Wetlands Tools Python Toolbox

Installation Instructions and User Information

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National Wetland Inventory

Contents

Introduction

The Wetlands Tools Python Toolbox is designed to assist users in producing summary statistics of wetland types within a given area. It provides a suite of tools to help select, process, and analyze U.S. Fish and Wildlife Service National Wetlands Inventory wetlands data. A sample workflow for this python toolbox can be described as selecting the wetlands features that contain the habitat(s) you are interested in, clipping those features to a study area, and calculating summary statistics to analyze the distribution and size of the wetlands in the study area.

This toolset was created using Python 3.0 and is compatible with ESRI ArcDesktop 10.7.1 software suite as well as ArcGIS Pro 2.4.

Folder Contents

The wetlands tools and associated files are contained in a folder called 'Wetlands Toolbox' (Figure 1). This folder can be stored in any location on your machine and contains:

- Readme.txt
- XML Metadata files (10 small .xml files that help document the toolbox)
- Wetlands Tools Python Toolbox Installation and User Information.pdf
- Wetlands_Tools.pyt

1. Readme.txt provides a general description of the contents and purpose of the folder.

2. The 10 .xml files store documentation and guidance on using the toolbox within ArcDesktop or ArcPro.

3. The Wetlands Tools Python Toolbox Installation and User Information document provides descriptions and procedures on the use of the wetlands tools.

4. Wetlands_Tools.pyt is the Python Toolbox that contains the Wetlands Tools scripts, compatible with ArcDesktop 10.6.1 (10.7.1?) and ArcGIS Pro 2.4.
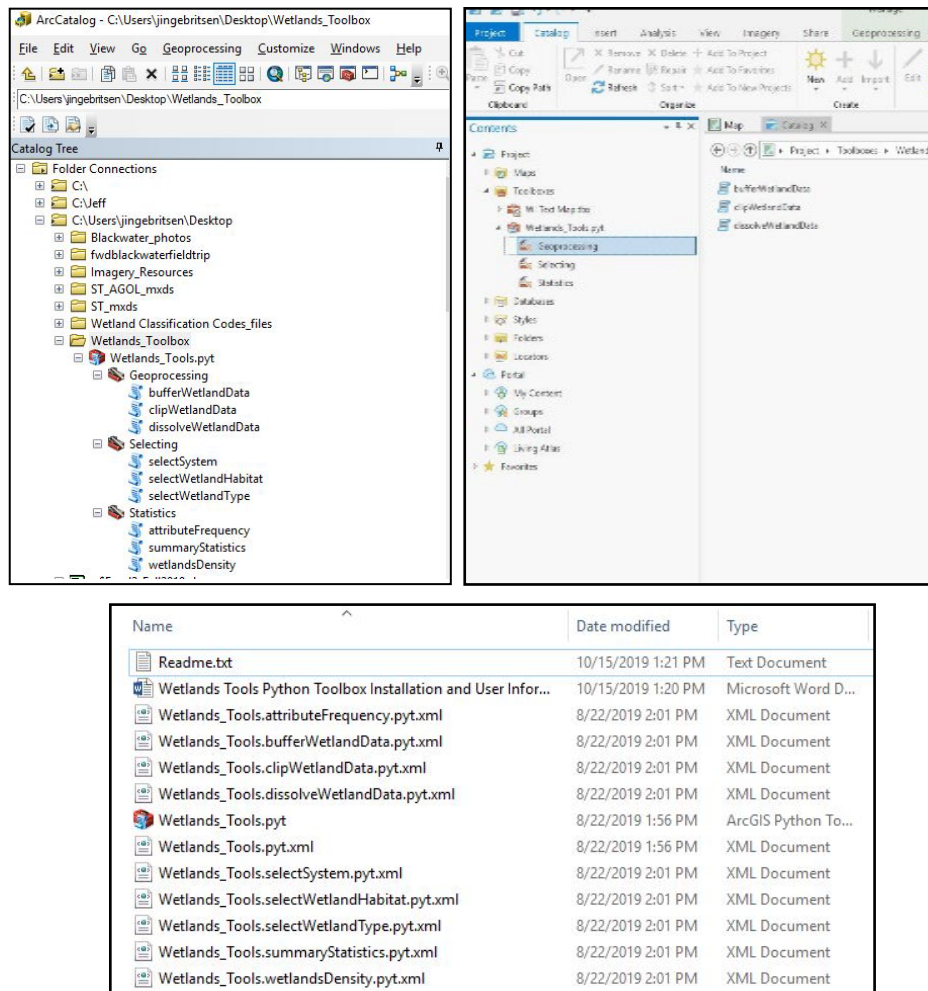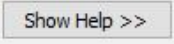

Figure 1. Wetlands_Tools viewed in Desktop ArcCatalog (left), ArcGIS Pro Catalog (right), and Windows Explorer (bottom).

Toolbox Contents

This toolset was designed to work on NWI wetlands data extracted from the FWS wetlands database and will only work on data following that schema. Specifically, it requires the wetlands feature class to have fields named ATTRIBUTE (the Cowardin code)[https://www.fws.gov/wetlands/Data/Wetland-Codes.html] and ACRES (the area of the polygon in acres). The wetlands data can be either in a shapefile or feature class format. Use of this toolbox on other data formats or schemas will likely fail and is not recommended.

Running the tools

To run any of the tools in ArcDesktop:

1. Navigate in ArcDesktop to the ⊞ 🦃 Wetlands_Tools.pyt toolbox located in the Wetlands_Tools folder.

2. Open the toolbox, open a toolset (example: ⊞ 🐚 Geoprocessing), and double-click on any of the individual tools (example: 🦃 clipWetlandData). A window will appear similar to the one in Figure 2, which will allow the user to select the tool parameters and provide a description of the tool on the right pane, if the Show Help >> button is selected.

3. Click the browse button 📂 next to the various parameter text boxes and make sure they are filled out. In the example shown, browse to the input wetlands data, select a study area boundary, and choose an output file. Then press 'Ok' (Figure 2).
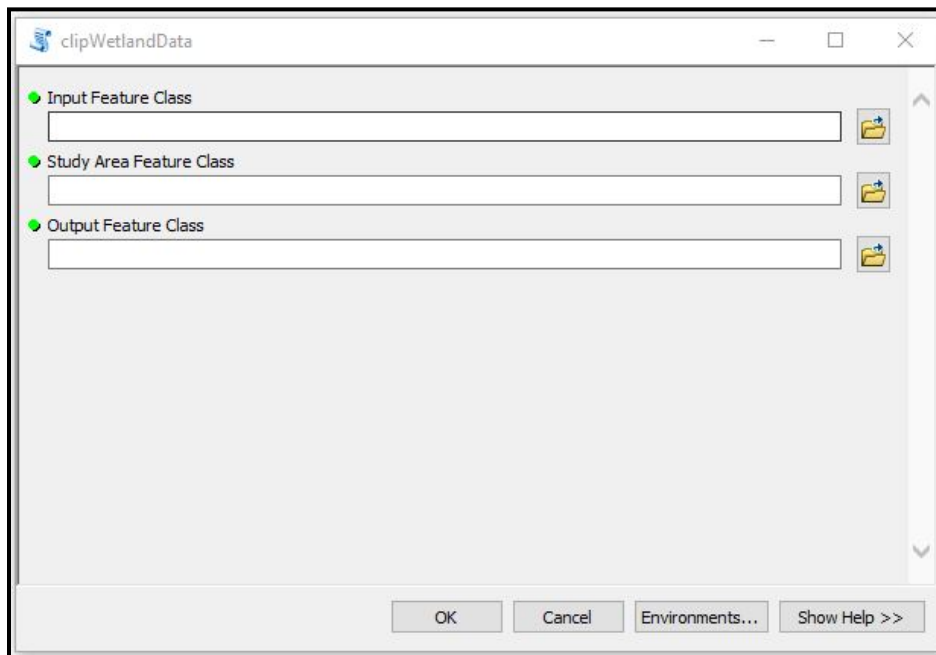

Figure 2. Example of a tool user interface in ArcDesktop. Chooses the wetlands data to clip, the study area to serve as the boundary of the wetlands data, and select a location and name for the output feature class. Clicking 'Tool Help' shows a description of the selected tool.

To run any of the tools in ArcPro:
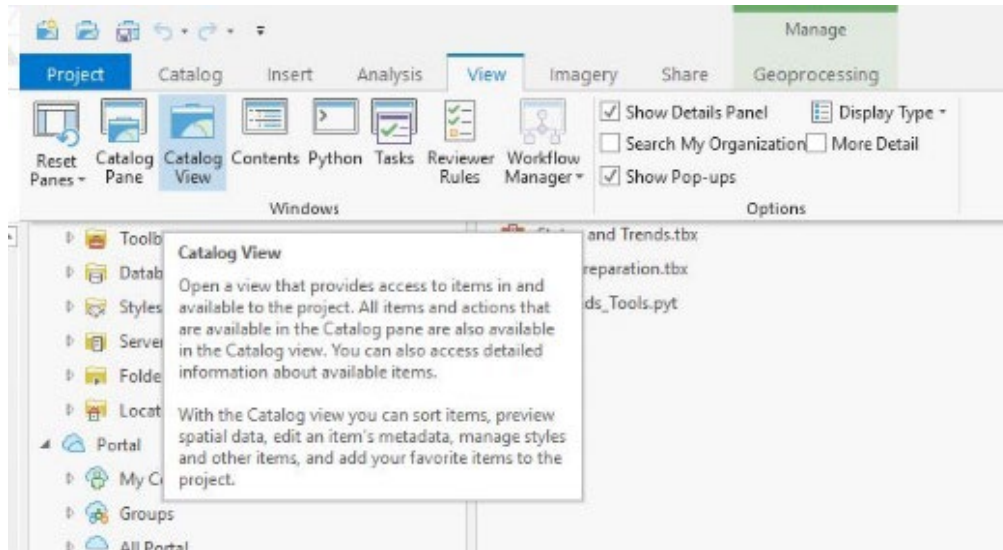
1. Navigate in ArcPro to the Catalog View (Figure 3).

Figure 3. ArcPro Catalog View.

2. In Catalog View, right-click on Toolboxes 📦 Toolboxes and select "Add Toolbox" (Figure 4).
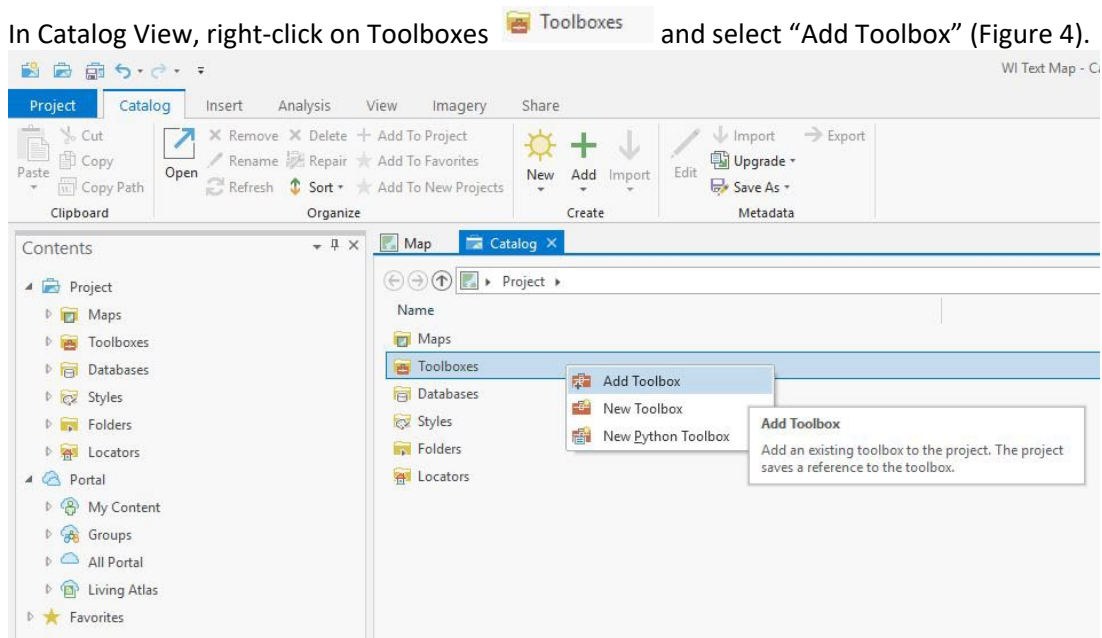

Figure 4. Add Toolbox.

3. Navigate to the Wetlands_Tools python toolbox, select it, and hit "OK" (Figure 5).
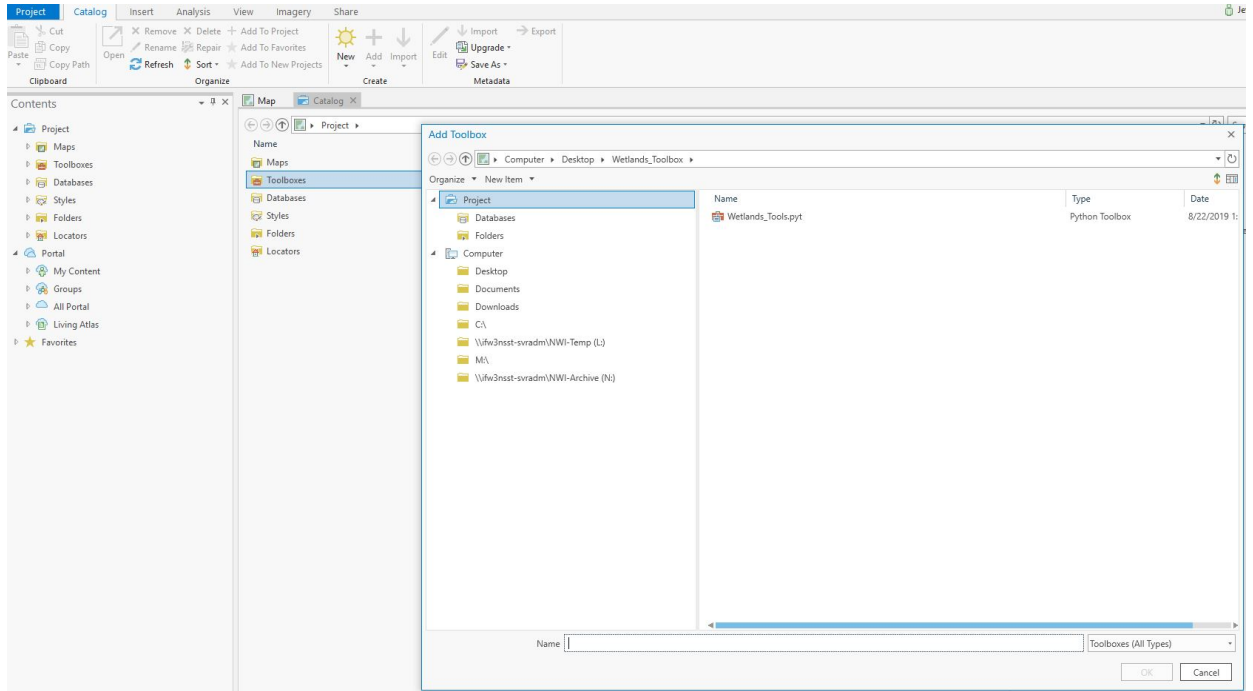

Figure 5. Select Toolbox.

4. Open the toolbox, open a toolset (example:), and double-click on any of the individual tools (example:). A window will appear similar to the one in Figure 6, which will allow the user to select the tool parameters and provides a description of the tool on the right pane, if the button is hovered over. The parameters can be described by hovering over the asterisk/'i' button to the left of the window.

5. Click the browse button [folder icon] next to the various parameter text boxes and make sure they are filled out. In the example shown, browse to the input wetlands data, select a study area boundary, and choose an output file. Then press 'Ok' (Figure 6).

Figure 6. Example of a tool user interface in ArcPro. Chooses the wetlands data to clip, the study area to serve as the boundary of the wetlands data, and select a location and name for the output feature class. Clicking 'Tool Help' shows a description of the selected tool.

Explanations of the Wetlands Tools

Geoprocessing

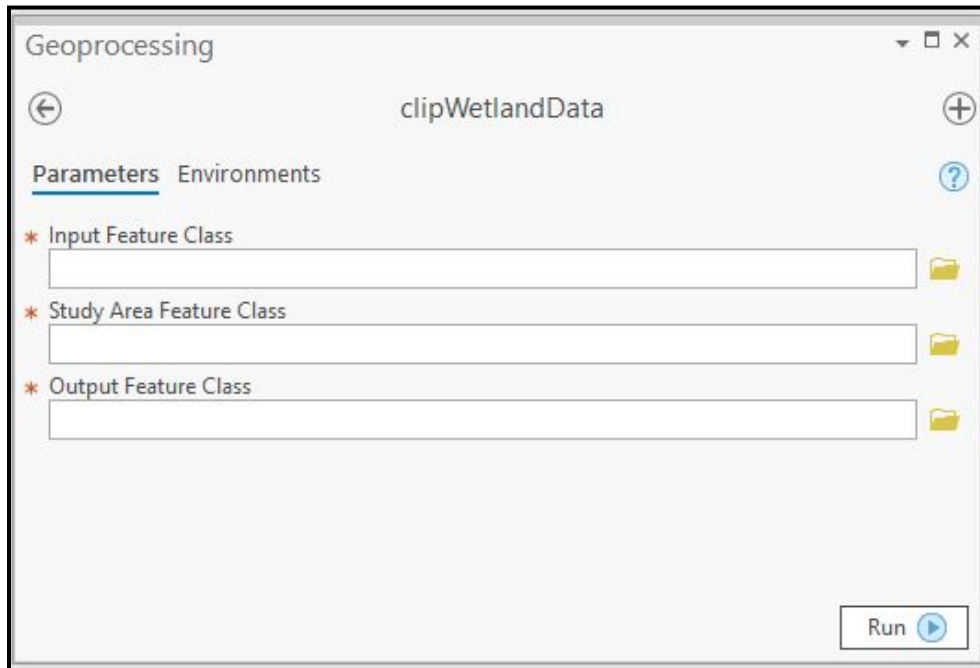### bufferWetlandData (Buffer)

This tool creates buffer polygons around input features to a specified distance. This buffer tool creates a buffered output with the default side type, end type, buffer method, and dissolve type settings.

clipWetlandData (Clip)

This tool extracts input features that overlay the clip features. Use this tool to cut out wetlands data using a study area as a clip boundary. This will create a new feature class of wetlands data containing a subset of the input wetlands data geographically restrained to the study area.

dissolveWetlandData (Dissolve)

Aggregates input features into contiguous wetland features. The output features are single-part, so the output feature class may contain several unique 'wetland complexes'.

Selecting

selectSystem (Select by System)

This tool exports features according to their Cowardin Classification 'System' attribute.
The five system options are:

· Estuarine
· Lacustrine
· Marine
· Palustrine
· Riverine

selectWetlandHabitat (Select by Wetland Habitat)

This tool exports features according to their 'Wetland Habitat' attribute.
The fifteen wetland habitat options are:

· Deepwater Salt
· Flooded Forest
· Flooded Herbaceous
· Flooded Shrub
· Fresh Shores
· Intermittent Rivers
· Lakes and Ponds
· Perennial Rivers
· Salt Herbaceous
· Salt Shores
· Salt Woody
· Saturated Forested
· Saturated Herbaceous
· Saturated Shrub
· Tidal Rivers

selectWetlandType (Select by Wetland Type)

This tool exports features according to their 'Wetland Type' attribute.
The eight wetland type options are:
· Estuarine and Marine Deepwater
· Estuarine and Marine Wetland
· Freshwater Emergent Wetland
· Freshwater Forested/Shrub Wetland
· Freshwater Pond
· Lake
· Other
· Riverine

Statistics

attributeFrequency (Calculate Attribute Frequency)

This tool calculates the frequency of each feature and the sum of those features' acres. It can do those calculations for either each unique ATTRIBUTE or WETLAND_TYPE.

summaryStatistics (Calculate Summary Statistics)

This tool calculates three summary statistics (SUM of ACRES, MEAN of ACRES, and STANDARD DEVIATION of ACRES) for wetlands data. Those statistics can be calculated for each unique wetland attribute in the input feature class, grouped into wetland types, or calculated for all of the wetland features as one.

wetlandsDensity (Calculate Wetlands Density)

This tool calculates wetland density values for each wetland type and for total wetland acres within a study area. Two fields are added to the study area feature class for each wetland type: ACRES and DENSITY.

- [WETLAND_TYPE]_ACRES contains the aggregate acres of that wetland type in the study area
- [WETLAND_TYPE]_DENSITY is the ratio of that [WETLAND_TYPE]_ACRES to the study area ACRES. These density values can be symbolized with a sequential color scheme to represent the variety of wetland densities across the study area.

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