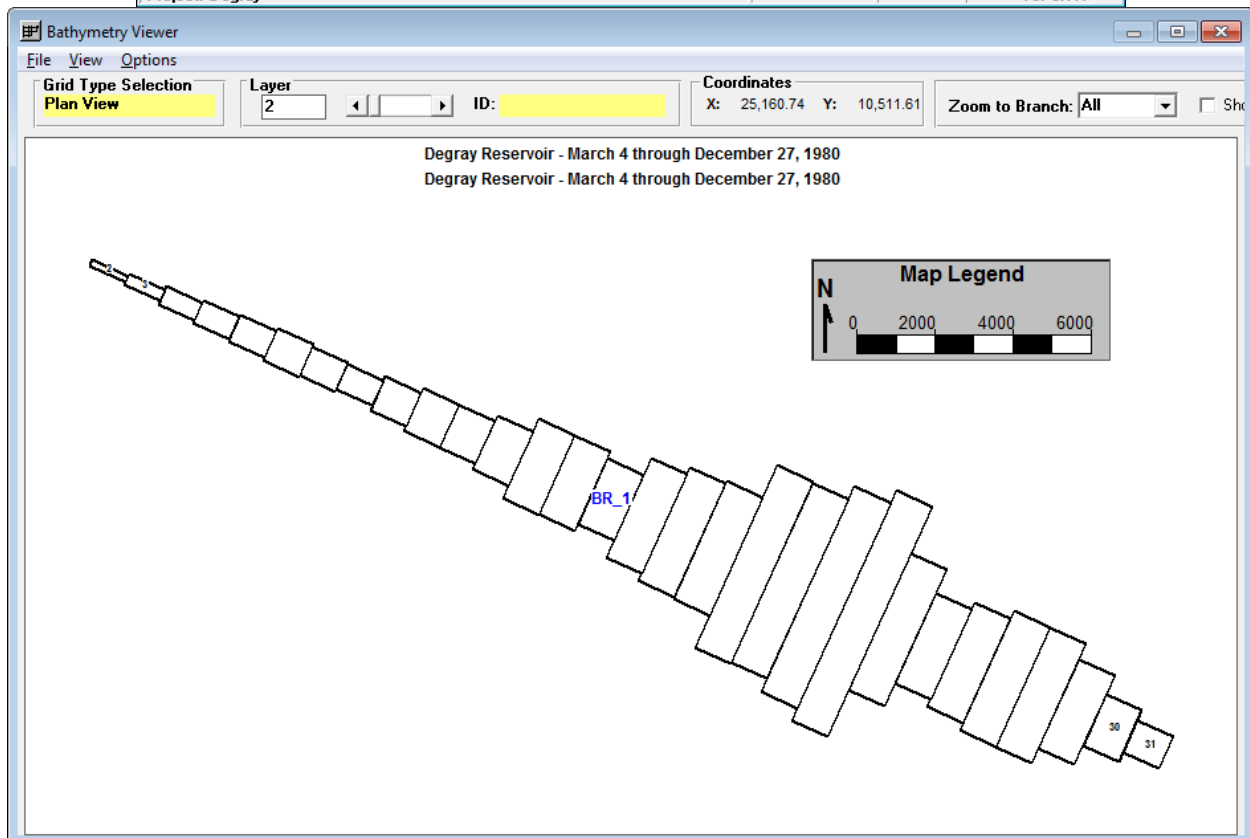
Profile

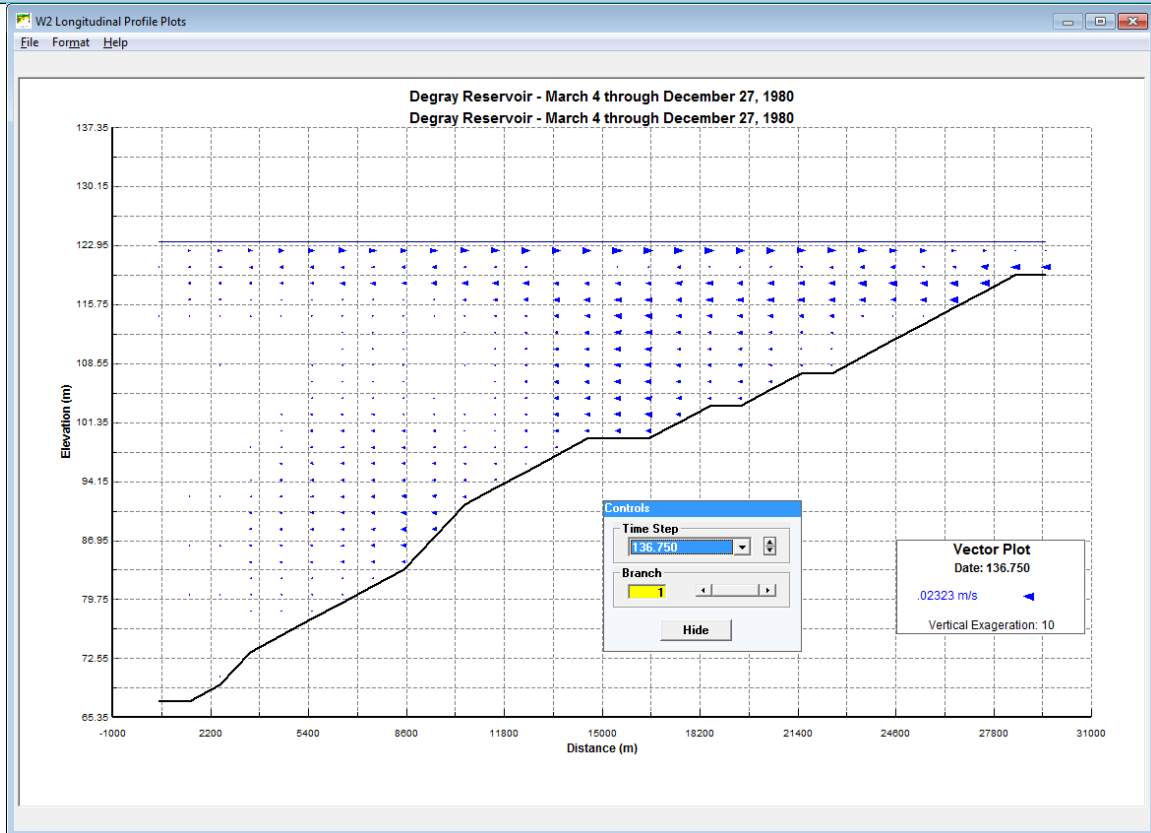
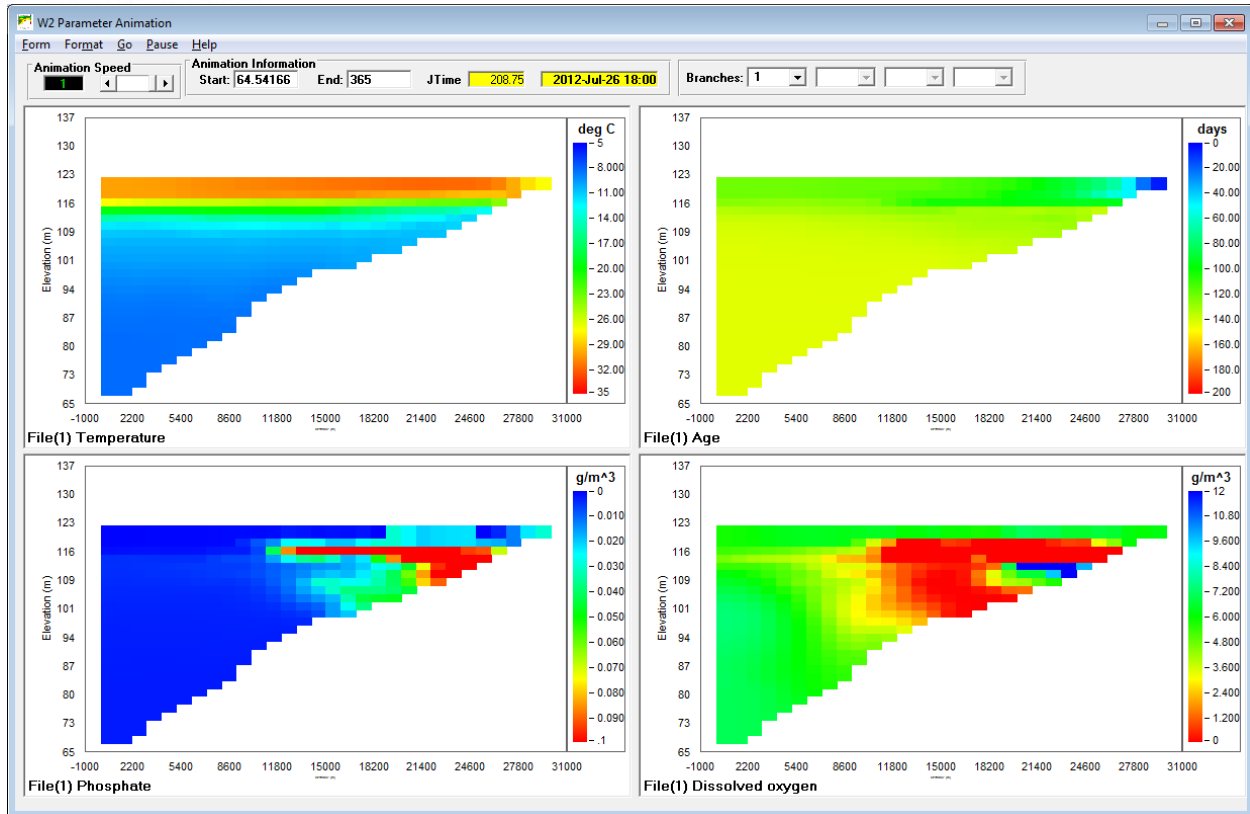
Contour

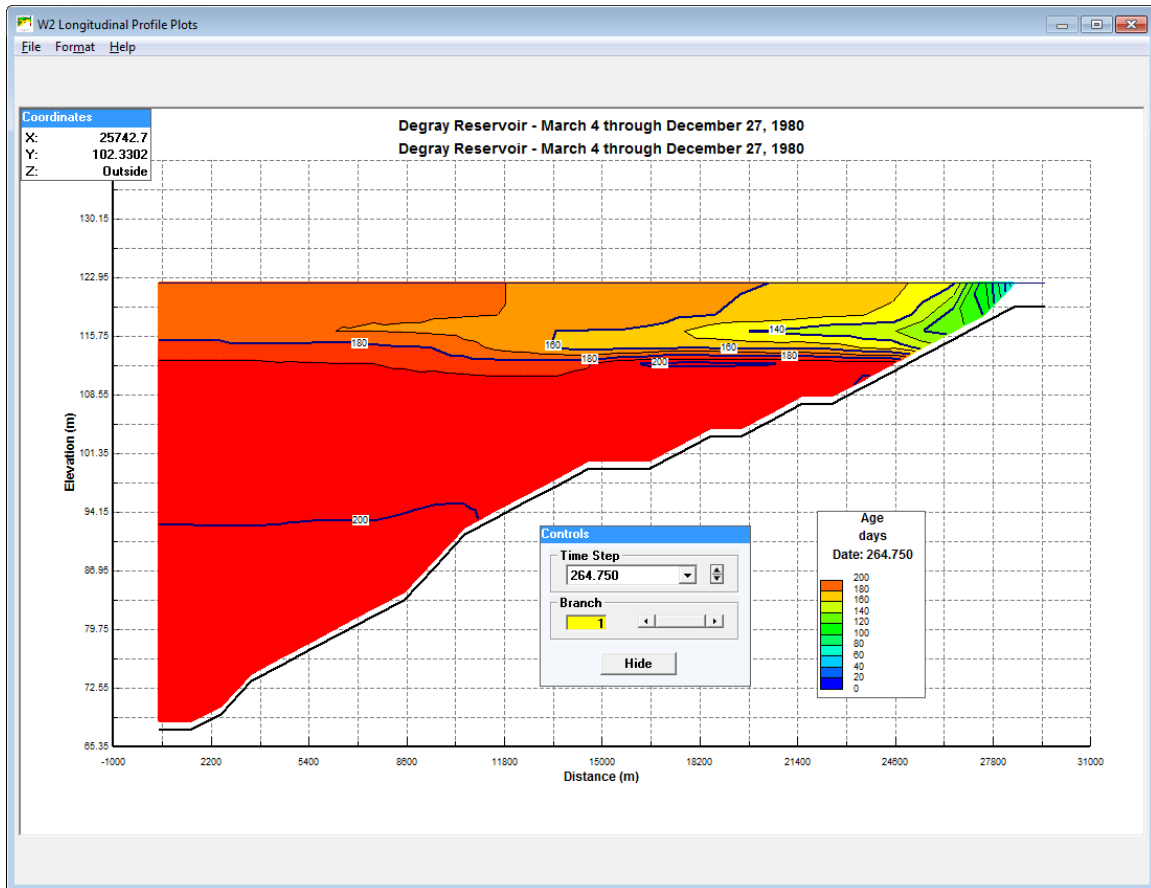
Calib Stats



Project: Degray Ver 3.7.1







Roosevelt Reservoir Example

CE-QUAL-W2 Water Quality Model Post Processor

File View Help

File 1 File 2 File 3 File 4

Main File Information

E:\Code\FORTRAN\W2\V3.7\examples\Roosevelt\PMC02\Roosevelt.w2l Browse

Version 3.7 Lake Roosevelt Model

Snapshot Simulation Times

Start: 1.25 Stop: 365.00 #: 1455

Outlet Times

Start: NA Stop: NA

| WB | BR | US | DS | SEG |
|----|----|----|----|-----|
| 1 | 1 | 2 | 19 | #18 |
| 2 | 2 | 22 | 31 | #10 |
| 3 | 3 | 34 | 43 | #10 |
| 4 | 4 | 46 | 55 | #10 |
| 5 | 5 | 58 | 67 | #10 |
| 6 | 6 | 70 | 79 | #10 |
| 7 | 7 | 82 | 91 | #10 |

List of Parameters

Horizontal Velocity
Vertical Velocity
Temperature
Age

Model Dimensions

Waterbodies: 25
Branches: 25
Segments: 583
Layers: 76

Clear File

Calibration Data


Clear Selections

Input Data

Grid Titles

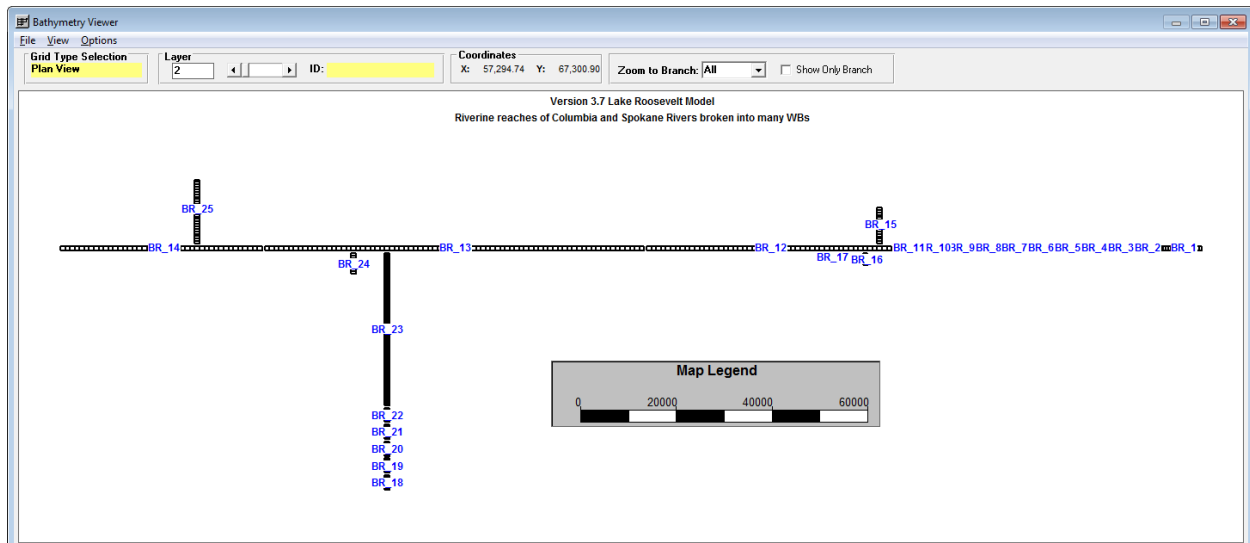
Model Results

Time Series Vectors Animate Plan View
Profile Contour Calib Stats

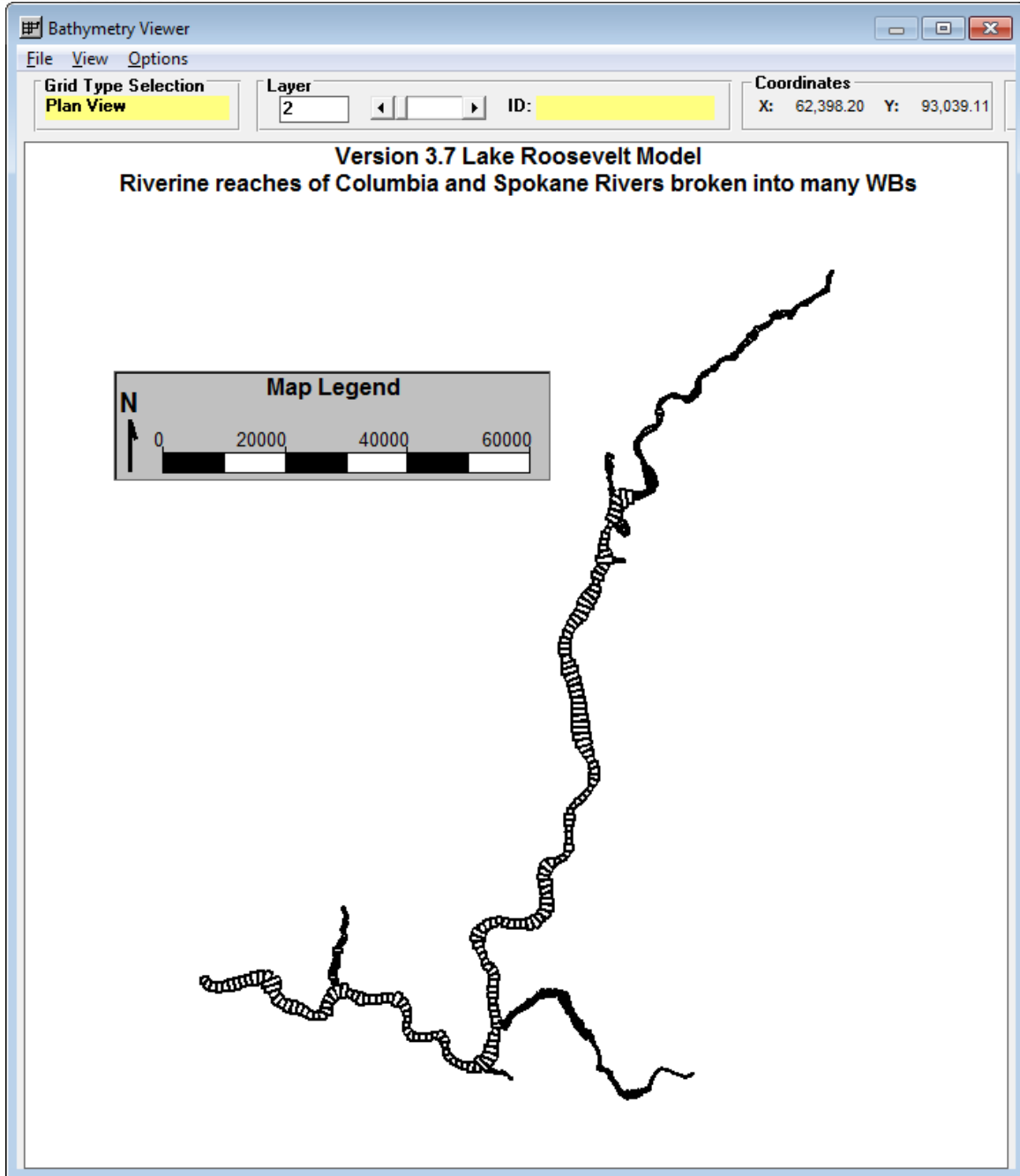


Project: Roosevelt Ver 3.7.1

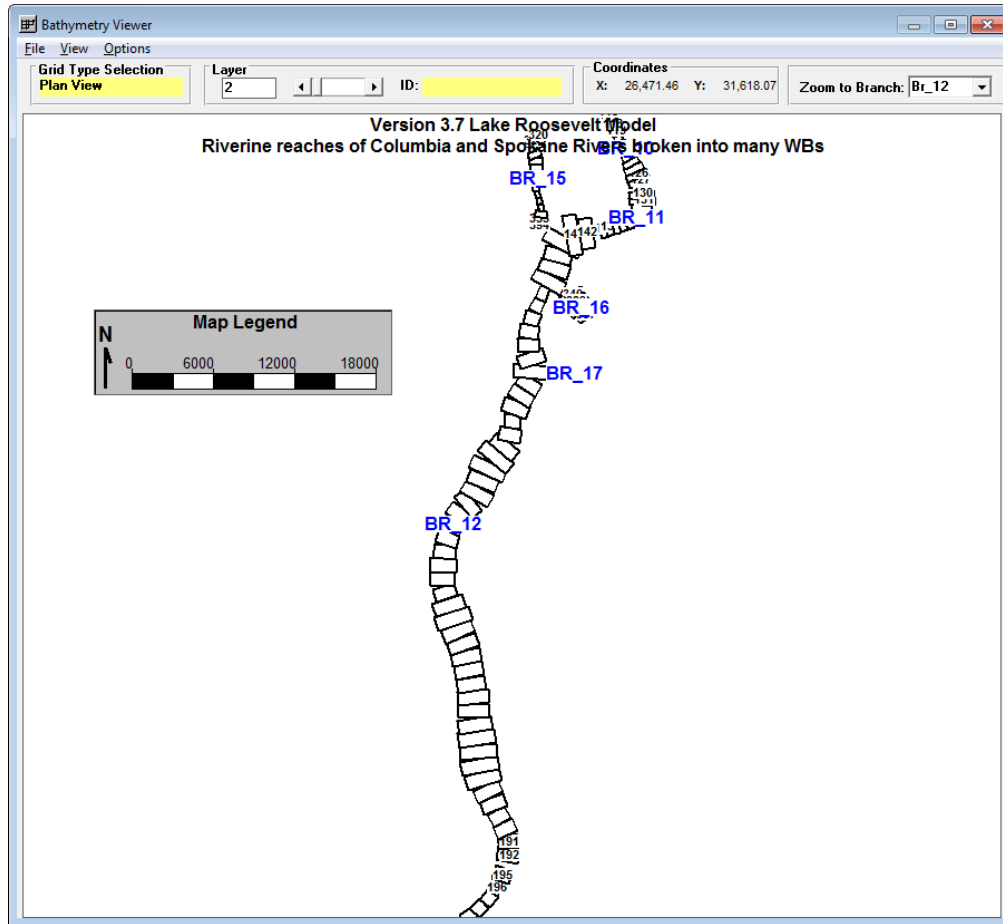
Grid – Plan View – Block View



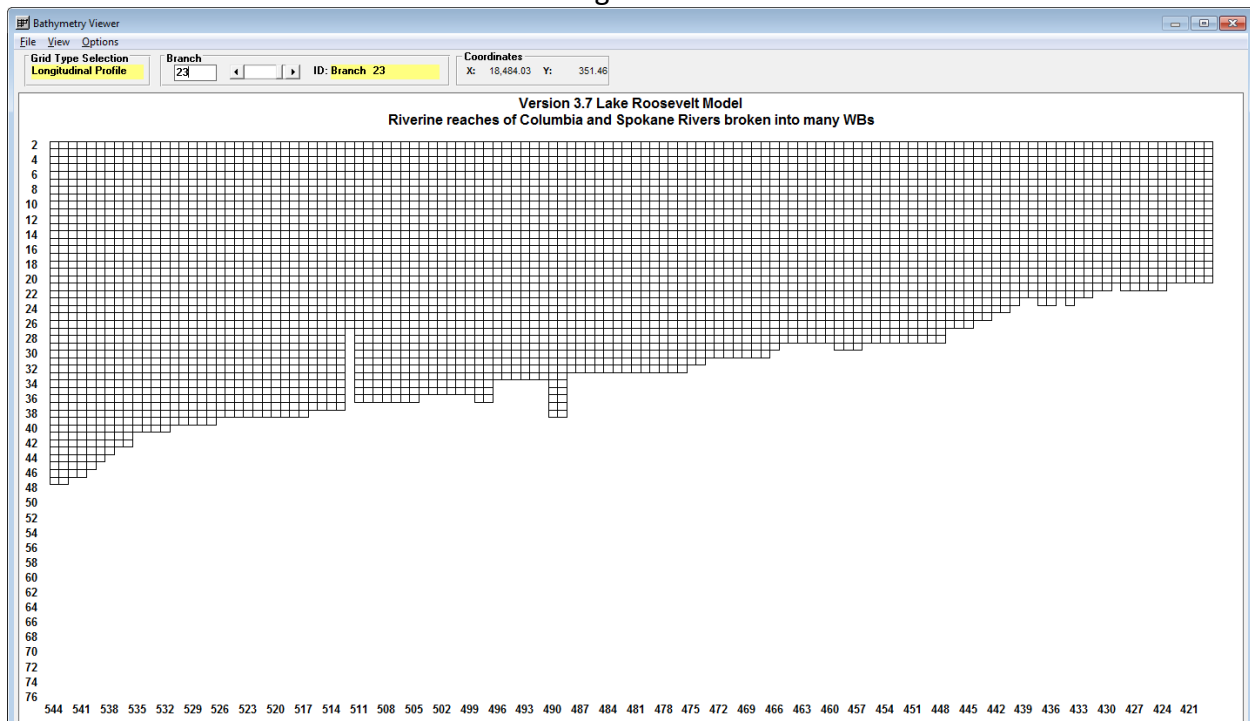
Grid – Plan View – Normal View



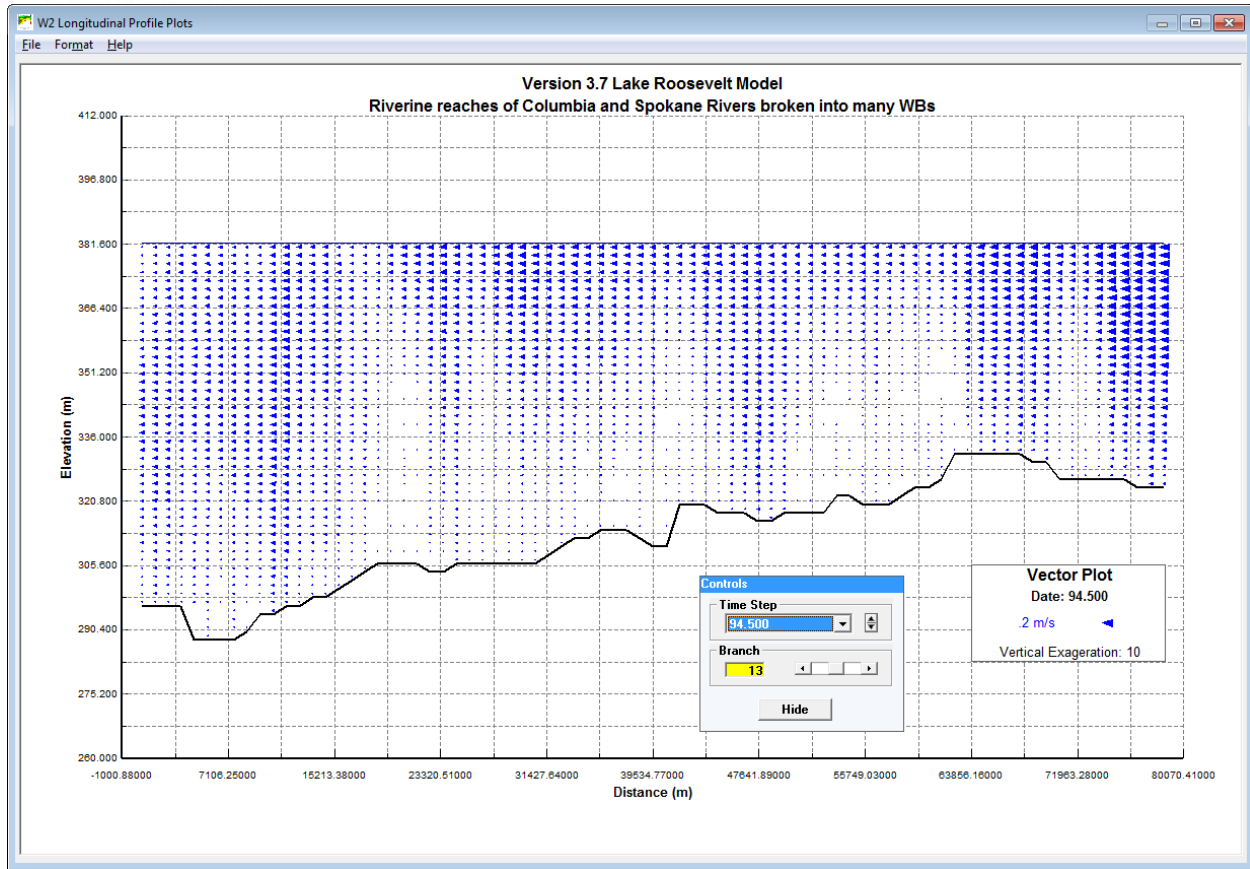
Grid – Plan View – Normal View with Labeling



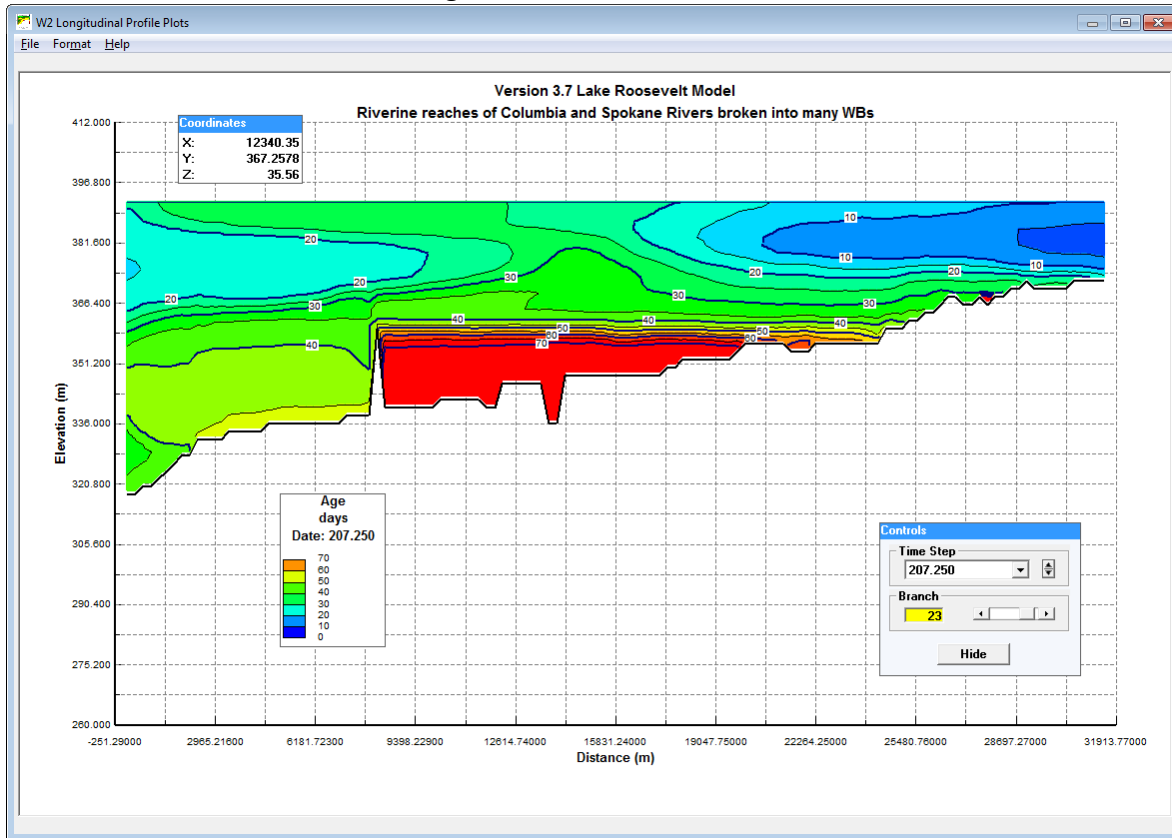
Grid – Longitudinal Profile



2D Velocity Vectors



Longitudinal Profile - Contours



Animate – Two Parameters, Same Branch

CE-QUAL-W2 Water Quality Model Post Processor

File View Help

File 1 File 2 File 3 File 4

Main File Information
E:\Code\FORTRAN\W2\V3.7\examples\Roosevelt\PMC02\Roosevelt.w2l Browse

Version 3.7 Lake Roosevelt Model

Snapshot Simulation Times
Start: 1.25 Stop: 365.00 #: 1455

Outlet Times
Start: NA Stop: NA

| WB | BR | US | DS | SEG |
|----|----|-----|-----|------|
| 19 | 19 | 363 | 374 | #12 |
| 20 | 20 | 377 | 388 | #12 |
| 21 | 21 | 391 | 402 | #12 |
| 22 | 22 | 405 | 416 | #12 |
| 23 | 23 | 419 | 544 | #126 |
| 24 | 24 | 547 | 554 | #8 |
| 25 | 25 | 557 | 582 | #26 |

List of Parameters
Horizontal Velocity
Vertical Velocity
Temperature
Age

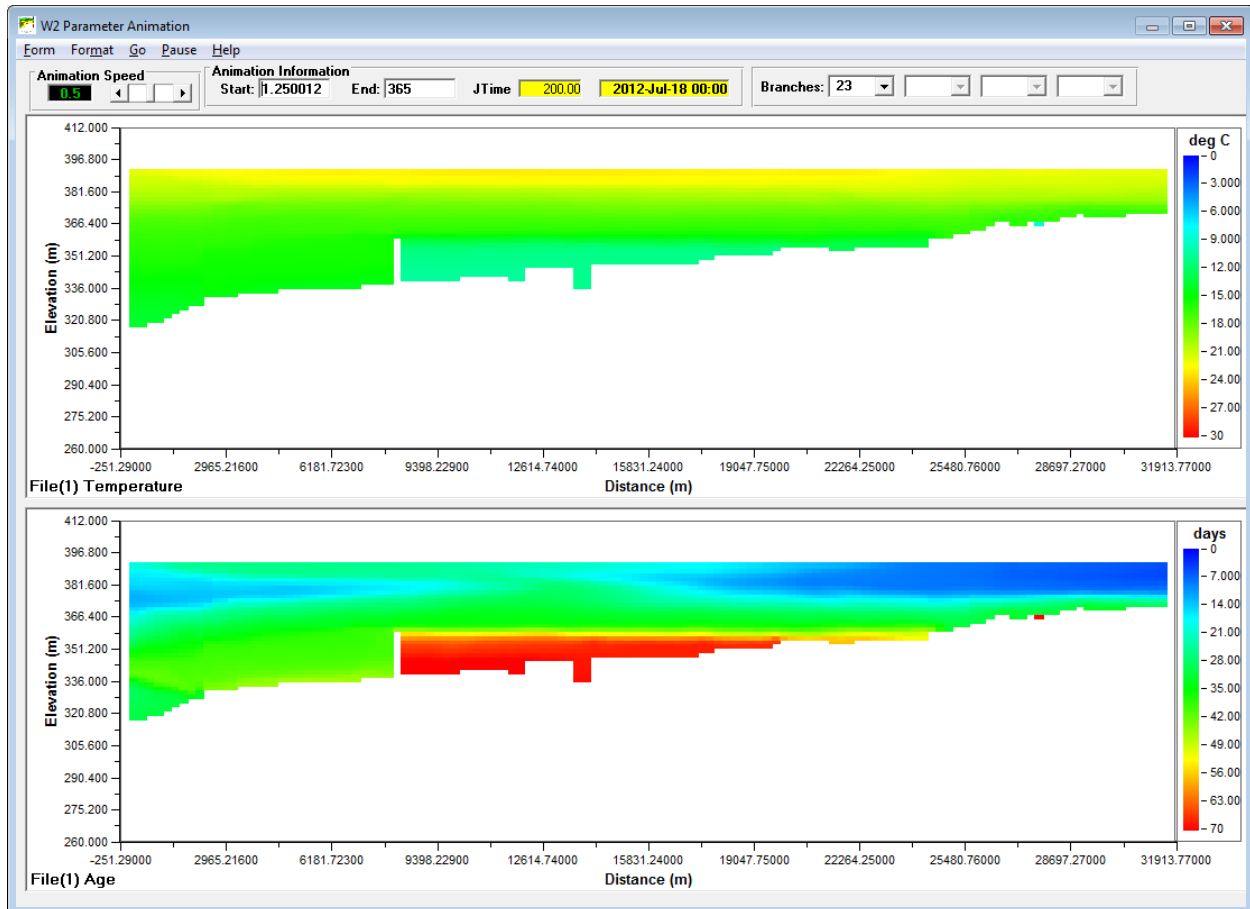
Model Dimensions
Waterbodies: 25
Branches: 25
Segments: 583
Layers: 76
Clear File
Calibration Data
Clear Selections

Input Data
Grid
Titles

Model Results
Time Series
Profile
Vectors
Contour
Calib Stats
Animate
Plan View

Project: Roosevelt Ver 3.7.1

- 1) Open the W2L file desired
 - a) Each "File" tab on the W2_Post form can be animated on one screen. Only 4 total branch/parameter combinations can be animate at the same time.
- 2) Select the branch for each file
- 3) Select the parameters for each branch.
- 4) Press "Animate"



Whatcom Reservoir Example

Water Quality Modeling Post Processor

File View Help

File 1 File 2 File 3 File 4

Main File Information

E:\CODE\FORTRAN\W2\W3.7\EXAMPLES\WHATCOM\PMC01\WHATCOM.W2L Browse

Version 3.7 Whatcom L. Model

Snapshot Simulation Times

Start: 37.622.00 Stop: 37.625.50

Outlet Times

Start: NA Stop: NA

| WB | BR | US | DS |
|----|----|----|----|
| 1 | 1 | 2 | 31 |
| 1 | 2 | 34 | 40 |
| 1 | 3 | 43 | 45 |
| 2 | 4 | 48 | 63 |
| 2 | 5 | 66 | 67 |

List of Parameters

- Labile POM
- Refractory POM
- Algae1
- Algae2
- Algae3
- Algae4
- Dissolved oxygen
- Inorganic carbon
- Alkalinity

Model Dimensions

Waterbodies: 2

Branches: 5

Segments: 68

Layers: 105

Clear File

Calibration Data

Clear Selections

Input Data

Grid

Title

Model Results

Time Series


Vectors

Animate

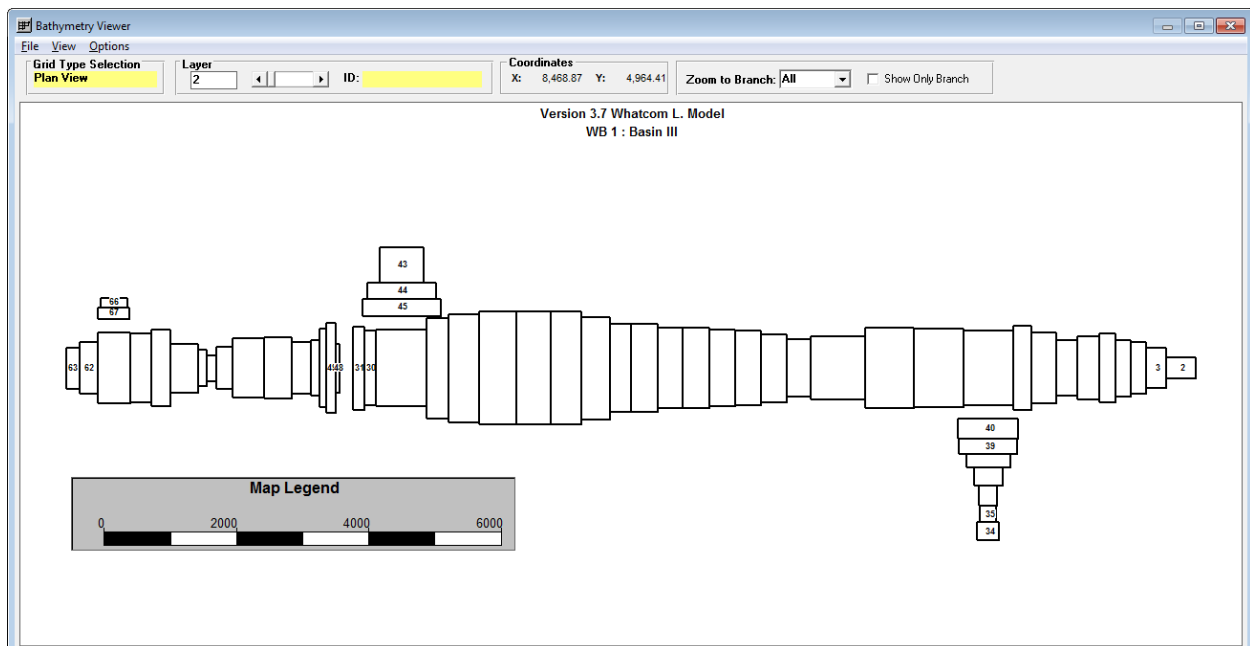
Profiles

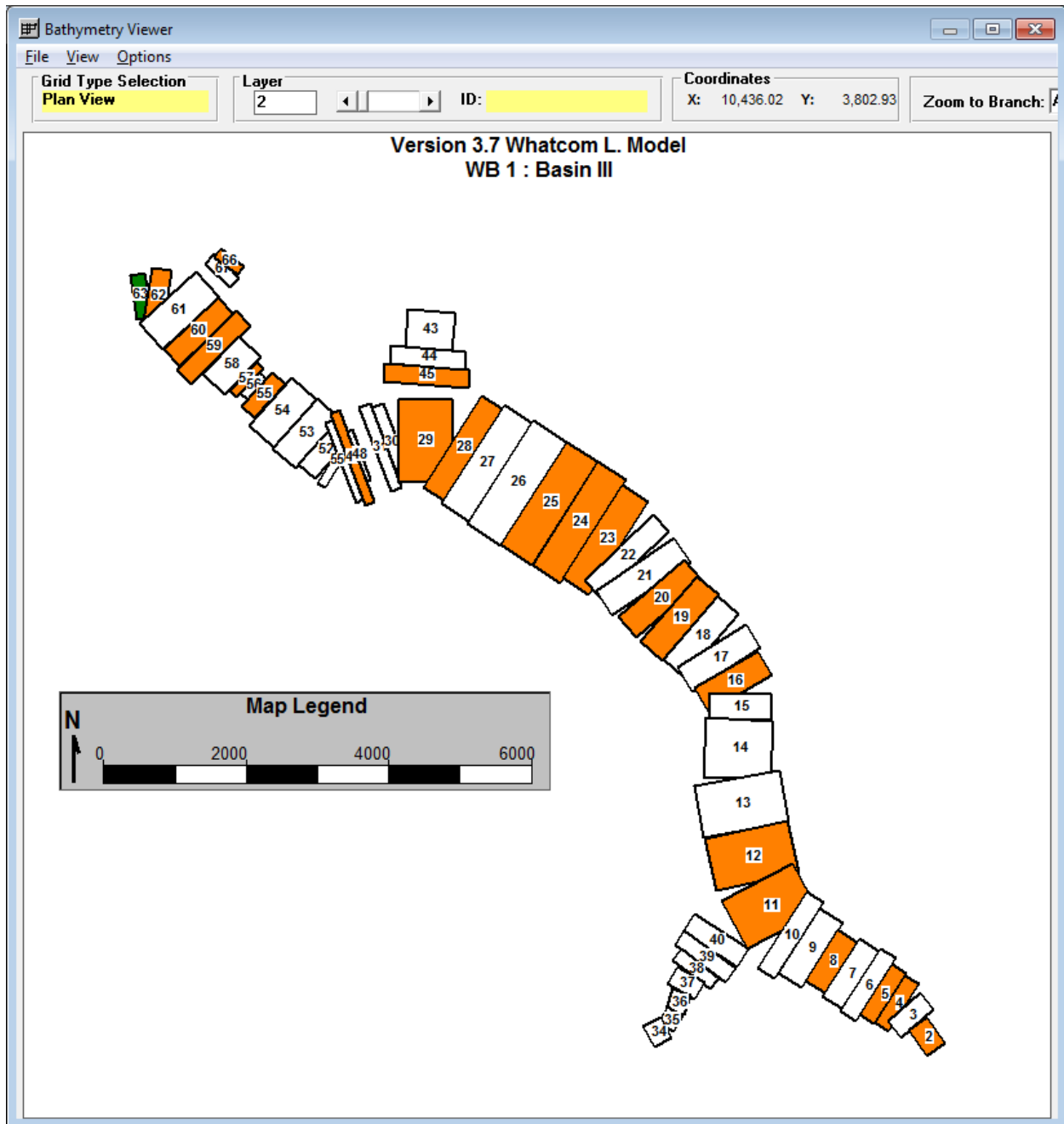
Contour

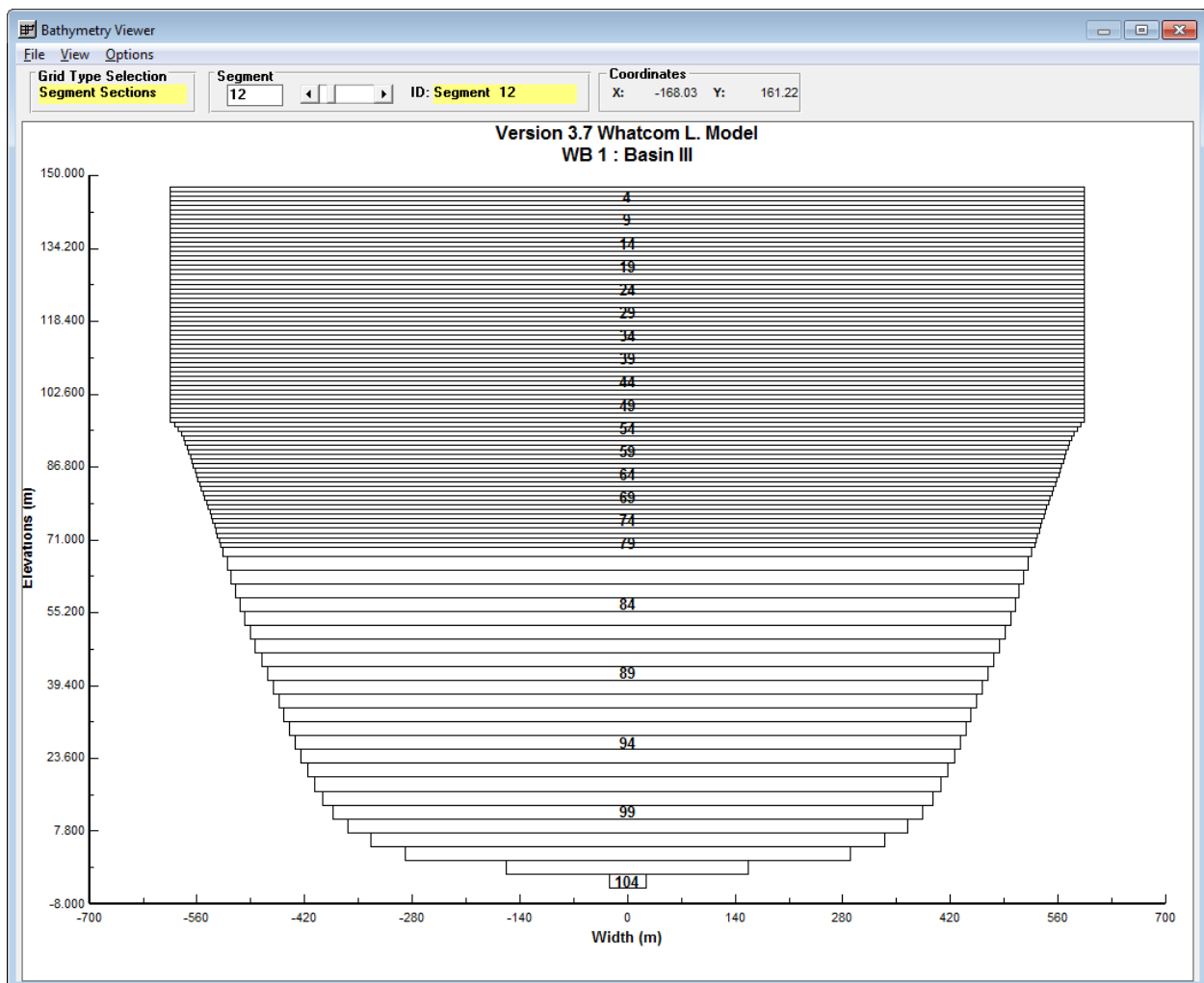
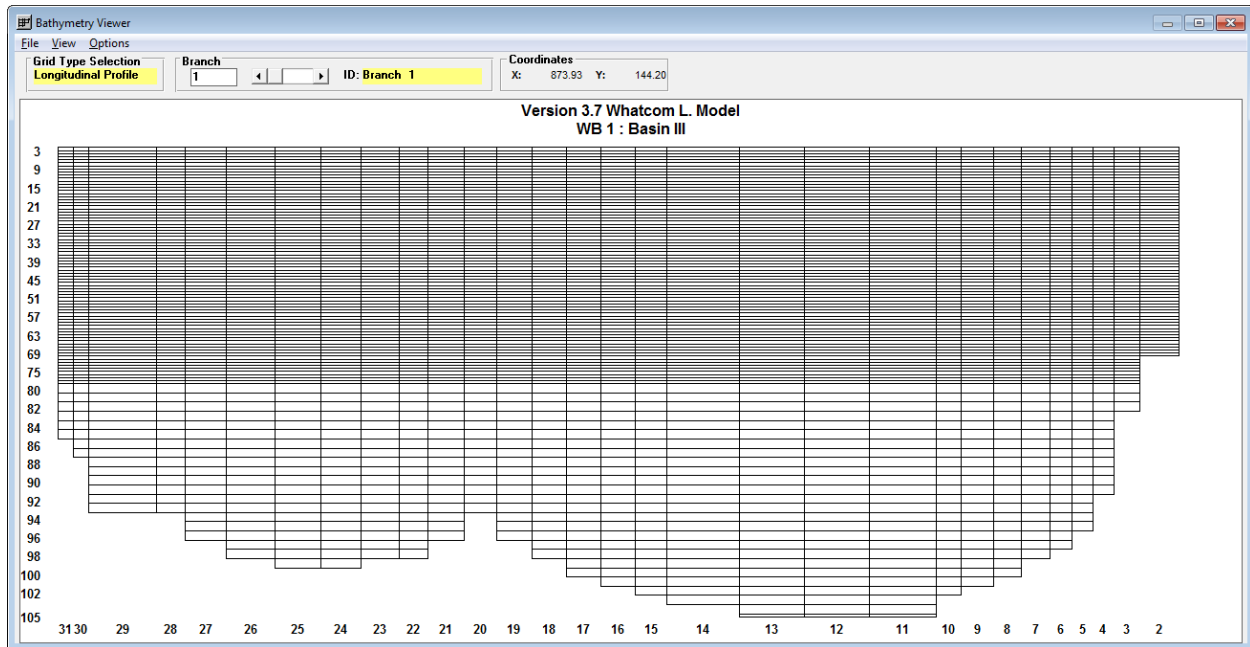
Calib Stats

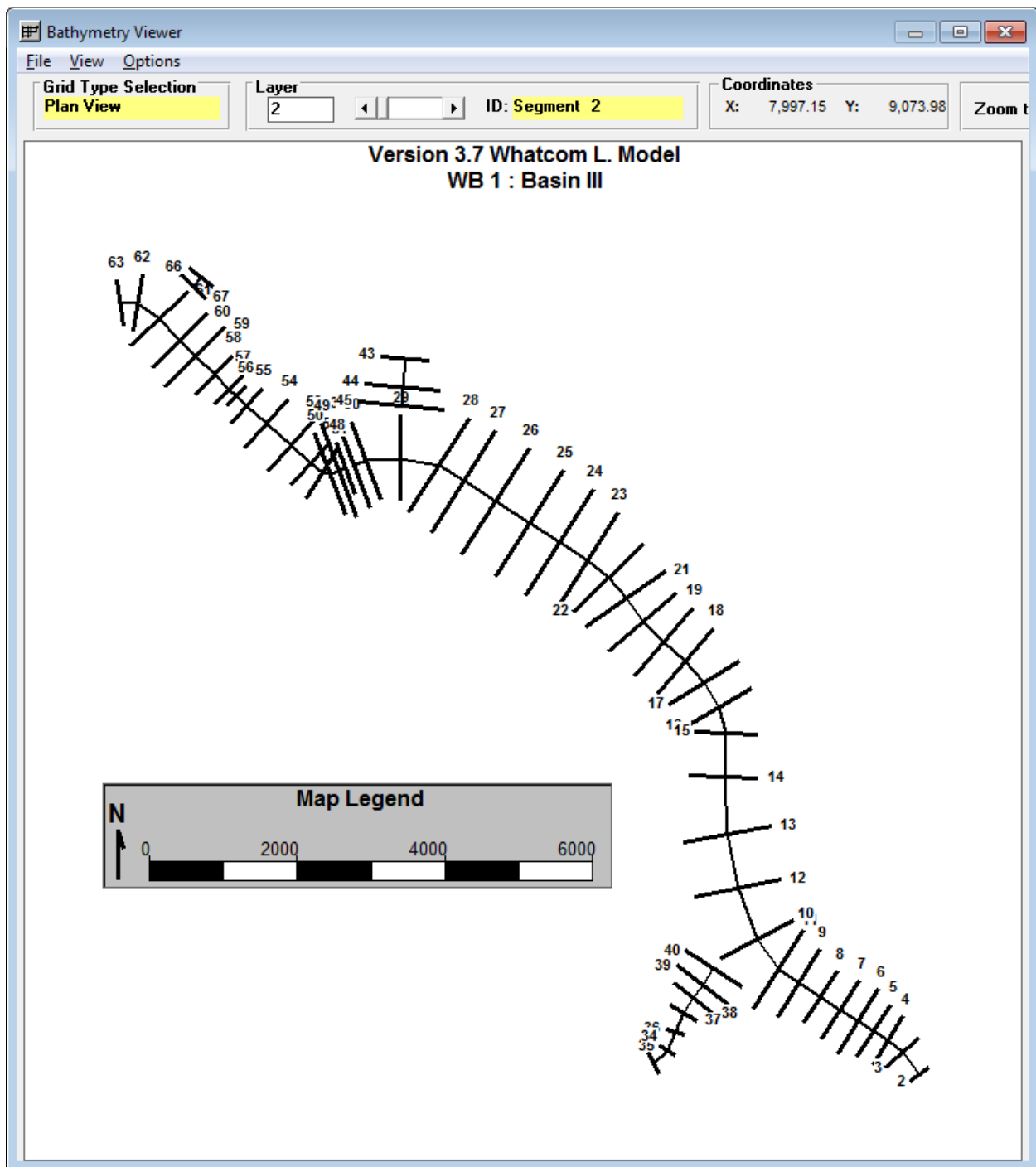


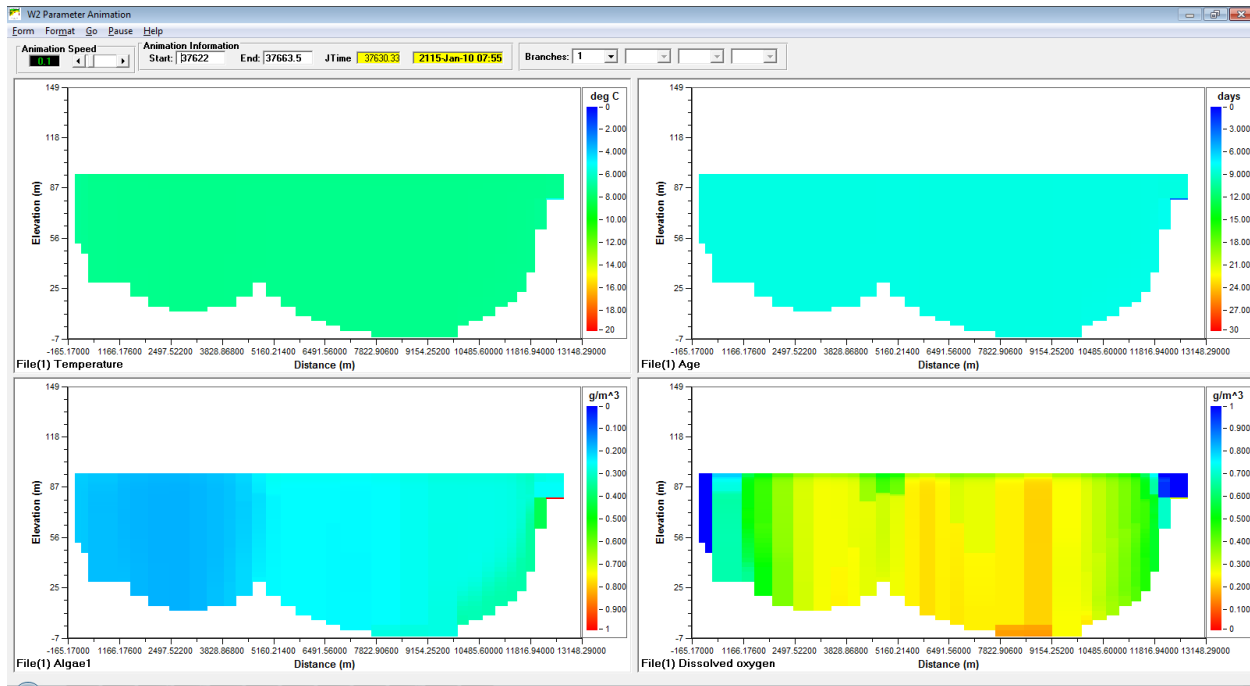
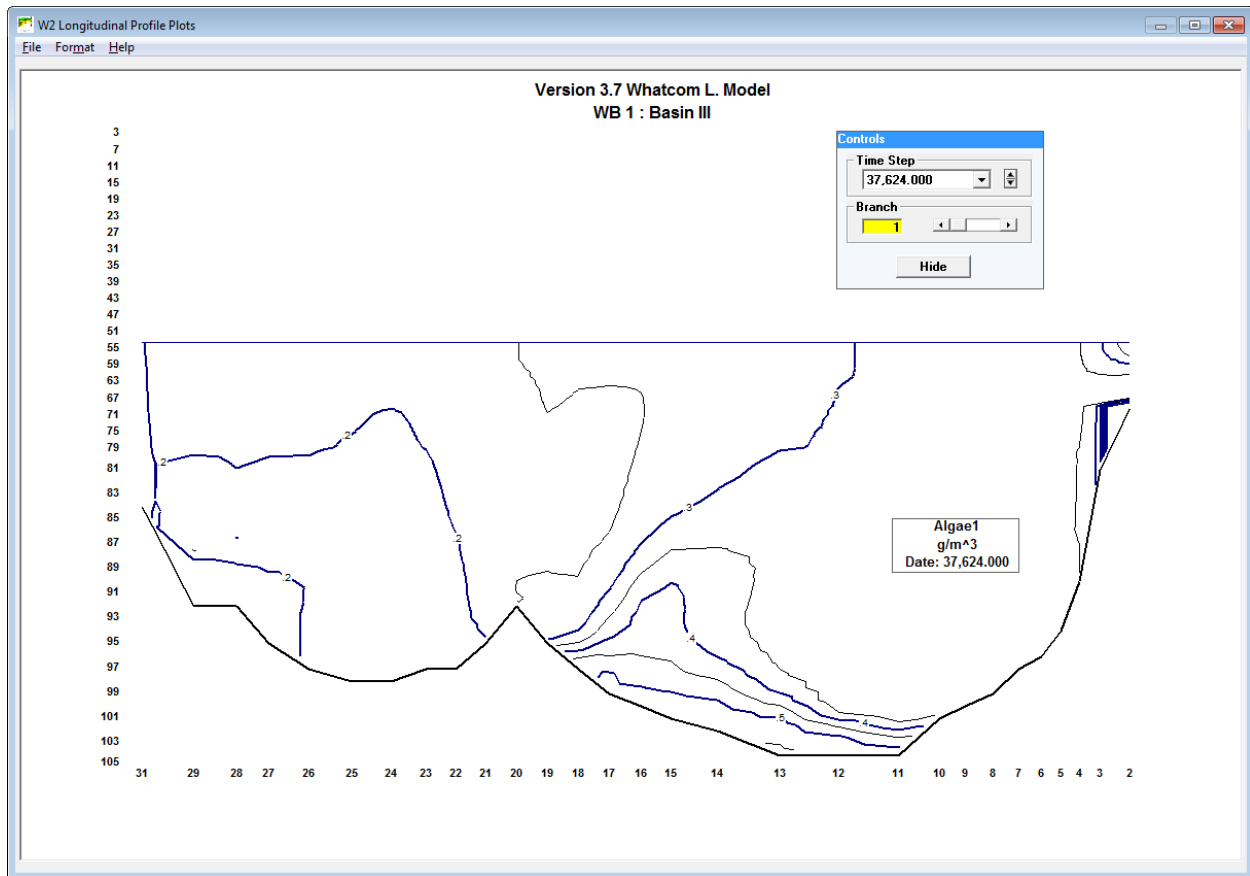
Project: Whatcom 4:13 PM 2012-06-13











Output of grid to kml or Google Earth file

Plan View Options

Format Options

☒ Normal View

☐ Simple Angle View Angles

☐ Line View

Labeling Options

☒ No Labeling

☐ Label Ends

☐ Label All

Branch ID's ☐

World Coordinate Offset

Easting: Northing:

Segment Widths

☐ Varies by bathymetry

☒ Fixed

Layer:

Width Exaggeration:

Width:

Branch Gap:

Cell Colors

☐ Show Colors

InAct Std With Out Strc Trib

☐ ☐ ☐ ☐ ☐ ☐

Change

Cancel OK

Enter UTM coordinates for Easting and Westing; these can be obtained from Google Earth. You must choose what coordinate to start your grid. For Lake Roosevelt the world coordinates are
WorldX=352
136.09375
WorldY=531
3519.5

KML Export Options

UTM Zone (1 to 60, +Northern, -Southern):

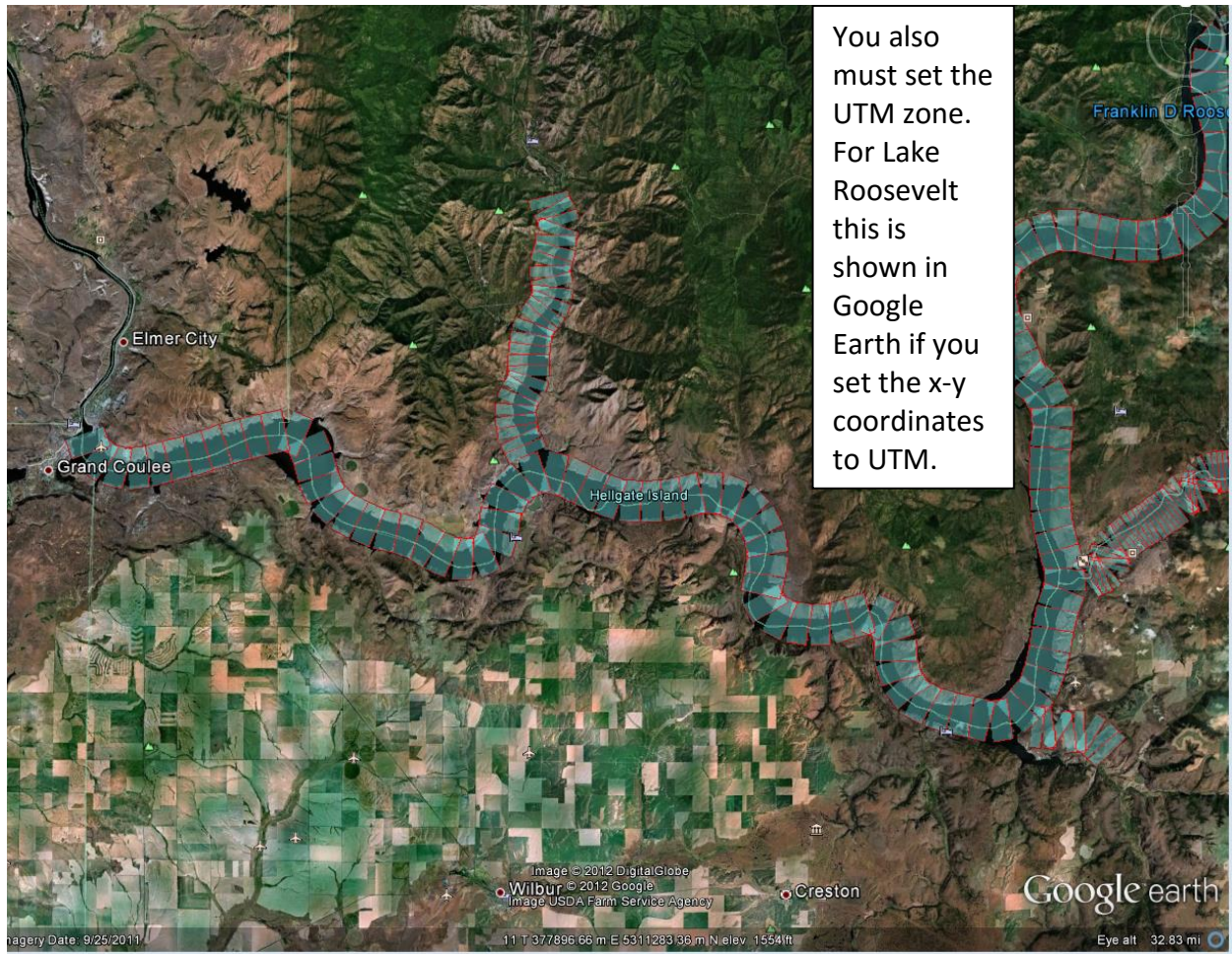
Opacity of Fill (0 to 100%): ☐

Opacity of Polyline (0 to 100%): ☐

Blank Invalid Cells ☐

Invalid Data Flag:

Cancel OK



Calibration Data

Measured Data

Measured Water Quality Data

Measurements File

River Distance Units
☒ River Miles
☐ Meters ☐ Kilometers

Depth Units
☒ Feet
☐ Meters

Simulation Start
 Year:

Constituents

Branch Information
 Br 1
 Downstream Loc: RM

Location Summary

| Br | Seg | JDate | RM | Date/Time |
|----|-----|-------|----|-----------|
| | | | | |

Match Tolerance (Hrs): ☐ Clip Profiles @ Grid Bottom ☐ Use Measured Data ☐

Water Level Measurements File

River Distance Units
☒ River Miles
☐ Meters ☐ Kilometers

Elevation Units
☒ Feet
☐ Meters

Gage Location
 Distance:

Data file for
import

Fields
populated
after
reading in
the data file

Data file for
import

The data import format is as follows:

Vertical Profiles - Calibration Data: Date/Time Vertical Profiles - Calibration Data: Julian Date

Degray_Profiles_Date.dat - Notepad

File Edit Format View Help

Degray Reservoir Calibration Data

| Param# | Br | RM | DateTime | Depth (m) | Temp Deg C |
|--------|-----|------------------|----------|-----------|------------|
| 1 | 150 | 2000-02-06 12:00 | 0 | 7.9 | |
| 1 | 150 | 2000-02-06 12:00 | 1 | 7.7 | |
| 1 | 150 | 2000-02-06 12:00 | 2 | 7.5 | |
| 1 | 150 | 2000-02-06 12:00 | 3 | 7.4 | |
| 1 | 150 | 2000-02-06 12:00 | 4 | 7.4 | |
| 1 | 150 | 2000-02-06 12:00 | 5 | 7.4 | |
| 1 | 150 | 2000-02-06 12:00 | 6 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 7 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 8 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 9 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 10 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 11 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 12 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 13 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 14 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 15 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 16 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 17 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 18 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 19 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 20 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 21 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 22 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 23 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 24 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 25 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 26 | 7.3 | |
| 1 | 150 | 2000-02-06 12:00 | 27 | 7.2 | |
| 1 | 150 | 2000-02-06 12:00 | 28 | 7.2 | |
| 1 | 150 | 2000-02-06 12:00 | 29 | 7.2 | |
| 1 | 150 | 2000-02-06 12:00 | 30 | 7 | |
| 1 | 150 | 2000-02-06 12:00 | 31 | 6.9 | |
| 1 | 150 | 2000-02-06 12:00 | 32 | 6.9 | |
| 1 | 150 | 2000-02-06 12:00 | 33 | 6.8 | |
| 1 | 150 | 2000-02-06 12:00 | 34 | 6.8 | |
| 1 | 150 | 2000-02-06 12:00 | 35 | 6.8 | |
| 1 | 150 | 2000-02-06 12:00 | 36 | 6.8 | |
| 1 | 150 | 2000-02-06 12:00 | 37 | 6.7 | |
| 1 | 150 | 2000-02-06 12:00 | 38 | 6.7 | |
| 1 | 150 | 2000-02-06 12:00 | 39 | 6.7 | |
| 1 | 150 | 2000-02-06 12:00 | 40 | 6.7 | |
| 1 | 150 | 2000-02-06 12:00 | 41 | 6.7 | |
| 1 | 150 | 2000-02-06 12:00 | 42 | 6.7 | |

Degray_Profiles_Julian.dat - Notepad

File Edit Format View Help

Degray Reservoir calibration Data

| Param# | Br | RM | JDay | Depth (m) | Temp Deg C |
|--------|-----|----|------|-----------|------------|
| 1 | 150 | 0 | 36.5 | 0.0 | 7.9 |
| 1 | 150 | 1 | 36.5 | 1.0 | 7.7 |
| 1 | 150 | 2 | 36.5 | 2.0 | 7.5 |
| 1 | 150 | 3 | 36.5 | 3.0 | 7.4 |
| 1 | 150 | 4 | 36.5 | 4.0 | 7.4 |
| 1 | 150 | 5 | 36.5 | 5.0 | 7.4 |
| 1 | 150 | 6 | 36.5 | 6.0 | 7.3 |
| 1 | 150 | 7 | 36.5 | 7.0 | 7.3 |
| 1 | 150 | 8 | 36.5 | 8.0 | 7.3 |
| 1 | 150 | 9 | 36.5 | 9.0 | 7.3 |
| 1 | 150 | 10 | 36.5 | 10.0 | 7.3 |
| 1 | 150 | 11 | 36.5 | 11.0 | 7.3 |
| 1 | 150 | 12 | 36.5 | 12.0 | 7.3 |
| 1 | 150 | 13 | 36.5 | 13.0 | 7.3 |
| 1 | 150 | 14 | 36.5 | 14.0 | 7.3 |
| 1 | 150 | 15 | 36.5 | 15.0 | 7.3 |
| 1 | 150 | 16 | 36.5 | 16.0 | 7.3 |
| 1 | 150 | 17 | 36.5 | 17.0 | 7.3 |
| 1 | 150 | 18 | 36.5 | 18.0 | 7.3 |
| 1 | 150 | 19 | 36.5 | 19.0 | 7.3 |
| 1 | 150 | 20 | 36.5 | 20.0 | 7.3 |
| 1 | 150 | 21 | 36.5 | 21.0 | 7.3 |
| 1 | 150 | 22 | 36.5 | 22.0 | 7.3 |
| 1 | 150 | 23 | 36.5 | 23.0 | 7.3 |
| 1 | 150 | 24 | 36.5 | 24.0 | 7.3 |
| 1 | 150 | 25 | 36.5 | 25.0 | 7.3 |
| 1 | 150 | 26 | 36.5 | 26.0 | 7.3 |
| 1 | 150 | 27 | 36.5 | 27.0 | 7.2 |
| 1 | 150 | 28 | 36.5 | 28.0 | 7.2 |
| 1 | 150 | 29 | 36.5 | 29.0 | 7.2 |
| 1 | 150 | 30 | 36.5 | 30.0 | 7.0 |
| 1 | 150 | 31 | 36.5 | 31.0 | 6.9 |
| 1 | 150 | 32 | 36.5 | 32.0 | 6.9 |
| 1 | 150 | 33 | 36.5 | 33.0 | 6.8 |
| 1 | 150 | 34 | 36.5 | 34.0 | 6.8 |
| 1 | 150 | 35 | 36.5 | 35.0 | 6.8 |
| 1 | 150 | 36 | 36.5 | 36.0 | 6.8 |
| 1 | 150 | 37 | 36.5 | 37.0 | 6.7 |
| 1 | 150 | 38 | 36.5 | 38.0 | 6.7 |
| 1 | 150 | 39 | 36.5 | 39.0 | 6.7 |
| 1 | 150 | 40 | 36.5 | 40.0 | 6.7 |
| 1 | 150 | 41 | 36.5 | 41.0 | 6.7 |
| 1 | 150 | 42 | 36.5 | 42.0 | 6.7 |

File Contents

Line1: Text description of file contents (ignored by W2_Post)

Line2: A line containing the parameter numbers (from the W2 parameters being modeled) that are included in this calibration file. Any number of parameters can be included, one parameter per column.

Line3 and Line4: Description and units (ignored by W2_Post).

Column Definitions:

Br: W2 model branch number

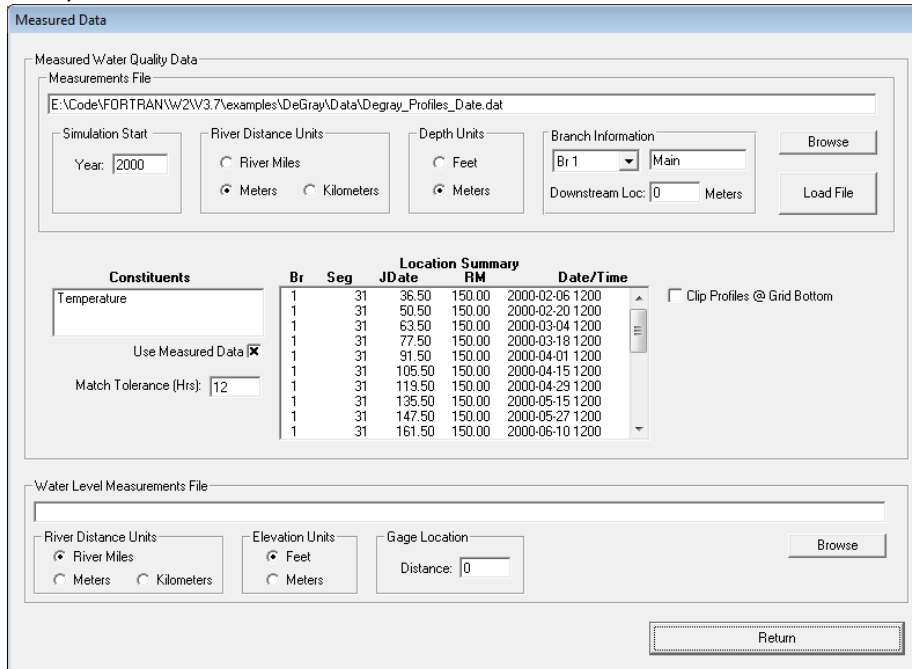
RM: Distance upstream of the most downstream segment face of the specified branch

Date/Time or Julian Date: A valid date time formatted field (must include time), or
A valid Julian date from the start date of the model (e.g. 2004-01-01)

Depth: Depth of the measurement

Parameter Measurement value corresponding to each depth. Each parameter in a column. Use -999 to indicate missing values. All columns must be filled.

Example Form showing the calibration file settings after loading the specified file (using “Load File”).



Measured Data

Measured Water Quality Data

Measurements File
E:\Code\FORTRAN\W2\W3.7\examples\DeGray\Data\DeGray_Profiles_Date.dat

Simulation Start
Year: 2000

River Distance Units
☐ River Miles
☒ Meters
☐ Kilometers

Depth Units
☐ Feet
☒ Meters

Branch Information
 Br 1 | Main
 Downstream Loc: 0 Meters

Browse
Load File

Constituents
 Temperature
 Use Measured Data ☒
 Match Tolerance (Hrs): 12

Location Summary

| Br | Seg | JDate | RM | Date/Time |
|----|-----|--------|--------|-----------------|
| 1 | 31 | 36.50 | 150.00 | 2000-02-06 1200 |
| 1 | 31 | 50.50 | 150.00 | 2000-02-20 1200 |
| 1 | 31 | 63.50 | 150.00 | 2000-03-04 1200 |
| 1 | 31 | 77.50 | 150.00 | 2000-03-18 1200 |
| 1 | 31 | 91.50 | 150.00 | 2000-04-01 1200 |
| 1 | 31 | 105.50 | 150.00 | 2000-04-15 1200 |
| 1 | 31 | 119.50 | 150.00 | 2000-04-29 1200 |
| 1 | 31 | 135.50 | 150.00 | 2000-05-15 1200 |
| 1 | 31 | 147.50 | 150.00 | 2000-05-27 1200 |
| 1 | 31 | 161.50 | 150.00 | 2000-06-10 1200 |

☐ Clip Profiles @ Grid Bottom

Water Level Measurements File

River Distance Units
☒ River Miles
☐ Meters
☐ Kilometers

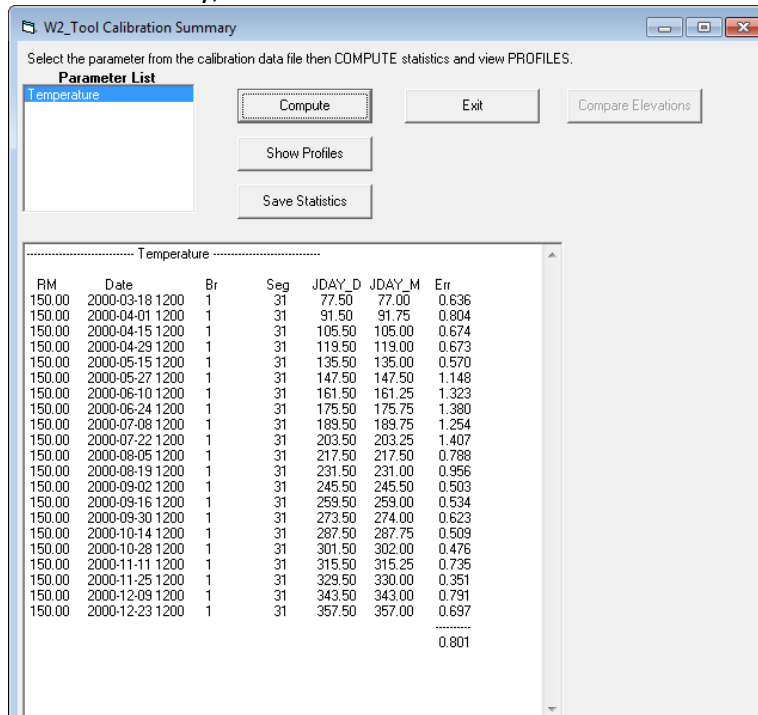
Elevation Units
☒ Feet
☐ Meters

Gage Location
 Distance: 0

Browse

Return

Using the “Calib Stats” button on the main W2_Post form, the user will see the W2_Tool Calibration Summary form. The user must select the parameter to compute then click on the “Compute” button. W2_Post will then compute the profile statistics and summarize all of the measured profiles in the summary, as seen below.



W2_Tool Calibration Summary

Select the parameter from the calibration data file then COMPUTE statistics and view PROFILES.

Parameter List
 Temperature

Compute
Exit
Compare Elevations
Show Profiles
Save Statistics

Temperature

| RM | Date | Br | Seg | JDAY_D | JDAY_M | Err |
|--------|-----------------|----|-----|--------|--------|-------|
| 150.00 | 2000-03-18 1200 | 1 | 31 | 77.50 | 77.00 | 0.636 |
| 150.00 | 2000-04-01 1200 | 1 | 31 | 91.50 | 91.75 | 0.804 |
| 150.00 | 2000-04-15 1200 | 1 | 31 | 105.50 | 105.00 | 0.674 |
| 150.00 | 2000-04-29 1200 | 1 | 31 | 119.50 | 119.00 | 0.673 |
| 150.00 | 2000-05-15 1200 | 1 | 31 | 135.50 | 135.00 | 0.570 |
| 150.00 | 2000-05-27 1200 | 1 | 31 | 147.50 | 147.50 | 1.148 |
| 150.00 | 2000-06-10 1200 | 1 | 31 | 161.50 | 161.25 | 1.323 |
| 150.00 | 2000-06-24 1200 | 1 | 31 | 175.50 | 175.75 | 1.380 |
| 150.00 | 2000-07-08 1200 | 1 | 31 | 189.50 | 189.75 | 1.254 |
| 150.00 | 2000-07-22 1200 | 1 | 31 | 203.50 | 203.25 | 1.407 |
| 150.00 | 2000-08-05 1200 | 1 | 31 | 217.50 | 217.50 | 0.788 |
| 150.00 | 2000-08-19 1200 | 1 | 31 | 231.50 | 231.00 | 0.956 |
| 150.00 | 2000-09-02 1200 | 1 | 31 | 245.50 | 245.50 | 0.503 |
| 150.00 | 2000-09-16 1200 | 1 | 31 | 259.50 | 259.00 | 0.534 |
| 150.00 | 2000-09-30 1200 | 1 | 31 | 273.50 | 274.00 | 0.623 |
| 150.00 | 2000-10-14 1200 | 1 | 31 | 287.50 | 287.75 | 0.509 |
| 150.00 | 2000-10-28 1200 | 1 | 31 | 301.50 | 302.00 | 0.476 |
| 150.00 | 2000-11-11 1200 | 1 | 31 | 315.50 | 315.25 | 0.735 |
| 150.00 | 2000-11-25 1200 | 1 | 31 | 329.50 | 330.00 | 0.351 |
| 150.00 | 2000-12-09 1200 | 1 | 31 | 343.50 | 343.00 | 0.791 |
| 150.00 | 2000-12-23 1200 | 1 | 31 | 357.50 | 357.00 | 0.697 |
| | | | | | | 0.801 |

After computing the summary statistics, the user can view the profiles by clicking on the “Show Profiles”. Eight profiles are shown per page. Plotting control is available using the “X Axis” and elevation settings on the form. The profiles can be saved as metafiles using the “Export Plots” button. An example is shown below.

