

Karlyn's SWSI Process Bible

FIRST TESTAMENT

- 1) Thou shall always keep this document on hand bc clearly its crucial ;)
- 2) Thou shall always start SWSI before the 6th (aka about a week before you need it but at least 5 days into the month so that NRCS has a chance to update their database)
- 3) Thou shall always send nice emails to Lori when one is finished with SWSI bc, however much Doug and her disagree, she's always been the BEST about SWSI stuff!

Disclaimer: This document is intended to be a quick-guide and process document; it is nt intended to replace the SWSI Program User Manual. While running SWSI is straightforward, filling in missing data/troubleshooting does require understanding of how the program works and what data it uses. Prior to operating this program you should become familiar with the base assumptions, data, and method of the SWSI program via the SWSI Program User Manual.

Setting up SWSI/Where to find things

SWSI documentation and old modeling files are in Laserfiche; you can access them from the SWSI page on DWR's website. The master program lives on the Apps Drive at P:\cdss\SWSIApp. Monthly reports, project files, and native flow calculation sheets are located at Z:\Water Supply\TEAM 237\SWSI.

I like keeping a copy of the guide, native flow calculation spreadsheet, current month's' program, and previous month's results on my C Drive. I would not recommend running the program off the network since its rather large.

You will need TSTool version 11.08.01 or later (I have not tried more recent versions) and Access on your computer to run SWSI. NOTE - in late 2016 NRCS changed their web services address that required a file to be updated in the TSTool program. If you have an existing TSTool install and are having trouble connecting to NRCS's AWDB talk to Doug Stenzel about how to fix this file.

Shorthand on how to run SWSI (see the user documentation for complete instructions/details)

- 1) You will need to download the SWSI Program to your computer. The mother program can be found on the Apps Drive at P:\cdss\SWSIApp \SWSI_TSToolProgramPckg_12-2015. This folder can live anywhere on your local machine and can be renamed to anything you like; I recommend renaming it to reflect the current month and year. This folder is what I consider the "program folder" - Tracy has been running it from: C:\CDSS\TSTool-11.08.01\bin\TSTool.exe (this has the "System" folder updated to point to the correct NRCS AWDB location)
- 2) Copy/paste last month's' SWSI program folder and rename with the current month. These files are stored at: G:\My Drive\Water Supply Collaboration\SWSI\SWSI monthly runs\ **All future instructions refer to locations within the current month's program folder unless otherwise stated.** Note: All files after January 1, 2019 are programed for the January month to be calculated only from storage, not storage and forecasted runoff. This should be changed back if

NRCS does produce forecasts again on Jan 1.

- a. If you are not sentimental about having old model runs close at hand, you can just rename the SWSI program to match the current month instead of copy/pasting. Similarly, if you are starting with a fresh version of the SWSI program simply replace the master control spreadsheet with last month's control spreadsheet, which can be found in the modeling files in Laserfiche.
 - b. If you do write over last month's program: *Before running the current month's program*, I'd recommend grabbing the previous months' Results Summary Spreadsheet and saving it to a location convenient for you that is *not* in the current months' program folder. It can be handy to have last months' results (and even input files) close at hand when running SWSI.
- 3) Open the Control spreadsheet (and update cell E7 in the Config Tab to reflect the current month): If you are running the June 1, 2017 SWSI, enter 2017-06.
- 4) In the Control spreadsheet, review the Overrides Tab to see if there are any manual overrides you want to turn off/on. Don't bother changing the items with grey highlight, they are pretty permanent. I prefer to turn off all the overrides in white for the first run.
 - a. To turn off an override just select enter "NO" in the Include Column (Column A). I prefer to see if any data that was missing last month is now available so that I don't accidentally write over good data. If the values are still missing you can always turn the override back on later by deleting the "NO".
- 5) Close the Control Spreadsheet. It is important to ALWAYS close ALL excel documents related to SWSI before completing any program runs!!
- 6) Open TSTool. TSTool does *not* need to be connected to DWR's internal Hydrobase to run the SWSI program. All data in the SWSI program come from public web services. I have been using: C:\CDSS\TSTool-11.08.01\bin\tstool.exe
- 7) Click File/Open Command File and navigate to \00-RunSteps01-27; select 00-RunSteps01-27.TSTool. In TSTool click "Run All Commands".
- 8) Go do other work for a bit, the program will take some time to run (appx 2-10 min).

Once TSTool tells you the program has finished (it will say "Ready" in the bottom right hand corner), open \27-FillDataManual\TimeSeriesChecks.xlsx, Missing Value List Tab. If you have any missing data for the program to calculate the SWSI, you will see it here.

- a. YOU MUST MAKE IT SO THIS TAB HAS NO VALUES LISTED TO BE ABLE TO CALCULATE THE SWSI.
- b. To see details about missing data, click on the other tabs in this spreadsheet. These tabs

will list all of the stations pulled for SWSI and if/how many data pieces are missing for these stations.

- 9) Fill in the missing values. While there are several ways you might fill missing values, the most common way to get missing values into the program is to use the “Overrides” tab of the Control Spreadsheet.
 - a. To understand this process you need some SWSI Tool background. The program runs a sequence of downloads and data manipulations in a specific order. You can run these steps individually or in “groups”. When you “Run Steps 01-27” you are running the group of steps that get data for the SWSI. First the program downloads data from NRCS’s AWDB database (and sometimes DWR depending on the data station), then it auto-fills data with regressions/zeros/other as pre-programmed when the SWSI Tool was made, and *then* it fills data with manual overrides. This means that, even if there was data downloaded for a station, if it was auto-filled in the next step that auto-fill data would override the downloaded data. The same thing is true for manual data overriding download/autofill data.
 - b. Therefore, when you find values for missing data points you can go into the Overrides Tab of the Control Spreadsheet to fill these missing values. You can also use this tab to override a bad datapoint that is being pulled into SWSI (that is what the manual overrides that are highlighted in dark grey are doing).
 - i. Find the Station ID in the Combined Inputs tab of the Control Spreadsheet or in the Time Series Check spreadsheet you previously opened.
 - ii. Enter the value and month you are replacing. NOTE- for all reservoir and native flow values you are going to enter the month *before* the SWSI month (AKA for the August 2017 SWSI you enter 7-2017) for your override month.
 - iii. In the Override Comment write “MO-” (Don’t ask) then write in why you are replacing the value, where your override number came from, and your initials.
 - iv. This is also a good time to cross check your missing values list with manual overrides you turned “off” for the first run. If that data is still missing just turn those overrides back on by deleting the “NO” in column A.
 - c. Once you’re happy with your Overrides Entry its time to run the SWSI Tool again. However, this time you *only* run Step 27-FillDataManual.
 - i. Close all SWSI excel documents
 - ii. Click File/Open Command File and navigate to \ 27-FillDataManual; select 27-FillDataManual.TSTool. In TSTool click “Run All Commands”. This run should take less than a minute or so.
 - iii. Once TSTool tells you the program has finished (it will say “Ready” in the bottom right hand corner), open \27-FillDataManual\TimeSeriesChecks.xlsx, Missing Value List Tab. If you have any missing data for the program to calculate the SWSI, you will see it here.
 - d. Repeat Step 10 as many times as is needed to fill in the missing values. Each time you use the override it will override any other values, include previous overrides.
 - e. If for any reason you want to retrieve data from the database again (messed up an

- override, know there is new data in AWDB, etc) you will need to go back to Step 4 and re-download all data (this might also involve temporarily turning off overrides again)
- 10) As a secondary data check, I like to go \Input-TimeSeries-Raw\ Input-Data-Final.xlsx. This is where you can see ALL of the values the program will be using. I often look at the last couple of months for big volume changes or numbers that have not changed at all.
- The database used for this program, NRCS' AWDB, is a conglomerate of data that often involves manual entry. Typos do happen (water users entering elevation instead of storage volume, entry in the wrong cell, missing a zero, etc). I have found that reviewing this spreadsheet is the most effective way of catching database typos.
- 11) When you are satisfied with the data available for SWSI to run, you can move on to running Steps 30-55, which is where TSTool manipulates the data and then calculates SWSI.
- Close all SWSI excel spreadsheets
 - Click File/Open Command File and navigate to \ 00-RunSteps30-55; select 00-RunSteps30-55.TSTool. In TSTool click "Run All Commands".
 - This series of calculations will take some time. Plan on 15-30 min depending on how fast your computer is.
- 12) Now its time to analyze your results!

Where to hunt for missing data

Reservoir Data

In the last year or so we have had regular issues getting data to pull from AWDB for Silver Jack Reservoir and Vouga Reservoir. We do not know what the issue is but, given the limited extent of the issue, typically just grab the data from AWDB ourselves and enter it as a manual override. You can access the AWDB report at:

<https://wcc.sc.egov.usda.gov/reportGenerator/view/customMultipleStationReport/monthly/09116500:CO:BOR%7C09125800:CO:BOR%7Cid=%22%22%7Cname/CurrentCY,CurrentCYEnd/stationId,name,RESC:value>

NRCS manually builds AWDB data from user reports and telemetry data. If data is missing it could be because the user has not provided it to NRCS yet or because NRCS hasn't pushed out newly available data to ADWB.

Forecast Data

Per email from Karl Wetlaufer of NRCS 1-8-2018, the forecast for **Bear Creek Above Evergreen** will only be issued in the months of April, May and June (see text below). So, I have turned this station off in the Control File (in two locations), but, it will need to be turned back on in April.

The Bear Creek at Evergreen is a very low skill forecast and it has been a topic of conversation to discontinue or alter it for quite a while. With our regression models unfortunately the skill was low enough that until April 1st we determined (working with Forecasters in Portland and local water users) that the models weren't much better than assuming average flow and adjusting qualitatively for what to

expect. All that said, we have determined that going forward it is most appropriate to not publicly produce that forecast until April 1st when the forecast skill actually has adequate predictive power.

Native FLOW Data

In 2017, most native flow data for the months it was needed (July 1, Aug 1 & Sept 1 SWSIs) was available from AWDB. Sarah Smith from Northern provided July 1 & Aug 1 flows for the four gages impacted by Northern's operations (Boulder, St. Vrain, Poudre, and Big T). In August, NCWCD does not compute natural flows, and so Tracy computed them for those gage locations - Poudre & Big T using diversion data and St. Vrain and Boulder using the regression equations in the Native Flow spreadsheet. Each month, of the summer I computed the native flow for Mancos using diversion data from Rusty Crangle. For Elkhead Creek, I used the gaged flow.

The natural flow calcs can be performed in the following spreadsheet:

G:\My Drive\Water Supply Collaboration\SWSI WATF and Drought\SWSI (Luke's Stuff)\Natural Flow Calcs Master Spreadsheet

See the Mancos Tab on the spreadsheet

Analyzing the results

Since you already did your primary data checks in Steps 1-27, the purpose of this step is really to find the anomalies and understand what is causing them rather than to spot bad data.

Open\Results-Web\swsi-summary\SWSI-Current-Summary.xlsx to the HUC Components tab. In here you can see all of the individual stations, the volume of water they contributed to the SWSI, and their individual NEP.

Highlight the "Component NEP by Month" column and conditional format the cell so that values of less than 25 are highlighted; these highlighted components may be of interest in the Water Availability Report and often warrant further investigation.

To expedite your investigation of these components I suggest copying over the notes from the previous months' SWSI Summary to the current month. Any stations that do not have notes from previous months or where the notes are outdated may warrant further investigation.

Some tricks I have used to investigate reservoir components with low/ high NEPS

Sometimes changes in reservoir operations mean that the new "normal" looks different than the historical "normal", thereby throwing off the SWSI. Open the SWSI input files and manipulate the spreadsheet so that you only see data from the same month of all years. Compare the current year to previous years. In the last 10 years has the monthly volume shifted significantly higher/lower?

Important Note about Winter SWSI! If you are running winter SWSI some of the HUCs will not have a SWSI number. To prevent mapping issues you need to go into the SWSI-Current-Summary spreadsheet,

HUC Summary tab and manually change all HUCs with no data to **-99.99**. This tells MapViewer to provide NO color to the map that month (instead of a 0, which is a *real* number and will generate a color in MapViewer). An example of this data fill can be found in a summary spreadsheet from a previous year (see modeling files available in LF).

What to do with the data once you're satisfied with the results

You will need to facilitate the data's upload to Hydrobase, MapViewer, and Laserfiche *and* make the data available to whoever is writing the Water Supply Report (if applicable).

1) Upload files to Hydrobase:

- a. Put a copy of the SWSI Summary file into this folder: P:\cdss\SWSI (note this is *not* the same location as the master program).
- b. From that same folder, open up the Access Program called "SWSI_FileLoader". The program will have a pop up window called "SWSI Modeling Data Loader"; the file you just placed in the folder should show up as the only available file.
- c. Make sure that file is highlighted and then click "Load". Once the operation is completed the program will close.
- d. Go back into the P:\cdss\SWSI folder and *move* the current SWSI summary to the subfolder called "Archive". (Technically everything in the archive could be deleted because its in Hydrobase, but Im a pack rat)
- e. Open the Archive Folder and rename the Current Summary File to reflect the month and year.

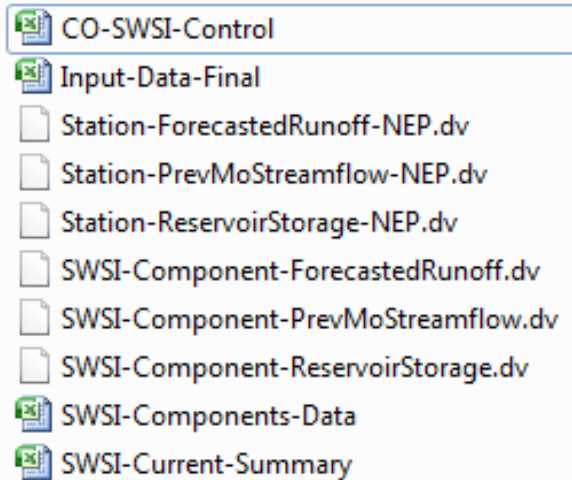
2) Queue data for MapViewer:

Context of this step: My understanding of the process to get data to MapViewer is that Hydrobase "pushes" data to a spot where MapViewer can "find" it. MapViewer goes "looking" for data, where it finds the items Hydrobase has made available, whereby MapViewer uploads this data. *However*, the code that tells MapViewer to go "looking" for data automatically is not done yet. Therefore, data gets *manually* uploaded by OIT staff at the beginning of every month. They specially upload SWSI data mid-month because of the nature of SWSI data, but it's an extra step for them. Once the code is complete the need to manually upload data, and this entire Step 2, will no longer be necessary.

- a. Once the data is in Hydrobase it should update into MapViewer automatically on a nightly basis.
- b. Can't get data into MapViewer in time for WATF? Ask Chris Brown (preferably a day or two in advance) to make you a map. Once the map is complete be sure to email it to NRCS since they are the ones who present it at the WATF. (NRCS typically gets their SWSI map from MapViewer)
- c. In MapViewer, turn on SWSI, Water Division, and Topography layers and change transparency as needed. Then, use the "Print" button. Select the highest resolution, for the Map Scale, select Statewide Extent, then in the Map Title enter "SWSI Month 1, Year"

3) Create modeling package for Laserfiche

- a. At a location convenient to you, create a file called
[MONTH] [YEAR] MODELING: COLORADO WATER SUPPLY CONDITIONS
- b. Copy the following files from your monthly model folder into the new folder:



- Station files and SWSI-Component files can be found in the *Input-TimeSeries-ForSWSI* folder and subfolders
 - The “Input-Data-Final” file can be found in *Input-TimeSeries-Raw* folder
 - The “SWSI-Current-Summary” file can be found in the *Results-Web\swwsi-summary* folder
- c. Zip the folder and move to the location where you upload files into Laserfiche via HBDMC.
 - i. Once the Monthly Report is *also* ready and placed in this location, upload the report and modeling files into Laserfiche via HBDMC. The guide for this process can be found at <https://docs.google.com/document/d/1kfM-BOGijMhXr3RBXlxzPGAgHJ--hIBfgRi2VW2UeQ/edit#>. It is easiest to copy the file name and update the month and year in HBDMC instead of retyping in HBDCM, because the files name needs to match exactly. NOTE: for the report, uncheck mark the Convert pdf to tiff box, it needs to remain a pdf file.
 - 4) Copy the “Results-Web” folder of your model to a location where it can be picked up by whoever is completing the Water Supply Report (if applicable). I have historically placed it in a file at this location: Z:\Water Supply\TEAM 237\SWSI\SWSI program working files
 - 5) Congratulations, you’re done for the month! Go buy a cookie.

Ongoing issues/Other notes

Summer SWSI is not fun. Be EXTRA sure to start SWSI early during those months because you may need time to hunt down data and/or create your own calculations.

At some point Doug is hoping to automate the SWSI data upload to MapViewer. However, until that time, the data has to manually be pushed to MapViewer by OIT (current contact is Lori Toriki). This situation creates staffing/time allocation concerns because the rest of the MapViewer data is pushed at

the beginning of the month while SWSI data needs to be pushed around the 12th of the month. This will continue to be a tense subject until everything is automated. I always encourage getting SWSI into MapViewer as soon as possible in each month so that Lori can maintain work priorities and still get SWSI data uploaded in time for the WATF.

The monthly Water Supply Report is typically ready some time after the SWSI data is available in MapViewer. Since MapViewer provides a link to the Water Supply Report this creates an awkward data gap until the report is uploaded. Therefore, we have made “placeholder” reports that tell users to check back for the Water Supply Report at a later date. Placeholder pages have been uploaded to Laserfiche for reports through December 2017. You will want to batch upload more reports in 2018. You can work with Records to do this.

Right now SWSI compares the current month to the same month of years 1970/ 1971 through 2009/2010. At some point this historical data period should be updated. The historical years, “recent period” dates, and timelines of the graphs can all be updated through the Config tab of the Control spreadsheet. Refer to the User Documentation for details on this.

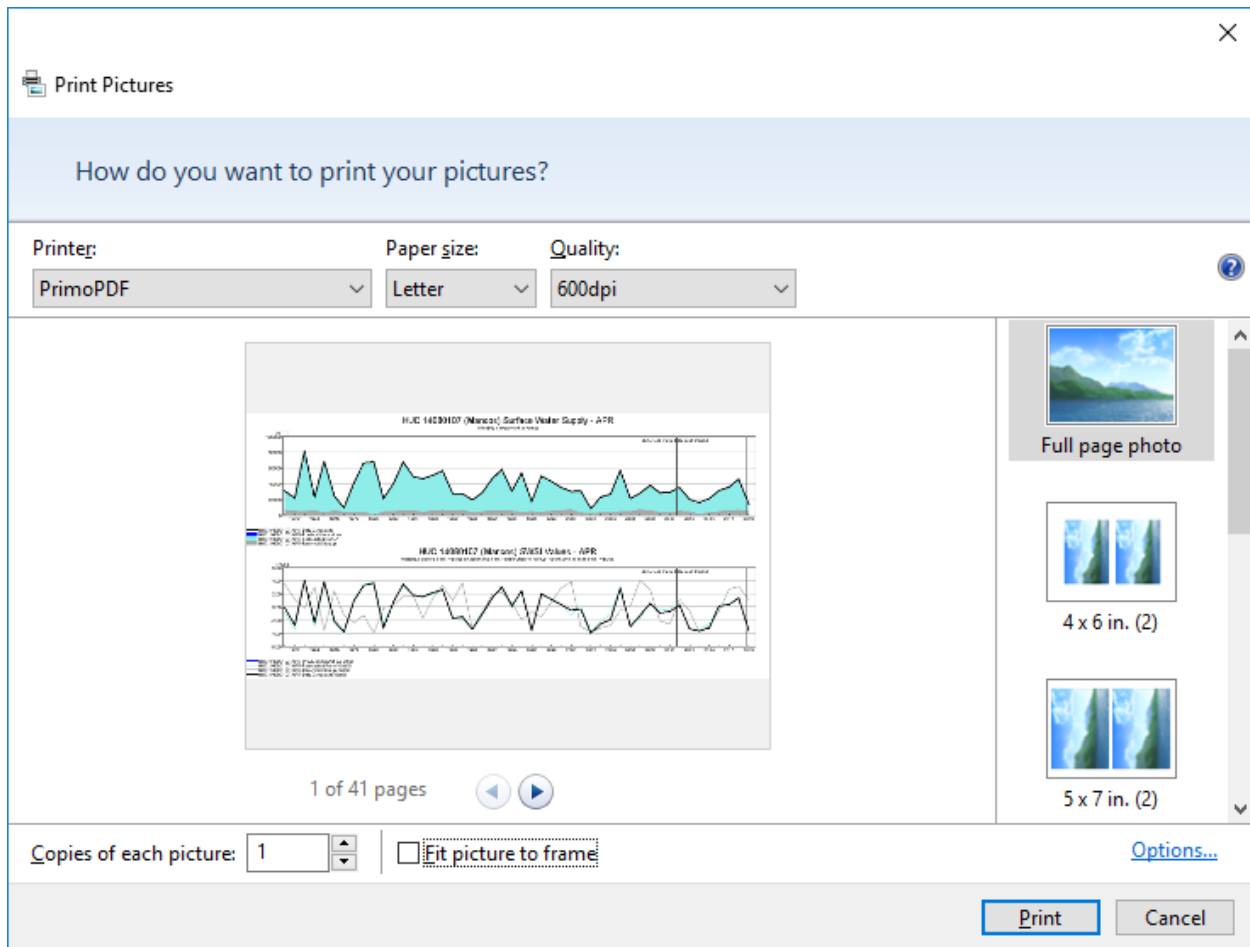
Should you ever decide to change the base components considered in each HUC for SWSI, you may want to back-run SWSIs for comparison purposes. There is an option to back-calculate SWSI information for previous years in the TSTool program; see the User Manual for details on this.

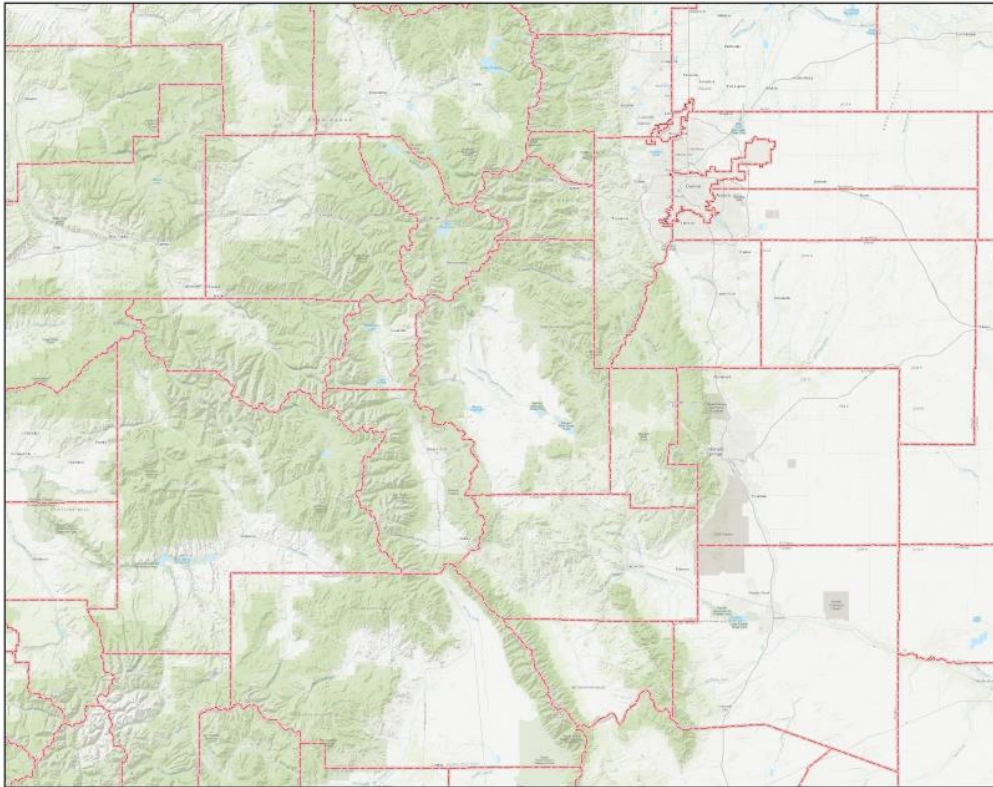
Monthly Report Assembly

1. In the “Reports” folder, save last month’s report as a new word doc with this month’s date. Keep the file type as a .doc because there have been problems in the past if the word doc converts to a .docx type.
2. You will receive the reservoir storage, streamflow and division reports from various people. There is a spreadsheet summarizing who does what in the SWSI WATF and Drought Folder, called Report Section Tracking.xlsx.
3. Create a new folder in the Monthly_Inputs folder for the information that will be received from division offices, such as _May 2018.
4. The graphs of streamflow and reservoir storage are linked excel files that are located in the main folder “SWSI WATF and Drought”. They are named for each water division and either for the stream or “RESVR”. Enter the new streamflow and reservoir data for the month. For reservoirs, update the yellow highlighted cells toward the bottom for the correct month so the chart will pull the correct data and have appropriate labels.
5. The full page graphs for each basin are generated by TSTool and can be found at: G:\My Drive\Water Supply Collaboration\SWSI WATF and Drought\SWSI monthly TSTool runs\2018-04\Results-Web\graphs-png\ALL-BASIN. These graphs are turned and stretched to be 9.5” tall and then centered.
6. Insert DE Reports, update the maps, etc.
7. For the Map Viewer Map, turn on the division, topo, and SWSI layers, adjust transparency. Select print, update the scale to statewide extent, change the screen resolution to the highest

available, change the map title to SWSI March 1, 2018. You can print it as a pdf and then use the Adobe snapshot tool to select the map, copy and paste into the report.

8. For the tables conditional format the tables using the coloring codes: Red (RGB,231,84,25), Yellow (RGB, 255,255,156), Blue (RGB, 121,159,205)
9. For the HUC graphs at the end of the report, use these PNG files: G:\My Drive\Water Supply Collaboration\SWSI WATF and Drought\SWSI monthly TSTool runs\2018-04 (1)\Results-Web\graphs-png\04-APR-HUC. Select all of the images and then "Print". The Print Pictures window will open, click the "fit picture to frame" box off. Then, it should print the graphs all together as one pdf. Then, combine the report pdf with the graphs at the end.





Legend

 County

Location



Notes

56.7 0 28.35 56.7 Miles
1: 1,796,110



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Date Prepared: 7/19/2018 1:43:40 PM