

## Tutorial 5: Output: Reservoirs and QUAL Source Tracking

The purpose of this tutorial is to provide instruction on advanced output options. The first part involves modifications to the text input file, *hydro.inp*. We will add some outputs and also take a look at how data in *hydro.inp* is prioritized. The second part introduces the use of *groups* and source tracking.

### 1. Add Output Paths to *hydro.inp*:

- a. In Windows Explorer, navigate to the directory,  
`{\DSM2_home}\tutorial\simple\t5_output`.
- b. Open the file *addin.inp* and note the new output paths for the channels and reservoir.
- c. Copy the entire file contents to the clipboard.
- d. Open the file *hydro.inp*.
- e. Navigate to the bottom of the file and paste the information. Note that the output *bnd\_1* is the same as one of the outputs in *output\_hydro\_tutorial.inp*, except that the distance has been changed from 0 to 1. The top-level input file (*hydro.inp*) overrides all the other layers.

### 2. Add *Boundary* and *Source Groups*:

- a. In the study directory, create a file called *group\_tutorial.inp*.
- b. Add a group table. This is a simple table (it only exists so there is a parent table for overriding/layering) and we define two groups:

```
GROUP
NAME
boundary
sources
END
```

- c. Now define the group members. Create the *GROUP\_MEMBER* table below the *GROUP* table:

```
GROUP_MEMBER
GROUP_NAME MEMBER_TYPE  PATTERN
END
```

d. In the *Group Members table*:

- 1) Enter a row with the following values in the appropriate fields:
  - i) GROUP\_NAME: *boundary*
  - ii) MEMBER\_TYPE: *stage*
  - iii) PATTERN: *.\*stream.\**
  - iv) Note that the dot-star in the above pattern is a “regular expression” wildcard. You can use any standard Perl-style regular expression in groups, but the html documentation describes most of the patterns you can put in a GROUP\_MEMBER that are really useful.
- 2) Enter another row with the following values in the appropriate fields:
  - i) GROUP\_NAME: *boundary*
  - ii) MEMBER\_TYPE: *flow\_boundary*
  - iii) PATTERN: *.\*stream.\**
- 3) In the *Group Members table* insert another row with the following values in the appropriate fields:
  - i) GROUP\_NAME: *sources*
  - ii) MEMBER\_TYPE: *source\_sink*
  - iii) PATTERN: *source1*

e. In qual, create the GROUPS (note the plural) include block that will reference this file:

```
GROUPS
group_tutorial.inp
END
```

f. Save the current settings.

### 3. Add Group Output for Channel 5:

- a. Create a new file called *output\_qual\_sourcetrack.inp*.
- b. In this file, create an OUTPUT\_CHANNEL table. Use your previous work as a template.
- c. In the *Channel Output* table create 3 rows:

- 1) For the first new row, enter the following values into the appropriate fields:
  - i) Name: *ch5*
  - ii) Channel: *5*
  - iii) Distance: *5000*
  - iv) Variable: *ec*
  - v) Source Group: *none* (this will track *ec* from all sources)
  - vi) Output File: *\${QUALOUTDSSFILE}*
  - vii) Time Interval: *15min*
  - viii) Period Op: *inst*
- 2) For the second new row, enter the following values into the appropriate fields:
  - i) Name: *ch5\_bnd*
  - ii) Channel: *5*
  - iii) Distance: *5000*
  - iv) Variable: *ec*
  - v) Source Group: *boundary*
  - vi) Output File: *\${QUALOUTDSSFILE}*
  - vii) Time Interval: *15min*
  - viii) Period Op: *inst*
- 3) For the third new row, enter the following values into the appropriate fields:
  - i) Name: *ch5\_src*
  - ii) Channel: *5*
  - iii) Distance: *5000*
  - iv) Variable: *ec*
  - v) Source Group: *source*
  - vi) Output File: *\${QUALOUTDSSFILE}*
  - vii) Time Interval: *15min*
  - viii) Period Op: *inst*

d. Save the current settings.

#### 4. Running HYDRO and QUAL

- a. Open a command window for the *t5\_output* directory.

- b. In the command window, type: *hydro hydro.inp*.
- c. In the command window, type: *qual qual.inp*.
- d. Open the hydro echo file *output\_tutorial\_hydro\_echo.inp*. Which version of *bnd\_1* got picked up by the model, the one in *hydro.inp* or the one in *output\_tutorial\_hydro.inp*.
- e. Open the *output.dss* file in the *t5\_output* directory, and examine the results. Do a little mass balance to make sure you believe the source tracking adds up.