

# Lichen: Covers 6% of the earth's surface

Continued from Page A1

And they haven't even left the parking lot yet.

McCune and Stone are lichenology experts and pioneers of the field. Throughout the past three decades, their knowledge has guided a new wave of scientists toward the small, colorful organism that covers 6% of the earth's surface.

This week, they guided the Northwest Lichenologists, a nonprofit that promotes professional training, through the Lewis and Clark National Historical Park. The team of seven conducted lichen surveys, each bearing a pocket knife, a hand lens and a bag full of the leafy, scaly species.

This is big news for the park. Without the help of the volunteer lichenologists, the park would have to draft contracts, secure funding and possibly wait years to conduct similar surveys.

In just three days, the park's lichen herbarium — a collection of preserved plant species kept under lock and key in a climate-controlled room — more than doubled.

"A good starting point is to at least know what species we have," Carla Cole, the park's natural resources project manager, said. "To really manage things properly, you have to know what you have, so we're always wanting more inventory."

At the park, making that inventory list took time, as the region is covered in lichens. It took the lichenologists more than an hour to drop from the visitor center to a footbridge less than half a mile away.

And that's a really good sign for the plants, the park and the people that live here.

It means the air we're breathing is clean.

## Air quality indicators

Because of their genetic build, lichens are extremely sensitive to their living conditions, which makes them natural air quality indicators.

"They care about where they live, so now we use lichens to notice air quality," Stone said. "The lichens are out there getting the air blown by them all the time, so they know much more about air quality than a machine can measure, or than we think we know."

Scientists throughout



Photos by Hailey Hoffman/The Astorian

**Daphne Stone, also known as Dr. Usnea, holds a sample of usnea lichen she pulled from a tree branch. Usnea grow in small net patterns to catch water from the air and are indicators of good air quality.**

the country utilize lichens to study air quality and better understand the impact humans have on their natural surroundings. In highly polluted urban areas, lichens are few and far between. In Clatsop County's cool and moist coastal climate, lichens are everywhere: dangling off branches, growing on road signs, clinging to bridges.

But it's not just the fact that they're here that matters. The specific type of lichens scientists found tell us even more about the air.

"By looking at the lichens we find on a plot, we can tell exactly what the air quality is like, which is just amazing," she said. "There's nothing else that sensitive."

*'ANYTHING THAT LOOKS LIKE IT CAME OUT OF A DR. SEUSS BOOK IS PROBABLY A LICHEN.'*

Daphne Stone

In regions dominated by agricultural land, such as parts of Oregon's Interstate 5 corridor, small, orange-tinted lichens grow aggressively, a sign that the air is polluted with nitrogen compounds.

"We're not seeing that at all here," Stone said. Instead, the survey team found abundant amounts of cyanolichen, which enhance tree growth and are not found in polluted places. "It means that the air is really clean."

Understanding the lichens that thrive in this region is a crucial first step for the National Park Service.

Lichens are at the base of the food chain. They act as their own miniature forest and provide a habitat for small, sometimes microscopic animals. Larger predators, such as birds, frogs and bigger bugs, pick through lichens to feed on those smaller creatures. The more park monitors know about the lichens, the more they can understand all the animals that live in the region.

"There's a lot of life going on at the tiny level inside the lichen habitat," Cole said.

An understanding of the lichens throughout the park's

seven units will help guide it forward. Discovering and recording different types of lichens throughout habitats will influence design plans and enhance habitat diversity. The knowledge helps guide restoration projects for prairies and wildflower meadows, according to Cole.

"The first step in knowing what to do is getting these basic inventories and species lists down," she said. "That always informs the next step of management."

## Enhance growth

Lichens are epiphytes, which means they don't take nutrients from the plants they grow on, and though lichens are often wrongly blamed for killing trees, they actually enhance growth by retaining moisture and stabilizing soil.

Lichens also have medicinal properties and cultural value. Native Americans used lichens to dye wool and Scandinavians feed them to reindeer. Some lichens, such as usnea, have an antibiotic substance used in tinctures and sold commercially.

But none of those reasons are what drew Stone or McCune to lichenology.

For McCune, it was "the lure of the unknown."

"It's as if they're from outer space," he said. "They're weird forms. They're beautiful, they're colorful, they're so varied in form. It's just one surprise after another."

For Stone, it was the fact that they made intricate fairy houses when she was a young girl.

"I loved all the details I found on the forest floor," she said, "and one of them was lichens."

Now, she has a general tip for anyone interested in exploring the lichens in their own backyard or in the park.

"Anything that looks like it came out of a Dr. Seuss book," she said, "is probably a lichen."

# Violations: Newer tour providers have complained about Port's arrangement with Conner

Continued from Page A1

called foul on the arrangement between the Port and Conner. Kulp filed a previous ethics complaint last year and at one point contemplated a lawsuit over the Port's relationship with Conner.

Over the past decade, Astoria has become a bigger cruise ship destination, hosting more than 40,000 passengers a year on average. Newer tour providers like Kulp and Bob Vinatieri of Astoria Tours have complained about the Port's arrangement with Conner. They protested the Port reserving pier access to tour operators — mostly Conner — who have agreements with cruise lines. Jim Knight, the Port's former executive director, had argued the arrangement protects cruise line reve-

nue and helps entice them to visit Astoria.

The investigation noted an email from Port counsel Eileen Eakins to Knight last year recommending the Port consider terminating Conner's marketing contract. Conner "is not only being paid by the Port, but the work he is doing for the Port will have the direct effect of increasing tour sales for his company," she wrote.

Will Isom, the Port's interim executive director, said he will meet with Eakins and Conner to discuss the relationship moving forward. Conflicts of interest aren't in themselves wrongdoing and could just require more disclosure, he said.

"My goal is just to protect the Port here," Isom said. "At the same time, I don't want to hang Bruce over this."

# Contract: Repairs expected to last until October 2024

Continued from Page A1

The Army Corps has not asked a contractor to source so much rock since the last major rehabilitation of the South Jetty in the 1960s. The rock will come from quarries in Oregon and Washington state, including the Drake Pit in Clatsop County, Vandegrift said.

McAmis has been awarded three of the last four major jetty contracts along the Columbia River and is finishing up the repair of the North Jetty.

For the repair, McAmis has had rocks barged to Tansy Point in Warrenton and through Cape Disappointment State Park

in Washington.

The company plans to initially truck a lot of materials before constructing a barge facility in Fort Stevens State Park in the spring to accept rocks, Vandegrift said. Part of the project entails keeping public access open to all parking areas.

The repairs are expected to last until October 2024. Storms generally limit stone placement to between May and October, with more constraints on the outer reaches of the jetty.

"The construction duration is five years," Vandegrift said. "We're always shooting to get done early, but I'd say four to five years."

# Students: 'I think every district ... has some work to do'

Continued from Page A1

Less than 18% of Knappa students were on track in math, a decline from 23.1% two years ago, half the statewide rate and significantly worse than county peers.

"We have work to do," Paulette Johnson, the schools superintendent in Knappa, said of the results. "I think every district in the state has some work to do."

Johnson couldn't pinpoint exactly why Knappa students struggle on state assessments, but said it could be related to demographics, academic rigor or teaching styles.

"We always thought we need to add more rigor to what we do," she said.

School districts statewide are creating improvement plans to secure an estimated \$1 billion annually in additional revenue from the Student Success Act starting in fall 2020. Knappa educators have talked about investing more in after-school opportunities, expanding preschool and increasing school days, Johnson said.

In Astoria, just more than half of students were on track in English and language arts, tracking similarly to the last three years and just below the state average. Nearly 37% of Astoria students were on track in math, a slight decrease from the previous spring, but within 2% of the state average.

Nearly half of Warrenton-Hammond School District students were on track in English and language arts, down from half of students

the previous spring, but up from less than 44% two years ago.

Warrenton-Hammond students were again the most proficient countywide in math, with more than 37% on track. District students in 2017-18 eclipsed the state average in math proficiency, a rarity for county school districts.

In Seaside, 44% of students were on track in English and language arts, down from more than half of students in 2017-18. A mere 28.4% of Seaside students were on track in math, down from more than 32% the year prior.

In the rural K-12 Jewell School, where results can skew heavily because of a small student population,

more than 42% of students were on-track in English and language arts, compared to around half of students the previous two years. Nearly 22% were proficient in math, down from more than 26% the previous spring.

"It is clear improvement is needed in these two subject areas," Colt Gill, direc-

tor of the state Department of Education, said in a news release. "Thanks to the historic Student Success Act passed by lawmakers and signed by Gov. Kate Brown, we will eventually see more resources targeted to help students graduate high school ready for college or a career."

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