



**U.S. Fish & Wildlife Service**  
**National Wetlands Inventory**

National Standards and Support Team

# Riparian Data Verification Toolset

## *Installation Instructions and User Information*

**April 2019**

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## **Introduction**

The Riparian Data Verification Toolset is designed to automate the quality control functions necessary to ensure the accuracy of data in the riparian geodatabase. It has been designed to address geospatial errors, digital anomalies, and logic checks. In addition, it has the option to build a cumulative history table of identified errors to track the progress of corrections.

This toolset was created using Environmental Systems Research Institute's (ESRI) ModelBuilder and is compatible with ESRI ArcDesktop 10.6.1 software suite as well as ArcGIS Pro 2.3. It will only work on file geodatabases and replaces previous versions of custom riparian verification tools.

## Folder Contents

The verification toolset and associated files are contained in a folder called 'NWI\_QAQC\_Tool' (Figure 1). This folder can be stored in any location on your machine and contains:

- Readme.txt
- Riparian Data Verification Toolset Installation and User Information.pdf
- Workspace folder
  - NWI\_Riparian\_Codes.gdb
  - Riparian\_Database\_Schema.gdb
- NWI\_QAQC\_ToolRiparian.tbx

1. **Readme.txt** provides a general description of the contents and purpose of the folder.
2. The **Riparian Data Verification Toolset Installation and User Information** document provides descriptions and procedures on the use of the verification models.
3. The **NWI riparian codes geodatabase** within the workspace folder serves as a reference for the code portion of the tool and must remain in the same directory as the toolbox.
4. The **riparian database schema** organizes feature classes in the format used by the verification tool. Users can import data into respective feature classes and use it as the tool input.
5. The **NWI\_QAQC\_Tool.tbx** is the ArcToolbox that contains the Riparian QAQC models, compatible with ArcDesktop 10.6.1 and ArcGIS Pro 2.3.

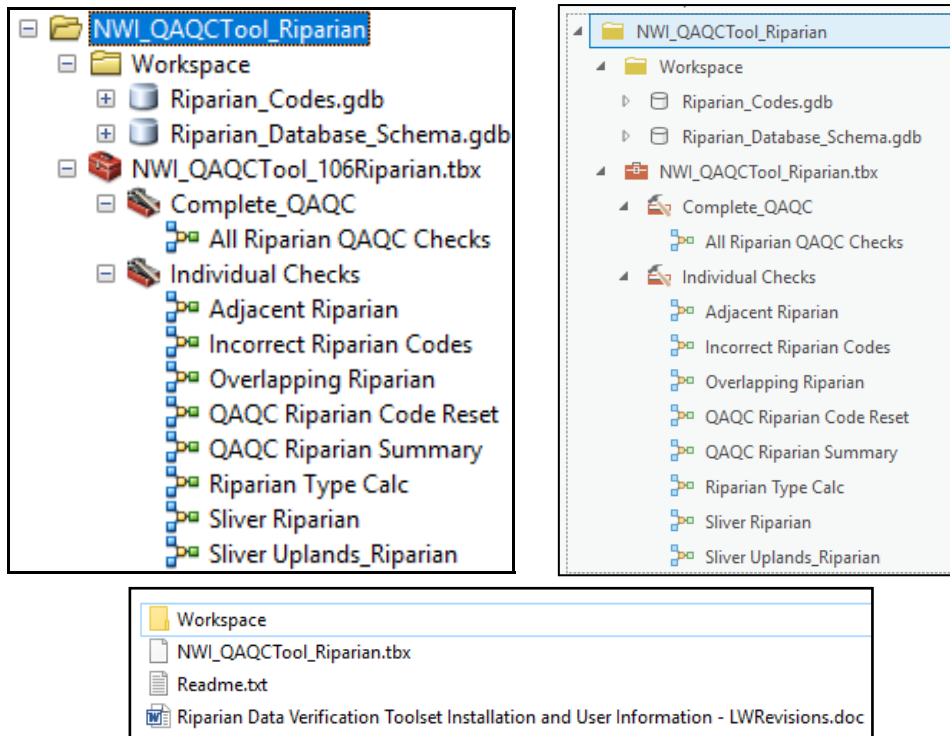


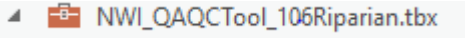
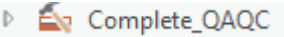

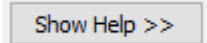

Figure 1. NWI\_QAQC\_Tool\_Riparian view in ArcCatalog (left), ArcGIS Pro (right), and Windows Explorer (bottom).

## Dataset Compatibility

This toolset was designed to work on **file geodatabases** extracted from the FWS wetlands database and will only work on data following that schema. Specifically, it requires the feature class CONUS\_rip\_poly in a CONUS\_riparian feature dataset, and CONUS\_rip\_projects in a CONUS\_projects feature dataset (substitute AK, HI, PRVI or PacTrust for CONUS in other mapping areas). The CONUS\_rip\_projects feature class must contain a polygon that completely covers the area where wetland mapping was conducted. A sample file geodatabase matching this schema is provided with this tool in the workspace folder. This sample file geodatabase can be copied and loaded with riparian data or used as a reference to build file geodatabases with the correct schema. Use of this toolbox on other data formats or schemas will likely fail and is not recommended.

## Running the models

To run any of the QAQC models:

1. Navigate in Catalog to the  NWI\_QAQC\_Tool\_106Riparian.tbx toolbox located in the NWI\_QAQC\_Tool folder.
2. Open the toolbox, open either the  Complete\_QAQC toolset or the  Individual Checks toolset, and double-click on 'All Riparian QAQC Checks' or any of the individual models. A window will appear similar to the one in Figure 2, which will allow the user to select input data and provides a description of the tool on the right pane, if the  Show Help >> button is selected.
3. Identify the mapping area (CONUS, AK, HI, PRVI, or PacTrust)
4. Click the browse button  next to the Geodatabase text box and browse to the riparian file geodatabase on which to conduct verification and then press 'OK' (Figure 2).

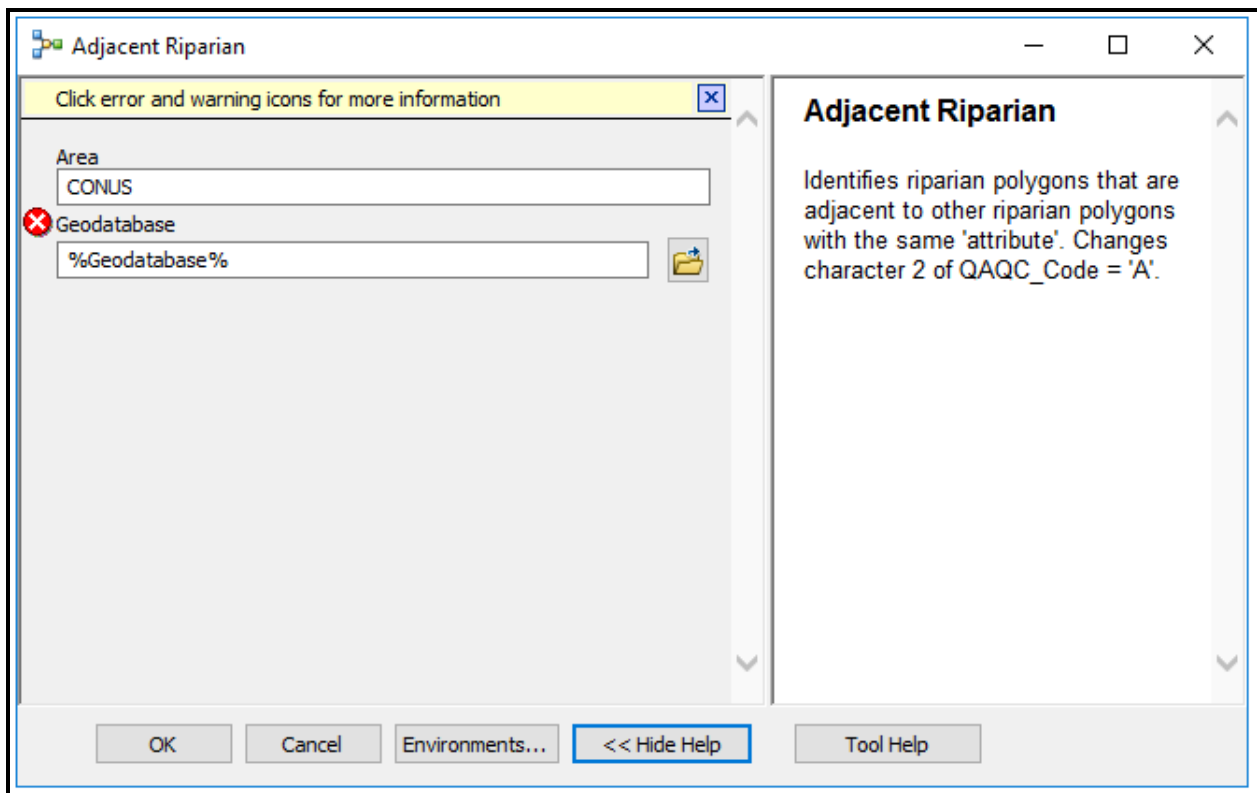


Figure 2. Example of a model user interface. Verify the mapping area and browse to the file geodatabase on which to conduct verification. Clicking 'Tool Help' shows a description of the selected tool.

# Explanations of the Verification Models

## *Complete QAQC*

### **All QAQC Checks**

This model performs complete data verification by running each individual model and then summarizing the results in a summary table. It includes the QAQC Code Reset, Incorrect Riparian Codes, Adjacent Riparian areas, Sliver Riparian areas, Sliver Uplands, Overlapping Riparian areas, Riparian Type Calculation, and QAQC Summary models.

**NOTE:** Running the All QAQC Checks on projects that contain a high number of polygons or complex polygons may fail due to limitations in computer resources. It may be more efficient to run all the individual checks separately for these types of projects.

### **Optional Inputs**

**Verified By** – Enter the individual or organization conducting the verification. This information will be output to the QAQC Summary table and QC History table (if option is selected).

**Save History Table** – This option will create a QAQC\_History table and append subsequent iteration results of the QAQC\_Summary table. Each group of errors appended from the QAQC\_Summary table will be identified by a count iterator shown in the 'Run' field. The QAQC\_History table will continue to grow with each iteration until it is manually deleted. This allows the user to track the progress of dataset edits between verification runs.

## *Individual Checks*

### **QAQC Code Reset**

This model calculates the QAQC\_CODE = 'NNNNN'. This erases all recorded errors in the dataset and properly attributes the field for use by all other models. Users should run this tool to reset error codes after each round of edits.

### **Incorrect Riparian Codes**

This model cross-references the list of valid riparian codes and identifies riparian polygons with invalid codes, or null or blank values in the 'attribute' field. For identified code errors, this model changes the first character of the QAQC\_CODE to 'C'.

To correct this error, users should change the attribute of the identified error to a valid riparian code.

## Adjacent Riparian

This model identifies riparian polygons that are adjacent to other riparian polygons with the same 'attribute', or multipart features. For identified errors, this model changes the second character of the QAQC\_CODE to 'A'.

To correct this error, users should join adjacent polygons sharing the same attribute, change one of the attributes, or explode the multipart feature.

## Sliver Riparian

This model identifies riparian polygons less than 0.01 acres, which is smaller than the minimum mapping standard. For identified records, this model changes the third character of QAQC\_CODE to 'S'.

Genuine riparian features flagged as sliver riparian can be justified as correct in the comments field of the QAQC\_Summary table. Other features should be deleted or joined to adjacent polygons.

## Sliver Uplands

Identifies upland islands or gaps in riparian and wetland areas that are less than 0.01 acres. This tool requires input from the accompanying wetlands geodatabase, because sliver uplands may occur between shared edges of riparian and wetlands polygons in the same project area. Because this model identifies gaps and missing areas, it changes the fourth character of QAQC\_CODE to 'U', in riparian polygons **adjacent** to the upland sliver. In addition, this tool creates a new sliver upland feature class in 'CONUS\_riparian' to assist in locating these small geographic features. This tool requires that '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.

Like sliver riparian, these upland polygons may be genuine upland features and can be justified as such in the comments field of the 'QAQC\_Summary' table. Otherwise, these areas can be copied from the generated feature class and merged with the appropriate adjacent polygon.

**NOTE:** This tool is among the most computationally intensive and may fail on geographically large project areas with many polygons. One possible remedy of this failure is to split a portion of 'CONUS\_rip\_poly' polygons into a new geodatabase, run the tool on each geodatabase, and then merge the resulting outputs to a single feature class.

## Overlapping Riparian

This model identifies overlapping wetland polygons and changes the fifth character of QAQC\_CODE to 'O'. The overlapping portions of these polygons are stored in the 'CONUS\_riparian' feature dataset as a new feature class to assist in locating these features. Overlapping polygons should be edited so that polygons are not concurrent.

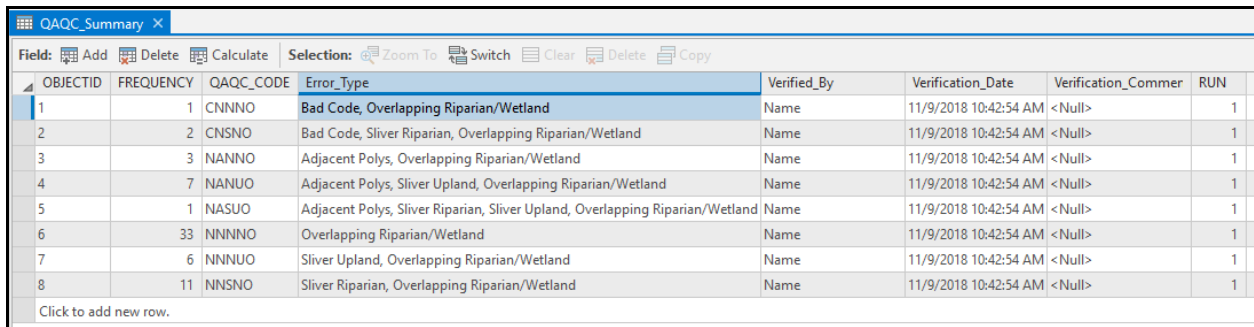


## Riparian Type Calculation

This model populates the 'RIPARIAN\_TYPE' field based on the wetland code in the 'attribute' field. The riparian\_type field provides a general description of the wetland and is used in the cartographic representation of the different riparian types on the Wetlands Mapper.

## QAQC Summary

This model summarizes the QAQC\_CODE field into a 'QAQC\_Summary' table in the riparian file geodatabase. It also defines each error type and records the user conducting the data verification along with a timestamp. Records shown in the 'QAQC\_Summary' represent polygon counts for each unique code combination. Comments can be added to the 'comments' field of the QAQC\_Summary table to justify specific types of errors.



OBJECTID	FREQUENCY	QAQC_CODE	Error_Type	Verified_By	Verification_Date	Verification_Commer	RUN
1	1	CNNNO	Bad Code, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
2	2	CNSNO	Bad Code, Sliver Riparian, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
3	3	NANNO	Adjacent Polys, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
4	7	NANUO	Adjacent Polys, Sliver Upland, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
5	1	NASUO	Adjacent Polys, Sliver Riparian, Sliver Upland, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
6	33	NNNNO	Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
7	6	NNNUO	Sliver Upland, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1
8	11	NNSNO	Sliver Riparian, Overlapping Riparian/Wetland	Name	11/9/2018 10:42:54 AM	<Null>	1

**Figure 3. Because many polygons within a riparian dataset will be flagged with multiple errors, the QAQC\_Summary table shows the frequency of each unique combination of errors, and provides a comments field for justification.**

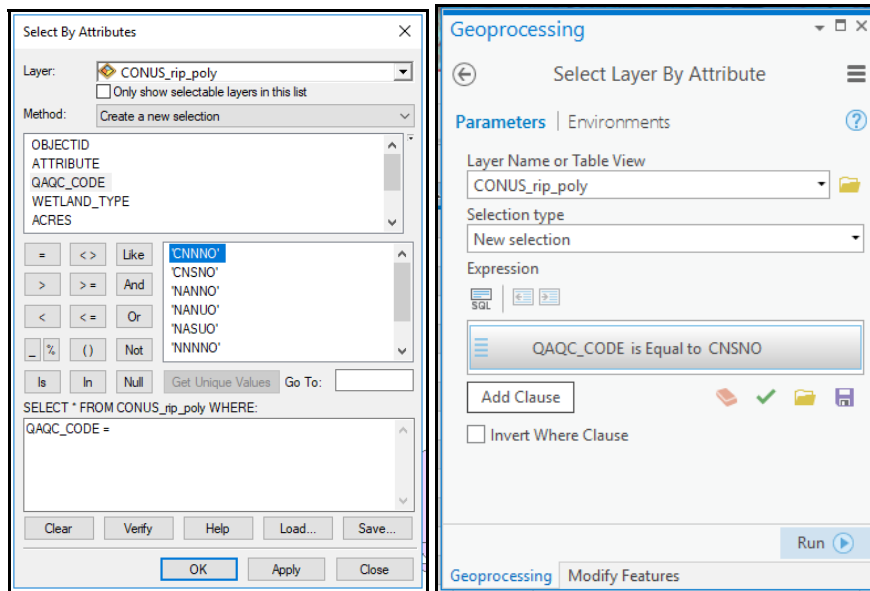
## Reviewing Verification Errors

To find specific instances of an error, in ArcMap or ArcGIS Pro, sort the 'CONUS\_rip\_poly' attribute table by QAQC\_CODE and double-click the gray box associated with a given record on the far left side of the table (Figure 4). This will zoom the map display to that polygon.

OBJECTID	SHAPE	ATTRIBUTE	QAQC_CODE	WETLAND_TYPE	ACRES	GLOBALID	SHAPE_Length	SHAPE_Area
41	Polygon	Rp1EM	NNNUO	Emergent Riparian	6.974278	{BB1F8E90-BC76-4935-AE62-DC5424CFEA5F}	1028.684075	28223.903214
50	Polygon	Rp1EM	NANNO	Emergent Riparian	0.047088	{EE6A06A5-E4D7-4059-A441-5CFEF33DAB06}	52.418373	190.556809
60	Polygon	Rp1EM	NNSNO	Emergent Riparian	0.000224	{797ADC3D-97B4-48AA-8393-55DB4181F07E}	8.128331	0.905572
64	Polygon	Rp1EM	NNSNO	Emergent Riparian	0.000734	{32F59E1E-BEB3-4809-8CEB-9E7DF5603FEA}	6.519114	2.969216
15	Polygon	Rp1FO7ME	NNNNO	Forested Riparian	1.036057	{6DACB1E7-7B30-4115-816B-C3FE94A8AF11}	272.632424	4192.773732
21	Polygon	Rp1FO7ME	NNNNO	Forested Riparian	0.261781	{D4168B00-42AC-47EF-8CCF-5075AE29FEE2}	166.323925	1059.388597
27	Polygon	Rp1FO7ME	NNNNO	Forested Riparian	0.725545	{6B32B498-B209-4C11-ABC3-37359FFD3B2A}	207.508343	2936.178447
30	Polygon	Rp1FO	NNNUO	Forested Riparian	2.516318	{E16FD251-BA89-4C35-8792-32294AC32006}	587.904683	10183.179135
36	Polygon	Rp1FO	NNNNO	Forested Riparian	0.029753	{F223E088-9427-4B5D-A212-A847F6F60FBD}	40.107093	120.407262
42	Polygon	Rp1FO	NNNNO	Forested Riparian	0.11987	{60D252DA-AFCC-4856-BB5B-79FF3A4886D6}	89.803481	485.096501
45	Polygon	Rp1FO	NNNNO	Forested Riparian	20.032987	{FE39AF20-8551-4C9D-BF50-194A5A75D2DF}	1116.959639	81070.620588
48	Polygon	Rp1FO	NNNNO	Forested Riparian	0.348464	{32BB9958-AEE4-4CF8-99B1-36BBD6FB8A00}	151.373383	1410.185406
1	Polygon	Rp2FO6	NNNNO	Other	4.708703	{1C5F65EA-9D63-4CA0-B38E-0AE45E0E5F1F}	841.393547	19055.443076
2	Polygon	Rp2SS6	NNNNO	Other	4.322021	{1E1B1308-36C3-440C-B9ED-E0861312DC92}	710.102027	17490.596569
3	Polygon	Rp2FO	NNNNO	Other	1.793731	{0E244337-F56E-4636-BE6A-3CA444FA91FD}	402.651188	7258.971415

Figure 4. The 'QAQC\_Code' field in the 'CONUS\_rip\_poly' attribute table can be used to sort and review error codes.

The 'Select by Attribute' function, shown in Figure 5, can also be used to select all records of a defined QAQC\_CODE value.



**Figure 5. 'Select by Attributes', shown in ArcGIS Catalog (left) and ArcGIS Pro (right) can help select and navigate to specific polygon errors.**

To view the errors cartographically, create symbology rules on the CONUS\_rip\_poly feature class using the QAQC\_CODE field. (e.g. QAQC\_CODE = 'NNNNN' symbolize green, all other values symbolize red).

For further information, assistance or questions contact: [wetlands\\_team@fws.gov](mailto:wetlands_team@fws.gov)