

**Web Soil Survey lesson plans and instructor guide: Developing learning tools  
for undergraduate soil science classes**

by

**Nicholas Saumweber**

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Program of Study Committee:  
Dr. Richard Cruse – Major Professor  
Dr. Mark Westgate  
Dr. Laura Merrick

Iowa State University

Ames, Iowa

## TABLE OF CONTENTS

	Page
Acknowledgments.....	3
Abstract.....	4
Introduction.....	5
Background.....	6
Challenges and Need for Action.....	7
Approach.....	8
Instructor Presentation.....	10
Lesson Plan 1 – Group Assignment.....	11
Lesson Plan 2 – Individual Assignment.....	12
Tools and Methodology.....	14
Conclusion.....	15
References.....	16
Appendix A – Instructor Presentation.....	18
Appendix B – Group Lesson Plan.....	30
Appendix C – Individual Lesson Plan.....	35

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## ABSTRACT

Teaching soil science can often be a challenging endeavor. It can be difficult to teach about a resource that can't always be seen. One of the most powerful tools that can be used to help teach soil science to undergraduate students is Web Soil Survey offered by the Natural Resources Conservation Service. This proposal presents an instructor's user guide for utilizing Web Soil Survey as a teaching aide in undergraduate soil science classes. The user guide consists of three parts. The first is an instructor user guide to be given by the instructor prior to lessons one and two. Lesson 1 is a group lesson where students use the instructor guide as a reference to collaborate and understand the basics of Web Soil Survey. Finally, lesson two is an individual assignment where students take the lessons they learned from the previous two lessons and incorporate them into a real-world scenario where they must act as a realtor and try to sell a piece of land of their choice to one of three clients. The goal of this user guide is to assist undergraduate soil science instructors by providing them with a user guide on how to supplement their teaching of soil science using Web Soil Survey.

## INTRODUCTION

Teaching an undergraduate soil science course can have its rewards as well as its challenges. The subject matter can be very interesting to those who enjoy soil. However, some students may struggle with comprehending the study of a resource as immutable as soil science. Patrick Drohan of The Pennsylvania State University said “I think for any teacher, what drives one to teach is the accomplishment felt in conveying an idea that a student understands and perhaps puts into practice.” (Hartemink et al. 2014). While there are plenty of resources available for teaching soil science such as text books, laboratory experiments and lecture materials, one thing that is often missing is a real world application of the understanding of soil science principles.

Web Soil Survey (WSS) is a free, online Geographic Information System (GIS) platform that allows users to get detailed information about the soil in a particular location. Developed by the United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), it provides users with a wealth of information about the soil right under their feet. This information was previously only accessible by reviewing paper versions of an individual county’s soil survey. The software can be a very effective teaching tool, helping students learn not only about basic soils science properties but also about more advanced functions and suitability (White, 2018). This creative component develops a comprehensive set of tools for soil science instructors to introduce students to WSS. This is accomplished through the development of an instructor presentation on how to use WSS and a two-lesson plan demonstrating the real-world functionality of Web Soil Survey

(WSS) and showcasing how it can be used to make agricultural land management decisions and more. The first lesson plan provides the instructor with a format for teaching students the basic of WSS through a collaborative group learning process. The second lesson plan provides the instructor a medium for determining a student's understanding of the principles of WSS and provide the students with the opportunity to apply that understanding to a situation that they could realistically face in a future career.

## BACKGROUND

Several agricultural lesson plans on WSS have already been developed for a variety of educational levels (White, 2018). There are also several resources available that show how to utilize WSS (Soil Survey Staff, 2010). However, these resources can either be too lengthy or too short for the purposes of giving students an introduction to the functionality of WSS. This set of instructor tools is designed to incorporate and expand upon some of these WSS resources and lesson plans by providing a basic introduction to how to navigate WSS and incorporating a real world element, evaluating the suitability of a particular soil for both agricultural and commercial use. It is designed to provide community college instructors the ability to showcase how WSS works and how students can utilize it to learn more about the soil in a particular location.

Throughout this lesson, students will learn how to use the various information contained in the WSS to make management decisions. Several of the lesson plans involve reviewing the soil's suitability in a predetermined area. This is

useful as it gives the student an opportunity to learn about the various functionalities of WSS. However, it doesn't grant much creativity to students to explore the soil in an area of their choosing. Additionally, many of the existing lesson plans focus only on the suitability of the soil for agricultural usage. While important, not all soils are suitable for agriculture. Therefore, evaluating the soil for other uses can help students broaden their understanding of soil.

### CHALLENGES AND NEED FOR ACTION

Several challenges exist when teaching soil science. It can often be difficult for instructors to engage students in soil science and soil science curriculums in certain areas have shown decline (Taskey, 1994). WSS has the potential to provide students with a modern medium for using information that they learn through their classes. The lesson plans developed for this creative component project will allow students to apply this knowledge and skills to a practical, real world example that they could realistically face in their future careers.

While WSS has its uses for those unfamiliar with the principles of soils, these lesson plans are designed for students who have a basic understanding of soil science. The lesson plans are designed as a capstone lesson for an introduction to soil science class.

There is a certain type of joy that can be achieved through teaching soil science. However, it can often be a difficult subject to grasp, especially if students do not come from an agricultural background. One of the best ways to introduce students to soil science is to showcase the real world applications it can have. It is

this desire to incorporate a real-world approach to an undergraduate soil science course that has spurred the idea of using Web Soil Survey as a teaching tool.

Teaching Introduction to Soil Science at Cumberland Community College, it has been the experience of this instructor that often the class consists of students who have varying degrees of skills when it comes to electronic geographic information systems. The group lesson is designed to afford those students an opportunity to learn from their peers and strengthen their confidence for completing the individual assignment. Additionally, this comprehensive guide can be something that can be utilized by other institutions in their teaching of soil science.

### APPROACH

The goal of this comprehensive resource on WSS is twofold. First it is to provide instructors with a method of teaching students how to use WSS. Secondly, it is to provide students with an understanding of the functionality of WSS and apply that

knowledge to a real world scenario. These two goals can be accomplished through three distinct work products which are outlined in Diagram 1.1. The three work products are the instructor presentation, WSS group assignment and the WSS individual assignment. The premise of the first work product is to provide the

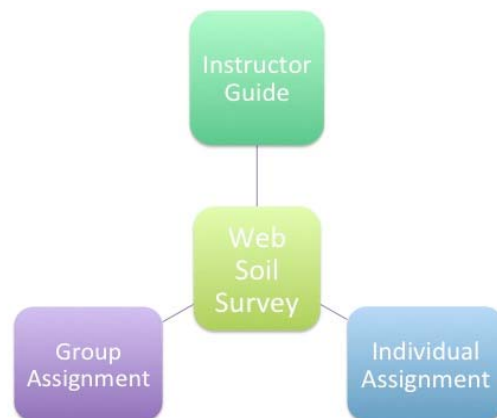


Figure 1.1 showing the relationship between the various work products.



instructor an opportunity to showcase how to utilize WSS. It will condense the lengthy NRCS presentation into a short presentation that focuses strictly on the basics of how to navigate WSS and research soil properties. One item to potentially include is a slide about Soil Web which is a mobile application that can use a person's location to determine the soils of a area (Beaudette et al, 2009).

The second work product is designed to allow the students to become more comfortable with WSS by affording them the opportunity to work in groups to derive information about soils together. This lesson plan will incorporate several different lesson plans ranging from instruction provided by NRCS in their presentation "Web Soil Instructions" (Soil Survey Staff, 2010). It will involve a brief lesson where students work together to identify a particular area and working in groups, each will research a particular piece of information about the soils in this pre-defined area. Students will then come together to present their findings and provide a basic soils map. This work product is developed using components of similar lesson plans such as those developed by for the Nebraska Soil Science Curriculum.

The third work product, another lesson plan, is based on the premise that the students are working for a real estate firm. There are three clients looking to buy land, each with distinctly different goals and objectives. Each client has a portfolio indicating what they would like to do with their soon-to-be purchased land. The students will utilize WSS to help them decide which of the clients would be most suited to a particular piece of ground of their choosing. The approach of this lesson plans is three-fold. The first component of this lesson plan is to provide students

with a basic overview of how to use WSS. It involves the selection of a pre-determined location on WSS and a comprehensive review of the soil's information contained within WSS for that specific area. This will help ensure that the students have a good grasp of where to find the various soils information contained in WSS. The second step will be the generation of a report from WSS by the student about the soils from a particular area of their choosing. This can be their house, a vacant lot across their street, or a piece of ground slated for development. The final step of the lesson plan is the writing of an executive summary explaining why the chosen ground is suitable for that particular client. This helps the student develop their professional and persuasive skills.

## INSTRUCTOR PRESENTATION

In order to show how WSS works, it would be useful for instructors to have a short presentation that can serve as a user guide. USDA-NRCS has several resources already available but these are either very brief or



Example of a screenshot that would be included in the instructor presentation (Soil Survey Staff, 2017)

incredibly expansive (Soil Survey Staff, 2010). Through the review of various lesson plans on WSS, there seems to be a lack of a formal presentation that walks students through the basic tools that WSS has. Therefore, an instructor presentation would help facilitate the basic knowledge needed to complete the further lessons.

The presentation will use diagrams, screenshots and text to show students how to define an area of interest, explore the soil information, derive a soils map and how to interpret the information contained therein. The presentation must be comprehensive enough to teach the students how to use WSS but brief enough that the instructor can convey the necessary knowledge in one class sitting. The instructor presentation can be found in appendix A.

### WEB SOIL SURVEY LESSON 1 – GROUP LESSON

There have been several lesson plans already developed designed to give students a working understanding of WSS. The Nebraska Soil Science Curriculum has a lesson plan that is geared towards team based learning which involves the completion of several tables describing the soils physical, chemical and suitability properties. A lesson plan by Mark Bowen of the University of Wisconsin Oshkosh focuses on providing students a nice overview of some of the more intricate uses of WSS (Bowen, 2018). NRCS also has a lengthy user guide in the form of a power point presentation. It will also provide the instructor an opportunity to showcase the basics of WSS before students get together in groups. However, in order to incorporate a team based learning approach, the lesson plan will be separated into several sections. This allows each group of students to focus on a particular soil physical, chemical or suitability characteristic.

A critical component of this lesson plan is the instructor presentation that an instructor can give either during or before the course of this lesson. However, because students often dislike group assignments, this lesson plan is designed to be

completed in a within-class sitting where all students have access to a computer and WSS. It will also be designed so that if a student misses that particular class, he or she can complete the lesson on their own.

All students will be given the same area from which to derive soils information. They will then each be assigned the task of researching the soil in their area and be responsible for completing a particular portion of a data table and creating a map based on the soil's particular characteristic or suitability. Examples of maps include the soils suitability for dwelling with basements, crop productivity, shrink/swell potential or soil chemical properties. Examples of soils information that will be derived include the soils erodibility factor and water holding capacity, just to name a few (Nebraska Soil Science Curriculum, 2018). Students will then come together and compile their findings into a group report they will give orally to the class. As each student has been assigned a particular aspect of the soil, they will each have to rely on the others to present their sections.

In order to provide students with a large range of soils information, site selection is very important (Hempel et al, 2008). To that end, the location that the instructor selects should contain at least 3 different soil types. They should also be at least two different soil textures. For instance, when this was done in the Cumberland Community College soils class, using the college grounds as the selected location made it difficult to showcase the full functionality of WSS as the only soils types around the college were just straight sand. Therefore, selecting a location further afield was more beneficial as it allowed the students to visualize some of the various map products that WSS can create.

Another goal of this assignment is to allow students who might not be as comfortable with computer resources to learn from their peers and potentially find the assistance they will need for the individual assignment. This assignment can be found in appendix B.

## WEB SOIL SURVEY LESSON 2 – INDIVIDUAL ASSIGNMENT

The goal of this lesson is to provide students with a real world example of where they might use the skills they learned in the previous lesson. The premise of lesson 2 is that students work for a real estate firm. Their supervisor has assigned them the task of selling a piece of ground. There are three clients, each with different management objectives. In an effort to provide students with the opportunity to make this assignment their own, the student will be given the opportunity to select their own piece of ground. The area of interest should be at least 10 acres and can be located anywhere in the country. It can be their home, a vacant lot down the street or an area of the country in which they are interested. This lesson plan contains two parts and can be found in appendix C.

The first part of the lesson plan will be that the students will be given a profile of three different clients. They will be responsible for generating three different reports from WSS specific for each customer, focusing on their unique needs and plans for the properties. The report should include basics such as a soils map but also specific maps about the suitability for the different management goals for each client. The maps should be accompanied by critical information derived from WSS about the maps they have generated.

The second component of this lesson is the development of an executive summary. Since the reports that are generated from WSS are often very expansive and it is unrealistic that a client would be willing to read the entire report, summarizing the information into an executive summary is necessary. Based on the reports the students generated in the first part of the lesson, they will select one customer for whom they think that the selected location would be most appropriate. Since the reports generated in the first part of this lesson will be summarized into an executive summary designed to convince the prospective client to purchase this piece of ground, the summary should be persuasive, highlighting the benefits of their selected piece of ground and why it is appropriate for that particular client.

#### TOOLS AND METHODOLOGIES

One of the benefits of this comprehensive lesson plan is that the only tools that are needed are a computer with access to WSS via internet access. This can be provided by most undergraduate institutions through the use of a computer lab.

At minimum students will need the following:

- Access to a computer
- A portable hard drive. This is needed so students can save their area of interest as they work on the reports
- Pencil or pen
- WSS user guide

## CONCLUSIONS

It is the goal of this project to provide instructors of basic soils science the tools they need to teach about the power of WSS in helping land managers make decisions about their property. The lessons outlined above provide the instructor with a variety of teaching tools that they can use to not only apply a real world problem to their classes but also incorporate aspects of individual and team based learning. These lesson plans can also be used by students in the future to help them identify the soils characteristics unique to their chosen location. It is the hope of this author that these tools can be used by other instructors as a way to highlight the importance of knowing basic information about what is under our very feet.

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## APPENDIX A – INSTRUCTOR GUIDE

# Web Soil Survey User and Lesson Guide

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NICHOLAS SAUMWEBER

1

## Overview and Additional Resources

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- This Instructor Guide provides a brief walkthrough of how to use Web Soil Survey.
- It is to be used in conjunction with the Web Soil Survey Group Lesson Plan.
- Additional resources to help you with understanding Web Soil Survey are included below.

Web Soil Survey Quick Start Guide:

<http://websoilsurvey.sc.egov.usda.gov/App/GettingStarted.htm>

NRCS Presentation on the Functionality of Web Soil Survey

[http://websoilsurvey.sc.egov.usda.gov/App/Help/WSS\\_HomePage\\_HowTo\\_3\\_0.pdf](http://websoilsurvey.sc.egov.usda.gov/App/Help/WSS_HomePage_HowTo_3_0.pdf)

2

## Starting WSS

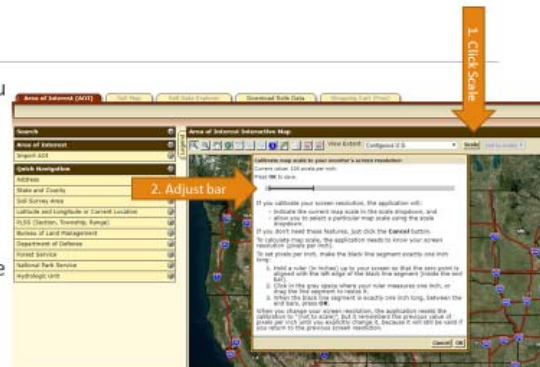


- Navigate to:  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- Click on the green "Start WSS" button

3

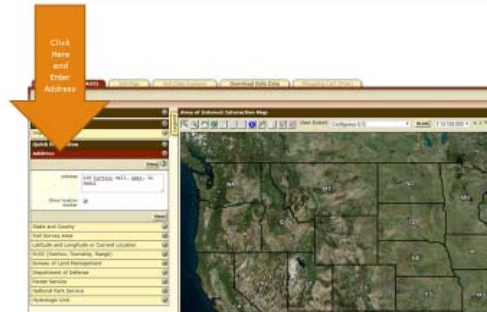
## Setting Map Scale

- Setting the scale ensures that the product you create can be used in the real world
- Without a scale, you can't accurately determine the area you are investigating
- Click on the "Scale" button
- Using a ruler, measure exactly one inch on the screen and adjust the line accordingly
- Click "OK" when finished



4

## Locating your Area of Interest (AOI)



- The Area of Interest (AOI) is the area where you want to get information about
- There are several ways to locate your geographic area but the easiest is by using the address or the lat/long
- Click on "Address" on the right Quick Navigation menu
- Locate Curtiss Hall on the ISU campus by entering the following address: 138 Curtiss Hall, Ames, IA 50011
- Click "View"

5

## Defining your AOI

- The AOI is identified by either drawing a rectangle around your area or by free hand drawing

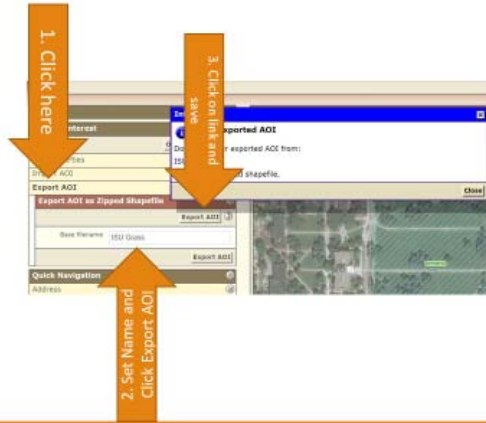


- Click on either AOI button and sketch out an area around the grassy area in front of Curtiss Hall
- You may need to use the zoom button to get close



6

## Saving and Exporting your AOI

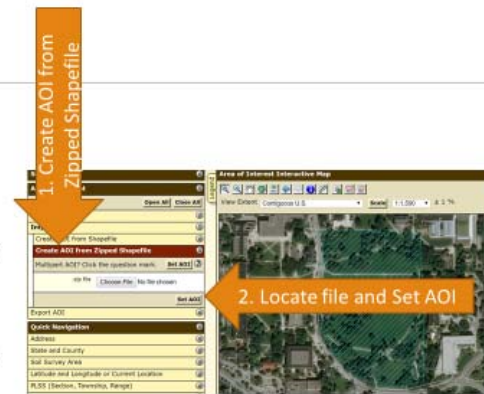


- Saving your AOI allows you to skip the last step should you need to exit and come back later
- Click “Export AOI as Zipped Shapefile” and give the base name of “ISU Grass” and click “Export AOI”
- Click on the newly created link from the pop up window and save the file on your desktop or on a portable hard drive
- Exit WSS and restart

7

## Importing your AOI

- Once you have restarted WSS, select on the “Import AOI” button on the right navigation menu
- Select Create AOI from Zipped Shapefile
- Click the “Choose File” button and locate your saved zip file
- Click “Set AOI”
- The AOI you saved should show on the screen



8

- Answer the questions in Section 1 of your Web Soil Survey Lesson 1



- This will give you lots of information about the soils in your area



## Reviewing Soil Basics

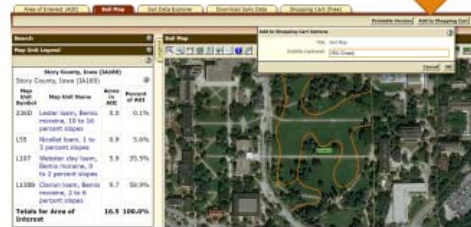


- WSS also provides detailed information about the soils in your AOI
- Click the "Soil Data Explorer" tab on the top menu
- A new menu, "Suitabilities and Limitation Ratings" now appears
- Click on the "Intro to Soils" tab on the second top menu
- There is a lot of information here but for simplicity, we will focus on just a few
  - Under "Information for Land Users", select "Homebuyers", "Developers and Builders" and "Farmers and Ranchers"
  - Select "View Selected Topics"
- Use this information to help you answer the questions in Section 2 of your Web Soil Survey Lesson 1
- You may want to read about other topics as well as it might help you decide what information you want to include in your custom report for your individual assignment

11

## Creating a Custom Report

- Throughout this lesson you will be creating several maps and reports
- You can save each manually or create a custom report
- Creating a custom report requires that you complete all your required maps in one session
  - Click on "Add to Shopping Cart", give your map the name of "ISU Grass" and click "OK"
  - Your map and report are now saved in your shopping cart
- You can also create individual maps using the "Printable Version"



12



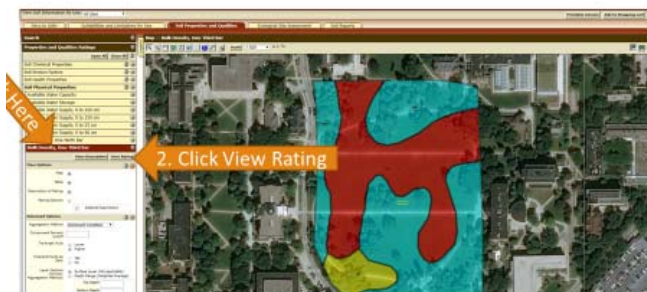
## Reviewing Soil Physical Properties – Group 1

- Now it is time to review information about the physical properties of our soils
- Select the “Soil Properties and Qualities” tab from the second top menu
- Expand the “Soil Physical Properties” tab on the left menu, select “Available Water Capacity”
- Under the “Advanced Options”, select “Surface Layer” and then click “View Rating”
- Add this map to your shopping cart using the name “ISU Grass AWC”



13

## Soil Physical Properties Continued



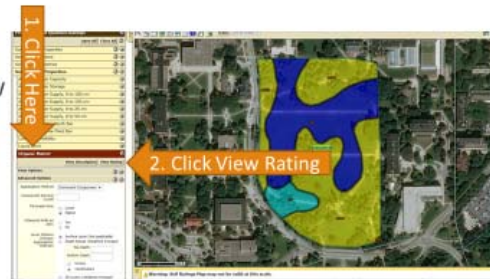
- Next, we will look at the bulk density of our soils
- On the left hand menu select “Bulk Density, One-Third Bar”
- Under “Advanced Options” again select “Surface Layer” and then “View Rating”
- A color coded map and table should appear
- Add the map to your shopping cart using the name “ISU Grass Bulk Density”

14



## Soil Physical Properties Continued

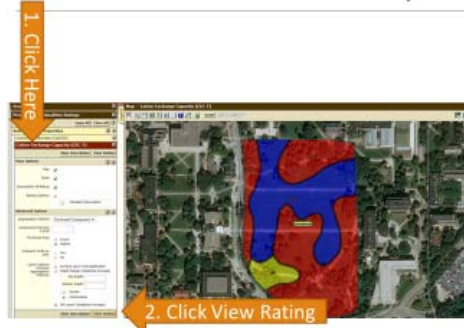
- Next we will look at the average organic matter in our soils.
- On the left hand menu, select "Organic Matter" tab
- Select "Surface Layer" and then "View Rating"
- Add your map to your shopping cart using the name "ISU Grass SOM"
- Answer the questions in Section 2 of Lesson 1



15

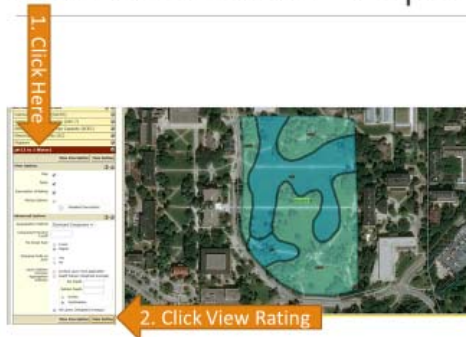
## Soil Chemical Properties – Group 2

- Under the left menu tab, select "Soil Chemical Properties"
- Select "Cation Exchange Capacity (CEC-7)"
- Under advanced options, select "All Layers" and then "View Rating"
- Save this map to your shopping cart using the name "ISU Grass CEC"



16

## Soil Chemical Properties Continued



- Next, create a map showing the average pH of the soils in the AOI
- Select “pH (1 to 1 Water)” from the left hand menu
- Select “All Layers (Weighted Average)” and then “View Rating”
- Save your map to your shopping cart using the name “ISU Grass pH”

17

## Soil Chemical Properties Continued

- Finally, let's look at the soil's hydrologic group
- Select “Soil Qualities and Features” from the left hand menu
- Select “Hydrologic Soil Group” and then “View Rating”
- Answer the questions in Section 3 of Lesson 1



18

## Soil Suitability – Group 3

- Now let's evaluate the suitability of our soils for different uses
- Select "Suitabilities and Limitations for Use" from the top menu
- Select "Building Site Development" from the left menu
- Select "Dwellings with Basements" from the submenu and click "View Rating"
- Save the map to your shopping cart using the name "ISU Grass Basement"



19

## Soil Suitability Continued

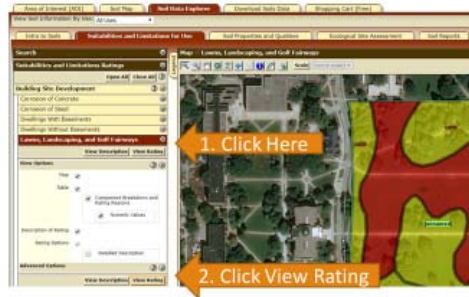
- Next, let's look at the suitability of the soil for steel
- Select "Corrosion of Steel" from the left menu and select view rating
- Add the map to your shopping cart using the naming convention "ISU Grass Steel"



20

## Soil Suitability Continued

- Select “Lawns, Landscaping, and Golf Fairways” from the left menu and click “View Rating”
- Save this map to your shopping cart using the name “ISU Grass Lawns”
- Answer the questions in Section 4 of Lesson 1



21

## Checkout Shopping Cart

- Now that you’ve created all the maps you need, it’s time to download your completed custom report
- Select “Shopping Cart (Free)” from the top menu
- Verify that all the maps/reports you added in previous steps are selected in the left menu
- Click “Check Out” in the top right corner
- You can choose to download the report immediately or download later. For the purpose of this assignment, select “Get Now”
- Wait for the PDF to load. This may take several minutes depending on the size of the report
- Answer the questions of your respective sections and be prepared to share with the rest of the class



22

## Share With the Group

- Come together and share your answers with the rest of the group
- Review the requirements for the Web Soil Assignment Lesson 2



23

## References

Screen Captured Images taken from:

Soil Survey Staff. 2017. Web soil survey. USDA-NRCS.  
<http://websoilsurvey.nrcs.usda.gov>  
 (updated 21 August 2017; accessed 6 March 2019).

24

## APPENDIX B – WEB SOIL SURVEY LESSON 1 GROUP ASSIGNMENT

**Web Soil Survey Lesson 1 – Group Assignment**

This assignment is designed to help familiarize you with the various functionalities of Web Soil Survey (WSS) as well as showcase some of the useful information that can be derived from it. While basic instructions for each section are provided below, you should also use the Instructor Presentation provided to you earlier to help you. Slide numbers from the presentation are noted next to each instruction. Following the completion of instructions for each section, answer the corresponding questions for each section.

Section 1 is to be completed individually. For subsequent sections, you will be split into teams upon the conclusion of the lesson, we will come together to discuss your findings and answers.

You can also use the NRCS User Guide Presentation as well as the NRCS Quick Start Guide if you need additional help.

Remember to save the various maps you create in each section using the “Create Custom Report” tool. Instructions for which can be found on slide 11 of the Instructor Presentation.

**Section 1 – Completed by the entire class****Instructions**

1. Open WSS by navigating to the following link and clicking the green “Start WSS” button.  
(slide 1)  
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
2. Once inside WSS, remember to set the scale for your maps. (slide 3)
3. Locate Curtis Hall at Iowa State University by selecting “Address” from the Quick Navigation side bar and entering the following address: 138 Curtiss Hall, Ames, IA 50011. (slide 4)
4. Define your AOI. (slide 5)
5. Review the Map Unit Descriptions for the soils in your AOI. (slide 9)
6. Create your Soil Map using the “Create Custom Soil Report”. (slide 11)
7. Answer the questions below.

**Section 1 Questions**

1. How many acres does your map cover?
  
  
  
  
  
  
  
  
  
2. What is dominant soil type in your AOI?

3. What is the Map Unit Symbol for the dominant soil type?
4. What is the parent material for the dominant soil type?
5. What is the depth to water table for the dominant soil type?
6. What is the typical profile for the dominant soil type? List the soil horizons, depths and textures.

Profile Designation	Depth	Texture

## Section 2 – Group 1 (Soil Physical Properties)

### Instructions

1. Select the “Soil Data Explorer” from the top tab menu.
2. Select “Soil Properties and Qualities” from the second tier top tab menu
3. Follow the instructions in slides 11 through 14 of the Instructor Presentation to create “Custom Soils Reports” for the following physical properties:  
Available Water Capacity, Bulk Density and Organic Matter

### Section 2 Questions

1. What is the definition of Available Water Capacity?
2. Which soil type has the smallest AWC?
3. Why would this soil have a smaller AWC compared to the other soils in the AOI?
4. What would the AWC of a soil with a rating of 0.31? Hint: Review the description of how AWC is calculated.
5. Which soil type has the highest bulk density rating?
6. Based solely on bulk density, which soil type would be most suited for the building of a storage shed with a concrete pad?
7. Looking at the percent soil organic matter, which soil type would be most suited for the development of a small vegetable garden?
8. What is the texture of the soil you selected as being most suitable for a vegetable garden? What might be a problem with this soil texture when it comes to establishing a garden



### Section 3 – Soil Chemical Properties (Group 2)

#### Instructions

1. Select the “Soil Data Explorer” from the top tab menu.
2. Select “Soil Properties and Qualities” from the second tier top tab menu.
3. Follow the instructions in slides 15 through 17 of the Instructor Presentation to create “Custom Soils Reports” for the following chemical properties:  
Cation Exchange Capacity, pH and Hydrologic Group.

#### Section 3 Questions

1. Which soil type has the highest CEC rating? Why do you think this is?
2. Explain how a soil with a high CEC can potentially help reduce the susceptibility to ground-water pollution from nutrients and pesticides.
3. Which soil has the lowest pH rating?
4. Explain the effect that pH has on the uptake of plant nutrients.
5. List the Hydrologic Soil Group for each of the 4 soil types:

Soil Type (Use the Map Unit Name & Full Name)	Hydrological Group

6. Which soil has the highest potential for runoff based on its hydrologic group?

#### Section 4 – Soil Suitability (Group 3)

##### Instructions

1. Select the “Soil Data Explorer” from the top tab menu.
2. Select “Suitabilities and Limitations for Use” from the second tier top tab menu
3. Follow the instructions in slides 18 through 20 of the Instructor Presentation to create “Custom Soils Reports” for the following suitabilities and limitations: Dwellings with Basements, Corrosion of Steel and Lawns, Landscaping, and Golf Fairways.

##### Section 4 Questions

1. Which soil map unit(s) has the lowest suitability rating for Dwellings with Basements?
2. What are the reasons for these soils low suitability rating for Dwellings with Basements?
3. Based on your review of the suitability ratings, which soil map unit would be most suited for a Dwelling with Basement? List the reasons for your answer.
4. List 3 questions that homebuyers should ask themselves before deciding where to build a house.
5. List 2 hazards that can be avoided by Developers and Builders by reviewing basic soils information.
6. Which soil map unit(s) have the highest rating for Corrosion of Steel?
7. Is there anything that you as a building planner would do to steel that might be placed in the soils of this area?
8. Which of the soil map units are the least suited for the construction of Lawns, Landscaping and Fairways?
9. What are the reasons for this soils low suitability rating for the construction of Lawns, Landscaping and Fairways?

## APPENDIX C – WEB SOIL SURVEY LESSON 2 INDIVIDUAL ASSIGNMENT

**Web Soil Survey Lesson 2 - Individual Assignment****Overview:**

Web Soil Survey is a powerful tool developed by the Natural Resources Conservation Service (NRCS). It allows landowners, developers and managers the ability to research information about the soils of a particular location. It combines Geographic Information Systems (GIS) and soils data to help users make informed decisions about land management.

**Assignment Objectives:**

This lesson is designed to equip you with the knowledge and skills needed to access and interpret critical soil information. This lesson will involve you identifying an area of ground, producing custom maps and developing material to help different landowners make management decisions about the ground based on the data you have gathered.

Specific learning objectives include:

- Familiarize you with basic soil survey data
- Introduce you to GIS tools available for soils data
- Familiarize you with land capability classes
- Give you the ability to make informed decisions about land management based off data
- Summarize data and present it to prospective clients

**Assignment Outline:**

You are an agent at a local realtor where you have worked for several years. Recognizing how good you are at your job, your boss has given you one of the company's biggest and most valuable pieces of land to try and sell. There are several potential buyers, all who want to do distinctly different things with the land. Your job is to help these potential buyers make informed decisions about whether or not the land is suitable for their particular needs. You have three different clients that you are considering approaching about this fantastic opportunity. Be sure to read their respective biographies closely and pay attention to what their needs are. This will help you determine what information you need to gather from Web Soil Survey to convince them to purchase this piece of land. Pay particular attention to highlighted sections of each of the client's descriptions. They will give you critical clues as to what information you need to gather.

**Client 1: Clarence and Brenda Biggum**

Clarence and Brenda are in their retirement age after each working for 35 years in high powered architectural firms. They have a desire to build their dream house. They would like a house with a large footprint and a basement where Brenda can host her annual Oscar parties. They would also like to have an in ground pool where

Clarence can keep himself active by practicing his backstroke. Being city folks their entire lives, Brenda is interested in taking up gardening as a hobby and would like to set up a small garden where she can putter around. Clarence is an avid golfer and would like to set up a mini golf course on his property.

#### **Client 2: Jim Klienfeld of CLORPT Farms Inc.**

Jim Klienfeld is the owner and sole proprietor of CLORPT Farms Inc. His company owns land across the country and is looking for a piece of ground that is suitable for growing his tomato cash crops. Because his produce is sold to consumers, he needs farmland that is free from contaminants and has good drainage. His operation involves intensive tillage so the erosion potential of the soil is important to him. He is also concerned about how much water the soil can hold and how much organic matter it contains.

#### **Client 3: BIG BOX USA**

Watch out, a big box store is moving in! BIG BOX USA would like to put a one stop shop where consumers can buy everything from groceries to building supplies. They will need ground that is easy to work with a high Bulk Density. The soil should also be suitable for roads. Seeing as they will have a lot of drainage from all of the asphalt they will be putting in, the soil should also be suitable for a retention pond and should have a relatively deep depth to water table. The large building will be constructed out of steel and concrete. The building will be heavy so the soil should not have a high shrink-swell potential.

#### Step 1: Review the Basics

Review the basic principles of how WSS works. Your instructor will provide you with copies of the instructions or they can be accessed here:

<http://websoilsurvey.sc.egov.usda.gov/App/GettingStarted.htm>

If you struggle with computers a little, you may also want to check out the “How to use Web Soil Survey” presentation available here:

[http://websoilsurvey.sc.egov.usda.gov/App/Help/WSS\\_HomePage\\_HowTo\\_3\\_0.pdf](http://websoilsurvey.sc.egov.usda.gov/App/Help/WSS_HomePage_HowTo_3_0.pdf)

#### Step 2: Select your Piece of Land

Select a piece of land from which you would like to gather data. You can select any location you want but the area selected should be at least 10 acres in size. This can be an open field near your house, a vacant lot by your work or your own piece of land (probably your neighbors too). The exact size of your piece doesn’t matter, so long as it is at least 10 acres in size.

#### Step 3: Define the AOI

Define your Area of Interest (AOI). Refer to the instructions on how to define your AOI. You can use the square feature or draw your own. Once you have your AOI identified, click on the Soils Map Tab. Then click the “Add to Shopping Cart” tab in the right hand corner. Label your map with the client you are researching first i.e. “Biggum”, “CLORPT Farms” or “BIG BOX USA”. You will be reviewing this AOI several times so it is going to be worthwhile to save it so that you don’t have to draw

it over and over again. Select “Export AOI” from the drop down menu on the right. Label it with a unique identifier such as “WSS Assignment” and then click the “Export AOI” button. Save this somewhere for future access. When you are ready to access it again, you can use the “Import AOI” function and select your “WSS\_Assignment.zip” file and it will automatically draw your area back for you. DON’T FORGET TO DO THIS! It will save you a lot of time and headache later on.

#### Step 4: Review the Intro to Soils Tab

Click on the “Soil Data Explorer” Tab. You will now see additional tabs below the main ones. Look through the various tabs starting with “Intro to Soils”. Remember, your clients are not experts in soils like you are so there may be some basic information there that you will want to include in your report. However, you don’t want to bombard them with too much information so just select the relevant information by selecting or unselecting the appropriate tabs. After reading through the tabs, check the various sections that you think are important for your clients to know and click “Add to Shopping Cart” in the top right section.

#### Step 5: Delve Deeper

Research your AOI further by clicking on the “Suitabilities and Limitations for Use” and “Soil Properties and Qualities” tabs. Expand the various categories. When you find one about which you think your client would like to know, click the “View Rating” button. A map and description will now appear on your screen. Review the map and description below and think about what the data is telling you. Pay particular attention to tabs that talk about some of the focus areas that your clients have. If you come across a particular set of data that you find interesting or relevant, you may want to add it to your shopping cart. There is a lot of data available on WSS. Don’t be overwhelmed by it, focus on individual pieces of information and make notes about how you would explain it to a prospective client. To add a relevant rating or map to your report, click the “Add to Shopping Cart” button at the top right. Remember, you may need to add several pieces of data so it might be a good idea to give a title to each report, a title that helps you identify what each of the data sets is telling you. Also remember that the different clients have different goals. BIG BOX STORE USA is going to want distinctly different information compared to the Biggums. It is your job to make sure that your custom reports reflect take these into account.

#### Step 6: Create your Custom Report

Once you have added all of the reports you want to your shopping cart, click on the “Shopping Cart (Free)” tab on the master tab list. If you scroll down, you will see all of the data that you have added to your shopping cart. If something was added by accident and you don’t want it there, simply uncheck it. When you think you have all the data you need, click the “Checkout” button in the upper right hand of your screen. Keep the “Get Now” button selected. Viola! You now have a custom report. Save this report using the following naming mechanism “YourLastName\_ClientName”. If you are ready to move onto the next client, do not

exit. If you need a break, remember to make sure you have exported your AOI as outlined in Step 3.

#### Step 7: Repeat for the Other Clients

Repeat steps 4 through 6 for each of the respective clients. Remember that they all have different ideas and visions for what they want their planned development to look like so make sure you are looking at all the different information. Create your custom reports for each client, name them appropriately and save them.

#### Step 8: Decision Letter - Which Customer is the Land Most Suited For?

Now that you have created 3 awesome custom soil reports, you need to present this data to them. You don't have time to offer it to all 3 clients so based on your analysis of the reports, chose one of the clients to which you want to try and make a pitch. Write a 1-2 page letter using a word processor to that client outlining why you think the piece of land you have researched is a good fit for them. Remember that the report contains a lot of information, it is your job to summarize it and the letter is your opportunity to do just that. Be sure to highlight the aspects of the land that suit your chosen clients goals and objectives. Remember, you are a professional, so be sure to use appropriate language. Save your letter using the following naming convention "YourLastName\_ClientName\_Letter"

#### What you need to have this assignment completed:

1. 3 Custom Soils Reports from WSS for each of the 3 clients listed above. Each report should clearly identify to which client it is referring.
2. A letter to 1 of the 3 clients that, based on your research of their reports, you think would be most interested in purchasing your piece of land.

Seeing as this is potentially a lot of paper to print, I encourage you to e-mail me the custom report and decision letter to [nsaumweber@cccnj.edu](mailto:nsaumweber@cccnj.edu). Be certain that your reports and letter are properly labeled using the naming conventions described above.

The grading rubric used for this assignment is included in the subsequent page. You may collaborate with other students on this assignment but each student must submit their own individual documents.

**DO NOT PANIC! YOU CAN ABSOLUTELY DO THIS!**

It is understood that you may not necessarily know what every piece of information contained in your custom reports means. This assignment is a lesson in summarization and report gathering. If you are having a difficult time with a particular concept, consult your text book, the internet or your fellow students.