

ACPF FiNRT toolbox step-by-step guide

The Agricultural Conservation Planning Framework Financial and Nutrient Reduction Tool (ACPF FiNRT) is an ACPF-compatible tool that provides information about costs and estimated nitrate reduction outcomes from ACPF-generated conservation scenarios. The ACPF FiNRT itself contains two parts: 1) Estimate Field Nitrogen Requirements & 2) Analyze Conservation Scenario N Load. This guide is to assist users in navigating the toolbox and generating useful watershed information regarding financial cost of best management practice (BMP) implementation and the associated potential nutrient load reduction.

In order to utilize the ACPF FiNRT, the ACPF needs to be run first to produce a suite of potential BMPs that are available for the watershed of interest. The GIS feature classes for each of the conservation practices can be used as inputs to the ACPF FiNRT to conduct financial calculations. These ACPF-generated BMPs have already been produced and packaged for two demo geodatabases available at <https://acpf4watersheds.org/>. The example used in this guide will be the Upper Big Creek Watershed located in central Iowa, but these steps can be applied to other watersheds.

Step 1: Adding ACPF FiNRT toolbox

1. Navigate to <https://acpf4watersheds.org/>
2. Download the ACPF FiNRT toolbox labeled for Iowa
3. Once unzipped, it is recommended to save the ACPF FiNRT folder to a location on your computer (not the desktop or a network location) in which you have read/write permissions. The file path should not contain any spaces.
4. Within ArcGIS Pro, open the toolbox menu and right click to 'Add Toolbox'
5. Locate the folder where the ACPF FiNRT IA tool is saved and add that toolbox to the menu

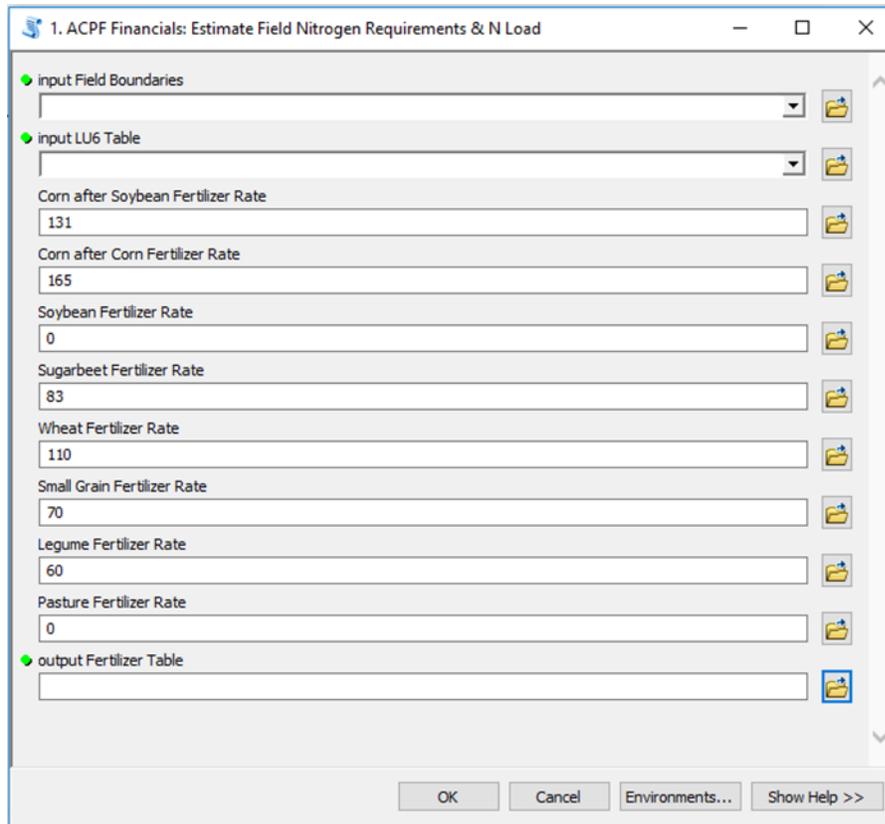
Step 2: Accessing the data

1. The geodatabases for two demo watersheds can be found at <https://acpf4watersheds.org/>
2. Download the Upper Big Creek Watershed geodatabase (acpf071000040801.gdb)
3. Navigate to ArcGIS Pro
4. Make a folder connection to the folder that the watershed geodatabase is housed in
5. Add all of the base input data from the geodatabase to the map

Step 3: ACPF FiNRT: Estimate Field Nitrogen Requirements & N Load

Summary: The goal of estimating field nitrogen requirements is to quantify the potential nitrogen load at the field- and watershed-level. This is an important first step because it calculates the amount of nitrogen, at the field-level, that may be lost – and thus is an opportunity for individual conservation practices to capture and reduce.

1. Open the ACPF FiNRT toolbox
2. Double click to open the first tool titled Estimate Field Nitrogen Requirements & N Load

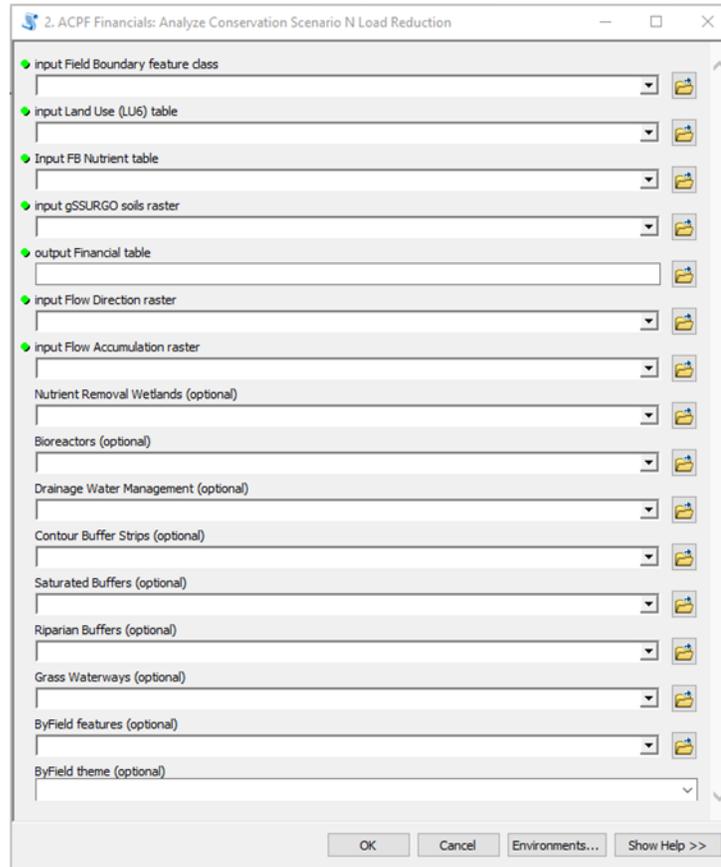


3. This tool requires two input data layers: the Field Boundaries feature class and the LU6 table. Both are found in the ACPF watershed file geodatabase.
4. Default data are provided for the rate of nitrogen fertilizer in pounds for a variety of agricultural row crops and, optionally, legumes and pasture. These values should be modified to use values that are appropriate for the watershed that is being evaluated.
5. The output fertilizer table will be named fieldNRequirements071000040801 and saved in a the ACPF file geodatabase.

Step 4: ACPF FiNRT: Analyze Conservation Scenario N Load Reduction

Summary: This tool allows ACPF users to estimate the total costs and expected nitrogen reduction of various conservation scenarios at field scales and at the HUC 12-watershed scale. Analysts can perform various scenario-oriented financial analyses such as total cost for budgeting, comparative cost-effectiveness, and budget or N-reduction goal optimization. Across the practices considered in this tool, there are three primary categories of cost: 1) design, site preparation and practice establishment; 2) short- and long-term management or maintenance; and 3) annual opportunity cost of land (if land is removed from production) and/or overhead. In support of the Iowa Nutrient Reduction Strategy (INRS) and based on a literature review, conservation practices were reviewed to assess potential N-load reduction and corn yield effects. Using the percent N-load reduction potentials from the INRS, allows for N load, N-load reduction potential from conservation practices, and cost per pound of N reduced per practice to be estimated in the ACPF FiNRT toolbox.

1. Open the ACPF FiNRT toolbox
2. Double click to open the second tool titled Analyze Conservation Scenario N Load Reduction



3. The input data include field boundary, LU6 table, gSSURGO soils raster, the nutrient table from the first tool (fieldNRequirements071000040801), flow direction raster, flow accumulation raster, all of which can be found in the ACPF geodatabase
4. The remaining fields are where the user gets to determine the BMPs included in their scenario. These input data are located in the ACPF geodatabase and are named by BMP.
 - a. Note: if riparian or saturated buffers are an included practice, the RAP feature class must be joined to the Riparian Buffer OR Saturated Buffer table using riparianID as the join field. Once joined, the RAP feature class can be used as the input for riparian OR saturated buffers in the tool. If both riparian and saturated buffers are desired in the scenario, add a second instance of the RAP feature class and modify the name in the table of contents, i.e RAP071000040801_saturatedBuffer and RAP071000040801_riparianBuffer. Use these RAP references in the tool.
 - b. The ByField features field in the ACPF Financials tool can be populated by the field boundaries feature class. Any selection within the field boundaries feature class can be made to designate which fields will receive treatment of cover crops, living mulch, or reduced tillage. The ByField theme input field has a variety of treatment options, including rye cover crops, oat cover crops, living mulch, conservation tillage, and no till. Note, only one By-Field conservation practice can be selected and run at a time.

5. The output feature classes and financial table are saved to a scenario file-geodatabase in the scenarios071000040801 folder. You may wish to modify the scenario file-geodatabase name if you expect to generate more than one scenario.

Step 5: Creating a map of scenario

1. Within the scenarios071000040801 folder, the scenario fgdb will hold the results of the Analyze Conservation Scenario N Load Reduction tool.
2. All financial and nutrient reduction information for the scenario is stored in the 'scenarioSummary' table and can be opened to show the attribute table
3. <BMP>_WSnutrientSummary feature class for each BMP respectively can be added to the map and viewed on the watershed
4. The map below is an example scenario of nutrient removal wetlands, saturated buffers, and bioreactors in the Upper Big Creek Watershed

