The Sharpshooter

Oregon Society of Soil Scientists Newsletter

Winter 2025

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President's Message

Dear Soil Enthusiasts:

I'm excited about our upcoming annual meeting on February 21 in Hood River. It's a place we have been before, and I'm thankful they reached out and invited us back. Finding venues that fit our budget and help us assemble all the pieces to make a good meeting has been challenging. In addition, we have rescheduled the annual tour for May. Our incoming president, Jalene Weatherholt is carrying forward our plans of visiting the impacts of dams removals in the Klamath Basin.

Please note I'm using the terms "Annual" meeting and "Annual" tour, rather than winter and summer, because, well...for many of us in government agencies, summer has now morphed into simply fire season. The shift in weather behavior and dry fuel loads has changed our roles as Soil Scientists in the BLM and Forest Service from people who provide expertise on soil conservation for timber activities to people who lead teams of scientists in advising firefighters during fires and advising decision makers on emergency safety and erosion treatments after fires.

Given this shift of focus to Soil Scientists serving through and after fires, we thought it appropriate to share the knowledge we are gaining through experience and research about how fires impact soils in Oregon. Whether it's the creation and use of biochar in restoration, the research into hillslope hydrology changes after multiple re-burns, or the production and potential uses of Soil Burn Severity maps, Soil Scientists are at the forefront of bringing essential knowledge and skills to every aspect of the fire conversation in Oregon.

We hope you will join us for our annual events and learn about the impacts of fires and dam removals on our soils and our beloved state.

Warmest wishes during this coldest of seasons,

Wendy Peterman

OSSS President

Join us at the 2025 Winter Meeting in Hood River, Oregon to discuss the impacts of fire on soil, how it can be a tool for restoration, and discuss how soil scientists play a role in its management across the west.

Speaker topics will include: Post-fire recovery, the Burned Area Emergency Response process, Biochar production, and changed soil hydrology after multiple burns.

The field trip for the tour will take place at a site with recently burned soils in the Mt. Hood National Forest.

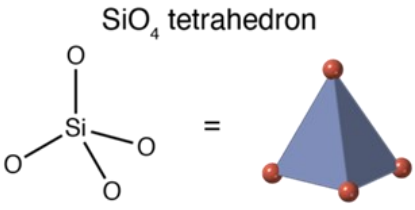
Register for the 2025 Winter Meeting here:

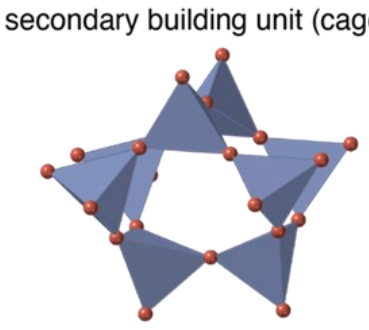
https://www.oregonsoils.org/events/

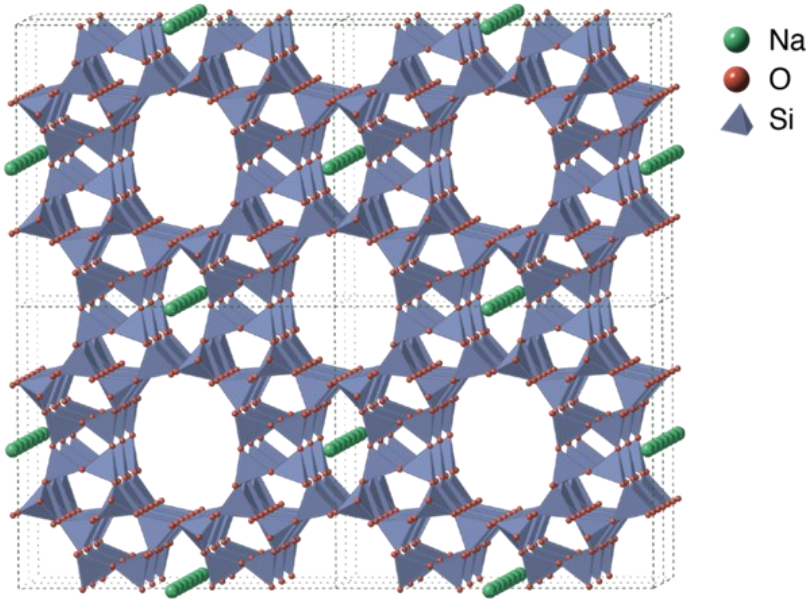
Zeolite Soils

Zeal for Zeolite!

I would guess that upon hearing the word "zeolite", for many of us what comes to mind is a sorbent-y material you often find at the pet store or perhaps for absorbing and cleaning up oil in your garage – but they can do so much more! Zeolites, along with other common minerals such as quartz and feldspars, belong to the tectosilicate (or "framework") class of aluminosilicate minerals, meaning that their crystallographic structure is highly three-dimensional. However, unlike quartz and feldspars, zeolites are 'metastable' and can easily dissolve or be altered to another mineral if the conditions change. This is because zeolites (as with smectites) form by precipitation from solutions saturated with aluminum and silicon in the presence of basic cations like sodium and calcium. Due to their mechanisms of formation, they are commonly found associated with volcanism, including volcanic rocks and the soils which form from them or their ashes. Hence zeolites are frequently found in soils across the State of Oregon, but to my knowledge there are no soils (here or elsewhere) in which zeolitic mineralogy is dominant, i.e. there is no zeolitic family mineralogy class. I became particularly interested in them when I began working on the Middle Fork Ranger district of the Willamette N.F., because (according to David Sherrod's 1986 Doctoral thesis) the volcaniclastic rocks (tuffs) have a significant component of zeolite minerals and I wondered what functional/edaphic differences this may lend to the tuff derived soils. Interestingly, the term "zeolite" was coined in the 1750's and was inspired by the observation that heating of the mineral released large amounts of water vapor which had been adsorbed and was held in the mineral matrix. Thus, like the short range order minerals commonly found in Andisols, zeolites hold significant amounts of water in cavities created within the mineral structure, potentially altering site water availability or energy relations when present in sufficient quantities. The ability of zeolites to hygroscopically retain water is related to their exceptionally high cation exchange capacities (water being held by charged surfaces), with values of common zeolite minerals ranging from ~200-450 meq/100 g. In regions of the







Mordenite (MOR framework)

world with high cation leaching rates, such as the Western Cascades, though they may only be 3-10% of the clay fraction, zeolites likely provide a crucial means of slowing nutrient losses and maintaining water quality. Finally, zeolites are often used in the petrochemical industries as solid-state catalysis of hydrocarbons, especially the acidic zeolites which act as solid acids. In the little time I have spent thus far on the District, I have noticed that tuff-derived soils often appear to be lower in organic matter and are easily recognized in the field by their uniform buff (tuffs are buff!) color. Given the ability of zeolites (along with Fe and Mn oxides) to catalyze the break down of complex organic molecules leads me to wonder whether mineral catalysis may be a strong determinant of organic matter fate in these tuff-derived soils.

Figure 1 - Relatively bad photo of a colluvial soil derived from tuff in an area that burned in the Chalk Fire. Note the buff color of the soil. Photo credit VWA, 2024

So in summary, while zeolites may not be proportionally dominant clay minerals in most of our area's soils, they nevertheless have some interesting properties which may have an outsized influence on the ecohydrologic (or edaphic) functioning of soils in which they occur. Owing to their high CEC, a soil with 1% zeolite would have approximately the same CEC as a soil with 100% clay that is kaolinitic! Also they can release water with heating; which implies that soils with zeolite minerals in the surface and which occur on warmer aspects (S, SW) may have increased drought resilience owing to the retention and release of hygroscopic water. Finally, because of their complex structure and surface chemistry, the natural catalytic property of zeolites may play some role in the abiotic component of organic matter processing and storage in our region's soils. However, based on a quick literature search there have been no comprehensive studies focused on these minerals in natural soils outside of their use as an agricultural amendment. Clearly, more work is needed!

Vance Almquist-Past President

Interview with Genevieve Landucci
New Regional Forest Service Soils Scientist

Genevieve Landucci started last year as the new Forest Service Regional Soil Scientist for Oregon and Washington. Being new to the region, OSSS wanted to take the opportunity to welcome Genevieve and introduce her to our members.

Sarah Brame– Sharpshooter Editor

What is your current job and what are your main duties?

My current job is USDA Forest Service, Pacific Northwest Regional Soil Scientist. I am the soils program leader for the national forests in Oregon and Washington which entails providing leadership, support, and recommendations for personnel at all organizational levels in the management, protection and enhancement of soils and watershed resources. I like to consider my job as the soil's cheerleader in the natural resource realm.

Could you tell us about your career path?

Started my soils career right after graduating from Cal Poly. I was hired under the career internship program for USDA-Natural Resources Conservation Service as a soil scientist down in the Mojave Desert. I spent three years doing initial soil mapping of the Mojave National Preserve. Then I took another soil scientist position on the central coast of California. I spent seven years working on all sorts of soil surveys, from urban mapping in Los Angeles to remapping portions of San Fransico Bay area. After almost ten years with soil survey, I was done traveling so much for work and wanted to be home with my family. That's when I moved to Navada to be a resource soil scientist where I worked with conservationists, engineers, and landowners/operators providing technical soil services. Now I find myself still working for the USDA but with the Forest Service in Oregon, a place I always wanted to work.

What was your inspiration for becoming a Soil Scientist?

I had never heard of soil science as a degree or career till I was in college. At Cal Poly I wasn't happy in my engineering classes. Had a friend, who told me that her major was fun, included hiking around, and I should try it. Met with the head of the Earth and Soils Department, and he recommended soils science since I had already taken every calculus, physics, and chemistry class. The rest is history.

What aspects of your job you like the most?

I enjoy collaborating with other disciplines. For much of my career I was working on soil survey, mapping areas of California, typically by myself or as a small soils crew where the goal was to produce soils map and fill in missing data. Now I get to help interpret and explain the significance of soils and soil mapping that I spent much of my career creating.

What is the most interesting or bizarre soil profile you have ever seen?

Back when mapping soils in Los Angels County I was digging a soil pit in a park near the coast. After getting through the top 50 or so centimeters of fill material there were blue clays underneath. Like blue, blue soils. I pulled out my Munsell color book and started recording the colors because they started to oxidize quickly. I remember being awe struck by the vibrant blue colors, and I wanted to tell someone. Unfortunately, I was alone and enjoyed the surprising blues soils by myself.

What is your favorite soil order?

Mollisols!

What advice would you give to new soil scientist?

Get your hands dirty! Dig more holes and check out the soil. There are lots of maps, models, and available data but nothing replaces looking at the soil yourself.

CONTRIBUTE YOUR OREGON SOILS PHOTOS TO THE OSSS ARCHIVE

Send an email with the following and any additional information to morenov@oregonstate.edu to contribute to our interactive map of Oregon soils

01

High resolution photo of entire soil profile

Please only send JPG or PNG file format photos

02

A link to an Official Soil Description

If not yet described by the NRCS, share a brief description of the soil properties

03

Location of the soil profile

Include coordinates, general location or regional description

04

Photo credits

Include the name of photographer and source of the additional soil information

Soil Carbon Monitoring

Monitoring Soil Carbon across National Forest System lands

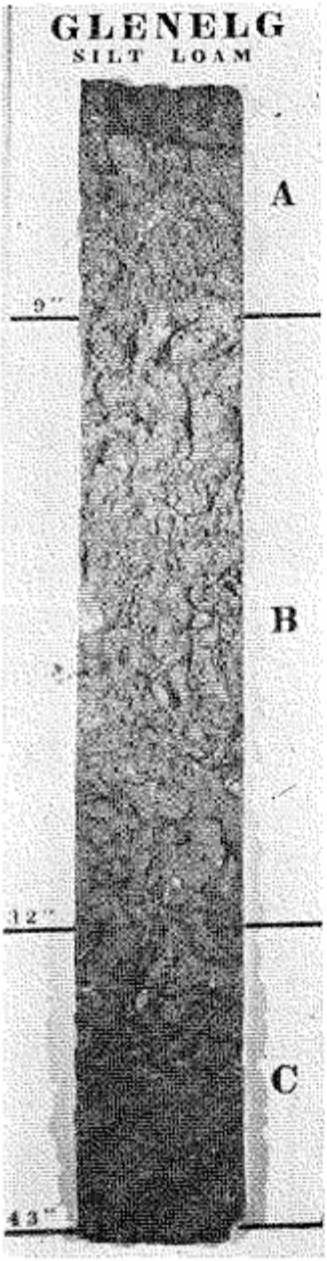
Oregon and Washington Forest Service Soil Scientists began collecting soil samples this last year in response to a national effort to build a better soil carbon database. The National Forest System Soils Program and Research & Development Program has led this effort to collect and compile soil carbon data across the nation.

Currently soil carbon data is in many different formats and locations which has made it difficult to use. The goal is to harmonize the data into one location and to create a database specific to storing, monitoring, and modelling soil carbon in support of data driven land management practices across NFS lands.

The goal in the next couple of years is to outreach with USDA Forest Service Soils Community, USDA NRCS, and other external partners, Curate digitized soil carbon datasets from NFS lands, and Develop schema for USFS soil carbon database with crosswalks to NRCS and other existing soil carbon databases. The hope is by bringing all the data together will build a better tool for monitoring and managing carbon data. More information on carbon monitoring can be found at https://research.fs.usda.gov/inventory/carbonmonitoring

Sarah Brame-*Sharpshooter* Editor

Let's Take a Soil Monolith

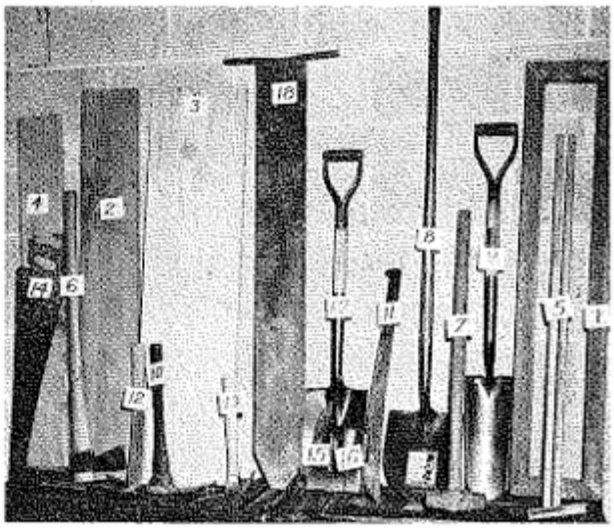


H. C. Porter, R. E. Devereux, G. R. Epperson[1]

Some 3 years ago a few soil scientists were the only ones taking soil monolith samples. Recently, the interest among vocational agriculture teachers, Extension Service workers, and others in obtaining representative samples for local use has developed to the point where the demand can be filled only by local personnel. This circular is designed to help them.

Persons taking samples, of course, need to have sites representing certain soils properly identified by a competent soil scientist.

In the following pages, you will find a picture story of each important step in taking a large soil monolith.



Equipment for taking soil monolith.

[1]Associate Agronomist, Formerly Soil Scientist USDA, Associate Extension Agronomist, respectively.

Leaflet No. 3 April 1960

Virginia Agricultural Experiment Station
Virginia Polytechnic Institute
Blacksburg, Virginia

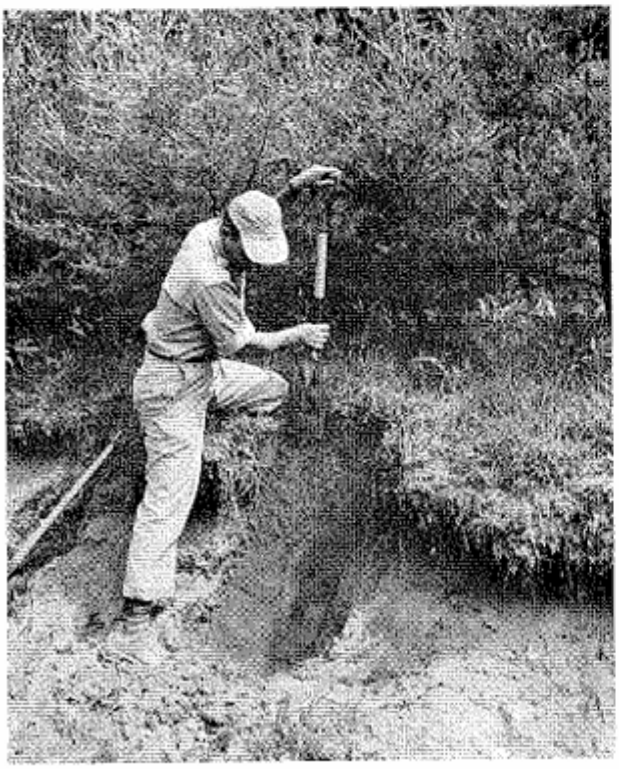
EQUIPMENT

To do a good job of sampling, you will need the proper equipment and tools.

It is very important that you have all the listed equipment and supplies before starting on your sampling expedition.

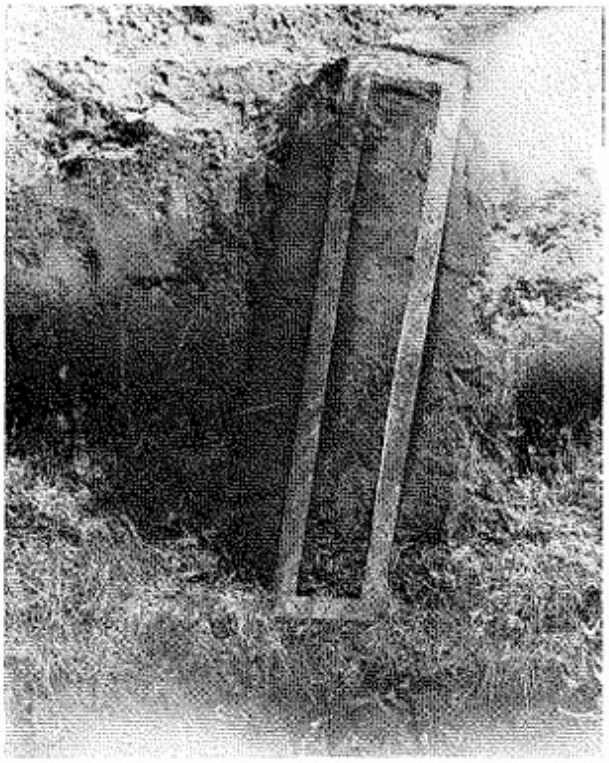
1. Steel frame made of 2 x ¼-inch angle iron. Inside measurements of frame 6 x 42 inches. This will be referred to as the "monolith sampler."
2. One-inch board (plywood) 10 x 48 inches. This is the "cover board."
3. One-half inch plywood board 12 x 48 inches. For mounting sample and will be referred to as "mounting board."
4. One-inch board 6 x 42 inches. For use in pushing soil from sampler. This will be referred to as the "push board."
5. One-inch wood strips 48 inches long to protect sides of sample and 6 inches long to protect end of sample. Will be referred to as "protection strips."
6. Large mattock.
7. Sledge hammer (6-8 lb.).
8. Long handle round pointed shovel.
9. Sharp shooter (16 inch drain spade).
10. Small army pick.
11. Large knife with heavy blade (machete).
12. Short handle stiff bladed knife (hunting).
13. Claw hammer.
14. Hand saw.
15. Tin snips.
16. Ice pick; supply small nails.
17. Flat spade.
18. Special cutter

Taking a Soil Monolith



1. Dig a pit 4 by 4 feet and as deep as necessary to get the soil profile. A road cut may be selected but much care must be taken to insure an undisturbed profile. Above picture shows how cut or side of pit should be smoothed with "sharp shooter" or flat face spade.

2. Steel sampling frame (monolith sampler) being driven into side of cut with sledge hammer. If soil is very hard or contains gravel, mark soil by running knife along side of frame. Cut around this marked area so that frame may be forced over cut.

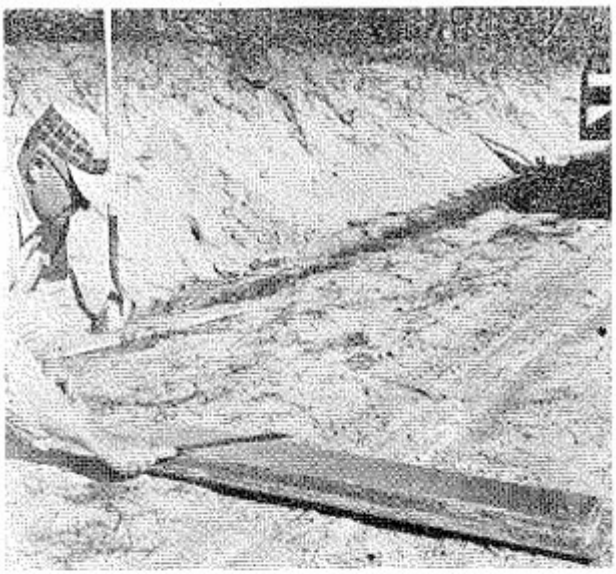


3. Monolith sampler driven into side of prepared cut. Note that the face of the sampler is flush with the soil.

4. After cover board (10″ x 48″ x 1″) has been bolted onto face of frame, use care not to loosen frame around soil. Dig soil away from sides of frame and cut soil behind the frame with sharp shooter. All roots must be cut. When they are fairly large, use pruning saw to cut them.

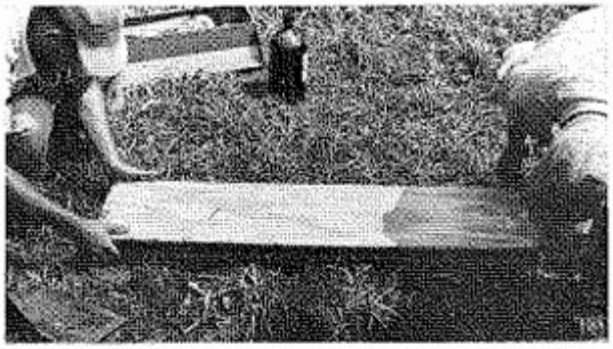
5. When moisture conditions are good, soil may be cut behind the frame with a special tool designed for the purpose.

6. Sample is placed on smooth surface with cutting edge of sampler up.



7. Using large knife, trim soil level with cutting edge of sampler.

9. Remove cover board from face of frame. Replace with push board (6″ x 42″). Holding push board with thumbs at each end, push down at each end. At the same time lift up the sampler frame leaving the soil sample on the mounting board.



8. Carefully place plywood board (12″ x 48″ x ½″) against cutting edge of sampler containing soil. This is the soil sample mounting board and should be carefully centered on soil sample, placing the top of the sample about 3 inches from edge of the board. Now you are ready for a very important step, turning the sample completely over so that the smooth side of the soil rests on the mounting board. This operation requires two men. Care must be taken so that the mounting board does not slip.

10. Place mounting board with soil sample on face of sampler. Whisk loose soil away. Hold protection strips firmly against sides of sample and nail to mounting board. At this point, your monolith sample is about 2 inches thick. Using an ice pick or a pointed knife, pick the soil down to at least 1 inch thickness. This is done by picking out structural peds. The operation is best done immediately after taking sample, as moisture conditions are quite favorable at that time. When soil is picked down to desired thickness, store your sample in a safe place for drying.

11. Using a beaker or tin cup, pour dope over the soil until it is thoroughly saturated. Treatment of each sample will require approximately one-half gallon of dope. The dope is a mixture of one-third Keytone, two-thirds Acetone and 350 grams of Vinylite resin (VYHH) to a gallon. When the dope has penetrated the soil, remove the protective strips of wood from the edges of the soil. Allow to dry.

Soil Monoliths On Display at OSU

OSSS Annual Tour

RESCHEDULED from Oct 2024

May 2025

Undamming the Klamath River

Join OSSS as we explore the Klamath Dam Removal Project, discuss local soils issues, and as always, investigate unique soil pits. Housing will be provided at OSU Klamath Basin Research Station.

Stay tuned for specific dates and agendas!

OREGON SOCIETY OF
Soil Scientists

The Sharpshooter is the official quarterly newsletter distributed to the members of the Oregon Society of Soil Scientists. Send address changes or inquiries about membership to: osss.pres@gmail.com or

OSSS | P.O. Box 391 | Corvallis, OR 97339

OSSS Webpage: www.oregonsoils.org

We always welcome article submissions and news from soil scientists near and far!

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