

II. Tutorial 1: Channels

The purpose of this tutorial is to set up a simple channel-only grid with simple constant boundary conditions. As shown in the PowerPoint presentation, the channels have the following configuration and specifications:

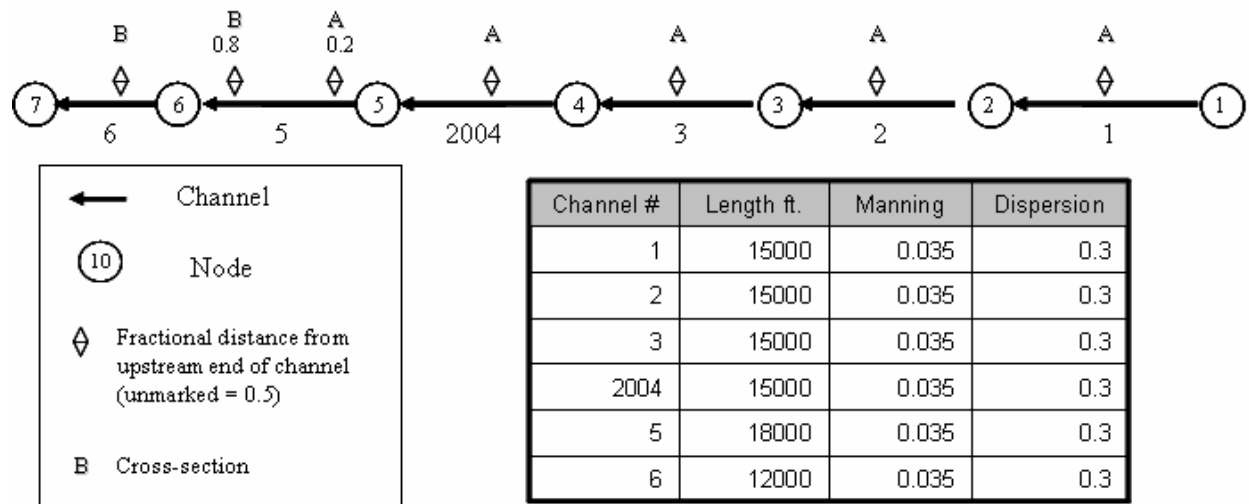


Figure 1 - Simple channel configuration and specifications.

The following steps will instruct you on how to create these channels and enter these and other specifications into the GUI.

1. Launch the GUI:

- Navigate to the directory, `ldsm2_training\bin`.
- Double-click `gui.bat`.

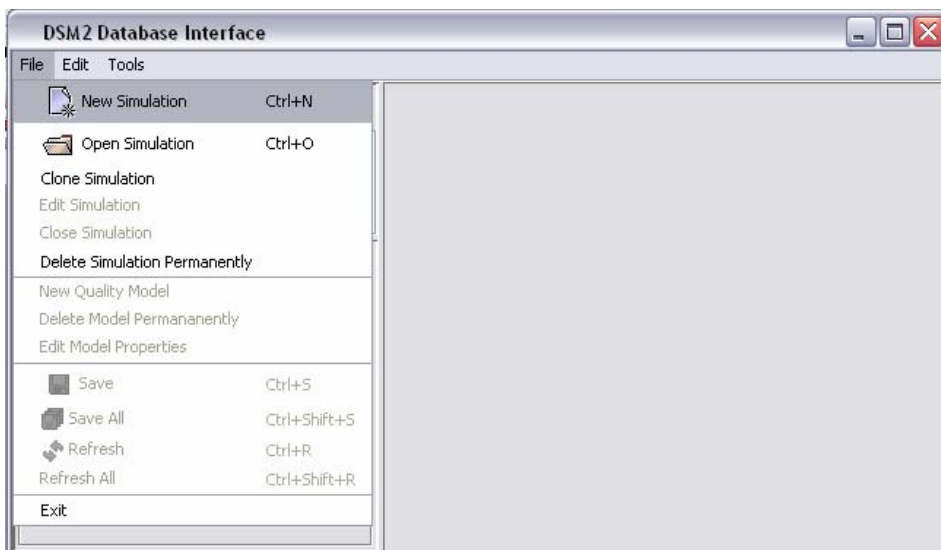
2. Check/Modify the Database Connection:

- In the GUI:
 - Click on the *Tools* menu.
 - Select *Configure Database*.
 - Make certain that the *ODBC source (named in system files)* option is selected.
 - In the *ODBC DSN* text box, make certain it says: `dsm2input_access`.
- In Windows Explorer:

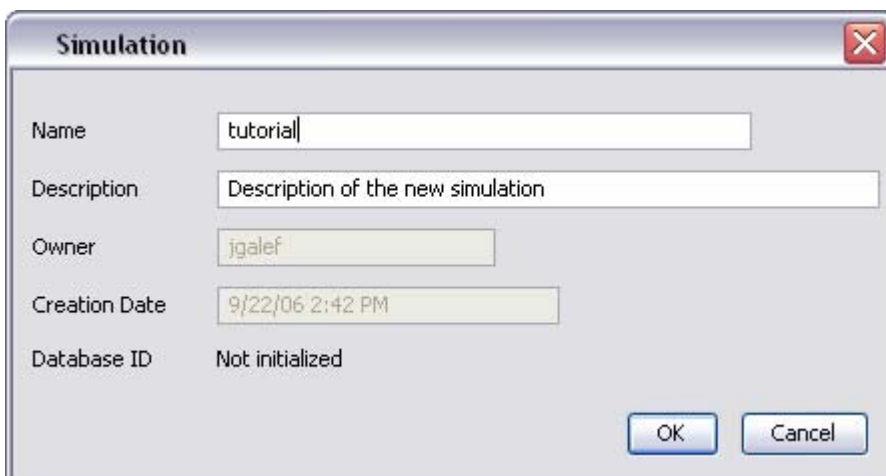
- 1) Navigate to the directory:
`\\dsm2_training\tutorial\simulations\simple\t1_channels.`
- 2) Open the file, *hydro.inp*.
 - i) Locate the SCALAR section.
 - ii) Locate the variable, *dbase_in_tutorial*.
 - iii) Change this value to *dsm2input_access*.
- 3) Repeat this process for the *qual.inp* file.

3. Create a simulation called *tutorial*.

- a. Go to *file* and select *New Simulation*.

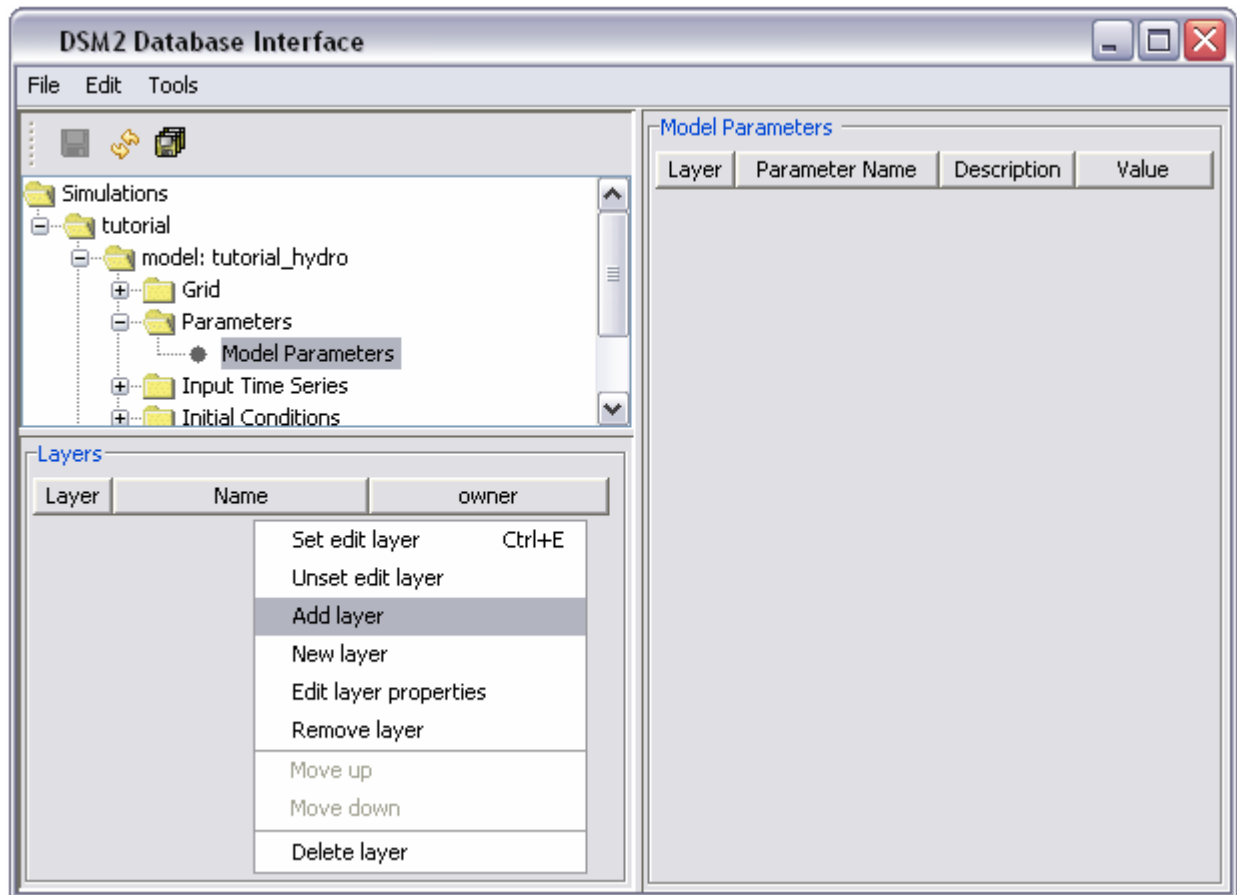


- b. Name the new simulation, *tutorial*, and add a description.

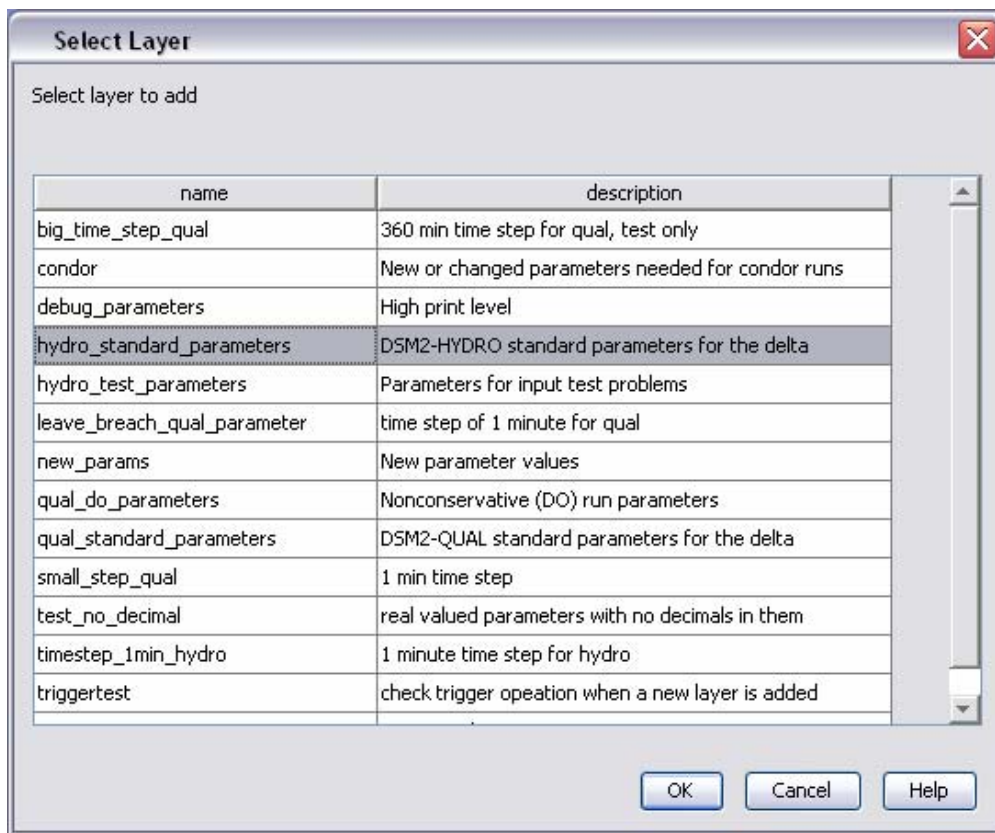


4. In HYDRO, add the Parameter information:

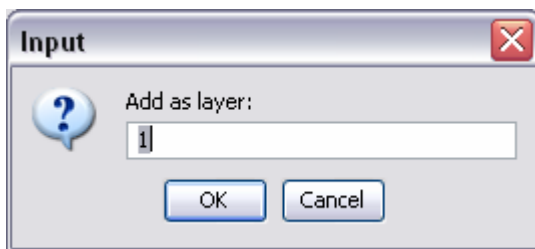
- a. In the *Simulations Navigator*:
 - 1) Expand the *tutorial* folder.
 - 2) Expand the *model: tutorial_hydro* folder.
 - 3) Expand the *Parameters* folder.
 - 4) Double-click on *Model Parameters*.
- b. In the *Layers Panel*, right-click and select *Add layer* from the menu.



- c. In the *Select Layers* window, double-click the *hydro_standard_parameters* layer.



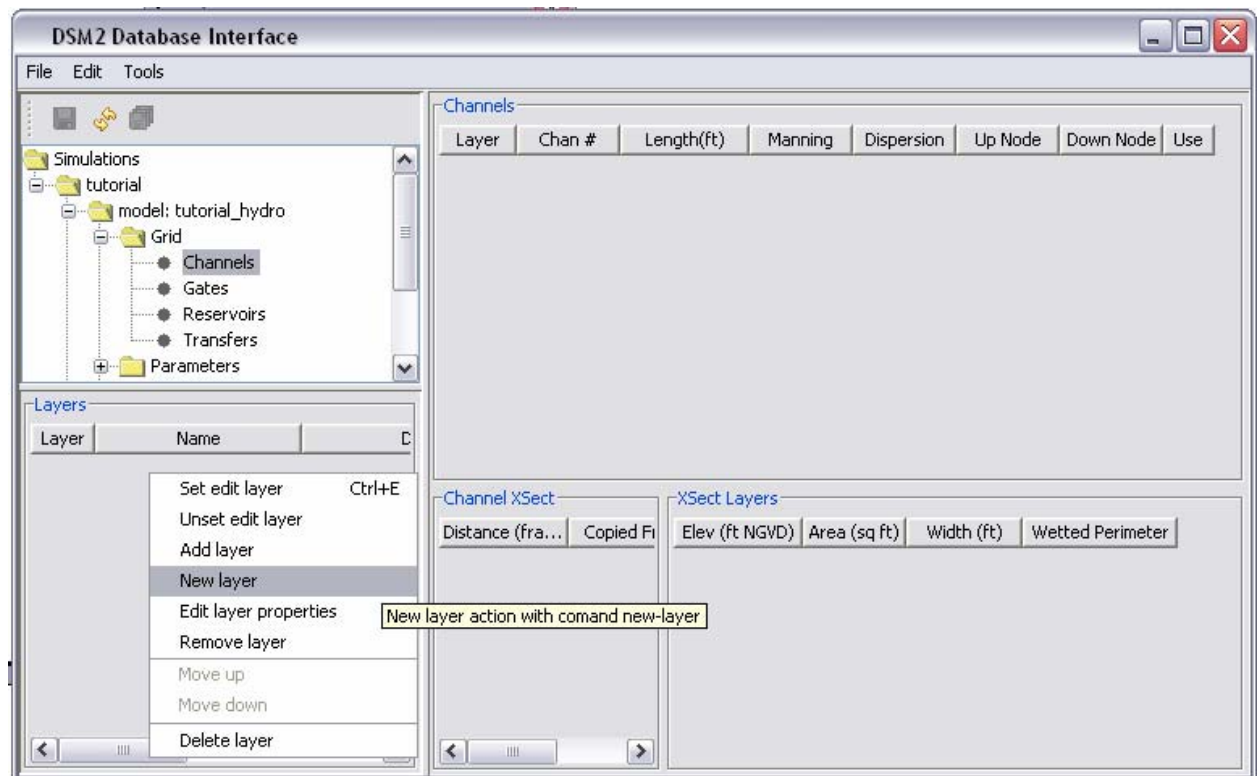
- d. In the *Input* window, add as layer 1.



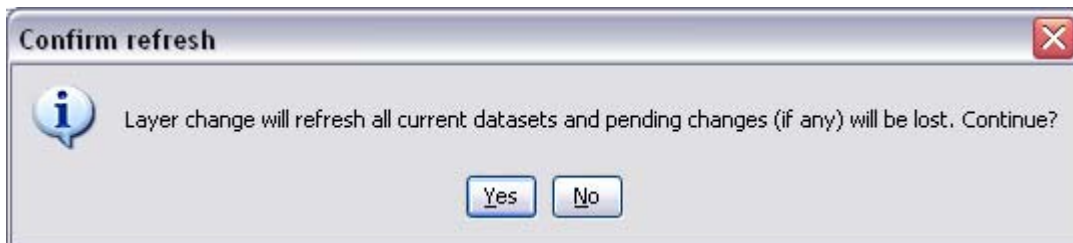
5. In HYDRO, add Channel information:

- In the *Simulations Navigator*:
 - 1) Collapse the *Parameters* folder [optional].
 - 2) Expand the *Grid* folder.
 - 3) Double-click on *Channels*.
- Add a Channels Layer:

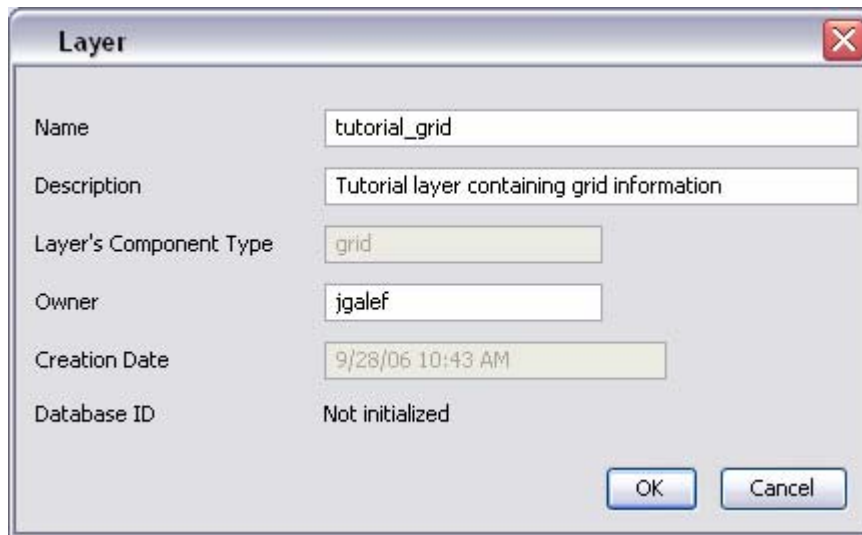
1) In the *Layers Panel*, right-click and select *New layer* from the menu.



2) In the *Confirm refresh* window, select *Yes*.



3) In the *Layer window*, name the new layer, *tutorial_grid*, and add a description.



Layer

Name: tutorial_grid

Description: Tutorial layer containing grid information

Layer's Component Type: grid

Owner: jgalef

Creation Date: 9/28/06 10:43 AM

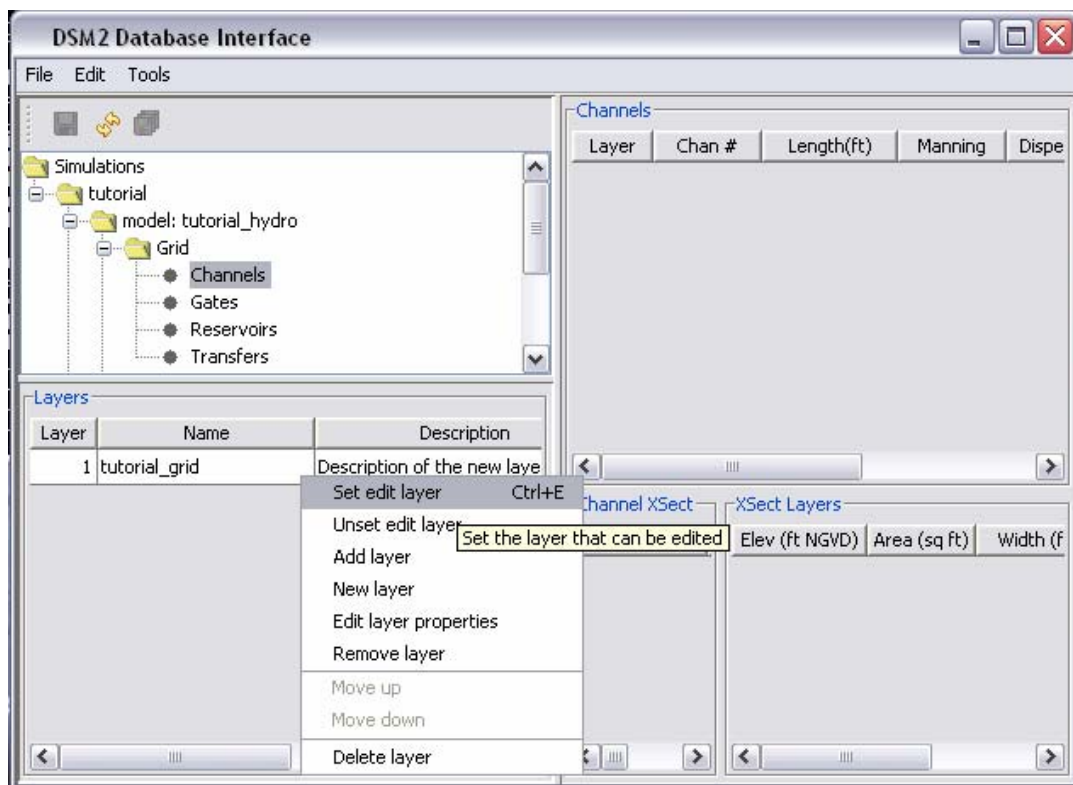
Database ID: Not initialized

OK Cancel

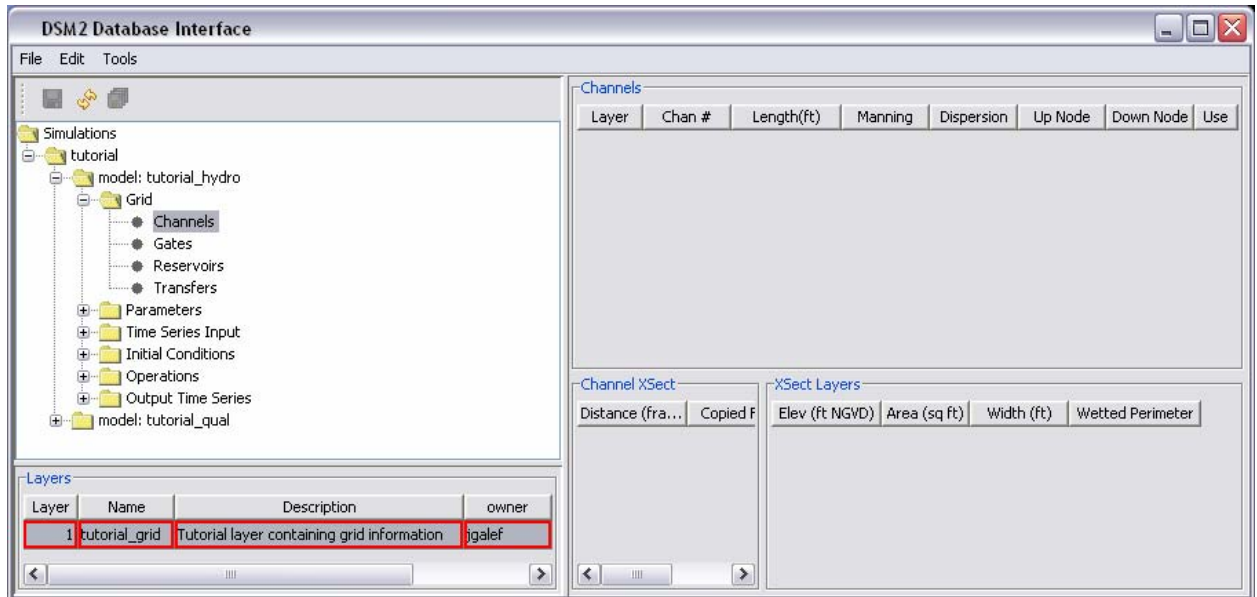
4) In the *Input window*, add as layer 1.

5) The *tutorial_grid* layer then appears in the *Layers panel*.

c. In the *Layers panel*, right-click and select *Set edit layer*.



- d. In the *Select Layers* window, double-click the *tutorial_grid* layer. The layer then appears with a red border in the *Layers panel*.



- e. In the *Channels View*, note that there are three tables which require information: *Channels*, *Channel Xsect*, and *XSec Layers*. The headers for each of these tables are displayed with blue letters.
- f. The following directions involve entering information into these three tables for each of the channels shown in Figure 1.
- 1) In *Windows Explorer*, navigate to the following directory:
dsm2_training\tutorial\simulations\simple
 - 2) Open the Excel file, *TutorialSetup.xls*, and do the following:
 - i) Select the *Channel Configuration* tab.
 - ii) View the channel information and note that Channel 2004 looks mislabeled. This is deliberate, demonstrating that there is no upper limit on channel numbers.
 - iii) Copy the information from the first row of the table (for *Channel 1*) to the clipboard. Do **not** include headers when copying and pasting.

Microsoft Excel - TutorialSetup.xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

File Retrieve Arial B I 100%

A3 1

	A	B	C	D	E	F	G	H
1								
2	Layer	Channel #	Length	Manning	Dispersion	UpNode	DownNode	Use
3	1	1	15000	0.035	0.3	1	2	TRUE
4	1	2	15000	0.035	0.3	2	3	TRUE
5	1	3	15000	0.035	0.3	3	4	TRUE
6	1	2004	15000	0.035	0.3	4	5	TRUE
7	1	5	18000	0.035	0.3	5	6	TRUE
8	1	6	12000	0.035	0.3	6	7	TRUE
9								
10								

Channel Configuration Initial Conditions Output Xsect A Xsect I

Ready Sum=15005.335 NUM

- 3) Return to the GUI.
- 4) In the *Channels* table, left-click and then hit control-v to paste the information.
- 5) In the *Channel Xsect* table:
 - i) Right-click and select *Insert row*.

DSM2 Database Interface

File Edit Tools

Simulations
tutorial
model: tutorial_hydro
Grid
Channels
Gates
Reservoirs

Layers

Layer	Name
1	tutorial_grid

Channels

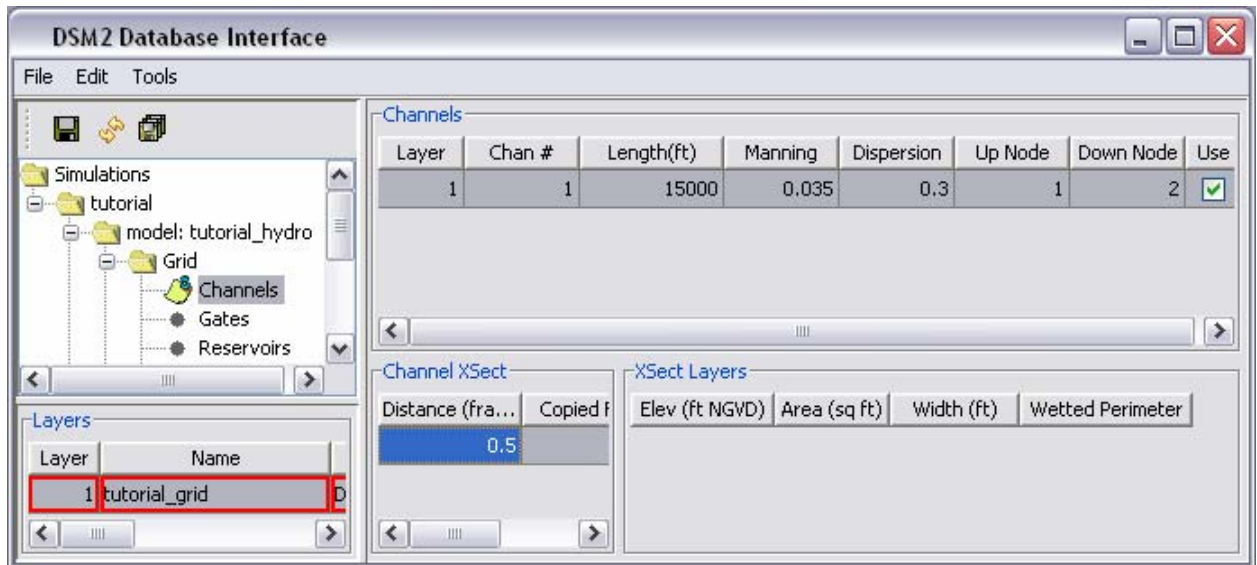
Layer	Chan #	Length(ft)	Manning	Dispersion	Up Node	Down Node	Use
1	1	15000	0.035	0.3	1	2	<input checked="" type="checkbox"/>

Channel Xsect Xsect Layers

Distance (fra... Copied Fro Elev (ft NGVD) Area (sq ft) Width (ft) Wetted Perimeter

Insert Row
Delete Row(s)
Copy row to edit layer (with subtables)

- ii) In the *Distance (fraction)* field, type 0.5 and press *enter*. As seen from the channel configuration diagram, the cross-section is at 0.5 times the length of the channel.



- 6) Navigate back to the Excel file, *TutorialSetup.xls*.
 - i) Select the *XSect A* tab.
 - ii) Locate the Summary table and copy all of the information to the clipboard.

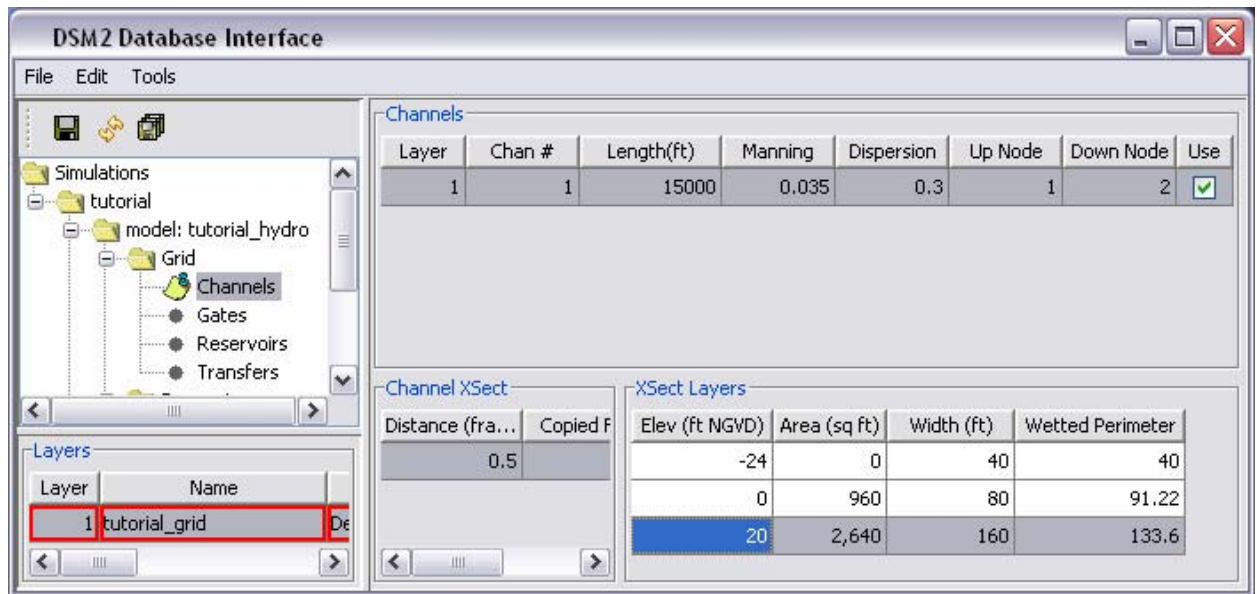
Do **not** include the headers.

The screenshot shows the Microsoft Excel - TutorialSetup.xls file with the following data in the Summary table:

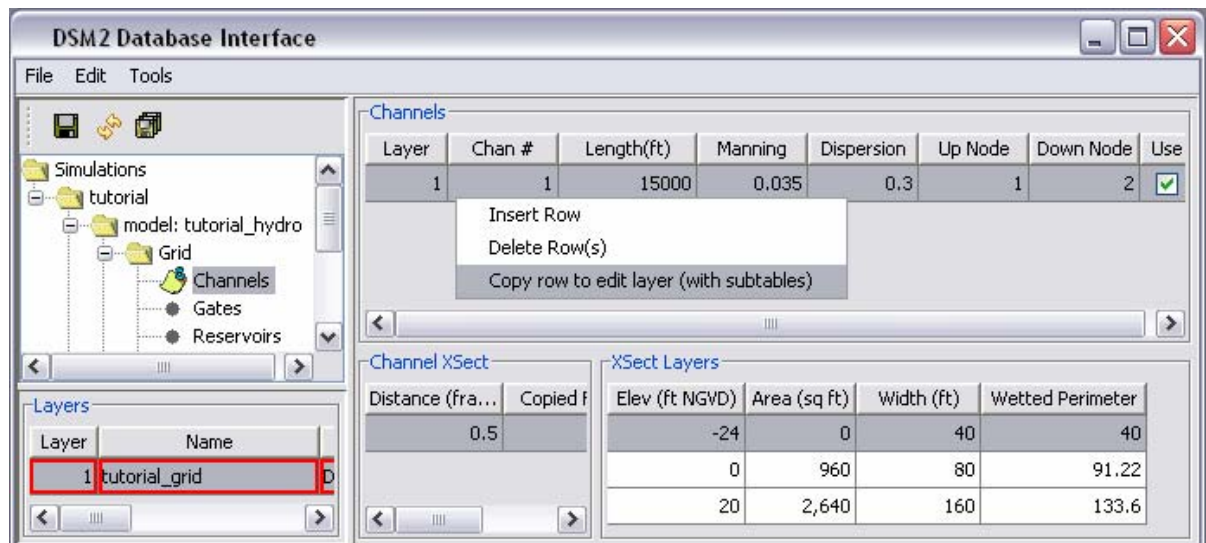
	A	B	C	D
21	Summary			
22	Elev	Area	Width	Wetted Perimeter
23	-24	0	40	40.00
24	0	960	80	91.22
25	20	2640	160	133.60

- 7) Return to the GUI.

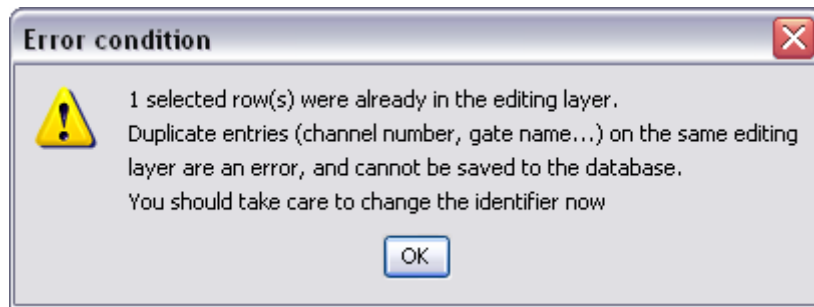
- 8) In the *XSect Layers* table, left-click and then hit control-v to paste the table.



- 9) In the *Channels* table, right-click the row and select *Copy row to edit layer* (with subtables).



The following message will appear:



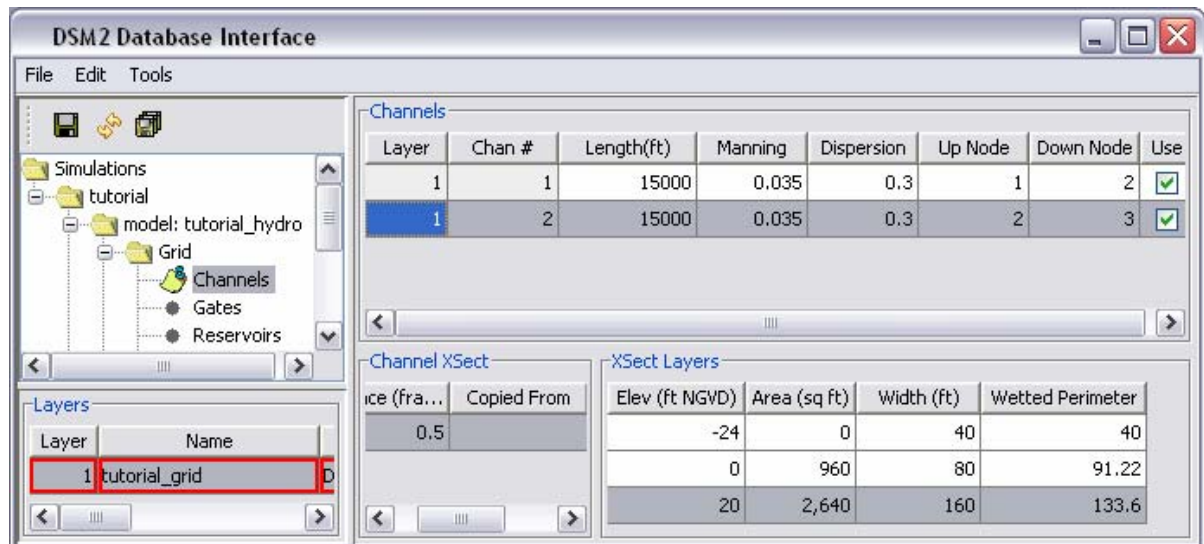
This message warns against duplicate rows. Since the new row will be modified before being saved, there will be no problem, so proceed by clicking *OK*.

10) Navigate back to the Excel file, *TutorialSetup.xls*, and select the *Channel Configuration* tab.

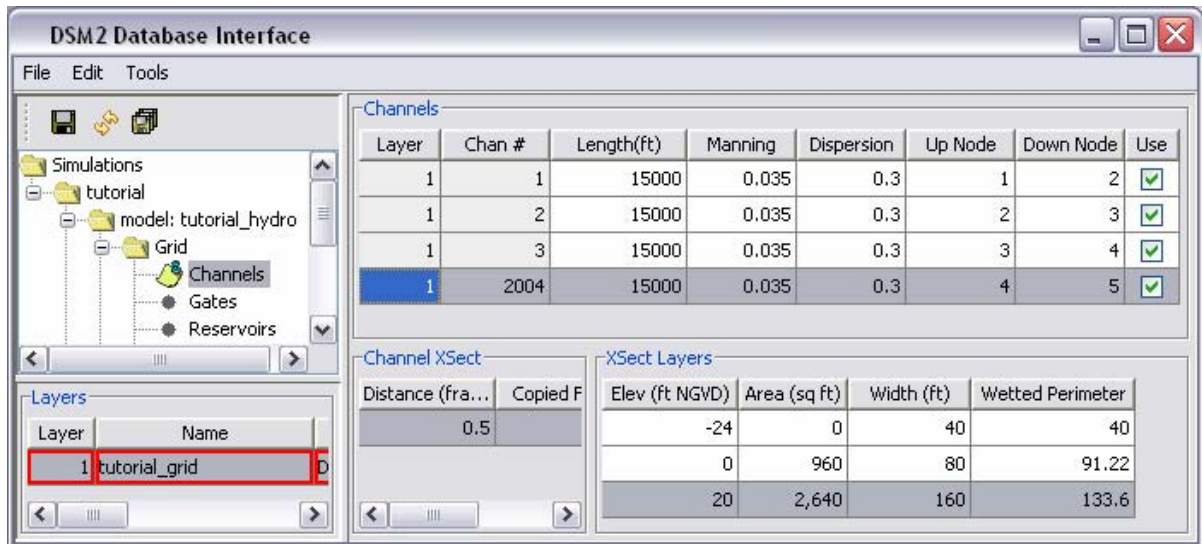
11) View the information in the second row of the table, and note that the information for *Channel 2* is identical to that of *Channel 1*, with the exception of the *Channel*, *Up Node*, and *Down Node* fields. These numbers are incremented by one.

12) Navigate back to the GUI, and select the second row in the *Channels* table.

13) Make the changes to the *Channel*, *Up Node*, and *Down Node* fields.



14) Note that the situation is identical for *Channels 3* and *2004*. Repeat steps 18 through 22 with the appropriate information for these two channels. The GUI should then look as follows:



15) Enter information for *Channel 5*:

- i) In the *Channels* table, right-click and select *Insert row*.
- ii) Fill-in the fields of the new row for *Channel 5*, so that they match those in the *Channel Configuration* table of the Excel file.
- iii) Note from Figure 1 that *Channel 5* has two cross-sections; one at 0.2 times the length of the channel, and one at 0.8 times the length of the channel. In the *Channel Xsect* table, right-click and select *Insert row*.
- iv) In the *Distance (fraction)* column, enter *0.2*.
- v) Navigate to the Excel file and select the *Xsect A* tab.
- vi) Copy the information in the summary table to the clipboard.
- vii) Navigate back to the GUI.
- viii) In the *Xsect Layers* table, left-click and then hit control-v.
- ix) Right-click in the *Channel Xsect* table, and select *Insert Row*.
- x) In the *Distance (fraction)* column, type *0.8* and press *enter*.
- xi) Navigate to the Excel file and select the *Xsect B* tab.
- xii) Copy the information in the summary table to the clipboard. Do **not** include the headers.

	A	B	C	D
23	Summary			
24	Elev	Area	Width	Wetted Perimeter
25	-20	0	60	60.00
26	-4	1120	80	97.74
27	2	1660	100	109.40
28	10	2700	160	140.45

xiii) Navigate back to the GUI.

xiv) In the *XSect Layers* table, left-click and hit control-v.

Layer	Chan #	Length(ft)	Manning	Dispersion	Up Node	Down Node	Use
1	1	15000	0.035	0.3	1	2	<input checked="" type="checkbox"/>
1	2	15000	0.035	0.3	2	3	<input checked="" type="checkbox"/>
1	3	15000	0.035	0.3	3	4	<input checked="" type="checkbox"/>
1	2004	15000	0.035	0.3	4	5	<input checked="" type="checkbox"/>
1	5	18000	0.035	0.3	5	6	<input checked="" type="checkbox"/>

Distance (fra...)	Copied F
0.2	
0.8	

Elev (ft NGVD)	Area (sq ft)	Width (ft)	Wetted Perimeter
-20	0	60	60
-4	1,120	80	97.74
2	1,660	100	109.4
10	2,700	160	140.45

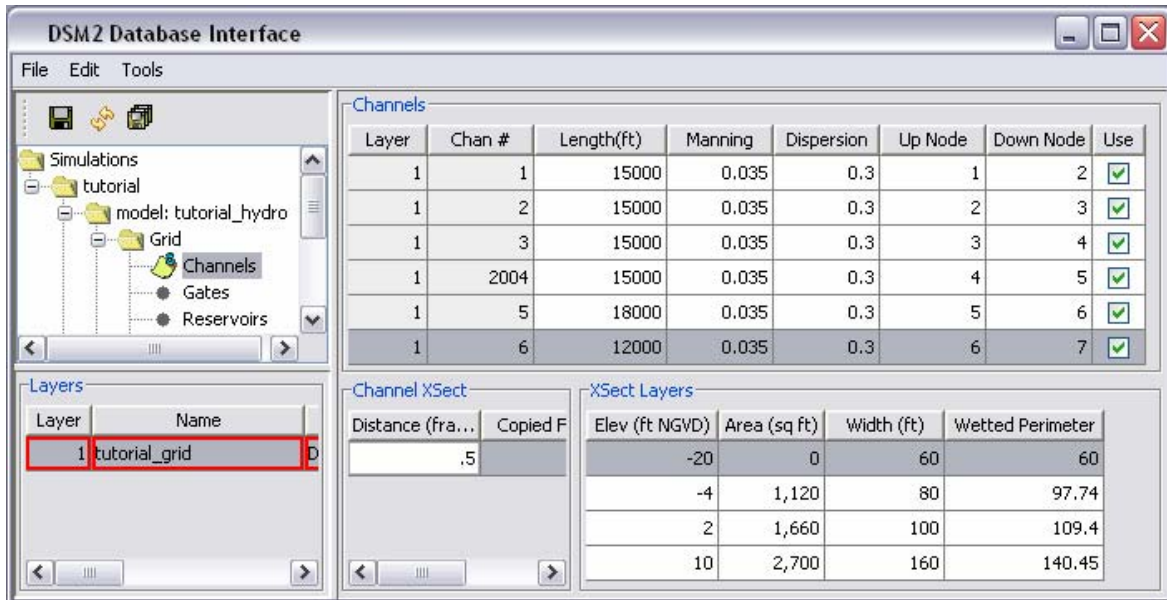
16) Enter information for *Channel 6*:

i) In the *Channels* table, right-click and select *Insert row*.

ii) Enter the information for *Channel 6* from the *Channel Configuration* tab of the Excel file into this row.

iii) In the *Channel XSect* table, right-click and select *Insert Row*.

- iv) In the *Distance (fraction)* column, type *0.5* and press enter.
- v) Navigate to the Excel file and select the *XSect B* tab.
- vi) Copy the information in the summary table to the clipboard.
- vii) In the *XSect Layers* table, left-click and then hit control-v.

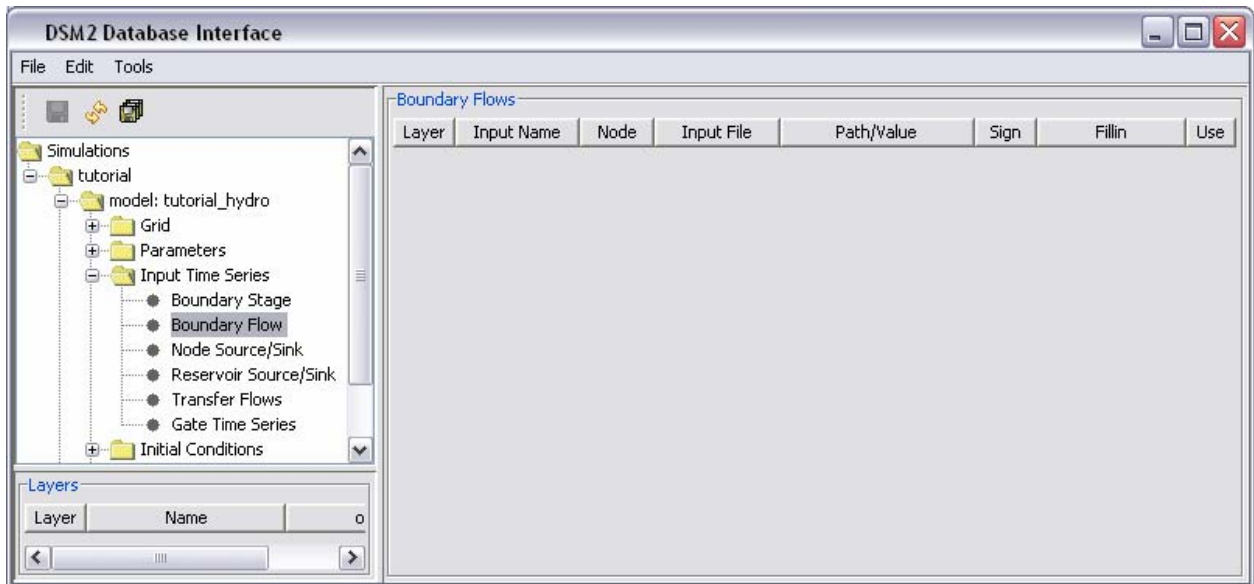


17) Save the current settings.

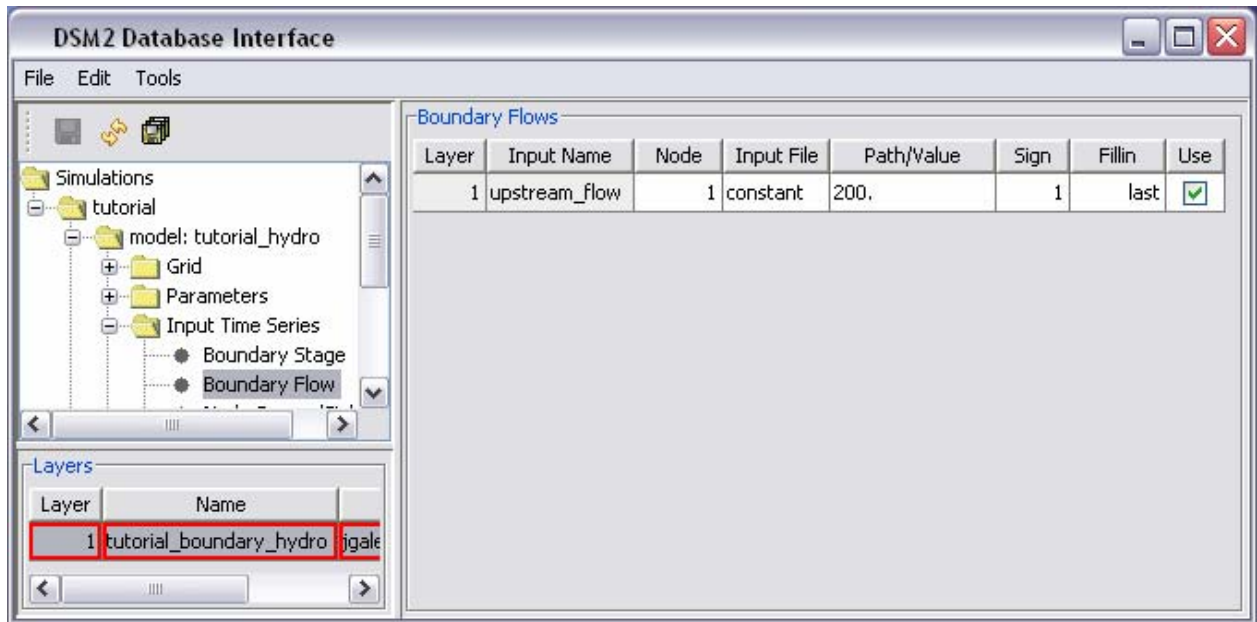
18) In the *Layers panel*, right-click and select *Unset edit layer* [optional].

6. In HYDRO, set the Boundary Flow information:

- a. In the *Simulations Navigator*.
 - 1) Collapse the *Grid* folder [optional].
 - 2) Expand the *Input Time Series* folder.
 - 3) Double-click on *Boundary Flow*.



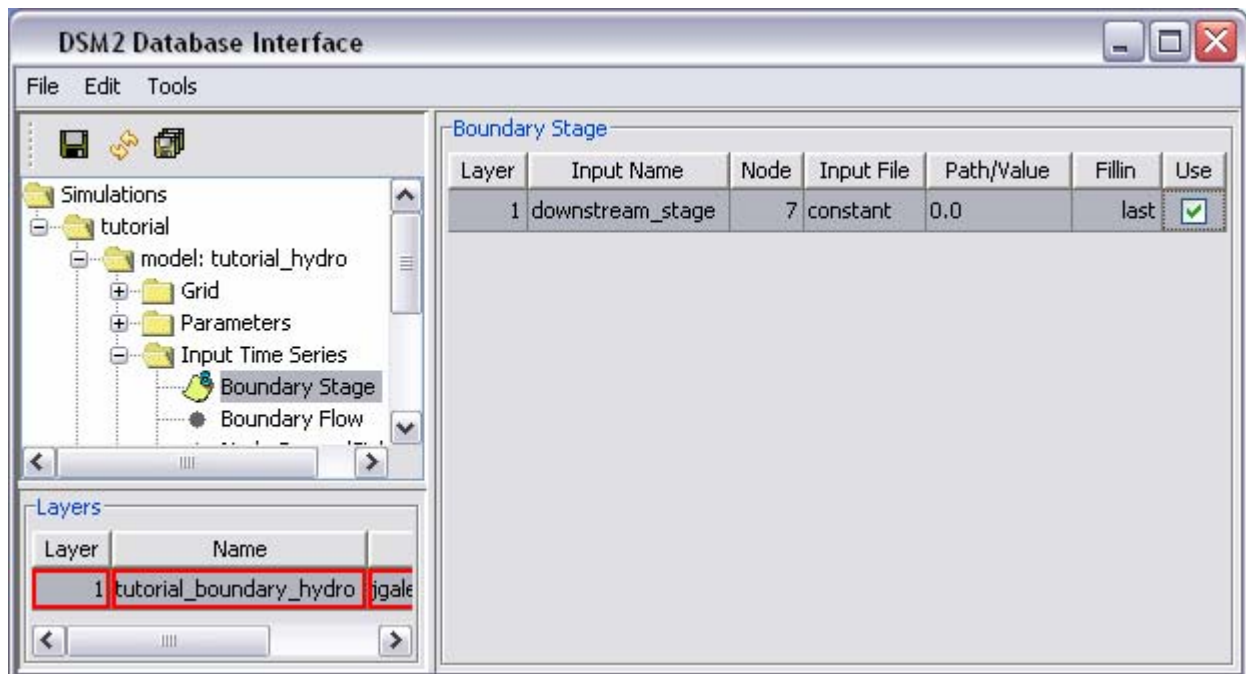
- b. Add a HYDRO Boundary Layer:
 - 1) In the *Layers panel*, right-click and select *New Layer*.
 - 2) Select *Yes* to confirm the refresh.
 - 3) Name the new layer, *tutorial_boundary_hydro*, and add a description.
 - 4) In the *Input window*, add as layer 1.
- c. In the *Layers panel*, right-click and select *Set edit layer*.
- d. In the *Select Layers* window, double-click the *tutorial_boundary_hydro* layer.
- e. In the *Boundary Flows* table:
 - 1) Right-click and click *Insert row*.
 - 2) In the new row, enter the following values into the correct fields:
 - i) Input Name: *upstream_flow*
 - ii) Node: *1*
 - iii) Input File: *constant*
 - iv) Path/Value: *200*.
 - iv) Sign: *1*
 - v) Fillin: *Last*
 - vi) Use: Make sure that the row contains a check-mark.



- b. Save the current settings.
- c. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

2. In HYDRO, set the Boundary Stage information:

- a. In the *Simulations Navigator*:
 - 1) Remain in the *Time Series Input* folder.
 - 2) Double-click on *Boundary Stage*.
- b. In the *Layers panel*, right-click and select *Set edit layer*.
- c. In the *Select Layers* window, double-click the *tutorial_boundary_hydro* layer.
- d. In the *Boundary Stage table*:
 - 1) Right-click and select *Insert Row*.
 - 2) In the new row, enter the following values into the appropriate fields:
 - i) Input Name: *downstream_stage*
 - ii) Node: *7*
 - iii) Input File: *constant*
 - iv) Path/Value: *0.0*
 - v) Fillin: *Last*
 - vi) Use: Make sure that the entry contains a checkmark.



- b. Save the current settings.
- c. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

2. In HYDRO, set the Initial Conditions for stage and flow:

For each of the channels, the stage and flow will be set 0. These 0-values will be applied at both the 0 and *length* distances along the channel. With seven channels, two variables, and two locations to set the values, there will be a total of 28 rows. To save time, this information has been provided in the accompanying Excel spreadsheet.

- a. In the *Simulations Navigator*:
 - 1) Collapse the *Input Time Series* folder [optional].
 - 2) Expand the *Initial Conditions* folder.
 - 3) Double-click on *Channel IC*.
- b. In the *Layers panel*, right-click and select *Set edit layer*.
- c. In the *Select Layer* window, double-click the layer, *tutorial_grid*.
- d. Navigate back to the Excel spreadsheet, *TutorialSetup.xls*.
 - 1) Select the *Initial Conditions* tab.
 - 2) Copy the information from the table to the clipboard. Do **not** include the headers.

Microsoft Excel - TutorialSetup.xls

File Edit View Insert Format Tools Data Window Help

Adobe PDF

File

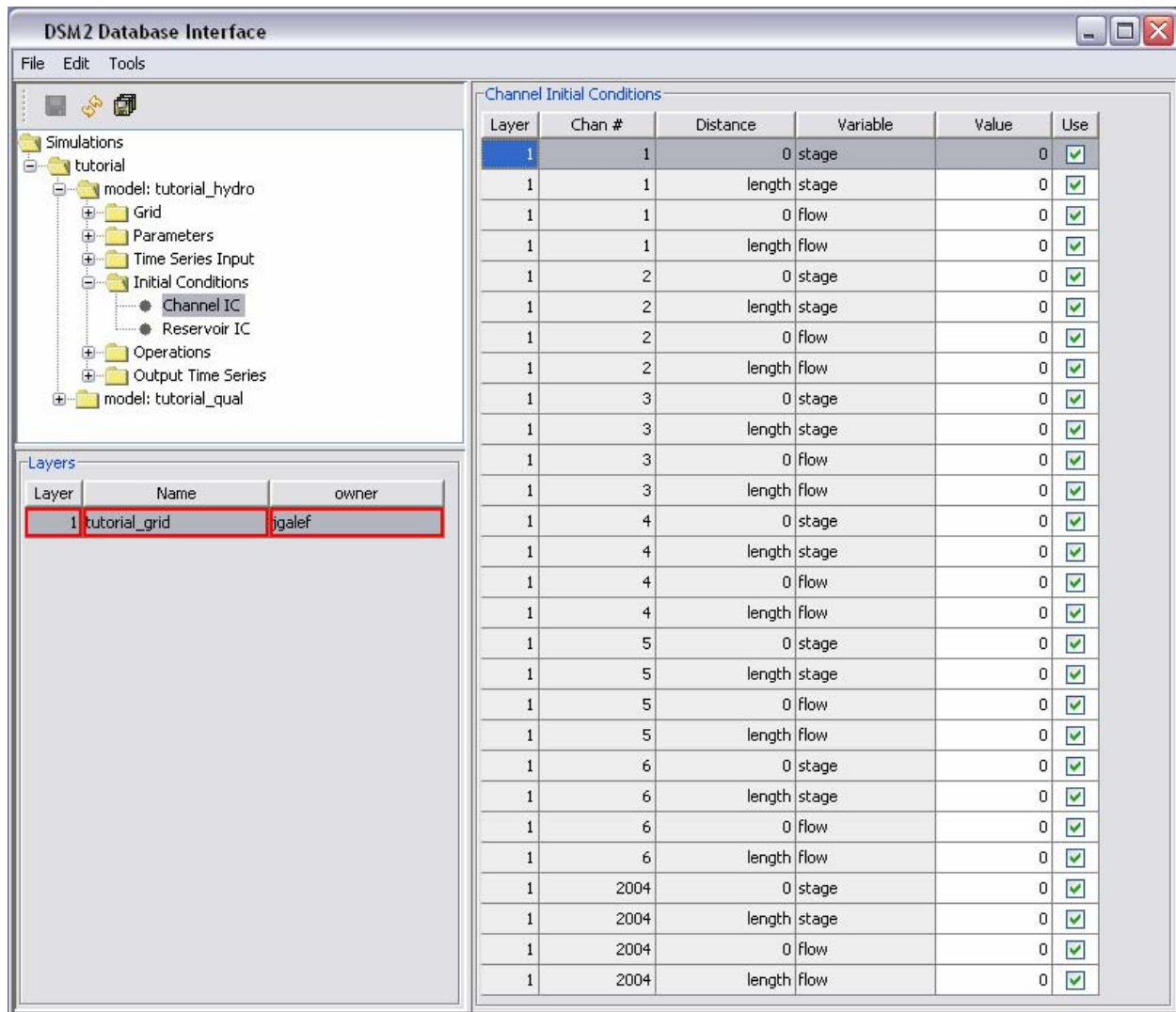
A3 f_x 1 Fill Color (Yellow)

	A	B	C	D	E	F
1	Tutorial 1					
2	Layer	Channel #	Distance	Variable	Value	Use
3	1	1	0	stage	0	TRUE
4	1	1	length	stage	0	TRUE
5	1	1	0	flow	0	TRUE
6	1	1	length	flow	0	TRUE
7	1	2	0	stage	0	TRUE
8	1	2	length	stage	0	TRUE
9	1	2	0	flow	0	TRUE
10	1	2	length	flow	0	TRUE
11	1	3	0	stage	0	TRUE
12	1	3	length	stage	0	TRUE
13	1	3	0	flow	0	TRUE
14	1	3	length	flow	0	TRUE
15	1	5	0	stage	0	TRUE
16	1	5	length	stage	0	TRUE
17	1	5	0	flow	0	TRUE
18	1	5	length	flow	0	TRUE
19	1	6	0	stage	0	TRUE
20	1	6	length	stage	0	TRUE
21	1	6	0	flow	0	TRUE
22	1	6	length	flow	0	TRUE
23	1	2004	0	stage	0	TRUE
24	1	2004	length	stage	0	TRUE
25	1	2004	0	flow	0	TRUE
26	1	2004	length	flow	0	TRUE

Initial Conditions / HYDRO Output / QUAL Output

Ready Sum=8108 NUM

- e. Return to the GUI.
- f. In the *Channels table*, left-click and hit control-v to paste the initial conditions information from Excel.



- g. Save the current settings.
- h. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

3. In HYDRO, Specify the Output Locations:

A new layer will be created for the output locations. These locations will include the two boundaries, two locations along Channel 2, and the beginning of Channel 2004. The output variables will include both stage and flow.

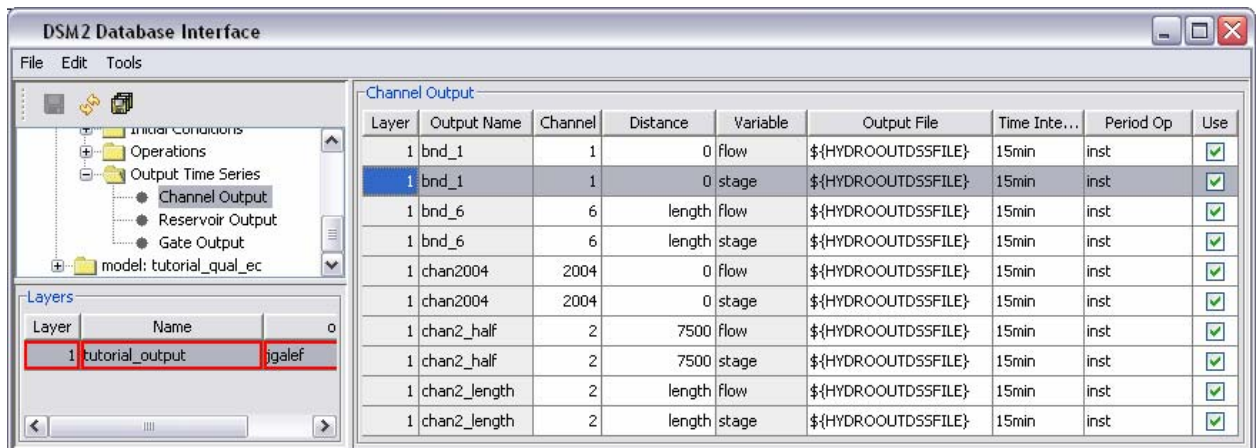
- a. In the *Simulations Navigator*:
 - 1) Collapse the *Initial Conditions* folder [optional].
 - 2) Expand the *Output Time Series* folder.
 - 3) Double-click on *Channel Output*.

- b. Create a new Output Layer:
 - 1) In the *Layers panel*, right-click and select *New layer* from the menu.
 - 2) Select Yes to confirm the refresh.
 - 3) Name the new layer, *tutorial_output*, and add a description.
 - 4) In the *Input window*, add as layer 1.
- c. In the *Layers panel*, right-click and select *Set edit layer*.
- d. In the *Select Layers* window, double-click the *tutorial_output* layer.
- e. Navigate back to the Excel spreadsheet, *TutorialSetup.xls*.
 - 1) Select the *HYDRO Output* tab.
 - 2) Copy the information from the table to the clipboard. Do **not** include the headers.

	A	B	C	D	E	F	G	H	I
1	Layer	Output Name	Channel	Distance	Variable	Output File	Time Interval	Period Op	Use
2	1	bnd_1	1	0	flow	\${HYDROOUTDSSFILE}	15min	inst	TRUE
3	1	bnd_1	1	0	stage	\${HYDROOUTDSSFILE}	15min	inst	TRUE
4	1	bnd_6	6	length	flow	\${HYDROOUTDSSFILE}	15min	inst	TRUE
5	1	bnd_6	6	length	stage	\${HYDROOUTDSSFILE}	15min	inst	TRUE
6	1	chan2004	2004	0	flow	\${HYDROOUTDSSFILE}	15min	inst	TRUE
7	1	chan2004	2004	0	stage	\${HYDROOUTDSSFILE}	15min	inst	TRUE
8	1	chan2_half	2	7500	flow	\${HYDROOUTDSSFILE}	15min	inst	TRUE
9	1	chan2_half	2	7500	stage	\${HYDROOUTDSSFILE}	15min	inst	TRUE
10	1	chan2_length	2	length	flow	\${HYDROOUTDSSFILE}	15min	inst	TRUE
11	1	chan2_length	2	length	stage	\${HYDROOUTDSSFILE}	15min	inst	TRUE

- f. Return to the GUI.
- g. In the *Channel Output* table, left-click and hit control-v to paste the *Channel Output Locations* information from Excel.

h. The GUI should now look as follows:



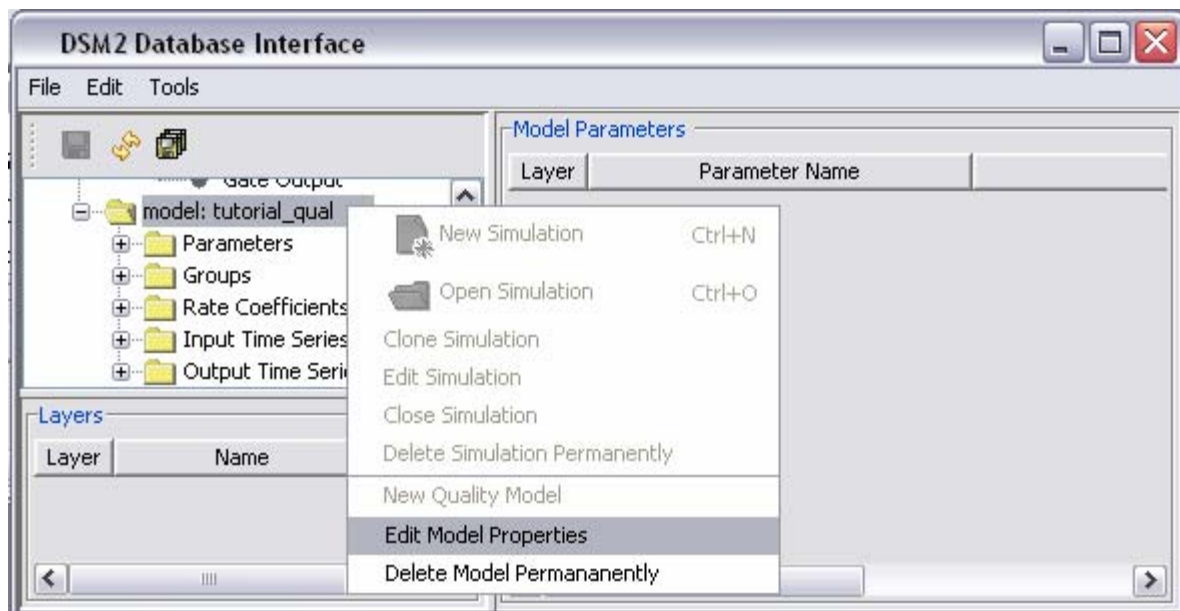
i. Save the current settings.

j. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

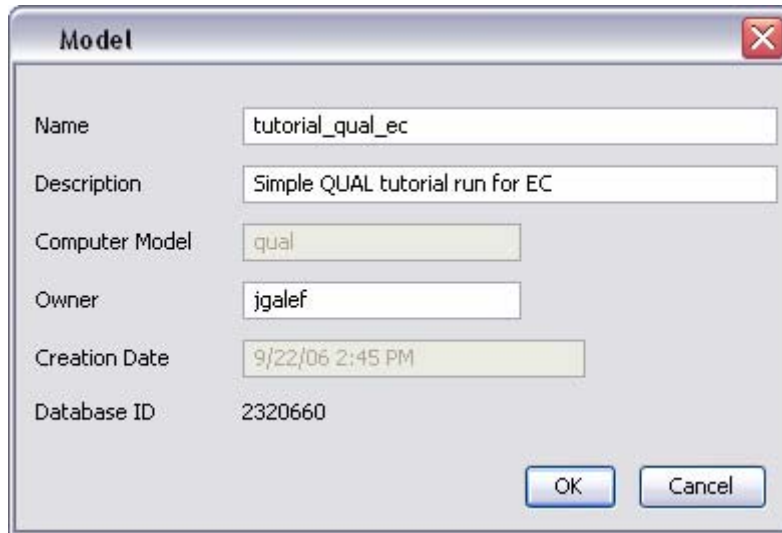
4. Rename QUAL Model

By default, the QUAL model is named *tutorial_qual*.

a. In the *Sessions Navigator*, right-click on *model:tutorial_qual* and select *Edit model properties*.



- b. In the *Model Window*, change the name of the model to *tutorial_qual_ec*, and add a description.



The screenshot shows a 'Model' dialog box with the following fields and values:

Field	Value
Name	tutorial_qual_ec
Description	Simple QUAL tutorial run for EC
Computer Model	qual
Owner	jgalef
Creation Date	9/22/06 2:45 PM
Database ID	2320660

At the bottom right, there are 'OK' and 'Cancel' buttons.

2. In QUAL, add the Parameter information:

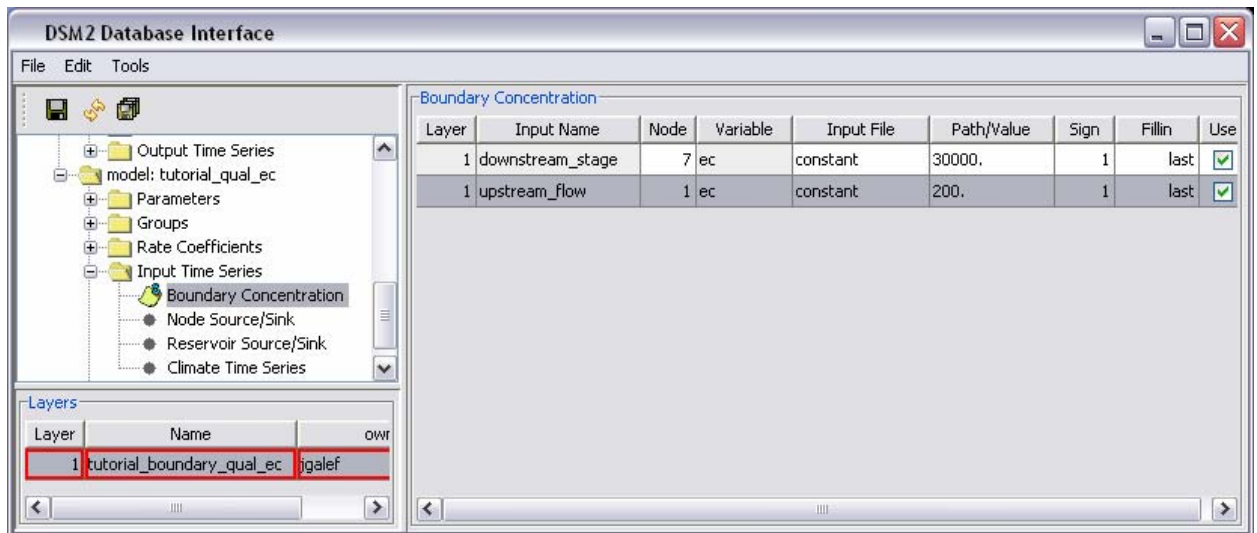
- a. In the *Simulations Navigator*:
- 1) Collapse the *model: tutorial_hydro* folder [optional].
 - 2) Expand the *model: tutorial_qual-ec* folder.
 - 3) Expand the *Parameters* folder.
 - 4) Double-click on *Model Parameters*.
- b. In the *Layers panel*, right-click and select *Add layer* from the menu.
- c. In the *Select Layer* window, double-click the *qual_standard_parameters* layer.
- d. In the *Input window*, add as layer 1.

3. In QUAL, set the Boundary Concentration information:

- a. In the *Simulations Navigator*:
- 1) Collapse the *Parameters* folder [optional].
 - 2) Expand the *Input Time Series* folder.
 - 3) Double-click on *Boundary Concentration*.
- b. Add a QUAL Boundary Layer:
- 1) In the *Layers panel*, right-click and select *New layer*.
 - 2) Click yes to confirm the refresh.

- 3) Name the layer, *tutorial_boundary_qual_ec*, and provide a description.
- 4) In the *Input window*, add as layer 1.
- c. In the *Layers panel*, right-click and select *Set edit layer*.
- d. In the *Select Layer* window, double-click the *tutorial_boundary_qual_ec* layer.
- e. In the *Boundary Concentration* table, add an upstream concentration row:
 - 1) Right-click and select *Insert row*.
 - 2) In the new row, enter the following information into the appropriate fields:
 - i) Input Name: *upstream_flow*.
 - ii) Node: 1.
 - iii) Variable: *ec*.
 - iv) Input File: *constant*.
 - v) Path/Value: 200.
 - vi) Sign: 1.
 - vii) Fillin: *last*.
 - viii) Use: Make sure that the entry contains a checkmark.
- f. In the *Boundary Concentration* table, add a downstream concentration row:
 - 1) Right-click and select *Insert row*.
 - 2) In the newest row, enter the following information into the appropriate fields:
 - i) Input Name: *downstream_stage*.
 - ii) Node: 7.
 - iii) Variable: *ec*.
 - iv) Input File: *constant*.
 - v) Path: 30000.
 - vi) Sign: 1.
 - vii) Fillin: *last*.
 - viii) Use: Make sure that the entry contains a checkmark.

- g. When complete, the interface should look as follows:



- h. Save the current settings.
i. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

4. In QUAL, Specify the Output Locations:

A new layer will be created for the output locations. These locations will include the two boundaries, two locations along Channel 2, and the beginning of Channel 2004. The output variable will be *ec*.

- a. In the *Simulations Navigator*:
 - 1) Collapse the *Input Time Series* folder [optional].
 - 2) Expand the *Output Time Series* folder.
 - 3) Double-click on *Channel Output*.
- b. Create a QUAL Output Layer:
 - 1) In the *Layers panel*, right-click and select *New layer*.
 - 2) Select *Yes* to confirm the refresh.
 - 3) Name the new layer, *tutorial_output_ec*, and add a description of the new layer.
 - 4) Enter *1* for the layer number.
- c. In the *Layers panel*, right-click and select *Set edit layer*.
- d. In the *Select Layer* window, double-click the *tutorial_output_ec* layer.

- e. Navigate back to the Excel spreadsheet, *TutorialSetup.xls*.
 - 1) Select the *QUAL Output* tab.
 - 2) Copy the information from the table to the clipboard. Do **not** include the headers.

Layer	Output Name	Channel	Distance	Variable	Source Group	Output File	Time Interval	Period Op	Use
1	bnd_1	1	0	ec		\${QUALOUTDSSFILE}	15min	inst	TRUE
1	bnd_6	6	length	ec		\${QUALOUTDSSFILE}	15min	inst	TRUE
1	chan2004	2004	0	ec		\${QUALOUTDSSFILE}	15min	inst	TRUE
1	chan2_half	2	7500	ec		\${QUALOUTDSSFILE}	15min	inst	TRUE
1	chan2_length	2	length	ec		\${QUALOUTDSSFILE}	15min	inst	TRUE

- f. Return to the GUI.
- g. In the *Channel Output* table, left-click and hit control-v to paste the output locations information from Excel.
- h. The GUI should now look as follows:

Layer	Output Name	Channel	Dist...	Variable	Source Group	Output File	Time Inte...	Period Op	Use
1	bnd_1	1	0	ec		\${QUALOUTDSSFILE}	15min	inst	<input checked="" type="checkbox"/>
1	bnd_6	6	length	ec		\${QUALOUTDSSFILE}	15min	inst	<input checked="" type="checkbox"/>
1	chan2004	2004	0	ec		\${QUALOUTDSSFILE}	15min	inst	<input checked="" type="checkbox"/>
1	chan2_half	2	7500	ec		\${QUALOUTDSSFILE}	15min	inst	<input checked="" type="checkbox"/>
1	chan2_length	2	length	ec		\${QUALOUTDSSFILE}	15min	inst	<input checked="" type="checkbox"/>

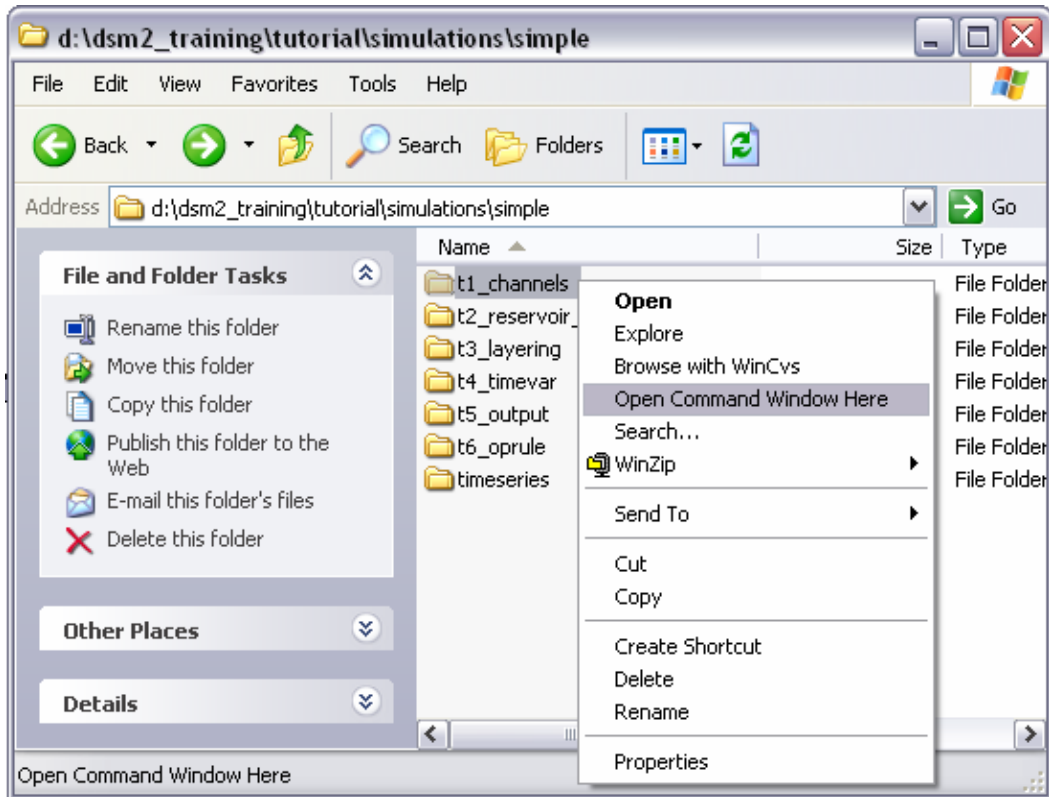
Layer	Name	own
1	tutorial_output_ec	igalef

- i. Save the current settings.
- j. In the *Layers panel*, right-click and select *Unset edit layer* [optional].

5. Running HYDRO and QUAL

- a. In Windows Explorer, navigate to the directory:
`\\dsm2_training\tutorial\simulations\simple\`

- b. Right-click on the directory, *t1_channels*, and select *Open Command Window Here*.



- c. In the command window, type: *hydro hydro.inp*.



- d. HYDRO will then run and create an *output.dss* file in the same directory.
- e. In the command window, type: *qual qual.inp*.
- f. QUAL will then run and add output to the *output.dss* file.
- g. Open the *output.dss* file and examine the results.