



Assessing Sites for Christmas Tree Production Using Web Soil Survey

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Successfully growing Christmas trees presents an array of challenges for growers. However, many issues that growers encounter over the course of a Christmas tree rotation can be averted by a comprehensive site assessment. A thorough understanding of your sites, especially their soil characteristics, serves as the foundation for key decisions such as what species to grow or whether to purchase a given piece of property for growing trees. Some key aspects of site conditions such as slope and aspect are readily apparent on a site visit (Photo 1), but many soil properties require further investigation. Fortunately, the Web Soil Survey (WSS) developed by the USDA Natural Resource Conservation Service (NRCS) is a free, powerful, and easy-to-use tool that provides a wealth of soils and site-related information with a few clicks of your mouse.

The Web Soil Survey can be accessed at www.websoilsurvey.nrcs.usda.gov (search Web Soil Survey in Google or another search site). The site enables users to identify plots of land by street address or by zooming in on an interactive map similar to navigating in Google Maps or similar GPS programs. WSS provides an interactive tool that links users to soils and other site data that was previously available through hardcopies of county soil surveys that were published by the USDA Soil Conservation Service, which was the fore-runner of today's NRCS.

Getting started with Web Soil Survey:

As with most web-based programs, the easiest and best way to learn how to use Web Soil Survey is to open the program and explore its features through some trial and error. Before jumping into WSS, however, below are a few basics to get you started with the Web Soil Survey tool. For our example, we'll look at soil properties for a section of the MSU Forestry Tree Research Center near East Lansing.

Once you land on the WSS homepage, the first step is to click on the green circle button "Start WSS" in upper right. This will launch the program and take you to the next web page. From this page you can identify a location of interest to you. The easiest way to find a location is by entering the address under the "Quick Navigation" tab. Alternatively, you can zero in on specific areas on the WSS map using the zoom feature.

Once you have found your desired field, you will need to create an area of interest (AOI). An AOI can be created

Photo 1 – A thorough site assessment is essential for a successful tree rotation.

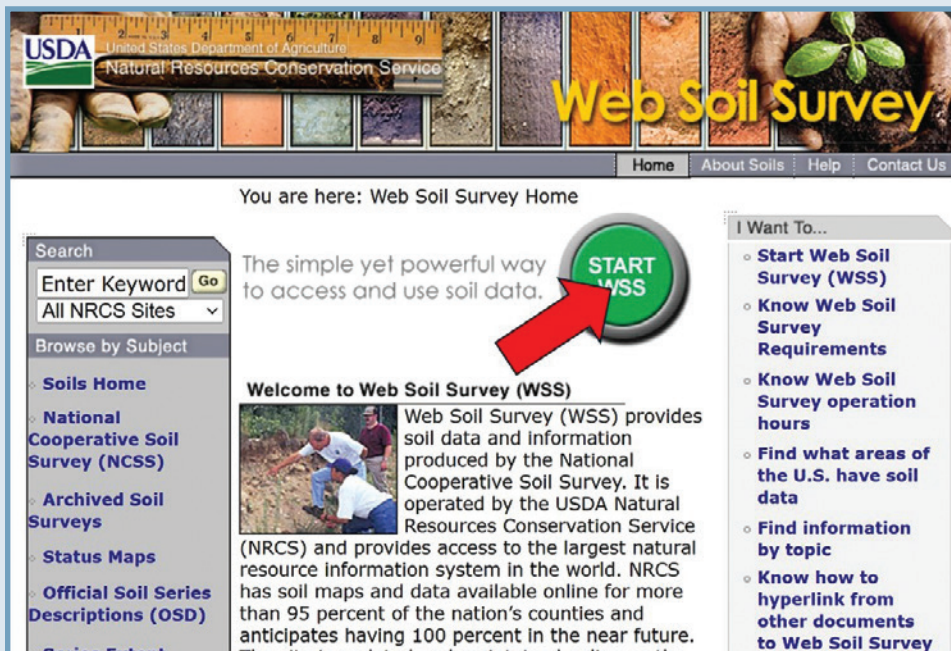


Image 2 – Launch the Web Soil Survey Program by clicking on the START WSS button.

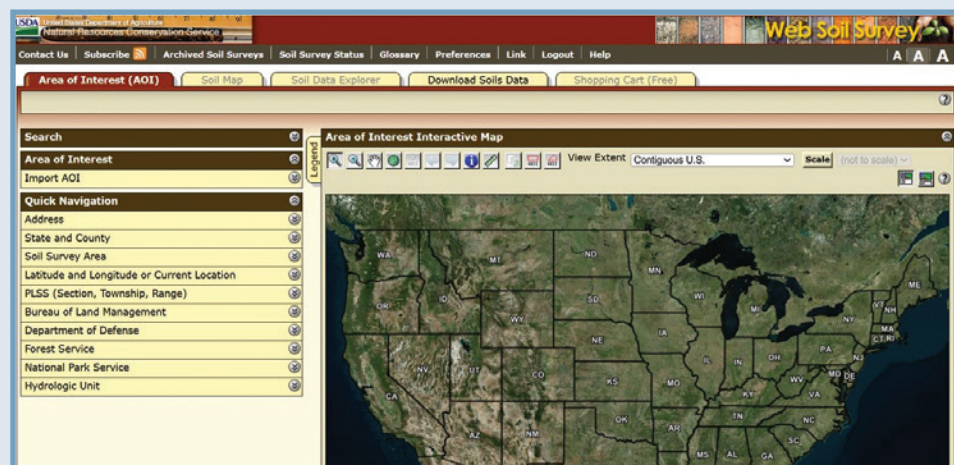


Image 3 – The opening window of the Web Soil Survey.

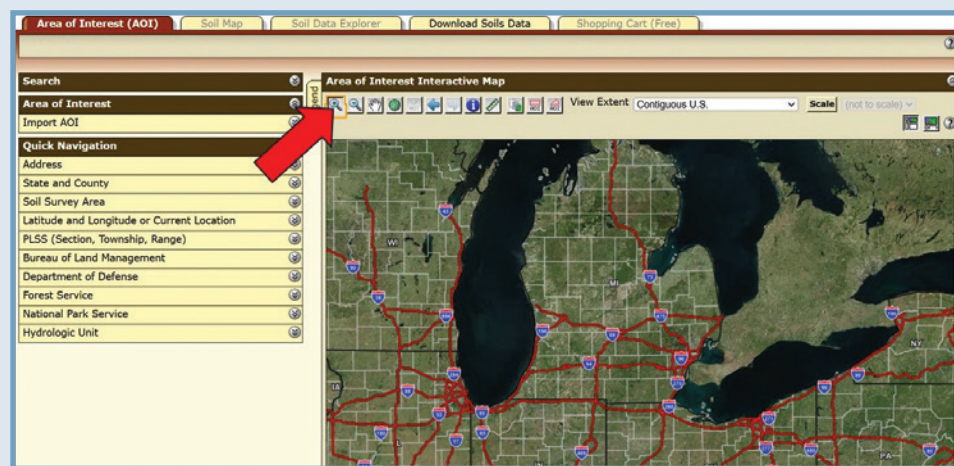


Image 4 – Using the Zoom feature of WSS to find a specific property.

by selecting either the “define AOI” rectangle or polygon shapes, which are near the top of the interactive map. To finish the AOI using a polygon shape tool, double click when the area is delineated.

Once you have delineated your AOI, click on the “soil map” tab. Web Soil Survey will display a map indicating the soil types within the area of interest (screenshot). Each soil type within the AOI will be indicated by an

abbreviation. To the left of the map, the program will display a legend that provides the name of the soil series associated with each abbreviation and the area in each soil type in acres and as a percentage of the total area in the AOI.

Clicking on the soils series description in the legend opens a menu that provides important site and soils information that can be extremely useful in key decisions for Christmas tree operations.

Map Unit Setting – this is general information about the site including climatic data such as mean precipitation and temperature. In many cases, a grower will already know much of this information, but it can be useful if considering lease or purchase of a distant tract.

Setting – describes the general landform such as moraine or outwash and parent material of the soil.

Typical profile – this provides the soil texture class of the various soil horizons. This is a powerful feature of WSS as it allows growers to know if the soil on a site is loamy, sandy, or heavy clay without ever setting foot on the site and taking a soil sample.

Properties and qualities – This section provides further critical information for making decisions for a Christmas tree operation. Growers should pay particular attention to Drainage class. In WSS Drainage class is listed using descriptive terms such as excessively drained, well drained, moderately well drained, poorly drained, or very poorly drained. Other key properties that growers should note are Frequency of flooding and Frequency of ponding. Frequency of flooding refers to large-scale inundation due to events such as overflowing streams. Frequency of ponding refers to smaller-scale inundation due to poor drainage following precipitation or snow melt. Sites that are identified as having periodic ponding/flooding or are described as poorly drained are ‘red flags’ for growers considering growing

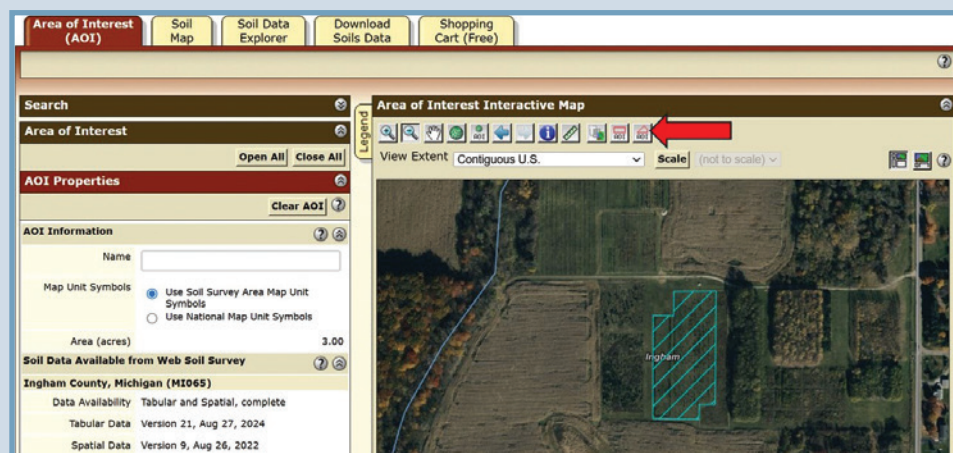


Image 5 – Delineating an irregular-shaped Area of Interest (AOI) with the AOI polygon feature.

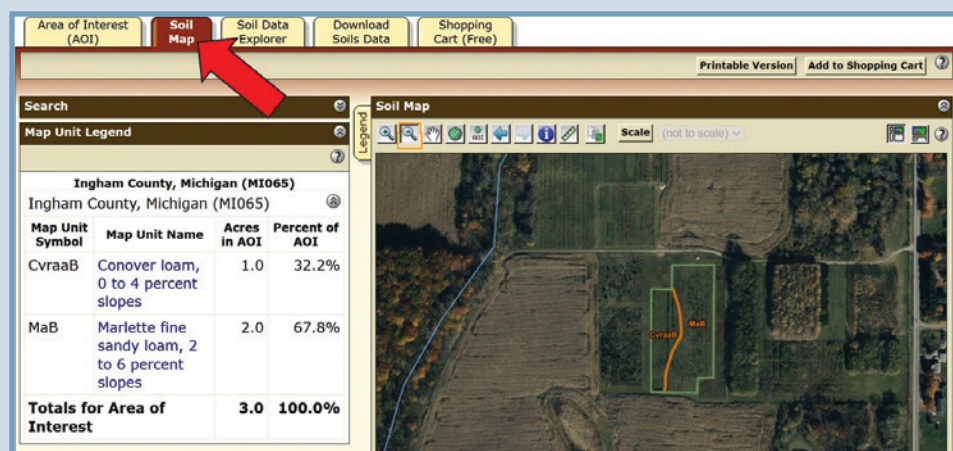


Image 6 – Using the Soil Map feature to identify the soil types within an Area of Interest.

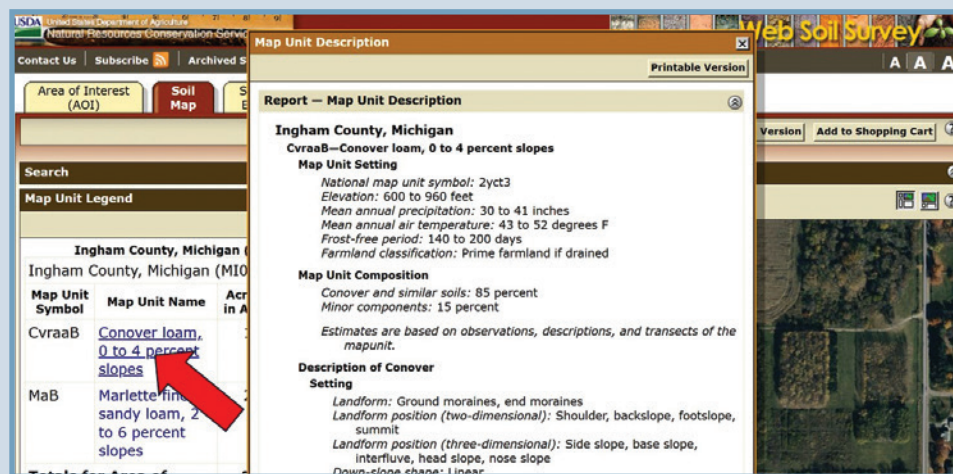


Image 7 – Clicking on the soil type (Map Unit Name) opens a window provides details on the soil and site characteristics for that soil type.

species that are intolerant of 'wet feet,' especially Fraser fir. Such sites will be highly conducive to phytophthora root rot, which can devastate Fraser fir plantings.

It is important to note that drainage class and frequency of ponding are often related to subsurface soil features and may not be related to surface soil texture. Producers sometimes erroneously conclude that their site is well-drained because they observe sandy soil at the surface. However, it is possible to have a site with a light textured surface horizon on a poorly drained site. This is an example of the utility of WSS as it provides growers with comprehensive information on site drainage that might not be apparent on a site visit during a dry period in August.

Growers can get additional information on the soil properties on their site by using the Soil Data Explorer tab within Web Soil Survey. While a complete discussion of the information available on the WSS system is beyond the scope of this article, key properties that are of interest to Christmas tree growers can be found under 'Soil Properties and Qualities' and 'Soil Reports.' Under these tabs growers can access information on soil physical properties and soil chemical properties. One important soil physical property which is estimated by WSS is Available Water Capacity (AWC), which indicates the amount of water in the soil profile that is available to plants, expressed as a decimal fraction. For example, if we assume a rooting depth of 10" for young trees and the AWC is 0.10 in/in, that means the soil can hold 1" of water (10" depth \times 0.10 = 1"). This information can be useful in assessing the potential need for irrigation or developing an irrigation schedule. AWC above 0.2 in/in indicates a high


water holding capacity, meaning growers can irrigate less frequently but at higher rates. In contrast, an AWC value below 0.1 indicates a low water holding capacity, indicating growers may need to irrigate more often and at lower rates.

Within the soil chemical properties parameters, WSS provides estimates of Cation Exchange Capacity (CEC) and soil pH, both of which are important for managing soil fertility. CEC is largely determined by soil texture – CEC increases with clay fraction – and soil organic matter, which also increases CEC. Soils with relatively high CEC values (i.e., CEC > 20) are able to retain key soil nutrients such as potassium, iron, and magnesium but are more resistant to changes in soil pH. Soil pH (or soil reaction) is a measure of the relative acidity of soil and is critical in determining the availability of key nutrients such as iron and manganese. It is important to note that soil pH is dynamic and changes with past cropping and management, such as fertilization or liming. Therefore, growers should use the soil pH information derived from WSS as a general guideline but should not substitute this information for onsite sampling.

For users that have some training or knowledge of ecology, the information found under the 'Ecological Sites,' can provide some useful insights. For instance, in our example for the Tree Research Center, part of the area is classified as 'Moist Loamy Depression.' In native forests, these areas would be dominated by bottomland species such as silver maple and green ash, which suggests they would be poor sites for Fraser fir. In contrast, other areas are classified as 'Dry Loamy Drift Plains'

which would typically support upland tree species such as white oak and bur oak and may be better suited for trees that require good soil drainage.

Summary

The Web Soil Survey tool produced by the USDA NRCS provides Christmas tree growers with a free, powerful, easy to use on-line program for gaining critical information on soil on their sites. This knowledge can be invaluable in leasing or purchasing decisions and in selecting which species to plant in a given site. In particular, the resource provides assessment of site drainage classes and frequency of ponding or flooding, which are critical limiting factors for some species. The tool can also provide baseline information on key physical and chemical properties that are essential for irrigation decisions and nutrition management. 

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	Age	Per 100	Per 1000
Norway Spruce			
8-12"	2-0	62.00	320.00
12-18"	2-1	162.00	1040.00
16-24"	2-1	180.00	1265.00
Colorado Blue Spruce			
8-12"	2-0	62.00	310.00
10-16"	2-1	162.00	1040.00
Fraser Fir			
7-12"	P+1	170.00	1175.00
Douglas Fir			
12-18"	2-0	67.00	340.00
8-14"	1-1	160.00	975.00

Also Available

White Spruce, Serbian Spruce, Black Hills Spruce,
White Pine, Scotch Pine

Bare-root Perennials & Deciduous also available

Please Call or Write for a Complete List

Detailed instructions for how to use WSS can be found at
<https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/getting-started-with-web-soil-survey>