



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



Ecological Site Descriptions (ESDs) in Nevada State Technical Advisory Committee

FARM PRODUCTION AND CONSERVATION
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Intro slide

Objectives

- Status of published soil survey and ecological site information in Nevada
- What is a “provisional” ecological site description (ESD)?
- How can ESD’s help you?
- Where can I find this information?



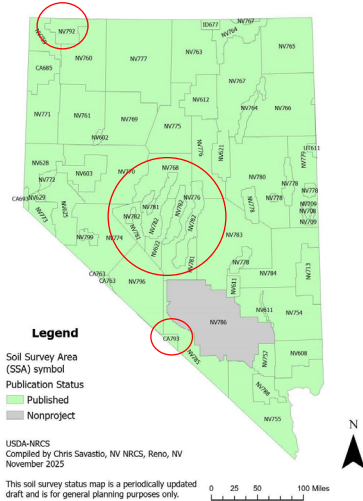
Status of published soil survey information. There are some very big changes to report from the Soil and Plant Science Division regarding updates to soil and ecological site information throughout the state.

What is a provisional ESD: I will briefly discuss the differences between draft and provisional ecological sites and I’ll demonstrate why these changes are beneficial to those of you who might use this information

How can ESD’s help you? What are some of the practical applications of ecological site information?

And lastly, I’ll show you a few ways to access this information online.

Soil Survey Status of Nevada FY 2026



Soil map of Nevada – Completed 10/2025

- Sheldon Antelope Refuge (Klamath Falls SSO)
- Toiyabe National Forest, Central Part (Minden SSO)
- Death Valley National Park (Victorville SSO)

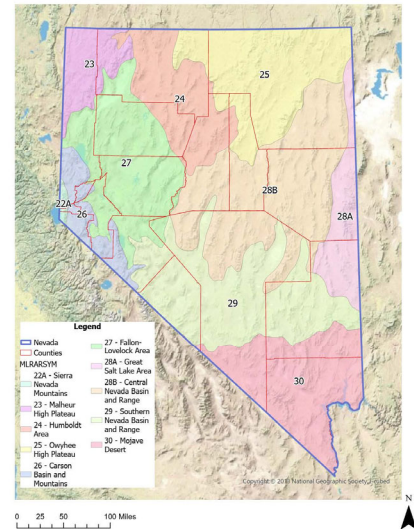
I want to start my presentation with this map showing that initial soil survey project work in Nevada is completed. As you can see here, the entire state, with the exception of the **Nevada Test and Training Range** shown in gray, now has published soil survey information. The three soil surveys listed on this slide and circled in red were published last October. This is obviously a major milestone for the dozens of soil scientists and ecologists who spent decades filling in the gaps on this map, but it's also important for the discussion of ecological sites in the state. Ecological sites are identified for each mapped soil. So if you have published soil survey data, you can identify the ecological site based on the soil. I'll demonstrate that a little bit here today.

Provisional Ecological Site Initiative

- Completed in 2025
- Bring sites up to Provisional publication standards
- Provisional sites are scientifically rigorous
- Provisional sites are public

	ESD	ESG
MLRA 22A		13
MLRA 23	26	21
MLRA 24	45	
MLRA 25	74	
MLRA 26	100	
MLRA 27	59	
MLRA 28A	88	
MLRA 28B	23	
MLRA 29	46	
MLRA 30	350	

Nevada Major Land Resource Areas



At the same time the remaining Nevada soil surveys were completed, soil survey regions were also working on the Provisional Ecological Site Initiative. This was a nation-wide project to bring ecological sites up to at least the provisional standard. In Nevada, there were almost no ecological sites in provisional status. We had a lot of DRAFT sites, which were conceptually sound but were far from meeting our agency's publication standard and were therefore not viewable by the public. The chart in the middle of the slide shows how many sites were improved across the state per each MLRA.

There is another status above provisional called "approved" but since there are so few approved sites nationally and not much likelihood of moving sites to approved status very easily, the approved status isn't really worth discussing today. There is a much bigger difference between draft and provisional, and I'll discuss that in the next slide.

What is a Provisional Ecological Site?

- Site Characteristics: physiographic, climate, soil, and water features
- Plant Communities: plant species, vegetation states, and ecological dynamics
- Site Interpretations: management alternatives for the site and its related resources
- Supporting Information: relevant literature, information and data sources



In order to bring Nevada's sites from draft to provisional status, they needed substantial additions to the attributes described here.

Site characteristics describe how the ecological site is inextricably tied to the soil, this is why they are associated with soil types in our published soil survey data... the ecological site itself does not change, only changing states and phases based on disturbance and management regimes, which I will touch on in the next slide a little more.

Plant communities: This includes a plant species list, but that's only a small part of it. The ecological dynamics are one of the most useful aspects of a site description for management purposes. We'll go into that more on the next slide when we talk about state and transition models. By the way, every provisional ecological site must have a state-and-transition model. That is one of the key aspects that differentiate a draft from a provisional site, and one that makes them significantly more useful for management.

Site interpretations are perhaps equally important for making management decisions. A well-designed ecological site in provisional status will have management recommendations based on site condition, and those are listed below the state-and-

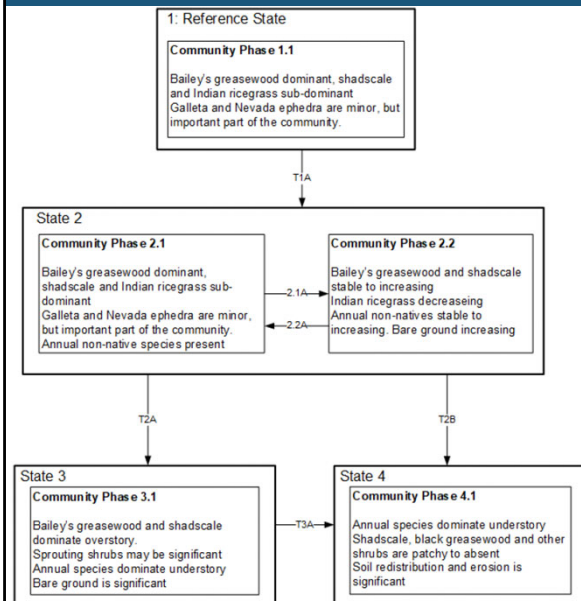
transition model and refer back to that.

The supporting information section lists the sources that provide the basis of the ecological site concept. There is no bibliography required for a draft site.

This is a good summary of the contents of a published ecological site. I don't have time to go through a site section by section, but I want to bring a little extra attention to the state and transition model before we move on.

State-and-Transition Models

- Provides actionable information about the ecological dynamics, the processes and mechanisms of ecosystem change, and management actions that can be used to influence change
- Developed using relevant published literature, expert knowledge, field data, existing inventory/datasets



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I want to start this slide by reminding folks that STM's weren't available in draft ecological sites, but they are required for provisional ecological sites. This feature of the provisional site is a huge reason that they are so valuable for land managers using this information.

If you see an STM in a Nevada ecological site that looks like the diagram on this slide, it was almost certainly developed by Dr. Tamzen Stringham at UNR and the many other excellent ecologists and soil scientists who worked with her over the years on this effort. Her contributions to the published ecological site information in Nevada can't be overstated. An STM unites literature and tacit knowledge and presents it as a Schematic. This example was pulled directly from the Stony Loam 4 to 8 ecological site in MLRA 27, Fallon-Lovelock Area. In brief, it requires **a lot of energy and resources to move between states (represented by the larger boxes) and less to move between community phases, the smaller boxes within a state. This knowledge can be used to prevent migration to a less desirable state using informed management practices, which this diagram helps with.** The arrows between states and phases are the transitions, or the pathways that can lead you in one direction or another. These are described in detail in a key located below this diagram.



How do Ecological Sites Help Me?

- Understand capability to respond to management activities or disturbance
- Conservation planning
 - Reclamation/rehabilitation
 - Wildlife habitat
 - Monitoring
 - Assessment
 - Resource inventory/evaluating alternatives
 - Management decisions
- Contractors
 - Predict potential site conditions
 - Draw boundaries
 - NEPA

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Before I show you how to find this information, I want to illustrate some examples of how ecological sites help various users of published ecological site information in their planning process. **My background is more in the development of ecological site information versus the application, so I gathered some of this information from a webinar series that is available online, and I will share the link to that webinar at the end of this presentation as well.** Understanding the capability of a site to respond to management activities or various types of disturbance is the key to making an ESD a useful planning tool.

In NRCS conservation planning, ecological site descriptions can help inform the planner in quite a few ways.

Reclamation, for example. ESD plant lists are used to find species that will thrive on a site for seeding recommendations.

For wildlife habitat, STM's can be used as a prescriptive tool for identifying states that have ideal sage grouse nesting habitat, for example. You can then use the ESD to help determine management actions to get to the desired plant community.

Monitoring, as a component of prescribed grazing and the conservation planning process. You can use the ESD to compare production and condition

ratings across years to assess change over time, then demonstrate state or phase changes using the STM.

For site assessment, the reference state is described in an ESD. When a planner fills out a rangeland health assessment form, they should use the reference state as the baseline. For example, a reference state may have gullies present, so gullies might not be a negative indicator for soil health depending on the site. Then there are several other conservation planning activities where information gleaned from the ESD could apply, such as grazing management, resource inventory and evaluating alternatives, and probably other applications that people in this room could tell me that I haven't considered. For conservation planning in the NRCS, ecological site information goes a long way towards making informed management decisions.

Likewise, for folks in the private sector or working for other agencies, there are other general and specific ways in which ecological sites can be beneficial. For example, when preparing for remote field work, ESD's can help predict potential site conditions, what's most likely to be there, useful for cost analysis/protocol development, predicting how much will it cost to monitor? Will this be a 30 minute or 4 hour protocol, and so on.

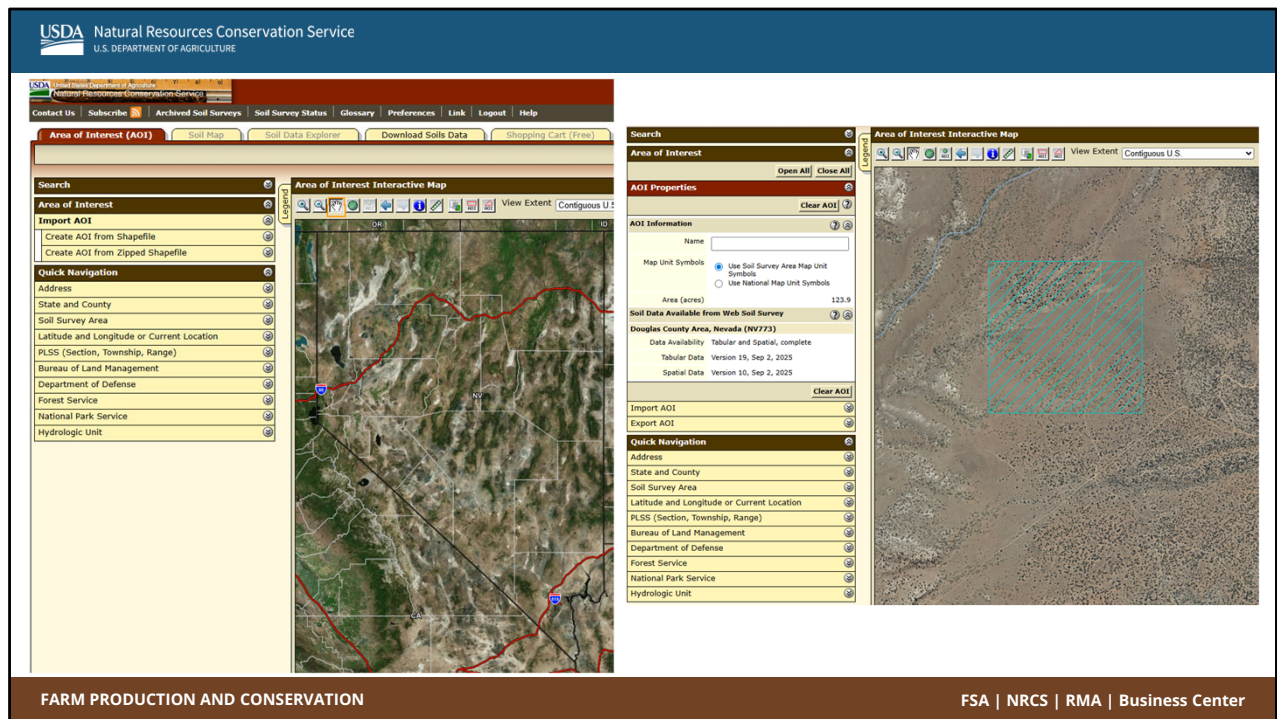
Once you're on site: now we have plant list, soil list, ecological processes, community dynamics, all in one place. Now we have a starting point. The ESD acts as sort of a cheat sheet, and helps narrow down plants and soils that you might encounter. Also, is this a fire-driven site? Could this be something that was converted from sagebrush steppe to cheatgrass? Look at dynamics before you get in the field, now you have some ideas before you even go into the field. This is going to be much easier than starting with a blank slate. You can imagine it would be useful for getting thought processes moving along in a hurry. In that same sense of saving time, soil survey and ecological site data together will go a long way towards setting the boundaries for a project area's focus..

ESD's can help answer questions from the NEPA process, by describing the existing environment and the impact of action vs no action on a project. It can suggest the management practices that make the most sense and predict changes in ecosystem. It provides an analysis of potential impacts, for example, what will happen to the site various conditions, such as Fire, veg removal, soil disturbance, and so on)

Accessing ES Data through Web Soil Survey



As I mentioned at the beginning of the presentation, ecological sites are associated with the soils that are mapped in soil survey. So, to determine what ecological site description you want to look at, you'll first want to access the soil survey for your property or project area. The length of this presentation is too short to teach you how to use Web Soil Survey, but I am going to give you a very quick walkthrough just to show you what it will look like when you arrive at the information you're looking for. At the end of the presentation, and on the ecological site handout, there is a link to take you directly to Web Soil Survey. The image here is what you'll see at the top of the page. Click the green button to proceed to the app.



After you click the green button, you are directed to a map where you have to define the boundary of your project. You can either import a shapefile directly or you can search by coordinate or address, or simply zoom to the area you're working on using the magnifying glass icon. Then you can manually draw the shape of your project area once it's visible on the map, like so. At this point you can click over to the Soil Map tab in the top row.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
483	Indian Creek very cobbly loam, 2 to 8 percent slopes	11.3	9.1%
6078	Boondock-Chalco complex, 8 to 30 percent slopes	18.9	15.2%
6902	Ackley gravelly sandy loam, 2 to 8 percent slopes	93.7	75.6%
Totals for Area of Interest		123.9	100.0%

Map Unit Description

Douglas County Area, Nevada
6902—Ackley gravelly sandy loam, 2 to 8 percent slopes

Map Unit Setting
 National map unit symbol: pmqs
 Elevation: 5,500 to 5,700 feet
 Mean annual precipitation: 8 to 12 inches
 Mean annual air temperature: 48 to 52 degrees F
 Frost-free period: 90 to 110 days
 Farmland classification: Not prime farmland

Map Unit Composition
 Ackley and similar soils: 95 percent
 Minor components: 5 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ackley
Setting
 Landform: Fan remnants
 Down-slope shape: Linear
 Across-slope shape: Convex
 Parent material: Alluvium derived from mixed

Typical profile
 A - 0 to 10 inches: gravelly sandy loam
 Bt - 10 to 34 inches: loam
 Bk - 34 to 60 inches: fine sandy loam

Properties and qualities
 Slope: 2 to 8 percent
 Depth to restrictive feature: More than 80 inches
 Drainage class: Well drained
 Runoff class: Low
 Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
 Depth to water table: More than 80 inches
 Frequency of flooding: None
 Frequency of ponding: None
 Calcium carbonate, maximum content: 5 percent
 Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
 Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups
 Land capability classification (irrigated): 2e
 Land capability classification (nonirrigated): 6c
 Hydrologic Soil Group: B
 Ecological site: R026XY016NV - LOAMY 8-10 P.Z.
 Other vegetative classification: GRAVELLY LOAM 8-10 P.Z. (026XY098NV_2)
 Hydric soil rating: No

This soil map, which covers about 124 acres, contains 3 soil map units. You can see them listed on the legend to the left and delineated on the map to the right. For the purposes of this demo, let's say we want information on the ecological sites for the area indicated by the red arrow because we think there is possible pinyon pine encroachment and we want to see if the ecological site identifies that as a potential. You can't see it but that's Map Unit 6902. You can either click on the Map Unit Name in the legend for a quick map unit description in a pop-up window, or you can click over to the shopping cart tab at the top of the page. The Shopping Cart is just the place where you go to save a copy of the soil survey report, you don't actually have to pay for anything.

For the sake of time and simplicity, we'll just look at the quick description shown on the right. This gives a lot of information. First of all, there are multiple soil types listed, and more than one ecological site along with that. This soil map unit is called Ackley gravelly sandy loam, 2 to 8 percent slopes. That means Ackley is the MAJOR component of this map unit. We can start with the assumption that Ackley is the soil we're managing for, since 85% of the map unit is composed of Ackley. However, the other component in this map unit occur on a different landscape position and may be different enough that the ecological site is different as well, so it's good to read the full description and try to infer where those other soils apply. For today, let's assume we

are certain that we're dealing with Ackley, again for simplicity's sake.

Underneath the "interpretive groups" header in the quick mapunit description, the ecological site for this soil is listed. Now unfortunately, in Web Soil Survey, you can't click the site name and have it appear in a pop up browser. You have the information, now you have to open up the EDIT website and search for the site in a list. The link to the EDIT website is also featured on the handout and at the end of this presentation. Now that we have ecological site name and number, we can go find it on EDIT.

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EDIT –Ecosystem Dynamics Interpretive Tool

Get Started

Select a data catalog

Ecological Site Descriptions

Ecological sites are the basic component of a land-type classification system that describes ecological potential and ecosystem dynamics of land areas. All land/land use types are identified within the ecological site system, including rangeland, pasture, and forest land. An ecological site is defined as a distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in its ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to

U.S. Ecological Site Groups

This catalog features ecosystem dynamics of the United States by ecoregion. Ecoregions are subdivided into classes known as ecological site groups, and separate models of ecosystem dynamics are developed for each class. Models are used to characterize ecosystem dynamics occurring at the site (land unit) scale, with an emphasis on natural and semi-natural ecosystems. Models may be a generalization of those developed by the Natural Resources Conservation Service and its partners for

General information

Next steps

MLRA list

MLRA map

MLRA photos

Briefcase

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EDIT is actually a lot simpler to navigate than Web Soil Survey. Once you know what site you’re looking for, you simply drill down through the choice lists until you find your site. The loading page points you to ecological site DESCRIPTIONS or GROUPS. In most cases in Nevada, you will probably be clicking on the descriptions button. If you aren’t sure if you are looking for a description or a group, you can just search in both using the method I am showing you. After you click through the loading page, you’ll be presented with the options shown on the right. Click on MLRA list.

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EDIT –Ecosystem Dynamics Interpretive Tool

Major Land Resource Area list

SEARCH

26

FILTER BY

state

availability

more...

clear all

SORT BY

symbol

name

Viewing 3 of 3

View all

026X

Carson Basin and Mountains

126X

Central Allegheny Plateau

226X

Aleutian Islands-Western Alaska Peninsula

Viewing 3 of 3

View all

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: B

Ecological site: R026XY016NV - LOAMY 8-10 P.Z.

Other vegetative classification: GRAVELLY LOAM 8-10 P.Z. (026XY098NV_2)

Hydric soil rating: No

Carson Basin and Mountains

HOME / ESD CATALOG / MLRA 026X

General information

Next steps

Ecological site list

Ecological site map

Ecological site keys

Ecological site photos

Print

Briefcase

Ecological site list

SEARCH

FILTER BY

interactive key

precipitation

frost free days

more...

clear all

SORT BY

id

name

stage

Viewing 20 of 110

View all

F026XY044NV/F026XY044NV

Shallow Sandy Slope 10-12 P.Z.

PROVISIONAL

F026XY050NV/F026XY050NV

Sandy Flood Plain 8-10 P.Z.

PROVISIONAL

F026XY060NV/F026XY060NV

Shallow Loamy Slopes 12-16 P.Z. PIMO/ARTRV/ACTH7

PROVISIONAL

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Now I am going to find that ecological site from Web Soil Survey. You can search by MLRA, which is found in the ID number of the ecological site itself. Your MLRA is in the first part of the identifier, after the letter. So, R-0-2-6. This site is from MLRA 26. When I type 26 into the search bar, it gives me a few options. If I type in 0-2-6, it will only give me the MLRA that I'm looking for. Notice you can also filter by state. If you select Nevada under state, it will list all of the MLRA's within Nevada, if you prefer.

After selecting your MLRA, you'll move to the next page, where you'll click Ecological Site List on the left hand side. This will bring up a list of all published ecological sites within that MLRA. The ecological site is called "Loamy 8-10 P.Z." Type "Loamy 8-10" into the search bar at the top of the page and it will shorten the list of ecological sites to include only the sites with "Loamy 8-10" in the name, or you can simply scroll to Loamy 8-10 on the numerically ordered list at the bottom of the page without typing anything in, then click on the site.

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EDIT –Ecosystem Dynamics Interpretive Tool

LOAMY 8-10 P.Z.

HOME / ESD CATALOG / MLRA 026X / ECOLOGICAL SITE R026XY010NV

USC METRIC

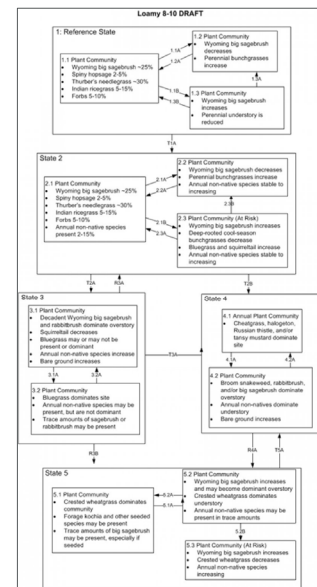
General information	General information Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.
Physiographic features	
Climatic features	
Water features	
Soil features	
Ecological dynamics	MLRA notes Major Land Resource Area (MLRA): 026X-Carson Basin and Mountains The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark
Interpretations	
Supporting information	
Reference sheet	
Print options	
All Sections	

Now, finally, you are looking at your ecological site. You can click on each tab or you can print this as a single document. Go to Print Options if you want to only print specific sections or change the formatting.

Infilling by Pinyon?

From Ecological Dynamics section:

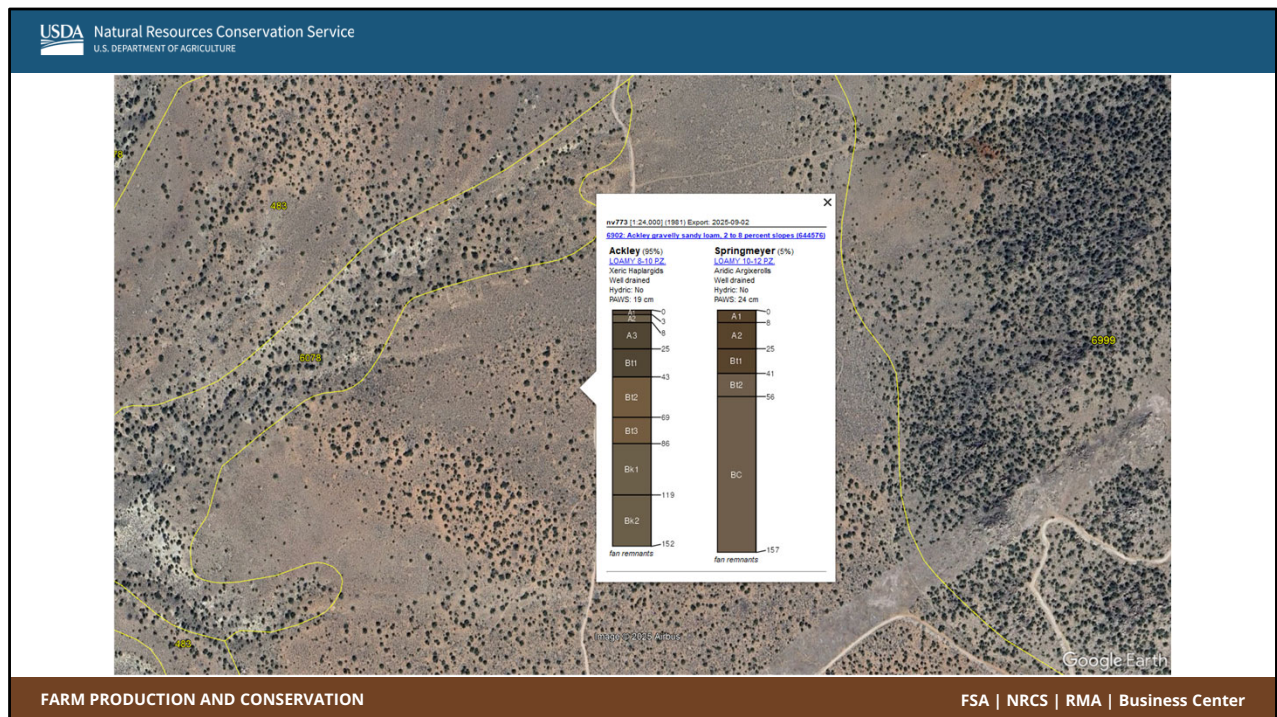
Infilling by singleleaf pinyon and Utah juniper may also occur with an extended fire return interval. Eventually, singleleaf pinyon and Utah juniper will dominate the site and out-compete sagebrush for water and sunlight severely reducing both the shrub and herbaceous understory (Lett and Knapp 2005, Miller et al. 2000). Bluegrasses may remain underneath trees on north-facing slopes. The potential for soil erosion increases as woodland matures and the understory plant community cover declines (Pierson et al. 2010).



Like I have said already, there is an abundance of information in the ecological site document, but let's focus really quickly on the example we've been looking at. We suspect infilling has occurred in our project area and we are seeing if the ecological site information confirms that. The Ecological Dynamics tab is the mostly likely section for finding the answer. Within the introductory text of this section, we see a paragraph describing infilling, with extended fire return interval as the cause, and the long term effects of infilling if not treated. This is all supported by scientific evidence as you can see by the citations, which are listed in the bibliography section.

Further in the document, we find the state and transition model. We can use the descriptions of each state listed below the model to identify what state and community phase we're in, then we can read about the likely transitions and restoration pathways that can send this site from one state or phase to another, and we can use this to inform management decisions.

Now before I wrap up I'd like to show you another way of accessing this information.



It pops up a very nice graphical summary of the soil mapunit. It shows all of the mapped soils, a soil profile description, soil taxonomy, hydrology, landforms, and importantly, right under the soil names, the ecological site. From this pop up, you can click the site name and it takes you directly to the ecological site description that I just showed you with much fewer steps. Google Earth is free, but you don't need Google Earth to make this work. UC Davis has their own browser-based map that you can use in the exact same fashion, plus apps on iPhone and Android that can give you this information in the exact spot where you're standing. So, whether you're accessing soil survey for ecological site purposes or for any other purpose, I can't recommend these apps more highly. Contact me directly for more information on how to access SoilWeb.



Nevada ESD “2-pager”

- Description of ecological sites
- Summary of publication status in Nevada
- How to access information online

If you haven't yet, please pick up the Nevada ESD handout, which has information about ecological sites that I hopefully covered during this presentation as well as links to access ecological site information.

Contact Information

- Chris Savastio, Acting State Soil Scientist
 - Chris.Savastio@usda.gov



EDIT (Use the "NRCS-EDIT" link found on this website):
<https://www.nrcs.usda.gov/conservation-basics/natural-resourceconcerns/soil/ecological-sitestools>



Web Soil Survey:
<https://websoilsurvey.nrcs.usda.gov/>



Ecological Site Descriptions - An Interdisciplinary and Interagency Effort (8 Session Webinar Series):
<https://www.nrcs.usda.gov/getting-assistance/technical-assistance/ecological-sciences/ecological-site-descriptions>

Please contact me if you need help accessing soil or ecological site information and I'll help point you in the right direction.

Questions?