

Data Description for French Creek Watershed Wetlands Map

The following information describes the processes that were used to analyze wetland information provided by the National Wetlands Inventory (<http://wetlands.fws.gov/>) and National Land Cover Dataset (<http://landcover.usgs.gov/natl/landcover.html>) within the French Creek watershed in Pennsylvania. The following ESRI software was used to analyze this data: ArcGIS 8 software, including the ArcMap and ArcToolbox applications, and the Spatial Analyst extension. The XTools extension that was acquired from Taiga GIS was also used in analysis (<http://www.taigagis.com/>).

The first step was to download NWI (National Wetland Inventory) files for all 7.5-minute USGS quadrangles within the French Creek watershed boundary. These datasets were downloaded from the GeoComm International Corporation at (www.gisdatadepot.com). The files were then converted from ARC/INFO interchange file format to ARC/INFO coverages using the ArcToolbox application. The NWI coverages consisted of polygon features with associated attributes such as area, perimeter, and attribute (wetland category).

The second step was to merge all of the NWI coverages into a single NWI dataset (shapefile). This was accomplished by utilizing the “merge” tool in the ArcMap Geoprocessing Wizard. The resulting shapefile consisted of a single dataset, which included all of the NWI features and their associated attributes. The shapefile was then projected into a common coordinate system for the project using ArcToolbox: UTM17Nad83.

The third step was to remove specific wetland categories that would not be needed in the analysis from the NWI dataset. Using the Select by Attributes tool and the Editor in ArcMap, the following wetland categories were selected and removed from the NWI shapefile attribute table: upland (U), lacustrine (L), and riverine (R).

The fourth step was to clip the NWI shapefile by the French Creek watershed boundary. The French Creek watershed boundary shapefile was created by selecting and merging features from a sub-watershed boundary shapefile. The sub-watersheds dataset was acquired from the Pennsylvania Spatial Data Access spatial data clearinghouse (<http://www.pasda.psu.edu/>). Next, the “clip” geoprocessing tool in ArcMap was used to clip the features of the NWI shapefile by the French Creek watershed boundary. The resulting NWI shapefile consisted of only those features and their attributes that fell within the French Creek watershed boundary. Since the attribute values in the perimeter and area field were not updated during geoprocessing, the attribute items were removed from the attribute table using the Editor.

The fifth step was to calculate the total number of hectares of land within the French Creek watershed and that total number of hectares of wetland for each type of wetland category in the NWI dataset. To accomplish this, the XTools extension was used to calculate hectares for each feature or polygon in the French Creek watershed and NWI shapefiles. During processing, the attribute item “hectares” was added to the respective attribute tables. Since there was only one

feature in the French Creek watershed shapefile, the value in the “hectares” attribute field represented the total number of hectares of land within the French Creek watershed. To find the total number of hectares of wetland within the French Creek watershed, the Statistics tool was used to find the sum of the values in the “hectares” item of the attribute table for the NWI dataset. This value represented the total number of hectares of wetlands within the French Creek watershed.

The sixth step was to determine the total number of hectares of wetland and percentage of wetlands for each wetland category using NWI shapefile. The Select by Attributes tool was used to select each category of wetland from the NWI shapefile and then the Statistics tool was used to find the sum of the “hectares” for the selected features. This value represented the total number of hectares for a specific wetland category. Next, the total hectares of wetlands for each wetland category were divided by the total hectares of wetland and multiplied by 100. This value represented the percentage of wetland that each category of wetland accounted for. The wetland categories that were calculated were PAB, PEM, PFO, POW, PSS, and PUB.

The seventh step was to aggregate the NWI dataset based on the type of wetland. This was accomplished by using the “dissolve” geoprocessing tool in ArcMap. First, the features of the NWI shapefile were dissolved by the values in the “attribute” (wetland category) item and the values in the “hectares” item were summed. The resulting output shapefile consisted of a “count” item, which was the total number of wetlands features for each wetland category. The total number of hectares that each wetland category accounted for was also calculated. By examining the values in the attribute table, questions such as which category of wetland occurs most within the French Creek watershed and what are the 10 most frequently occurring categories of wetlands could be answered.

The eighth step was to add an NLCD raster dataset to the data frame and calculate the total number of hectares of wetland and percentage of wetlands for each wetland classification. The National Land Cover Dataset (NLCD) is a 21-class landcover classification scheme applied consistently over the United States. This dataset was acquired from the Pennsylvania Spatial Data Access spatial data clearinghouse (<http://www.pasda.psu.edu/>). Two wetland classifications existed with the dataset: emergent herbaceous wetlands and woody wetlands. To calculate the total number of hectares for each wetland classification, the values in the “count” attribute item for the respective wetland classification were multiplied by 900 (number of square meters in one cell) and then divided by 10,000 (number of sq. meters in one hectare). The resulting value represented the total number of hectares for each specific wetland classification. To find the percentage of wetland for each wetland classification, the sum of the “count” item in the NLCD dataset was calculated using the Statistics tool. The total number of cells for each wetland classification were then divided by the total number of cells in the NLCD dataset and multiplied by 100. The resulting value represented the percentage of wetlands with the French Creek watershed that each wetland classification accounted for.

The ninth step was to reclassify the cells in the NLCD dataset in order to remove all of the landcover classifications beside emergent herbaceous wetland and woody wetlands. To accomplish this, the reclassification tool in the Spatial Analyst extension for ArcGIS 8 was used. First, the analysis options such as analysis mask, analysis extent, and output cell size were set so that the resulting output grid would only consist of grid cells within the French Creek watershed. Next, the NLCD dataset was reclassified and all of the landcover classifications beside emergent herbaceous wetlands and woody wetland were removed. The resulting grid consisted of cells whose values were emergent herbaceous wetland, woody wetlands, or NoData.

The tenth step was to convert the reclassified NLCD dataset into vector format so that it could eventually be intersected with the clipped NWI shapefile. To do this, the Raster to Vector tool in the Spatial Analyst extension was used. The resulting shapefile consisted of polygon features whose attribute value was either emergent herbaceous wetlands or woody wetlands.

The eleventh step was to intersect the features of the NLCD vector dataset with the features of the clipped NWI dataset. To do this, the “intersect” geoprocessing tool in ArcMap was used. This tool produced an output vector dataset whose features consisted of both NWI and NLCD wetland polygons. The associated attributes, such as wetland category and wetland classification of their respective datasets were carried over to the intersected output dataset. However, the values in the “hectares” attribute items were not updated during geoprocessing. Therefore, the erroneous attribute item was removed from the attribute tables and the XTools extension was used to calculate new “hectare” values for each polygon feature in the NWI and NLCD intersected dataset.

The twelfth and final step was to create a map composition that displayed the results of the analysis. This map composition consisted of four layers that were layered on top of each other respectively: the French Creek watershed boundary (black outline and hollow), NWI and NLCD wetlands (red), NWI wetlands (blue), and NLCD wetlands (green). A map title, description of the map, scale bar, north arrow, and name/date were also placed on the map composition.