**Creating the SWAT Model and Calibrating it to Run Wildfire Scenarios**

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1. Use the code ***1-create-swat-files.R*** to download the data (climate, DEM, land use, soils) needed to build the SWAT model.
   1. You’ll need to know the HUC or USGS site you want to model and the dates you want to run the model through.
2. Use the code ***2-create-PET-txt-file.R*** to download potential evapotranspiration data for the period you want to run the model through. You’ll need this for model setup.
3. Open QGIS, set up QSWAT if needed and start to build the model.
   1. This is a good tutorial to follow if help is needed building the model: <https://web.ics.purdue.edu/~vmerwade/education/qswat.pdf>
   2. It’s important for later to make sure to create a full hru shapefile during the HRU creation process.
4. Once the model is built, you’ll want to make a few edits to the input files from the SWAT editor.
   1. Go to the subbasins and activate subbasin level snow parameters for all subbasins.
   2. Go to the management files, and for each landuse, remove the management operations, and set the initial landcover as the correct landuse for the HRU. Set LAI\_INIT to 1, BIO\_INIT to 1000, and PHU\_PLT to 3500. This will have the correct plants growing when the model starts and not have things harvested that aren’t in real life. Make sure to extent edits to all the HRU’s of the same landuse.
   3. Go to basin and change the PET model to read in PET, set the file to the PET.txt file you created in step 2.
   4. Make sure to rewrite the input files.
5. Check the model runs from the SWAT editor using the default SWAT module.
6. Create the SWAT-Cup project using SUFI2 method.
7. Once project has been created, make the following changes to allow DOC/wildfire module to work. **Once changes are made, copy the revised folders into the backup folder so the changes are saved.**
   1. In the basin.bsn file, set CSWAT to 2.
   2. On lines 132-135 paste the following lines:
      1. 0 | fire: for wildfire scenarios: 1 fire, 0 nofire
      2. 223 | fr\_day: starting date for wildfire scenarios
      3. 18 | fr\_yr: starting year for wildfire scenarios
   3. Copy the model.in file from the data inputs folder into the swat-cup project and run swat-edit.exe to modify the starting carbon parameters.
   4. Copy over the correct swat.exe file. It’s suggested to use the one with DOC units as mg/L for the calibration (swat-module-doc-mgL).
   5. Copy over the absolute\_swat\_values.txt file to the swat-cup project, which as some modified values to make the nutrient more realistic.
8. For calibration choose representative HRU’s for each major landuse in the model to calibrate for ET. It’s recommended to look at the HruLanduseSoilSlopeRepSwat.txt file to identify good candidates. Ideally, they should be relatively large, but also have relatively consistent ET across the HRU. You can explore this using the code ***3-ET-check.R***.
   1. From personal experience it’s best not to use an HRU with a D class soil.
9. Run the script ***4-create-swat-cal-files.R*** to create the calibration and swat-cup files needed to calibrate the model.

**Table 1:** Specific Values Used in Building the American and Tule Models

|  |  |  |
| --- | --- | --- |
| **Parameter** | **American River (12488500)** | **Tule River (11204100)** |
| Stream Threshold (km2) | 4 | 9 |
| Slope Bands | 20,40 | |
| Soils | SSURGO | |
| HRU Thresholds (%) | 10 | 12 |
| Weather Generator | WGEN\_US\_COOP\_1960\_2010 | |