

Nature Trails

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Lake Abert in 2015. Photo by Ron Larson

The Natural History of Lake Abert, Oregon's Salt Lake

Ron Larson

U.S. Fish and Wildlife Service, Retired;
Klamath Falls, Oregon

Friday, 18 May 2018, 7:30pm,

Room 100 Willamette Hall, UO Campus



Coastal Oregon was a great place for a youngster, Ron Larson said. From his home in Newport he was given free rein, spending lots of time along the shore and in the hills and coastal forests. Besides just being fun, he pointed

out that this freedom to explore the outdoors was great training for becoming a natural historian. Larson's interest in natural history thus dates back to his youth. His education took its direction from this interest. His undergraduate work at Oregon State University netted him a degree in invertebrate zoology. Then he took a break—an involuntary one. He got drafted, and part of his military experience was in Viet Nam. Surviving the war, he landed a job at the Smithsonian Institute. After two years there he went to the University of Puerto Rico for a Master's degree in marine biology, doing research on jellies. M.S. in hand he returned to the Smithsonian, where he continued to work in the Department of Invertebrate Zoology. He and his wife Kathy wanted to return to the west, so he became a graduate student at the University of Victoria, in British Columbia, where he got his Ph.D., working on plankton in the nearby fjords. After a post-doc at the Harbor Branch Oceanographic Institute in Florida he got a position with the U.S. Fish and Wildlife Service, first in Georgia, then Mississippi, and finally in Klamath Falls, Oregon.

During his career Larson has done research on several natural history subjects, ranging from deep-sea fauna to orchid pollination. In the 20 years he has been in Klamath Falls his focus has shifted. In the beginning of his tenure there he worked on endangered species and water development issues associated with wetlands. He recently retired from USFW, and currently he is working on Great Basin wetland and lake ecology, with a special interest in salt lakes. In this effort he has combined his love of natural history with his passion for photography. This augurs well for us: not only will we learn about this little-known region we will be treated to stunning photographs of the area.

Lake Abert lies within the Great Basin, so it has no outlet. Its main source of water is the Chewauchan River. The spring runoff from snowmelt supplies the

lion's share of the water in the lake. In good water years the early spring runoff can be substantial enough to keep the lake at an adequate level all year. Larson says, "Few other areas of Oregon have such a rich natural history as Abert Lake and Rim. Hundreds of lava flows 15 million years ago and Basin and Range faulting some 6-7 million years ago created the dramatic Abert Rim and Lake. Oregon's sixth largest lake, Lake Abert is also its only highly saline lake, with a salt content reaching over seven times that of the ocean. The lake supports a simple but productive ecosystem with vast numbers of brine shrimp and alkali flies that are eaten by hundreds of thousands of migratory waterbirds annually. The surrounding sage and greasewood high-desert landscape is home to several lizard species and snakes, many birds ranging in size from small Horned Larks to magnificent Golden Eagles. Numerous small to large mammals, including antelope ground squirrels and bighorn sheep, are found there too. People first came to the lake over 14,000 years ago when it was much larger and fresh, and some eventually settled around its shores before it became too salty."

Larson's serious interest in Lake Abert began about ten years ago. For the last eight years he has been monitoring the lake's ecology. The lake's salinity, already several times that of the world's oceans, began to increase even more in 2010. Lake Abert's water level dropped dramatically in 2014, to the point that it was almost dry. Back in the 1920's and 1930's the lake level got as low as it did in 2014 but there is no information on the effects of that cycle, so the data from the 2014 dry-down were the first to be recorded. The 2014 event resulted in a massive die-off of the brine shrimp and flies. Instead of hundreds of thousands of migratory shorebirds and waterfowl, with their food source now essentially gone there were mere handfuls. The lake turned red due to a bloom of hypersaline-adapted bacteria and archaea, which produce a red-colored pigment for protection from ultra-violet rays.



The cause of the 2014 dry-down is a subject that has generated debate. There are roughly 40,000 acres of local agriculture irrigated with the Chewauchan River's water. These ranches have

had legal rights to all of the Chewauchan's water for decades, and Lake Abert, which is owned by all of us, has no legal right to any of it. On one side of the

debate the decrease in water level is considered solely a drought event. On the other, human water use is considered orders of magnitude more important than climatic fluctuation. In a 2014 Oregon Live story by Rob Davis about how Lake Abert was drying up, and the myriad consequences that would result if the situation did not change, Davis asked Larson why he thought the lake's condition was essentially being ignored by Oregon state officials. Larson replied, "To put it frankly, it's water rights. It's the fear that these state agencies are going to upset somebody. Whether it's deliberate or not, it's a tacit approval of the status quo."

The political merry-go-round on which Lake Abert is trapped is disturbing. Here's a link to an Oregon Field Guide video aired in 2015:

<https://www.opb.org/television/programs/ofg/segment/lake-abert-dries-up/>

Watching it you'll see Larson, and hear his concern for the dramatic degradation of the lake as its water source is removed by agencies and ranches whose legal rights to the Chewauchan River's water supersede those of Lake Abert. The politics could no doubt make up another entire talk, but Larson will steer clear of that topic in his ENHS presentation. He will, however, no doubt mention current conditions.

Larson documented a modest increase in abundance of shorebirds using Lake Abert in 2017. Levels that hovered near zero in 2014 began to rise slightly in 2015 and 16, and reached above 150,000 in 2017, roughly half of normal. So far, 2018 is also shaping up to be a decent water year.

In his talk Larson will highlight the unusual ecosystem in and around Lake Abert, focusing on its geology, anthropology and ecology. Its high salt content and alkalinity in a way simplify the lake's ecology, since only extremophiles such as the aforementioned archaea and bacteria, brine shrimp and flies can survive in such a harsh environment. But birds are what really make the lake notable. Eighty bird species, including waterbirds such as Avocets, Eared Grebes and Phalaropes, have been recorded in and around the lake, and under favorable conditions they can number in the hundreds of thousands. We can look forward to an educational evening illustrated by wonderful photographs of this starkly beautiful region. Please join us at 7:30pm on Friday, 18 May, in room 100 Willamette Hall on the UO campus to hear Ron Larson's presentation "The Natural History of Lake Abert, Oregon's Salt Lake."

John Carter

Do-It-Yourself Water by Tom A. Titus

The path rises gently toward the spring across an erosional terrace cut into the side of Upper Smith River Canyon in a time when the river and canyon were much younger. The trail was once a skid road over which the original forest was hauled to burgeoning lumber mills of the mid-1900's. When I began making this walk 25 years ago, the way was shaded by a closed canopy of 50-year-old second-growth Douglas-fir. Those trees were felled a decade ago, and on this April afternoon the six-foot "third-growth" Douglas-fir are too young to impede the warm spring sunshine.

The spring is the source of a precarious do-it-yourself water system for the old house. Icy water bubbles from several sandstone pores into a small depression on the side of the ridge. These converge into a tiny stream backed into a small pool by a four-foot concrete dam. The majority of the impounded water spills happily into a draw in the valley bottom and eventually becomes a wetland spreading over the valley floor, home to rushes, sedges, and breeding chorus frogs. But a small amount of water exits through a rusty pipe embedded just below the lip of the dam and runs through a black plastic pipe to the springhouse, a concrete box about six feet square and four feet deep, covered by a single-slope roof of green metal. Most of the springhouse water flushes

from a pipe near the top of one wall, then vanishes into a hole and disappears into a secret subterranean path back to the creek. An outflow pipe at the foot of the same wall directs water to the house and garden about 900 feet downhill.

There are many things to love about this homegrown water system. It has enough vertical drop to be gravity fed and therefore requires little ongoing energy to run. Water comes directly from the earth, rather than flowing magically from a city faucet where it is the end product of complex infrastructure and maintenance. My walks to the spring are a seasonal tour of the natural and unnatural history of the Coast Range. I miss the old second growth with its cooling summer shadow, extraordinary patch of fall chanterelles, winter rain dripping into deepening moss, spring trillium, and Calypso orchids. Today the new clearcut is sun-drenched delayed gratification preceding the squinting shadows inside the towering old forest where the spring is born. I always drink from the source, a two-gallon pool of clarity disguising dissolved minerals that find their way from the bones of the mountains into my own bones.

I love the living dance of seasonal change, but make this walk regularly because the delivery of cold water is often interrupted. Today, I discover that water is not issuing from the overflow pipe at the springhouse. I also see that the outflowing pipe at the

foot of the wall has become disconnected. The pipe is easily stuck back together at the junction, but this does not solve the problem of the absence of incoming water. At the intake pool, I find that winter and early spring deluges have filled it with silt. A shovel leans against a large fir tree, left there precisely for the purpose of dredging out the pool. I scoop out piles of drippy brown sludge.

The origin of the spring is 30 yards upstream. Along the way are delicate five-petaled oxalis flowers. White trilliums are aging to purple. Twenty Calypso orchids that we transplanted just ahead of the imminent clearcut next door have dwindled to only two. Apparently we do not understand the full needs of Calypso orchids. My customary drink from the white porcelain cup is long and cold.

When I return to the newly dredged intake pool, the water has cleared. A southern torrent salamander larva a little smaller than my pinky squirts across the bottom. I love torrent salamanders because they are cute as buttons, and require cold, softly flowing water. The springhouse still isn't receiving any flow. After removing a bolus of pebbles from the pipe at the intake pool, clear water finally gushes from the end of the pipe into the concrete collecting box. I take the long way back to the house through the old forest. A patch of Calypso orchids have made their own way at the edge of the dark trees. They are blooming in profusion, probably sixty of them. Calypso orchids know exactly what they need.

We need this forest water. Our partial taming of the spring feeds a mythology of self-sufficiency that runs deep and wide in my family. This isn't surprising—I'm here because several generations of maternal and paternal ancestors lived fiercely independent lives that eventually comingled in this valley back in the 1940s. But this proud independence has a cost. The

idea that we are entities separate from the larger world is an illusion. Our home-grown water system exists only because myriad other people extracted petroleum and synthesized plastic water pipe, dug and processed gravel that made the concrete for the small dam and springhouse, and developed the complex infrastructure that moved those manufactured materials to point of sale. Harnessing a tiny volume of water from the heart of these mountains has been the product of a complex network of cooperative extraction and manufacturing.

These human endeavors don't include the natural processes that bring water burbling from the side of this canyon. The ongoing life of this spring requires huge hydrologic phenomena of evaporation, cooling, condensation, and gargantuan atmospheric pinwheels driven to spin by changes in temperature and the rotation of Earth herself. Imagine 50 million years of geology, the sedimentation, plate tectonics, uplift, and erosion that produced the exposed sandstone aquifer from which the spring now flows. Add to this a 200-year-old forest that shades the ridge and keeps the water cool in my throat and fit for torrent salamanders. A mindboggling confluence of earthly events is contained in one cup of water. We owe our water to all of this.

In the end, I treasure a measure of self-reliance and self-responsibility. Each of us should remain our own person. My ancestors gave me an old house in the Coast Range with clean gravity-fed water flowing from a spring in a forest that is home to wildflowers and torrent salamanders. But we didn't do this alone. Nor do we live here alone. As I walk down the hill with water surging through the pipe and sunlight drenching my shoulders, I'm grateful for all of it—the independence and interdependence that brings our water to life and our life to the water.

Hot Water from the Earth by Dean Walton



Ash Meadows. Photo by Dean Walton.

We lost a dear colleague last month. Dick Castenholz, a biologist, hot-spring ecologist, and specialist in thermophiles, those organisms that love the heat, died at the age of 87 – Dick, who started work at the university 61 years ago—yes, that's 61 years—and still had an active lab on the University of Oregon campus up until the day he died. I had just sat down to chat with him a week earlier in his office. I was asking him about the mapping of rare or uncommon bacterial species, and I could see his eyes glint. He was still excited about the topic of these hot spring-related bacteria. He was excited to tell me about a species that had only been found in New Zealand and Iceland. How does something come to have a range limited to a few hot springs 17,000 kilometers apart? Another species, he mentioned, had

only been found in New Zealand. He loved exploring these areas and the work took him everywhere. I still remember the advertisements he posted for a summer field assistant, someone who could carry his bottled specimens back from the geysers and hot pools of our first national park. It was something to the effect of “Needed: summer assistant to drive me to Yellowstone.”

I know very little about thermophilic organisms. I do know that some are in the group known as the Archaea, the “ancient ones,” and are similar but now considered separate from bacteria. There are also numerous cyanobacteria. I have also had the chance to see many of these bacterial communities in the hot springs I have visited on my travels. Hot springs create finite bounded ecological communities and their presence on the landscape is limited. While there seem to be few vascular plants and animals that are rare in these otherwise “rare” communities, and while we do seem to find some rare bacteria, many other rare things are found in the slightly cooler springs.

Ash Meadows is a set of cool, freshwater springs in the outskirts of the Nevada side of Death Valley. The surrounding area is barren, open, windy, and deadly hot in the summer, and probably equally cold in the winter. On my visit, the ambient outdoor temperature was above 46°C (114°F). The pools are the closest thing to an oasis that the United States has to offer and are teeming with things found nowhere else in the world. Isolation leads to speciation just like on the Galapagos Islands. Each set of the pools has its own unique species of pupfish. The plants there are rare, as are the insects and snails. It single handedly has the highest density of rare species in the country. The immediate boundary of the springs is lush green. Tens of feet later, the area is dirt brown. In all, there are about 30 endemic species at the spot. Eleven of them are vascular plants, including the federally endangered Amargosa niterwort (*Nitrophila mohavensis*). There are at least five species of fish, down from six after the Ash Meadows killifish was extirpated from the area, and there are fifteen invertebrates including twelve snails.

The area is now protected as a national wildlife refuge, but that wasn't always the case. Water is a valuable commodity in the desert. Pumping for agricultural use quickly led to changes in water levels and quality and also led to the loss of one snail and the Ash Meadow killifish. Several other minnow-related species, those in the family Cyprinidae, are still around, including two pupfish. Of these, one is represented by two subspecies, *Cyprinodon nevadensis* (*mionectes* & *pectoralis*). The second is *Cyprinodon diabolis*, the Devil's Hole pupfish. The

other fish include the Ash Meadows speckled dace (*Rhinichthys osculus*) and the Ash Meadows poolfish (*Empetrichthys merriami*). Unlike the other springs that lead to flowing water and streams and that Oasis look of greenness in the desert, the Devil's Hole is a crack in the rock leading to a deep covered pool. Water here stays in the pool. There is no escape at the ground level, but what goes on in the subterranean realm is unknown. There are no plants here.

Oregon is known for its thermal springs too, and like those of Yellowstone, Iceland and New Zealand, there are thermophilic species that are spatially limited on the landscape and can only survive in the hottest of liquid water. These places inspired Dick Castenholz. At Hunter's Hot Spring just north of Lakeview, the temperature of the water at its hottest point is just two degrees centigrade below boiling for water at that elevation. Mats of the cyanobacteria *Synechococcus* create green biofilms over the surface. These bacteria are obligate thermophiles and die if the water temperature drops below 55°C (131°F), much hotter than a person would want to hold her hand in. Under these green mats is another layer of the bright yellow-orange thermophilic bacterium *Chloroflexus*. On the periphery and in other somewhat cooler areas a third bacterium becomes dominant, *Geitlerinema cf. terebriformis*. This species forms brown mats of material. What Dick noted was a concentric ring set of zones, somewhat like the bullseye target pattern as the water cooled from the hot spot to the cooler edges. At some point, the spring is cool enough to support thermophilic ostracods, small crustaceans that would graze on the bacterial sheets. Dick described the invertebrates as swimming up into the *Synechococcus* zone where the higher temperature rendered them immotile until the current of the spring moved them back into cooler waters where they recovered and repeated the process.

Yet, Oregon also has a couple of cooler desert springs like those of Ash Meadows. Foskett's and Dace Springs support Foskett's speckled dace, the only place in the world where this fish is found. In the greater area, other clades of speckled dace inhabit isolated small lakes. In addition, like the Foskett's speckled dace, the Borax Lake chub is another endemic desert fish, isolated in time and place from other water sources in the central area of our state.

Dick Castenholz traveled to many of these places and while he was much more interested in the bacteria of the hot springs than the fish of the cooler springs, he was overwhelmingly attracted to these punctuated ecological communities on the landscape. If he were still with us, I know he would have spent a

good afternoon recounting his explorations of these

intriguing springs, communities and organisms.

Events of Interest in the Community

McKenzie River Trust

Saturday, 12 May, 10am-4pm. McKenzie River Trust Special Land Stewards Volunteer Training. One of MRT's key tools to protect land is to buy property with outstanding conservation values. With 16 owned properties—more than 2,250 acres—there is much to care for. During the training, volunteers meet in the classroom and in the field to learn how to prepare for a safe site visit, read and interpret baseline reports and property management plans, utilize technology to map observations and collect data, identify key habitat characteristics, keep records and report findings, and learn about ecosystem management from experts in the field. **Registration is required** for this training. Folks can register here:

<http://www.mckenzieiver.org/events/list/special-lands-steward-volunteer-training-saturday-may-12th/> or contact Elizabeth Goward (elizabeth@mckenzieiver.org, 541-345-2799 x109). The training will be at 120 Shelton McMurphey Blvd, Eugene. For other MRT events—of which there are many—go to <http://www.mckenzieiver.org/events/>

Lane County Audubon Society

Saturday, 19 May. Third Saturday Bird Walk. Go to <http://www.laneaudubon.org/> for location and times.

Tuesday, 22 May, 7:30pm. Exploring Oregon's Ancient Forests. By Chandra LeGue, Oregon Wild's Western Oregon Field Coordinator. LeGue has revised Wendell Wood's 1991 book, *A Walking Guide to Oregon's Ancient Forests*. Over the last year, she has spent six months traveling across Oregon seeking out some of the finest examples of these forests to share with others in the new version of the guide. Publication by Mountaineers Books is set for 2019. She will show them to us and talk about the many reasons why they are critical to our state's future. Eugene Garden Club, 1645 High St.

Mt. Pisgah Arboretum

Saturday, 12 May, 10am-3:30pm. Plant Fiber Cordage Making and Basket Weaving Workshop. In this weaving workshop for beginners and beyond, local artist Donna Crispin will introduce you to a variety of leaves, grasses, and fibers, creating a small collection of natural cordage. We will use some of your cords, in addition to commercially prepared seagrass, to weave over a 16-ounce Mason jar. This will be a 5-hour workshop with a break for lunch. Workshop meets at the EPUD community room (33733 Seavey Loop Rd, Eugene, OR 97405). \$40 members, \$45 non-members, PLUS \$12 materials fee paid to instructor. All basketry materials included. Bring a lunch, kitchen shears or lightweight garden shears, old hand towel, and a spray bottle (optional). Pre-registration required. To register call 541-747-3817 or visit

<http://www.mountpisgaharboretum.com/learn/workshop-registration/>

Saturday, 12 May, 1-3pm. Reptiles and Amphibians Walk. Join Tom Titus, local biologist and author, on an exploration of the reptiles and amphibians that make their home on Mount Pisgah. From oak savanna to wetlands, Tom will open your eyes to these amazing creatures and hopefully capture a few to look at more closely (ages 8 and up). Meet at the Arboretum Visitor Center. Don't forget your parking pass. \$8 per family, \$5 individual, members free.

Sunday, 13 May, 8-11am. Bird Walk. Join Julia Siporin and Joni Dawning for another monthly bird walk intended for people with all levels of birding experience. We'll use vocalizations, habitat, and behavior clues for identification of our spring migrants and year-round residents. Come discover the Arboretum's avian diversity. Please bring binoculars. Option to continue the walk until noon for those who are interested. Rain or shine. Meet at the Arboretum Visitor Center. \$5, Members free.

Sunday, 20 May. 10am-5pm. 2018 Music and Wildflower Festival. In partnership with the Native Plant Society of Oregon and Lane Community College. 300-400 wildflower species on display. Live music all day! A Kids' Booth with nature crafts, face painting and microscopes. Nature walks with expert guides. A plant sale with native plants, perennials and houseplants. The beautiful Art in Nature trail. Food booths from local favorites. Art and craft vendors.

Friends of Buford Park and Mt. Pisgah

Monday Morning Regulars. 9am-12pm. Contact volunteer@bufordpark.org for more information.

Tuesdays and Thursdays, 9am-12pm. Nursery Work. Meet and work at the Native Plant Nursery at Buford Park. Enter Buford Park from Seavey Loop Road. Turn LEFT after crossing the bridge and drive 1/4 mile to the nursery.

WREN (Willamette Resources and Educational Network)

Go to <http://wewwild.blogspot.com/> for information on WREN upcoming events.

The University of Oregon's Museum of Natural and Cultural History

New Exhibit. NAVIGATING KNOWLEDGE. From monkeys and maps to fossils and folklore, MNCH collections help University of Oregon scholars solve mysteries about our planet and our collective human experience. Glimpse into the vaults with UO faculty and student researchers and join their ongoing investigations: you'll traverse land and sea to uncover life's origins, voyage across the Pacific in search of the First Americans, discover how fossils can predict earthquakes, explore arts in Africa and the Americas, and more. Other exhibits: OREGON – WHERE PAST IS PRESENT; EXPLORE OREGON; and H2O TODAY. Exhibit hours: Tuesdays – Sundays 11am-5pm.

Native Plant Society of Oregon, Emerald Chapter

Sunday, 13 May, 9am-12pm. Field Trip: Wildwood Falls and Lasells Stewart Park. These two Lane County Parks are located on opposite sides of the Row River at scenic Wildwood Falls, southeast of Cottage Grove in the foothills of the western Cascades. Though only about 20 acres combined, the two parks have a diverse flora because of forest, riparian, and rock

outcrop habitats. If there is interest, in the afternoon we can participate in the Bikes to Blooms event occurring nearby along the Row River Trail. Location: meet at 9am at 19th and Patterson in the South Eugene High School parking lot. For more information, contact Ed Alverson, 541-461-1958.

Nearby Nature

Saturday, 12 May, 9am-1pm. Birds Without Borders—World Bird Migration Day Celebration. Celebrate International Migratory Bird Day with bird walks plus family activities at the Learnscape. Co-sponsored by the Lane County Audubon Society. Park in the main Alton Baker Park parking lot or at the boat ramp and follow signs to Learnscape. \$5 suggested donation.

North American Butterfly Association, Oregon (Eugene/Springfield) Chapter

Go to <http://www.naba.org/chapters/nabaes/> for information about NABA's next event.

ENHS welcomes new members! To join, fill out the form below. Membership payments allow us to give modest honoraria to our speakers, as well as to pay for the publication and mailing of *Nature Trails*. Our web address: <http://biology.uoregon.edu/enhs>

MEMBERSHIP FORM

Name _____
Address _____
City _____ State & Zip _____ Phone _____
E-mail (if you want to receive announcements) _____
I (we) prefer electronic copies of NT rather than paper copies. ___ Yes ___ No
If yes, email address (if different from the one above): _____
ANNUAL DUES: Family \$25.00
 Individual 15.00
 Life Membership 300.00
 Contribution _____

Annual dues for renewing members are payable in September. Memberships run from September to September. Generosity is encouraged and appreciated.

Make checks payable to:
Eugene Natural History Society
P.O. Box 5494, Eugene OR 97405

A good place to park for our meetings is the Physical Plant lot: turn north from Franklin onto Onyx, go about a block and you will be in the lot. After 6pm it's open to the public.

The May meeting is our annual Business Meeting. Members will be asked to vote on whether to accept the slate of officers and at-large Board members.

ENHS Officers and Board Members 2017-2018

President: Dean Walton <mailto:dpwalton@uoregon.edu> 541-346-2871

Vice President: Rebecca Hazen <mailto:rebeccahazen2011@comcast.net>

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2018-2019 Speakers and titles or topics

21 Sept.	Marli Miller	Assembling the Northwest: a Roadside View of Oregon and Washington Geology
19 Oct.	Michael Nelson	Wolves and Moose on Isle Royale
16 Nov.	Scott Fisher	Astronomy
14 Dec.	Bruce Newhouse	Pollinator Primer: Your Tiny Neighbors and the Plants They Love
18 Jan.	Laura Tesler	Undersea Photography
15 Feb.	Samantha Hopkins	Evolving mammals on an active landscape: Biogeographic history of Oregon's mammals over deep time
15 Mar.	Amanda Stamper	Burning for Butterflies, Birds, and Blooms: Prescribed Fire in the Willamette Valley
17 Apr.	Scott Burns	Cataclysms on the Columbia: The Great Missoula Floods
17 May	Vanessa Petro	How Busy are Beavers in Oregon?



Avocet (l), Snowy Plovers (r). Photos by Ron Larson. Both taken at Summer Lake.