Users Guide to the NFSEG Automated Water-Use Permit Simulation Tool:

Step-by-Step Procedures

Disclaimer

Please report any errors to Lanie Meridth (lmeridth@sjrwmd.com) at the St Johns River Water Management District, Douglas Durden (Douglas.Durden@srwmd.org) at the Suwannee River Water Management.

Software Requirements:

ArcGIS Desktop, version 10.0 or later, installed on your local machine (or a computer that you connect with remotely that has ArcGIS installed on it).

Overview of Steps:

Note to the User: If this is the first time running the tool or an update, please read the more detailed instructions (below) first.

1. Navigate to the top-level tool directory
2. Create a formatted User input csv file. Name is flexible, but no spaces are allowed in the name. The “user_input_files” folder is provided with example input files and is the recommended location for new input files.
3. Double-click on the batch file “sim_cup_initiate.bat” to open the tool console
4. Fill-in the User input filename, select whether to replace an existing results directory which possesses the same name as the User input file, and select a projection as prompted.
5. Monitor the output in the console to ensure no errors occur, process takes about 10-20 minutes for each well depending on the size of withdrawal/injection.

6. A completion message appears at the end of a run. The console pauses to allow inspection of the output. If no errors occurred (signified by an error statement on the console) then the User has the option to either enter another User input file to run, or type **exit** to close the console. There is no limit to the number of times new input files may be processed before exiting the console. Each run is processed in its own results directory with its own logfile.
7. Each successful run generates a results directory containing an mxd map of the change in head water levels, two output csv files, and the logfile.

NOTE: Before clicking on the batch file to start the tool, close all related Excel and ArcMap files that are used to setup the Permitting Tool. Any open files could cause program errors. Also, it is sometimes necessary to save Excel csv files in MSDOS csv format.

NOTE: This tool is setup to run the NFSEG v1.1 groundwater model. Using a different model will cause unpredictable errors.

NOTE: The Suwanee River Water Management District (SRWMD) and St Johns River Water Management District (SJRWMD) utilize two different map projections in GIS. X,Y coordinates must correspond to the correct projection. Input the selection when prompted at the command line.

1 = SRWMD is used for State Plane North

2 = SJRWMD is used for UTM Zone 17N meters

Detailed Instructions:

Initial Setup / Installation of the Tool

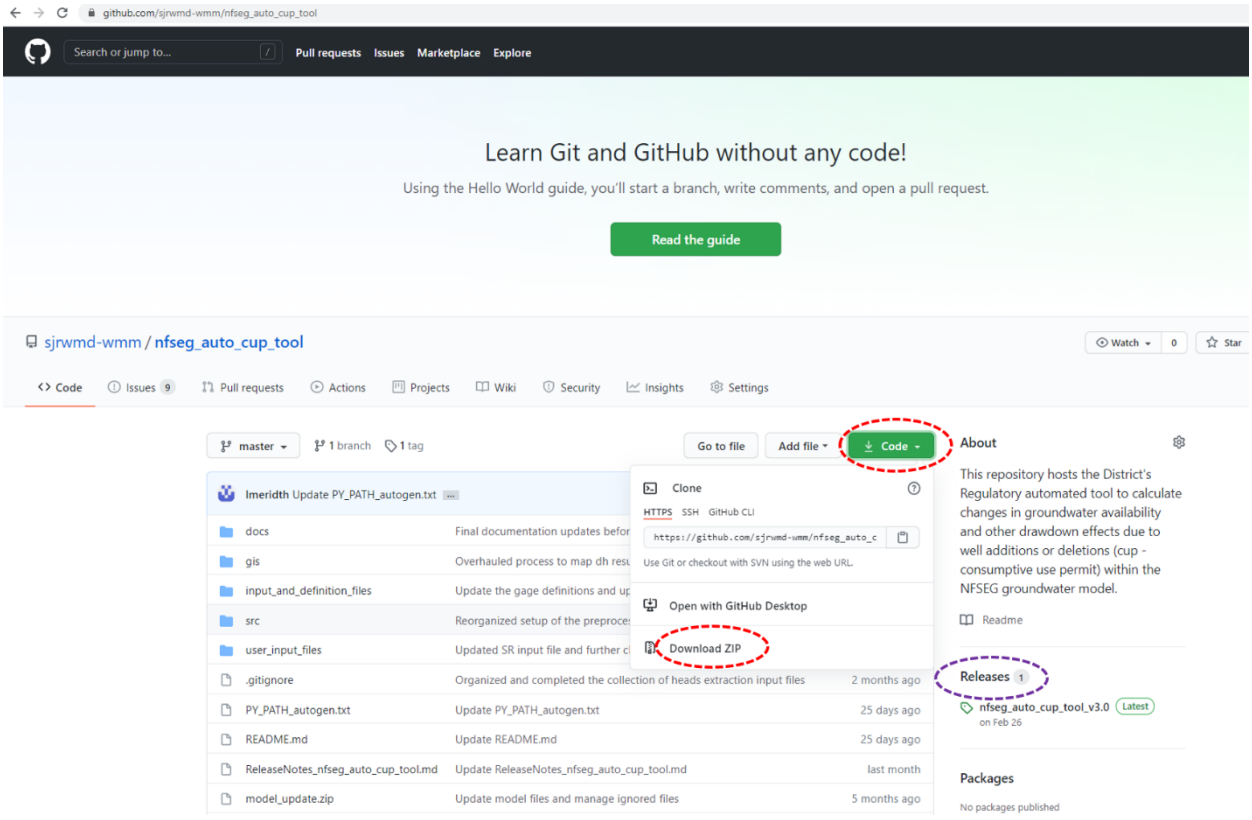
NOTE: This process only needs to be done once per tool update.

NOTE: This tool uses the Python that is bundled with ArcMap 10.0 or newer. The tool automatically searches for the location of this Python. If that is unsuccessful, then ERRORs will occur. Ensure that ArcMap's Python can be found before running the tool (see steps below).

NOTE: The tool should be downloaded to the local machine's hard drive, such as the local C:\ drive, where ArcMap is generally installed. The tool does not currently support running from a server location (i.e. poseidon or beohome).

1. There are two types of download versions: the development and release versions, each of which can be downloaded as zip files. Navigate to the Tool's GitHub repository (https://github.com/sjrwmd-wmm/nfseg_auto_cup_tool) and download the zip file. The development version is found by clicking on the green colored "Code" icon (see figure, dashed red circle). The release version is found

by clicking on the “Releases” tab and downloading the zip file from the desired release version (see figure below, dashed purple circle). After the download is complete, unzip the tool to a directory on the local machine’s hard drive. The tool unzips into its own directory, referred to as the *top-level tool directory*. The last portion of the default Windows PATH when unzipping is usually not necessary. Unzip the tool and enter the top-level tool directory. **NOTE:** Microsoft Edge or Firefox are the preferred browsers to use to access the District’s GitHub webpage. You may receive a security warning when visiting the page, please proceed to the webpage. If you are using Microsoft Edge, click ‘Details’ and ‘Go on to webpage’ to visit the webpage.

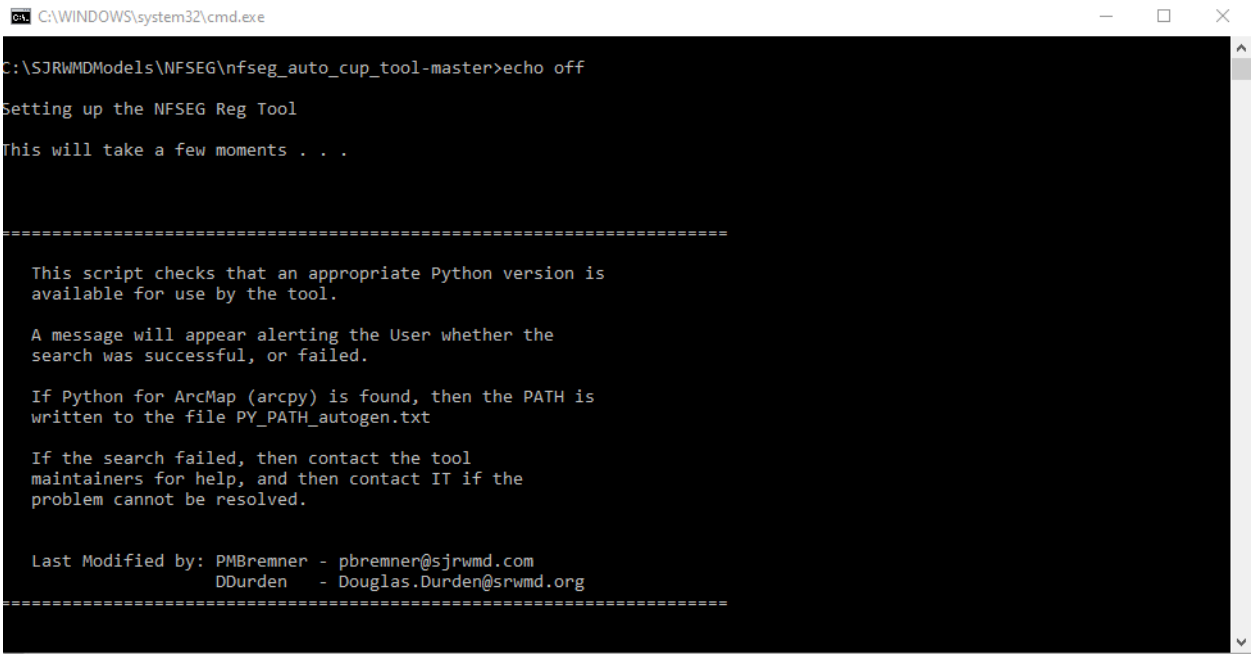


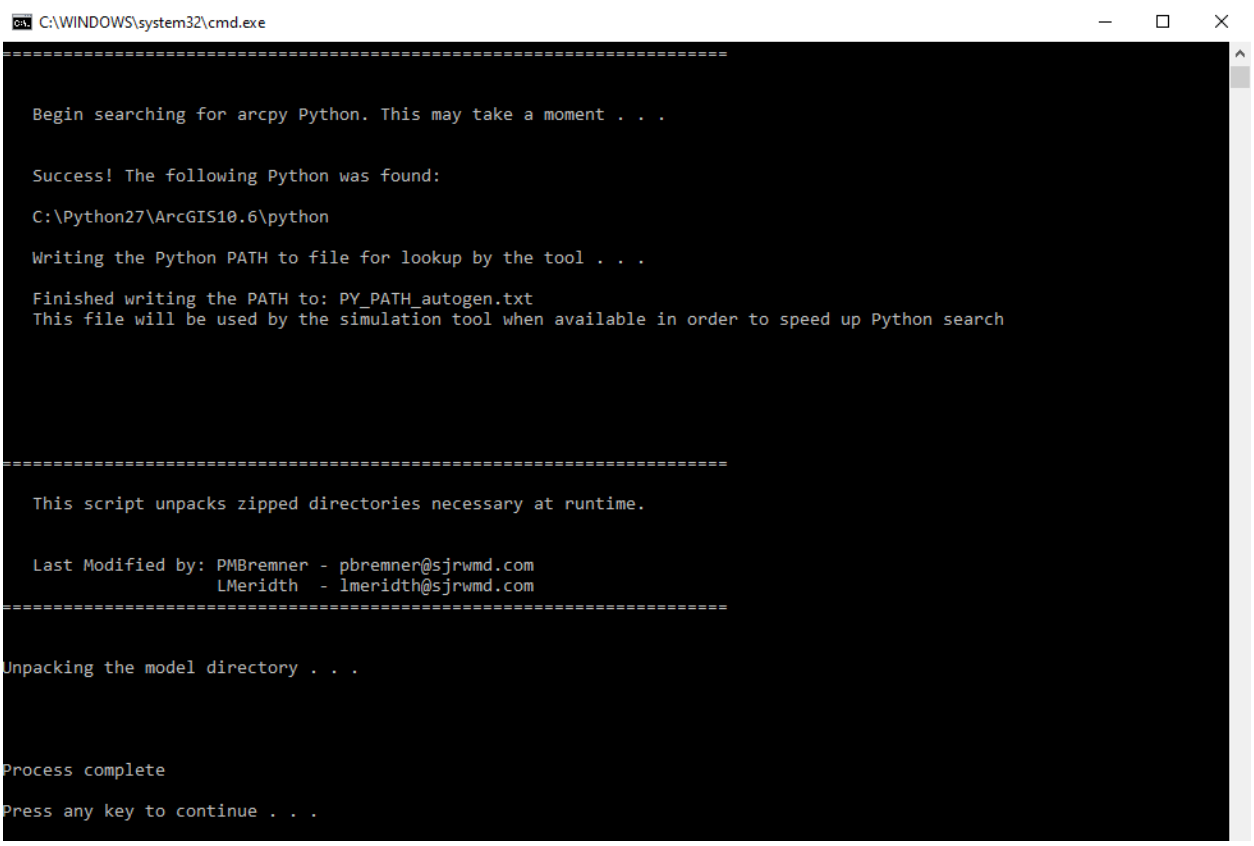
2. Check that the top-level tool directory includes (at a minimum) the following:
    - docs *(folder)* containing this Quick Users Guide
    - gis *(folder)*
    - input_and_definition_files *(folder)*
    - model_update.zip *(zip file)*
    - src *(folder)*
    - user_input_files *(folder)*
    - sim_cup_initiate.bat
    - setup.bat

NOTE: Additional files will appear in the top-level tool directory following download that are not accessed directly by the tool. This includes a file named ‘README.md’. ‘README.md’ is a markdown file containing a general description of the tool which appears in its formatted form on the GitHub repository page where the tool is accessed.

3. Setup the tool for use by double-clicking the *setup.bat* script in the top-level directory. A message may appear warning you about running the script. Click the **Run-Anyway** option (sometimes this option only appears after clicking **More**). The setup script does the following:
    a. Unzip the model and preprocess data directories.
    b. Search for the Python bundled with ArcGIS.
    c. Automatically generate a file called *PY_PATH_autogen.txt* to store the PATH. Though the simulation tool does not require the auto-generated file (the tool auto searches for Python when the file is not present), having this file available will decrease the tool runtime significantly. If Python could not be found, then a **Failure** message will appear. If this occurs, or if the version is not the one desired by the User, it will be necessary to manually set Python in the tool to resolve the issue. Please contact the tool maintainers for help.

    NOTE: It may take several minutes for the Python version on your computer to be located. To verify that the setup was successful, the *PY_PATH_autogen.txt* text file should be created and when opened should contain the file path to python on your computer. The model_update.zip should be unzipped into a folder named "model_update". In the event that “model_update” is chosen to be unzipped manually, remove the final directory name that appears in the default Windows chosen PATH, which inserts the model_update directory into another directory called model_update. Likewise, the preprocess file wellpkg_update.zip should be unzipped into a folder named “wellpkg_update“ and located in “input_and_definition_files\preproc”. If unzipping manually, remove the final directory name that appears in the default Windows chosen PATH to ensure the new directory appears in the expected location.





How to setup the User Input File

The User input file is a comma-separated-value (.csv) file created in MS Excel, or equivalent, that lists all the wells needing to be processed for a permit. Table 1 shows an example of the Excel file format, and example csv files are also provided in the

user_input_files folder included in the tool download. The name given to the file is not important, but the name must NOT contain spaces. Instead, use underscores in place of spaces. A descriptive filename of the permit simulation is recommended. The name assigned to the User input file is used to create a new results directory one directory level above the top-level tool directory. Results directories are created outside of the top-level directory to prevent results from being overwritten whenever new release versions of the tool are downloaded and installed by users. The results directory name appends "_results" to the base User input file name. Within the results directory, two csv files are output summarizing the results of the simulation, both of which will be prepended with the base of the User input filename. A logfile with all output from the console is written to the results directory and named with the base User input filename. An mxd map (dh.mxd) showing the change in head in model layers 1, 3, and 5 from the simulation is output to the results gis folder. The area-weighted average heads beneath lakes in the model are output to the postproc dh folder for three different waterbody input files. The change in heads at all model cells in each model layer (DeltaHeads_SP2-SP1_all_layers.csv) is also output to the postproc dh folder. The User input file used for the simulation is also copied to the output results directory.

For example, if the input filename is:

"sim_cup_input_example_srwmd.csv"

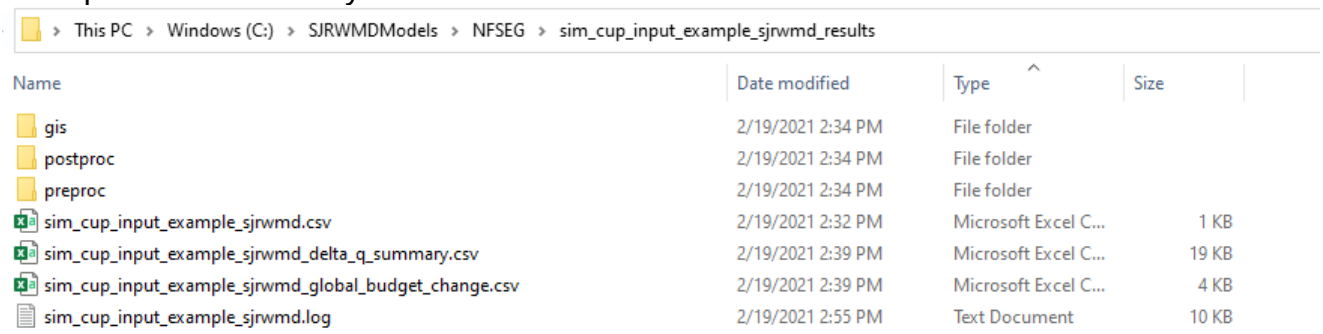
then the results directory will be named:

"sim_cup_input_example_srwmd_results"

and the two output csv files and log file will be named:

"sim_cup_input_example_srwmd_delta_q_summary.csv"
"sim_cup_input_example_srwmd_global_budget_change.csv"
"sim_cup_input_example_srwmd.log"

Example results directory:



The Rows of the User input file are as follows:

- *Row 1* contains the Permit ID and Name.

- *Row 2* contains a set of header field names describing what information needs to be filled out by the User. The field names MUST be in the order and spelling shown in the example.
- *Rows 3+* contain all the need-to-be-processed wells, one well per row.

The Columns of the well data portion (rows 3+) of the User input file are as follows:

- *Col A – WellKey* – an integer counter for each well
- *Col B – WellId* – an identifier for each well
- *Col C/D – Xcoord/Ycoord* – Cartesian coordinate representation of the Lon/Lat well coordinates. For each well, use a GIS program such as ArcMap, to obtain the X,Y coordinates within the NFSEG model. **IMPORTANT**: Reference the NFSEG grid to confirm that any added wells are within the model domain. Including a well in the user input file that is outside of the model domain will result in errors and failure of the tool, with an error message such as “division by zero”.
- *Col E – layer* – model layer the well will interact with
- *Col F – Q_mgd* – amount of water flowing through the well [units = million-gallons-per-day].

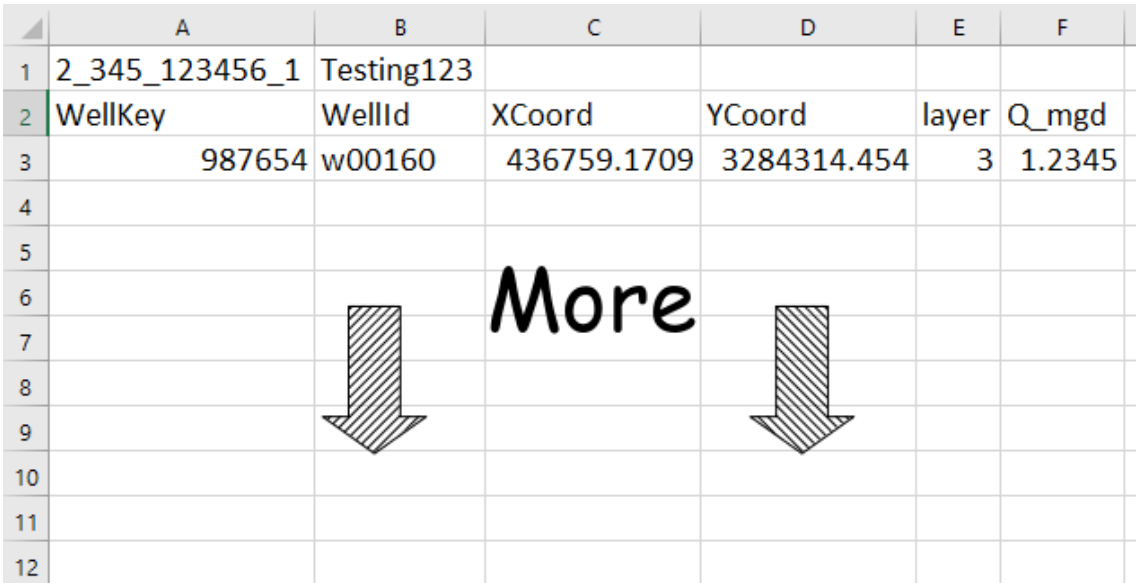
IMPORTANT: The Suwanee River Water Management District (SRWMD) and St Johns River Water Management District (SJRWMD) utilize two different map projections in GIS. Make note of which projection was used in GIS and input the selection when prompted at the command line.

1 = SRWMD is used for State Plane North

2 = SJRWMD is used for UTM Zone 17N meters

NOTE: Use a positive Q_mgd value for withdrawal, and a negative value for injection.

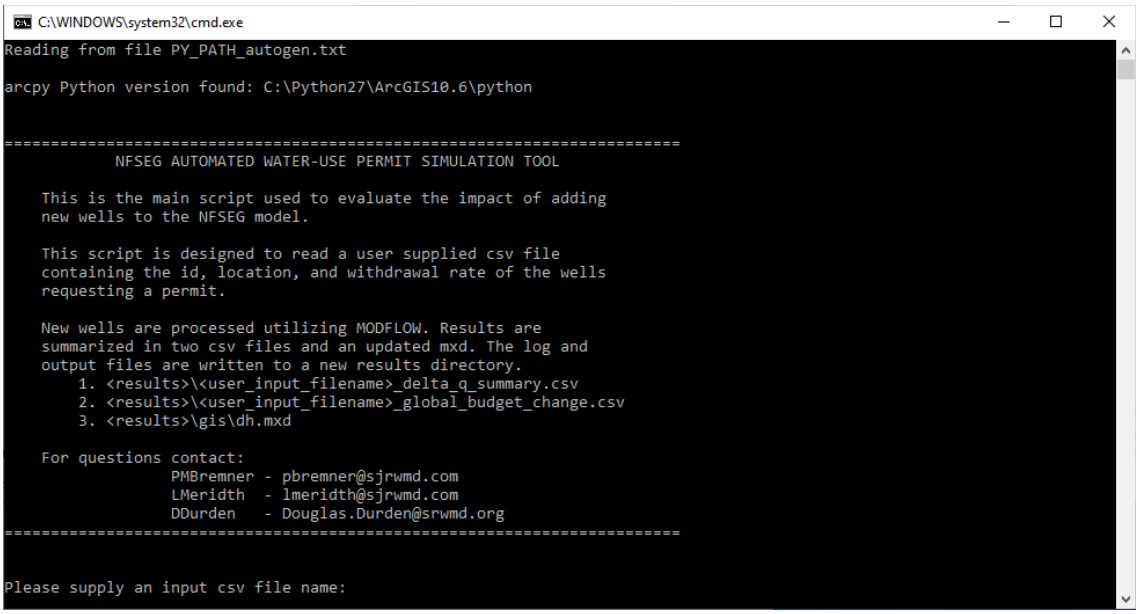
Table 1 User input file example. File should be created in MS Excel, or equivalent, and be saved as a .csv file.



Running the Water-Use Simulation Permit Simulation

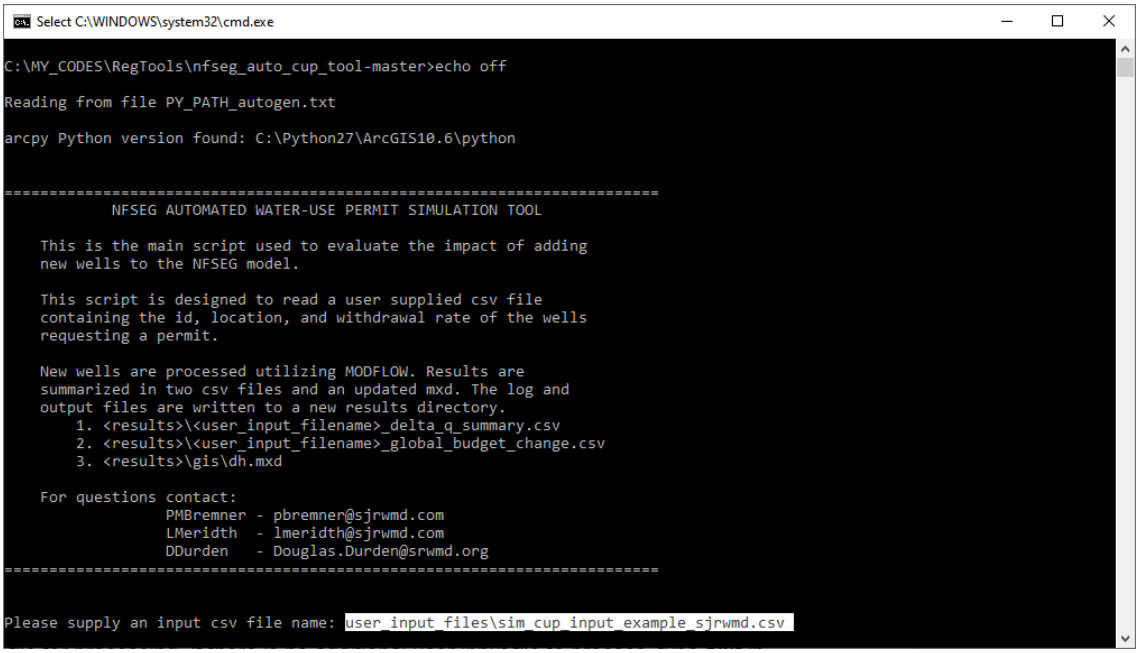
The Automated Water-Use Permit Simulation Tool runs a batch script within a Windows Command Prompt console. In the background, the batch script runs a Python script that controls the processing workflow and manages output. Successive input files may be processed without limit, where each new User input file is able to be entered once the current process is completed. The following are the steps to activate and run the tool:

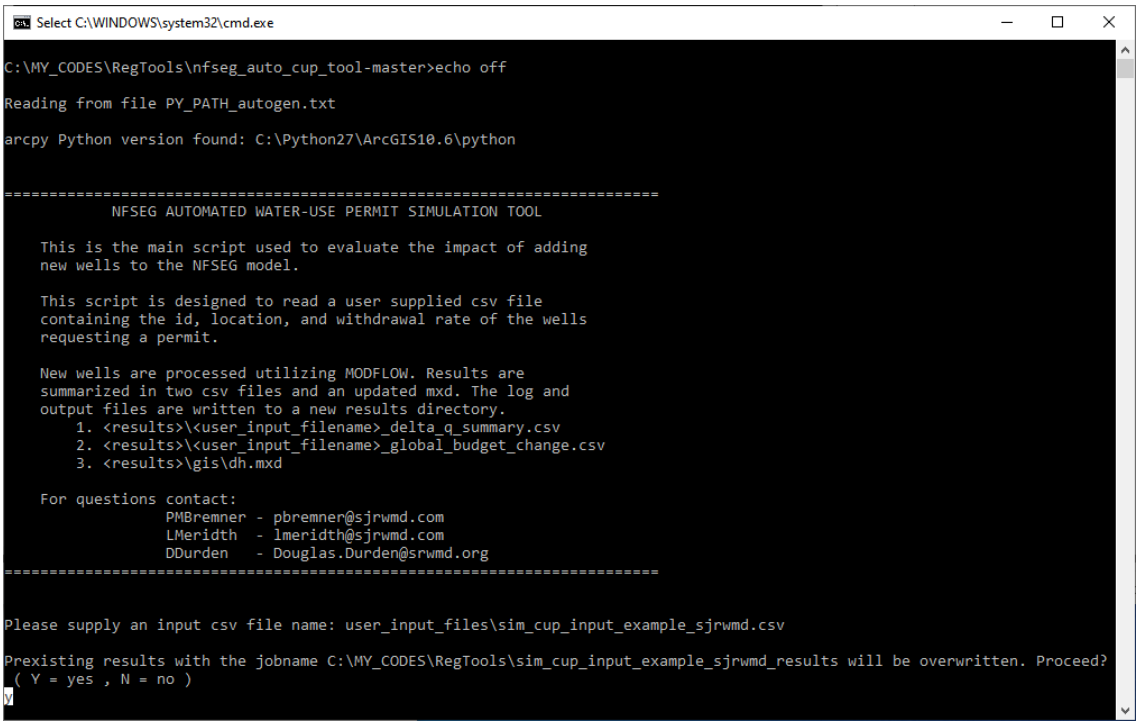
1. Navigate to the top-level directory of the tool
2. Double click on the batch file *sim_cup_initiate.bat*. A console will pop-up on the screen. When first opened, the tool may take a few moments to initialize before prompting for User input. Note that this step should take place only after the initial setup and installation of the tool has been completed (see Initial Setup / Installation of the Tool)

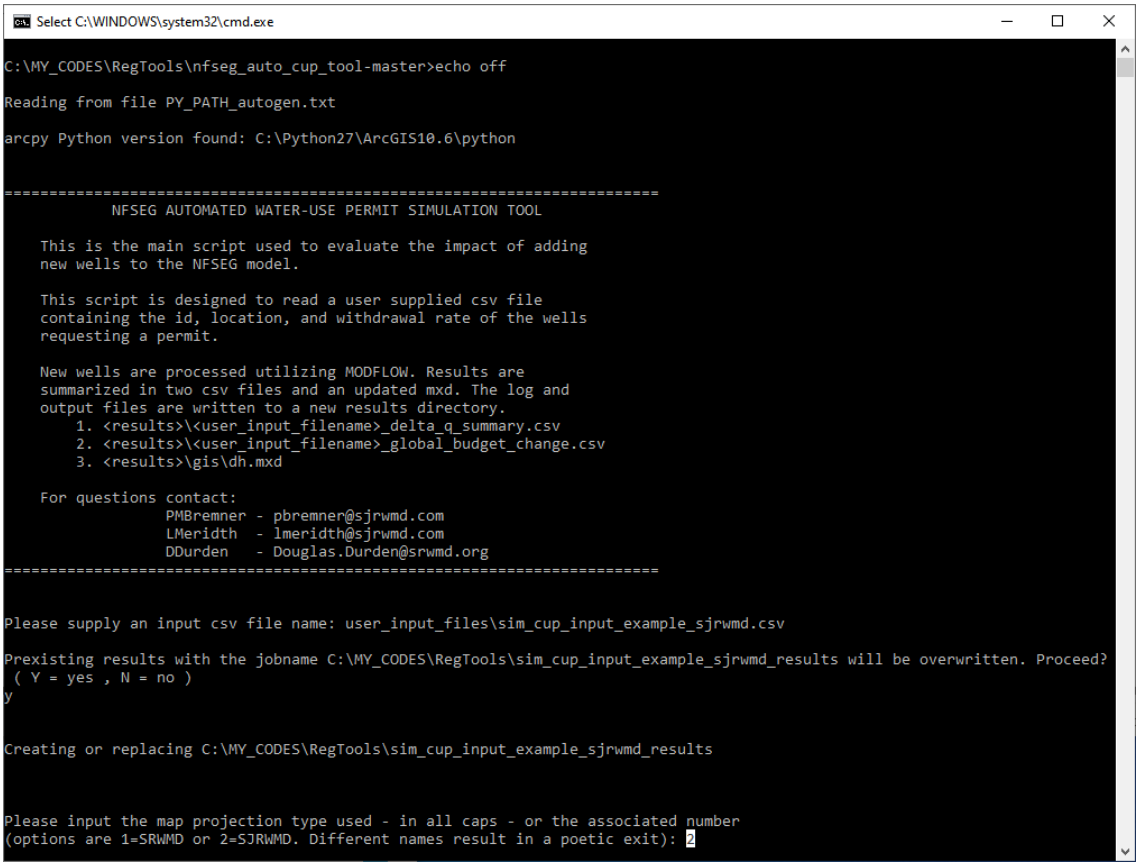


3. Follow the prompts to input both the User input csv filename, whether to proceed with overwriting an existing results directory possessing the same name (overwrite is currently the only option), as well as the map projection that corresponds to what was used in GIS to obtain the X,Y coordinates of each well. Push Enter after each prompted input.

   NOTE: While a User created input csv file may be located anywhere convenient to the User, a directory called "*user_input_files*" that is included with the tool download may be used. When prompted to supply an input csv file name after initiating the tool, type the path to the file in the command line, such as: input_user_files\User input csv filename as highlighted in the screenshot below:

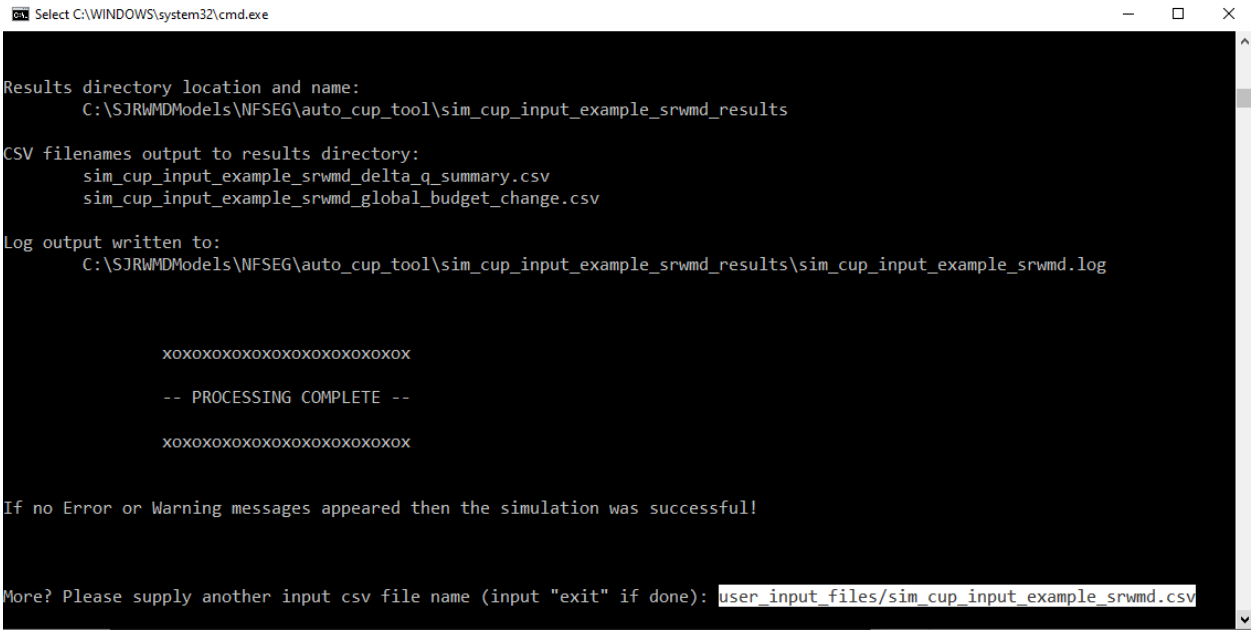






4. The simulation proceeds to run. Monitor the output to ensure no error messages appear. If the simulation was successful, then the output files will be written to

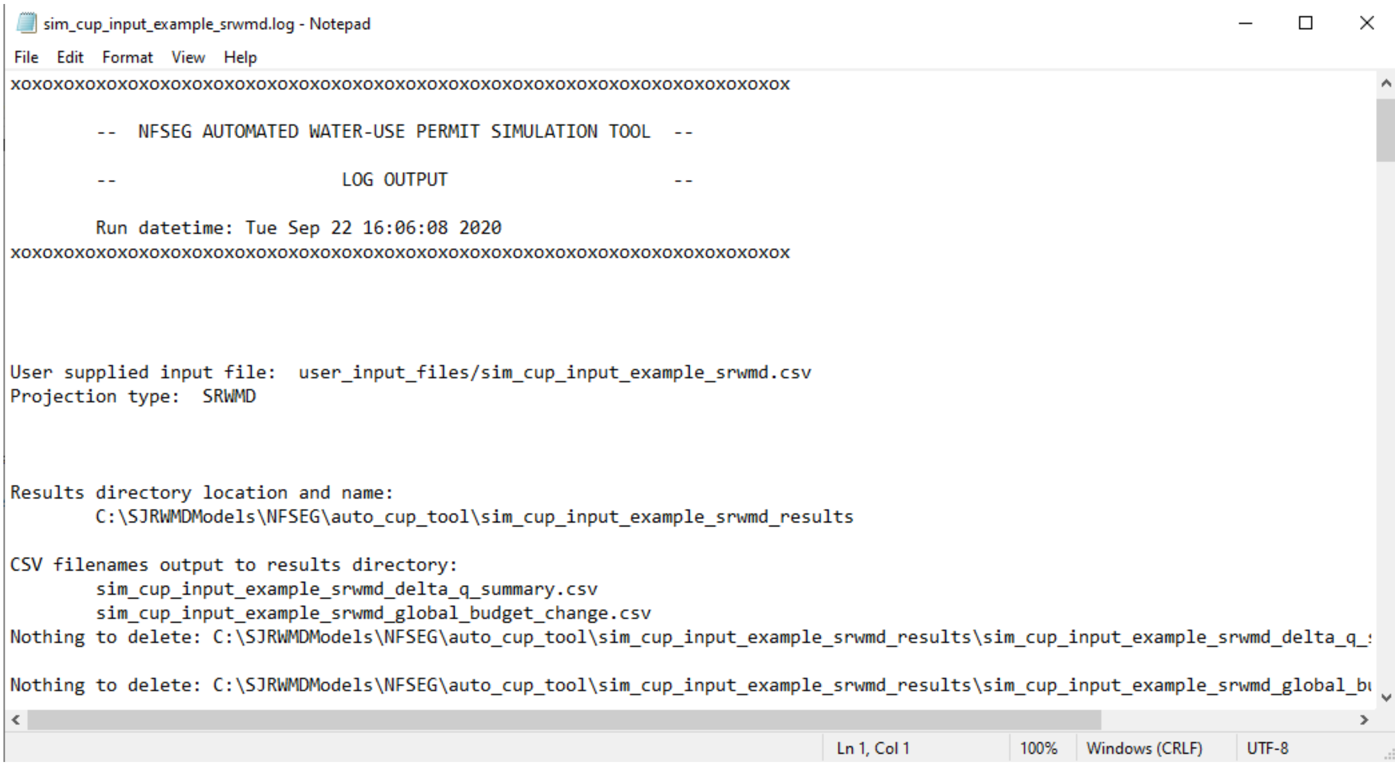
the new results folder one level above the top-level tool directory, and a completion message will appear in the console. The output files will be prepended with the User input filename. The user will then be prompted to supply another User input file for processing. If there is no additional user input file to process, type **exit** in the command prompt or close the command terminal to exit.



Water-Use Simulation Permit Simulation Log File

Output from the console, including any error messages, is written to a log file in the results directory that is named with the base User input filename. Error messages and warning messages usually start with one of the following terms: “ERROR”, “Warning”, or “Traceback”. If an error occurs during execution of the tool, and it is not obvious why the error occurred, then the logfile should be examined for additional information. If errors persist, the log file and a description of the issue should be emailed to the tool maintainers.

Example log file:



```
sim_cup_input_example_srwmd.log - Notepad
File  Edit  Format  View  Help
xoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxox

        --  NFSEG AUTOMATED WATER-USE PERMIT SIMULATION TOOL  --

        --                     LOG OUTPUT                     --

        Run datetime: Tue Sep 22 16:06:08 2020
xoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxox



User supplied input file:  user_input_files/sim_cup_input_example_srwmd.csv
Projection type:  SRWMD


Results directory location and name:
        C:\SJRWMDModels\NFSEG\auto_cup_tool\sim_cup_input_example_srwmd_results

CSV filenames output to results directory:
        sim_cup_input_example_srwmd_delta_q_summary.csv
        sim_cup_input_example_srwmd_global_budget_change.csv
Nothing to delete: C:\SJRWMDModels\NFSEG\auto_cup_tool\sim_cup_input_example_srwmd_results\sim_cup_input_example_srwmd_delta_q_:

Nothing to delete: C:\SJRWMDModels\NFSEG\auto_cup_tool\sim_cup_input_example_srwmd_results\sim_cup_input_example_srwmd_global_bu
Ln 1, Col 1    100%    Windows (CRLF)    UTF-8
```

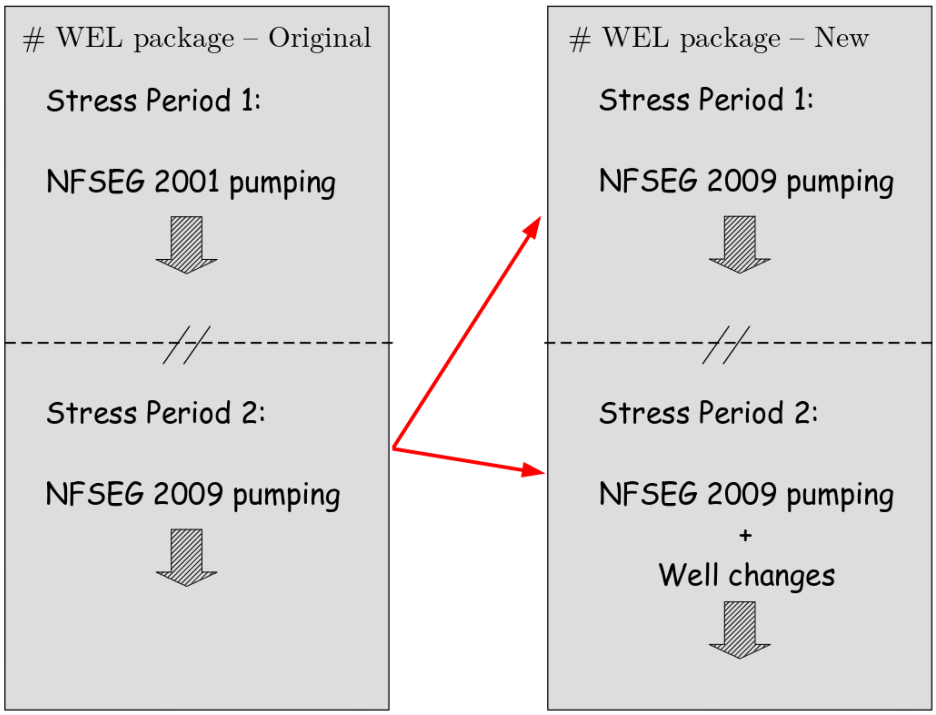
Tool Operations and Results

The NFSEG Automated Water-Use Simulation Tool uses MODFLOW to calculate changes in groundwater availability and other drawdown effects due to well additions or deletions (CUP - consumptive use permit) within the NFSEG groundwater model domain. The tool calculates the cumulative effects of adding one or more new CUP wells within the NFSEG model area, and summarizes results in the following outputs:

- Change in water budget
- Change in flow at river gages and springs
- Change in head in all model layers
- MXD of change in head in model layers 1, 3, and 5
- Change in area-weighted average head beneath lakes in all model layers

The tool can be split into three stages:

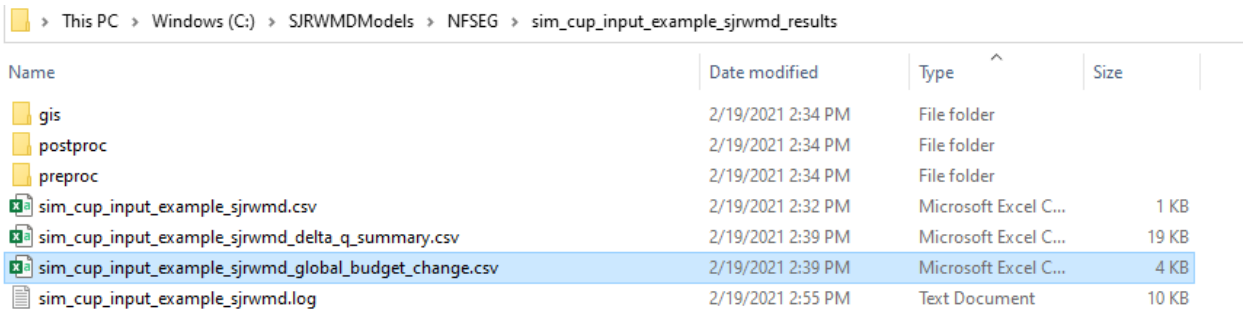
1. **Preprocessing** – Processing the input CUP wells in order to setup a new MODFLOW WEL Package. The new WEL Package starts with the calibrated NFSEG 2nd Stress Period (2009), which becomes the new Stress Period 1. The new 2nd Stress Period repeats Calibrated NFSEG 2nd Stress Period plus all the CUP well modifications:



2. **Execute MODFLOW** – Utilize the new WEL Package, but all other packages are unchanged.

3. **Postprocess the results** – Extract and process the global water budget and changes in flow and head from the *.lst* and *.hds* files.

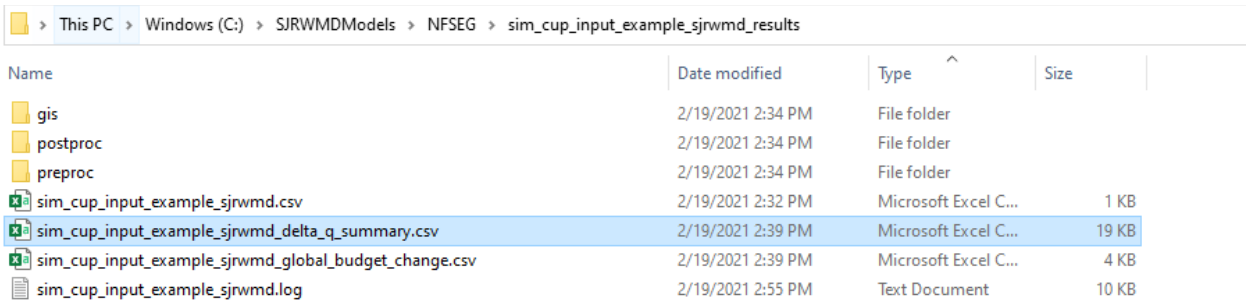
    a. **<u>Global water budget summary</u>**
        i. Results are in the top-level results directory in the file named *<user_input_filename>_global_budget_change.csv* (see example below)
        ii. Global water budget terms are provided in units of cubic feet per day (cfd), cubic feet per second (cfs) and million gallons per day (mgd)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	bc_flux_type	flux_units	timeStep_1	stressPeriod_1	timeStep_2	stressPeriod_2	in_rate_1	in_rate_2	in_rate_2_minus_1	out_rate_1	out_rate_2	out_rate_2_minus_1	net_rate_1	net_rate_2	net_rate_2_minus_1	net_rate_2_minus_1_fraction_of_netWellPkg
2	CONSTANT H	cfd	1	1	1	2	5.9E+07	5.9E+07	108	1.4E+08	1.4E+08	-3584	-81253472	-81249780	3692	-0.02
3	DRAINS	cfd	1	1	1	2	0	0	0	9.9E+08	9.9E+08	-44736	-986734528	-986689792	44736	-0.27
4	ET	cfd	1	1	1	2	0	0	0	2.6E+09	2.6E+09	-45312	-2.611E+09	-2.611E+09	45312	-0.27
5	HEAD DEP BO	cfd	1	1	1	2	1.7E+08	1.7E+08	3232	6.7E+08	6.7E+08	-18304	-499298480	-499276944	21536	-0.13
6	MNW2	cfd	1	1	1	2	3644789	3644522	-267.25	2E+07	2E+07	1874	-15948449	-15950591	-2141.25	0.01
7	RECHARGE	cfd	1	1	1	2	5.3E+09	5.3E+09	0	0	0	0	5.298E+09	5298147328	0	0
8	RIVER LEAKA(	cfd	1	1	1	2	2.2E+08	2.2E+08	3792	1.2E+09	1.2E+09	-41088	-947824048	-947779168	44880	-0.27
9	STORAGE	cfd	1	1	1	2	0	0	0	0	0	0	0	0	0	0
10	WELLS	cfd	1	1	1	2	5.4E+07	5.4E+07	0	2.1E+08	2.1E+08	165024	-155672492	-155837516	-165024	1
11	CONSTANT H	cfs	1	1	1	2	681.973	681.975	0.0013	1622.41	1622.37	-0.0415	-940.4337	-940.391	0.0427	-0.02
12	DRAINS	cfs	1	1	1	2	0	0	0	11420.5	11420	-0.5178	-11420.539	-11420.021	0.5178	-0.27
13	ET	cfs	1	1	1	2	0	0	0	30224.7	30224.2	-0.5244	-30224.714	-30224.19	0.5244	-0.27
14	HEAD DEP BO	cfs	1	1	1	2	2023.78	2023.82	0.0374	7802.7	7802.49	-0.2119	-5778.9176	-5778.6683	0.2493	-0.13
15	MNW2	cfs	1	1	1	2	42.1851	42.182	-0.0031	226.774	226.795	0.0217	-184.5885	-184.6133	-0.0248	0.01
16	RECHARGE	cfs	1	1	1	2	61321.1	61321.1	0	0	0	0	61321.15	61321.1496	0	0
17	RIVER LEAKA(	cfs	1	1	1	2	2518.55	2518.59	0.0439	13488.7	13488.3	-0.4756	-10970.186	-10969.666	0.5194	-0.27
18	STORAGE	cfs	1	1	1	2	0	0	0	0	0	0	0	0	0	0
19	WELLS	cfs	1	1	1	2	625.512	625.512	0	2427.28	2429.19	1.91	-1801.765	-1803.675	-1.91	1
20	CONSTANT H	mgd	1	1	1	2	440.771	440.772	0.0008	1048.59	1048.56	-0.0268	-607.8182	-607.7906	0.0276	-0.02
21	DRAINS	mgd	1	1	1	2	0	0	0	7381.29	7380.95	-0.3346	-7381.2874	-7380.9527	0.3346	-0.27
22	ET	mgd	1	1	1	2	0	0	0	19534.7	19534.4	-0.339	-19534.744	-19534.405	0.339	-0.27
23	HEAD DEP BO	mgd	1	1	1	2	1308	1308.03	0.0242	5043.02	5042.88	-0.1369	-3735.0123	-3734.8512	0.1611	-0.13
24	MNW2	mgd	1	1	1	2	27.2649	27.2629	-0.002	146.568	146.582	0.014	-119.3027	-119.3187	-0.016	0.01
25	RECHARGE	mgd	1	1	1	2	39632.9	39632.9	0	0	0	0	39632.897	39632.8971	0	0
26	RIVER LEAKA(	mgd	1	1	1	2	1627.78	1627.81	0.0284	8718	8717.69	-0.3074	-7090.2167	-7089.881	0.3357	-0.27
27	STORAGE	mgd	1	1	1	2	0	0	0	0	0	0	0	0	0	0
28	WELLS	mgd	1	1	1	2	404.279	404.279	0	1568.79	1570.02	1.2345	-1164.5112	-1165.7457	-1.2345	1

b. **River gage and spring flow summary**

i. Results are in the top-level results directory in the file named *<user_input_filename>_delta_q_summary.csv* (see example below):



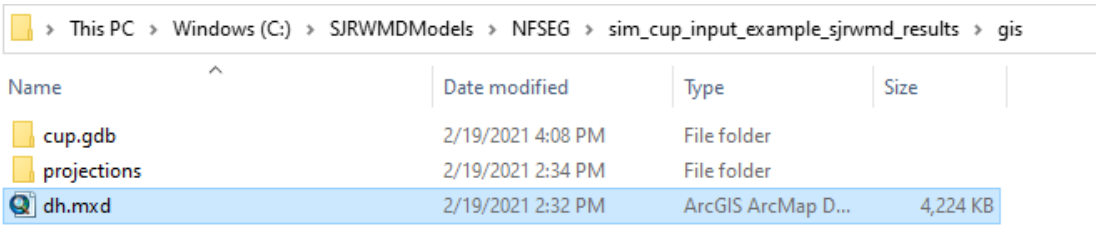
	A	B	C	D	E	F	G	H
1	station_number	station_name	WMD	simulated_flux_base_condition	simulated_flux_with_cup_cfs	simulated_change_in_flow_cfs	simulated_change_in_flow_as_fraction_of	simulated_change_in_flow_as_a_fraction_of_cup
2	2315000	suwannee river near benton	SR	-125.509979	-125.509895	0.000084	-0.000001	0.000044
3	2315500	suwannee river at white springs	SR	-162.703548	-162.703276	0.000272	-0.000002	0.000142
4	2317620	alapaha river near jennings fla	SR	-810.400413	-810.40019	0.000223	0	0.000117
5	2319000	withlacoochee river near pinetta fla	SR	-840.685156	-840.681939	0.003217	-0.000004	0.001684
6	2319394	withlacoochee river nr lee	SR	-1274.527095	-1274.517004	0.010091	-0.000008	0.005283
7	2319500	suwannee river at ellaville	SR	-3010.126663	-3010.095574	0.031089	-0.00001	0.016277
8	2319800	suwannee river at dowling park	SR	-3126.411761	-3126.38003	0.031731	-0.00001	0.016613
9	2320000	suwannee river at luraville	SR	-3304.500603	-3304.468535	0.032068	-0.00001	0.016789
10	2320500	suwannee river at branford	SR	-3916.9242	-3916.891027	0.033173	-0.000008	0.017368
11	2320700	santa fe river near graham	SR	-3.309329	-3.308515	0.000815	-0.000246	0.000426
12	2321000	new river near lake butler	SR	-16.638419	-16.638099	0.00032	-0.000019	0.000167
13	2322700	ichetucknee river at us hwy27 near hildreth	SR	-270.155136	-270.152738	0.002398	-0.000009	0.001255
14	2321500	santa fe river near worthington springs	SR	-43.502116	-43.50033	0.001786	-0.000041	0.000935
15	2321975	santa fe river at us hwy 441 near high springs	SR	-146.389683	-146.377849	0.011834	-0.000081	0.006196
16	2322500	santa fe river near fort white	SR	-723.580624	-723.564397	0.016227	-0.000022	0.008496
17	2322800	santa fe river near hildreth	SR	-1141.0581	-1141.039076	0.019024	-0.000017	0.00996
18	2323500	suwannee river near wilcox	SR	-5485.65224	-5485.599734	0.052506	-0.00001	0.027489
19	2323592	suwannee river ab gopher river nr suwannee	SR	-5950.460653	-5950.407406	0.053247	-0.000009	0.027877
20	2313700	waccasassa river nr gulf hammock	SR	-123.742246	-123.736499	0.005747	-0.000046	0.003009
21	2324000	steinhatchee river near cross city	SR	-62.235365	-62.235365	0	0	0
22	2324400	fenholloway river near foley	SR	-2.882957	-2.882957	0	0	0
23	2324500	fenholloway river at foley	SR	-9.601852	-9.601852	0	0	0
24	2325000	fenholloway river near perry	SR	-69.334619	-69.334619	0	0	0
25	2326000	econfina river near perry	SR	-49.552804	-49.552791	0.000013	0	0.000007
26	2326526	wacissa river nr wacissa	SR	-447.556424	-447.555833	0.000591	-0.000001	0.000309
27	2326500	aucilla river at lamont	SR	-93.658734	-93.658349	0.000385	-0.000004	0.000202
28	2326550	aucilla river nr mouth near nutall rise	SR	-1467.814163	-1467.812707	0.001456	-0.000001	0.000762
29	n011117008	madison blue spring nr blue springs fl	SR	-104.052824	-104.051748	0.001076	-0.00001	0.000563
30	n011120012	pot spring	SR	-35.833808	-35.833438	0.00037	-0.00001	0.000194
31	n011121006	tanner spring	SR	-98.428738	-98.427639	0.001099	-0.000011	0.000576
32	s020302004	wacissa headspring	SR	-163.959259	-163.959028	0.000231	-0.000001	0.000121

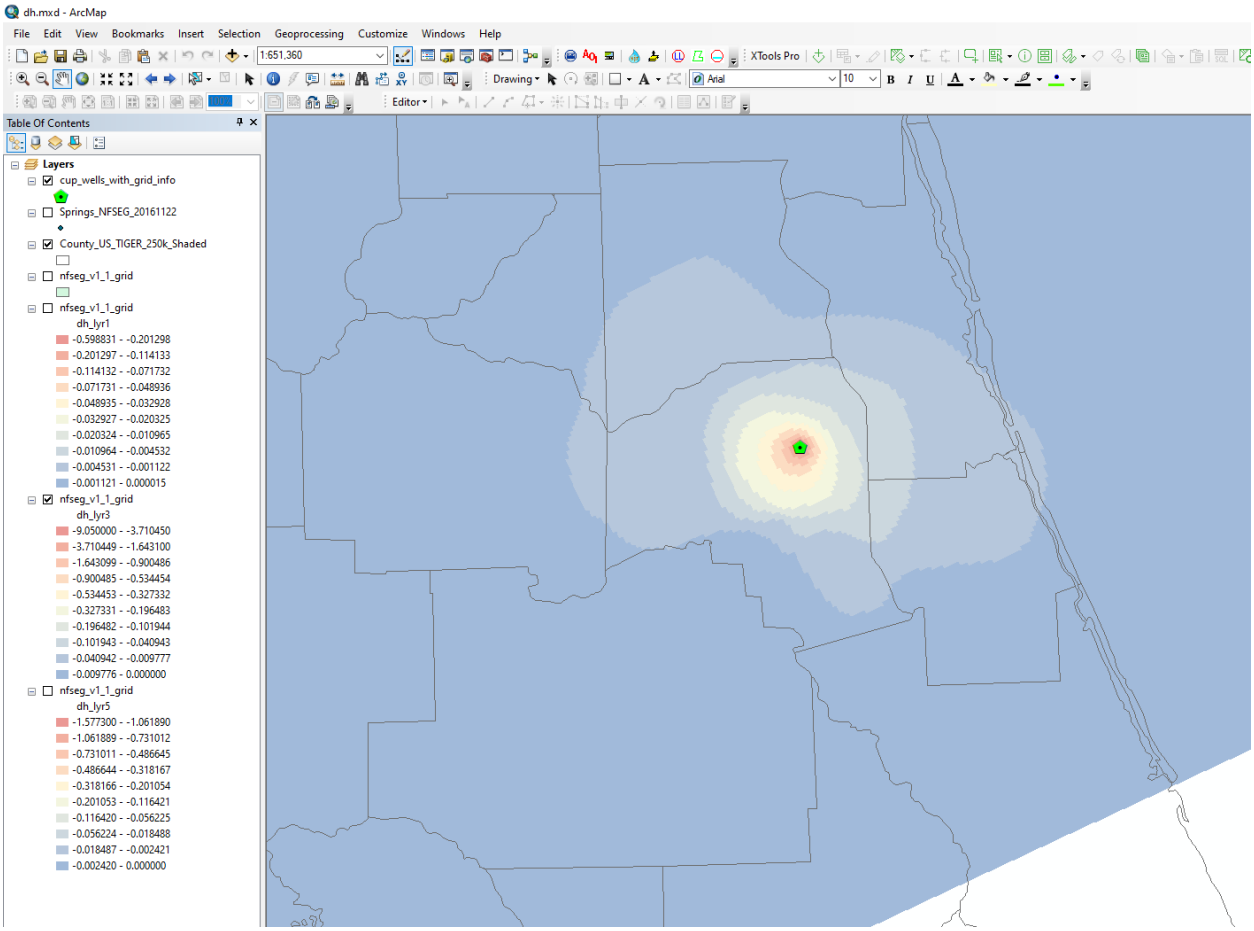
c. **Model-wide change in heads**

i. The change in head levels of layers 1, 3, and 5 are viewable from the *dh.mxd* located in the gis folder (see example below).

ii. **NOTE**: The change in head feature layers generated during post-processing (*dh_layerX, where X represents the model layer number*) may need to be rescaled in the *dh.mxd* file. This can happen if calculated changes in head are outside of the range of values in the legend, resulting is some cells showing as blank or unclassified in the map. This should be verified in the symbology classification tab for the feature layer. Also note that the *dh_layerX* feature layer is semi-transparent to enable the user to add base maps or reference layers.

iii. The change in head for all model cells in each layer is also output to the file 'DeltaHeads_SP2-SP1_all_layers.csv' located *postproc/dh* in the results directory.





d. **<u>Change in area-weighted average heads beneath lakes</u>**

i. Lake results are viewable in the *postproc/dh* results folder (see below)

ii. The change in area-weighted average head beneath lakes is processed from three lists of waterbodies (WaterBodiesFromJohnGood.dat, WaterBodiesFromTrey.dat, WaterBodiesFromVito.dat) and output files are generated for each list at each layer in the model.

iii. Each line within each of the input files lists the NFSEG grid row and column for a given LakeID, along with the fraction of the lake's area within the model cell. Each lake has a unique ID.

iv. Each input file list has a corresponding .csv file that can be used to match each unique lake ID with the appropriate lake name. The reference files are named 'WaterBodiesFromJohnGoodList.csv', 'WaterBodiesFromTreyList.csv' and 'WaterBodiesFromVitoList.csv' and are saved in the *postproc/dh* folder.

v. Each output file lists the area-weighted average head for each Stress Period beneath each LakeID, as well as the difference between SP2 and SP1 average heads beneath the lake.

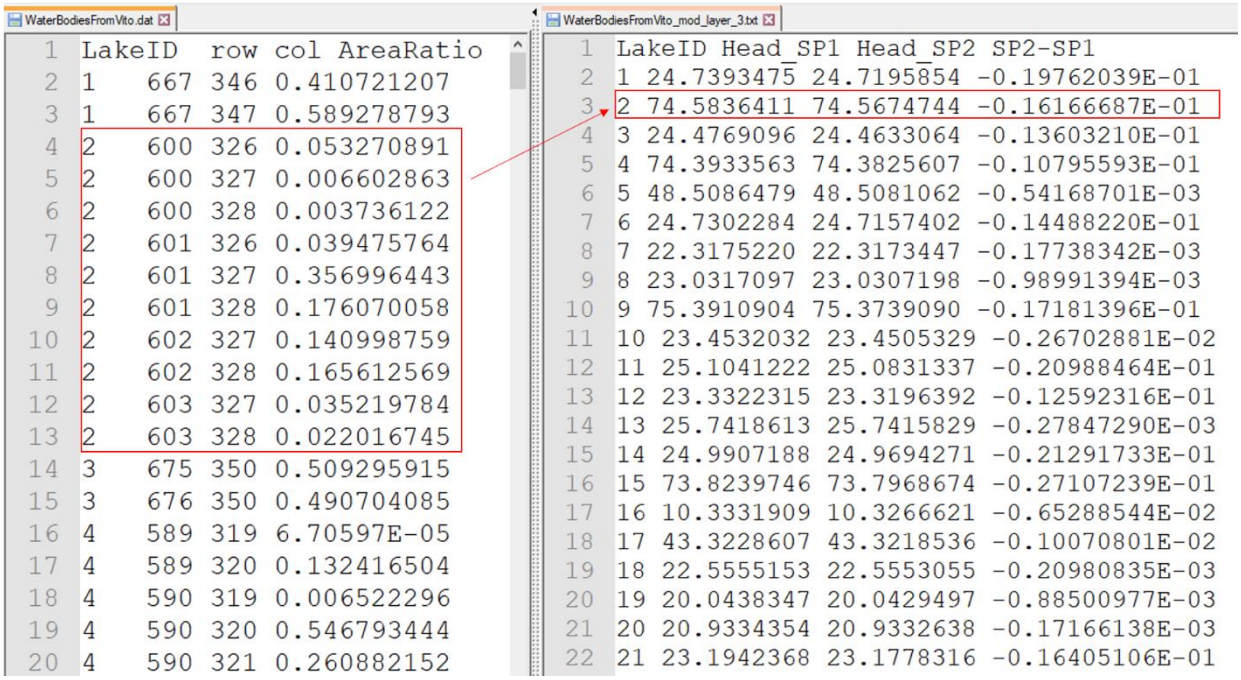
vi. Each output file is named with the prefix corresponding to the input waterbody file followed by the suffix '_mod_layer_X.txt', where X represents one of the NFSEG model layers 1-7. For example, to view results from the input waterbody list 'WaterBodiesFromVito.dat' at model layer 3, the file to access is named: 'WaterBodiesFromVito_mod_layer_3.txt'.

This PC › Windows (C:) › SJRWMDModels › NFSEG › sim_cup_input_example_sjrwmd_results › postproc › dh

Name	Date modified	Type	Size
DeltaHeads_SP2-SP1_all_layers.csv	2/19/2021 2:39 PM	Microsoft Excel C...	39,162 KB
hds_processing_control_file.txt	2/19/2021 2:32 PM	TXT File	2 KB
nfseg_auto.hds	2/19/2021 2:39 PM	HDS File	28,953 KB
WaterBodiesFromJohnGood.dat	2/19/2021 2:32 PM	DAT File	2 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGood_mod_layer_...	2/19/2021 2:39 PM	TXT File	1 KB
WaterBodiesFromJohnGoodList.csv	2/19/2021 2:32 PM	Microsoft Excel C...	1 KB
WaterBodiesFromTrey.dat	2/19/2021 2:32 PM	DAT File	129 KB
WaterBodiesFromTrey_mod_layer_1.txt	2/19/2021 2:39 PM	TXT File	10 KB
WaterBodiesFromTrey_mod_layer_2.txt	2/19/2021 2:39 PM	TXT File	11 KB
WaterBodiesFromTrey_mod_layer_3.txt	2/19/2021 2:39 PM	TXT File	11 KB
WaterBodiesFromTrey_mod_layer_4.txt	2/19/2021 2:39 PM	TXT File	11 KB
WaterBodiesFromTrey_mod_layer_5.txt	2/19/2021 2:39 PM	TXT File	11 KB
WaterBodiesFromTrey_mod_layer_6.txt	2/19/2021 2:39 PM	TXT File	12 KB
WaterBodiesFromTrey_mod_layer_7.txt	2/19/2021 2:39 PM	TXT File	12 KB
WaterBodiesFromTreyList.csv	2/19/2021 2:32 PM	Microsoft Excel C...	6 KB
WaterBodiesFromVito.dat	2/19/2021 2:32 PM	DAT File	23 KB
WaterBodiesFromVito_mod_layer_1.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_2.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_3.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_4.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_5.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_6.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVito_mod_layer_7.txt	2/19/2021 2:39 PM	TXT File	4 KB
WaterBodiesFromVitoList.csv	2/19/2021 2:32 PM	Microsoft Excel C...	3 KB

Left: Input file

Right: Example output file



WaterBodiesFromVito.dat

	LakeID	row	col	AreaRatio
1	1	667	346	0.410721207
2	1	667	347	0.589278793
3	2	600	326	0.053270891
4	2	600	327	0.006602863
5	2	600	328	0.003736122
6	2	601	326	0.039475764
7	2	601	327	0.356996443
8	2	601	328	0.176070058
9	2	602	327	0.140998759
10	2	602	328	0.165612569
11	2	603	327	0.035219784
12	2	603	328	0.022016745
13	3	675	350	0.509295915
14	3	676	350	0.490704085
15	4	589	319	6.70597E-05
16	4	589	320	0.132416504
17	4	590	319	0.006522296
18	4	590	320	0.546793444
19	4	590	321	0.260882152

WaterBodiesFromVito_mod_layer_3.txt

	LakeID	Head_SP1	Head_SP2	SP2-SP1
1	1	24.7393475	24.7195854	-0.19762039E-01
2	2	74.5836411	74.5674744	-0.16166687E-01
3	3	24.4769096	24.4633064	-0.13603210E-01
4	4	74.3933563	74.3825607	-0.10795593E-01
5	5	48.5086479	48.5081062	-0.54168701E-03
6	6	24.7302284	24.7157402	-0.14488220E-01
7	7	22.3175220	22.3173447	-0.17738342E-03
8	8	23.0317097	23.0307198	-0.98991394E-03
9	9	75.3910904	75.3739090	-0.17181396E-01
10	10	23.4532032	23.4505329	-0.26702881E-02
11	11	25.1041222	25.0831337	-0.20988464E-01
12	12	23.3322315	23.3196392	-0.12592316E-01
13	13	25.7418613	25.7415829	-0.27847290E-03
14	14	24.9907188	24.9694271	-0.21291733E-01
15	15	73.8239746	73.7968674	-0.27107239E-01
16	16	10.3331909	10.3266621	-0.65288544E-02
17	17	43.3228607	43.3218536	-0.10070801E-02
18	18	22.5555153	22.5553055	-0.20980835E-03
19	19	20.0438347	20.0429497	-0.88500977E-03
20	20	20.9334354	20.9332638	-0.17166138E-03
21	21	23.1942368	23.1778316	-0.16405106E-01