*CARB Workflow README*

File specifics are contained in the header comments of each file. Most are self-contained, any extra needed files are specified below. **Some inputs/defaults at the top of each script will need to be edited.** Files are preceded by number indicating order to be run in, ordering is not absolute. SETUP inputs are largely automated beyond changing inputs, other sections will required more changing of inputs throughout and will depend more on the purpose of the script.

Some specific notes on the setup (preprocessing and climate input) workflow:

1. 1.1\_SETUP\_get\_stream\_spatial\_data.R
   * Based on an input USGS gauge ID, retrieves an encompassing basin, DEM, soils data, and streamflow data. Encompassing basin may be the actual basin of interest or a larger basin, basin definition using GIS tools will likely still be needed.
   * Following this step, the user should preform their typical GIS map generation.
     + to get slope, aspect, horizon, stream, basin, and hillslope maps. Patch maps can be generated in a later step and zone map will be base on the netcdf.
     + An example using whitebox tools is in 1.2.a.
     + An example using GRASS is included in 1.2.b.
     + NOTE: aspect is now being automatically changed from the default GRASS format into the standard format needed for RHESSys by the RHESSys Preprocessing (as of 9/2022)
2. 1.3\_SETUP\_make\_patch\_reclass\_soils\_maps
   * Generation of additional input maps, including a patch map (patches unique based on grid cells) and soils map reclassification (this is subjective and will need user input).
3. 1.4.a\_SETUP\_LPC\_vegcover\_msrrules
   * Creates Multiscale Routing rules (in a rules file) and a rules map, to be used with RHESSys-MSR. This is based on input vegetation cover data, specifically the lifeform percent cover maps from Parra & Greenburg.
   * Based on an input basin map and the appropriate LPC maps (covering your region of interest), extracts the needed cover data, and bins to the nearest 10% (and accounts for issues arising form that binning). Outputs a text file of rules and a map of those same rule IDs.
   * Vegetation ID values may need to be changed depending on your vegetation parameter definition files.
   * 1.4.b includes an alternative workflow using NLCD veg cover data.
4. 1.5\_SETUP\_clim\_ncdf\_processgridmet
   * Processes GridMet climate data, specifically temporally aggregated netcdf GridMet from THEDDS (<http://thredds.northwestknowledge.net:8080/thredds/reacch_climate_MET_aggregated_catalog.html>), subsets it based on an input basin raster file, and processes it to be compatible with RHESSys.
   * Requires NetCDF Operators (NCO, <http://nco.sourceforge.net/>) , can be downloaded or if on linux with apt via: sudo apt-get install nco
5. 1.6.a\_SETUP\_clim\_ncdf\_makebasestation
   * Requires the C file ‘createbaseinfo\_netcdf.c’, which should be included along with this workflow.
   * Using subset and processed netcdf climate data and a basin raster map, creates the climate grid, and then generates the appropriate basestation file needed for running netcdf climate with RHESSys using the compiled c program from createbaseinfo\_netcdf.c.
   * Assumes the use of extended climate inputs, if not all are being used the ‘netcdf\_XYZ\_filename’ and ‘netcdf\_var\_XYZ’, for the undesired climate inputs, can both be set as ‘NULL’ in the section starting at line 112.
6. 1.7\_SETUP\_run\_preprocessing
   * Based on the above scripts (including the creation of maps via GRASS using the script or via other methods), runs RHESSysPreprocessing and creates the world file and flowtable. Includes examples for running both standard and for use with MSR RHESSys.