



# 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/

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#### 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 <u>http://rred.mtri.org/rred/</u>.

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: https://webserver.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.

🔇 Untitle	d Project -	QGIS									
Project	dit <u>V</u> iew	<u>L</u> ayer	Settings Plugins	Vect <u>o</u> r	<u>R</u> aster	<u>D</u> atabase	<u>W</u> eb	<u>M</u> esh	Pro <u>c</u> essing	<u>H</u> elp	
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			😫 Style Manager.				~ 0	~ ⁄⊾	s / 🖂 💷	e 🗙	6

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

Installed Not installed Settings	🏠 All	Search	Search							
Spatial Query Plugin	Installed Not installed Settings	The GPS Tools         M GRASS 7         Heatmap         Interpolation plugin         MetaSearch Catalogue Client         OfflineEditing         Oracle Spatial GeoRaster         M Processing         OfflineEditing         Oracle Spatial GeoRaster         M QGIS WEPP         Raster Terrain Analysis plugin		Installed Plugins Here you only see plugins installed on your QGIS. Click on the name to see details. Click the checkbox or doubleclick the name to activate deactivate the plugin. You can change the sorting via the context menu (righ click).	or					
		V Spatial Query Plugin	-	Upgrade all Uninstall plugin Reinstall plugin	e.					

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 <a href="http://rred.mtri.org/rred/">http://rred.mtri.org/rred/</a>
- 2. Select the Upload BARC Map button
- 3. Browse to your classified raster file.
- 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.

→ C ☆ © Not secure   rred.mtri.org/rr apid Response Erosion I	Database	
patial WEPP Model Inputs Generator patial WEPP Products Manuals	🕖 Help 🛛 🖗 Locate Me on Map 🗹 Show available data on map	Uptoad BARC Map
Draw Area on the Map Draw Selection on Map Or, Select an MTBS Fire Select state: Select year Select year Select an MTBS fire Or, Use a Custom Soil Burn Severity Map Upload Map Draw Select Key Upload Suppliers: Use 10m DEM (default: 30m)	Di burn severity map!	Select a raster file to upload: C. t/akepath/Fish_sbsN83.tif Specify the values of burn severity classes in the uploaded raster. Any value that is not Low, Moderate, or High will be reclassified as Unburned: Low: 2 ≎ Moderate: 3 ≎ High: 4 ≎ Optional parameters: ✓ Buffer my burned area by 10 ≎ pixels EPSG code (SRID) ÷
le format: ASCII Grid (*.asc)	3529 Mexicon	A private key will be generated which grants you future access to your uploaded data. Only this key can be used to access the burn sevenity map you uploaded and it will expire, along with your uploaded data, after 14 days. Within that time, use this key instead of uploading the file again.

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**.

Success	⊗
Received file "rainsbs.tif" on the server. Your private key, which expires on 2015-05-08, 92ccfd6d7f0566eedd26303baf96fb8d	is:
ОК	

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 <a href="http://rred.mtri.org/rred/">http://rred.mtri.org/rred/</a>
- 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.

apid Res	ponse Erosion	Database	Minister Freih	UAS	NAT
atial WEPP Model	Inputs Generator Manuals	Help      PLocate Me on Map     ✓ Show available data on map			
oraw Area on the Map -	Aap				
Dr, Select an MTBS Fire					
elect state:	WY	A State of the sta			
elect year.	2012 (32 fires)			Denild City	
elect an MTBS fire:	OIL_CREEK_E			Rapid City	
)r, Use a Custom Soil E	lurn Severity Map				
🔒 Upload Map 🛛 🔑 U	Use Private Key				
tions: Use	10m DEM (default: 30m)				
format: ASCII	Grid (*.asc)	A AN AN AND AND AND AND AND AND AND AND			
	fines and the second second				

#### 3) Draw Selection on Map

- 1. Use a web browser to go to <a href="http://rred.mtri.org/rred/">http://rred.mtri.org/rred/</a>
- 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.



### 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. Open QGIS

#### 2. Click on the NASA BAER button



👮 QWEPP	8	x
Spatial Interface for WEPF for use with the N	P - Water Erosion Prediction Project ASA rapid response database	
Project Folder Name:	C:/Users/memiller/qgis_proj/fish_ex	
Input data folder:	B:\Active\Fish_SBS\geowepp_KEY-2522759a0c71f6f85c9	
CSA (ha):	5	
MSCL (m):	100	
Check Box to	load not burned datasets OK Cance	

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.

![](_page_8_Picture_2.jpeg)

👮 QGIS :	2.18.1																											×
Project	Edit	View	<u>L</u> ayer	<u>S</u> ettir	ngs B	lugins	Vect <u>o</u> r	<u>R</u> as	ter <u>D</u>	atabase	<u>W</u> eb	Progess	ng <u>H</u> e	lp														
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5. Next select the run WEPP button to begin modeling – you will be asked to select an output name for this modeling run.

🅎 My Plugin Tool Bar		? ×
File base name for model outputs:		
Run1		
	ОК	Cancel

**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.

🚬 WEPP Cli	imate Selection					×					
Latitude:	34.1497	Longitu	de:	-117.93							
State	California 💌	Station M	T WILS	ON FC 338B CA	•						
Based on the watershed outlet point chosen the selection above is the closest climate station for CLIGEN data which is used in WEPP simulations.											
Distance to	Distance to Closest Station (miles): 9.8 (MT WILSON FC 338B CA)										
Use Existi	ng Climate File	Use Selected Station		Use Closest Station	Canc	el					

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

![](_page_9_Picture_5.jpeg)

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

😻 topwepp2 - TOPAZ Translator		×
topwepp2 - TOPAZ Windows can check onlin	Translator has stopped working te for a solution to the problem.	
<ul><li>Check online for</li><li>Close the prog</li></ul>	or a solution and close the program ram	
• Hide problem details		
Problem signature: Problem Event Name: Application Name: Application Version: Application Timestamp: Fault Module Name: Fault Module Version: Fault Module Timestamp: Evention Code:	APPCRASH topwepp2.exe 2.2.0.0 464b0945 topwepp2.exe 2.2.0.0 464b0945 <0000005 III	• •

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.

	WEPP N	fanagement and Soil Lookup		x
	Area	GIS Landuse	WEPP Management	
	19.0%	Low Burn Severity	GeoWEPP\90% cover-low severity burn.rot	
	3.0%	Moderate Burn Severity	GeoWEPP\45% cover-moderate severity b	
	3.1%	Moderate Burn Severity	GeoWEPP\45% cover-moderate severity b	
	5.6%	Forest	Forest\Disturbed WEPP Management\Fore	=
	53.1%	Low Burn Severity	GeoWEPP130% cover-low severity burn rot	-
· ۱				
ι	.anduse	Soils Channels		
lo	run a W	(EPP simulation the landuse and soils defined in the click on any ontwin the V(EPP management)	the GIS must be associated with equivalent WE at a solution of the solution of	PP
l ing tha	at may be	used. Where no WEPP management or soil is	specified the default soil or management will be i	.s used
l (*)			opeoined the derdak con of management min be t	
19.7				
		ОК	Cancel	

**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.

e View Help							
WEPP Watershed Set	tings	<u>^</u>	Name	Management	Soil	% of Area	
Change Soil A	secciations Channel Associations		Hill 281	GeoWEPP\90% cover-low sev	DisturbedWepp KEY-2522759	1.4%	10
Change Soli A	Change Channel Associations		Hill_283	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	1.8%	
			Hill_291	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	1.6%	
Uhange Managem	ent Associations		Hill_282	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	2.6%	
	100.01		Hill_141	Forest\Disturbed WEPP Mana	DisturbedWepp_KEY-2522759	1.3%	
Watershed has 80 Hi	lislopes and 33 Channels.		Hill_271	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	1.4%	
		=	Hill_292	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	0.5%	
Climate.	California\MT WILSON FC 338B CA.cli		Hill_293	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	1.1%	
Llimate			Hill_273	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY-2522759	0.1%	
Number of Years	5 Change Climate		Hill_263	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY 2522759	0.2%	
			Hill_233	GeoWEPP\90% cover-low sev	Disturbedwepp_KEY-2522759	1.9%	
Simulation Method	Watershed   Return Periods		Hill_142	Forest\Disturbed WEPP Mana	DisturbedWepp_KEY 2522759	2.6%	
			Hill_241	GeoWEPP\90% cover-low sev	Disturbedwepp_KEY-2522759	1.7%	
	Bun WEPP		Hill_143	GeoWEPP\90% cover-low sev	DisturbedWepp_KEY 2522759	2.7%	
	Trail WEIT	-	4				Þ

**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!

Running WEPP		
Running	Hillslope 10 of 80	
	Cancel	
WEPP Complete		
WEPP runs done. Click OK button to return to GIS program. Runtime: 0:27		
		ОК

**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.

![](_page_12_Figure_0.jpeg)

**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.