STONE ENVIRONMENTAL

Development of a web-based interface for simulating alternative conservation practices using APEX

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Overview

APEX Model Background

Existing APEX Interfaces

NRCS Systematic Tool for Analyzing Resources (STAR)

STAR Walkthrough

APEX Model Background

Farm/small watershed scale

Developed by USDA in Temple, TX and Texas A&M University

Simulates:

- Water, sediment, nutrients, pesticide transport from fields
- Crop growth, biomass, yields

APEX Model Background

Agronomic management:

- Irrigation, Drainage, Furrow dikes
- Buffer strips, Grass Waterways
- Fertilization, Pesticide applications
- Manure management
- Crop rotations

Review paper Gassman et al. (2010). Trans. ASABE Vol. 53(3): 711-740.

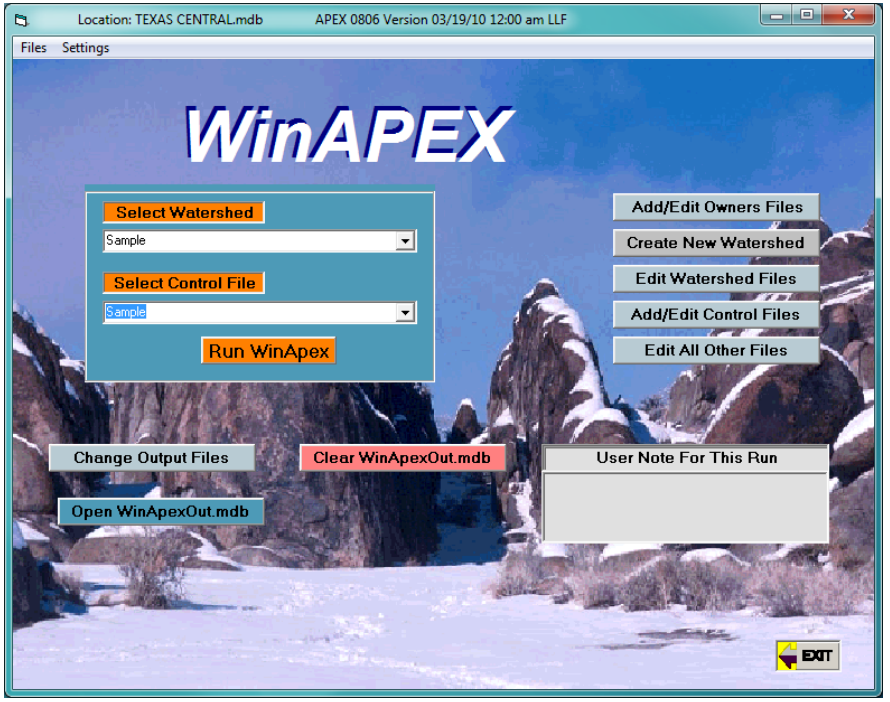
Existing APEX Interface

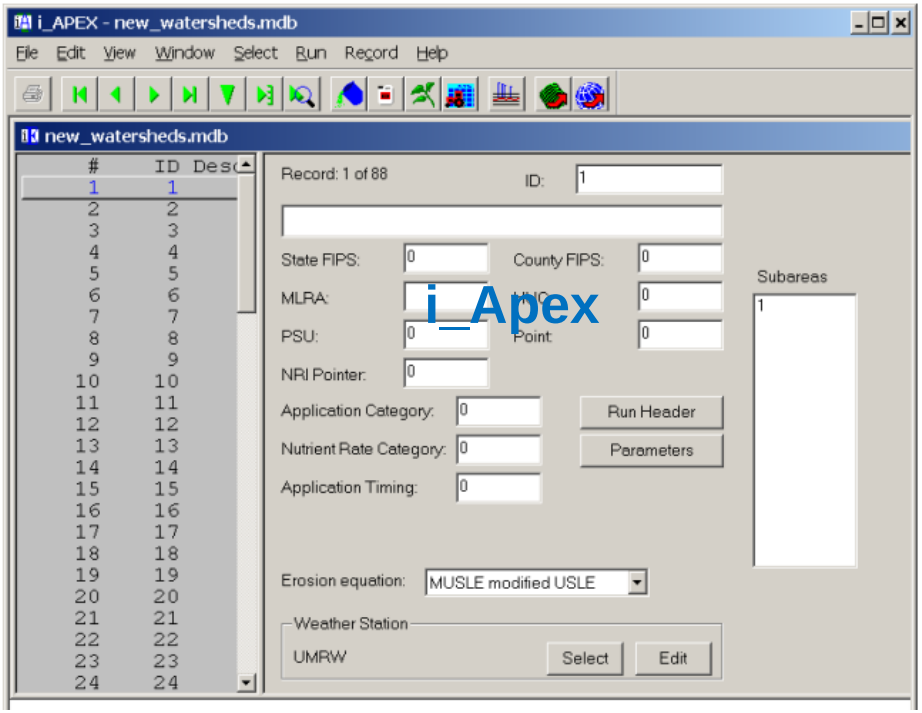
ArcApex, i_Apex, WinApex

Useful for detailed site-specific analysis

Intensive input data requirement

Involves significant learning curve and model understanding





Why use a web-based interface for APEX?

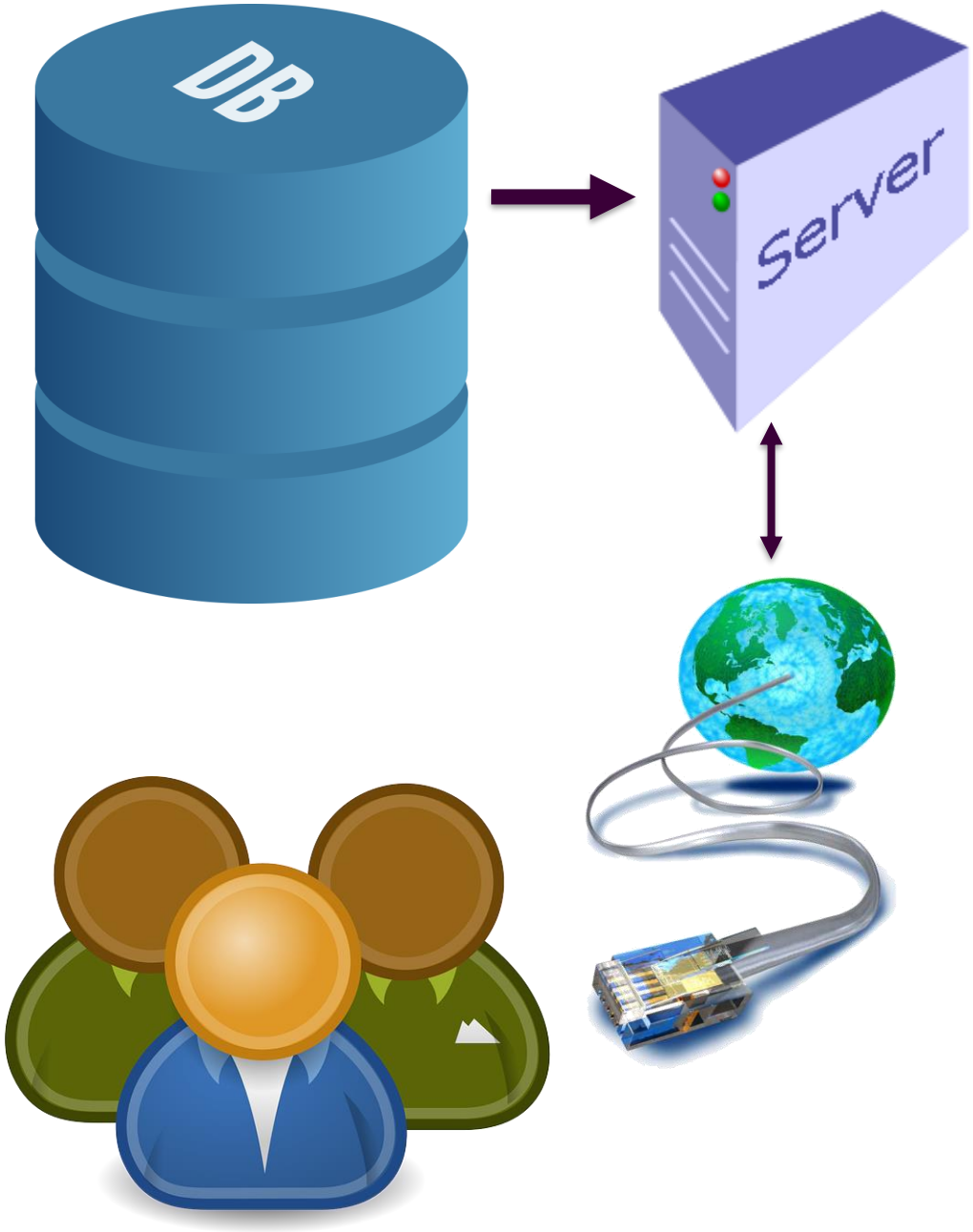
Easier to use

No software dependencies (e.g. ArcGIS license)

Can be accessed through any internet-enabled computer

Databases can be updated as new data or information becomes available

Seamless workflow between running a complex mathematical model and interpreting nutrient management planning results



Web-Based APEX, NRCS STAR

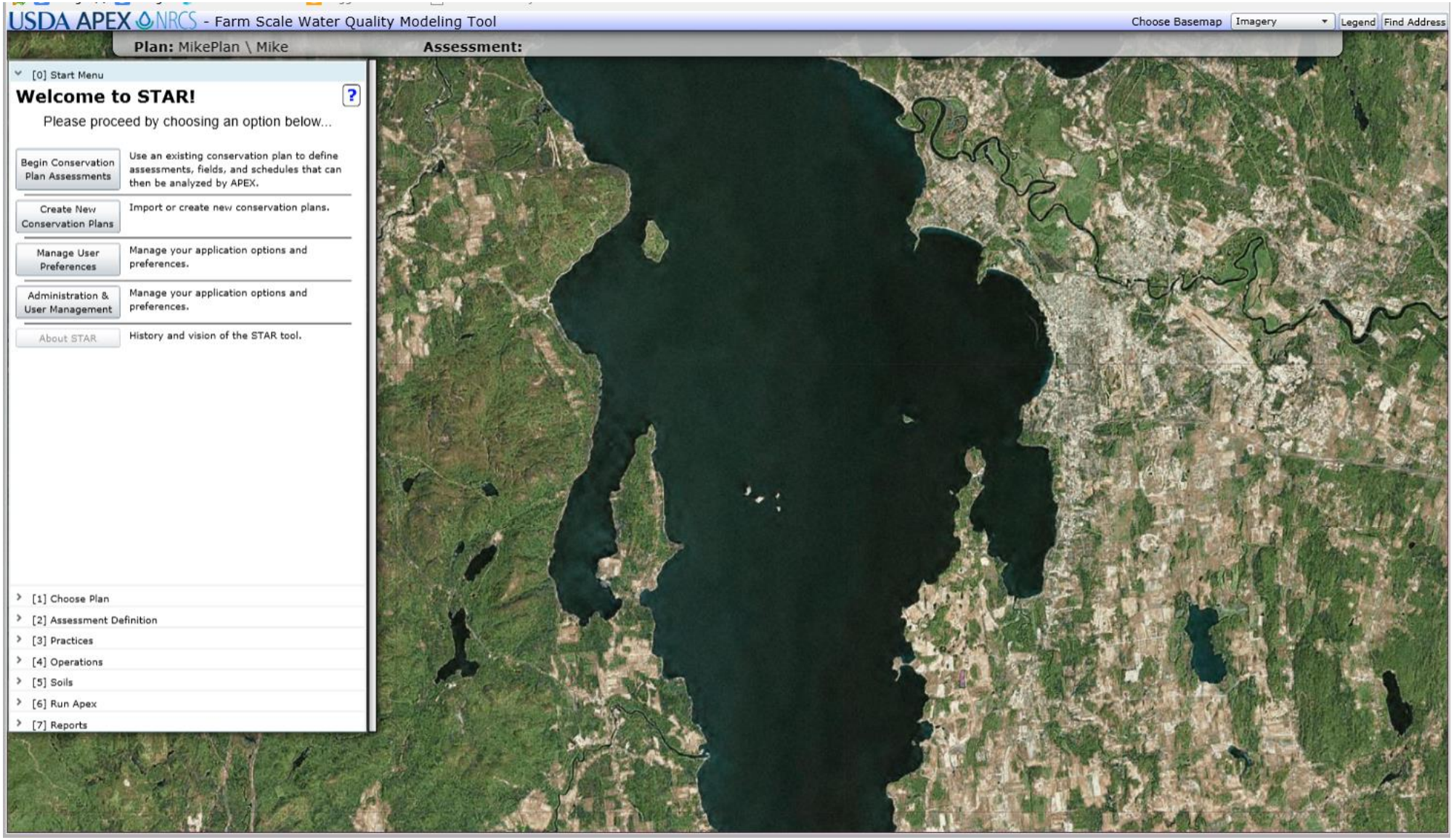
Stone has been working with Texas A&M University and the NRCS in TX and VT to develop a tool for running APEX on the web.

The tool features:

- Ability to run a complex water quality model (APEX) through a streamlined, user interface.
- Databases with built in local topography, soils, and weather to populate model inputs.
- Simulation of multiple types of best management practices and field operations schedules specific to the Northeast.
- Reporting capabilities that generate comparisons between “baseline” and alternative management practices.
- Web-based access, run remotely on cloud computers.

Farm specific field conditions, historical and current agronomic practices, and BMPs can be assessed.

Web-Based APEX, NRCS STAR: Vermont Example Walkthrough

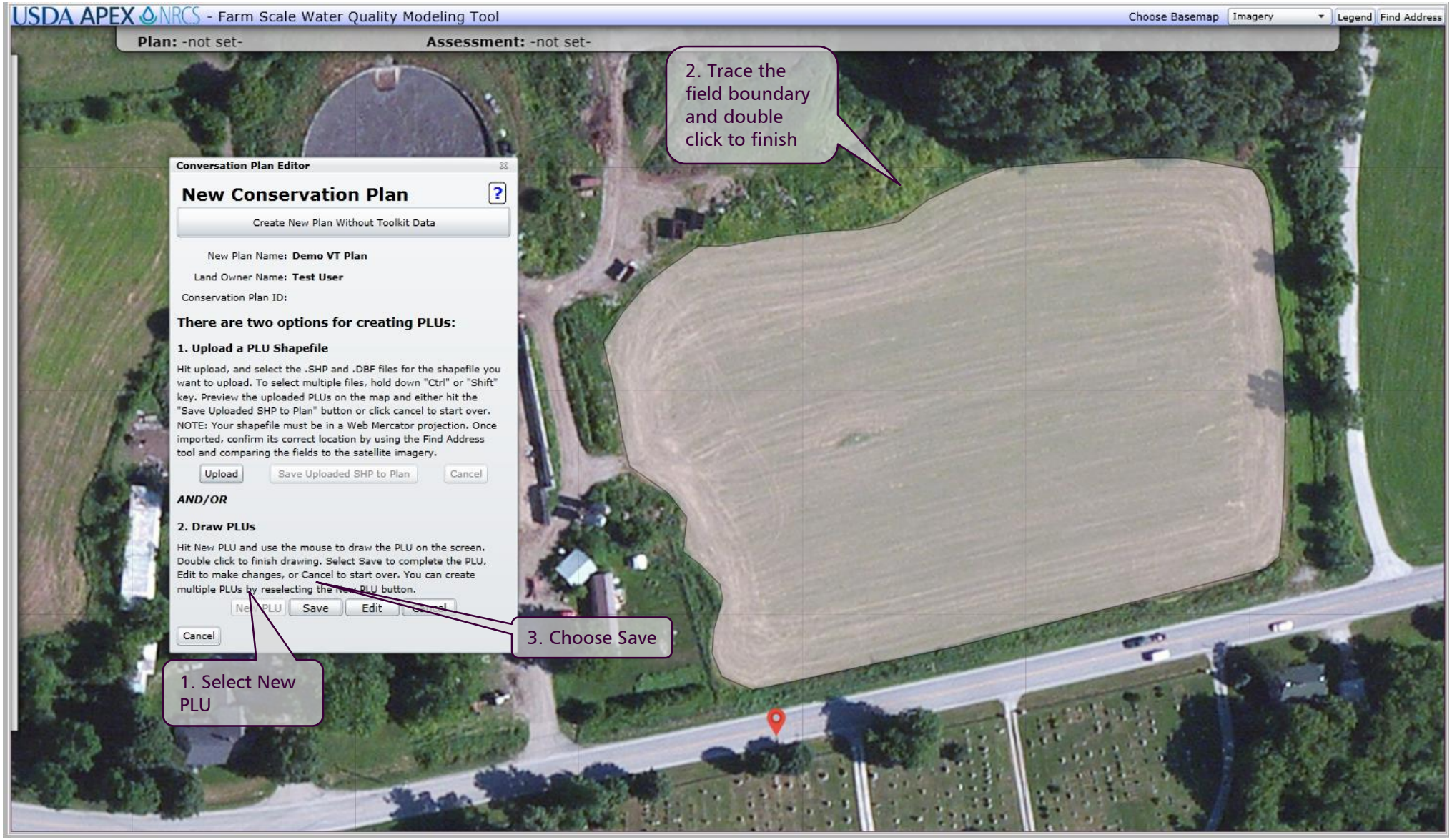


NRCS STAR: VT Example Walkthrough

Create a New Conservation Plan

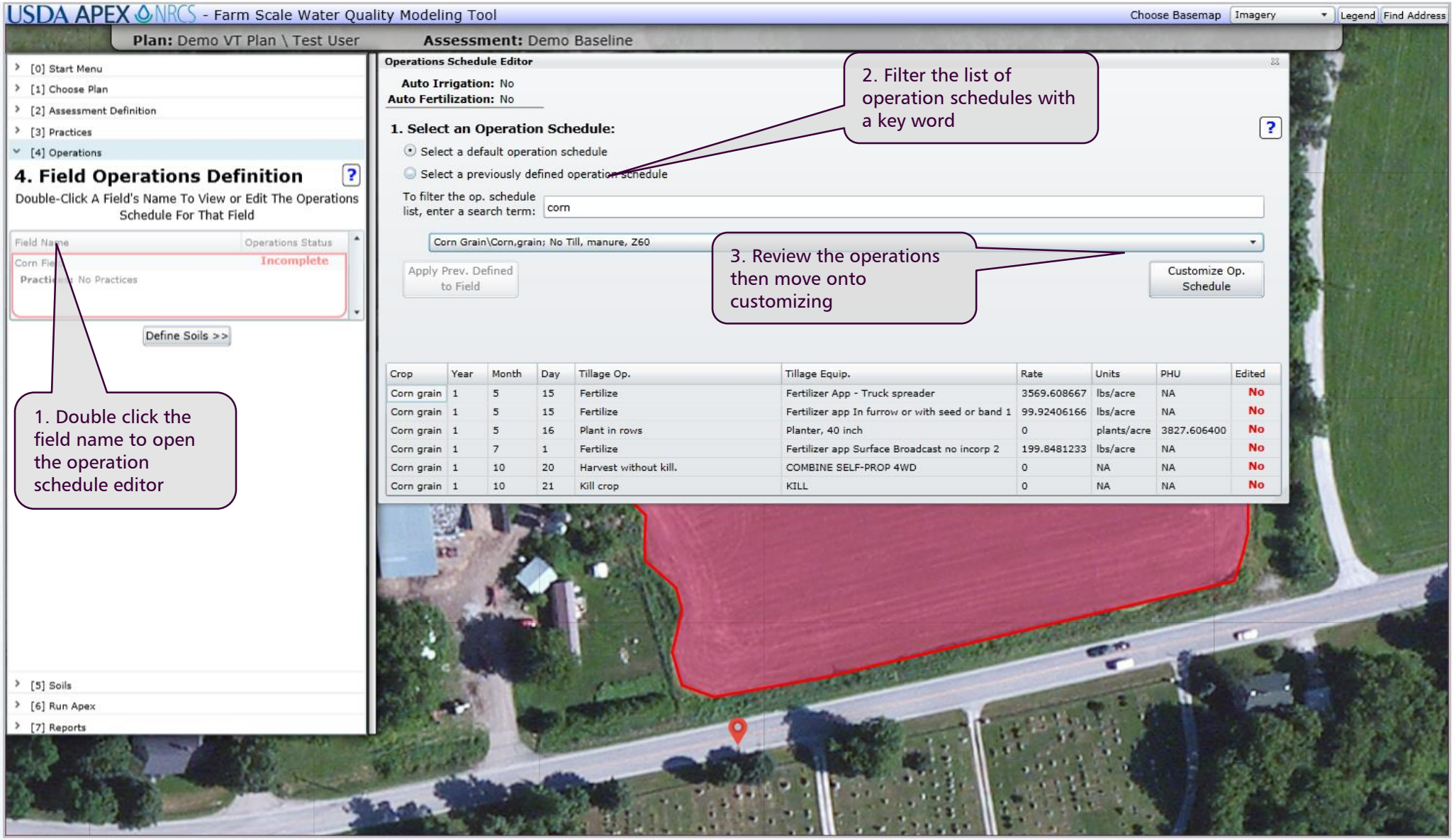
NRCS STAR: VT Example Walkthrough

Draw or Import Field Boundaries



NRCS STAR: VT Example Walkthrough

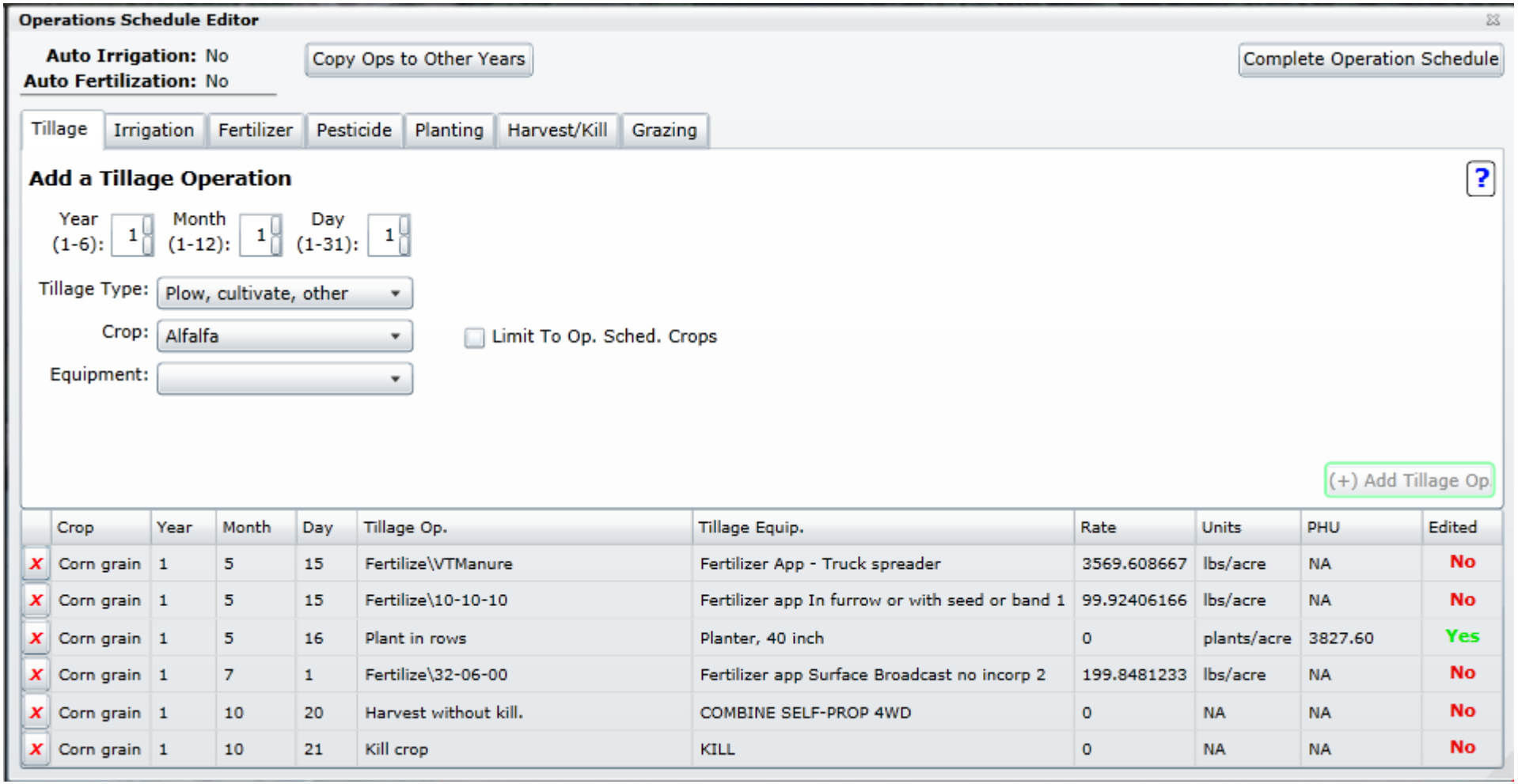
Select an Operation Schedule



NRCS STAR: VT Example Walkthrough

Edit Operations

- Modify any of the listed operations by double clicking
- Add new operations by selecting the appropriate tab

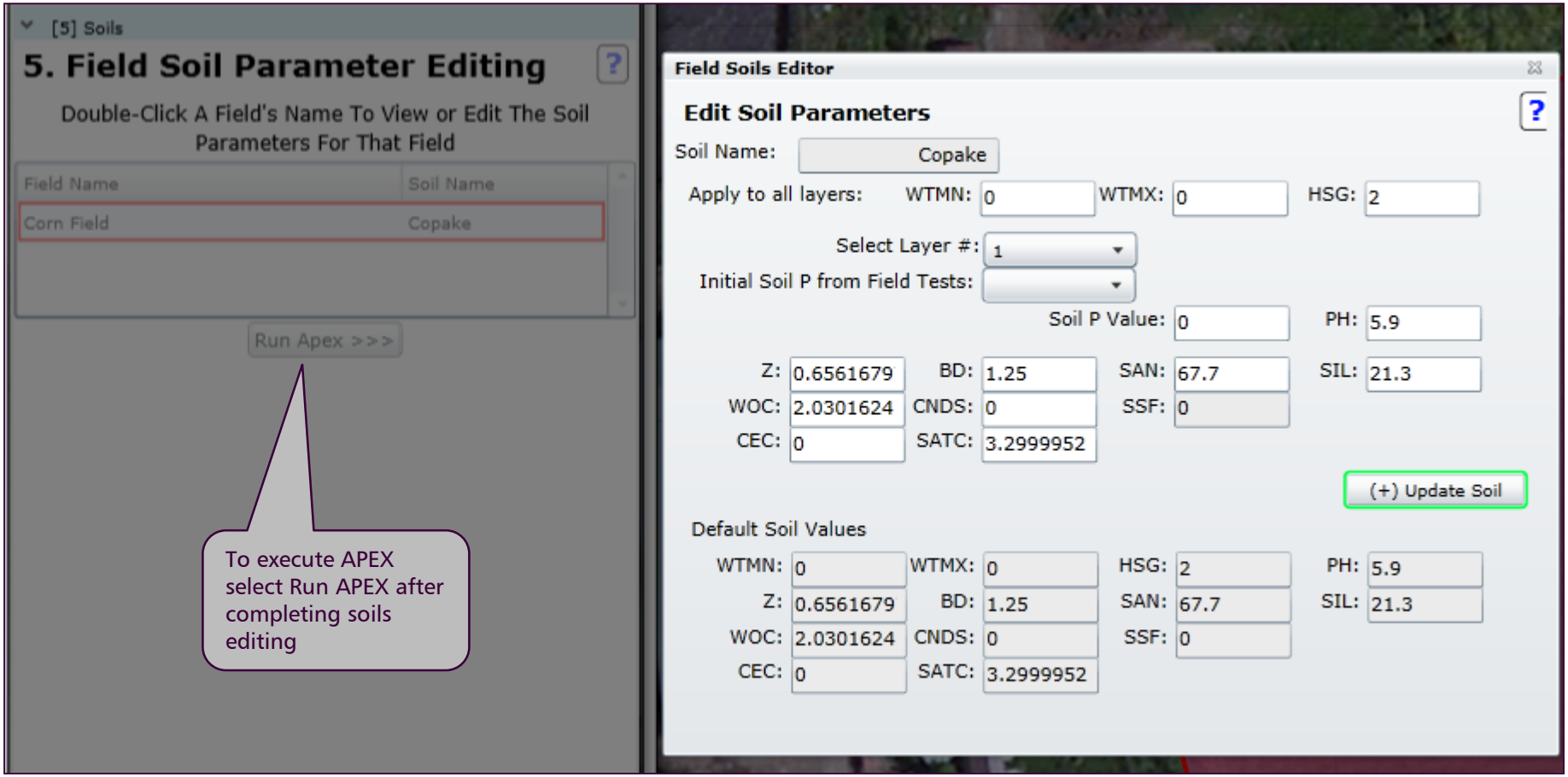


	Crop	Year	Month	Day	Tillage Op.	Tillage Equip.	Rate	Units	PHU	Edited
X	Corn grain	1	5	15	Fertilize\VTManure	Fertilizer App - Truck spreader	3569.608667	lbs/acre	NA	No
X	Corn grain	1	5	15	Fertilize\10-10-10	Fertilizer app In furrow or with seed or band 1	99.92406166	lbs/acre	NA	No
X	Corn grain	1	5	16	Plant in rows	Planter, 40 inch	0	plants/acre	3827.60	Yes
X	Corn grain	1	7	1	Fertilize\32-06-00	Fertilizer app Surface Broadcast no incorp 2	199.8481233	lbs/acre	NA	No
X	Corn grain	1	10	20	Harvest without kill.	COMBINE SELF-PROP 4WD	0	NA	NA	No
X	Corn grain	1	10	21	Kill crop	KILL	0	NA	NA	No

NRCS STAR: VT Example Walkthrough

Soils Processing and Editing

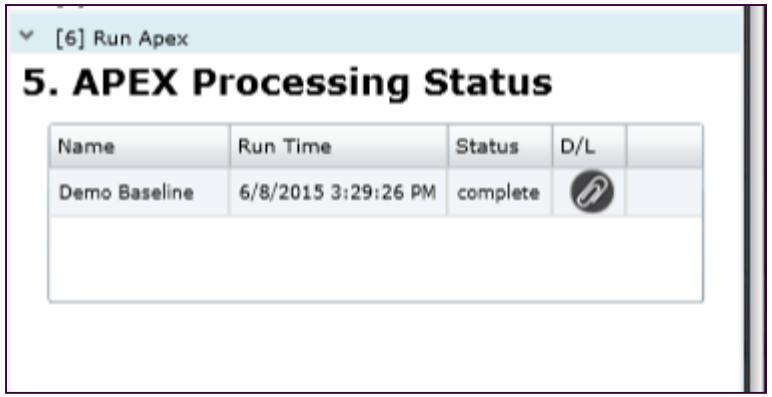
- The predominant soil on the field is determined and soil parameters can be edited by double clicking the field name on the soil panel



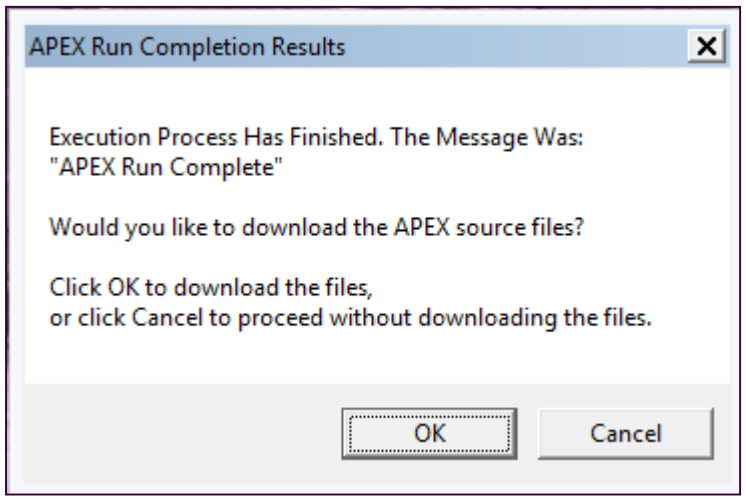
NRCS STAR: VT Example Walkthrough

Executing APEX

- While the data is being prepared for the APEX run and APEX is executing the status will be updated.



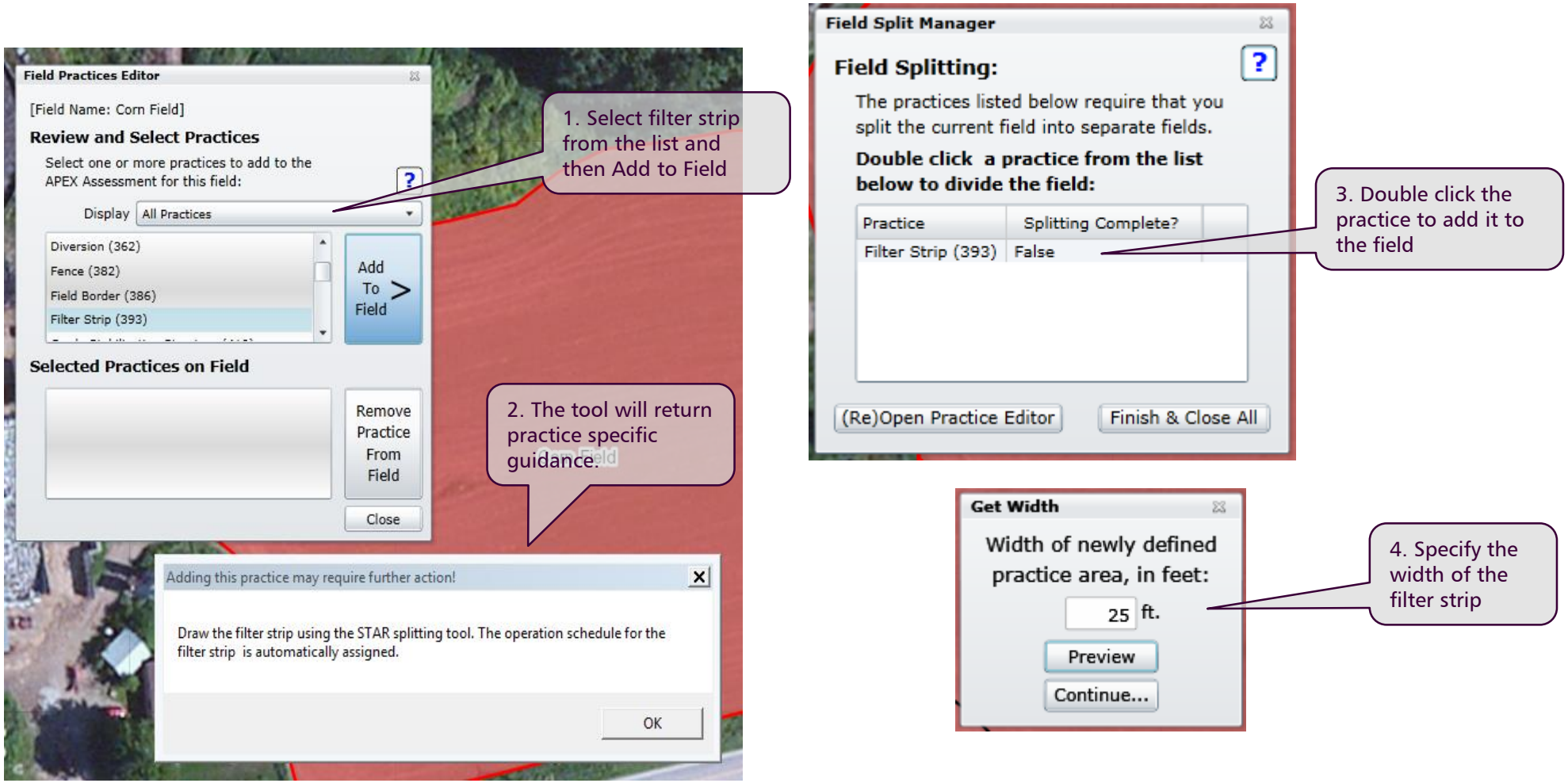
- Once APEX finishes executing, you have the option of downloading the source files



NRCS STAR: VT Example Walkthrough

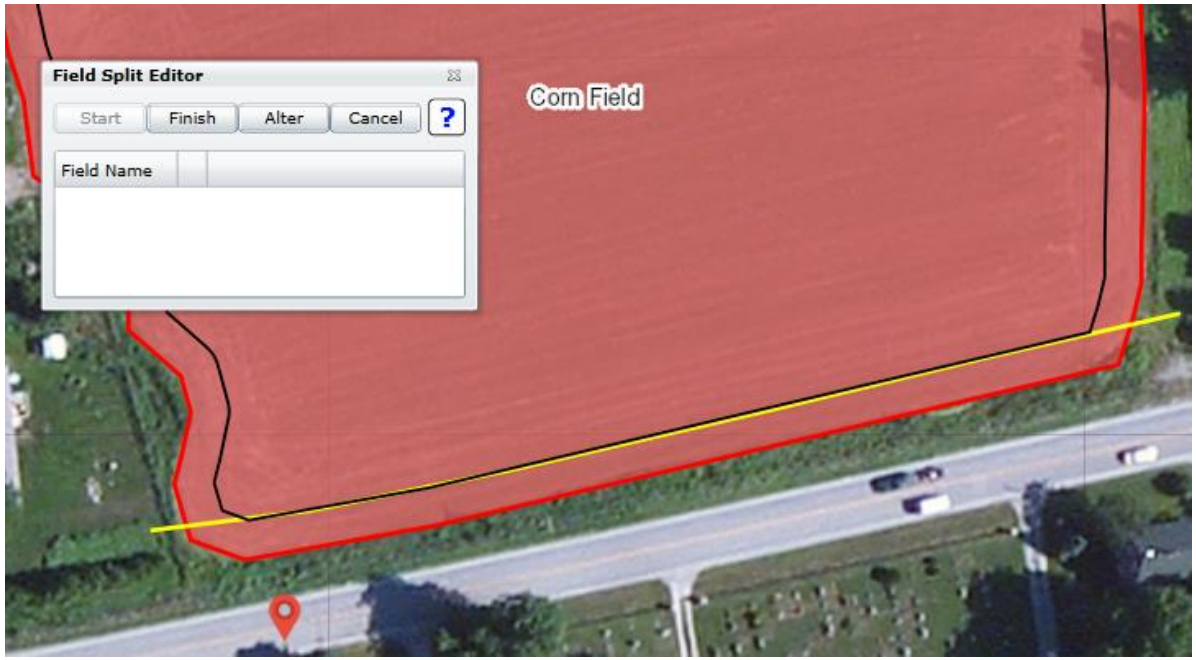
Add a Filter Strip for an Alternative Assessment

- To add a BMP, double click the field name on the Field Practice Definition panel



NRCS STAR: VT Example Walkthrough

Draw the Filter Strip



- A line is displayed based on the width entered. Trace the line at the desired location to create the filter strip.

- The filter is split from the corn field as a new polygon. Specify the drainage for the field and the filter strip.