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RECLAMATION

# Missouri Basin Region Hydromet Tools User's Manual



Bighorn Reservoir, Montana

Missouri Basin Regional Office

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# Introduction

Hydromet Tools is a desktop application that allows you to graph and edit series data such as gauge height, river flow, water temperature, etc. This application was developed by PN Region and therefore has several features that are customized for PN Region data. Basic features such as instant data, daily data, and Data Analysis do work for MB Region data. The user interface is much more intuitive than the SmarTerm interface for viewing, interpreting, and editing data. There is now a password required for Hydromet Tools downloads from GitHub. There is no password to access the software once it is downloaded. Contact the Hydromet Coordinator to receive the password.

Requirements:

- Windows- XP or higher
- .net 2.0 or higher

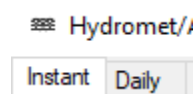
Download Hydromet Tools from:

<https://github.com/usbr/HydrometTools/releases>

Hydromet Tools installation does *not* require any special user privileges, so you will probably be able to install this yourself. If not, contact your administrator.

## Querying Data

The first two tabs in Hydromet Tools: Instant or Daily determine the interval of data. Some parameter codes are different between intervals. For example, flow rate is 'Q' for instant and 'QD' for daily.



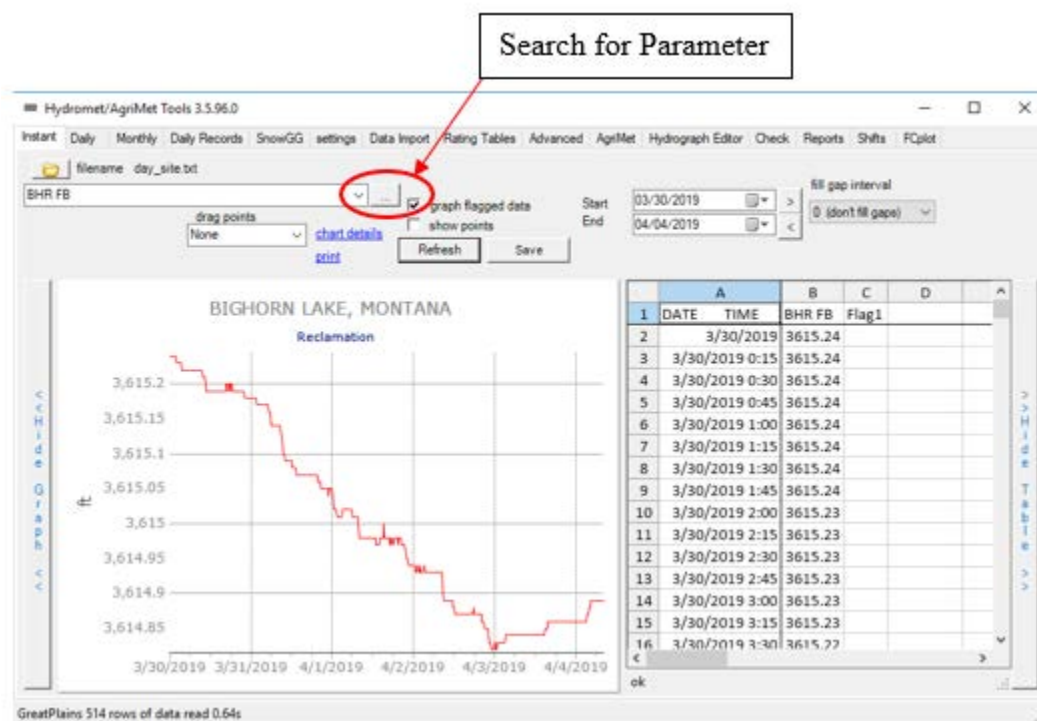
It is possible to mix intervals in a single graph, so you can graph daily data and instant data in the same graph. However, the table will only show and allow editing for the interval/tab selected. To mix intervals put a prefix in front of the cbtt. For example, enter 'BHR AF, d:BHR AF'. This query means graph Bighorn contents in whatever interval you have selected and plot the daily Bighorn contents.

| Prefix | Description |
|--------|-------------|
| d:     | daily data  |

|    |              |
|----|--------------|
| i: | instant data |
| m: | monthly data |

Hydromet data is queried using a CBT'T and parameter code like this: 'BHR FB'. The CBT'T is the short name for a Hydromet site, such as BHR (Bighorn Lake). The CBT'T tells where the data is coming from. The parameter code, such as FB (forebay), tells what type of data you want. The button to the right of the input with three dots on it opens a searchable list of sites. Search for keywords, locations, or CBT'T site codes. Additionally, a list of site codes is provided in Appendix B- List of Sites in MB Region Hydromet. For a limited list of example parameter codes, see Appendix C – Example Parameter Codes.

For example, enter the query BHR FB as shown below and click the Refresh button.



The forebay data is graphed on the left and tabulated on the right.

More query examples:

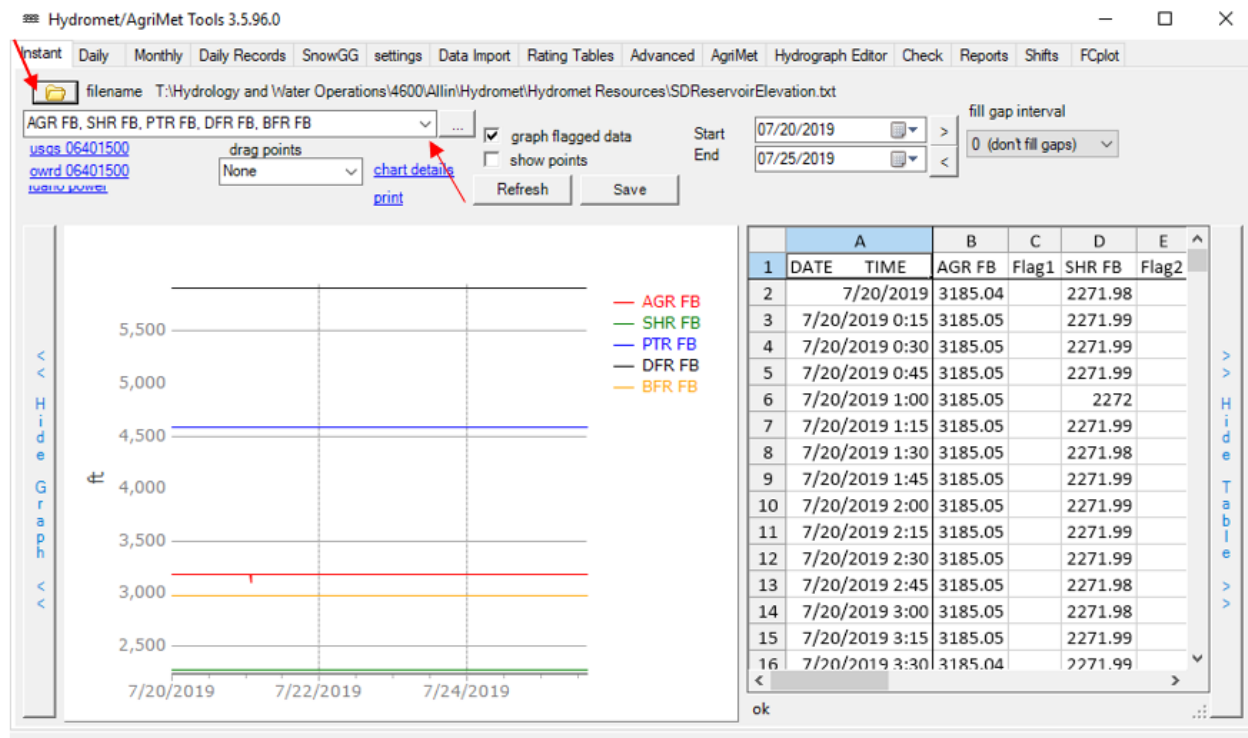
| Example   | Description                                  |
|-----------|--|
| BHR FB    | Bighorn Lake forebay                         |
| BHR FB,AF | Bighorn Lake forebay and storage (acre-feet) |

|     |  |
|-----|--|
| BHR | Bighorn Lake. All parameters are plotted because only the CBT* is entered. |
|-----|--|

To quickly query multiple site and parameter combinations, you can create a text file with a list of combinations. The example created generates a list of elevations for all South Dakota reservoirs:

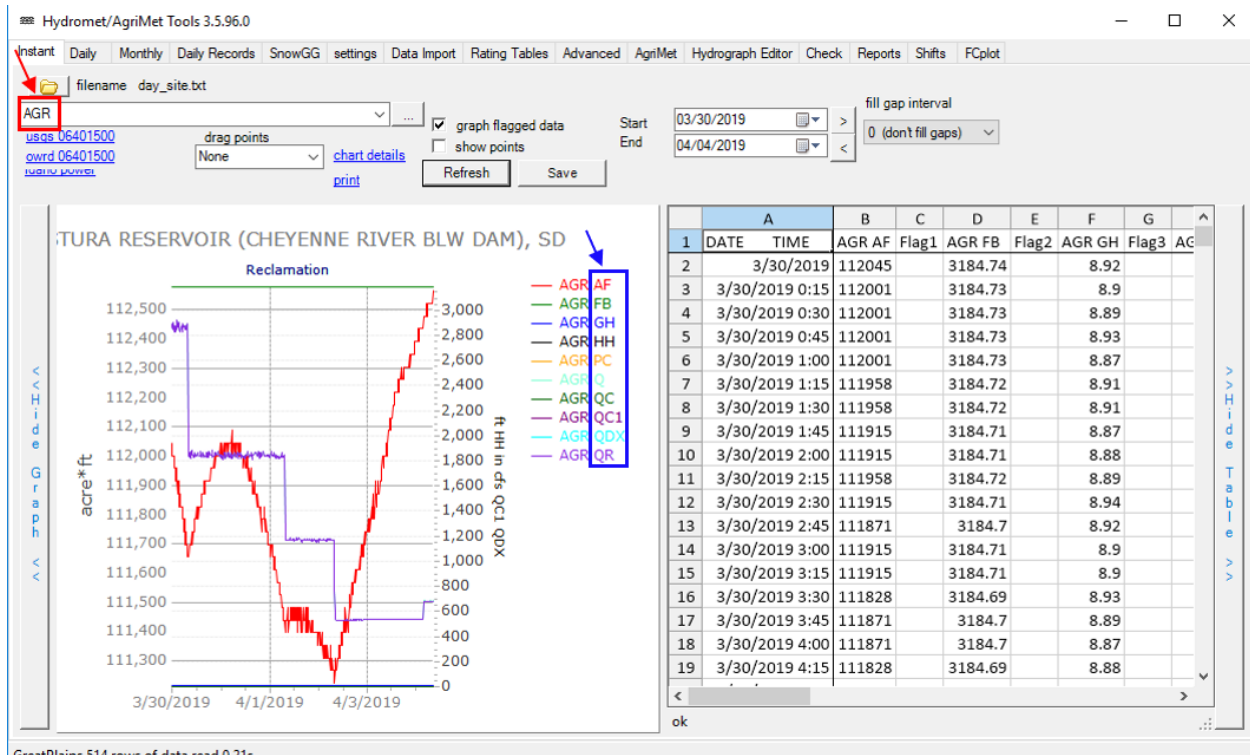
AGR FB, SHR FB, PTR FB, DFR FB, BFR FB

Save this text to a text file, then open Hydromet Tools. Select the folder icon in the upper right corner and select the created text file. Hit the dropdown icon in the input box to see the list of stations appear. This is particularly useful for operators who query the same data repeatedly.



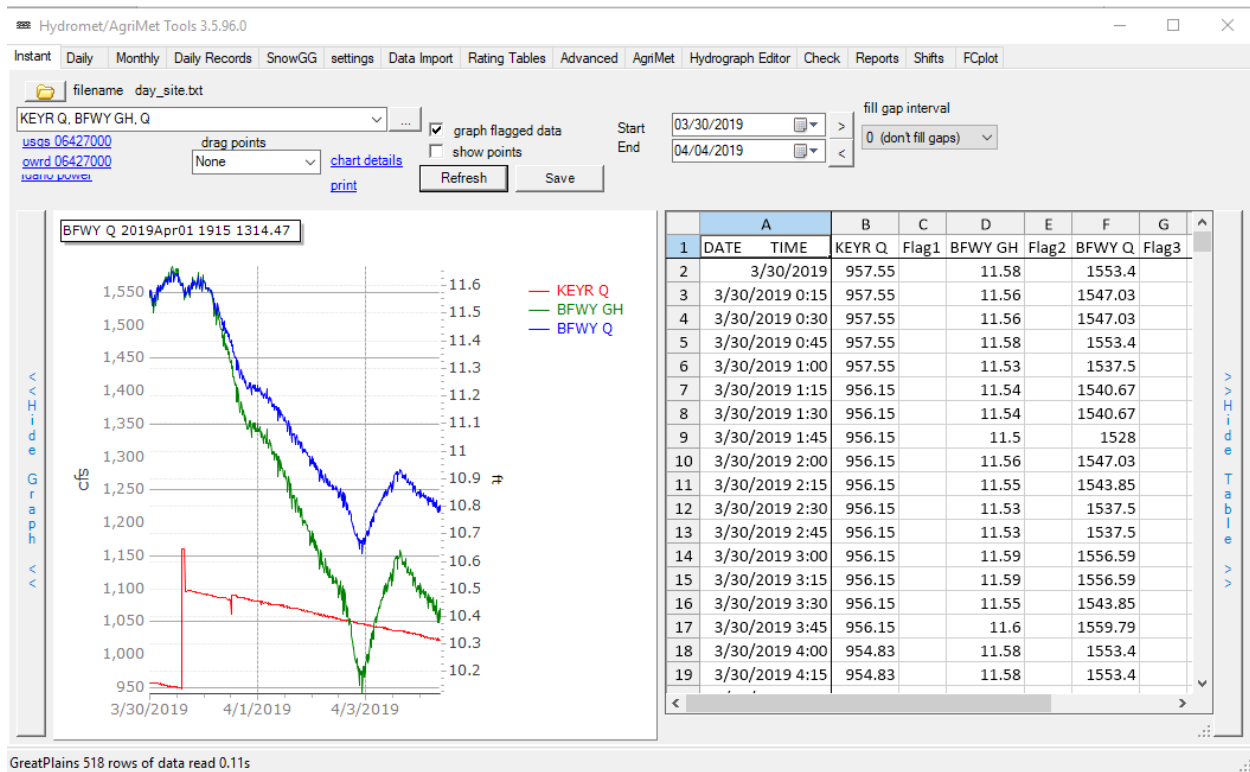
## Instant Data – Viewing and Editing

Click the Instant Tab to view instant data. This is the equivalent of Dayfile data in SmartTerm. It is recording in 15, 30, or 60-minute intervals depending on the station. You can observe the graphed data on the left and edit the data on the right.

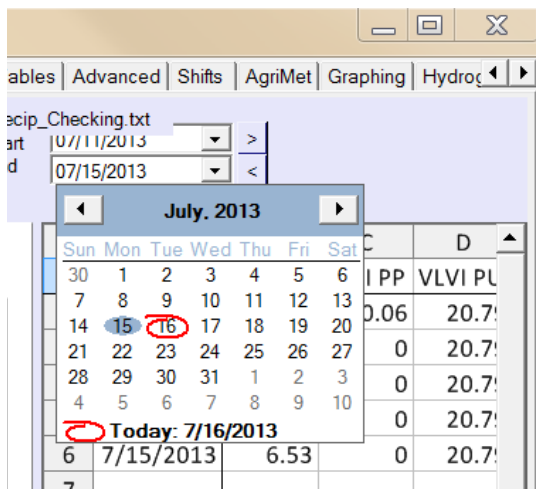


All data is queried through two types of codes, **CBTT** and **PCODE**. An example of **CBTT** is **AGR** (Angostura Reservoir) and of **PCODE** is **FB** (Forebay). If only **AGR** is entered, all of the instant parameters for the site are returned.

Hydromet Tools also has the ability to graph multiple **CBTT** and **PCODES** at once. You can see on the graph below under the filename box there is a single **CBTT** code followed by two **PCODES**, and this process is repeated multiple times.



The range at which you view this data can be changed using the Start and End Dates.



**Graph flagged data** means data that is outside the acceptable ranges still gets graphed.

**Show points** shows data points on your graph.



Hydromet/AgriMet Tools 3.5.96.0

Instant Daily Monthly Daily Records SnowGG settings Data Import Rating Tables Advanced AgriMet Hydrograph Editor Check Reports Shifts FCplot

filename day\_site.txt

KEYR Q. BFWY GH. Q

usgs 06427000  
owrd 06427000  
tugriv 06427000

drag points None chart details print

☒ graph flagged data  
☒ show points

Start 03/30/2019  
End 04/04/2019

fill gap interval 0 (don't fill gaps)

Refresh Save

For example: This is a graph depicting *flagged data* starting at 3/19/2019 08:45.



It is generally recommended to edit instant data as opposed to editing daily data. Daily data is often calculated using instant data values. To edit instant data, you can edit directly in the system or edit in Excel and copy paste into the system. Hit the save button when done editing. If there is a value missing, or a wrong value that you do not know the correct value of, and it is a situation that makes sense to interpolate, Hydromet Tools has an interpolate feature. Delete the wrong value, then select the values on either side, right click, and select interpolate.

## Daily Data – Viewing and Editing

Daily data is retrieved the same way instant data is. Daily data is very similar to instant data except it's the daily values graphed instead of 15 minute intervals. In Hydromet SmartTerm, daily data is



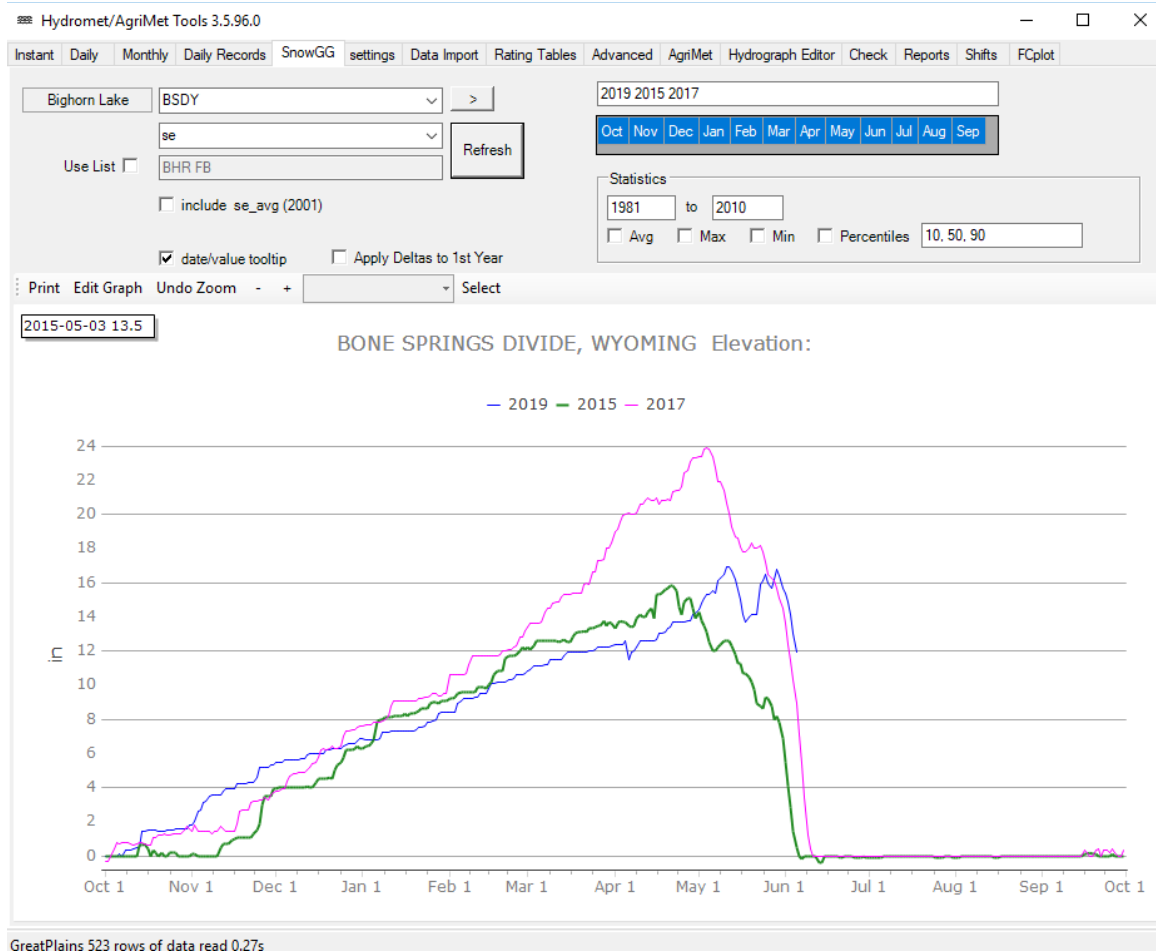
called Archives. Most of the daily data is calculated using the instant data. Other daily data is manually entered.

Editing daily data is the same as editing instant data. However, it is generally recommended to edit instant data as opposed to daily data. Daily data is often calculated using instant data values. You can edit directly in the system or edit in Excel and copy paste into the system. Hit the save button when done editing. If there is a value missing, or a wrong value that you do not know the correct value of, and it makes sense to interpolate the data, Hydromet Tools has an interpolate feature. Delete the wrong value, then right click and select interpolate.

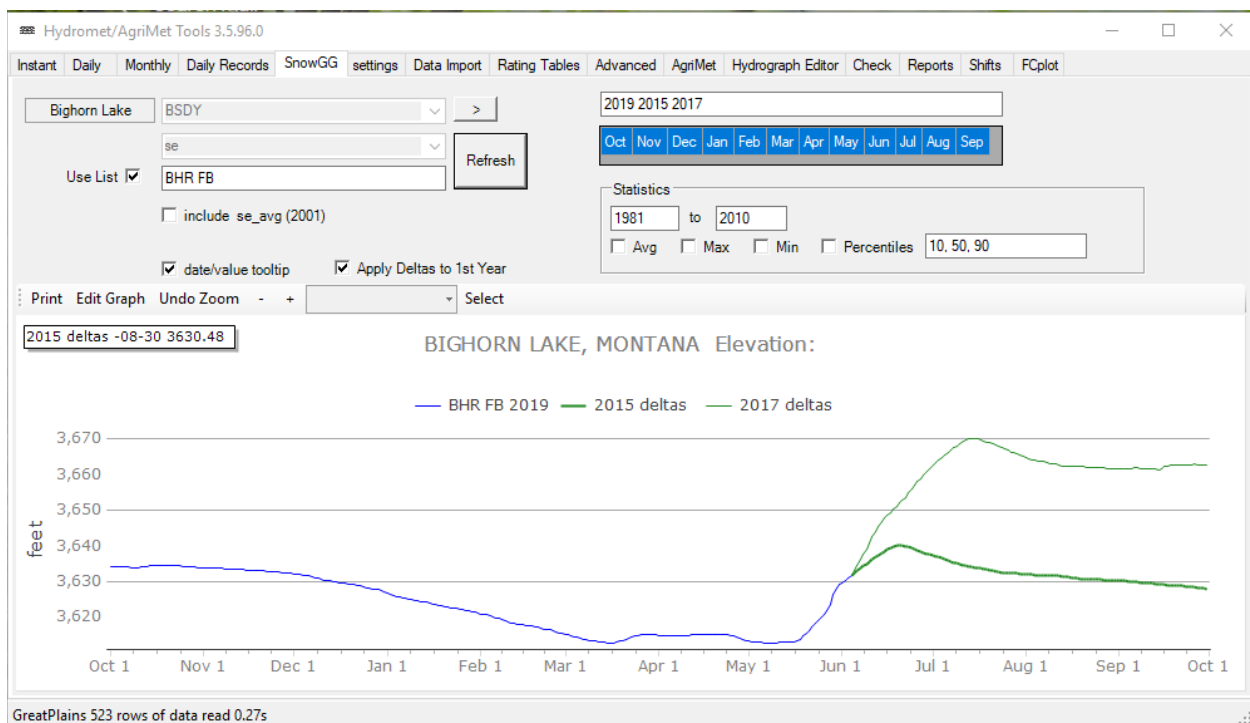
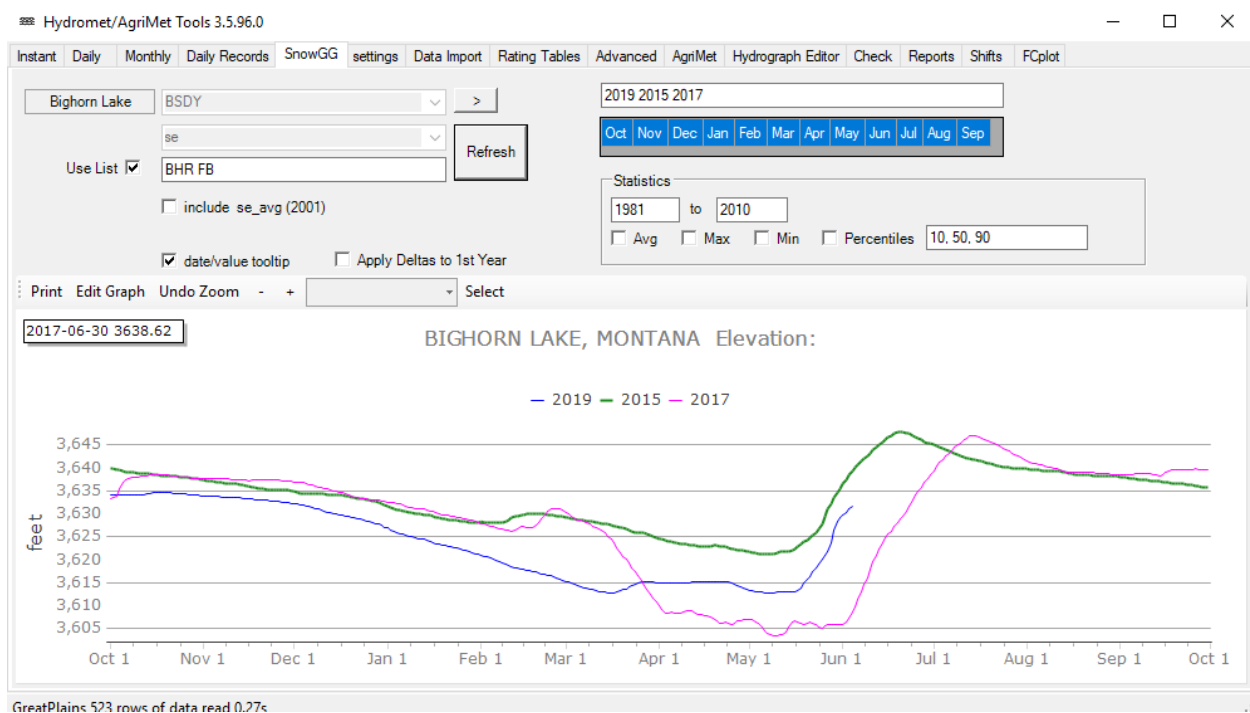
Under the advanced tab, there is an option to calculate daily computations using instant values for a time range. This section is useful after editing instant data as it makes the necessary computations to generate daily data. More information about this tool can be found in the Advanced section.

## **Data Analysis**

Data Analysis is used to graph multiple water years of daily data. This tab sorts the data by basin. A site within the basin is selected and then a type of data is selected. Alternatively, a list of CBITT-parameter code combinations can be specified by checking “Use List”. Multiple years can be selected, and specific months within each year can be selected. Additionally, statistics such as average, min, max, and percentiles can be graphed to compare to the current year or other years.

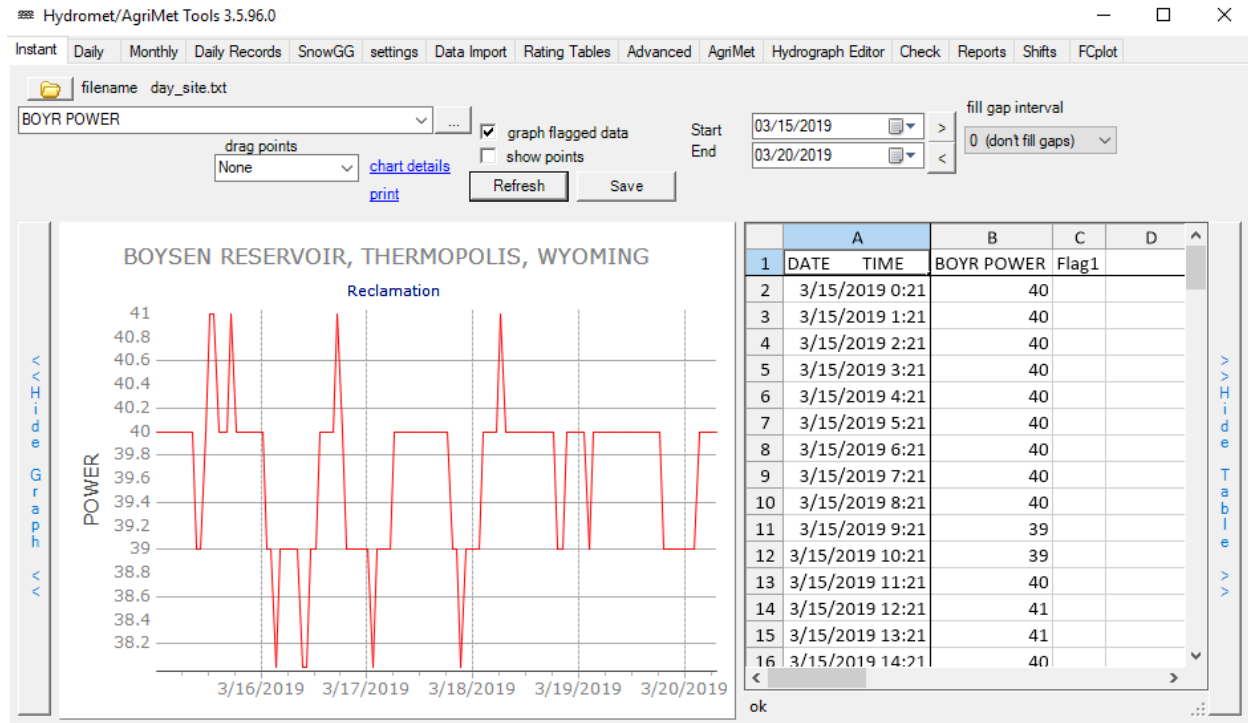


Historical delta calculations can be applied to current observations. In the years input, list the current year first, then add years to compare. This will create projected conditions based on the selected year and current conditions. In the following example at Bighorn Lake, the first image shows forebay elevation for 2019, 2015, and 2017. The next image shows the same information but with “Apply Deltas to 1<sup>st</sup> Year” selected. This plot takes the current elevation, then calculates the elevation trend if the conditions suddenly looked like 2015 or 2017.



## Transmission Data

There is a way to examine transmission data through Hydromet Tools as opposed to going through the MCF G Tab on SmarTerm. While on the Instant Data Tab, input the site name and “POWER” in the main input window to view power during each transmission. The example below shows “BOYR POWER”. This shows if a transmission was missed or if there are any other problems related to the transmission. Another input is “Site name PARITY”. If Parity displays zero, it means the transmitted data matches the data collected at the site. If Parity shows any other value, the transmitted data does not match the data collected at the site. Another transmission command is “Site name CHARCNT”, which displays the number of characters transmitted in the message.



## Settings

To access MB Hydromet, ensure that Billings Hydromet is selected under time series data source. Additionally, if calculations, computations, raw data updates, or inserting zeros are being completed, ensure that “I’m an expert show all options” and “enable computations” are selected in the advanced section. The log details tab is useful for debugging. When something doesn’t seem right you can look here for technical details. The other tabs in the settings tab do not work on MB Hydromet.

Instant
Daily
Monthly
Daily Records
SnowGG
settings
Data Import
Rating Tables
Advanced
AgriMet
Hydrograph Editor
Check
Reports
Shifts
FCplot

general
notifications
log details
alarms

time series data source

☐ Yakima Hydromet
☒ Billings Hydromet
☐ Boise Linux Hydromet
☐ Yakima Linux
☐ Local source:

database name:

☐ hide status dialog

advanced

☒ I'm an expert show all options
☐ enable computations

other

☐ use multiple y axis (on left side)
☒ automatically flag dayfiles with 'e' during edits

relational database

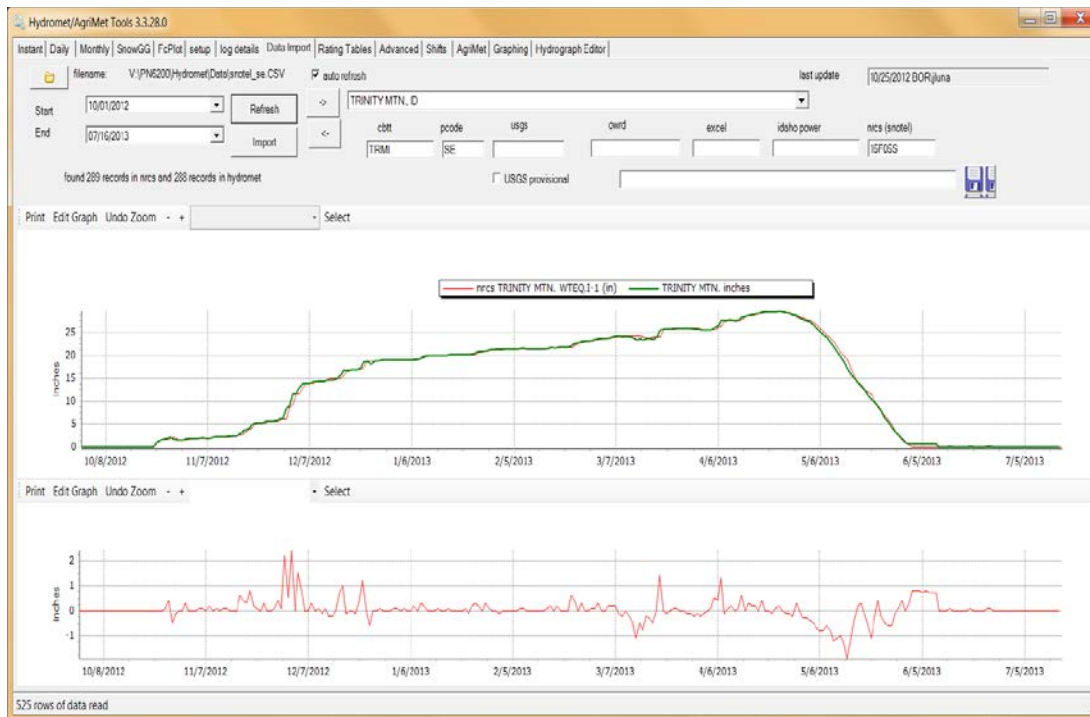
password

show

## Data Import

Use the Data import Tab to import published data from USGS, NRCS and Idaho power. The published data is compared to Hydromet data. For example, this Trinity Mtn, ID graph compares data between Hydromet and NRCS on the top graph and the *difference* between **NRCS's** data and Hydromet data on the bottom. These are organized by CBTI and PCODE. A table of all the displayed data is provided as well.

Hydromet Tools comes with several pre-imported data sets. However, these data sets are all for the PN Region Hydromet data. Data pertinent to MB data can be imported using the appropriate codes and hitting import.



## Advanced

There are several sections of interest in the Advanced openvms tab. If you cannot see this tab, go into settings and make sure “I’m an expert show all options” is checked.

The rawdata section is used to reprocess satellite data for a site. This is typically used after a site has changed decoding methods.

The daily calculation section calculates daily computations using instant values for a time range. This section is useful after editing instant data. Calculations for the daily data are made with instant values. After editing instant, the daily data values will not be automatically updated. That is why this section would be used.

The daily calculation for multiple sites tab does the same thing as the daily calculation section but allows the user to input multiple sites.

Calculations can be made using rating table calculations. The rating table math package computes one parameter based on another, for example storage (AF) based on forebay (FB) or computes flow (Q) based on gage height (GH). This can be run using both instant and daily data. If the “use ace table” check is selected, the system will calculate storage based on an ACE table rather than the site’s AF rating table in Hydromet. If you would like to run the rating table calculation on instant data and then run the archiver for daily data, use the “also compute daily value” box.

The insert zeros into instant database rewrites data for a time period to all be zero.

The MB FIXINFLO section will calculate inflows after data is edited either manually or through a procedure. This would only need to be run for complex reservoirs in MB Region. It runs the FIXINFLO procedure from Hydromet.