### **The Sharpshooter** Oregon Society of Soil Scientists Quarterly Newsletter Summer 2019



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### The Chetco Effect OSSS Summer Tour September 12-13th

The Oregon Society of Soil Scientists is making an excursion to Oregon's "Banana Belt" for our summer field tour, hosted in cooperation with our friends at the Northwest Forest Soils Council! Spend two days with fellow soils professionals and enthusiasts as we explore diverse landscapes on the Rogue River-Siskiyou National Forest. We'll hear from members of the Forest's Burned Area Emergency Response (BAER) Team to learn about how soils are affected by fire and drive



watershed response. We'll also learn how local land managers are responding to a diverse array of resource concerns in the wake of the fire. Potential field topics include soil burn severity mapping, salvage logging, protection of critical infrastructure, management of noxious weeds and rare plant communities, and forest management for insects and disease. And, of course there will be soil profiles!

We will camp out along the stunning Chetco River at Alfred Loeb State Park. We will see and discuss impacts of the Chetco Bar fire on soils and ecosystems and the strategies land managers employ to reduce the impacts of wildfire. We will also see some absolutely glorious flora, geology, and soils; including coastal redwoods, peridotites, and serpentinitic soils.

Registration is currently live and can be found at

https://www.oregonsoils.org/upcoming-meetings/event-registration/

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### **Editors** note By Vance Almquist

Welcome to the Summer 2019 Sharpshooter. In this issue you will find a thought-provoking review of an oft-forgotten pedological process, highlights from soil resource inventory work above the arctic circle, and even a poem. You can also find a couple of important updates about the scholarships OSSS is offering this fall and of course, the up coming Summer tour in Brookings, OR.

On another note, I want to take a moment to provide an update on a forthcoming, special issue of the sharpshooter. You might remember that earlier this year I outlined a proposed issue featuring the research and other scholarly soil-related work from around the state and region. I have been hard at work Un-named rivers empty into the one we explore, developing the peer-review and submission guidelines and the typesetting format. Submissions will be solicited in late fall via email with publication expected by early spring. If you think you are up to reviewing an article, please send me an email. In the meantime you can expect to see a call for reviewers and submissions sometime late next month.

Enjoy this edition of the Sharpshooter! Vance Almquist *Sharpshooter* Editor

# **OSSS 2019 Scholarships**

#### Update by Vance Almquist

OSSS is pleased to announce that we will once again be offering scholarships! Applications are due this fall. The application deadline will be early fall and is limited to current members who are pursuing a soil-related degree. Detailed requirements and application guidelines will go out in an email and be posted to the website in the coming month. The awards are expected to be announced sometime in October.

## Sharpshooter Annals

A poem by Randy Hinson, Spring ed. 2007

- Back in time, in history we know, The first Soil Survey went up the big Mo, Clark did the veg, Lewis the soils, They drew out new maps, the landforms, the spoils.

Over the Bitterroot to the Snake River plain, Gathering quamash for hunger, willow for pain. At the mother of rivers westward it flowed, Clouds of salmon went by; "well" that's what we're told.

Onward they pushed this un-daunting crew, Lewis, Clark and Sacagawea too.

Over Celilo Falls an ominous roar.

Past potential site for city or town, The fleas are of clouds and bring us all down.

We can't quit now, we are so near, But, the crew is sickly, sickly we fear.

It's been raining for days, will it ever end? Just beyond our reach, just around the bend.

West wind blowing, a fresh new scent, As a chill comes over, we know what is meant.

Standing upon the sands, the horizon is vast, The Pacific, pacific at last.

Imagine if you can, no Buoy 9 Restaurant & Lounge, No fort to hold up in, not one could be found.

No Rusty Cup Beanery to get something to eat, No market or grocery just up the street.

No Wet Dog Cafe to get a cold brew, There was nothing like that for those exhausted few.

No Holiday Inn under the bridge, No Column to stand near up on the ridge.

It was a journey unwritten, a story to be told, No one knew how it all would unfold.-



### 2019 Dalton Forest Inventory and Dietrich River Fire

#### By Marissa Theve and Ron McCormick

0600 – Generator on the RV starts up ... good, can sleep for another 30 minutes 0630 – Generator shuts down, so we know Ken has his fresh coffee ready 0700 – Quick breakfast on the banks of the Dietrich River, cuppa tea and prep for the day 0729 – Packs packed, lunches made, water bottle filled, boots, hats, sunscreen, DEET, bear spray 0730 – In the trucks, ready to go, and always home before dark

And so it went for 27 combined field and travel days, with 3 days off in-between, for the team of eight collecting soils and vegetation data on BLMmanaged lands along the Dalton Highway. Eric Geisler, program lead for forestry, soils, invasive species, range, botany, ES&R for Alaska BLM, organized the second year of this broad-scale yegetation and soils data collection project. The field crew included: Ken Stumpf, Sage Romberg, and Chris Stumpf from Geographic Resource Solutions (GRS), Arcata, CA; Marc Much (Salcha-Delta Soil and Water Conservation District), Ron McCormick (BLM-WO), and Marissa Theve (BLM-OR-NWOD); Summer Nay (Salcha-Delta Soil and Water Conservation District); Andrew Davies (intern with BLM-AK from the Chicago Botanical Garden); and Charlie Gusty (Stoney River, AK), our field guide, bear guard, and most-welcome soil pit digging assistant. Field sampling occurred during a four-week period, beginning in Fairbanks on June 17th and ending back in Fairbanks late Saturday, July 13th; during this time the field staff endured not only very difficult hiking conditions due to vegetation (2-3' tall tussocks) and terrain (30 to over 70 percent slopes), but also abnormally high summer temperatures (high 70s to mid-80s) and smoke from the Hess Creek Fire near Livengood.



Project lead, Eric Geisler in front of cryoturbated frost heave mound

A total of 86 field sites were selected by contractors <u>Geographic Resource Solutions</u> (GRS) based on 2016 Landsat 8 imagery and grouped by reflectance characteristics. [Some elements of this report were borrowed from the GRS trip summary, located <u>here</u>, along with summaries from previous years.] The team conducted training and sampled test plots by the Yukon River Crossing, then traveled 175 miles north to the foothills of the Brooks Range, to the last spruce trees near Atigun Pass, and worked their way back south to Fairbanks (about 245 miles each way). Ken, Sage, Chris, Summer and Andrew used linepoint transect sampling to develop species/ landscape feature-specific canopy cover estimates. Over time, GRS has adapted this methodology to include forest inventory estimates that include species-specific estimates of trees/acres, height, cubic volume, and biomass (dry tons/ acre). All trees, shrubs, herbaceous and nonvascular plants were observed and recorded, as well as landscape features that represent abiotic site features related to the sampled plant communities. Specific transects were integrated into the sampling protocol to estimate coarse woody debris by decay class and fine woody debris by fuel class. The resulting sample area field summary data will yield species-specific estimates of canopy cover, quadratic mean diameter, trees/acre, average height, cubic volume/acre, and biomass (dry tons)/acre.



Left to right: And

Left to right: Andrew, Sheilla (AK BLM volunteer), Summer, Max (four- legged AK BLM volunteer), Marc, and Marissa at the Arctic

For the first 14 days, Marc and Ron dug soil pits and collected soil survey description data at each field site. After two weeks of grinding through till and chipping away at permafrost, Ron happily handed his tent off to Marissa, who gladly took her turn using the ice bar with Marc for the remainder of the field hitch. Soil types ranged from sandy alluvial deposits, to organic-rich permafrost, to very gravelly and cobble-filled glacial till, to thin lithic residuum. Vegetation data will be imported to EcoSurvey and soils data will be provided to NRCS as base information in developing an initial soil survey map and completing ecological site description (ESD) products.



Ron enjoying our public lands after a hard day's work

Throughout the data collection adventure, the team endured high temperatures and predictable summer bugs, thick brush, and 24-hour daylight. The last weekend of work included a visit to lands burned in the 2017 Dietrich River Fire to install and survey two <u>Assessment, Inventory, and Monitoring</u> (AIM) plots and to inventory and hand-pull invasive species. With DEET and endurance on their side, everyone returned safely to Fairbanks by July 13<sup>th</sup>.



A day in the field is better than any day in the office

\* Steven S. Perakis, Julie C. Pett-Ridge. Nitrogen-fixing red alder trees tap rock-derived nutrients. Proceedings of the National Academy of Sciences, 645<sup>3</sup>; 645<sup>2</sup>58<sup>12</sup>6 DOI: <u>10.1073/pnas.1814782116</u>

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### **Featured Article**

### Trying on a new pair of glasses :

A review of : Johnson, D.L., Schaetzl, R.J., 2015. Differing Views of Soil and Pedogenesis by two Masters: Darwin and Dokuchaev. Geoderma 237-238, 176-189.

### Contributed by: by David Rand

ary, a widespread tree-throw event occurred on the southern Willamette National Forest. Observing the amount of soil lifted and moved downhill by the uprooted trees challenged my preconception that bioturbation is just a pedological curiosity. Then I came across a 2015 paper by D.L. Johnson and Randy Schaetzl that explained why I'd glossed over tree-throw and other bioturbation processes all these years. I recommend reading it.

"Differing Views of Soil and Pedogenesis by two Masters: Darwin and Dokuchaev," blends literature review with a good deal of philosophizing. The authors, seasoned researchers in pedology and geomorphology, argue that the effect of bioturbation in pedogenesis has been generally underestimated and should be regarded as a dominant soil-forming process operating in most soils. They develop their point by comparing the ideas and careers of two important figures in soil science: Vasily Dokuchaev and Charles Darwin. Dokuchaev's Russian Chernozem (1883) established the state factor model (aka soil-forming factors) as the accepted framework for explaining and mapping soils. If Hans Jenny is the father of CLORPT, then Dokuchaev is "Grandpa."

Everyone knows about Darwin the evolutionist, but few know he had an abiding interest in soil. His very first scientific paper (1837-1838) dealt with soil formation. His last (1881) reported on

long-term experiments showing earthworms I'm trying on a new view of soil genesis. In Febru- could deposit castings on the soil surface at a rate of 1 acre-inch every 5 years. Considering pedology was brand new, Darwin's findings might have given bioturbation credence as a primary soilforming process, but instead bioturbation was overshadowed by other soil-forming processes viewed at the time as mainly abiotic. To most 20th-century pedologists, the "O" in CLORPT was very small.



Left: an engraving of a worm casting measuring 3 in x 1 in. Calcutta, India. Top: Burial of roman walls interpreted to be the result of worm casting. Image credit: Darwin, C. R. 1881. The formation of vegetable mould, through the action of worms, with observations on their babits. on their habits.

Rediscovery of biologically-driven pedogenesis has actually been happening for 30 years or so. In 1993, Johnson coined the term "dynamic denudation" for his biologically-driven model of landscape evolution. The bioturbation aspect of the model is known as biomantle theory. It is basically a way of looking at topsoil which emphasizes biomechanical action (burrowing, tree-tipping, etc.). With the biomechanical help of flora and

About the Author: David Rand is an NRCS soil scientist based out of Salem, OR. He is currently part of the Willamette National Forest initial soil survey team.

fauna, biomantles can move rapidly downslope. When parent materials contain fragments and bioturbators prefer to move finer particles, fragments can sink and concentrate at the base of the biomantle. To visualize the process, imagine a game of Jenga in which a specially-marked plank that cannot be moved (the fragment) appears to sink beneath the growing stack. Such fragment-rich layers, also referred to as 'stonelines', are typically interpreted as a the erosional remnants of a former soil. However, it appears to me that an extension of biomantle thinking suggests even more provocative genetic interpretations of many soil horizons. Case in point, what if the top of a Bt or Bk horizon marked not where clay illuviated or carbonates precipitated, but rather the depth to which bioturbation destroys the evidence of those processes?

The authors acknowledge both Dokuchaev and Darwin made great contributions to the science. They advocate that biomantle and state factor theory be integrated. Still, it still strikes me that the Darwin-Dokuchaev-compare-and-contrast format reveals the authors' distaste for Dokuchaev's ideas. Maybe they dislike the nuance of the term "state factor" because they feel it implies soil is static.

State factor and biomantle theory need not compete. State factors provide context for all soilforming processes, including bioturbation. Imagine how bewildering soil mapping would be if all that was known about soils was that they are churned by organisms? Such a process-only view might correctly identify the biological origin of mima mounds or a few stonelines, but without knowing the relationship between the environment and soil features, how could the type and magnitude of pedogenic processes be understood across a landscape?

Even if you don't buy into "big" bioturbation, the article is an interesting look at history. If you want to incorporate biomantle theory into your own mental model try asking questions like, "Who are the bioturbators in this soil? Are they mixers or sorters? What particle-sizes do they move? Which CLORPT factors control the pedogenic impact of each bioturbator?" So, how does the Willamette National Forest look through the biomantle lens? Well, the soil never sits still now, but that's ok because it doesn't move that fast. Actually, I might see it more clearly than before. 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:

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