# Nature Trails

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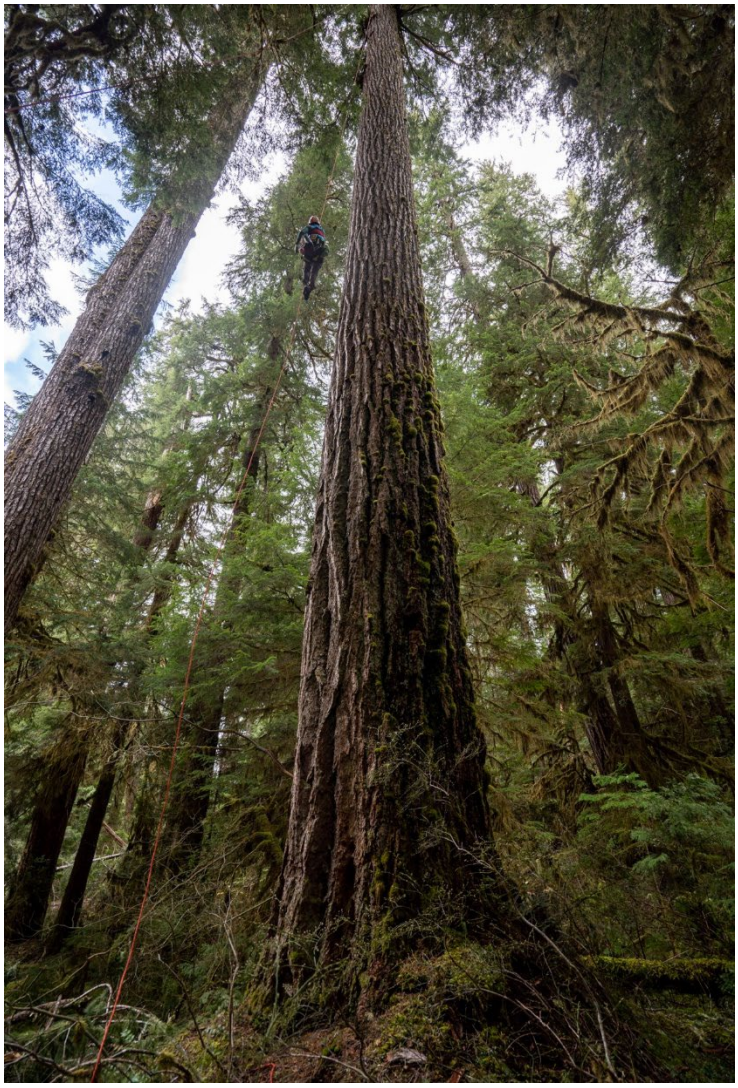

Ferrari heading up into the canopy. *Matt Betts*

## Into the Third Dimension:

## Understanding Vertical Microclimatic Gradients and Bird Distributions in the H.J. Andrews Experimental Forest

**Nina Ferrari**

**Oregon State University, Corvallis**

## Friday, 21 March 2025, 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.** The Zoom lecture link is https://zoom.us/j/97499095971?pwd=eE9sdG9hSHMvOHhIUEJuU21wT20rdz09 or see our website at https://eugenenaturalhistorysociety.org/

**This Month's Speaker: Nina Ferrari**


Imagine climbing into the swaying crown of a 300-foot Douglas-fir, bark dust clinging to your skin and the forest canopy stretching outward in all directions like a living sea. From that height, the layered world of an ancient forest reveals itself—moss-draped lower limbs, shadowed midstory, and sunlit canopy where warblers flit and red crossbills chip their calls. This is the world where Oregon State University doctoral researcher Nina Ferrari works, not by observing from below but by climbing into the vertical realm of the forests.

Nina blends naturalist curiosity with cutting-edge technology and a collaborative approach to forest science. She wants to offer new insights into how forest songbirds use vertical space and how ancient forests may provide climatic refuges critical to avian survival in a warming world.

Nina's path into forest science began in suburban Virginia, where her parents, both field researchers, modeled curiosity and exploration. Her mother, a volcanologist with the U.S. Geological Survey, and her father, a plankton biologist at the Smithsonian Institution, introduced her early to the idea that science was a way of exploring the world and asking questions about how it worked.

When Nina was a child, her curiosity flourished in nearby streams where she and her father would wade to collect tadpoles and insects. Her father had a gift for identifying and linking even the smallest creature to a larger ecological role, which greatly impacted Nina's ability to see and appreciate her experiences of nature through an ecosystem lens. This approach sparked her desire to expand her view.

Nina's understanding of science as a relational, exploratory process carried into her undergraduate years at the University of Vermont, where she majored in wildlife biology and took her first ornithology courses. There, she lived in a dorm with an environmental theme among equally motivated students majoring in various fields such as soils, plants, streams, and wildlife. Naturally, they developed into a cooperative learning network. "We would go out on hikes and spend time outside and just learn from each other." Within that learning community Nina came to a core personal understanding—that knowledge grows richer when shared.

Nina's appreciation for teamwork and field research deepened during a semester abroad in Chilean Patagonia during her junior year. There, she backpacked and camped for 3 months with a small group, conducting student-led research projects on plants, birds, and mammals. This was her first exposure to what real field research looks like over an extended period of time and was the first time she really came to recognize that although she loved working with people and working in nature her greatest satisfaction really came through combining the two.

Nina's current doctoral research pushes both scientific and physical boundaries. In the H.J. Andrews Experimental Forest near McKenzie Bridge, she is pioneering a first-of-its-kind study on how songbirds occupy vertical space within ancient and second-growth forests in the Pacific Northwest.

One of the core questions driving Nina's work stems from the classic theory of niche partitioning, originally popularized by Robert MacArthur in the 1950s: the idea that species are able to coexist in space by partitioning resources. MacArthur's widely cited 1950s research tracked warbler distributions in a Maine spruce forest, yet little follow-up research has been conducted to test these ideas. Nina investigates how microclimate, vegetation structure, and species interactions contribute to vertical niche partitioning. She explains:

> We know from previous research at the Andrews that where birds occur on the

horizontal is driven a lot by vegetation: what they're living in, what they're foraging on, and microclimate. So what happens when we flip that into the vertical? In western forests, we have some of the tallest trees in the world, and while there are some nest descriptions and descriptions of which species forage here, there's not a lot of getting up into the canopy and seeing how this all plays out.

Nina's study has focused on 14 Douglas-fir trees: seven in old-growth stands with trees up to 500 years old (the tallest trees at 300 ft) and seven in second-growth stands of 60–80 years (trees of 90–135 feet). Over three spring and summer seasons, she climbed each tree repeatedly, more than 50 times each in her first season in 2022, deploying and then gathering temperature, humidity, and audio sensors at 10-meter intervals from the forest floor to the canopy. Her goal is to capture how both microclimates and bird occupations shift. She also gathered real-time bird vocalization playback data, playing the recorded songs of known inhabitants within the two stands and noting the vertical extents of their territorial responses.

By comparing how birds use vertical space among old-growth and second-growth trees, Nina hopes to understand how forest structure, temperature variation, and species interactions influence where different kinds of birds spend their time and how those patterns might shift under future climate conditions. Now in her project's fourth year, her data collection is complete, so Nina is working on the next big challenge: processing and analyzing tens of thousands of hours of bird song recordings and microclimate information gathered across 14 trees at multiple heights over several seasons. "I have almost 20,000 hours of recordings. If I sat down and listened to them all, it would take me 3 years nonstop. We need creative ways to work with these giant data sets and to pull out the ecological patterns that matter."

Which is why she spent 3 weeks at a recent Computer Vision for Ecology workshop offered through the Caltech Resnick Sustainability Institute in Pasadena, CA working with computer scientists and other research ecologists to learn how to build a "neural network." In her case, this tool would help her identify the bird songs in her recordings. "I'm still tweaking it a bit, but I now basically have this network where, if I feed it my audio data it spits out predictions of which birds are in my recordings, significantly cutting down the processing time."

Nina wants to create the first comprehensive, three-dimensional map of how various birds distribute themselves and move through Pacific Northwest forests. "The first step is two dimensional, learning which species are present at each height. Once we have that, we can start figuring out and piecing together the 3D."

By mapping how birds use vertical partitioning in these various ecosystems, Nina's research advances the potential scope and scale of ecological theory and may provide practical insights for forest managers seeking to balance conservation with climate resilience.

Nina in her climbing gear. *Lina DiGregorio*

Join us in welcoming Nina Ferrari as she takes us *Into the Third Dimension: Understanding Vertical Microclimatic Gradients and Bird Distributions* at 221 Allen Hall, UO campus, Friday, March 21, 7 p.m. (there will be cookies!) or directly from this Zoom link: https://zoom.us/j/97499095971

—Alicia McGraw

**An After-Dinner Surprise by Whitey Lueck**

Most winters here in western Oregon, there is at least one extended period of dry weather when a temperature inversion develops. At such times, the southern Willamette Valley where I live can be socked in for days at a time with dense, cold fog and stale air, while the surrounding mountains are bathed in warm sunshine under crystal-clear skies. So it was in January 2001, when I decided to escape the fog for several days and visit my refuge on Foley Ridge in the West Cascades.

I took the #91 city bus from Eugene to McKenzie Bridge, as I had many times before, then headed up the narrow forest road into The Woods. After about 2 miles, I left the road and hiked off trail for another mile or so through a mature Douglas-fir forest until I reached a suitable place to set up my tent. I purposely selected a site fairly high on the ridge and under a dense conifer canopy. The nighttime temperature there would be a little warmer than in a low spot on the broad ridge—to which the coldest air sinks on clear, calm nights—or in an open meadow without the natural thermal cover of a closed-canopy forest.

Only a short distance away, however, were open areas where I could greet the morning sun rising over the High Cascades east of me and say farewell to the afternoon sun before it disappeared over Olallie Ridge just to the west. As warm and still as the days can be in the West Cascades during inversions, the temperature quickly plummets again after the sun sets.

After setting up my tent, I put on my pack, walked downhill to a little spring to fill my water bottle, then continued another hundred yards out into a clearing on a west-facing slope—just perfect for taking advantage of the last warming rays of the sun. About 50 feet from the edge of the forest, I sat down to make my supper and enjoy the intense quiet of a totally calm winter evening, far from the sounds of civilization.

I'd finished doing the supper dishes and was sitting completely still, with my legs pulled up to my chest, when I was startled by the very loud SNAP-SNAP of two sticks being broken in rapid succession just up the hill and behind me and then a loud WHUMP!! as an animal came over the rise at the edge of the clearing and headed downslope toward me. I stood up instinctively and turned around, smiling, fully expecting to see some wide-eyed blacktail deer that was surprised to find a human being sitting in the middle of her favorite meadow. Instead, I saw a large male cougar charging down the hill straight at me! To my surprise, he suddenly stopped dead in his tracks less than 30 feet away from me. I didn't move a muscle but just stared in awe at the beautiful creature, his face perfectly illuminated by the setting sun. I will never forget that brief moment, as human eyes met cougar eyes, before the big cat turned to his right, bounded away across the open slope, and slipped back into the woods.

After the cougar had disappeared, I continued to stand still, grinning broadly as I savored this once-in-a-lifetime encounter and reviewed the events of the previous seconds so I would never forget them. Then, the sun having dropped behind Olallie Ridge, I began to head back uphill to my tent. I first reached the spot where the cougar had briefly stood during our stare-down. There I found four large, rough holes in the dry duff. Where the cat had run across the slope after our meeting, I found in the soft soil a couple of very good tracks, each about 5 inches across.

As I slowly made my way back up the hill, I began to piece together what had really happened. Initially, I assumed that the cougar was just running downhill on his daily rounds when, uh-oh!, he nearly ran into me! But why would he have been running so fast unless he were chasing prey (which he was not)? And if he *had* been running down the slope for some distance, why had I not heard *other* branches and twigs breaking before he snapped the two that got my attention?

A little farther upslope, I reached the upturned root wad of a fallen Douglas-fir, below which I discovered where the cougar had landed (making the whump! sound) after jumping over or past the root wad. Upon close examination, I found the source of the two snaps I'd heard: two just-broken root tips, each about a half-inch in diameter, at the outer edge of the root wad. Aha!

Uphill from the root wad was an open grassy area with several square feet of just-flattened grass. I squatted down on the grass and looked

downslope to where I'd been sitting only minutes before. Except for the protruding root tips, it had been a straight shot. Only then did my glee at having seen my first wild cougar turn to horror as I realized that the cat had quietly crouched there on the grass before making his classic predatory dash toward me.

How fortuitous for me that the edge of the root wad was in the cat's way, because the snapping of those root tips gave me the necessary fraction of a second (!) to quickly stand up and face the oncoming cat. In retrospect, I am confident that this reaction of mine was the only thing that saved me from near-certain death. Up until that moment, the cougar had had every advantage: 1) surprise; 2) being uphill from his quarry, with gravity as his ally; and 3) with my back facing him (and, more specifically, my neck), it would have been a quick and easy kill. But because I stood up—thereby appearing much larger than when I was crouched—and because I happened to turn around and face him rather than getting up and running in the other direction like any other prey would (big cats almost always attack from behind, both for surprise and to avoid the flailing legs and hooves of their prey), he instead changed his mind at the last second and stopped within one or at most two pounces of me.

The following morning, as I headed up the ridge into a different clearing to make my breakfast in the sunshine, I noticed cougar tracks in the skiff of snow on the shady side of the clearing. They were headed directly toward my tent, and the spring, and the lower clearing where I'd made my supper the day before. Later that forenoon, farther up the ridge, I encountered the nearly day-old tracks several more times. Apparently, the cougar had been, indeed, just making his rounds—headed down the middle of the broad, almost flat ridge—until he neared my tent. He must have walked within only feet of the tent, but there was no snow in the woods to see his tracks there. Of course, I wasn't at my tent just then anyway. He wouldn't find me until he reached the clearing several hundred feet farther down the ridge, where I was quietly enjoying the last rays of sunshine on what would turn out to be one of the most remarkable days of my entire life.

**Epilogue**

This near-fatal encounter—or perhaps more correctly "attack"—has dramatically changed how I view nature and my place in it here in western Oregon. No longer is nature a largely benign entity where the most I risk by being out-of-doors is a rattlesnake bite or a case of poison oak. Although the chance of being killed or injured by a wild animal is remote, I have been reminded that the risk is still there, especially for those of us who spend a lot of time alone in the wilds and choose not to carry weapons.

I have not, however, let fear of another encounter keep me from the woods. But I am now much more alert to possible danger, and I take appropriate precautions. Instead of a small daypack that hangs low on my back, I now always carry a frame pack that extends up to my head, thus covering my neck when I'm hiking. When I stop to rest, I sit with my back to a tree, or next to a brushy area or I poke a couple of branches into the ground behind me and hang a jacket over them. No cougar is ever again going to surprise me from behind, and frontal attacks by big cats are virtually unheard of. I also carry a hiking stick these days, which could serve in an emergency as a somewhat better weapon than just my flailing arms and legs.

In a way, I deeply regret that I can no longer enjoy my time in the woods in the same way that I did before this encounter. I envy my friends who still see the Oregon wilderness as a completely safe environment. On the other hand, I am glad to have been sternly reminded of my own place in nature. Because I am *not* at the top of the food chain, I need to be more acutely aware of my surroundings than I have been—just as our ancestors had to be for tens of thousands of years simply to keep from becoming another animal's meal.

Perhaps because of my heightened awareness of potential danger, I now feel more alive than ever during visits to the woods. And that's a mighty good feeling to have.

*Getty Images*

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**Upcoming ENHS Field Trip**

**<u>April 5.</u> Join our own Tom Titus and Stan Sessions for a salamander foray along the Siuslaw River in the Coast Range. Meet at South Eugene High School, northeast corner of the parking lot, 9am. Bring lunch and water.**

## Upcoming Events

(for complete listings and details, see individual websites)

- **McKenzie River Trust** https://mckenzieriver.org/events/#event-listings or 541-345-2799
  **Weekly, 9–11:30am. Watershed Wednesdays at Green Island.** Volunteer projects include invasive species removal, habitat care, planting, and tree establishment. Sign up
  **First Fridays, 9:30am–noon. First Fridays at the Willamette Confluence**. Help care for this special area where the Middle and Coast Forks of the Willamette River meet. Projects vary season by season. Registration limited.
  **Second Saturdays, 8am–4pm, Mar.–Dec. Explore Green Island.** We open the gates to this conservation area and welcome our community to explore this special place. Free, no preregistration required. Please review the visitor guidelines: https://mckenzieriver.org/living-river-exploration-days/
- **Native Plant Society of Oregon, Emerald Chapter** https://emerald.npsoregon.org/
  **Saturday, 15 Mar., 10–11:30am. Westmoreland Park Wetlands Enhancement Work Party.** 1545 W. 22nd Ave., Eugene.
  **Monday, 17 Mar., 7–9pm. Lane County's Rare and Endangered List Update.** Speakers: Jenny Lippert, Tanya Harvey, Bruce Newhouse, and Ed Alverson. New species to look for this field season. Amazon Community Center, 2700 Hilyard, Eugene.
  **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.
- **Mt. Pisgah Arboretum** https://mountpisgaharboretum.com or 541-747-3817.
  **Saturday, 22 Mar., 9am–noon. Oak Savannah Trail Rebuild.** Tools, gloves, parking pass provided. Bring water.
  **Friday, 28 Mar., 10am–noon. No School Family Tour: Water Wonders.** Where does water come from and where does it go? We'll look for the many water-loving animals. Members free; nonmembers $5. Sign up here

**Saturday, 12 Apr., Wildflowers and Their Pollinators in Oak Habitat.** Leader: August Jackson. First program in the Fundraising Education Series **Oak Ecology Through the Seasons.** By investing $500 in this unique series, you're gaining valuable ecological knowledge and supporting inclusive nature education in our community. Limited to 12 participants; must register by 4 April. https://secure.lglforms.com/form_engine/s/qeQf4pYzRRdbdaKeH8TxcA?t=1740610024

- **Lane County Audubon Society** www.laneaudubon.org or 541-485-BIRD; maeveanddick@q.com or 541-343-8664

  **Saturday, 15 Mar. Third Saturday Bird Walk**. Open to all. Contact tolalla@gmail.com.
  **Tuesday, 25 Mar., 7–8:30pm. Our Amazing Swifts.** Presenters: Maeve Sowles and Dick Lamster. Zoom (see website for link) and in person, Campbell Community Center, 155 High St., Eugene.
  **Saturday, 5 Apr. First Saturday Bird Walk.** Contact Sarah at 1stsatbirdwalks@laneaudubon.org
- **Lane County Butterfly Club** https://www.lanebutterflies.org
  Find all of Lane County's more than 90 species with these guides:
  https://www.butterfliesoforegon.com/resources-books
- **Museum of Natural and Cultural History, University of Oregon** https://mnch.uoregon.edu/museum-home
  **Ongoing exhibits:** New! Roots and Resilience: Chinese American Heritage in Oregon.
  **Saturday, 15 Mar., 10am–5pm. Ice Age Giants.** Family day. Explore fossils, bones, and teeth. Activities and snacks provided.
  **Thursday, 18 Mar., 4–5pm. Paleontology in the Field and in Museum Collections.** Presenter: Samantha Hopkins. Preregistration needed.
- **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.
  **Monday, 24 Mar., 8:30am–4:30pm. No School Day: Weather Watchers.** Ages 5–11, our Learnscape.
  **Tuesday, 25 Mar., 8:30am–4:30pm. No School Day: Spring Sprouts.** Ages 5–11, our Learnscape.
  **Monday, 31 Mar., 8:30am–4:30pm. No School Day: Critters in Costume.** Ages 5–11, Hendricks Park.
  **Friday, 11 Apr., 8:30am–4:30pm. No School Day: Flower Power.** Ages 5–11, our Learnscape.

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

Eugene Natural History Society
P.O. Box 5494
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**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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**2024–2025 Speakers and Topics**

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|---|---|---|
| **20 Sept.** | **Patty Garvey-Darda** | **Why Did the Ecosystem Cross the Road?** |
| **18 Oct.** | **David Mildrexler** | **An Enduring Conservation Vision for the Blue Mountains Ecoregion** |
| **15 Nov.** | **David G. Lewis** | **Tribal Histories of the Willamette Valley: Reconstructing Traditional Environments** |
| **13 Dec.** | **Michael Murphy** | **The Modern Bird World … Living for the City** (co-sponsored with the Lane County Audubon Society) |
| **17 Jan.** | **Charles Lefevre** | **Diversity and Domestication of North America's Native Truffles** |
| **21 Feb.** | **David Paul Bayles** | **In Trees I Trust** |
| **21 Mar.** | **Nina Ferrari** | **Into the Third Dimension: Understanding Vertical Distributions of Birds in Old-Growth Forests** |
| **18 Apr.** | **Sara Hamilton** | **Taking Care of Oregon's Kelp Forests** (co-sponsored with the Emerald Chapter of the Native Plant Society of Oregon) |
| **16 May** | **Clara Bird** | **Gray Whale Foraging Behavior** |