NASA RRED USER MANUAL FOR RUNNING QWEPP

Manual for the NASA-Rapid Response Erosion Database & QWEPP

Prepared for
Forest Service Burned Area Emergency Response Teams &
Erosion modelers

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http://rred.mtri.org/rred/

April 23, 2019

System Requirements

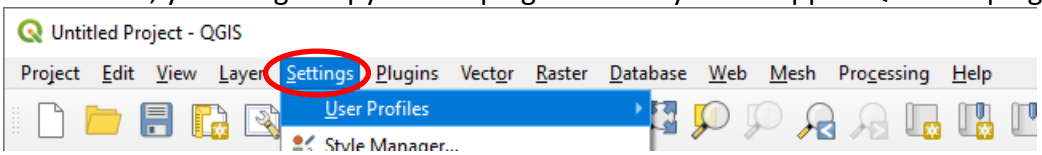
In order to utilize QWEPP users will need **QGIS 3.6 software** installed and the **QWEPP plugin**. You also might need the .NET Framework and at least 250 MB of hard drive space. The NASA Rapid Response Erosion Database (RRED) provides the spatial land cover, digital elevation model, and soils data pre-registered and linked with WEPP parameter files http://rred.mtri.org/rred/.

Be sure to install QWEPP and test the software before you need to run the model as installation and learning new software and modeling tools takes time. Experience using GIS software is very helpful for preparing, interpreting, and presenting modeling results. For QGIS installation go to this site: https://www.qgis.org/en/site/forusers/download.html# and select standalone version of QGIS. Software should work for 3.x versions.

Install QWEPP plugin

Once QGIS is installed, you are ready to install the QWEPP plugin. QWEPP can be downloaded here: ftp://ftp.mtri.org/pub/NASA_BAER/QWEPP3.zip. After downloading the QWEPP folder unzip the folder using the **extract here option** and then place the QWEPP3 folder within the plugin folder of your QGIS installation. In the future this step may be easier after the software is uploaded to the QGIS repository.

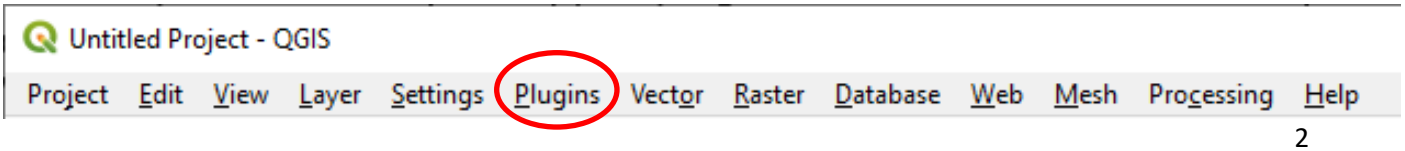
To find your plugin folder open QGIS:
Go to menu Settings -> User profiles -> Open active profile folder
From there, you can go to python -> plugins. Place your unzipped QWEPP3 plugin folder here.



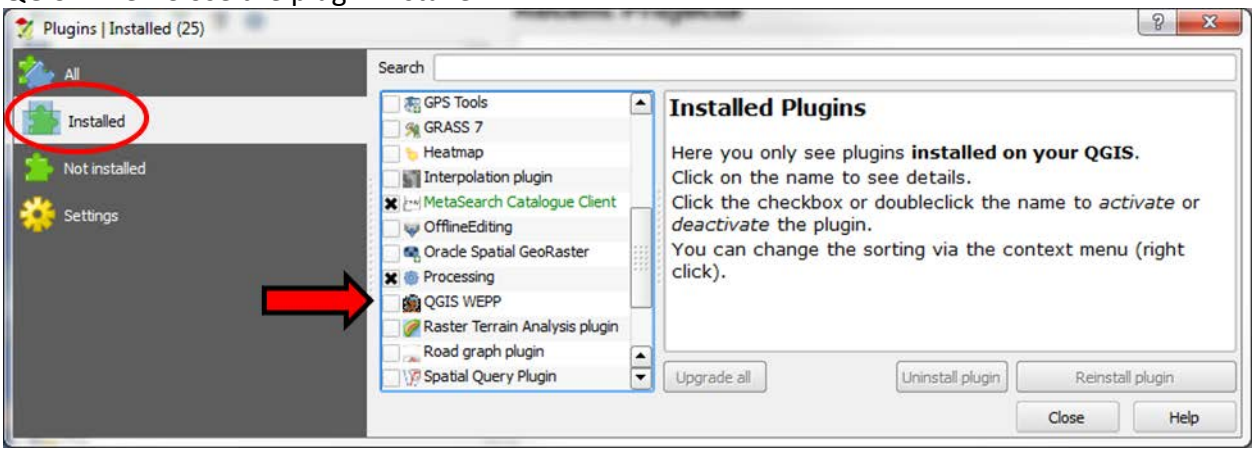
Here is an example folder path of where to place your plugin:
C:\Users\yourusername\AppData\Roaming\QGIS\QGIS3\profiles\default\python\plugins

Caveat: If you extracted your zipped plugin to the QWEPP\ folder than you will have a folder within your folder and your installation may looks like this:
C:\Users\yourusername\AppData\Roaming\QGIS\QGIS3\profiles\default\python\plugins
\QWEPP3\QWEPP3

Simply move all your files to the top QWEPP3 folder and you are ready to start QGIS. If QGIS was open when you moved the plugin software then you will need to restart QGIS.



From the toolbar select Plugins > Manage and Install Plugins…
Select Installed to shorten the list of plugins and then click on the box next to QGIS WEPP to activate QGIS. Then Close the plugin Installer



The following tool bar will appear and you are ready to begin modeling.

The NASA BAER button loads spatial model inputs into your project and is the first step.

The select watershed outlet tool allows you to select your watershed outlet and will delineate a watershed based on what point you click on in the map.

Select this button to start modeling – you will be asked to name the model run. You can model multiple watersheds in your view area and if you provide a unique name all the results will be saved.

This tool will save your qgs map only. To perform additional model runs you will need to reload your model inputs in order to resume modeling.

Note: Window messages are sometimes behind other screens! Look for them if too much time has passed!

Example data

An example dataset (Example_fish) depicting the fish fire is provided in the QWEPP folder. The soil parameter files are already copied into the WEPP soil folder.

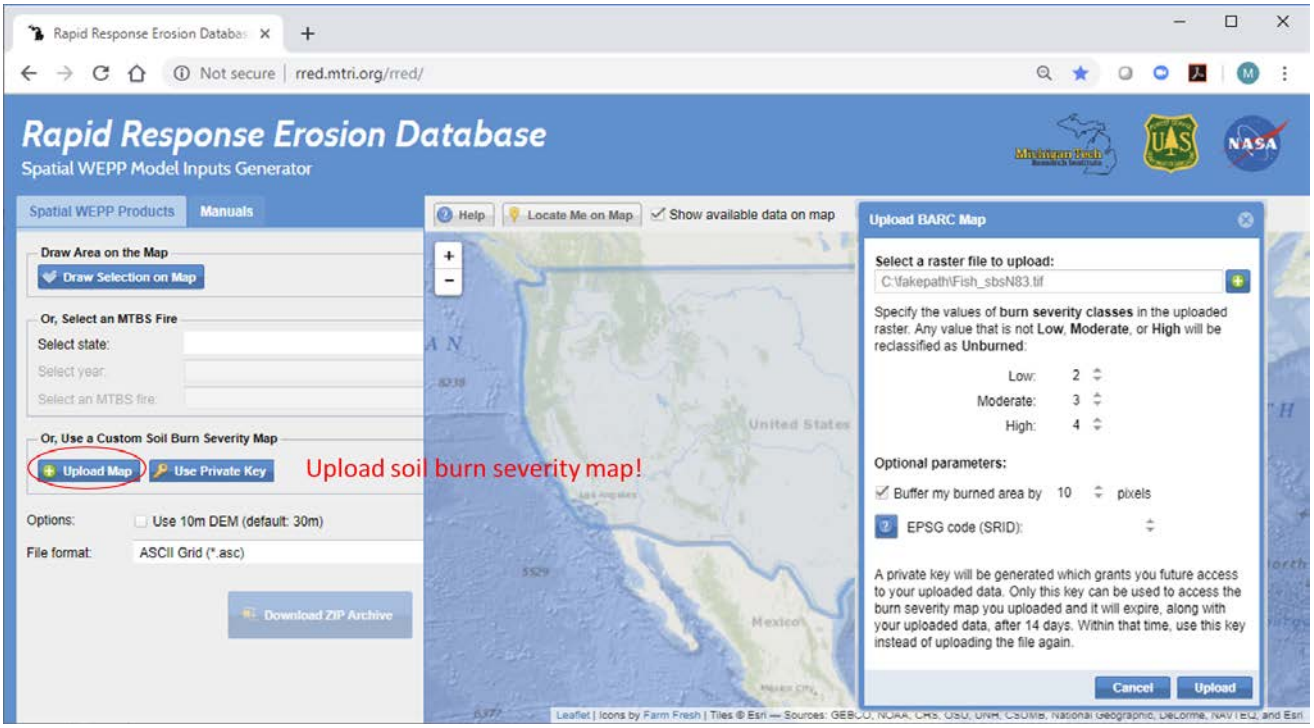
Down Load spatial modeling data from the NASA RRED site

The NASA RRED website is designed to provide spatial model inputs and parameters for modeling in spatial WEPP programs such as QWEPP or GeoWEPP. Currently users have three options for obtaining modeling inputs! **1)** Upload a user supplied burn severity map into the database or **2)** Select a historical fire from pre-formatted MTBS fires, the database currently has MTBS fires

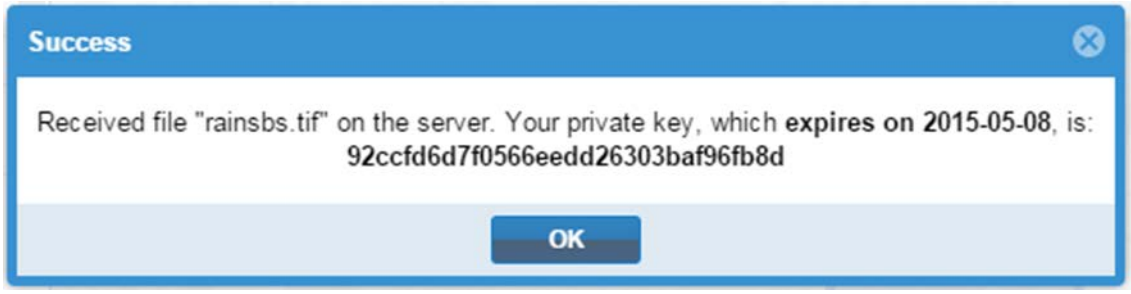
through 2014. **3)** Use the **Draw Selection on Map** tool – note currently this option will provide WEPP soils intended for agricultural applications.

1) The database was designed to rapidly merge soil burn severity maps (created by BAER Teams) with spatial land cover and soils data in order to support post fire remediation. The soil burn severity maps need to be in a classified raster format with geospatial information such as a geotiff or img file. The database can handle a number of projections, but it would be best to leave the data in the native projection of the original Landsat imagery. The classified maps can have up to three burn severity classes – low, moderate and high. Other classes such as unburned\low and enhanced regrowth are set to unburned. Users can reclassify their map before uploading the data to achieve desired results. Another application for the data base is to upload predicted maps of burn severity to support fuels planning projects.

1. Use a web browser to go to http://rred.mtri.org/rred/
2. Select the Upload BARC Map button
3. Browse to your classified raster file.
4. Specify the integer class values for each burn severity map. Typical values are Low – 2, Moderate – 3, and High – 4.
5. It is a good idea to buffer the burned area in order to capture enough data to model the unburned portions of watersheds.
6. An **optional** feature allows users to upload **EPSG** codes (or **SRID**'s) to identify the spatial reference system of the uploaded raster (e.g. **WGS84** or **UTM 19N**). For geotiffs the system automatically detects the SRID, but manually specifying a known SRID may help to avoid errors when uncommon formats are used.
   A table of common EPSG codes that this application can handle is provided. If you receive an "invalid SRID" error message when trying to upload your raster, try re-projecting it to one of the projections in the list and re-upload:
7. Click the Upload button and wait a few moments while NASA RRED prepares your modeling inputs! If your fire is large the process may take a few minutes.



8. When your raster soil burn severity map is uploaded it does not become publically available, a key is created and the imagery is stored for two weeks. You can share the key with others or use the key to access model inputs at a later date. Store the key in a safe place if you want to use it later and Click **OK.**

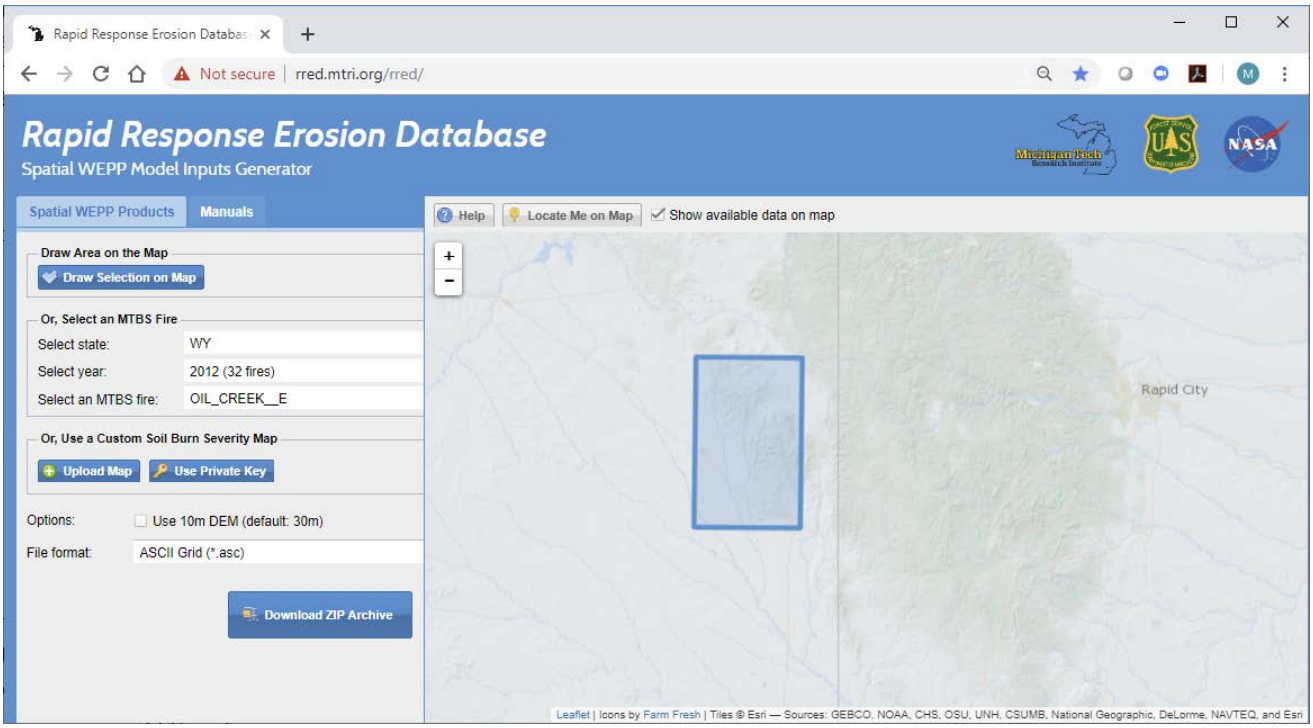


9. You can know Select the Download ZIP Archive button to obtain all the model inputs to model your watershed in both a burned and unburned state, move your zip file to a convenient location and extract the files to the folder name. You are ready to have fun modeling!

2) If you do not want to upload a burn severity raster you can select and download spatial WEPP modeling data generated from historical MTBS data. These data sets are a good way to practice modeling before a real fire event occurs. **Remember the burn severity maps in the MTBS data are not adjusted with BAER team field data into soil burn severity maps!**

1. Use a web browser to go to http://rred.mtri.org/rred/
2. Select state - currently data and fires are available for the 48 Continental US states.
3. Select year of fire – range currently available is 1984-2015.

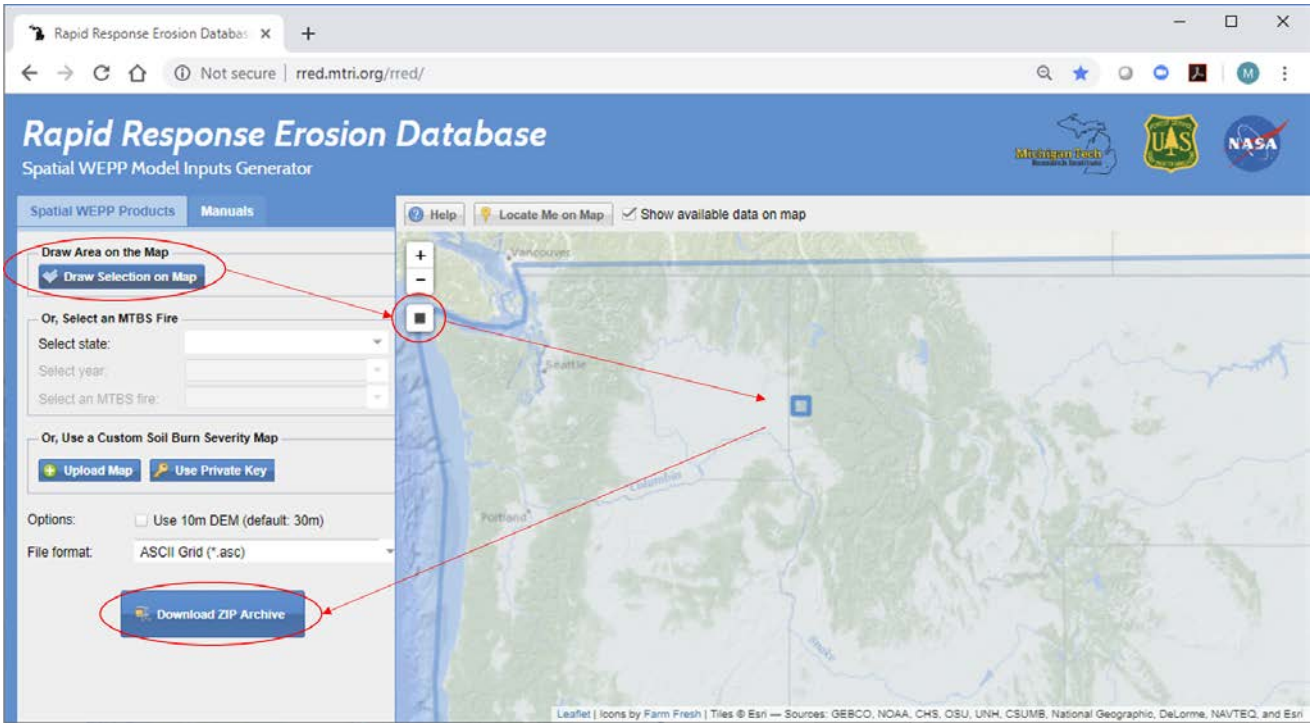
4. Select fire – name used when available. If the name ends with an E then the imagery used to create the map was not obtained immediately after the fire. Grasses may have recovered rapidly and these areas will show up as unburned.
5. Products needed for modeling in GeoWEPP should be selected
6. **File format**: set to ASCII Grid (*.asc)
7. **Download ZIP Archive** click on the Download ZIP Archive button, move your zip file to a convenient location and extract the files to the folder name. This folder will be referred to as your NASA RRED download folder. You are ready to have fun modeling! Feel free to rename your folder.



3) Draw Selection on Map

1. Use a web browser to go to http://rred.mtri.org/rred/
2. Select the Draw Selection on Map button
3. A new square map button will appear simply click on this new button.
4. Click on the map to draw a rectangle around your area of interest.
5. **Download ZIP Archive** click on the Download ZIP Archive button, move your zip file to a convenient location and extract the files to the folder name. This folder will be referred to as your NASA RRED download folder. You are ready to have fun modeling! Feel free to rename your folder.

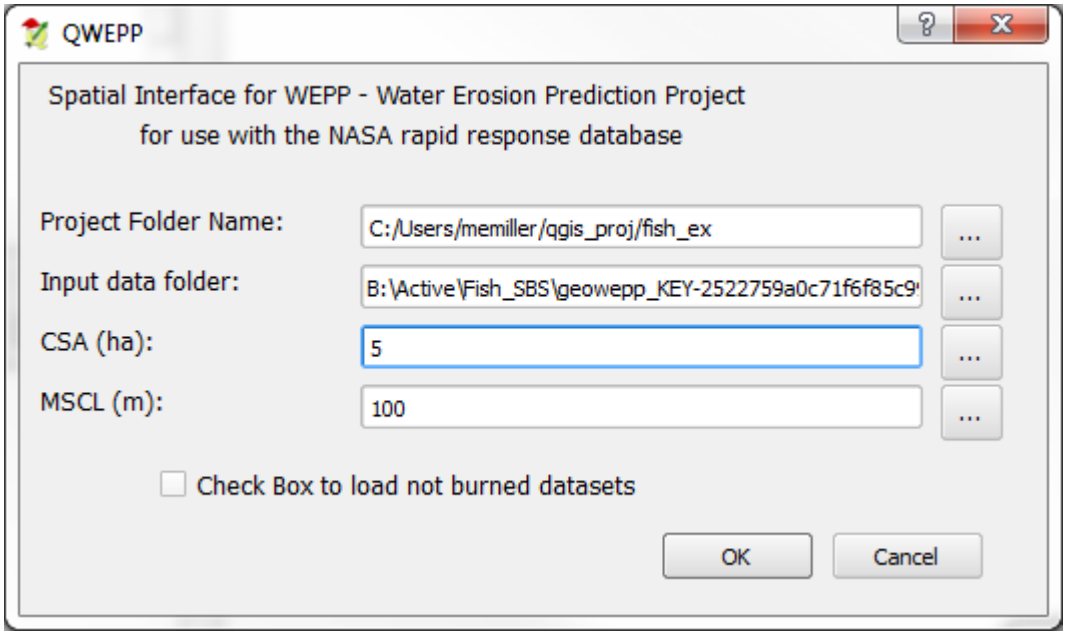
Remember your soil parameter files are intended for use in agricultural modeling when downloaded with this method.


Rapid Response Erosion Database
Not secure | rred.mtri.org/rred/
Rapid Response Erosion Database
Spatial WEPP Model Inputs Generator
Spatial WEPP Products
Manuals
Draw Area on the Map
Draw Selection on Map
Or, Select an MTBS Fire
Select state:
Select year:
Select an MTBS fire:
Or, Use a Custom Soil Burn Severity Map
Upload Map
Use Private Key
Options:
Use 10m DEM (default: 30m)
File format:
ASCII Grid (*.asc)
Download ZIP Archive
Help
Locate Me on Map
Show available data on map
Vancouver
Seattle
Portland
Leaflet | Icons by Farm Fresh | Tiles © Esri — Sources: GEBCO, NOAA, CHS, OSU, UNH, CSUMB, National Geographic, DeLorme, NAVTEQ, and Esri

Modeling with QWEPP and RRED data sets

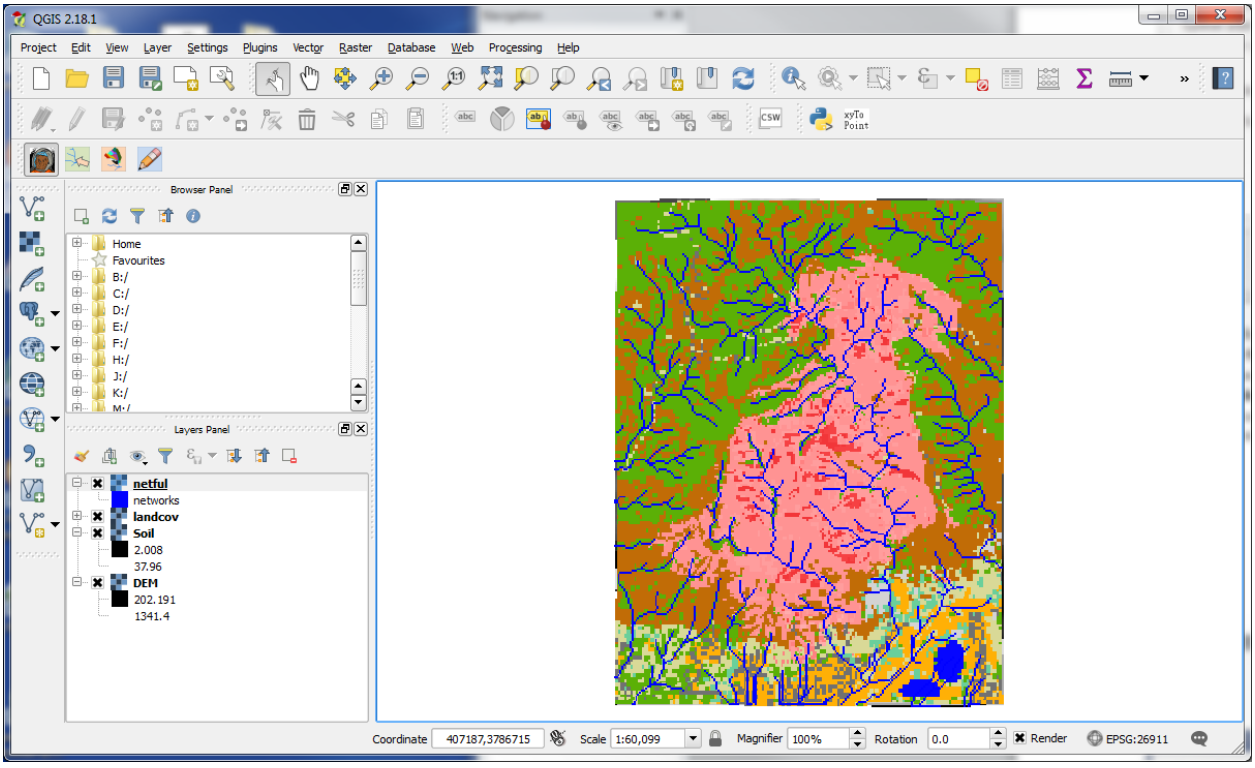
Once you have downloaded the data and installed QWEPP you are ready to begin modeling. The spatial ascii files within your downloaded dataset should include a dem, landcov_burned, landcov_unburned, soil_burned and soil_unburned files. (If you selected an area using the draw selection tool you will not have burned files.) These ascii files also have corresponding projection files that you can use to determine your utm zone. There are four text files that link the values in the ascii soil and land cover grids to actual WEPP parameter files – landcov.txt, landusedb.txt, soilsmap.txt, and soilsdb.txt. There is also a folder in the directory (i.e. - **DisturbedWepp_KEY-92ccfd6d7f0566eedd26303baf96fb8d**) that contains the WEPP soil parameter files needed to model the area you downloaded.

1. O**pen QGIS**
2. **Click on the NASA BAER button**

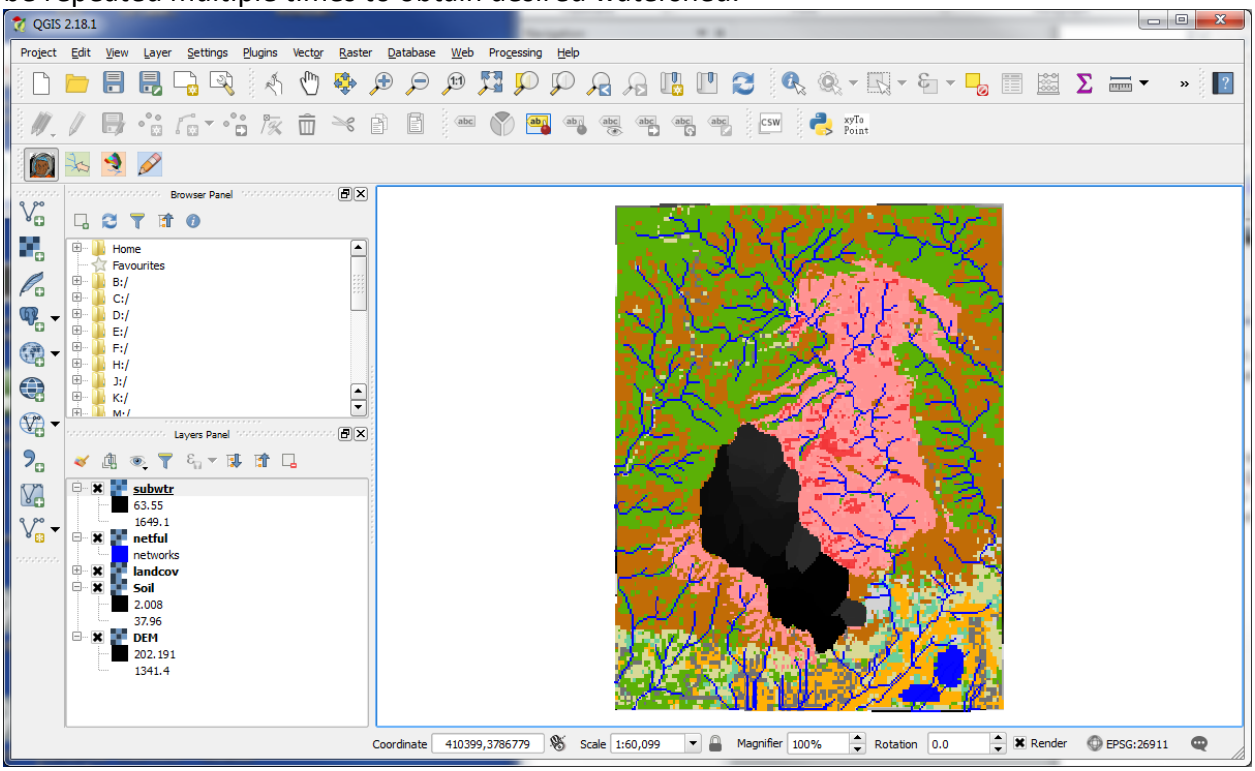


Provide the following inputs to load your data into QWEPP:
Project Folder Name: This is your new project folder name and path – put your folder somewhere convenient perhaps a qgis project folder.
Input data folder: This is your unzipped NASA RRED data folder – simply select it. Make sure you copied your soil folder to your WEPP soils folder.
CSA (ha): Critical Source Area in hectares – the smallest upslope catchment area.
MSCL (m): Minimum Source Channel length in meters is the shortest channel length allowed in the stream network.

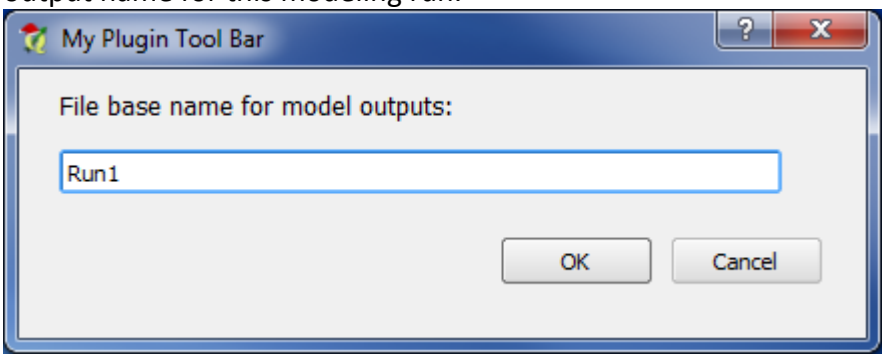
3. click **OK**



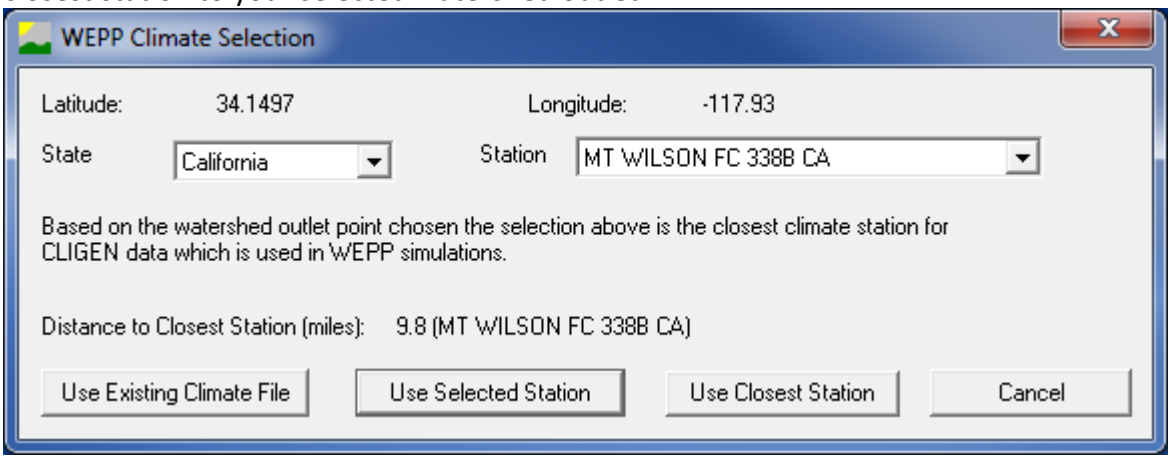
4. The next step is to select a watershed outlet and delineate the watershed using the select watershed button. Click on the button and then click on the map. This can be repeated multiple times to obtain desired watershed.



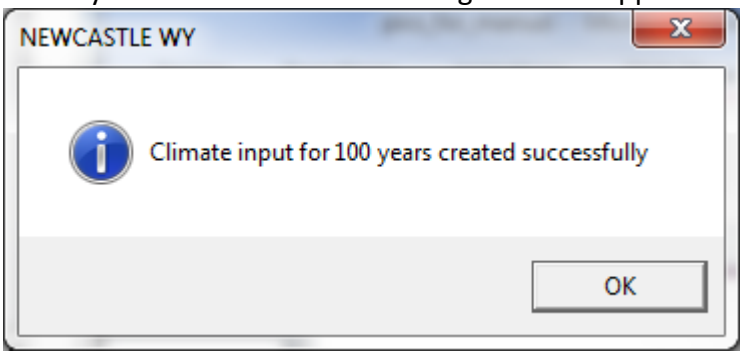
5. Next select the run WEPP button to begin modeling – you will be asked to select an output name for this modeling run.



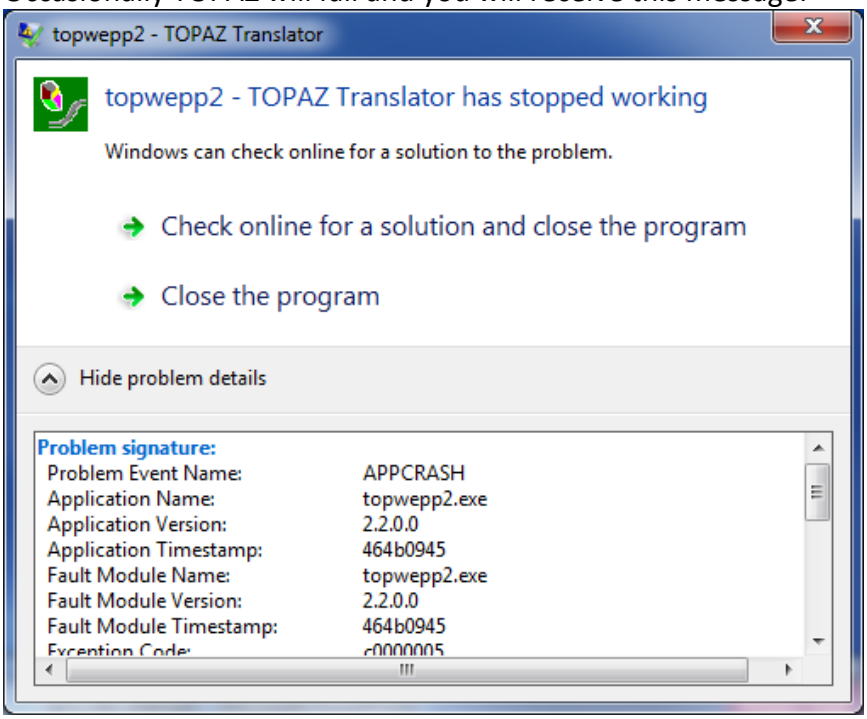
6. Next – you will be asked to select a climate file. If you want you can select a custom WEPP file to simulate a single storm or a multi-year climate file. The default climate should be the closest station to your selected watershed outlet.



7. When you select a climate a message box will appear – select **OK**

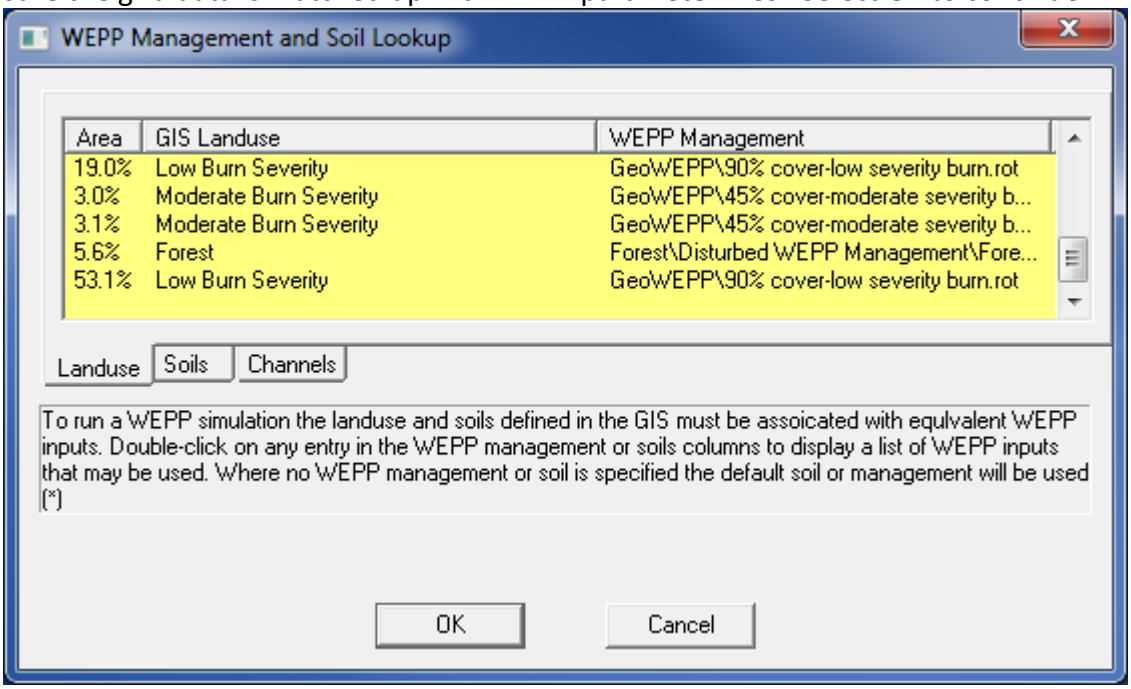


8. Occasionally TOPAZ will fail and you will receive this message:



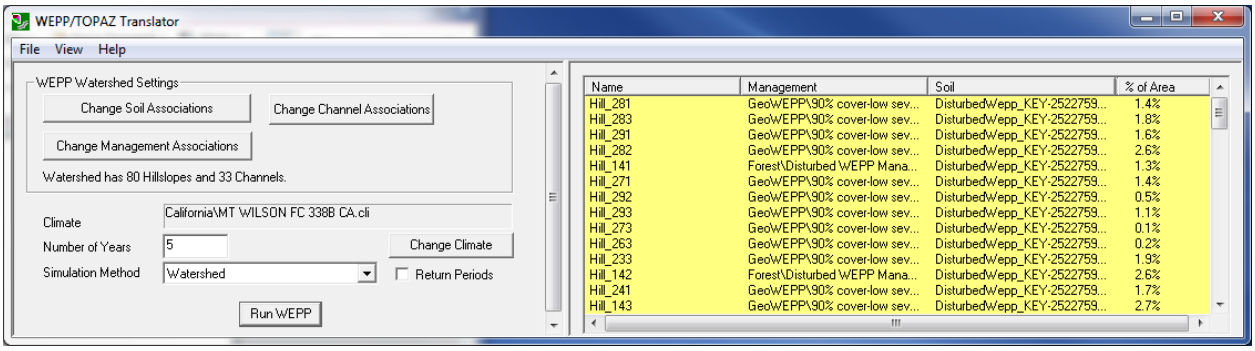
When this happens redelineate the watershed with a smaller area. Just use the select watershed button to select another outlet.

9. When TOPAZ is able to parameterize the watershed the WEPP Management and Soil Lookup box will appear. You can change soil and land cover parameters if needed and check to make sure the grid data is matched up with WEPP parameter files. Select **Ok** to continue.

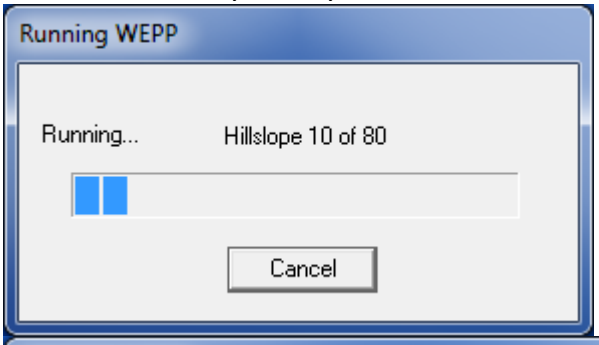


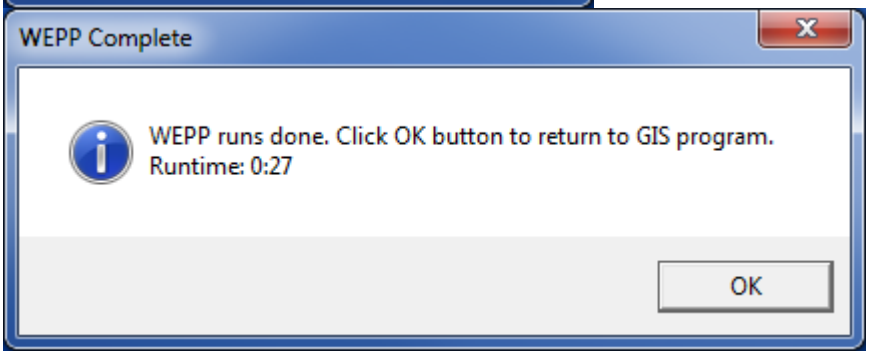
10. The WEPP/TOPAZ Translator window gives you an oppurtunity to change the WEPP parameter files, the climate file and number of years to model and allows you to select

Watershed and/or Flowpath simulations. Watershed simulations usually give more reasonable results and run times are much quicker, but the flowpath method can provide finer details on erosion and deposition on individual hillslopes. If you select multiple years (5+) you can elect to have a return period analysis. Hit Run WEPP when you are ready. Running multiple years is more time consuming than running individual storms.

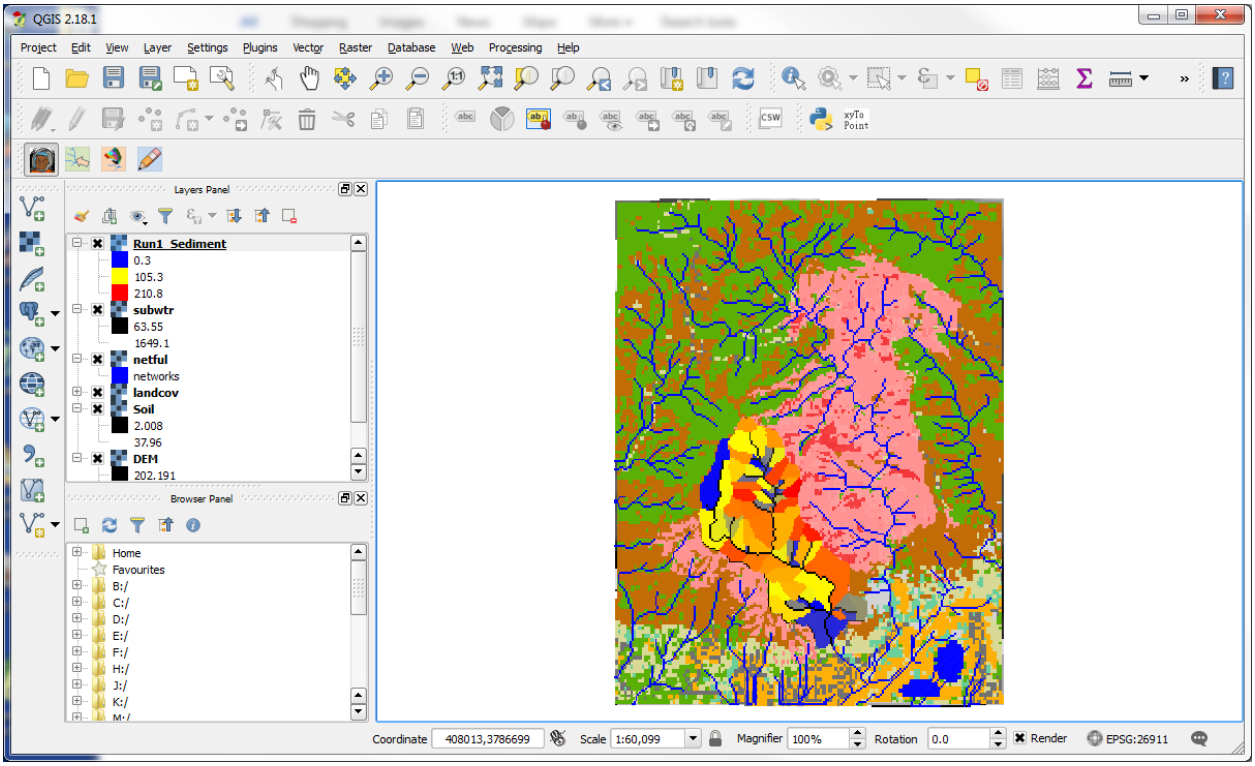


11. A series of message boxes will appear to let you know the status of your WEPP runs. When the runs are complete – hit OK – Sometimes these little message boxes are hidden under other windows – you may have to look for them!





12. The output layer is stretched map showing hillslope sediment yield in Mg/ha. Within your QWEPP project a Results folder is created containing model outputs for your run using the name you supplied in step 6.



13. You are free to select another watershed and create a new run – as long as you select unique name all your results will be saved in the results folder.