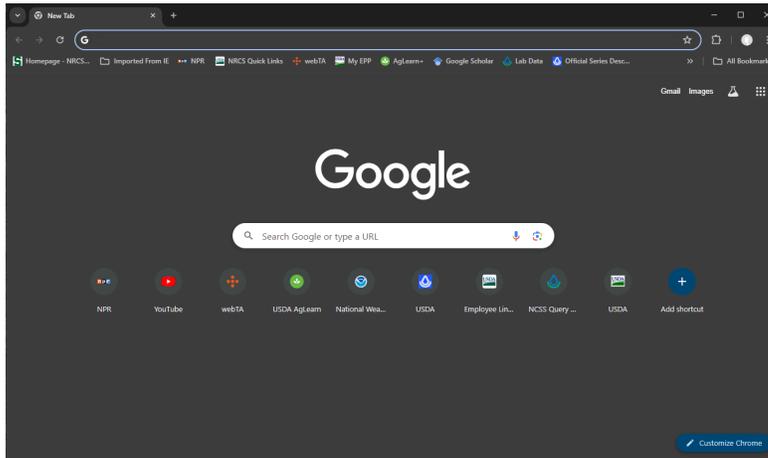
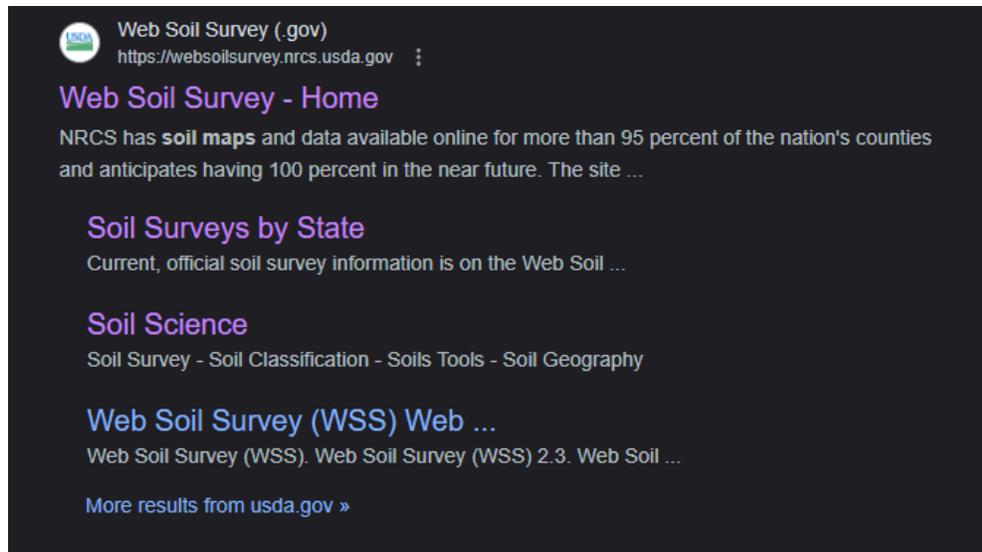


Web Soil Survey Exercise - **ANSWERS IN RED STARTING ON PAGE 10**

1. Open your internet browser of choice. (Chrome will be used for this demo)

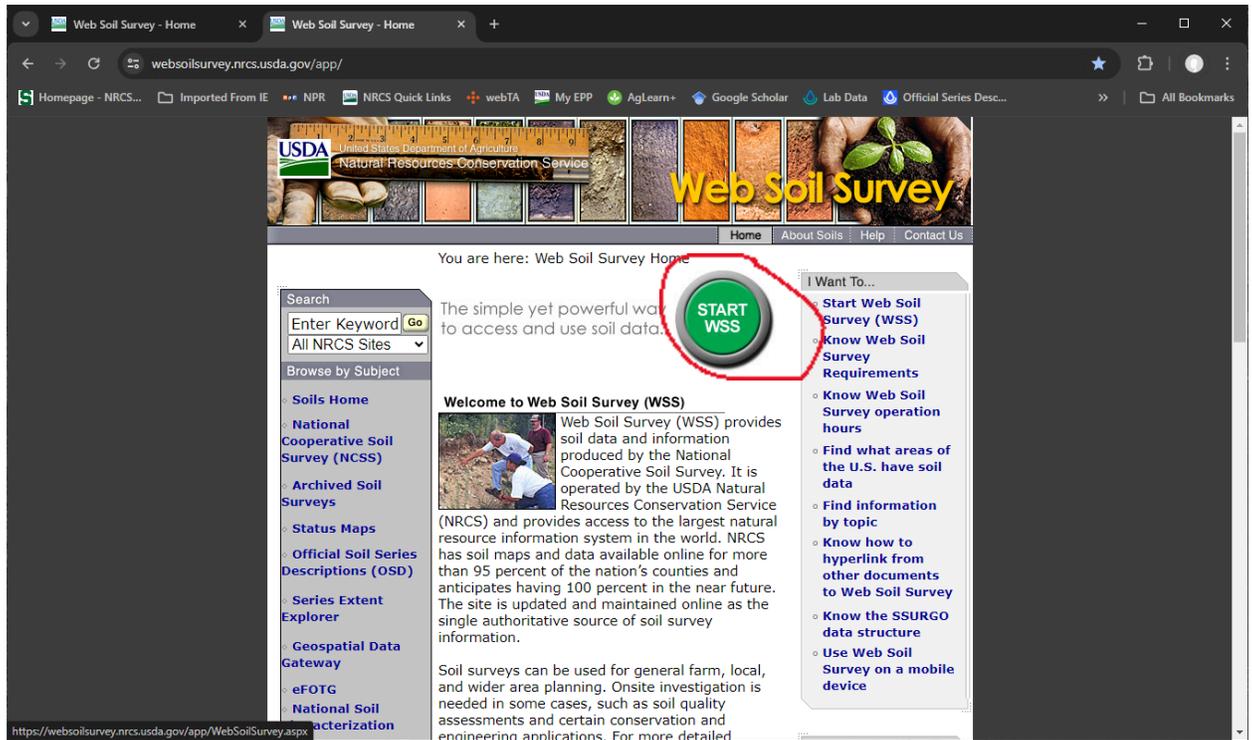


2. Type in “Web Soil Survey” and Search
 - a. The top search result should be the link we want. It is maintained by the USDA NRCS



- b. Click on “Web Soil Survey – Home”

3. Click on the big green start button



4. There are many different ways you can find an area you are interested in. For this exercise we will use the PLSS 9Section, Township, Range) option. Feel free to experiment with the other options.

Search	⌵
Area of Interest	⌵
Import AOI	⌵
Quick Navigation	⌵
Address	⌵
State and County	⌵
Soil Survey Area	⌵
Latitude and Longitude or Current Location	⌵
PLSS (Section, Township, Range)	⌵
Bureau of Land Management	⌵
Department of Defense	⌵
Forest Service	⌵
National Park Service	⌵
Hydrologic Unit	⌵



a. Click the drop down arrow and enter the information in the image below.

The screenshot shows the 'Web Soil Survey' application interface. The 'Area of Interest (AOI)' tab is selected. The 'PLSS (Section, Township, Range)' section is active, with the following input fields:

- State: North Dakota
- Principal Meridian: Fifth Principal Meridian
- Section: 1
- Township: 142 N
- Range: 68 W
- Duplicate Township: (dropdown menu)
- Show PLSS Township and Range Layer in Map:
- Show PLSS Section Layer in Map:

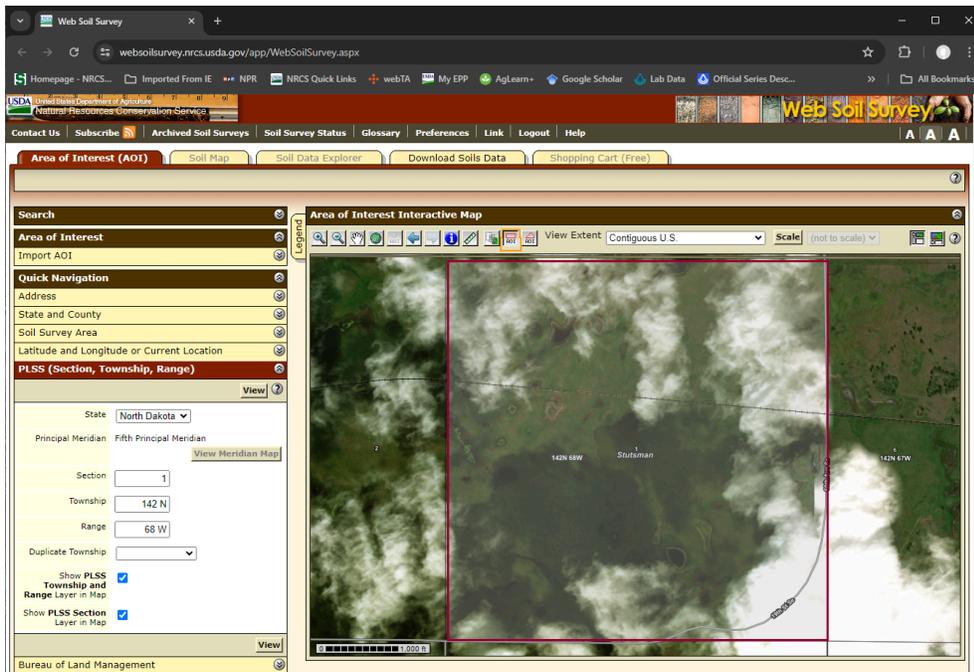
The 'Area of Interest Interactive Map' displays a satellite view of the selected area. The map shows a grid of sections and townships. The selected area is highlighted in red. The map includes a legend, a scale bar (1,000 ft), and a 'View Extent' dropdown menu set to 'Contiguous U.S.'.

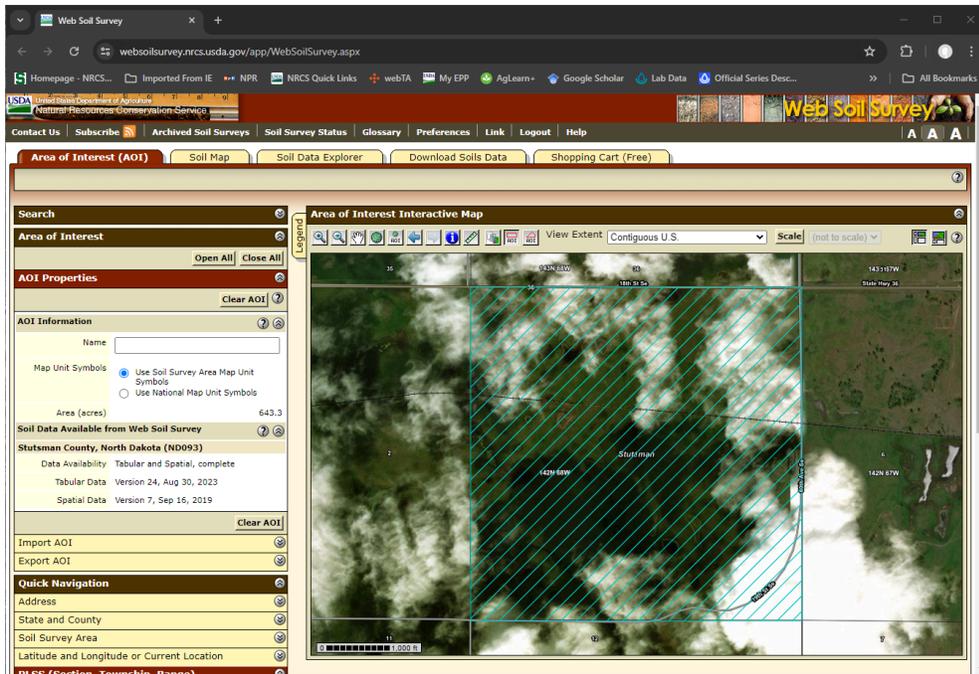
b. Click View and it should zoom into the area.

5. We will now define our Area Of Interest (AOI). Click the red rectangle button near the top of the Area of Interest interactive Map pane.



a. Draw a box around the section, double clicking once the area you want is within the box.



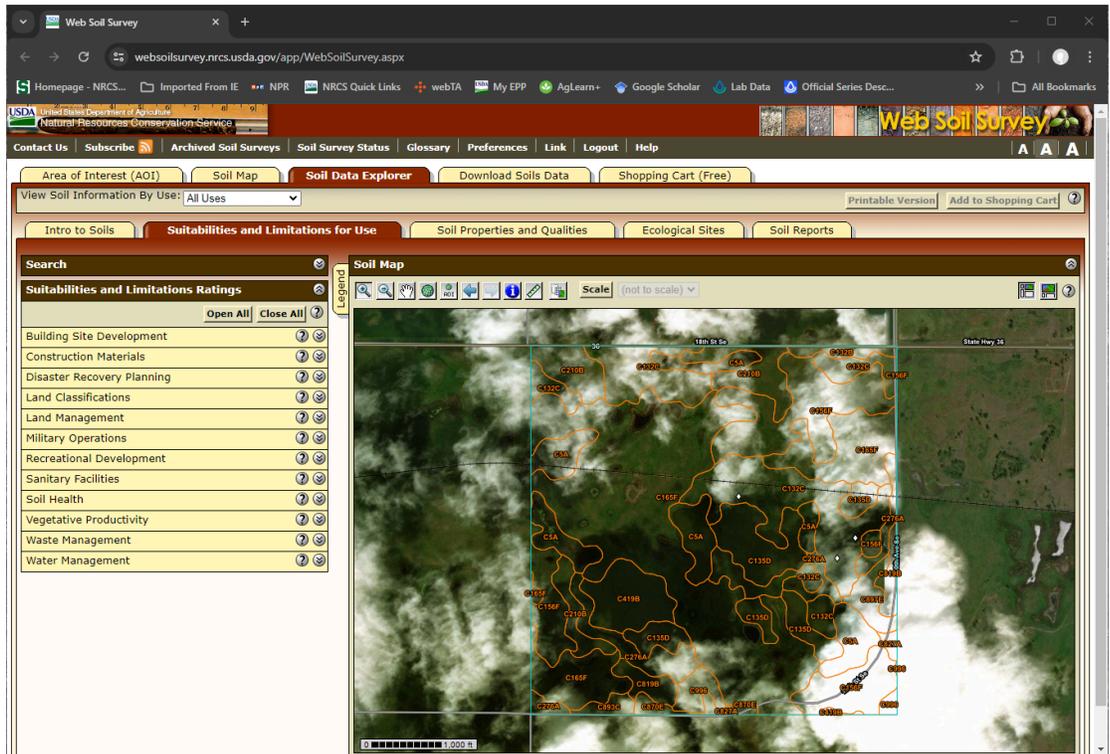


The area within the blue lines is our Area of Interest.

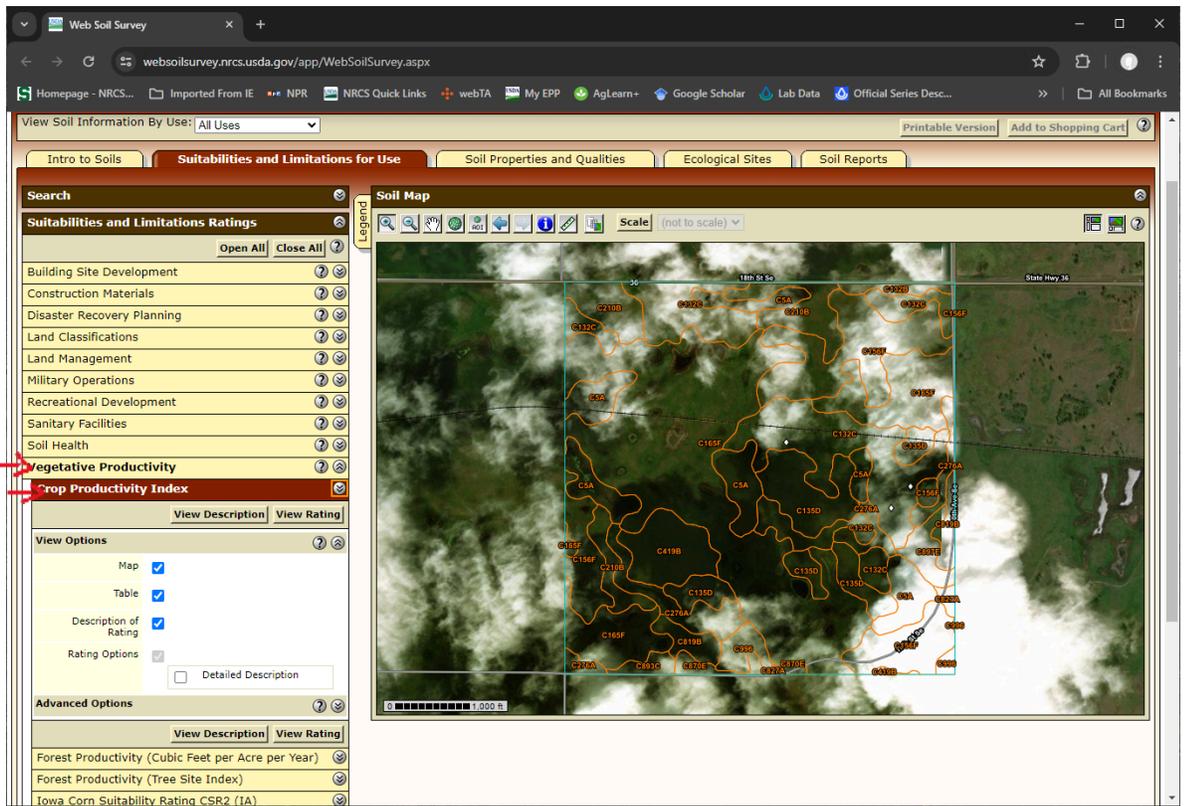
6. Click on the "Soil Data Explorer" tab. It will be highlighted in brown once you do.



a. The “Suitabilities and limitations for Use” tab will be highlighted automatically



b. Click on the “Vegetative Productivity” drop down and choose “Crop Productivity Index”



c. Click View Rating and scroll down to see the summary table that was generated.

Web Soil Survey

Message: NRCS... Imported From E... NRCS Quick Links... webTA... My EPP... AgLearns... Google Scholar... Lab Data... Official Series Desc... YouTube... National Weather S... Setup ODBC Conn... Access Tech - GitHub

Yields of Irrigated Crops (Component)
 Yields of Irrigated Crops (Map Unit)
 Yields of Non-Irrigated Crops (Component)
 Yields of Non-Irrigated Crops (Map Unit)
 Water Management
 Water Management

Warning: Soil Ratings Map may not be valid at this scale.
 You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale. Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Tables - Crop Productivity Index - Summary by Map Unit

Summary by Map Unit - Stutsman County, North Dakota (ND093)

Summary by Map Unit - Stutsman County, North Dakota (ND093)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CSA	Southern silty clay loam, 0 to 1 percent slopes	5	52.2	8.1%
C132B	Williams-Zahl loams, 3 to 6 percent slopes	76	5.3	0.8%
C132C	Williams-Zahl-Zahill complex, 6 to 9 percent slopes	61	103.3	16.1%
C135D	Zahl-Williams loams, 9 to 15 percent slopes	43	46.8	7.3%
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	36	83.5	13.0%
C165F	Zahl-Max-Parnell complex, 0 to 35 percent slopes	30	221.5	34.4%
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	83	37.7	5.9%
C276A	Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	58	28.0	4.3%
C419B	Wildrose silty clay, 2 to 6 percent slopes	83	22.9	3.6%
C819B	Lehr-Wabek loams, 2 to 6 percent slopes	41	12.5	1.9%
C827A	Divide-Marysland loams, 0 to 2 percent slopes	55	2.2	0.3%
C870E	Wabek-Lehr-Appam complex, 9 to 25 percent slopes	23	5.8	0.9%
C893C	Williams-Wabek complex, 2 to 9 percent slopes	53	4.2	0.6%
C897E	Wabek-Max-Zahl loams, 9 to 25 percent slopes	29	8.6	1.3%
C996	Water	0	8.8	1.4%
Totals for Area of Interest			643.3	100.0%

Description - Crop Productivity Index
 Crop productivity index ratings provide a relative ranking of soils based on their potential for intensive crop production. An index can be used to rate the potential yield of one soil against that of another over a period of time. Ratings range from 0 to 100. The higher numbers indicate higher production potential. The rating is not crop specific. Minnesota inquiries must use the "Map Unit Cropland Productivity Report (MN)" soils report from the Soil Reports tab under "Vegetative Productivity."
 When the soils are rated, the following assumptions are made: a) adequate management, b) natural weather conditions (no irrigation), c) artificial drainage where required, d) no frequent flooding on the lower lying soils, and e) no land leveling or terracing. Even though predicted average yields will change with time, the productivity indices are expected to remain relatively constant in relation to one another over time.

Rating Options - Crop Productivity Index

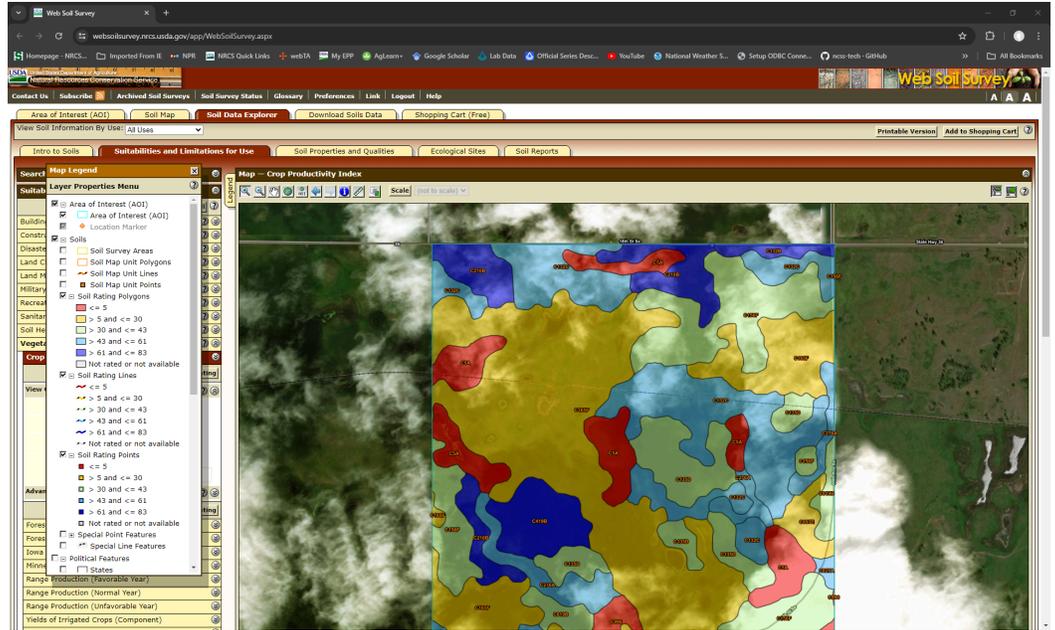
i.

Click on the Legend tab to learn more about what the colors on the map mean.

Map Legend

Layer Properties Menu

- Area of Interest (AOI)
 - Area of Interest (AOI)
 - Location Marker
- Soils
 - Soil Survey Areas
 - Soil Map Unit Polygons
 - Soil Map Unit Lines
 - Soil Map Unit Points
 - Soil Rating Polygons
 - ≤ 5
 - > 5 and ≤ 30
 - > 30 and ≤ 43
 - > 43 and ≤ 61
 - > 61 and ≤ 83
 - Not rated or not available
 - Soil Rating Lines
 - ≤ 5
 - > 5 and ≤ 30
 - > 30 and ≤ 43
 - > 43 and ≤ 61
 - > 61 and ≤ 83
 - Not rated or not available
 - Soil Rating Points
 - ≤ 5
 - > 5 and ≤ 30
 - > 30 and ≤ 43
 - > 43 and ≤ 61
 - > 61 and ≤ 83
 - Not rated or not available
 - Special Point Features
 - Special Line Features
 - Political Features
 - States



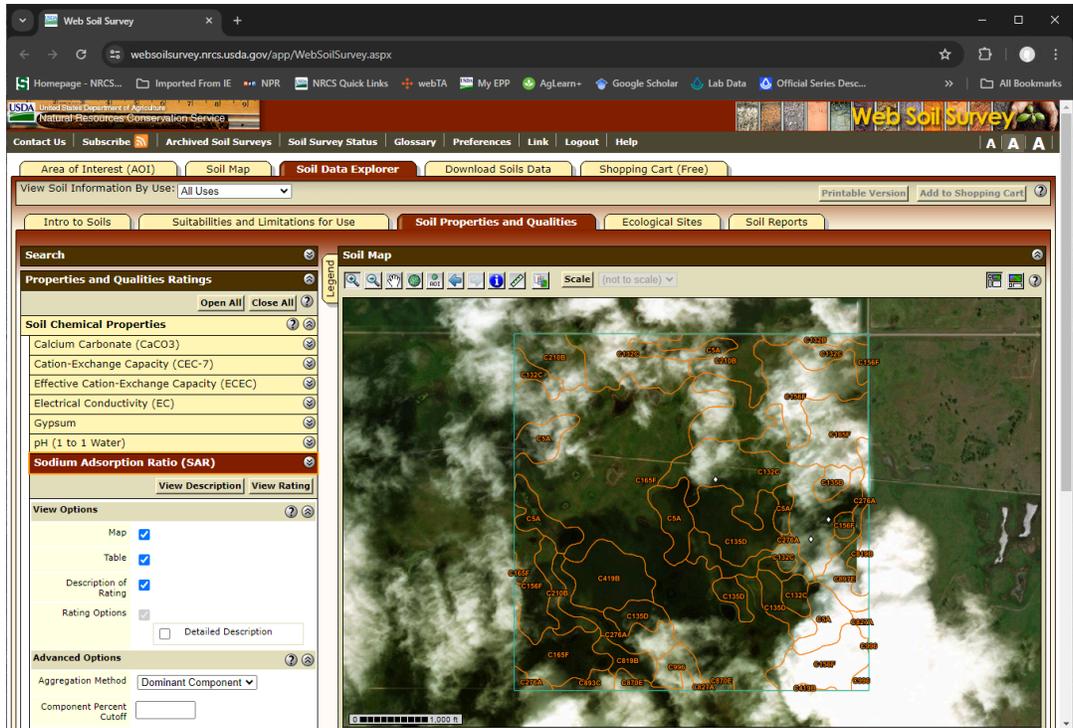
What soil in your area has the highest Rating? **Wildrose silty clay, 2 to 6 percent slopes and Williams-Bowbells loam, 3 to 6 percent slopes**

What color is the soil in your area with the highest Rating? **Blue**

7. Click on the “Soil Properties and Qualities” tab



a. Click on the “Soil Chemical Properties” dropdown and choose “Sodium Adsorption Ratio (SAR)”



- b. Under the “Advanced Options” window, put 0 for Top depth and 6 for Bottom depth. Then click view.

Advanced Options

Aggregation Method:

Component Percent Cutoff:

Tie-break Rule: Lower Higher

Interpret Nulls as Zero: Yes No

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable) Depth Range (Weighted Average)

Top Depth:

Bottom Depth:

Top Depth: Value required.
Bottom Depth: Value required.

Inches Centimeters

All Layers (Weighted Average)

The screenshot shows the Web Soil Survey interface. On the left, a list of soil properties is displayed, with 'Sodium Adsorption Ratio (SAR)' selected. Below this, 'View Options' and 'Advanced Options' are visible. The 'View Options' section includes checkboxes for 'Map', 'Table', and 'Description of Rating', and a 'Rating Options' section with a 'Detailed Description' checkbox. The 'Advanced Options' section includes 'Aggregation Method' (Dominant Component), 'Component Percent Cutoff', 'Tie-break Rule' (Higher selected), 'Interpret Nulls as Zero' (Yes selected), and 'Layer Options' (Depth Range selected, Top Depth 0, Bottom Depth 6, Centimeters selected).

The main map area shows a color-coded SAR map overlaid on a satellite image. A warning box is present: 'Warning: Soil Ratings Map may not be valid at this scale. You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale. Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.'

Below the map is a table titled 'Tables - Sodium Adsorption Ratio (SAR) - Summary By Map Unit'. The table provides a summary by map unit for Stutsman County, North Dakota (ND093).

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CSA	Southam silty clay loam, 0 to 1 percent slopes	0.0	52.2	8.1%
C132B	Williams-Zahl loams, 3 to 6 percent slopes	0.0	5.3	0.8%

Which map units have a high rating? **Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes and Divide-Marysland Loams, 0 to 2 percent slopes**

Thinking back to what we discovered in step 6c did these soils have a high or Low Crop productivity Rating? **They were in the middle neither high nor low.**

8. Click on the "Soil Health Properties" dropdown on the "Soil Properties and Qualities" tab. Click on "Soil Health – Organic Matter"
 - a. For Top Depth input "0"
 - b. For bottom depth input "6"

View Soil Information By Use: All Uses

- Intro to Soils
- Suitabilities and Limitations for Use
- Soil Properties and Qualities**
- Ecological

Search

Properties and Qualities Ratings

Open All Close All ?

Soil Chemical Properties

- Calcium Carbonate (CaCO3)
- Cation-Exchange Capacity (CEC-7)
- Effective Cation-Exchange Capacity (ECEC)
- Electrical Conductivity (EC)
- Gypsum
- pH (1 to 1 Water)
- Sodium Adsorption Ratio (SAR)

Soil Erosion Factors

Soil Health Properties

- Soil Health - Available Water Capacity
- Soil Health - Bulk Density, One-Third Bar

Soil Health - Organic Matter

View Description View Rating

View Options

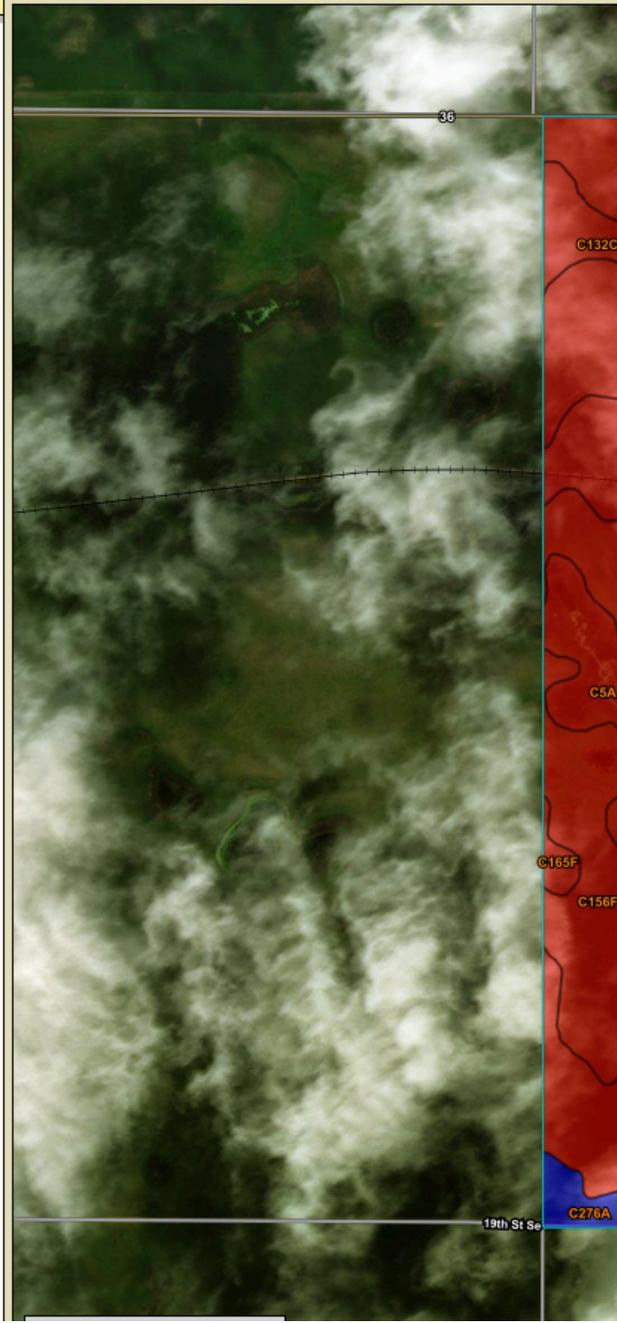
- Map
- Table
- Description of Rating
- Rating Options
 Detailed Description

Advanced Options

- Aggregation Method: Dominant Component
- Component Percent Cutoff:
- Tie-break Rule: Lower Higher
- Interpret Nulls as Zero: Yes No
- Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable) Depth Range (Weighted Average)
Top Depth:
Bottom Depth:
 Inches

Map - Sodium Adsorption Ratio (SAR)

Scale (not to scale)



C. click "View Rating".

What map unit has the highest rating? **Southam Silty Clay Loam, 0 to 1 percent slopes**

9. Click on the "Soil Map" tab and then click on the "Southam silty clay loam, 0 to 1 percent slopes" link in the "Map Unit Legend" pane.

The screenshot displays the Web Soil Survey interface. On the left, the "Map Unit Legend" pane shows a table of map units for Stutsman County, North Dakota (ND093). The "Southam silty clay loam, 0 to 1 percent slopes" map unit (C5A) is highlighted with a red circle. The table lists the following data:

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
C5A	Southam silty clay loam, 0 to 1 percent slopes	52.2	8.1%
C132B	Williams-Zahl loams, 3 to 6 percent slopes	5.3	0.8%
C132C	Williams-Zahl-Zahill complex, 6 to 9 percent slopes	103.3	16.1%
C135D	Zahl-Williams loams, 9 to 15 percent slopes	46.8	7.3%
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	83.5	13.0%
C165F	Zahl-Max-Parnell complex, 0 to 35 percent slopes	221.5	34.4%
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	37.7	5.9%

The right pane shows the "Report - Map Unit Description" for the selected map unit. The report includes the following information:

- Stutsman County, North Dakota**
- CSA - Southam silty clay loam, 0 to 1 percent slopes**
- Map Unit Setting**
 - National map unit symbol: 24539
 - Elevation: 1,280 to 2,560 feet
 - Mean annual precipitation: 13 to 22 inches
 - Mean annual air temperature: 37 to 46 degrees F
 - Frost-free period: 110 to 140 days
 - Farm land classification: Not prime farmland
- Map Unit Composition**
 - Southam and similar soils: 78 percent
 - Minor components: 22 percent
- Description of Southam**
 - Setting**
 - Landform: Marshes
 - Down-slope shape: Concave
 - Across-slope shape: Concave
 - Parent material: Local alluvium
 - Typical profile**
 - A - 0 to 4 inches: silty clay loam
 - Ag1 - 4 to 18 inches: silty clay loam
 - Ag2 - 18 to 42 inches: silty clay
 - Cg - 42 to 79 inches: silty clay
 - Properties and qualities**
 - Slope: 0 to 1 percent
 - Depth to restrictive feature: More than 80 inches
 - Drainage class: Very poorly drained
 - Runoff class: Negligible
 - Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
 - Depth to water table: About 0 inches
 - Frequency of flooding: None
 - Frequency of ponding: Frequent
 - Calcium carbonate, maximum content: 15 percent
 - Gypsum, maximum content: 3 percent
 - Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
 - Sodium adsorption ratio, maximum: 2.0
 - Available water supply, 0 to 60 inches: High (about 9.0 inches)
 - Interpretive groups**
 - Land capability classification (irrigated): None specified
 - Land capability classification (nonirrigated): 8w
 - Hydrologic Soil Group: C/D
 - Ecological site: R053BY900ND - Not Assigned
 - Other vegetative classification: Not suited (G053BY000ND)
 - Hydric soil ratings: Yes
- Minor Components**
 - Parnell**
 - Percent of map unit: 6 percent

A pop-up window will appear with information about the Southam map unit.

What is something about Southam that explains why it has a high Organic Matter Rating? **It is found in marshes**

What are the Minor components in the Map unit?
Parnell, Water, Vallery, Marysland, Minnewaukan