NHDPlus Exercise #8: “Simple” Modeling Exercise For NHDPlus – Last Updated 10/30/2006

This is a routing and nonpoint source "not so simple model" for NHDPlus.

Running this model and its procedures is best done if the user has a basic working knowledge of MSACCESS, especially:

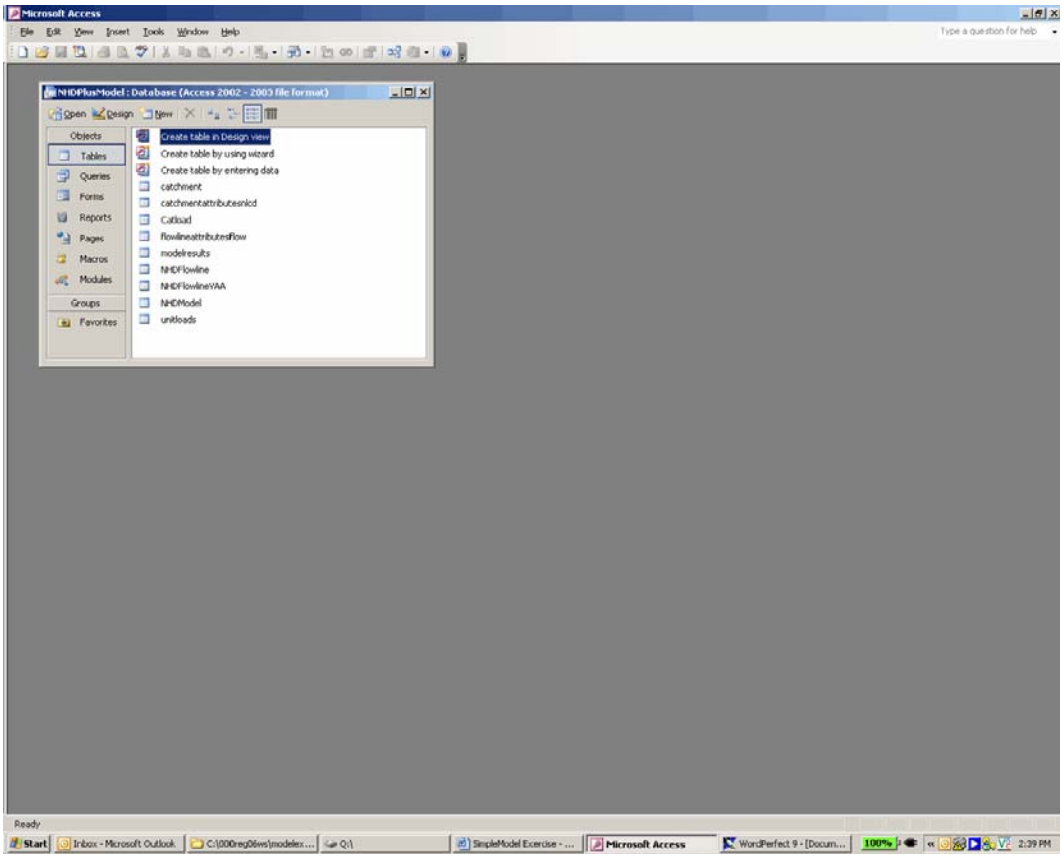
1. Loading data from .DBFs
2. Running Queries
3. Opening and Editing tables
4. Running VBA programs
5. Exporting tables to .DBF and .XLS files

The example MSACCESS Project “NHDPlusModel” comes pre-loaded to run Hydrologic Region 6. The routing and modeling program uses the Unit Runoff Method (UROM) Flows and velocities. The Visual Basic code provided in this exercise can be used as a template for building other modeling options using NHDPlus.

To load and run the model, perform the following steps:

Step 1: Open the MSACCESS Project by dbl-clicking on the file “NHDPlusModel.mdb”. If this mdb is not found in \NHDPlus06, see NHDPlus Exercise 0: Preparation.

The opening screen will look like this:

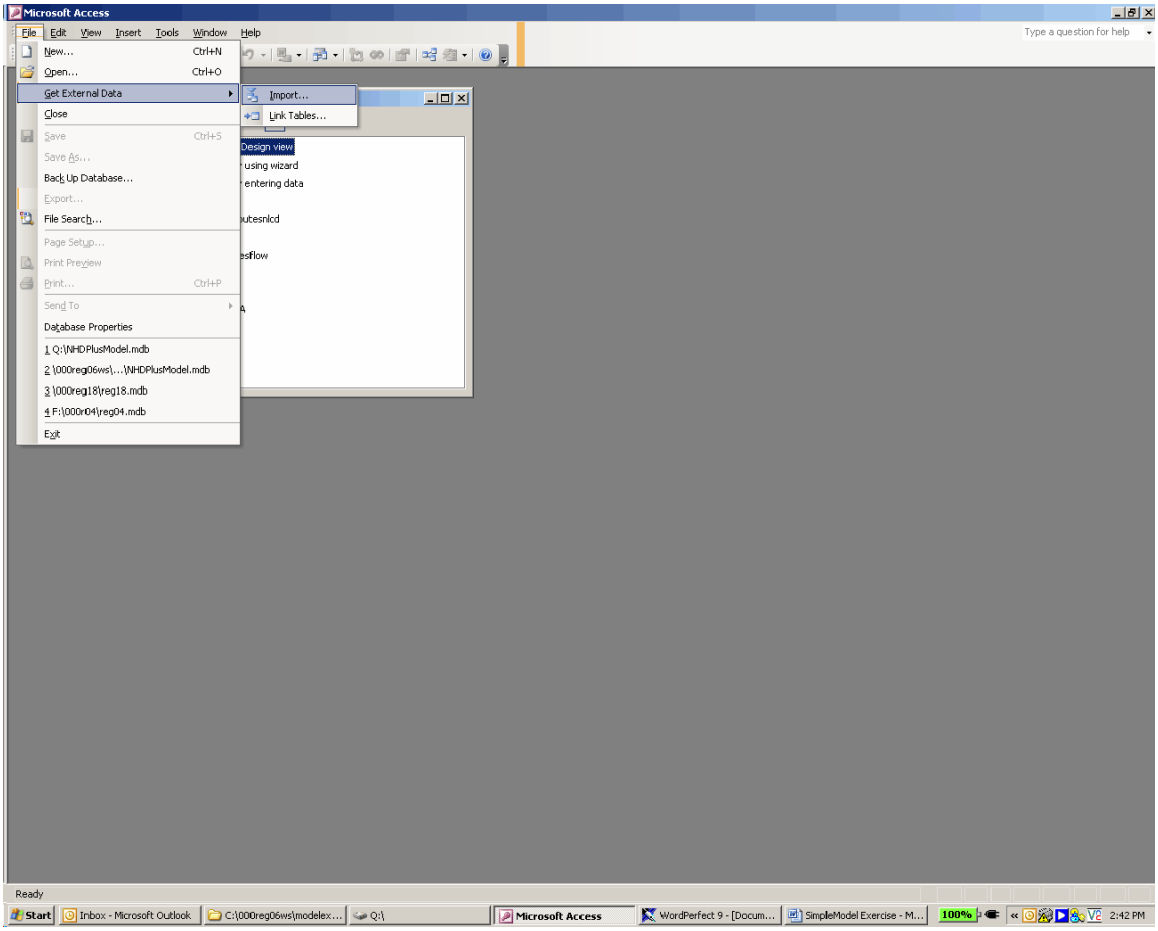


The individual tables are listed by clicking the “Tables” tab under “Objects”. If you will be using HydroRegion 6, skip to step 4.

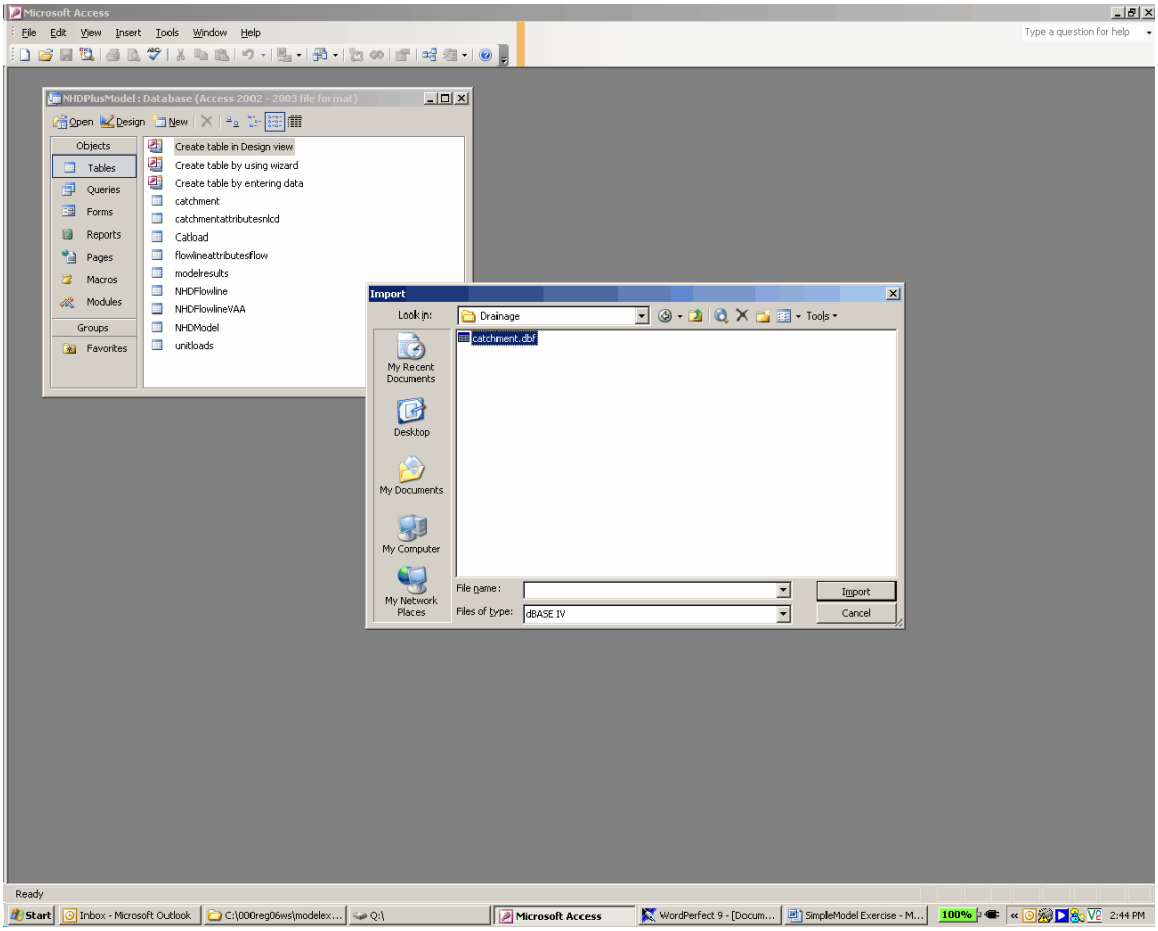
Step 2: For the Hydrologic Region of interest, load the following tables:

i. NHDFlowlineVAA.dbf
ii. FlowLineAttributesFlow.dbf
iii. Catchment.dbf from the Catchment Shapefile
iv. NHDFlowline.dbf from the NHDFlowline shapefile
v. CatchmentAttributesNLCD.dbf

Each table is loaded by going to File|Get External Data|Import, as shown below.



The Import dialogue box will come up as shown below. Be sure to set “Files of Type” to “DBASE IV”. Navigate to the proper subdirectory where the table is located. Click on the file name (e.g., “Catchment”), then click Import. Click “Yes” or “OK” to the prompts that import the table.



Import all five tables listed above for the HydroRegion of interest.

Step 3: Run the Query "Make NHDMODEL". This query combines the modeling data elements into a single table for use in running the model.

Under the “Objects” list, click “Queries”. Double-click the query “Make NHDModel”. Answer “yes” to the next three prompts. The NHDModel table is now built.

Step 4: Edit the provided UNITLOADS table. This table defines the nonpoint source pollutant loadings export coefficients and a single pollutant decay coefficient.

Click “Forms” under the “Objects” list. Dbl-click the “unitloads” form. An editable form will come up on the screen. This table contains annual average loadings by land cover type in units of Kg/Km^2/yr. The decay coefficient is in units of /day. See Appendix C in the User Guide for the land cover classes that correspond to each export coefficient. This is a one-record table. After editing the table, the edits are saved by clicking the “X” (close) in the upper right corner of the form.

Step 5: Run the program "Basic Routing".
To run the program, click “Modules” under the “objects” list. Be sure “Basic Routing” is highlighted, then Press the F5 function key. The code will be displayed with a dialoge box over it. Click “Run” in the dialog box. This runs the model. It will take a few minutes to run, depending on the size of the HydroRegion. After the model is finished running, a small window will appear saying “Done”. Click “OK”. Close the program by clicking the “X” in the upper right corner of the code view.

Step 6: Viewing and using the model results.

The Modeling results are saved in the table "MODELRESULTS". Another table is loaded named "CATLOAD". It contains the loadings and decay coefficient by comid and Gridcode for each networked flowline in the Hydroregion. The loadings are in units of Kg/yr by flowline.

To view these tables, click “Tables” under the Objects list. Then, dbl-click the table to open it. Model results can be displayed by exporting the MODELRESULTS table to a .dbf and then joining or linking to the NHDFlowline or Catchment shapefiles. To do this, first highlight the table. Then go to File|Export in the main toolbar. A dialog box will come up. Be sure to set “Save as Type” to Dbase IV”. Navigate to the desired directory/subdirectory where you want to store the table and then click “Export”.

The query "Make Profileplot" is provided as an example for making a profile plot table
The query makes a table named "PROFILEPLOT". This table can be exported to a .xls for graphing, etc. The default profile in the query uses the levelpathi for the Tennessee River mainstem. This table can be exported to Excel using a similar process as exporting the MODELRESULTS table, except select “Save as Type” to one of the Microsoft Excel options. Users can then perform various Excel operations on this file, such as graphing concentrations by Pathlength.

<u>Notes:</u>

1. Loads are routed and decayed down each flowline from the top of the flowline to the end; That is, it makes the simplified assumption that nonpoint source loads for a given catchment are not distributed along the flowline

2. The default unitloads provided in this example do not represent any particular pollutant; they are provided for example use only

3. Hydrologic Regions 5, 7, 8, and 15 are downstream of other Regions, and any upstream boundary conditions from these Regions are not considered should of these downstream Regions is being run.

4. Hydrologic Region 10 will need 10U and 10L to be appended before running it.

Below are some examples of how the modeling results can be displayed:

A map of the modeling results concentrations might look like this:

A Profile plot along the Tennessee Mainstem would look something like this: