# README file for archive of Webb’s Water, Energy, and Biogeochemical Model, User’s Manual

1. Full reference of the subject report (no web link assigned, latest draft of body, tables, and figures in Distribution\doc\ folder):

Webb, R.M.T., and Parkhurst, D.L., 2016, Water, Energy, and Biogeochemical Model (WEBMOD), User’s Manual, Version 1: : U.S. Geological Survey Techniques and Methods 6-BXX, XX p, http://dx.doi.org/10.3133/XXXXX.

1. Description of the Report Archive Folder structure:

\\igskahhwvswfslk\homes$\SWMARCHIVE\WEBMOD\_Manual\_1.0 (main directory)

modelgeoref.txt file – defines model spatial extent for Andrews Creek and DR2 wathersheds, the two watersheds included in the Example Problems section of the manual.

Contents\ – README.docx, -this document

Distribution\ - includes

\bin\webmod.exe, the model executable for a windows 64-bit PC as built per instructions in \SourceCode\README\_WEBMOD.txt,

\doc = contains the latest draft of the WEBMOD manual (body, tables, and figures). Will be replaced by the final approved PDF file.

\lib = java libraries needed to run the MMS Tool and the Paramter Tool described in the following report:

Markstrom, S.L., and Koczot, K.M., 2008, User’s manual for the object user interface (OUI)—An environmental resource modeling framework: U.S. Geological Survey Open File Report 2008–1120, 39 p. [Also available at <http://pubs.usgs.gov/of/2008/1120/>.]

projects\ - three WEBMOD projects, Andrews, Andrews\_tutorial, and DR2. For each project the contents are as follows:

webmod.bat-Batch file that prints model self-documentation to \control\ directory then runs WEBMOD simulation as instructed in \control\webmod.control.

webmod\_gui.bat- Batch file that prints model self-documentation to \control\ directory then begins an interactive session of WEBMOD simulation using the MMS Tool GUI.

webmod.paramtool.bat- Batch file that prints model self-documentation to \control\ directory then begins an interactive session to review and modify WEBMOD parameters using the Param Tool GUI.

webmod\_print.bat – prints self-documentation files in \*control*\ directory

There are also two Excel workbooks: .\projects\Andrews\Andrews.xlsm and .\projects\DR2\DR2.xlsm that contain input files and calibration targets. When macros are enabled, the data or parameter files may be written to ASCII files by running the macro ExportText.

\control\ -

webmod.control – describes input and output file names, period of simulations, and contents of Run Time Plots, Statistical output, and multidimensional output files. Required.

Four self-documentation files (optional for batch runs, needed for GUIs)

webmod.control.mod\_name – List of modules and coordinates for graphic display of module dependencies.

webmod.control.par\_name–Descriptions of all dimensions and parameters in model.

webmod.control.param-Default parameterf file

webmod.control.var\_name – Name of parameter file, hydrologic data file, period of simulation, and descriptions of all variables in the model.

\input\

phreeq\_lut-List of solutes and their properties

phreeqc\_web\_lite.dat-PHREEQC database

webmod.chem.dat-Daily values for concentrations of solutes in precipitation, irrigation, and stream samples. This file is not included in the DR2 project as inputs of constant composition are defined in the webmod.pqi file.

webmod.hydro.dat-Daily observations of precipitation and temperature (required) relative humidty (required if geochemistry simulated) along with discharge, insolation, pan evaporation, snow-water equivalence, irrigation amounts, and inflows of regional groundwater (optional)

webmod.params-Dimensions and parameters for project model.

webmod.pqi-PHREEQC input file with initial solutions and descriptions of all other entities to simulate the geochemistry.

\output – Upon model completion will contain at least the following files:

webmod.chem.out-Watershed summary of states and fluxes of solutes, if geochemistry simulated.

webmod.hydro.out-Watershed summary of states and fluxes of water.

webmod.statvar-User defined output of specific variables.

webmod.topout-Summary of soil properties, log-normal distribution of vertical hydrologic conductivity, along with states and fluxes through the unsaturated zone and the saturated zone simulated using the topography-driven hydrologic model (TOPMODEL).

For the Andrews and DR2 projects, there is also an excel workbook, Andrews.xlsm and DR2.xlsm, to compile input data, calibration targets, and evaluate model performance. Macros must be enables to run the ExportText macro.

GIS\_Data\ - Contains shapefiles of the bounding boxes for the Andrews Creek (Andrews.\*) and the DR2 (DR2.\*) watersheds.

SourceCode\ – Source code and CmakeFiles to build PC-compatible webmod executable located in Distribution\bin directory. Instructions to build Linux executable is also included; the MMS Tool and Parameter Tool GUIs are not available in Linux. Necessary compilers and build operations are described in README\_WEBMOD.txt.

1. Identify the operating system, platform, and software version:

Windows 7 service pack 1. Personal Computer with Intel® Xeon® CPU [E5630@2.53](mailto:E5630@2.53) GHz, 20 Gb RAM, 64-bit Operating system.

1. Model execution (successful run to completion and output matching report).

Three projects are included in this archive as described in the User’s Manual: Andrews, DR2, and Andrews\_tutorial. Each of these directories are referred to as \*project*\ below. To produce output matching the report as included in the \*project*\*output* directories do the following:

* 1. copy the \Distribution directory to a local PC
  2. erase all files in each of the \Distribution\*project*\*output* directories
  3. double click or execute \Distribution\*project*\*webmod.bat* for each of the three projects
  4. compare the files in the \Distribution\*project*\*output* directories with those in the archive.

The project Andrews\_tutorial is a deliberately miscalibrated version of Andrews. As detailed in the User’s Manual in the section “Quick Start Guide > Andrews Creek simulation and calibration”, the user is instructed to turn on geochemical simulations (chem\_sim=1), modifiy two hydrologic parameters, rain\_adj and snow\_adj, in *Andrews\_tutorial*\*input*\*webmod.params* and modify the surface to volume ratio that determines the weathering rate of of oligoclase in *Andrews\_tutorial*\*input*\*webmod.pqi*. Upon completion of the 45 steps, the output files in *Andrews\_tutorial*\*output*\ will be identical to those in *Andrew*\*output*\.