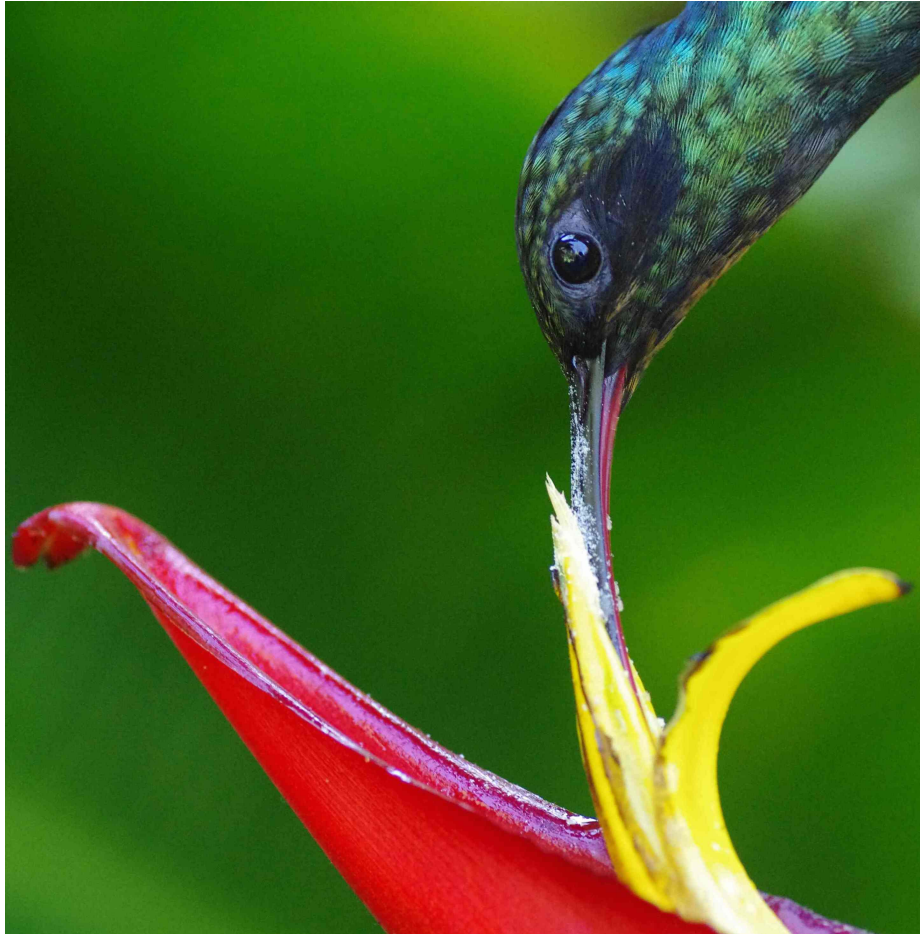


# Nature Trails

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Green Hermit (*Phaetornis guy*) hummingbird  
pollinating *Heliconia tortuosa*. Photo by Matt Betts

## **Hummingbird Highways: Why Landscape Connections Matter to Pollination in the Tropics**

**Matthew Betts**

Professor of Forest Ecosystems and Society  
Oregon State University

**Cosponsored by Lane County Audubon Society**

**Friday, 8 December 2017, 7:30pm,  
Room 100 Willamette Hall, UO Campus**

Matt Betts grew up in rural New Brunswick, Canada, near a forest. As a youngster he was attracted to natural settings, especially forested ones. He went from high school in New Brunswick to Queens University in Kingston, Ontario where he studied environmental policy. But his initial plans for a career in which he would influence forest management through the political and legal arenas gradually changed with his life experiences. He had put himself through school by working summers for a commercial timber operation planting trees in northern New Brunswick and northern Ontario. In those summers he was able to see the effects of commercial logging firsthand, and began to appreciate how wildlife species (particularly birds) are influenced by forestry practices. After graduating with a degree in political science from Queen's he took a year off from higher education, traveling in the U.S., Canada and Mexico, focusing on National Parks. Then he went to the University of Waterloo, in Ontario, for his M.S. in environmental planning, following which he worked for two non-governmental organizations in New Brunswick—the Nature Trust of New Brunswick and the Conservation Council of New Brunswick.

In his efforts with these NGOs Betts realized that his credibility as a critic of the New Brunswick forest industry would be enhanced if he learned more about forestry management practices. He enrolled in the University of New Brunswick (UNB) and obtained a second bachelor's degree, this one in forest management. He stayed at UNB for his Ph.D., for which he studied the effects of forest fragmentation on songbird populations. At the same time, he worked full time for the Greater Fundy Ecosystem Research Group and published a book on forest management for biodiversity conservation in the forests of eastern Canada. His degree, granted in 2005, is in forest ecology from the Faculty of Forestry and Environmental Management at UNB.

Following a two-year postdoctoral fellowship at Dartmouth College in New Hampshire Betts took a faculty position at Oregon State University in 2007, where in ten short years he has risen through the academic ranks to full professor.

Betts's tropical forest research program is now on its second major National Science Foundation (NSF) grant. NSF funding, always difficult to obtain, has only gotten more so in recent years. Many excellent proposals are going unfunded, so having NSF support

marks a program as truly outstanding. Another indicator of the quality of Betts's program is the Institute for Working Forest Landscapes (IWFL) Research Professorship he received in January 2016. "The IWFL professorships fund world-class researchers in the early part of their careers to lead research, promote effective dissemination and strengthen research leadership at the highest academic levels." Betts is using this three-year award to develop a Forest Biodiversity Research Network. He mentioned that there is already a critical mass of biodiversity researchers at OSU, and with the funds that accompany his award the FBRN is offering experts from other institutions the opportunity to come to OSU for short stays to develop collaborations.

Betts clearly takes seriously the outreach aspect of his appointment. He has been making his findings accessible to Oregonians ever since he first arrived on the scene. I listened to an interview he gave to Jefferson Public Radio back in 2009 in which he described his group's finding that passerine birds eavesdrop on neighbors' songs and the timing of those songs within a breeding season can affect the location of the nests of the eavesdroppers in the

subsequent year! His explanation was clear, his quiet excitement contagious. He told me he is still pursuing this aspect of his ornithological research and is excited about some very recent results with Marbled Murrelets. Actually it is because of his willingness to address the general public that ENHS found out about him. Two years ago Betts gave a talk to the Emerald Chapter of the Native Plant Society of Oregon, here in Eugene, and one of our board members was in the audience. After the talk she asked him if he'd be willing to talk to us at some point

in the future. He said sure.

Betts heads up the Forest Landscape Ecology Lab and the Forest Biodiversity Research Network in his department at OSU. These groups have multiple objectives including trying to address pressing conservation issues in forests of the globe. For his presentation to us he will discuss how fragmenting forests can influence biodiversity, and what strategies can be used, globally, to reduce human impacts. Perhaps the most surprising finding to come out of their recent research efforts has to do with which forests are most sensitive to fragmentation. Given two forests, one partially denuded and the other untouched, which would you suspect would suffer more species loss in response to logging (or other



large-scale disruption)? Their results are conclusive: it's the untouched forest!

Besides talking about conservation-related issues Betts will also delve into botanical and evolutionary topics. He will describe some work recently published in the *Proceedings of the National Academy of Sciences* in which he and colleagues discovered, for the first time, that a tropical plant species could actually distinguish hummingbird species and “decide” whether or not to invest in reproduction after visitation. The work has implications for coevolution between plants and pollinators, but also has high relevance to pollinators’ conservation. Betts points out that fragmentation of forests is leading to decline of plant species that depend on pollinators that shy away from forest edges and open areas. His ingenious methodology is allowing his group to demonstrate forcibly the negative effects of forest loss and fragmentation.

When I mentioned to Betts that although I had been a plant scientist for many years I was completely surprised to read about his group’s finding that some plants can essentially select among many pollinators the one from which they will accept pollen and allow seed-set to occur. He told me he wished he could say that they had postulated the result and arrived at it from first principles, but in fact they stumbled upon it after being certain that their experiments were flawed. Even Canadians are capable of understatement.

Please join us at 7:30pm on Friday, 8 December in room 100 Willamette Hall to hear Matt Betts’s talk “Hummingbird Highways: Why Landscape Connections Matter to Pollination in the Tropics.” As always, don’t have dessert before you come because there will be cookies. John Carter

## Forest Wildfires

by David Stone

Wow, there sure were a lot of fires in our forests this summer; and how about all that smoke?

As it turns out, it could be that we haven’t been having enough forest fires.

Huh?



According to a recent study by ecologist Matt Reilly, done when he was at Oregon State University, only about 10% of the eastside forests from Washington to California burned between 1985 and 2010. That’s not enough to keep ahead of the new growth of trees in the forests. Healthy forests need the mix of age and tree species that periodic fires provide. Not only do forests need old growth for such iconic species as the Northern Spotted Owl, they need open meadows, caused by a mosaic of fire-burned areas, and vital to such species as deer and

elk. Black-backed woodpeckers require freshly burned areas. Salmonids require both – older trees to shade the streams, fallen snags that make pools for the fish to rest in as they journey to their spawning spots and open sections that let the sun in to encourage growth of insects and algae that are important to fish.

How did this happen? It is well known that 100 years of fire suppression has changed our natural forests radically. Small, low-intensity fires were quickly extinguished due to the policy that sought to limit the “damage” that fires were believed to cause – the “out by 10” rule (put out all fires by 10 am the morning after a fire was reported).

A healthy, natural forest requires fire – cones of some conifers don’t open to release their seeds without the heat of fire, for instance. The forests inevitably, eventually burn. Delayed fires, feeding on densely packed small trees, unburned fallen limbs and ladder fuels—unburned, lower limbs that carry fire into tree canopies—burn much hotter and wider than do fires that occur in a natural sequence. These big,

stand-replacement fires severely damage the forest, killing even larger trees and leading to severe erosion and the loss of healthy soils.

Frequent, low-intensity (natural) fires burn in a “mosaic” pattern where patches of trees burn and nearby trees are left unburned. These fires thin out smaller, weaker trees, and burn fallen limbs, ladder fuels and highly resinous needles. They leave soils and large, fire-resistant trees intact. Streams stay clear and the forests are less vulnerable to drought and insect damage.

Human action set the forests on this path and, like it or not, we must respond. Most forest fires are human-caused, rather than, as many believe, caused by lightning. Education, enforcement, punishment and restricting access during high fire-danger weather is the way to address this problem. Lightning-caused fires should be allowed to burn out, as many would, on their own. This is the conclusion reached by managers of our National Park Service, with some caveats. Bruce Kilgore, a long-time NPS scientist, pointed out in a 2007 chapter (George Wright Forum, 24, 2007, pp 92-122) that between 1968, when the NPS's natural burn program began, and 1982 more than 900 lightning-caused fires burned over 130,000 acres, or just over 140 acres per fire on average. Small fires. In Yellowstone National Park in the wet, cool years between 1972 and 1987, of 235 lightning-caused fires 208 burned less than one acre and went out on their own.

Climate and weather are the biggest factors in determining whether fires become large; fighting those large fires is a futile, costly effort that only puts fire fighters' lives in danger. The event in 1988 in the Greater Yellowstone Area is a case in point. A cool, wet spring that fostered a lush growth of annual plants was followed by the driest summer on record, with almost no rain in June, July, and August. Several fires started in June by lightning strikes in Yellowstone and surrounding USFS units were allowed to burn, but dry, windy weather conditions led to such an expansion that fighting them became

impossible. Almost a million of the Park's 2.2 million acres burned that summer and the fires were declared out only after rain and snow fell in late September. It's worth pointing out that as devastating as the 1988 fire was, those of us who have visited YNP several times since can attest to its recovery, another point in favor of allowing natural fires to burn.

Some call for "salvage logging" of burned areas as a way to reduce fuels that would feed future fires. OSU researchers found that re-burning was more severe on burned lands that had been logged and replanted, than on burned areas left unlogged. Furthermore, salvage logging adds additional stress to an already stressed forest by road building, clearcutting and re-planting of single tree species.

Much of the cost of fire fighting occurs at the urban-wildland interface, where homes are built in or adjacent to forests. Those homes are much less likely to burn if they are built and maintained with "fire-safe" practices. Buildings need to have non-burnable roofs, siding and decks. Landscaping needs to be done to create "defensible space" – 100-200 feet of fire-resistant plants around the buildings.

In a word, if we want natural forests filled with diverse wildlife and abundant fish, we need to change our way of living – no more automatic fire-suppression, no more salvage logging, and sensibly locating, constructing and maintaining homes in the urban-wildland interface.

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## **Time and time again**      by Reida Kimmel

Looking at diagrams of past eras, species seem quicksilver flashes, passing in and out of existence—evolutionary dead ends or progenitors of whole new families and orders. But wait, those are millions of years passing! We have been comfortable with thinking that species we know today and have almost always known are our norm, and we assume they will be around, as is, for our duration. We see species as finished products, shaped and refined by natural selection to prosper in our environmental circumstances. In recent decades, however, the fabric of this comforting scenario has frayed, thanks to sophisticated studies of natural processes and to new scientific tools to study speciation. The work of Peter and Rosemary Grant, a twenty-year study of Galapagos finches on the island of Daphne Major, showed us that species' physical characteristics—phenotypes—can change rapidly in response to alterations in their environments. In response to drought or plenty, the fruits and plants on which the finches fed provided very different abundance or scarcity. In a few generations, just years for the

finches, the populations exhibited changes in beak size and shape to accommodate the sometimes-dramatic changes in their food supply. The finches were different, but they were not different species. In other years and other circumstances they could revert to their old beak size and shape. Yet they had the potential to become truly different species given enough time and a consistent change in climate patterns. It was fascinating to see just how malleable the genetic 'toolkit' of these Galapagos finches is. But could we find vertebrates that actually have become separate species in recent times?

Another finch genus might provide answers. Crossbills are finches whose powerfully muscled mandibles cross over, enabling the bill tips to penetrate the two scaly bracts that enclose a conifer seed. The bite pries the scales apart, freeing the seed so that it can be extracted by the bird's long tongue and husked along a groove in its upper palate. A crossbill might perform this seed extraction a thousand times a day. It is utterly dependent on conifer seeds, so much so that it even feeds its young on regurgitated seeds.

Red crossbills are especially interesting birds. Their northerly range encompasses the boreal forests of our continent. Reflecting their total dependence on conifers' seeds, they do not migrate north and south, but only between abundances of cones to harvest. They are hard to study because they are always on the move, flying great distances in search of new cone crops. They might live in the continent's coldest parts, but they can and do breed at any time of the year, when and where the food supply is plentiful enough to feed the chicks. Within the species there are distinct populations identified by their call notes. Ten 'kip call' types mark the different groups of crossbills, but call is only the beginning. The different call groups are specialists in exploiting different, particular, cone types, and their bills and bodies reflect their specialization. Crossbills feeding on ponderosa pine seeds are bigger birds with large heavy bills while hemlock specialists are smaller birds with delicate bills suitable for the small soft cones they must break into. Only very rarely do call groups mingle or breed. Ornithologists have long wondered if the different groups of red crossbills are actually undiscovered species or sub-species.

Craig Benkman, a University of Wyoming ecologist, has been studying red crossbills, *Loxia curvirostra*, since 1988. It was his research that showed that each call type has bills perfectly shaped to exploit the conifer seeds on which it feeds. He based his research on four questions: How do interactions between *Loxia* and conifers influence crossbill differentiation? Why and how does reproductive isolation evolve between diverse lineages and bill types? Why did one call group's population decline eighty percent between 2003 and 20011, and can this decline can be reversed? Finally, what is the cascade of effects caused by interactions among certain mammals and plants and the crossbills?

In 1988, the only call group that did not migrate, call group eight, was found in Newfoundland. But this group had become very scarce. Beckman noticed that the decline and possible extinction of call group eight was linked to squirrels, whose numbers grew explosively after they were introduced to the island in 1963. Unlike conifers elsewhere, which had evolved tougher, sturdier cones as defense against predation, Newfoundland's conifers had evolved no defenses against the squirrels, which stripped the trees, leaving little food for crossbills. Beckman had wanted to study the effects of isolation on genes and possible speciation, and knowing that he could not work with call group eight, which might no longer exist, he

searched for another non-migratory population. He found it in 1996, in the squirrel-free lodgepole pines of southern Idaho's South Hills. This, the third largest of the red crossbill types, with a big, tough bill, is now burry sounding kip call group nine. The pines these crossbills feed upon have huge, tough cones, evolved as a defense from prying crossbills. Their serotinous cones, closed by a resin until extreme heat opens them to release seeds after fire, can remain closed for a decade, which guarantees a constant source of food. There are always unopened serotinous cones on the trees. The crossbills here do not need to migrate at all. Global warming threatens them, however. Summers have become much hotter, and on a ninety-degree day cones can heat enough to melt the resin. Should this happen to most of the pines the birds' constant food supply would disappear. Worse news, it is projected that heat and drought will cause lodgepole pines to disappear from southern Idaho by 2080.

Benkman wanted to declare call group nine a new species. In 2009 *Loxia sinesciuris*, "squirrel free crossbill", was proposed but failed by one vote to pass the American Ornithologists Union Species Committee. This year, by sequencing the DNA of 219 red crossbills of all call types except Newfoundland's, Benkman and colleagues showed definitively that call group nine is a "discreet evolutionary branch." The Cassia Crossbill (*L. sinesciuris*) thus becomes America's 'newest' bird species, possibly diverging since the last Ice Age. But with its small population and range, and vulnerability to fire and starvation, it is extremely endangered and will probably disappear in our lifetimes. To prevent its extinction there are projects to plant serotinous



Cassia Crossbill by Craig Benkman.

pine seedlings high in the mountains, and to preserve forests in cool microclimates even in the face of warming and drought. Will they work? One can only hope.

(Nick Neely won an AAAS Kavali Science Journalism Award for his 2017 article [Cross Country](#) in *High Country News* about Benkman, the pines and the crossbills. Neely's article is the inspiration for and core of my essay. RK)

## Events of Interest in the Community

### Lane County Audubon Society

**Friday, 8 December, 7:30pm. Hummingbird Highways: Why Landscape Connections Matter to Pollination in the Tropics.** Matthew Betts. LCAS and ENHS are cosponsors of this talk. See p. 2.

**Sunday 31 December. 2017 Eugene Christmas Bird Count (ECBC).** This will be the 76th ECBC and the 118th National Audubon Society Christmas Bird Count. Dick Lamster is the Coordinator, supported by the Steering Committee of Allison Mickel, Herb Wisner, Dan Gleason, Vjera Thompson, and Barbara Gleason. We will divide our 15-mile diameter Count Circle into 27 Areas, and each Area will have an expert birder serving as the Team Leader. Contact Dick Lamster at 541.343.8664 or at [maeveanddick@q.com](mailto:maeveanddick@q.com). This fun and exciting event is open to anyone interested in birds. If you are a beginning birder and want to learn more, this is a good opportunity to learn while bird watching with experienced birders. If you are a skilled birdwatcher, we could use your assistance and expertise. If you have participated in the past, we hope you will join us again this year. We have space for everyone, and the more eyes the better!

### Mt. Pisgah Arboretum

**Saturday, 9 December, 10am-12pm. Mushroom Walk.** It's still mushroom season! Take a walk through the Arboretum's forested trails with experienced mycologists, Chris Melotti and Molly Widmer of the Cascade Mycological Society, and hunt for these fascinating fungi. Discuss identification, habitat, characteristics, natural history and the role of fungi within an ecosystem. Meet at the Arboretum Visitor Center. Rain or shine. \$5, members free.

**Sunday, 17 December, 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 fall 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.

**Thursday, 21 December, 10am-12pm. Winter Solstice Walk.** Come celebrate the shortest day of the year with a family-friendly walk and hot chocolate! Search for animals and plants taking advantage of the daylight while it lasts. Learn what causes the winter's darkness and how life in the Arboretum has adapted to it. Then warm up before you head back home with a build-your-own hot chocolate bar. Led by the Arboretum's Education Coordinator, Jenny Laxton. Rain or shine. Meet at the Arboretum Visitor Center. Don't forget your parking pass. Members \$5 per family, non-members \$8 per family.

### Friends of Buford Park and Mt. Pisgah

**Monday Morning Regulars. 9am-noon.** Contact [volunteer@bufordpark.org](mailto:volunteer@bufordpark.org) for more information.

**Tuesdays and Thursdays, 9am-noon. 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://wewild.blogspot.com/> for information on WREN upcoming events.

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

**[Wolves and Wild Lands in the 21st Century.](#)** How can wolves and people coexist in our modern world? From Alaska to Oregon to North Carolina, explore the epic story of North America's wolves—and the vital role humans play in shaping their future. On exhibit 11 August 2017 through 11 February 2018. Exhibit Hours: Tuesday through Sunday, 11am-5pm.

### Native Plant Society of Oregon, Emerald Chapter

Go to <http://www.npsoregon.org/calendar.html#EM> or call 541-954-5334 for information on upcoming NPS events.

### Nearby Nature

**Saturday, 16 December, 1-3pm. Tree and Tea Party Nature Quest.** Join Nearby Nature for a family-paced winter wander through Hendricks Park's tall trees. Post walk, enjoy tea and a warm fire in the Wilkins Shelter. Meet outside the Shelter. Members free, non-members \$5/family. Pre-register online at [nearbynature.org/events](http://nearbynature.org/events).

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

**Monday, 11 December, 7pm refreshments, 7:30 program. The Art and Science Behind Photographing Immature and Adult Lepidoptera: How and Why?** Join retired Oregon State University Professor of Entomology, Jeff Miller, to learn how and why to photograph caterpillars, butterflies, and moths. Dr. Miller has authored books on caterpillars and their adult butterfly and moth forms in the Pacific Northwest and in Costa Rica. He also has studied other insects such as lady beetles and how they control aphids. The Eugene Garden Club at 1645 High St.



LiDAR gives Matt Betts, OSU forest ecologist, a new view of complex habitat. By climbing into the canopy, he can compare data to direct observation. (Photo: David Stauth, OSU) [Photo and caption taken from LTER Network News. LiDAR stands for light detecting and ranging lasers]

**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**

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 E-mail (if you want to receive announcements) \_\_\_\_\_  
 I (we) prefer electronic copies of NT rather than paper copies. \_\_\_ Yes \_\_\_ No  
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**ANNUAL DUES:** Family \$25.00  
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 Life Membership 300.00  
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**Annual dues for renewing members are payable in September. Memberships run from September to September. Generosity is encouraged and appreciated.**

Make checks payable to:  
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 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.

### **ENHS Officers and Board Members 2017-2018**

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### **Schedule of Speakers and Topics for 2017-2018**

8 Dec.	Matthew Betts	Hummingbird Highways: Why Landscape Connections Matter to Pollination in the Tropics
19 Jan.	Nathan Reynolds	Mountain Goats Return to <i>Lawetlat'la</i> (Mt. St. Helens)!
16 Feb.	Gayle Hansen	Seaweeds on Japanese Tsunami Debris: Have They Invaded Our Shores?
16 March	Leigh Torres	Insights into Whale Ecology
20 April	Fred Swanson	Humanities, Arts, Science Collide at Andrews Forest, Mount St. Helens, and Beyond
18 May	Ron Larson	The Natural History of Lake Abert, Oregon's Salt Lake