

Wetlands Data Verification Toolset

Installation Instructions and User Information

ESRI ArcMap Version 10.3.1

June 2016

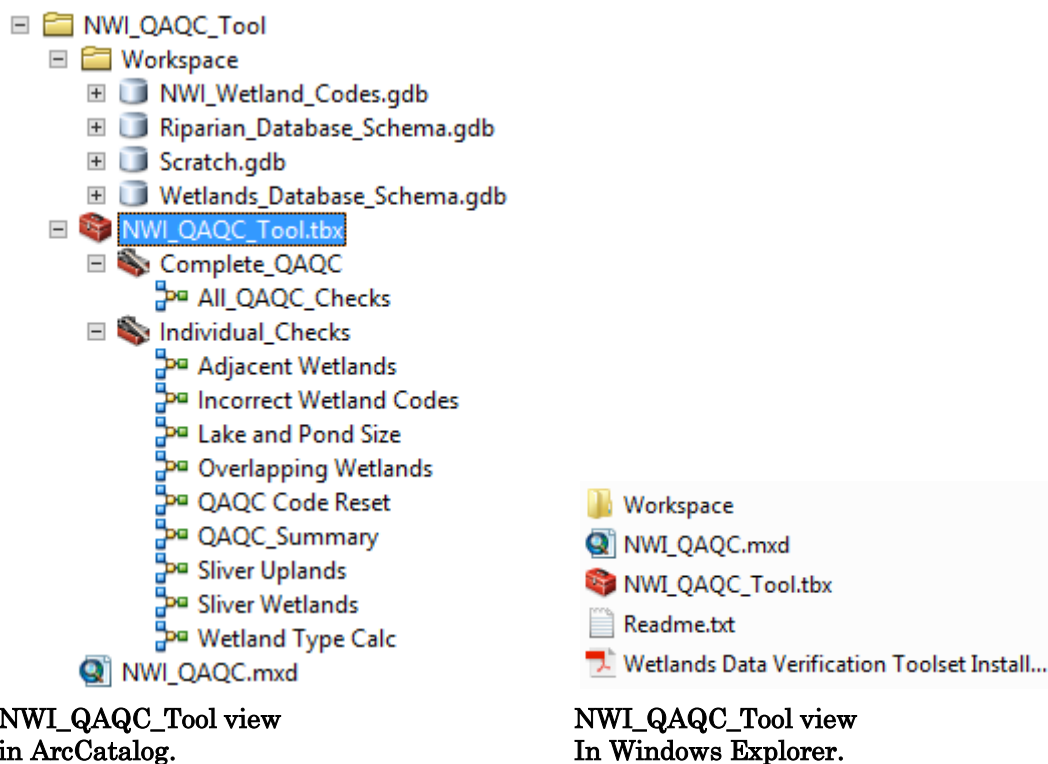
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Introduction

The Wetlands Data Verification Toolset is designed to automate the quality control functions necessary to ensure data in the Wetlands geodatabase is accurate. It has been designed to address geospatial errors, digital anomalies, and logic checks. The tool should be run multiple times by photo interpreters while mapping wetlands and as an interim and final quality control step. This toolset was created using Environmental Systems Research Institute's (ESRI) ModelBuilder, is compatible with ESRI's ArcDesktop 10.3.1 software suite, only works on File Geodatabases, and replaces previous custom Wetlands Verification Tools.

Getting Started






The Verification Toolset and associated files are stored in an 'NWI_QAQC_Tool' folder. This folder can be stored in any location on your machine and contains:

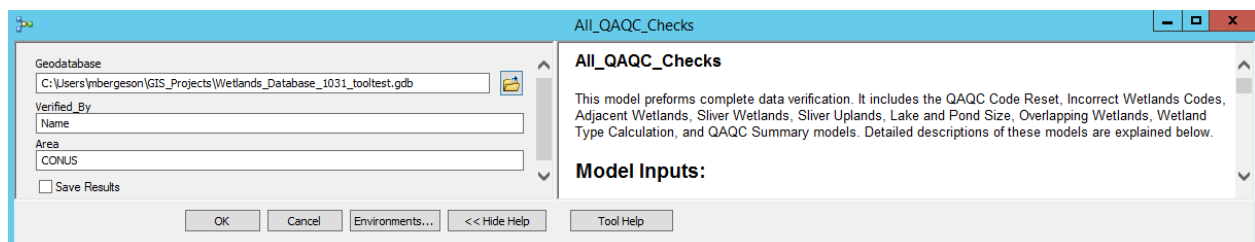


The Readme.txt provides a general description of the contents and purpose of the folder. The Wetlands Data Verification Toolset Installation and User Information document provides descriptions and procedures on the use of the verification models. The Workspace folder is used for writing intermediate data from the models and contains a file geodatabase named Scratch.gdb that is required for the models to run correctly. This folder also contains a file geodatabase of wetland codes and an example file geodatabase of the wetlands and riparian database schema. The NWI_QAQC_Tool.tbx is the ArcToolbox that contains the Wetlands QAQC models and the NWI_QAQC.mxd can be used to cartographically view errors.

Running the models

This toolset was designed to work on **File Geodatabases** extracted from the FWS Wetlands Database and will only work on data with that schema. In particular, it requires the feature class CONUS_wet_poly in a CONUS_wetlands feature dataset, and CONUS_wet_projects in a CONUS_projects feature dataset (substitute AK, HI, PRVI or PacTrust for CONUS in other mapping areas). The CONUS_wet_projects feature class **must** contain a polygon that completely covers the area where wetland mapping was conducted. This project polygon should represent the **exact extent** of the area that wetland mapping was conducted. A sample File Geodatabase is provided with this tool in the Workspace folder. This sample file geodatabase can be copied and loaded with wetlands data or used as a reference to build file geodatabases with the correct schema. Use of this toolbox on other data formats or schemas is not recommended and will likely fail.

To run any of the QAQC models, simply navigate to the  **NWI_QAQC_Tool** toolbox in ArcCatalog, which is in the NWI_QAQC_Tool folder, open the toolbox, open either the  **Complete_QAQC** toolset or the  **Individual_Checks** toolset and double-click on any of the models. A window will appear, similar to the one below, which will allow the user to select input data and provides a description of the tool on the right pane, if the  button is selected. Click the browse button  next to the Geodatabase text box and browse to the Wetlands file geodatabase you want to conduct verification on (or drag and drop), identify the mapping area you are working in, and then press 'Ok'. Some models also require the entry of your name in the 'Verified_By' text box and provide a check box which allows you to save the results. Each verification check can be run individually to address specific types of errors by using the models in the Individual_Checks Toolset or all the verification checks can be run at once using the All_QAQC_Checks model. Note: Because the Overlapping Wetlands and the All_QAQC_Checks use the topology layer, schema lock errors will occur if the data is in ArcMap when those models are run, unless you run those models from the Catalog window in that ArcMap session. All other individual models can be run when the data is in an ArcMap session from the standard ArcCatalog interface.



Example of a model user interface.

Modifications and Use Recommendations

This toolset was created using Environmental Systems Research Institute's (ESRI) ModelBuilder, is compatible with ESRI's ArcDesktop 10.3.1 software suite, only works on File Geodatabases, and replaces previous custom Wetlands Verification Tools. To improve performance of this toolset it is recommended that the tool and data are stored on the same computer. Modifications to this 10.3.1 tool include: the most recent, expanded and up to date wetland code list from June 2016, the addition of quad boundaries to improve the performance of the Upland Slivers tool, the use of ESRI topology to improve performance of identifying Overlapping Wetlands, and the insertion of a compact geodatabase and repair geometry functions before every tool is run to reduce the occurrence of lost data after an edit session due to an ESRI bug. This ESRI bug has not been resolved in 10.3.1 or earlier versions so be sure to make backup copies on the data often and check polygon counts before and after edit sessions and running models. When loss of data is observed, exporting and reloading the data from that feature class has shown to force the geodatabase to read the missing features and they reappear.

Explanations of the Verification Models

All QAQC Checks

This model performs complete data verification. It includes the QAQC Code Reset, Incorrect Wetland Codes, Adjacent Wetlands, Sliver Wetlands, Sliver Uplands, Lake and Pond Size, Overlapping Wetlands, Wetland Type Calculation, and QAQC Summary models. Detailed descriptions of these models are explained below. Check the 'Save Results' box to permanently save date stamped summary tables to your file geodatabase. The tool was designed to be run multiple times by photo interpreters while doing update work and in the process over writes the summary tables every time the tool is run. To pass the summary results and comments about the errors up the line to the next reviewer check this box to save a copy of the summary tables to your geodatabase.

QAQC Code Reset

This model calculates the QAQC_Code = 'NNNNNN'. This erases all recorded errors in the dataset and properly attributes the field for use by all other models.

Incorrect Wetland Codes

This model identifies wetland polygons with incorrect wetland codes, or null or blank values in the 'attribute' field. A bad attribute summary table is created and stored with your wetlands file geodatabase. Changes character 1 of QAQC_Code = 'C' if wetland code is bad.

Adjacent Wetlands

This model identifies wetland polygons that are adjacent to other wetland polygons with the same 'attribute' and changes the second character of QAQC_Code = 'A'.

Sliver Wetlands

This model identifies wetland polygons less than 0.01 acres and changes the third character of QAQC_Code = 'S'. These wetland features fall below the minimum mapping standard for wetlands and should be reviewed. Actual wetland features flagged as sliver wetlands can be justified as correct in the comments field of the QAQC_Summary table. These comments will only be saved if the 'Save Results' box is checked prior to running the All_QAQC_Checks model.

Sliver Uplands

Identifies upland islands or holes in wetlands that are less than 0.01 acres. These may be actual upland features but are identified as errors as they are typically errors in wetland mapping. The model changes the fourth character of QAQC_Code = 'U', in all wetland polygons adjacent to the upland sliver. The sliver upland polygons are stored as a new feature class 'Sliver Uplands' in your wetlands file geodatabase to assist in locating these small geographic features for review. This tool requires that a 'CONUS_wet_projects' has a feature(s) that defines the wetland mapping project and completely covers all features in the 'CONUS_wet_poly' feature class. NOTE: This tool is a computationally intensive process and may fail on extremely large geographic areas. To remedy this possible failure, quads that intersect the project polygon are used in this tool. Recognize that this may identify false sliver uplands along the interior quad lines within your project. These false sliver uplands can be deleted from the sliver upland feature class and comments can be added to the QAQC_Summary table to note these false errors.

Lake and Pond Size

This model identifies Lakes that are less than 20 acres in size and Ponds that are greater or equal to 20 acres in size. It changes the fifth character of QAQC_Code = 'L' for small lakes or 'P' for large ponds. These may or may not be errors and can be justified based on water depth of the identified waterbody or small lake portions on the edge of the mapping project area. Comments can be added to the 'comments' field of the QAQC_Summary table for those wetland features flagged that are valid based on depth requirements outlined in the wetlands mapping standards.

Overlapping Wetlands

This model identifies overlapping wetland polygons and changes the sixth character of QAQC_Code = 'O'. The overlapping portions of these polygons are stored in wetlands file geodatabase as an 'Overlapping_poly' feature class to assist in locating these features. It is also important to note that utilization of smoothing, buffering, and other functions that produce Bayesian curves along coincident wetland polygon boundaries may result in very small overlapping areas that may not be identified by this tool.

Wetland Type Calculation

This model calculates the 'wetland_type' field based on the wetland code in the 'attribute' field. The 'wetland_type' field provides a general description of the wetland and is used in the cartographic representation of the different wetland types on the Wetlands Mapper.

QAQC Summary

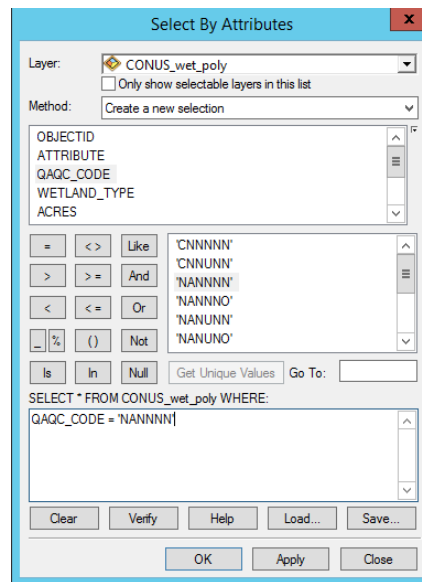
This model summarizes the QAQC_CODE field into a 'QAQC_Summary' table in your wetlands file geodatabase. It also describes each error type and records who conducted the verification and when the verification was run. Comments can be added to the 'comments' field of the QAQC_Summary table to justify specific types of errors. These comments will only be saved if the 'Save Results' box is checked prior to running the All_QAQC_Checks model.

Reviewing Verification Errors

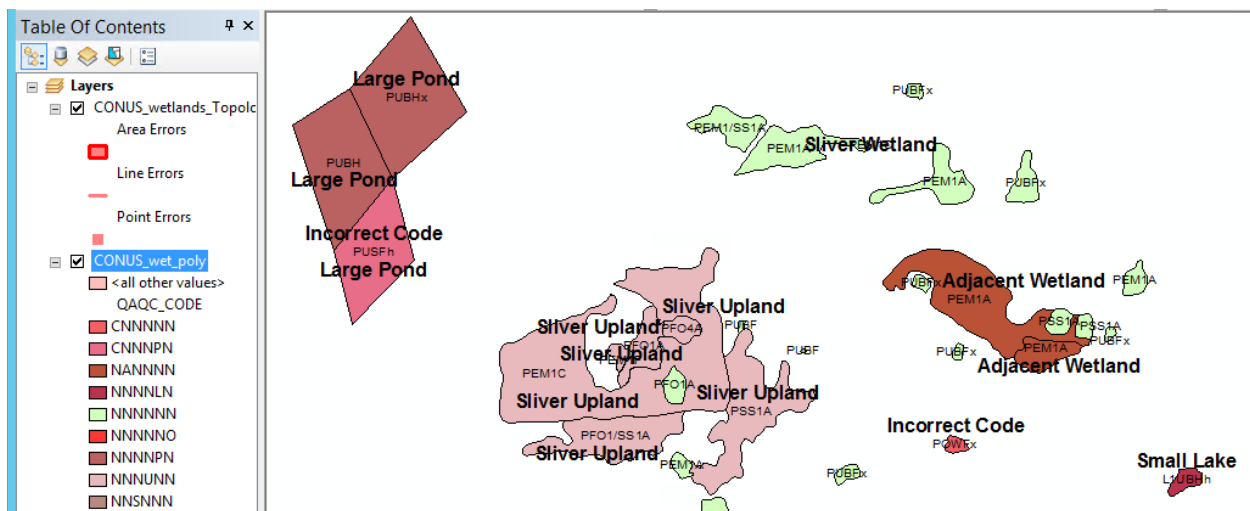
To find specific instances of an error in ArcMap sort the attribute table by QAQC_CODE and double-click the gray box associated with a given record on the far left side of the table. This will zoom the ArcMap display to that polygon.

Table					
CONUS_wet_poly					
	OBJECTID *	ATTRIBUTE *	HGM_CODE	QAQC_CODE	WETLAND_TYPE
	4435	PEM1C	<Null>	NNSUNO	Freshwater Emergent Wetland
	4431	PSS1C	<Null>	NNSNNO	Freshwater Forested/Shrub Wetland
	4432	R2UBH	<Null>	NNSNNO	Riverine
	4427	PEM1A	<Null>	NNSNNN	Freshwater Emergent Wetland
					ACRES
					0.000733
					0.006964
					0.00626
					0.000001

The 'Select by Attribute' function in ArcMap can also be used to select all records of a defined QAQC_CODE value. Example below:



To cartographically view the errors, create symbology rules on the CONUS_wet_poly feature class using the QAQC_CODE field. (e.g. QAQC_CODE = 'NANNNNN' symbolize green, all other values symbolize in shades of red). Or use the NWI_QAQC.mxd found in the NWI_QAQC_Tool folder. This map document color codes and labels errors.



Example of NWI_QAQC.mxd

For further information, assistance or questions contact: Wetlands_Team@fws.gov