

Ecological Sites and their Relationship to Soil Mapping

Steve Campbell
Soil Scientist
USDA – Natural Resources Conservation Service
West National Technology Support Center
Portland, Oregon



From the National Range and Pasture Handbook:

- Ecological sites have characteristic soils that have developed over time throughout the soil development process
- Soils with like properties that produce and support a characteristic native plant community are grouped into the same ecological site.

From the National Soil Survey Handbook:

- Soil-ecological site correlation establishes the relationship between soil map unit components and ecological sites.
- Ecological sites are correlated on the basis of soils and the resulting differences in species composition, proportion of species, and total production of the historic climax plant community.

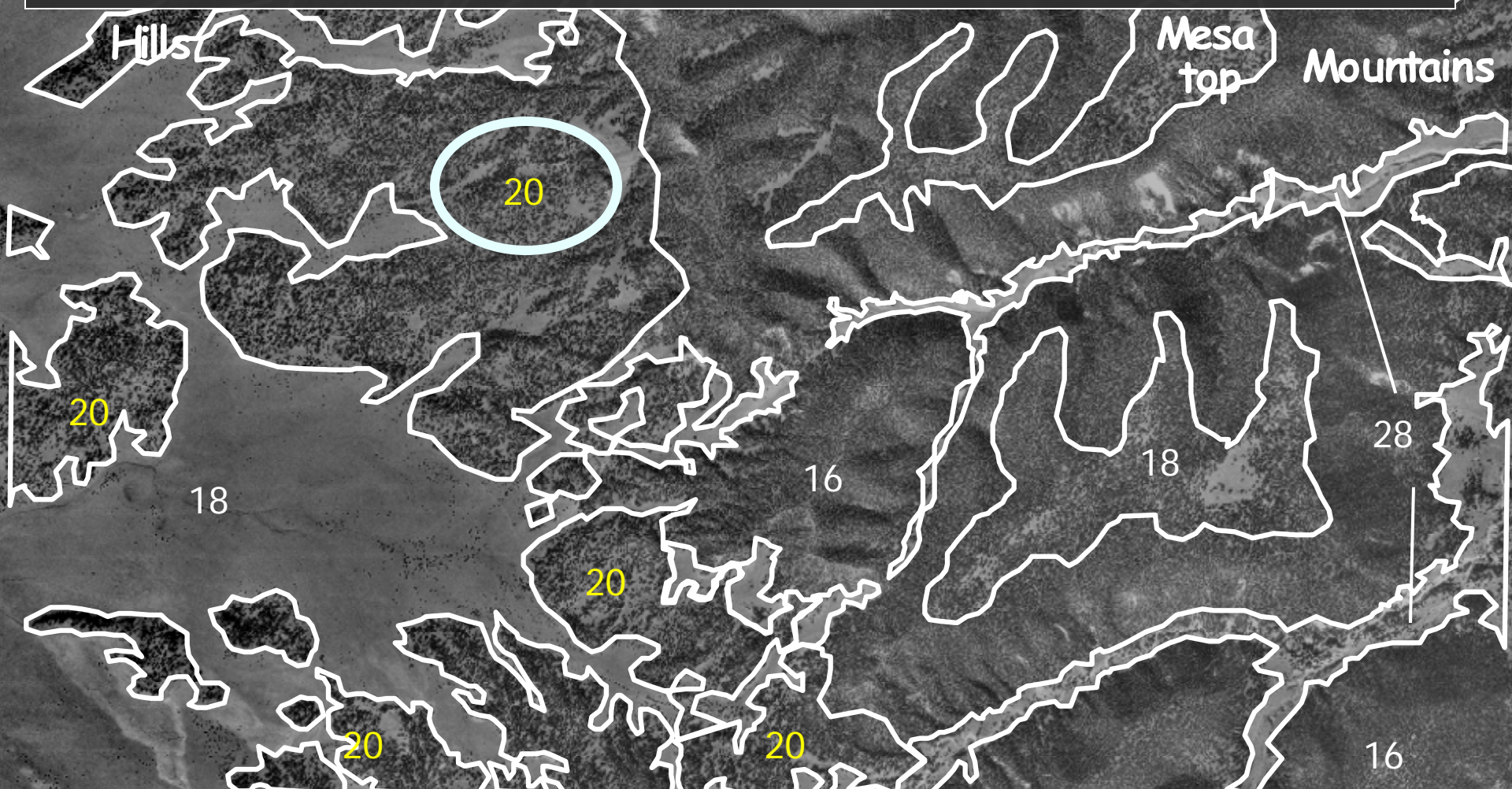
Site potential: (relatively) static soil properties

- ◆ (Relatively) static properties:
 - are used to define soil series (and therefore ecological sites)
 - change little in response to differences in management and vegetation
- ◆ Dynamic properties:
 - are used to define the relative condition of the soil
 - change in response to differences in management
 - are related to changes in erodibility, infiltration, nutrient availability, etc...

(Relatively) static soil properties are used in soil taxonomy and to identify ecological sites

- Soil depth
- Soil texture by depth
- Stoniness
- Type of clay (cracking vs. non-cracking)

Soil maps are used to identify groups of ecological sites associated with **soil map units** (e.g. "20" includes several soils and several different ecological sites).



Soil maps - an intro

- **Soil map unit:** includes one or more dominant *soil map unit components* + inclusions (minor map unit components)
- **Soil map unit *component*:** soil series + slope and surface texture modifier
 - *Soil series* is similar to a plant genus
 - *Soil map unit component* is similar to a species
 - Soil map unit components repeat across the landscape, and can be part of more than one map unit

Soil map units

- Soils are grouped into soil mapping units because we often cannot map soils at the scale at which they occur

Soil map unit on a mound – intermound landform



A soil map unit (what's on the map) can be:

- An *ASSOCIATION* of two or more soils that occur in a repetitive and *predictable* pattern (e.g. low ridges & swales)
- A *COMPLEX* of two or more soils that usually do not occur in a *predictable* pattern at a mappable scale (e.g. coarse and fine soils in a river floodplain)
- A single soil series (but even these map units usually have "inclusions" too small to be mapped). Sometimes call a *CONSOCIATION*

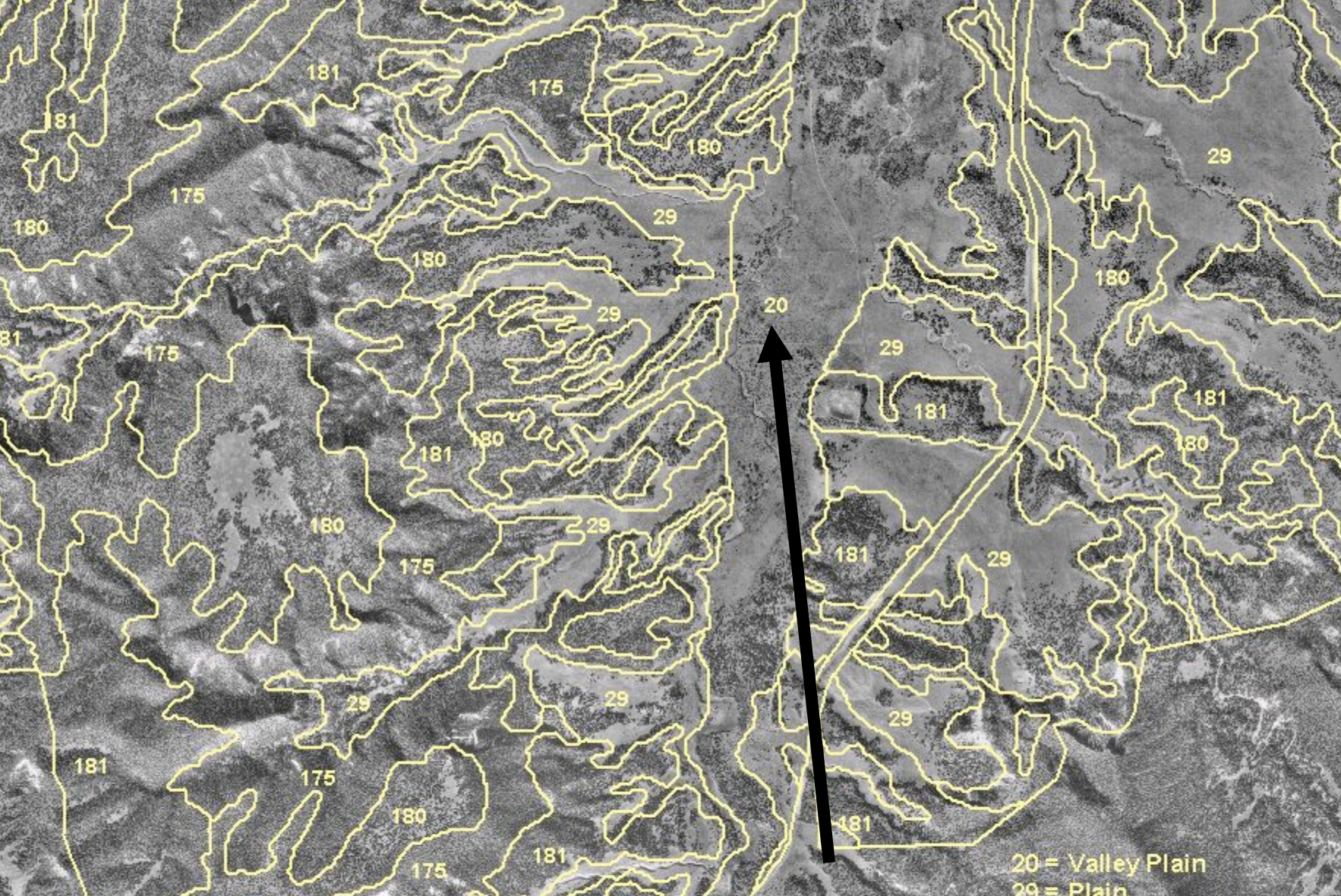
Using soils to identify ecological sites

- (1) A *soil map unit* can include more than one ecological site. Soil map units often include many different soils, with different potentials to support plant communities
- (2) An *ecological site* can include more than one soil series, provided that the soils are similar
- (3) Even a *soil series* can include more than one ecological site. Soil surface texture often varies within a soil series. Soil surface texture is very important in distinguishing ecological sites.

Using soils to identify ecological sites

- (4) One to many relationship - *Soil map unit component* can be associated with only one ecological site.
- (5) Many to one relationship - Ecological Site can have more than one *soil map unit component*.

Remember - map units can have contrasting components and do have inclusions (up to 15%).



Example: the Picante-Pecan soil map unit (#20)



(1) The Picante-Pecan soil map unit includes 3 ecological sites:

Soil Series	Soil map unit component	Ecological Site		
		Sandy	Loamy	Hills
Picante	Picante loamy sand, 5-15% slopes	X		
	Picante sandy loam, >15% slopes			X
Pecan	Pecan loam, 0-5% slopes		X	

(2) The loamy site includes many loamy soil series

		Ecological Site		
Soil Series	Soil map unit component	Sandy	Loamy	Hills
Picante	Picante loamy sand, 5-15% slopes	X		
	Picante sandy loam, 5-15% slopes		X	
	Picante sandy loam, >15% slopes			X
Pecan	Pecan loam, 0-5% slopes		X	
	Pecan sandy loam, 0-5% slopes		X	

(3) But the Picante soil series is associated with 3 different sites

Soil Series	Soil map unit component	Ecological Site		
		Sandy	Loamy	Hills
Picante	Picante loamy sand, 5-15% slopes	X		
	Picante sandy loam, 5-15% slopes		X	
	Picante sandy loam, >15% slopes			X
Pecan	Pecan loam, 0-5% slopes		X	
	Pecan sandy loam, 0-5% slopes		X	

Creating ecological site maps

- Ecological site maps can be developed from soil maps
- Like soil maps, ecological site map units include associations and complexes of multiple ecological sites

Remember - map units can have contrasting components and do have inclusions (up to 15%) - DIG A HOLE!

A photograph of a large, dark green tree engulfed in bright orange and yellow flames. The fire is intense and appears to be spreading upwards. The background is a clear, bright blue sky. In the foreground, there is a field of low-lying, greyish-green shrubs. The overall scene suggests a wildfire or a controlled burn in a natural setting.

Questions?

Ecological Site Description Information Sources

- Web Soil Survey
- Ecological Site Information System (ESIS)

Click on the "Start WSS" button to get started.

websoilsurvey.nrcs.usda.gov



Home About Soils Help Contact Us

You are here: WSS Home

Search

Browse by Subject

- ▶ [Soils Home](#)
- ▶ [National Cooperative Soil Survey \(NCSS\)](#)
- ▶ [Archived Soil Surveys](#)
- ▶ [Status Maps](#)
- ▶ [Official Soil Series Descriptions \(OSD\)](#)
- ▶ [Soil Series Extent Mapping Tool](#)
- ▶ [Soil Data Mart](#)

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)



Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

I Want To...

- [Start Web Soil Survey \(WSS\)](#)
- [Know the requirements for running Web Soil Survey](#)
- [Know whether my web browser works with Web Soil Survey](#)
- [Know the Web Soil Survey hours of operation](#)
- [Find what areas of the U.S. have soil data](#)

Announcements/Events

- [Web Soil Survey 2.0 has been released! View description of new](#)

The first step is to create your "Area of Interest (AOI)". Current selection criteria include Address; County; Soil Survey Area; Lat/Long; Section, Township and Range; Federal Land category, and Hydrologic Unit.

Area of Interest (AOI)

Quick Navigation

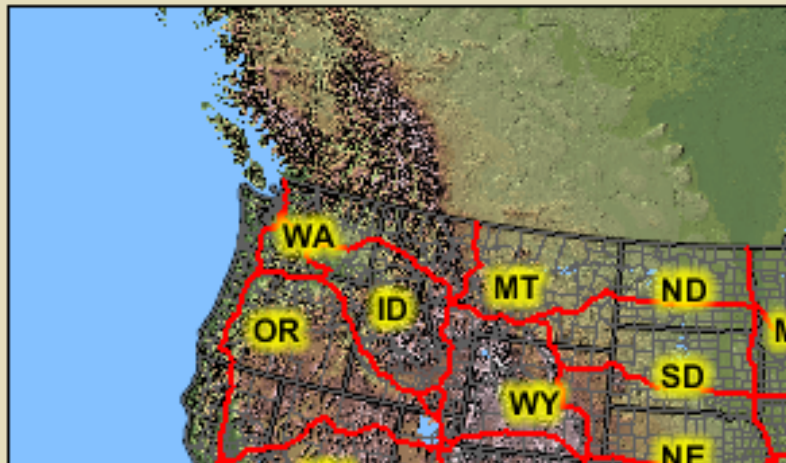
Navigate By...

- Address
- State and County
- Soil Survey Area
- Latitude and Longitude
- PLSS (Section, Township, Range)
- Bureau of Land Management
- Department of Defense
- Forest Service
- National Park Service
- Hydrologic Unit

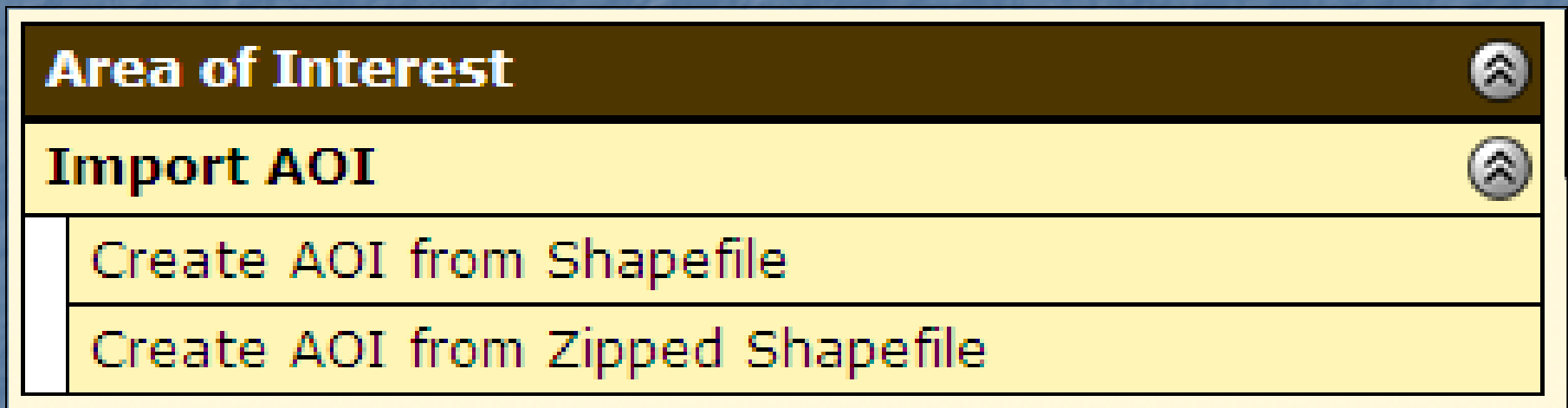
Area of Interest Interactive Map



View Extent



A new option – you can import a shapefile or zipped shapefile to create an Area of Interest (AOI)



PLSS (Section, Township, Range)

View



State Oregon

Principal Meridian Willamette

View Meridian Map

Section 3

Township 19

North

South

Range 35

East

West

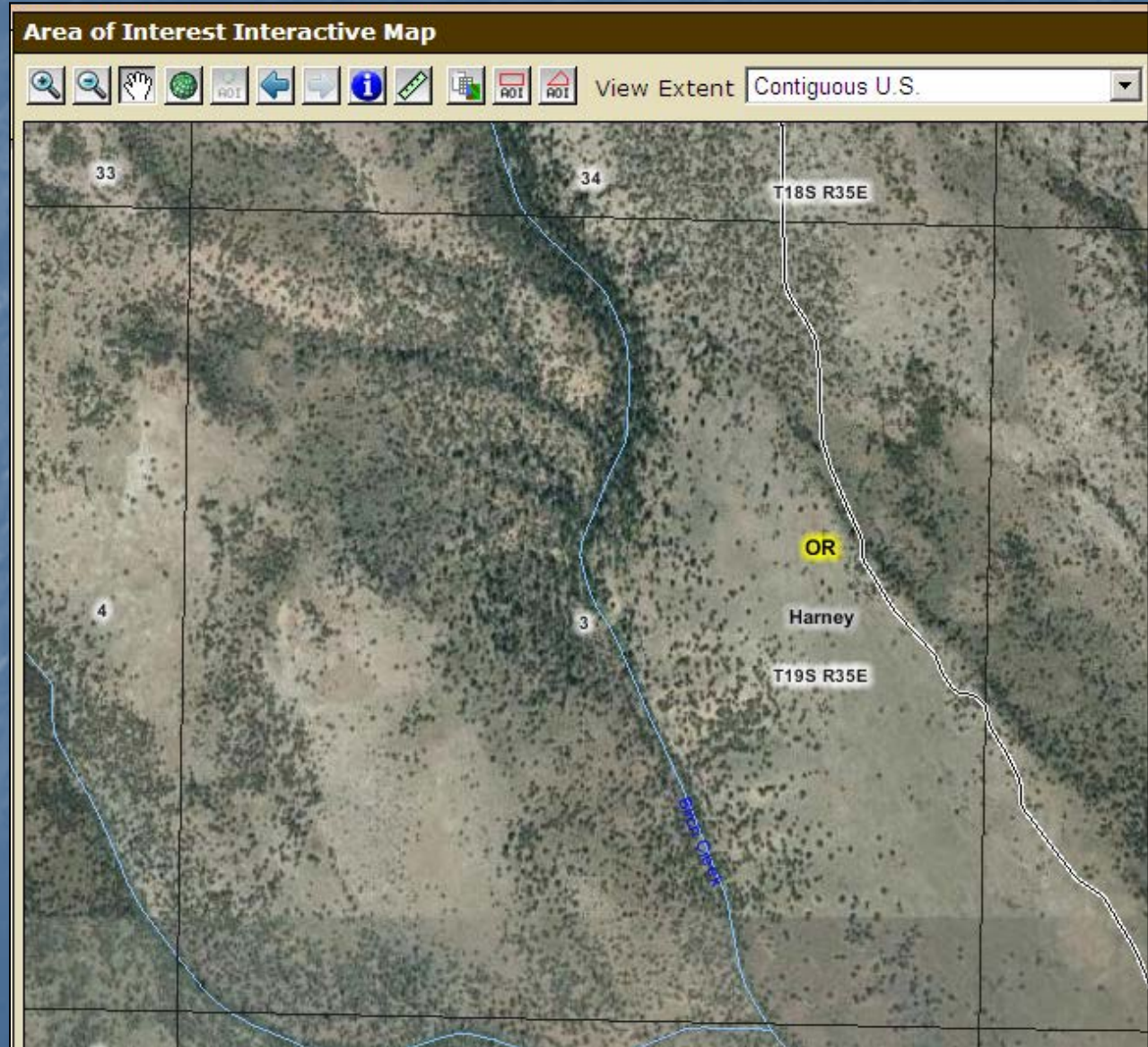
Show **PLSS Section** and **PLSS Township and Range** Layers in Map

View

In this example "PLSS" is the navigation choice. Select the State. Enter Section, Township, Range.

Click on the "View" button to zoom to this section.

We're now zoomed in to Section 3, Township 19 S, Range 35 E. The State and County names are also displayed.



When you zoom in, the orthophoto, roads, and water features appear. Layers can be turned on and off by clicking on the "Legend" tab.

The screenshot displays a GIS application interface. On the left is a 'Map Legend' window with a list of layers. On the right is the 'Area of Interest Interactive Map' window showing an aerial orthophoto with overlaid features.

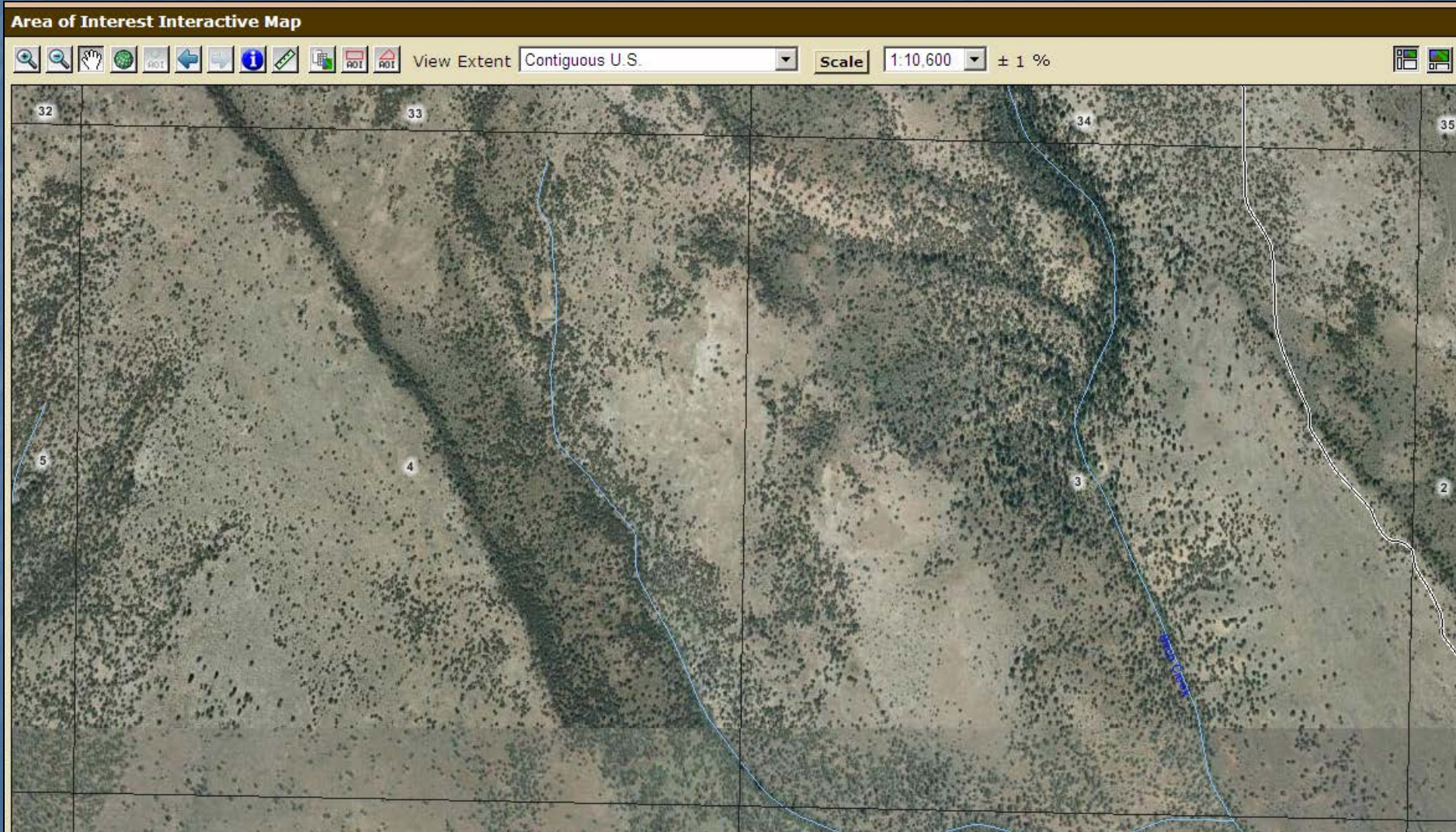
Map Legend

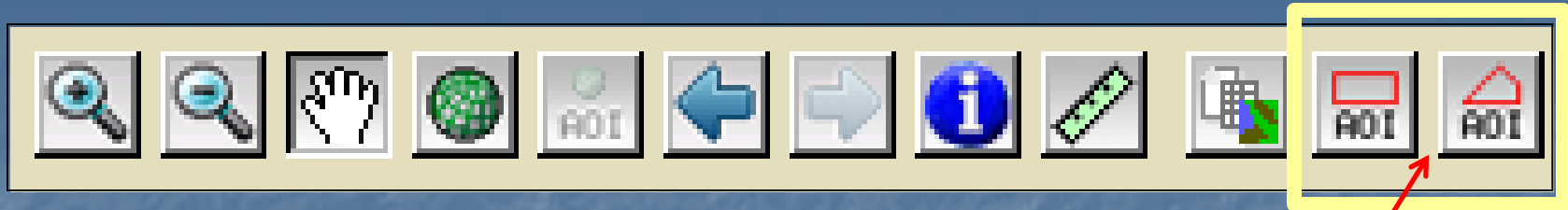
- Area of Interest (AOI)
 - Area of Interest (AOI)
- Soils
 - Soil Survey Areas
 - Soil Map Units
 - Soil Ratings
 - Special Point Features
 - Special Line Features
- Political Features
 - States
 - Counties
 - Urban Areas
 - Cities
 - Postal Code
 - PLSS Township and Range
 - PLSS Section
- Federal Land
 - Bureau of Land Management
 - Bureau of Reclamation
 - Department of Defense
 - Fish and Wildlife Service
 - Forest Service
 - National Park Service
 - Tennessee Valley Authority

Area of Interest Interactive Map

The map shows an aerial view of a region with a grid overlay. Township and Range labels include 'T18S R35E' and 'T19S R35E'. A yellow crosshair is visible on the map. A red arrow points to the 'Legend' tab in the top toolbar, and another red arrow points to the 'States' checkbox in the legend.

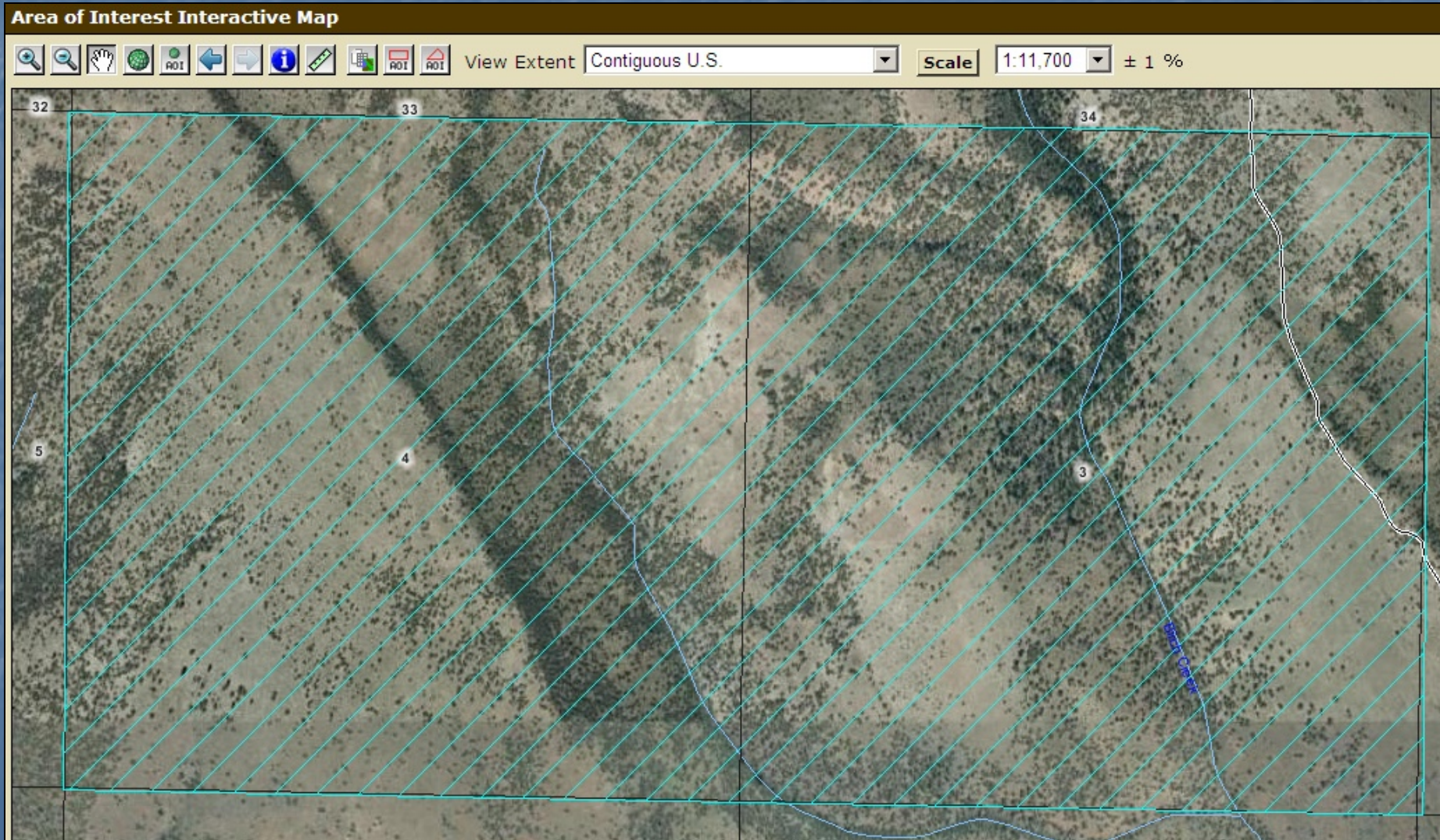
In this example, we want to include both Section 3 and 4 in our Area of Interest. We'll use the Zoom Out tool to make both sections visible.





The "AOI" buttons are used to create your Area of Interest. The left button creates a rectangle. The right button creates a polygon of any shape. The user creates the shape by left clicking at each vertex. Left double click at the last vertex to create the Area of Interest.

After you draw your "Area of Interest", it will appear as a blue hatched area.



Area of Interest (AOI) **Soil Map** ←

Search [v]

Area of Interest Properties [^]

Clear AOI

AOI Information [?] [^]

Name	<input type="text" value="Birch Creek Restoration Project"/>
Map Unit Symbols	<input checked="" type="radio"/> Use Soil Survey Area Map Unit Symbols <input type="radio"/> Use National Map Unit Symbols
Area (acres)	1,278.2

Soil Data Available from Web Soil Survey [?] [^]

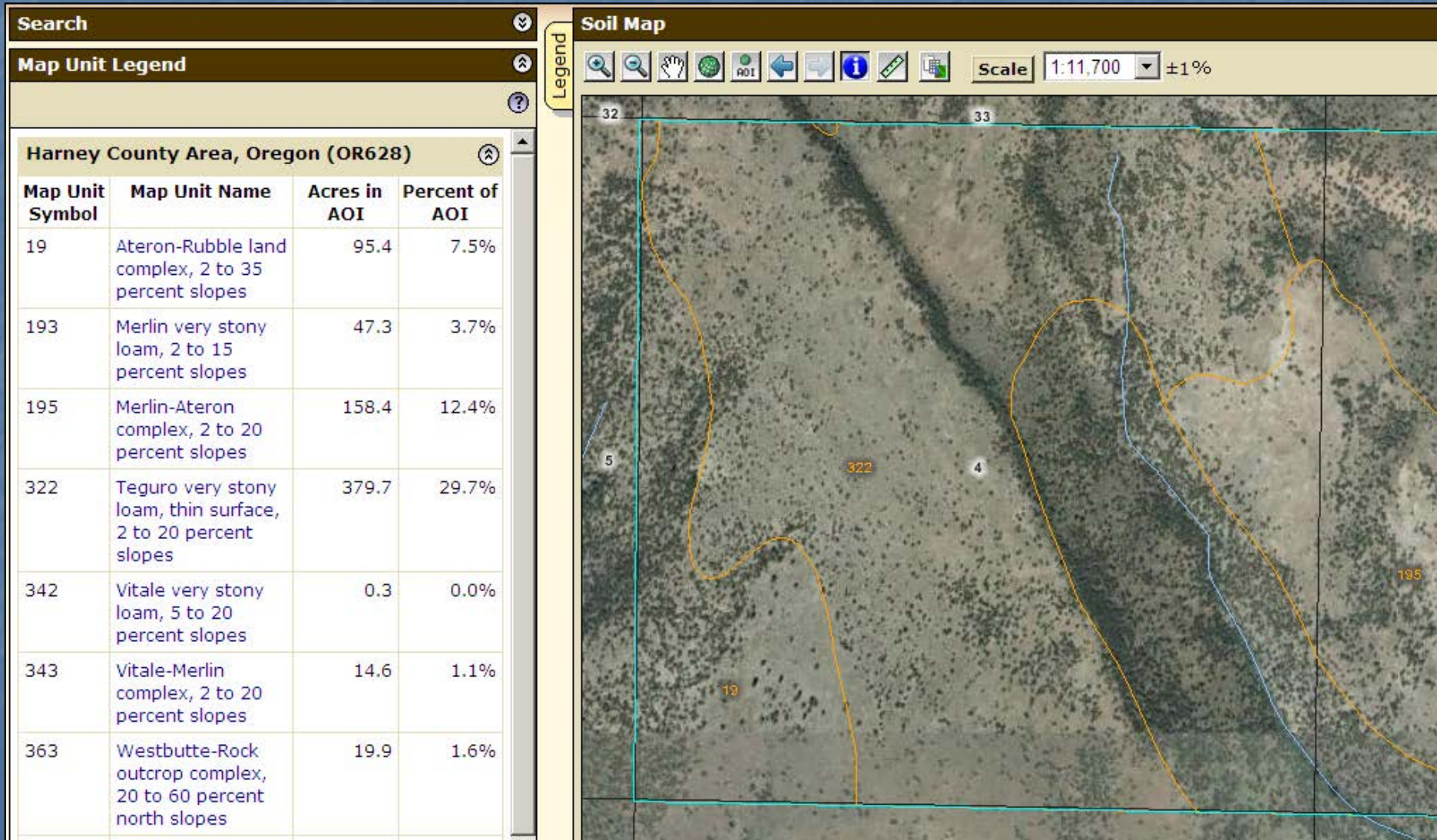
Harney County Area, Oregon (OR628)

Soil Maps	Version 4, Jul 15, 2010
Soil Data	Version 7, Feb 12, 2010

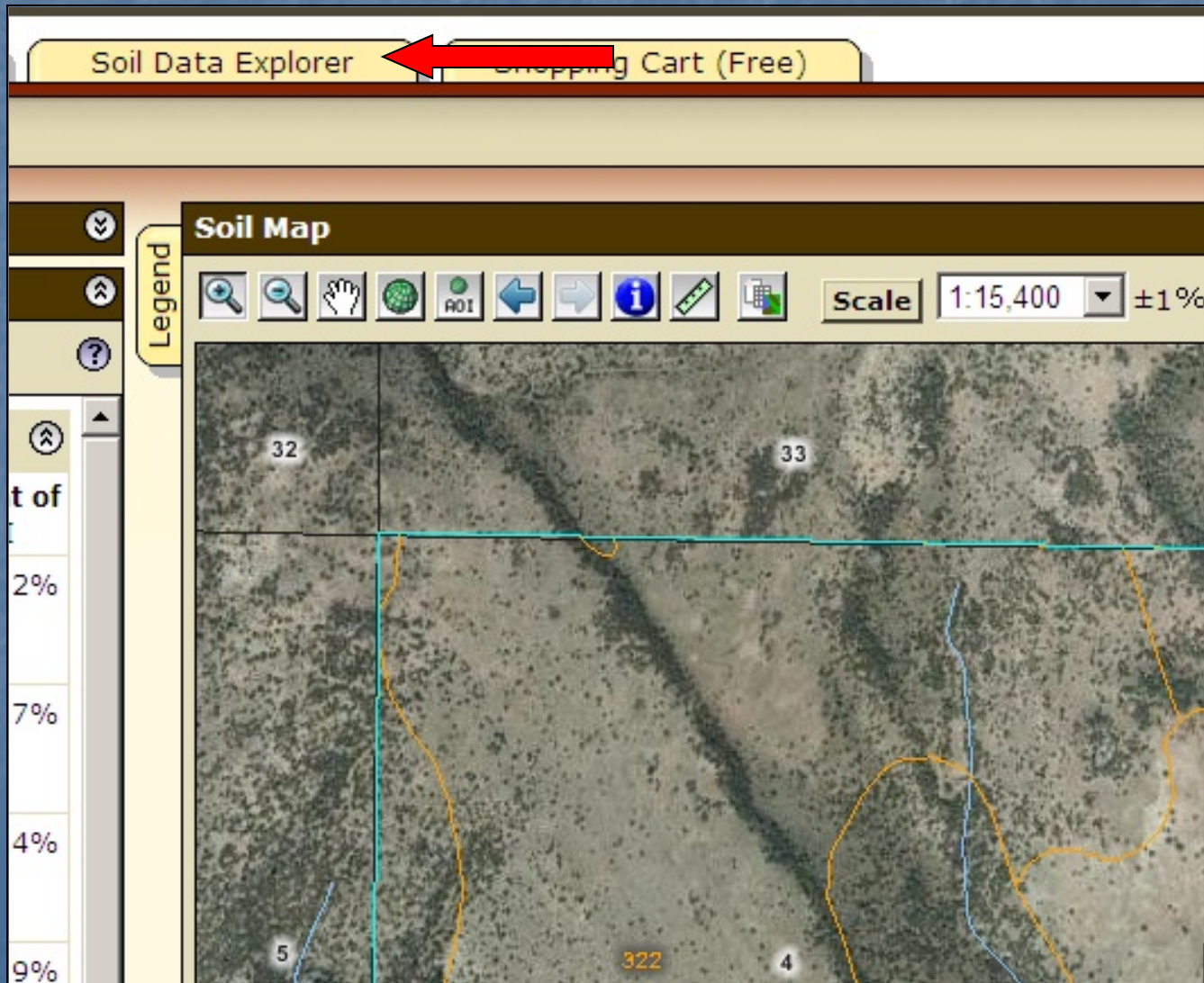
After the "AOI" is created, the size of the area and the type of data that is available is displayed.

The next step is to click on the "Soil Map" tab.

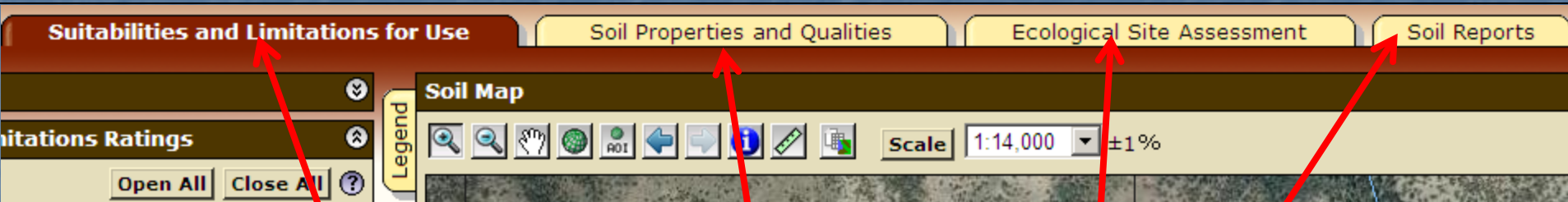
Soil Map with Legend of Map Units, Acres, and Percent of Area



Click on the "Soil Data Explorer" tab to create maps and reports of soil properties, interpretations, and ecological site information.



The Soil Data Explorer tab provides multiple options for displaying soils and ecological site information.



The "**Suitabilities and Limitations for Use**" tab is used to create maps and reports of a soil interpretation such as "Rangeland Seeding Basin Ecoregion".

The "**Soil Properties and Qualities**" tab is used to create reports for a soil property such as "Clay in the surface horizon".

The "**Ecological Site Assessment**" tab is used to view and print reports that contain multiple soil properties and interpretations.

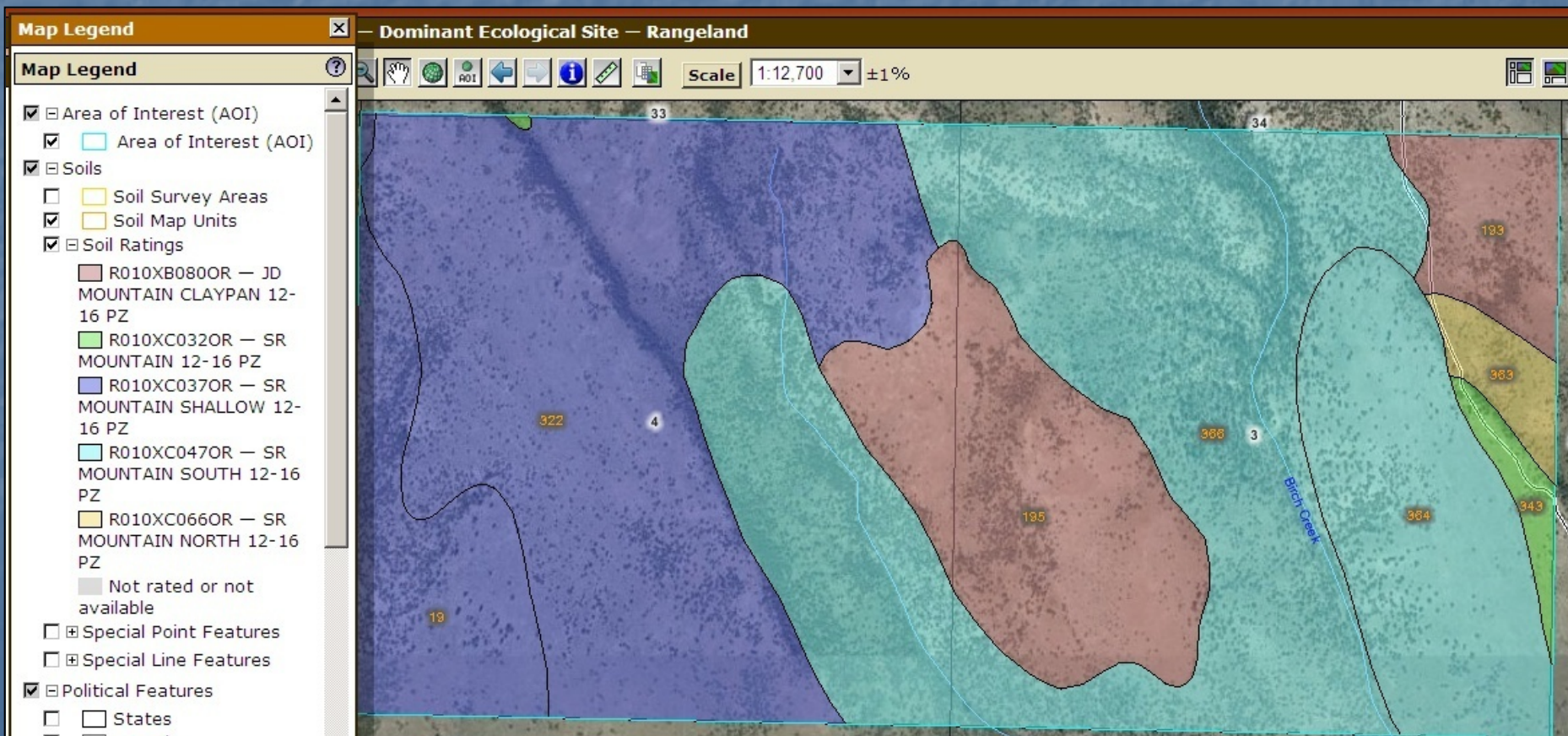
The "**Soil Reports**" tab is used to view and print reports that contain multiple soil properties and interpretations.

The **Ecological Site Assessment** tab can be used to generate maps of the dominant ecological sites and reports of ecological site descriptions.

Soil Properties and Qualities

Ecological Site Assessment

Soil Reports



The **Ecological Site Assessment** tab report of Ecological Sites in the Area of Interest (AOI).

Table — Ecological Sites by Map Unit Component — Rangeland

Harney County Area, Oregon

Map unit symbol	Component name (percent)	Ecological site	Acres in AOI	Percent of AOI
19	Ateron (50%)	R010XC037OR — SR MOUNTAIN SHALLOW 12-16 PZ	93.6	7.3%
	Rubble land (35%)			
193	Merlin (85%)	R010XB080OR — JD MOUNTAIN CLAYPAN 12-16 PZ	47.0	3.7%
195	Merlin (60%)	R010XB080OR — JD MOUNTAIN CLAYPAN 12-16 PZ	158.4	12.4%
	Ateron (25%)	R010XC080OR — SR MAHOGANY MOUNTAIN LOAM 14-18 PZ		
322	Teguro, thin surface (85%)	R010XC037OR — SR MOUNTAIN SHALLOW 12-16 PZ	381.9	29.9%
342	Vitale (85%)	R010XC032OR — SR MOUNTAIN 12-16 PZ	0.4	0.0%
343	Vitale (50%)	R010XC032OR — SR MOUNTAIN 12-16 PZ	13.9	1.1%
	Merlin (35%)	R010XB080OR — JD MOUNTAIN CLAYPAN 12-16 PZ		

Ecological Sites

Open All Close All ?

All Ecological Sites

R010XB0800R — JD MOUNTAIN CLAYPAN 12-16 PZ

R010XC0320R — SR MOUNTAIN 12-16 PZ ←

This Ecological Site

View Ecological Site Info

View Options

All Plant Community Photos	<input checked="" type="checkbox"/>	←
State Transition Diagram	<input checked="" type="checkbox"/>	←
Ecological Dynamics Description	<input checked="" type="checkbox"/>	←

View Ecological Site Info

Reference Plant Community

R010XC0370R — SR MOUNTAIN SHALLOW 12-16 PZ

R010XC0470R — SR MOUNTAIN SOUTH 12-16 PZ

R010XC0590R — SR MAHOGANY ROCKLAND 12+ PZ

R010XC0660R — SR MOUNTAIN NORTH 12-16 PZ

R010XC0800R — SR MAHOGANY MOUNTAIN LOAM 14-18 PZ

After selecting an ecological site, the following *View Options* are available:

- Plant Community Photos
- State Transition Diagram
- Ecological Dynamics Description

Reference Plant Community Photo:

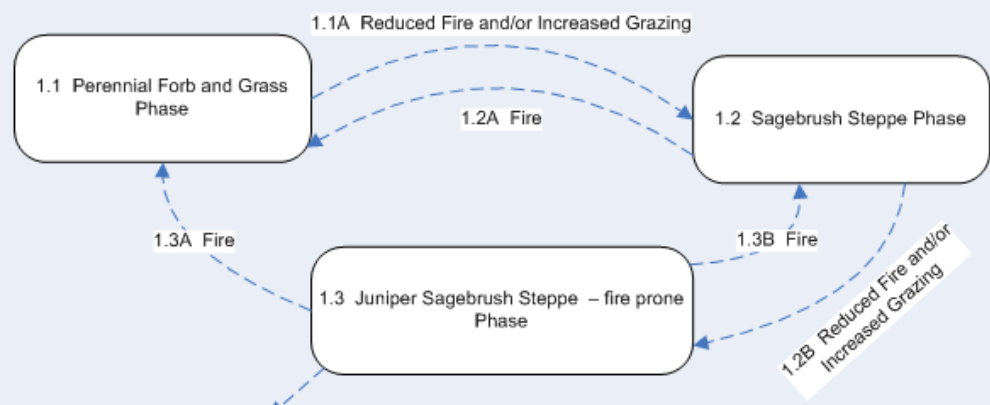
R010XC0320R – SR MOUNTAIN 12 – 16 PZ

All Plant Community Photos – R010XC0320R – SR MOUNTAIN 12-16 PZ Ecological Site

Reference Plant Community



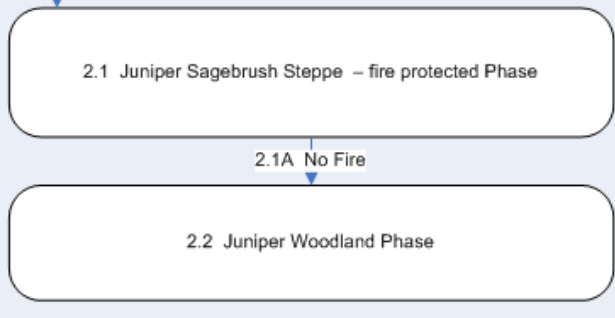
State 1 – Reference State, bunchgrass dominated



T1A Continued Fire Suppression

R2A Mechanical Juniper Removal

State 2 – Juniper dominated



T2A Soil Erosion

State 3



State Transition
Diagram:
Ecological Site
R010XC032OR -
SR MOUNTAIN
12 - 16 PZ

Ecological Dynamics Description

R010XC032OR - SR MOUNTAIN 12 – 16 PZ

Ecological Dynamics Description — R010XC032OR — SR MOUNTAIN 12-16 PZ Ecological Site

The potential native plant community is strongly dominated by Idaho fescue and mountain big sagebrush. Sandberg bluegrass is the dominant shallow rooted perennial grass. Bluebunch wheatgrass, prairie junegrass and a variety of forbs are present. Wild crab apple and antelope bitterbrush occur sporadically. Vegetative composition of the community is approximately 75 percent grasses, 10 percent forbs and 15 percent shrubs. Approximate ground cover is 70 to 80 percent (basal and crown).


Range in Characteristics:


Idaho fescue increases on silty clay loam surfaces. Bluebunch wheatgrass increases on slight south and west exposures. Needlegrasses increases on coarser surfaces and over shallower depths. Shrubs increase over gravelly and fractured substratums. Basin big sagebrush increases at lower elevations and as the precipitation zone approaches 12 inches. Production, antelope bitterbrush, serviceberry, snowberry and pine increase at the upper end of the precipitation zone.

Response to Disturbance - States:


If the condition of the site deteriorates as a result of overgrazing, Idaho fescue decreases. Mountain big sagebrush rapidly increases. Sandberg bluegrass increases and juniper invades. With continued overgrazing, juniper and big sagebrush dominate the overstory. Sandberg bluegrass dominates the understory. Annual invasion is limited unless ground disturbance occurs. With further deterioration and lack of fire juniper dominates the site, shrubs decrease and bare ground increases. With fire and heavy use or ground disturbance, annuals and Sandberg or bulbous bluegrass increase. Bare ground increases and excessive erosion contributes to downstream sedimentation.


States: ARTRV-T/POSE-Bare Ground; JUOC/ARTRV-T/POSE-Bare Ground; POSE-POBU -Annuals-Bare Ground

Ecological Sites 





All Ecological Sites

R010XB080OR — JD MOUNTAIN CLAYPAN 12-16 PZ 

R010XC032OR — SR MOUNTAIN 12-16 PZ 

This Ecological Site

Reference Plant Community 

View Options 

Plant Community Photos

Plant Community Description

Plant Community Tables

- Annual Production
- Plant Species Composition
- Plant Growth Curve

1. Select the "Reference Plant Community" option

2. Select the "View Options"

3. Click the "View Plant Community Info" button to generate a report.

Tables — Reference Plant Community
Annual Production (Lbs/Acre)

Plant Type	Low	Representative Value	High
Grass/Grasslike	900	1,200	1,500
Forb	120	160	200
Shrub/Vine	180	240	300
Totals	1,200	1,600	2,000

Plant Species Composition (Lbs/Acre)
Grass/Grasslike

Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre	
			Low	High
1: Dominant deep rooted bunchgrass			960	1280
	Idaho fescue	<i>Festuca idahoensis</i>	960	1280
2: Sub-dominant deep rooted bunchgrass			32	320
	bluebunch wheatgrass	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	32	320
3: Sub-dominant shallow rooted perennial grass			32	80
	Sandberg bluegrass	<i>Poa secunda</i>	32	80
4: Other perennial grasses			64	384
	western needlegrass	<i>Achnatherum occidentale</i>	0	32
	Thurber's needlegrass	<i>Achnatherum thurberianum</i>	32	128
	mountain brome	<i>Bromus marginatus</i>	0	32
	threadleaf sedge	<i>Carex filifolia</i>	0	32
	squirreltail	<i>Elymus elymoides</i>	0	32
	prairie Junegrass	<i>Koeleria macrantha</i>	16	48
	basin wildrye	<i>Leymus cinereus</i>	16	48
	oniongrass	<i>Melica bulbosa</i>	0	32

Forb				
Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre	
			Low	High
7: Dominant perennial forbs			32	48
	arrowleaf balsamroot	Balsamorhiza sagittata	32	48
8: Sub-dominant perennia forbs			112	224
	common yarrow	Achillea millefolium	16	32
	milkvetch	Astragalus	16	32
	fleabane	Erigeron	16	32
	buckwheat	Eriogonum	16	32
	desertparsley	Lomatium	16	32
	lupine	Lupinus	16	32
	phlox	Phlox	16	32
9: All other perennial forbs			30	200
	agoseris	Agoseris	2	10
	onion	Allium	2	10
	pussytoes	Antennaria	2	10
	brodiaea	Brodiaea	2	10
	mariposa lily	Calochortus	2	10
	Indian paintbrush	Castilleja	2	10
	bastard toadflax	Comandra	2	16
	bushy bird's beak	Cordylanthus ramosus	2	10
	tapertip hawksbeard	Crepis acuminata	2	16
	waterleaf	Hydrophyllum	0	16

Shrub/Vine				
Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre	
			Low	High
11: Dominant evergreen shrub			48	128
	mountain big sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>	48	128
12: Subdominant evergreen shrub			16	48
	basin big sagebrush	<i>Artemisia tridentata ssp. tridentata</i>	16	48
15: Other shrubs			32	320
	Saskatoon serviceberry	<i>Amelanchier alnifolia</i>	0	32
	threetip sagebrush	<i>Artemisia tripartita</i>	0	32
	big sagebrush	<i>Artemisia tridentata ssp. xericensis</i>	0	32
	yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>	0	32
	squaw apple	<i>Peraphyllum ramosissimum</i>	0	32
	antelope bitterbrush	<i>Purshia tridentata</i>	0	32
	wax currant	<i>Ribes cereum</i>	0	32
	Woods' rose	<i>Rosa woodsii</i>	0	32
	common snowberry	<i>Symphoricarpos albus</i>	0	32
	horsebrush	<i>Tetradymia</i>	0	32
Tree				
Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre	
			Low	High
16: Evergreen sub-dominant trees			0	64
	western juniper	<i>Juniperus occidentalis</i>	0	32
	ponderosa pine	<i>Pinus ponderosa</i>	0	32

Plant Growth Curve Table

Plant Growth Curve



Growth Curve Name

B10 SR Mtn, Cool & No 12-16pz

Growth Curve Description


SR Mtn, Cool & No 12-16pz RPC Growth Curve

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0%	0%	0%	10%	30%	30%	15%	5%	5%	5%	0%	0%

Ecological Site Information System (ESIS)

<http://esis.sc.egov.usda.gov/>

United States Department of Agriculture




Natural Resources Conservation Service

Ecological Site Information System

PLANTS | **ESIS** | ESD | FSGD | ESI Rangeland | ESI Forestland

Quick Access


- ▶ About ESIS
- ▶ ESD Home
- ▶ FSGD- Forage Suitability Groups
- ▶ ESI - Forest
- ▶ ESI - Range



Ecological Site Information System (ESIS)

ESIS is the NRCS repository for ecological site descriptions and for information associated with the collection of forestland and rangeland plot data. ESIS is organized into two applications and associated databases; the Ecological Site Description (ESD) application and the Ecological Site Inventory (ESI) application. This section, plus the access tab on the right, provides quick access to technical resources and technical guidance for developing and understanding ecological sites.

[...More Info](#)



Ecological Site Description (ESD)

The ESD application is used to enter, edit and store ecological site information. Only approved ecological sites for forestland and rangeland are available to the public. Open this section to access approved and non-approved ESD's. Entry/Edit privileges are required to access non-approved sites. Click on MLRA/state of interest, and available ESDs within that MLRA/LRU for the state will be displayed.

[...More Info](#)

Technical Resources

- [USDA - ARS Range Database](#)
- [Web Soil Survey](#)
- [Ag Handbook 296](#)
- [Climate Data](#)
- [Soil Change Guide](#)

Technical Guidance

- [National Range & Pasture Handbook](#)
- [National Biology Manual](#)
- [National Biology Handbook](#)
- [National Forestry Manual](#)
- [National Soil Survey Handbook \(NSSH\)](#)

Reports

- > [Approved ESD Reports](#)
- > [Approved Reference Sheets](#)

Data Access

- > [Data Edit/Entry, Download, Reports](#)
- > [GSAT Downloads](#)

Click on the *Approved ESD Reports* link to access ecological site descriptions.

Ecological Site Description (ESD) System for Rangeland and Forestland

The Ecological Site Description (ESD) application provides the capability to enter, edit, and view reports of rangeland and forest land ecological site descriptions. Anyone may view reports of approved Ecological Site Descriptions. Data entry, edit, download, and viewing draft reports is for authorized users only.

ESIS User Guide

Queries for Ecological Site Descriptions (ESD's) can be submitted by Major Land Resource Area (MLRA), State, or both

[MLRA Information](#)

[MLRA Explorer](#)

MLRA

None Selected



State

None Selected



None Selected

002X

003X

004B

005X

006X

Submit

In this example we'll query for ESD's in MLRA 8 from Oregon.

[MLRA Information](#)

[MLRA Explorer](#)

MLRA

008X

State

Oregon

Submit

Click the *Submit* button after the query criteria are selected.

A list of ESD's in MLRA 8 from Oregon are produced.

Click on an ESD link to view the ecological site description.

Ecological Site Description Selection

Select a site to view Report

ID	Type	MLRA	Site Name	Biotic Name
R008XY110OR	R	008X	LOAMY 10-12 PZ	
R008XY120OR	R	008X	LOAMY 12-14 PZ	
R008XY130OR	R	008X	SANDY LOAM 10-12 PZ	
R008XY140OR	R	008X	SHALLOW LOAM 10-14 PZ	
R008XY150OR	R	008X	VERY SHALLOW LOAM 10-14 PZ	
R008XY200OR	R	008X	SOUTH 10-14 PZ	/Artemisia tridentata ssp. tridentata-Ericameria nauseosa/Pseudoroegneria spicata ssp. spicata-Poa secunda



Data Access

- > [Return to Reports Selection Screen](#)

Report Selections

- General
- > [Physiographic Features](#)
- > [Climate Features](#)
- > [Water Features](#)
- > [Soil Features](#)
- > [Plant Communities](#)
- > [Site Interpretations](#)
- > [Supporting Information](#)
- > [Rangeland Health Reference Sheet](#)
- > [Complete Report](#)
- > [HTML Printable Format](#)

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION (New Format Report)

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: SOUTH 10-14 PZ

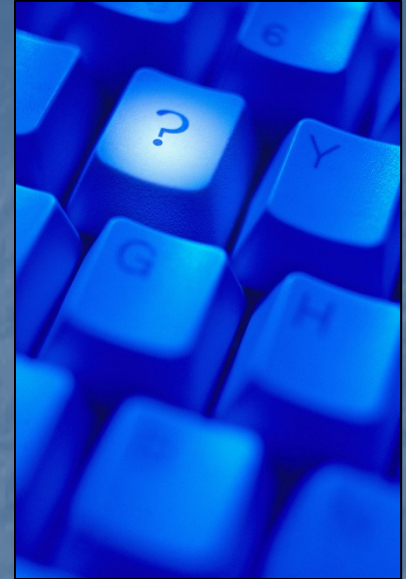
*/ Artemisia tridentata ssp. tridentata - Ericameria nauseosa /
Pseudoroegneria spicata ssp. spicata - Poa secunda
(/ basin big sagebrush - rubber rabbitbrush / bluebunch wheatgrass -
Sandberg bluegrass)*

Site ID: R008XY200OR

Major Land Resource Area: 008-Columbia Plateau



Questions ???



Steve Campbell

Soil Scientist

USDA – Natural Resources Conservation Service

West National Technology Support Center

Portland, Oregon

Phone: 503-273-2421

E-mail: steve.campbell@por.usda.gov