Note: Leif Karstrom's was unable to give the talk listed here. Dave Wagner gave the substitute talk "Sex Lives of Plants"

Nature Trails

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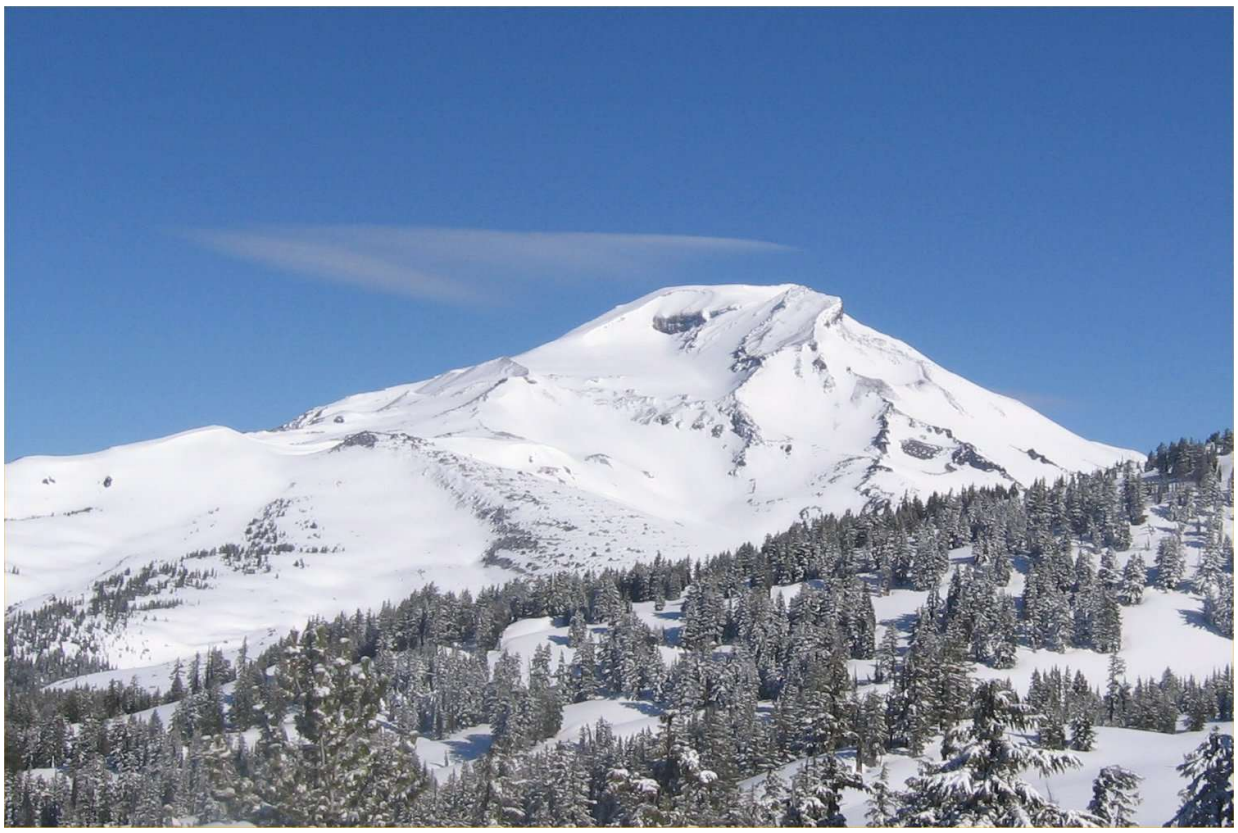
The Eugene Natural History Society is based out of the traditional homelands of the Kalapuya peoples, most of whom are citizens of the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians. These Indigenous people stewarded this land for millennia and continue to play an active role in local communities. We commit to supporting the many Tribes and Indigenous scholars and organizations working to shape the future of these lands and waters that we mutually cherish.



South Sister, 6 June 2012.

The Giant Aquifer of the Cascades

Leif Karlstrom

Department of Earth Sciences, University of Oregon

Friday, 20 February 2026, 7:00 pm

This month's meeting will be a hybrid of in person and real-time Zoom. The in-person lecture will be held at **7:00** in **221 Allen Hall, University of Oregon campus. Snacks provided!** The Zoom lecture link is https://zoom.us/j/97499095971?pwd=eE9sdG9hSHMvOHhIUEJuU21wT20rdz09 or see our website at https://eugenenaturalhistorysociety.org/

This Month's Speaker: Leif Karlstrom

If ever the tired phrase "man of many talents" were to be aptly used, it would be to introduce our February speaker, Leif Karlstrom. He is an associate professor of earth sciences at the University of Oregon. He is also a professional musician, playing violin and mandolin in two bands that perform both nationally and internationally.

Leif was introduced to geological research early in life. His father was a professor of structural geology who did some of his field research in the Grand Canyon. Leif got to accompany his dad into the canyon several times, his first trip being when he was 8 years old. However, this early exposure was not the impetus for his choice of geology as his scientific profession. He was put off by the long words and "didn't really understand what the point was."

Leif obtained a B.S. degree in physics (honors), a B.S. degree in mathematics, and a B.M. degree in violin performance, all from the University of Oregon, all in spring 2006. Just that short list says a lot about the range of his interests. It also suggests a healthy work ethic. During summers while an undergraduate, he was a river guide in Bend, Oregon, worked in a fish cannery in Alaska, and did some work in a physics lab. The winter before graduating, he was undecided as to what to do next. He was back in Albuquerque spending time with his family when one of his dad's colleagues asked him what he planned on doing the next summer. He said he wasn't sure, but he was thinking about doing some sort of research. The colleague knew Michael Mangas at the University of California, Berkeley who might have a research project he could work on. Leif contacted Mangas, who asked him come and work in the lab. There, Leif found that the physics he had learned could be applied to the volcanology he was now working on. Astrophysics was too big, subatomic physics was too small, but physics applied to earth sciences was just right. What started as a temporary gig turned into a Ph.D. project. In 2011 he received a Ph.D. in earth and planetary science from UC Berkeley and the Louderback Award.

After not liking geology as a youngster, Leif was now a budding geologist. He received an National Science Foundation postdoctoral fellowship that funded his work from 2012 to 2014 with Eric Dunham at Stanford University and has been a faculty member of the Department of Earth Sciences at the University of Oregon since 2015. The following is from the science section of Karlstrom's website: "I work on problems in volcanology, petrology, geodynamics, glaciology, and geomorphology. Active projects include the eruption cycle, melt focusing and crustal thickening in arcs, the Columbia River flood basalts, landscape evolution in volcanic environments, supraglacial hydrology, unsteady behavior in volcanic eruptions, and the interpretation of volcanic seismicity. My research involves a combination of theoretical and numerical models, field measurements, and laboratory experiments."

Leif has studied how water moves across and through the massive ice cap of Greenland. He has conducted work on the most active volcano on Earth—Mt. Kilauea, one of the two large mountains on the Big Island of Hawai'i. I asked him how many other volcanoes he has worked on. He answered "lots." His work spans the globe, and his research has been supported by both NSF and NASA: "Collaborative Research: Waves in Volcanic Conduit-Crack Systems and Very Long Period Seismicity at Kilauea Volcano, Hawaii", 2016; "Fluvial Supraglacial Erosion on the Greenland Ice Sheet as a Tracer of Spatially and Temporally Evolving Melt and Ice Sheet Dynamics," 2016; "The Legacy

Dataset of William H. Taubeneck: Structure and Geochemistry of the Columbia River Flood Basalt Group Feeder Dikes," 2016

His website has a separate section simply entitled "music." His mother is a professional musician, playing violin in an orchestra. Perhaps early exposure influenced his choice of instruments; he began studying violin when he was 5. The two touring bands he plays in are Front Country and Small Town Therapy. To hear Front Country jamming with Tibetan musicians next to the Sanjiangyuan River in Tibet, go to https://vimeo.com/273976182?fl=pl&fe=ti. Do this. You will not be disappointed. He demurred when I asked him whether he would play something for us after his ENHS presentation. But he said he would let us listen to some recorded volcano music.

Here is his summary of what he will tell us about.

> The Oregon Cascade Range showcases interactions between magma and water, Earth's two most important fluids in nearly every conceivable way. The region's topography, geology, climate, water resources, and ecology and the hazards arising from active volcanism all arise from these interactions over geologic time. Study of this near-surface environment where atmospheric and solid earth processes interact, collectively known as "critical zone science," facilitates natural resource assessment and the building of resilient societies. I will present recent work on volcanic landscapes of the Oregon Cascade Range, in which we seek to understand both the patterns of volcanic processes and the legacy of volcanism generally on the critical zone. I will focus on case studies in the Columbia River Gorge and the central Oregon Cascades, highlighting in particular the profound influence of volcanism on groundwater and surface water. In central Oregon, a volcanic bedrock age chronosequence indicates that the critical zone undergoes a structural shift, from depths of >1 km to only meters, over timescales of ~1 million years. This state shift explains the well-known dichotomy between high Cascades and western Cascades terrains and results in an active groundwater volume comparable to major continental lakes, stored at the Cascade Range crest. The study of volcanic landscape evolution thus provides a unique probe of deep coupling between Earth systems on display in the central Oregon Cascades.

Please join us on Friday, 20 February 2026 at 7 p.m. in 221 Allen Hall on the UO campus to hear Dr. Leif Karlstrom's talk "Giant Aquifer of the Cascades." As always, the cookies will be there.

If you can't join us in person, connect with us on Zoom: https://zoom.us/j/97499095971?pwd=eE9sdG9hSHMvOHhIUEJuU21wT20rdz09 or join from our website at https://eugenenaturalhistorysociety.org/

—John Carter

Immensity by John Carter

This past summer I had a unique experience. I sailed from Hawai'i to California. The sole member of the crew was my friend Steve Hodges, captain and owner of the 38-foot sloop *Frolic* (hands down best name for a sailboat) and a veteran deep-water sailor. Steve has owned *Frolic* for 30 years and has sailed about 30,000 miles in her. Several thousands of those miles were solo. He has encountered situations more sobering than any most of us have experienced. On our trip the passenger list consisted of me. We left Kona, on the west coast of the Big Island, on a July morning. In summer the trade winds blow steadily out of the northeast, meaning Kona is on the Big Island's lee side. The ocean around Kona was placid. Not enough wind to sail, so *Frolic*'s little engine came into play, pushing us north at a sedate pace. The calm start of our voyage abruptly ended. The channel between the Big Island and Maui acts like a funnel, and windspeed can be twice what it is in the open ocean. When we passed the northern tip of the Big Island we were exposed. Engine off and sails trimmed, we were dealing with serious wind, sometimes above 35 knots (1 knot = 1 nautical mile/hour). We were headed north, the wind was out of the northeast, and the ocean current was opposite the wind. A recipe for roughness. Being a total newbie, I got bounced around *Frolic*'s cabin like a pinball. I fell twice but managed not to break anything. We made

170 miles that first day, the most of any day on our trip.

After that frenetic start, the winds decreased. Several days later we were almost becalmed. There were times I could have walked faster than we were moving. But while we were ghosting along at 2–3 knots I had the leisure to consider how blessed I was to have this experience. I could not help but be struck by the immensity and simplicity of our world. For almost all of our voyage, there was nothing but seawater, clouds, and air for hundreds, even thousands of miles in any direction. Yet the interaction of those components powered by sun or lit by moon produced scenes of beautiful complexity and, occasionally, violent activity. Months later, thinking about our voyage, I am again made small.

I stood three 4-hour watches each day in *Frolic*'s cockpit, two at night and one in daylight. When conditions allowed, I had ample opportunity for contemplation. At some point I asked "how much seawater actually *is* there in all the world's oceans?" No internet connection, surprise, surprise, so I had to remember to look it up when and if we made it back to civilization. It's one of those numbers so large as to be almost incomprehensible. Swimming pools help a little; 1 km^3 of water will fill 400,000 Olympic swimming pools. The volume of seawater in all the world's oceans is 1.35 billion km^3, which is roughly 100,000 full swimming pools for every person on earth.

Where did all this water come from? How old is it? More deferred gratification. After I was safely back on dry land I learned that Earth's water came from the gaseous dusty regions of space between stars—the interstellar medium. Our water existed billions of years before the formation of our solar system, which is 4.3 billion years old. Some of the water molecules *Frolic* pushed aside as the wind ushered her toward our destination could have been 8 billion years old.

Looking at all that water, being mesmerized by the sound of *Frolic* moving through it, other questions came to mind: What about the salt? Where does it come from? How much salt is there in all the world's oceans? Are some parts of the ocean saltier than others? Again, things to find out after I got home. Saltiness varies. The Atlantic is saltier than the Pacific. The mid-Atlantic, i.e., west of the middle of Africa, is saltier than the north Atlantic. The ocean's salt comes from two main sources. Some minerals in rocks dissolve in fresh water and get delivered to oceans by rivers and streams. The other major source is openings in ocean floors, where water bearing salts comes up through the Earth's crust. Every liter of seawater contains roughly 35 grams of salt, and there are over 1 billion trillion liters of seawater in all the world's oceans. If we could magically remove every bit of salt from all the seas and spread it evenly over all the land on Earth—57.5 million square miles—the piles would be roughly 500 feet high. Imagine 500 vertical feet of pure salt everywhere.

On our voyage we were utterly dependent on the other component of this immensity: air. Restless air. Air on the move, which would be wind. My first impressions when *Frolic* took the wind were unexpected. I don't really know what I expected, but reality was better. On that first day, when the waves pounded her she just shouldered them off and came back for more. She felt alive, like she was having a good time. I could imagine her shouting, "C'mon, wind! Show me your best stuff!" It was strange at first, feeling her moving forward even though the wind was coming from the side or sometimes almost in my face as I looked forward. For this to happen, Captain Steve had to trim the sails and adjust the rudder just so, getting everything into balance. He and the ship were a team, each coaxing the best out of the other.

Countless molecules, mainly nitrogen and oxygen, running into and around *Frolic*'s sails, generated lift that let her move across the wind and even upwind. Where did it come from, the air that pushed and pulled *Frolic* from Hawai'i to California? The winds we experienced were a tiny part of Earth's atmosphere, just going past us as they moved from a high-pressure region to one of lower pressure. Nature abhors a vacuum.

But I'm thinking long term here. Where did our atmosphere come from? Parts of the earliest atmosphere were in the interstellar bits that came together to make our planet, so they were older than Earth. Those bits are long gone. Earth's atmosphere hasn't always been the same as it is now. Our planet's atmosphere has been obliterated at least twice in the >4 billion years

since Earth was formed. And its makeup has changed, too, over the eons. Lots of uncertainty here, but we know that the early atmospheres were mainly nitrogen and hydrogen gases. The oxygen we depend on came later, after cyanobacteria appeared.

Tragically, the makeup of Earth's atmosphere is changing more rapidly now than it has in perhaps thousands of years, and we humans are to blame. We've let the monster loose and we can't put her back in her cage. It'll get hotter. Storms will get more intense. Years from now the voyage we made might be too dangerous for innocents like me to consider.

Steve and I were on the water for >3 weeks. When the wind was very light we didn't have to pay attention to sailing. We didn't have to be tethered. We did laundry. Took baths. Read books. Those calm days were good for writing in my journal. But when the wind got up to about 5 knots, we started paying attention. Twenty knots and above? Completely in the moment. The hours that we were in a gale, windspeed around 30 knots, huge swells coming at our port beam, laying *Frolic* over far enough to put her lee rails under water.... I admit to occasional moments of terror.

For the rest of my life, I will look back on this trip and be thankful that I was clueless enough to ignore the potential for disaster and say "yes!" when Steve asked me if I was up for it. Our voyage from Kona, Hawai'i to San Francisco, California lent legitimacy to that overused phrase "trip of a lifetime."

ENHS Field Trip to Oregon Institute of Marine Biology (OIMB)
Charleston, OR
27 to 29 March 2026

We are returning to the OIMB for this late winter field trip! Possible activity options: tide pools near Cape Arago, estuary birding, Charleston Marine Life Center, and walks at South Slough Reserve/South Cove, Golden and Silver Falls State Natural Area, and Bastendorff Beach. Carpools will be arranged for traveling to Charleston and for any side trips.

Space: Limited to 20 participants. We have reserved five cottages and will have access to a large gathering area. All cottages have kitchens, so we will bring food to make our own breakfasts and lunches, with potluck meals on Friday and Saturday evenings.

Cost: Lodging is an amazing $53/person for the two nights (because we will be providing our own food). Checks should be made out to the Eugene Natural History Society and mailed it to Kris Kirkeby, 2080 Shields Ave, Eugene, OR 97405. Please provide participant name(s), phone numbers, home addresses, and email addresses. Include any dietary restrictions. Participants will not be enrolled until payment is received. **Deadline to register is March 13,** but don't wait. This trip usually fills up quickly.

For more information, contact Kris at kriskirkeby02@gmail.com or check the ENHS website and Facebook page.

Far left: Cape Arago
Left: Cabins at OIMB

Let's Go Salamandering!

Saturday, 4 April, 9 am, join the Eugene Natural History Society and Nearby Nature for a FREE salamander outing in the Coast Range! Salamander experts Tom Titus and Stan Sessions will lead a search for these secretive amphibians. Optional easy walking. Rain or shine. Families welcome. Bring water, lunch, and walking shoes. We'll return to Eugene by mid to late afternoon. Meet in the northeast corner of the South Eugene High School parking lot (corner of 19th and Patterson) to carpool and caravan to our site near the Whittaker Creek Recreation Site.

Upcoming Events

(for complete listings and details, see individual websites)

- **McKenzie River Trust** https://mckenzieriver.org/events/#event-listings or 541-345-2799
  Wednesdays, 9–11:30am. Watershed Wednesdays at Green Island. Projects include invasive species removal, habitat care, planting, and tree establishment. Sign up
  First Fridays, 9:30am. Explore the Willamette Confluence. See the MRT website for more information.
  Second Saturdays, 8am–4pm. Living River Exploration Day. Green Island, bilingual.
  Saturday, 21 Feb., 8–10am. Green Island Photography Walk. Join photographer GariRae for a guided photography walk through the riparian woodlands. Emphasis will be on creativity and connection with nature rather than achieving the "perfect shot." Sign up
- **Native Plant Society of Oregon, Emerald Chapter** https://emerald.npsoregon.org/
  Anytime. Self-guided Tour of Laurelwood Bog. Go south on Agate St in Eugene to the dead end at 29th. The entrance to the Bog is clearly signed, and the trails are covered with bark.
  Monday, 16 Feb., 7–9pm. Flammability and Treatment Options in Sagebrush Ecosystems of the Great Basin. Presenters: Sydney Turner, Sofia Koutzoukis. Zoom only: https://us06web.zoom.us/j/83626265623?pwd=8OxgVFFvEnlOFcVXKow2SUQwxeckYV.1
  Saturday, 7 Mar., 1–3pm. Gardening with Native Plants. Amazon Community Center, 2700 Hilyard St., Eugene.
- **Mt. Pisgah Arboretum** https://mountpisgaharboretum.com or 541-747-3817.
  Saturday, 14 Feb., 10am–noon. Slimy Valentine Family Tour. Look for amphibian eggs, poke oozy fungus, search for slugs. Preregistration required.
  Saturday, 21 Feb., 10am–noon. Winter Twig Tour. Leader: Sarah Erskine. Preregistration required.
  Sunday, 22 Feb., 9am–noon. Water Garden Work Party. Spread fine gravel on the water garden trails. Please sign up.
- **Coast to Cascades Bird Alliance** www.laneaudubon.org or 541-485-BIRD; maeveanddick@q.com or 541-343-8664
  Tuesday, 24 Feb., 7–9pm. Breathless: Celebrating Salamanders and Their Small Wild Spaces. Presenter: Tom Titus. Campbell Center, 155 High St., Eugene.
  Saturday, 7 Mar., 8–11am. First Saturday Bird Walk. In celebration of inclusivity and diversity, birders of all levels and backgrounds are welcome. For more info, contact Sarah: 1satbirdwalks@ccbirdalliance.org.
  Saturday, 21 Mar., 8–11am. Third Saturday Bird Walk. For more info, contact Lalla at tolalla@gmail.com.
- **Museum of Natural and Cultural History, University of Oregon** https://mnch.uoregon.edu/museum-home
  Ongoing exhibits: Oregon—Where Past Is Present; Explore Oregon; Roots and Resilience: Chinese American Heritage in Oregon; ReEnvisioned: Contemporary Portraits of Our Black Ancestors
  Saturday, 21 Feb., 10am. Arctic Adventure Family Day. Explore how animals and people have thrived in the Arctic for 1000s of years. Artifacts from the Jensen collection.
  Thursday, 12 Mar., 6pm. Listening to the Pulse of the Past. Artist and poet Sam Roxas-Chua Yao has worked alongside archaeologists in Astoria, The Dalles, and John Day to explore Chinese history in Oregon through audio field recordings, calligraphy with inks made from collected material, and poetry inspired by site surveys and subject matter experts.
- **Nearby Nature** https://www.nearbynature.org/ or 541-687-9699, 622 Day Island Rd., Eugene (Alton Baker Park)
  Monday, Wednesday, Friday mornings. Wonder Keepers. Preschool program outdoors in our Learnscape.
  Tuesdays and/or Fridays afternoons. Natural Neighbors. After-school program outdoors in our Learnscape.
- **Lane Country Butterfly Club** https://www.lanebutterflies.org (new website)
  We foster enjoyment, knowledge, and conservation of butterflies through education and presentations, field trips, monitoring and habitat conservation.

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and
https://www.youtube.com/channel/UCEryzVh9lw9y-nLS_t94BVw

Mt. Kīlauea summit eruption, December 2024. *U.S. Geological Service/K. Lynn*

Eugene Natural History Society
P.O. Box 5494
Eugene, OR 97405

Monthly meetings:
When: September–May: third Friday; December: second Friday
Where: 221 Allen Hall (UO campus) and/or on Zoom at https://zoom.us/j/97499095971?pwd=eE9sdG9hSHMvOHhIUEJuU21wT20rdz09
Time: 7:00 pm
Parking for UO events is available at the UO Physical Plant lot: From Franklin, turn north onto Onyx, go 1 block to the lot. After 6pm, it's open to the public.
See our website for more details.
http://eugenenaturalhistorysociety.org/

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2025–2026 Speakers and Topics

19 Sept.	**Joe Moll**	**The Audacity of Perpetuity: Land and Water Conservation in Uncertain Times**
17 Oct.	**Jamie Cornelius**	**Amazing Adaptations: How Birds Survive Stormy Weather**
21 Nov.	**Matt Betts**	**Can We Have Our Cake and Eat It Too? Conserving Forest Biodiversity in the Age of Humans**
12 Dec.	**Paul Bannick**	**A Year in the Life of North American Woodpeckers** (cosponsored with the Coast to Cascades Bird Alliance)
16 Jan.	**Marie Tosa**	**The Curious World of a Stinky Neglected Carnivore**
20 Feb.	**Leif Karlstrom**	**Giant Aquifer of the Cascades**
20 Mar.	**Anne Thompson**	**Marine Microbiology and Ecology**
17 Apr.	**Heron Brae**	**Oak Savannah Communities** (cosponsored with the Emerald Chapter of the Native Plant Society of Oregon)
15 May	**Samantha Hopkins**	**The Relationships among Paleontology, Climate Change, and Extinction**