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General Instructions for Installation and Use

These are the general installation and usage instructions for the PREWet model, version 2.4, which runs under MS Windows. The files necessary to run the model and the output files generated are also described.

Version 2.4 of the PREWet model is downwardly compatible with previous versions, and hence, existing application files can be used with this new version. The user should install the program on a hard disk with at least ten megabytes of free disk space. It is recommended that the user install the program files in a unique subdirectory (e.g. PREWet) created by the user.

All files associated with PREWet are archived in the self-extracting installation file, "PWInst.exe". To extract and install the files contained therein, double click the file PWInst.exe after saving it to the hard disk drive. The installation software will direct the user to select a directory for installing the program files. A shortcut icon to the program will be created on the user's desktop upon installation.

The following is a list of the files contained in the install extraction (PWInst.EXE), as well as what each file is:

1. PREWet.exe: The PREWet v 2.4 model executable
2. PREWetUI.exe: The PREWet model's user interface executable
3. readme.doc: This readme file
4. info.doc: Contains an overview of the PREWet model and interface
5. cache.inp: An example application of the PREWet model for the Cache River wetland
6. duck2.inp: An example application of the PREWet model for the Duck River Wetland
7. exam_v22.inp: An example application of the PREWet model using all constituents
8. example.inp: An example input file for the PREWet model
9. back.bmp: Background photo for the user interface

10. HELP: Directory of help files accessed by the user interface

The PREWet program will create temporary files on the user's computer during execution and will delete these files upon normal termination. An output file is also generated whenever the program is run.

The program can be run by double clicking the desktop icon for the program. The menu buttons across the top of the user interface are self-explanatory and can be easily navigated. Each button and input screen is explained in the help screens when the "Help" button is selected.

All model inputs are entered via the Input Data button on the main menu. The user must enter system properties, select which constituents will be modeled, and enter parameters for each constituent. The user can also enter concentrations entering the wetland in order to compute concentrations flowing out of the wetland.

There are six available constituents to model which consist of the following:

- Total Suspended Solids (TSS)
- Total Coliform Bacteria (TCB)
- Biochemical Oxygen Demand (BOD)
- Total Nitrogen (TN)
- Total Phosphorus (TP)
- Contaminants (organics and trace metals)

The user may select any or all of the constituents to model. The exception to this is that if the user wishes to model either Total Phosphorus with the calculate removal rate option or Contaminants then the program will require the user also model Total Suspended Solids since suspended solids are required for modeling either each of these. Once the user has checked the constituents to model, the user should select Constituent Data from the main screen Input Data button to enter the data for the constituents being modeled.

Once the user has entered all of the data required for each modeled constituent, then the user is ready to run the model. This is accomplished by selecting Model/Run Model from the main menu. After running, the output screen is automatically displayed. Output consists of removal rates (day^{-1}), removal efficiencies (RE in % removal), and outflow concentrations for each modeled constituent.

The user can select Reset Defaults from the main screen to reset all values in the model to their defaults. Additionally, the user may elect to open a new or existing application file, and save files with existing or new names using the New, Open, Save, or Save As options for data files under the File button on the main program screen. The program will only allow the user to use an '.inp' extension on the program data files. The user should therefore only enter the first 8 characters (no spaces between characters) of the filename. The program will append the appropriate extension.

The model results may be saved by clicking on the Save button on the model results screen. The program will prompt the user for a file name and location where the results should be saved. The output file contains such information as system properties and user input of modeled constituents as well as the calculated output (removal rates, removal efficiencies, and outflow concentrations, assuming inflow concentrations are input). This file can be printed directly from the program by pressing the Print button located on the model results screen.

The user can obtain help at any time by pressing one of the Help buttons that are located on virtually every screen of the PREWet model.

Attention PREWet Users

The total phosphorus removal rate coefficient can be either specified by the user or computed from first principles (given the appropriate input information). Please be aware of the assumptions used in developing the algorithm for computing the phosphorus (TP) removal rate coefficient in PREWet. This algorithm is based on the assumption that the growth and death of aquatic plants have no net effect on the long-term removal of TP. The justification for this is that plants take up P when they grow, but recycle it when they die. So for steady-state conditions, there is no net effect.

TP is assumed to partition only between water and solids, and the processes of suspended solids deposition, sediment resuspension, diffusion dissolved phosphorus across the sediment-water interface, and sediment burial affect its fate. A steady-state mass balance for the water column and sediment bed is used to derive the relationship of TP removal rate for these processes. The above approach is probably adequate for most forested wetlands, such as the Cache River Wetland, where peat build-up is minimal. Over 80% of the solids entering and leaving the Cache are inorganic. However, the use of this approach is questionable for marshes where peat building is a dominant process. Peat building is an important removal mechanism for phosphorus because part of the peat organic matter is refractory, or decays very slowly. This refractory organic matter, which holds some phosphorus, is eventually buried, thus, removing phosphorus from the system; so not all the phosphorus taken up by plants is recycled. Therefore, the algorithm for estimating the TP removal rate coefficient in PREWet may not be applicable for marshes since peat building is not included.

The TP removal rate constant can be specified based on experience from other wetlands. For example, a typical value reported for marsh wetlands by Kadlec and Knight (1996) is 11.5 m/yr, where as forested wetlands have much lower rates on the order of 3.0 m/yr (Dortch 1996).

Dortch, M.S. 1996. "Removal of Solids, Nitrogen, and Phosphorus in the Cache River Wetland," Wetlands, 16(3), 358-365.

Kadlec, R.H. and R.L. Knight, 1996. Treatment Wetlands. Lewis Publ., CRC Press, BocaRaton, FL, USA.