

Fall17
vol16no4

Washington State

MAGAZINE



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Streaming
solutions

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Plant for
the future

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Lindsey Elhart '14 learned about intercultural business negotiations by studying abroad and embracing WSU's global mindset.

Now she helps the Boeing Company close **multibillion dollar** deals with international airline companies.

At Washington State University, we strive for real-world impact. We start by empowering leaders like Lindsey.



Makers. Doers. Cougars.

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PULLMAN VANCOUVER TRI-CITIES SPOKANE EVERETT GLOBAL

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GO COUGS!

As a new academic year begins, full of optimism, anticipation, and Cougar spirit, we want to thank the tens of thousands of alumni and friends whose generous gifts throughout the year help make the WSU experience rich and rewarding for all students every day.

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FIRSTwords

“Water is the driving force of all nature.”
—Leonardo da Vinci

Shifting waters. On the south end of Puget Sound, where I lived for a number of years, water surrounds Olympia: Black Lake, Budd Bay, Capitol Lake, inlets, rivers, and creeks. It’s part of the picturesque scenery that I enjoyed daily, until I saw a half-submerged SUV at an intersection. The storms of 2007 flooded some streets, not to mention covering I-5 just south in Centralia. Water had become an unexpected hazard.

We can expect even more heavy storms and major floods, especially in the Midwest and Northeast, as the climate changes. Floods that were once seen every 20 years are projected to happen as much as every 4 to 6 years by the end of this century. Greater precipitation and shifts in snowfall are some of the more visible results of global warming.

In coastal cities like Seattle, San Francisco, and Miami, new kinds of flooding occur as sea levels rise. Washington State University landscape architect Hope Hui Rising and her students are tackling some of the challenges facing those cities, helping create and facilitate plans to mitigate the ocean seeping into the streets.

The opposite problem occurs around the world, though, as drought dries up landscapes in our new reality of climate variability. Water scarcity affects more than 40 percent of people globally, a very personal fact for WSU Tri-Cities engineer Yonas Demissie. He grew up in Ethiopia, where many of his fellow Ethiopians dealt with drought year after year. It inspired Demissie to study water, and his research ranges from evaluating climate effects on U.S. Department of Defense facilities to determining allocations of water from the Nile River.

Other WSU researchers examine drought from the plant and soil angle. Grain expert Kevin Murphy and his graduate students take quinoa seeds to Malawi and Ecuador, and return to the Palouse with pieces of genetic diversity that could strengthen plants and crops against climatic stresses. Lynne Carpenter-Boggs tests ways to reduce soil acidification, a problem in both Washington state and Africa.

Back on the “wet” side of the state, Puget Sound seems pristine, but the waters that flow into the nation’s second-largest estuary pick up pollutants from streets and cities. It’s all hands on deck to protect the Sound, including WSU stormwater researchers, Extension educators, and volunteers on the beaches and waterways.

We’re water creatures, with 60 percent of most adult bodies made of the substance. Yet we are also in thrall to its power, and without adapting ourselves, water—or lack of it—could overwhelm us.

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ELSON S. FLOYD COLLEGE OF MEDICINE

SHEDDING LIGHT ON THE MYSTERY OF SLEEP

Jason Gerstner's research team found that the same gene regulates the quality of sleep in mice, fruit flies, and humans.

It's the first observation of this mechanism across species—a key piece in the puzzle of why all must sleep.



TALKback

Even more Olympic connections

In "Cougs at the Olympics" in the Talkback section of our Fall '16 issue, Don Brust asked the question regarding what other Cougs had the opportunity to go to the Olympic Games. Another response:

In 1978 the U.S. Olympic Committee (USOC) moved its headquarters from New York to Colorado Springs. At that time I was working there for CPAs Haskins & Sells. The USOC's business manager/controller did not want to relocate, so I decided to apply and was lucky enough to be selected. The end result was that I was able to attend two Pan American Games (San Juan in 1979, Caracas in 1983) and three Olympic Games (Lake Placid in 1980, Sarajevo in 1984, and Los Angeles in 1984). In every case, I had the privilege of working, and sometimes living, in the athletes' villages during the games, which afforded me the opportunity to meet many of our Olympians. I left the USOC in 1987 to become executive vice president and chief operating officer for the U.S. Olympic Foundation (now Endowment) which was established using a majority of the USOC's share of the surplus revenue generated by the 1984 L.A. games. I retired from that position last December, having worked for the USOC/USOF(E) for 38.5 years.

ERNIE HINCK, '67, '69 MBA

And more Cougs in space

I read the piece on "Space Cougs" and remembered that my good friend Phil Gollnick did research for NASA on muscle function after astronauts returned from days in space. He was a faculty member and not a graduate of WSU but could still have deserved mention in the article.

JIM COOK

Emeritus Professor of Plant Pathology

EDITOR'S NOTE: Philip Gollnick, a physiologist and exercise science professor at Washington State University, conducted research on the muscles of astronauts who flew on the space shuttle Columbia. He used tiny muscle samples from

the astronauts to study the effect of weightlessness on muscle tissue, building on 25 years of research into how and why muscles adapt to levels of high activity. Gollnick died June 28, 1991, at 56 years old. Gollnick taught exercise physiology at WSU, and the American College of Sports Medicine still hosts an annual Gollnick Tutorial Lecture.

Where in the world

Some of us who left Pullman have no idea where the WSU arboretum might be. It'd be nice if you could show a map where in Whitman County it might be found. Once upon a time in Pullman, my family and I lived at 2105 Orchard Drive, up the street from the LDS church. We were directly across from (I assume WSU's) apple orchard. The previous editor had a tiny section in each issue about what's new on campus—that was nice to see. I think the last time I set foot on campus was 1983.

MARA TROTTER '66, '79

EDITOR'S NOTE: The arboretum is located on the very southwest of campus, to the east of Terre View Drive between the Pullman-Moscow highway and Grimes Way. We added a map in the online article that shows its location. If you want to explore it further, its coordinates are 46.727361, -117.135444. Regarding "What's New," we often feature new buildings and parts of WSU at the beginning of the Alumnipedia section. We'll keep looking for opportunities in articles to feature changes at WSU—look for an upcoming short story on the new Cougar Way in the Winter issue.

Some sustaining praise

I used to work at WSU and also completed my MBA there. I started receiving my alumni magazine and LOVE the paper and sustainable printing features. I have a client that is a recycling company and I would like to move them to something similar. Congrats on a stellar and beautiful magazine; I love getting it in my box.

JOSH PAULSEN '16 MBA

EDITOR'S NOTE: We really appreciate your thoughts. We did a lot of research in trying to break out of the norm (most large-run magazines print only on 10–30 percent recycled stock), and after a little perseverance, we think we came up with a good solution. We're one of the few university magazines to use 100 percent recycled web stock. WSM has also joined the Better Paper Project, a national effort to increase use of recycled stock. Thank you for noticing!

Saddened

I was saddened to read of the passing of Hubert Dunn in your summer issue. Hubie was a Big 10 gymnast at Southern Illinois University. After serving in the Navy, Hubie and his wife moved to WSC in 1948 to study for a masters in physical education. He also began to build a men's gymnastic program. He identified about a dozen of us who were new to gymnastics and began to coach us into a team. He also encouraged other colleges in the Northwest to develop teams as well. Beginning in the spring of 1950, we participated in dual meets with Oregon State, Montana State, the University of Idaho, and the University of British Columbia. Some of my fondest memories at WSU were of Couch Hubie and the members of the gymnastic team he formed in those early years.

WAYNE AESCHLIMAN '51

Arlington, Texas



DUNN DOING A "PARROT" OR "ENGLISH HANDSTAND"

(COURTESY U.S. GYMNASTICS HALL OF FAME)

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UPfront



Waves of the future

When the tides are high in parts of San Francisco, Charleston, and Miami, city streets experience an odd new kind of flooding that happens even on bright, sunny days.

In San Francisco's Embarcadero district, king tides caused flooding between Mission and Howard Street last winter. Seattle's Georgetown and South Park neighborhoods have experienced sewer back-ups into streets and basements after large storms.

These are quite literally waves of the future, confronted by Hope Hui Rising and her students at Washington State University. They are working on the front lines of sea level rise, developing urban design strategies to help communities adapt.

As the oceans warm due to climate change, they expand in volume—just like the mercury in a thermometer expands as it warms. Add melting from distant, frozen landscapes in Greenland and Antarctica to the thermal expansion, and the seas will rise. Unfortunately, much of civilization lives along the world's low-lying coastlines.

Researchers also predict more frequent, intense storms, which could overwhelm urban infrastructure. Very little funding exists for proactive adaptation planning or for holistic urban design strategies for a problem that promises to affect millions in the next century.

Rising, an assistant professor in the WSU School of Design and Construction, is a petite, constantly moving, whirlwind dynamo. She started the **WSU ADAPTIVE WATER URBANISM INITIATIVE**, a program that aims to bring research in climate adaptation to communities in need, while providing hands-on education to students and to those who will be affected by sea level rise. This program of design, research, and outreach is unique in the country, allowing students to work side by side with professionals and city experts who are leaders in resiliency, adaptation, and mitigation.

Earlier this year, Rising and students in landscape architecture, civil engineering, and environmental sciences held community meetings in San Francisco neighborhoods, inviting youth, community members, city staff, and professionals to participate. The students led workshops and facilitated games to develop design alternatives.

Throughout the semester, the students collaborated with planning and engineering experts. In May, they presented their ideas to San Francisco Public Works officials.

Throughout the project, Rising incorporated her research into the classroom while giving the students freedom to design solutions for communities at risk. The students poured their energy into the work, putting in extra hours and far exceeding the course requirements. "They really care about this work," she says.

The students developed several ideas, including a master plan for coastal resiliency for San Francisco's east side that would enhance the city and bay's biodiversity while building long-term resiliency along the coast. Other projects focused on site-specific designs to address recurrent flooding for the Embarcadero, the neighborhoods between Mission Creek and Islais Creek, and the Green Benefit District of Dogpatch and Northwest Potrero Hill.

"I am really excited because what I'm doing is being talked about and taken seriously," says Spencer Seeberger, a landscape architecture student from Graham, Washington. "It's really great to be part of starting these conversations."

Seeberger says he has enjoyed the challenge that combines design and problem-solving to develop solutions for the environment.

"If we stay in a bubble, we aren't going to be able to address these challenges," he said. "It's great for students to be pushing the envelope as much as the professionals."

Rising and her group continue to work with Seattle and San Francisco communities while responding to new requests on the West Coast and in Asia. Their work will also be used by the city of San Francisco to help inform a yearlong design challenge on resiliency solutions. ✨



Opposite: "King tide" at the Embarcadero, San Francisco. *Photo Mike Filippoff.* **Right:** WSU Assistant Professor of Landscape Architecture Hope Hui Rising. *Courtesy WSU School of Design and Construction.* **Below:** Three proposed zones of defense for coastal flooding and water quality: *Zone One* uses wave attenuators with living breakwaters and a tidal lagoon; *Zone Two* consists of a polder pond with phytoremediation beds; *Zone Three* is a super levee with water retention areas. *Courtesy Hope Hui Rising*

THREE

TWO

ONE



The people's plants

The Dominican boy had a leaf draped over his head, secured with a length of vine. Anthropologist Marsha Quinlan was intrigued.

"I asked him, 'Is that a hat?'" she recalls. "And he explained that, no, he woke up with a headache and the leaf makes your head feel better. And I thought that was so cool!"

Quinlan was a graduate student at the time, on her first trip to the Caribbean island of Dominica (not to be confused with the Dominican Republic). And that was the moment she realized she had to delve further into ethnobotany.

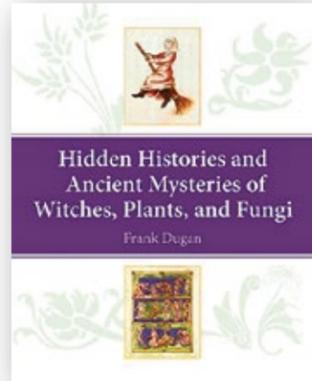
How people around the world use plants for food, fiber, fuel, and medicine potentially provides us with new ways of approaching old problems. Seventy percent of the world's population still relies on traditional herbal medical methodologies, Quinlan says. And while therapeutics certainly are important—and potentially profitable—they are not the only reason to pay attention to other cultures' uses of plants.

As Amanda Thiel, one of Quinlan's current graduate students at Washington State University, explains, ethnobotany is part of a larger field, ethnoecology, which seeks to describe people's relationship with the environment.

Interest in ethnobotany and related fields has surged as the scientific community looks for ways to adapt to climate change, deal with plant pests and diseases, and search for new ways of treating human ailments.

Traditional farming practices, for instance, might inform strategies for adapting to climate change by encouraging the adoption of more genetically diverse populations of crop plants.

Or take something as seemingly simple as the bows and arrows used by Amazonian people. Quinlan's doctoral student Armando Medinaceli is researching the ethnobotany of hunting. Where most scientists would approach hunting traditions in terms of the zoology, Medinaceli wants to know what plants they use. The answer is, a lot: He has



Clockwise, from top left: A cacao pod; preparing maize to make tortillas and atol; the cover of one of plant pathologist Frank Dugan's books; a local talking about the medicinal uses of the lemongrass plant to his right. Fieldwork photos courtesy Amanda Thiel

identified more than 30 plants used to make bows and arrows. The ramification is that indigenous peoples' uses of plants are far more complex than we realized.

Ethnobotany, Quinlan says, is the original medicine. "Everything is so specialized" in modern Euro-American culture, she says. "You have to have a license to be a massage therapist." And while regulation protects consumers from quacks and ineffectual or toxic compounds, ethnobotany offers us a way to "time travel," in a sense, "to see how things used to be for Europeans."

"Most medicines used to be plant-based," Quinlan says. Indeed, much of Europe still has a large medicinal plant industry. While a doctor in the United States probably would never prescribe a plant, "that's not true in Europe." European scientists have done lots more studies on the efficacy of herbal medicines, which is why, Quinlan says, "we publish a lot of our research in European journals."

Part of the fascination is trying to unravel how humans figured out how to use certain plants. "There's all these miracles," says Quinlan.

Take acorns, for example. They contain loads of incredibly bitter and potentially

toxic tannins. The water-soluble tannins can be removed with a few washes—but how did Native Americans and others figure that out? Or, adds Quinlan, Native Americans learned, somehow, to soak corn in lye, not only enhancing the niacin content of the resulting flour, but making it easier to grind, too.

Thiel speculates that perhaps people had better—or at least different—observational skills. Quinlan nods, adding, "We live in these built environments, so we notice when a light bulb has gone out." But we don't necessarily pay attention to the qualities of an acorn that's been submerged in a stream for a few days.

Quinlan mentions a study by a colleague in South Carolina who asked college students to name native species of plants in their area. "They'd maybe know a few," she says. "But places where we work—Dominica, Guatemala, Tanzania—they'd be able to name a bunch."

But then again, Quinlan says, laughing, we don't need to know all those plants, "because we can just go to Safeway!"

The "plant blindness" Quinlan refers to is familiar to Frank Dugan '92 PhD. Where Quinlan and her colleagues study

BY BRIAN CHARLES CLARK

the crosscultural present to learn how people adapt to their environment by using plants, Dugan takes a historical perspective to learn what past generations have to teach us.

Dugan points out that there are dozens of plants mentioned in Shakespeare's plays. The plants aren't just mentioned by name, but are alluded to in ways that make it clear the playwright fully expected his audience to understand the references. By contrast, a survey of plant knowledge of modern Londoners—including biology teachers—could name only a few common wildflowers.

Dugan admits that it may be the case that humans don't actually learn from our own histories—otherwise "why is the human race in such a perpetually dismal condition?"—but, like chocolate cake, he can't resist.

And the simple fact is, as he writes in *Hidden Histories and Ancient Mysteries of Witches, Plants, and Fungi*, that "climate change, invasive species, crop shortages, hunger, and even famine" are nothing new and we might learn something from the way people in the past have responded to threats to survival.

Synthesizing linguistic data, folklore, anthropological studies, economic studies of historical wheat prices, and much more, Dugan uses "consilience," or convergent evidence, to make the case that "herb-wives" in the Middle Ages helped keep their families sound by foraging for wild plants and herbal medicines. In the process, they accumulated and passed on a body of knowledge that the progenitors of modern plant science, including Linnaeus and many others, explicitly acknowledged and credited.

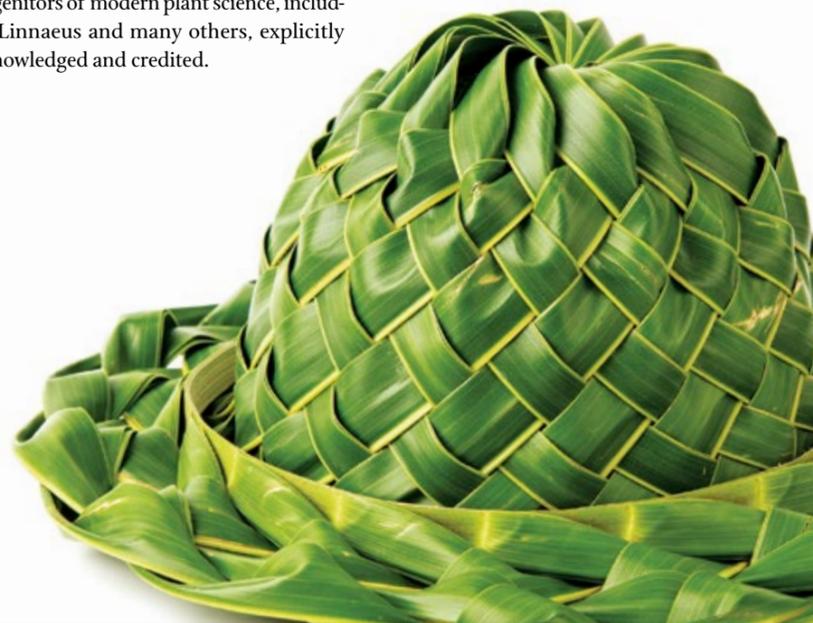
Dugan points out that modern drug discovery draws on the analysis of pre-modern herbals in the search for therapeutic compounds. Quinlan likewise acknowledges that the work of ethnobotanists sometimes leads to important drug or food crop discoveries.

But "prospecting" for useful plants is not what interests her, in part because it's an ethically murky practice. After all, if, in studying plant use among an indigenous people, a useful drug is discovered, who should get the profit when that drug is eventually commercialized? And even if there is some sort of remuneration to the source tribe, what about all the other people in the region that may have been using the same plant for similar purposes for thousands of years?

Like that leaf strapped to the Dominican boy's head. Known to botanists as *Piper peltatum* and commonly as cordoncillo, the *Piper* genus is used all over the tropics for a wide variety of purposes. The fruit is a kid's delicacy, while the leaves are eaten with rice and are great for wrapping food cooked over coals. Medicinally, the leaves and roots are used to treat numerous conditions, including headache, fevers, colds and coughs, and much more. Nothing is wasted; patents are never infringed.

Quinlan says people often will urge a plant on her. "We've been using this plant, it works—and you should use it too!"

"They have this ethic," Quinlan says, "that if it heals, people should have access to it." *



SHUTTERSTOCK

AT LEAST 10 PERCENT OF THE 250 MOST ESSENTIAL MODERN MEDICINES ARE DERIVED FROM FLOWERING PLANTS.

ASPIRIN [genus *Salix*] Known to the ancients, Hippocrates in about 400 BCE mentions salicylic tea as a fever reducer. Willow bark extracts have been standard in the European pharmacopoeia ever since. Modern aspirin was first synthesized in 1853.

DIGOXIN [genus *Digitalis*, foxglove] Also known medicinally since ancient times, science confirmed foxglove's efficacy as a treatment for "dropsy" in 1775. A century later, chemists began purifying drugs from the plant.

OPIUM AND MORPHINE [*Papaver somniferum*] Morphine was the first commercial therapeutic, brought to market by Merck in 1826. Along with cannabis, opium is one of humanity's oldest plant remedies. It was cultivated 5,500 years ago in Mesopotamia, but Neolithic finds push its use back much earlier.

PACLITAXEL [Taxol] USDA researchers first collected samples of the Pacific yew (*Taxus brevifolia*) on behalf of the National Cancer Institute in 1962. Paclitaxel's antitumor activity was demonstrated in the mid-1970s, and the FDA approved Taxol in 1984 as a treatment for breast, ovarian, and lung cancer, and Kaposi's sarcoma. To date, Taxol is the bestselling cancer drug in the world.

QUININE [genus *Cinchona*] Native to the forests of the western slopes of the Andes, quinine was first isolated from *cinchona* bark in 1820. The medicinal properties of *cinchona* were known to the Quechua people, who used it as a muscle relaxant to combat shivering in low temperatures and, later, to treat malaria.

Read about more medicinal plants at magazine.wsu.edu/extra/medicine-plants.

SHORTsubject

100% Made in Washington

In the verdant woods outside Covington, Dane Scarimbolo brews local beer.

After graduating from Washington State University's viticulture and enology program, Scarimbolo '10 realized a wine startup would take a lot of money and time. He enjoyed making beer, so he opened Four Horsemen Brewery in 2015 with an eye toward an older, community-minded ethos that could please the beer equivalent of a locavore.

"I was adamant about sourcing everything from Washington," he says. In that spirit, Scarimbolo sells his craft beer at farmers markets in the region, just like farmers offer lettuce, carrots, and berries grown locally. Scarimbolo knows the beekeepers who gather honey, the Yakima farm that grows hops, and the water that goes into his ales and lagers. He picks blackberries from across the road for his Black Zomberry Lager.

Yet, one local connection was only recently forged. For a long time, brewers couldn't make a truly Washington beer, because they didn't necessarily know where the very heart of their brews—malted grains—was grown, or even the variety of grain.

Since the Sumerians, Egyptians, and Chinese began brewing beer thousands of years ago, the only common ingredients—besides water—were grains that had been steeped, germinated, and dried to produce the malt enzymes needed for fermentation. Brewers make beer and distillers make whiskey from this malt. The Egyptians flavored it with dates, honey, and ginger. Modern beer, of course, flavors primarily with hops.

With over 30,000 varieties of barley, wheat, and other grains worldwide, brewers should be able to explore a multitude of grain flavors, too. However, after Prohibition the consolidation of the beer industry demanded grain consistency at the expense of variety. Malting companies and growers responded by concentrating on high yield, high protein, and low flavor grain varieties. By the 1980s and 1990s, it left the rapidly expanding craft brewing and distilling industries with few choices.

That all changed in Washington state in the last few years with the rise of a craft malting facility in Skagit Valley and another in Spokane Valley.

They came at the right time. "The craft brewing industry had been relegated to more or less use the same malt that was designed for big brewers," says Charles Finkel, one of the craft brew pioneers in the state.

Charles and Rose Ann Finkel started in the wine business, then imported craft beers before opening Pike Brewing Company in Seattle in 1989.

"When we started, we presumed, naive as we were, we should be able to get local malt for our beer. Alas, that was not the reality," he says.

It became reality when Wayne Carpenter, a former software executive, took an interest in malting grains around 2010 and founded Skagit Valley Malting. He brought in engineers to build a high-tech malting facility in Burlington for maltsters to transform local barley and wheat.

Now, in a warehouse just up the street from the WSU Bread Lab and Skagit County Extension, three huge stainless steel drums that resemble semitruck trailers spin slowly as they germinate and kiln barley and other grains from local farmers. Using smart sensors and automation in the energy- and water-efficient facility, the machines produce 20,000-pound batches. A smaller 400-pound malting machine runs experimental batches. The whole place smells like warm cereal.

Key to the operation, though, were partnerships with growers like Kraig Knutzen '85, says Adam Foy, a manager at Skagit Valley Malting. While Skagit Valley is known more for vegetables and flowers, farmers plant barley and wheat in rotation with primary crops.



WAYNE CARPENTER (SCOTT TERRELL/SKAGIT VALLEY HERALD)

"At first, there was a lot of skepticism about these grains, based on our location and varieties," says Foy. "Were they capable of being malted? Would they be successful brewing malts?"

Foy says they proved that they could not only malt these grains, but that they have unique flavors and nuance. "With just a little difference in time, temperature, and moisture, you go from light sweet honey to darker with some raisin and prune notes, to even darker with toasty, chocolatey flavor," he says, inhaling deeply from the samples at the facility.

Another future flagship barley for them could be NZ-151. Developed at WSU, it failed over on the east side of the state, but found its home in the maritime climate of Skagit Valley.

Skagit Valley Malting works with around 50 breweries and 8 distilleries, says Foy, all looking to test those new flavors. "Without blending, we can call out a variety from a specific year from a specific farmer."

One of the first consumers was Pike Brewing. Their Locale series first featured Skagit Valley Alba, a pale ale with a base malt of Alba barley grown by Knutzen Farms, a sixth-generation enterprise near Burlington. The Knutzens, including Kraig's son Tyler '13, Kristi Gundersen '83, and several other WSU alumni, primarily grow potatoes.

They gain economically from selling their cover crop to Skagit Valley Malting, but they also see and taste a delicious result.

"I don't want to underestimate the pride of place," says Finkel. "When Dave Hedlin, Kraig Knutzen, or John Roozen ('74) drink a Pike Locale, they're proud."

Finkel notes the similarity to wine in the state, which started with just a few grape varieties and now has over 150 specialized and intense varieties. For grains, he says, "we sacrifice a little of the yield per acre for flavor just as they have in the wine industry."

Back in Covington, Scarimbolo and his business manager and sister Dominique Torgerson '08 don't mind staying small, if it means staying local and sustainable. At the brewery, Scarimbolo grows 10 hops varieties, uses spent grains for chickens, and recirculates water for cooling. Using a DIY roaster, he makes rich chocolate malt for his award-winning Black Plague Stout. Mostly, says Scarimbolo, he doesn't want to be just another brewery.

"Where I'm at, there's not another brewery for seven or eight miles. There's a brewery every quarter-mile in Seattle," he says.



COURTESY PALOUSE COLONY FARM

The Palouse River cuts through the hills between the small towns of Endicott and St. John, in a valley where old grains flourish. With names like Purple Egyptian and Scots Bere, the barleys and wheats on Palouse Colony Farm look and taste unlike any other grains.

Don and Richard Scheuerman's German ancestors settled on this land in the late 1880s and applied their Old World agrarian knowledge, first learned in the Russian Volga region, to their new home on the Columbia Plateau. In 2015, the Scheuermans and the Ochs family re-established the homestead with heritage grains, grown sustainably with three-year crop rotations.

Called "landrace" crops, the Scheuermans grow and sell ancient prehybridized wheat, barley, oats, rye, and other grains through Palouse Heritage Grains. For example, says Richard '73, they re-established the first wheat ever grown in the Northwest, Hudson's Bay White. A history buff who has written extensively about the state's agricultural past, Richard is an education professor at Seattle Pacific University.

His brother Don manages the Palouse Colony Farm's 30 acres. (We're the smallest farm in Whitman County, jokes Don.) They credit WSU grain researchers Steve Lyon and Stephen Jones with helping track down and promote the landrace varieties. Leading a renaissance in breadmaking, the WSU professors tap into the complex flavors infused in the landrace grains like Lammas and

Turkey Red wheat. The new "culinary malts" offer another use for malted grains. They're also more nutritious.

"These landraces have much deeper taproots, and they pull up micronutrients that have interesting nutritional implications for the brews and the breads," says Richard.

Sitting on the table at Palouse Colony, a vase full of Purple Egyptian barley delivers a vibrant punctuation. The grain is indeed a deep purple and goes back to ancient Egypt as a malting variety.

Pike Brewing used some of the Purple Egyptian in its Locale series, and Spokane area bakers and brewers are discovering the unusual barley.

"That Purple Egyptian is magical," says maltster Joel Williamson. "The flavor is fruity. How can fruit flavor come from a barley? Usually that's hops or actual fruit."

Williamson malts Purple Egyptian at Palouse Pint in Spokane, along with other landrace grains from the Scheuermans. Palouse Pint was established in 2016 as part of farmers cooperative LINC Foods, managed by Williamson and Beth Robinette.

The cooperative delivers local food to universities and other institutions in the area, but Williamson says they wanted some off-season income. His interest in homebrewing inspired the craft malting idea. Soon they had a space in a Spokane Valley industrial area where Williamson directs the malting effort. He also helps lead a national craft malting guild.

He says one of the original LINC farmer-owners, Bill Meyer of Joseph's Grainery near Colfax, provided enthusiastic support and one of the popular malting grains, Baroness barley. He also grows WSU-developed Cashup winter white wheat, which has proven a popular malt variety.

"Grain growers don't usually know who's using their grain," says Williamson. "Here they can say with pride, 'That beer was made with my grains.'"

Palouse Pint works with a growing number of brewers and distillers, and several are anxiously awaiting another of the Scheuermans' landrace grains, Scots Bere. The legendary barley was prized by Scottish brewers and distillers for its high levels of fermentable sugars. It is cultivated on the Orkney Islands, perhaps back to Neolithic times.

The maltster and Palouse Heritage Grains had a seven-week Purple Egyptian collaboration with Bellwether Brewery in Spokane in the spring. Events like this can raise awareness, says Williamson.

"The local movement that drives the food side of our business is the same movement that will drive the malt side of the business. It's just a little further behind," says Don Scheuerman.

Williamson, Finkel, and the Scheuermans all note that craft malting is a return to the past. Just as there used to be flour mills in every small town, there used to be multiple maltsters in Spokane, Colfax, and throughout Washington, often connected to different breweries, in pre-Prohibition years.

The grains in those older malthouses brought variety to breweries and distilleries back then, and the new malts, sourced from local farmers, will bring distinct flavors to the industry today.

"Craft beer has a whole other age of exploration to go through," says Williamson. "I'm excited about the wine-ification of beer. There's more creativity to come."*

PHOTO: UNITED STATES NATIONAL ARBORETUM



more Doebler creations: magazine.wsu.edu/extra/gallery

OURstory

Fabric of the university

The ornate Washington State University mace, a convocation and commencement fixture, is perhaps the most widely recognizable of artist Tim Doeblers creations.

But his artwork is interwoven throughout the University. Commemorative and recognition placards in building lobbies. A stone monument on Terrell Mall. Finely crafted tokens of appreciation awarded to University leaders and supporters.

"I see this as part of the fabric of the University," says Doeblers '84 MFA, who is retiring in November after 38 years as an engineering technician with WSU's fine arts department.

A Vietnam veteran and survivor of the bloody Easter offensive, Doeblers returned to the States in 1972 and immersed himself in artistic pursuits.

He was good with his hands. Everything from carpentry and glassblowing to drawing and metal casting came easy to him. He also had an eye for detail.

After studying at an art institute in his hometown of Dayton, Ohio, Doeblers moved to La Grande, Oregon and discovered a vibrant arts community there. He returned to Ohio to finish a bachelor's degree before moving to Pullman in 1983 while awaiting his acceptance letter into WSU's graduate program.

"I fell in love with the Palouse," he explains. "While I was a student, I got a job working in the (art department) shops ... making sure they were taken care of and ready for whenever they were needed. I ended up staying on after I graduated, continued

maintaining and developing the shops, offering students any help or advice they might need, but otherwise I was free to make art."

The fine arts building includes an entire lower level of intersecting hallways where various industrial-type shops are located. Woodworking. Pottery. Glassblowing. Metal casting. Sculpting. They are among the facilities artists need to give physical shape to their creative visions and where student artists learn to work with tools.

This also is where many of Doeblers' creations came together.

He recalls being invited to a meeting in 1986 and asked if he could create a University mace. At the time, WSU was the only school in what was then the Pac-10 Conference that didn't have one. He submitted drawings to the University's centennial committee, which gave Doeblers the go-ahead and raised \$3,000 to cover materials and his time.

"I was like, of course, I can do that," he says with a laugh. "At the time, the shop tech was just a part-time position and I usually did things like build decks for people to make extra money so this was fantastic."

The project introduced the University and the arts community to Doeblers' skill and attention to detail. He wanted to make something that expanded on the medieval symbolism but conveyed a greater message of hope and progress.

He cast the entire two-foot piece in silver and bronze. A globe is cradled at the top to represent the awesome responsibility of a university president, laurel leaves are woven around it, and Doeblers added an anvil within the design

BY DAVID WASSON

as a reminder that WSU is where knowledge is forged.

Its first official use was in the inauguration of WSU's eighth president, Samuel H. Smith. It now is part of every commencement and convocation and is typically carried by the chair of the Faculty Senate.

The mace led to more commissioned artwork. Among them are the giant placards hanging in the lobby of French Administration bearing the names of donors to the University and the plaques nearby with the names of eminent faculty.

There are also plaques outside buildings commemorating those involved in their creation. All are carefully crafted to include design elements, often subtle, that are intended to help convey the building's purpose.

His favorite piece was an award commissioned by the WSU Foundation for retiring President Glenn Terrell, who was famous for his morning walks through campus in which he would engage students, staff, and faculty in casual conversation. Doeblers obtained a concrete core from the campus mall and mounted it atop an elaborate wooden stand he designed and built.

Those shop skills and craftsmanship are what he considers key to artistry. Doeblers calls them "attendant skills," mostly Old World knowledge that began to fade in the industrial era but that artists have continued to rely on for their creations.

Doeblers has a substantial personal collection of his own sculptures and artwork that he plans to showcase at galleries in retirement. *



UNIVERSITY MACE PHOTO BY ROBERT HUBNER; TIM DOEBLER PHOTO BY ZACH MAZUR

Holy smokes

The straggly plant is easy to dismiss. Narrow leaves and white, trumpet-like flowers, fade easily into Northwest fields and roadsides. But *Nicotiana attenuata*, commonly known as coyote tobacco, contains medicinal and ceremonial properties long revered by Native American cultures.

For thousands of years, coyote and other types of wild tobacco have provided what many consider a versatile healing remedy and meditative, spiritual channel to the Creator. Much of the botanical lore was muddled, however, with the arrival of Europeans and subsequent cultural upheaval.

At Washington State University, researchers Shannon Tushingham and David Gang '99 PhD are using a combination of archeology and high-end molecular chemistry to help identify and restore wild tobacco and other indigenous smoke plants used by Northwest Native groups.

Their work also supports a nationwide effort to design culturally-sensitive smoking cessation programs that emphasize the differences between traditional and commercial tobacco use.

Tushingham, assistant professor of anthropology, says tobacco use originated in South America, but exactly when remains a mystery. "We know some tobacco species were domesticated and used by North American

Indians in farming communities about 3,000–4,000 years ago," she says.

It certainly caught the eye of Columbus when he arrived in Cuba and noticed native people smoking "firebrands made of dried plants that produced pungent trails of smoke." He took some of their domestic stock back to Europe where it quickly became popular. Soon, Virginia colonists were growing tobacco on large plantations and eventually the dried leaves were carried into the Northwest for trade by Lewis and Clark.

Over time, commercial tobacco—with its higher nicotine content—was substituted for the wild type in some traditional Indian rituals. Natives were also introduced to casual smoking along with an increased risk for addiction and disease.

Tushingham says those types of social changes make it difficult to understand traditional tobacco use through archeological studies alone. To gain insight, she turned to the expertise of Gang, a professor in the Institute of Biological Chemistry.

Together, they used a unique research method to document the Northwest's oldest evidence of tobacco smoking in pipes.

Though pipes as old as 4,000 years have been found in Washington, this is the first time tobacco was confirmed as the smoking material. The pipes were found at three sites on the Snake River and one site near Moses Lake, which was carbon dated to about 1,600 years old.

To identify which plants were smoked, Tushingham and Gang put the pipes through a nondestructive chemical extraction

process. "With this technique, we no longer have to grind up the artifacts, just give them more of a good scrub with soap and water," says Gang.

Once extracted, the solution goes through molecular analysis to reveal a laundry list of plant compounds with specific chemical signatures. The findings are then compared to a list of signatures for plants that were experimentally "smoked" in the lab.

So far, Tushingham and Gang have identified several Northwest smoke plants including tobacco, kinnikinnick, dogwood, mistletoe, yew needles, madrone, and salal. Many of the plants are being grown in a greenhouse to collect seed for the Nez Perce Tribe and other Native groups.

"A big part of all my work is collaboration with Native American communities," says Tushingham. "Having our work be relevant to a modern community is really cool."

"We're also hoping we can debunk common urban myths about traditional smoking," adds Gang. "No, marijuana wasn't a traditional smoke plant; no, they didn't smoke that kind of tobacco; and no, they didn't smoke it 5 or 20 times a day. They only did it on special occasions and then, often just the medicine man or chief smoked."

It could all lead to more effective smoking cessation programs that recognize the sacredness of this powerful plant, says Tushingham. "Most national campaigns treat tobacco in black and white terms—saying that all tobacco use is bad, for example. But, that's not the reality for many Native communities." *

Smoking Place—a sacred area along the ancient travel route of the Nez Perce Indians that eventually became known as Lolo Trail. Courtesy National Park Service



GREENpages

Fluid dynamic

BY MAEGAN MURRAY

Growing up in Ethiopia's capital city of Addis Ababa, Yonas Demissie never suffered from lack of access to clean water, but he knew from a young age that it was a serious problem in most parts of his home country.

He remembers reading news and watching documentaries about the droughts and related famine that still impact Ethiopia.

"Why can't a three-year-old eat his breakfast?" the young Demissie would ask his parents and teachers. "A society should not have an excuse for a child to go hungry."

According to Water.org, which works to improve access to safe water and sanitation, just 43 percent have access to clean water in Ethiopia. Individuals in rural areas of the nation sometimes walk more than three hours to collect water, often from shallow wells or unprotected ponds shared with local wildlife. Those water sources may contain diseases and parasites that can prevent the body's ability to absorb proper nutrients, compounded by limited food supplies due to recurring droughts.

That is why Demissie, an assistant professor of civil and environmental engineering at Washington State University Tri-Cities, concentrates his research on monitoring, exploring, and evaluating the life-sustaining resource.

"I want my research in water to be my contribution to society," he says. "Water is a critical resource that needs to be accessible, protected, and properly managed."

One of Demissie's major research projects at WSU Tri-Cities is to assess the potential impact of climate change on military facilities and operations. He is halfway through a \$1 million, four-year U.S. Department of Defense project focusing on whether defense infrastructure and facilities could handle increased flooding and abnormal fluctuations in precipitation.

"DoD has many facilities across the globe and many of those installations are close to

coastal areas," he says. "They are worried about sea level rise, increased extreme storms, and how that will affect their facilities and operations. Our research is to assess flooding risk with the DoD facilities' existing storm-water management system and whether it is sufficient or needs to be upgraded."

Demissie also works with Hanford Site contractors and the Pacific Northwest National Laboratory in monitoring and modeling the groundwater flow from the nuclear site that created and now stores materials and chemicals associated with the creation of plutonium for the world's first atomic bombs. They want to ensure that radiation and other toxic materials from the site do not contaminate aquifers and reservoirs.

Beyond Washington, Demissie's work spans the globe, from the coasts shared by the United States and Mexico, to his roots in eastern Africa.

Demissie is researching ways to reduce the effects of nitrates and phosphorus in the Gulf of Mexico stemming from the biofuels industry. In the Midwest, biofuels like ethanol are made from corn, which requires increased

nitrogen and phosphorus application. The compounds end up in the streams, then flow into the Gulf of Mexico and increase algal blooms, which may prevent vegetation from growing and fish from surviving.

Demissie is also working with a team to examine current flow patterns and allocations of the Nile River, and how the resource can be more effectively shared by all African countries associated with the river.

"Our knowledge regarding water availability in the Nile Basin and how much and where water is lost in the system is limited," he says. "But our analysis shows that we get more water into the system than what was originally estimated. There is extra water that Ethiopia can use."

Demissie hopes his research will not only help increase access and strategies for clean water, but also raise awareness about the importance of protecting the valuable resource.

"Having a good understanding of water as a resource and coming up with a better management strategy I believe is critical for most societies," he says. *



Yonas Demissie (second from left), WSU Tri-Cities assistant professor of civil and environmental engineering, and his research team. Courtesy Maegan Murray

Till gone

The Greeks called phosphorus "the bearer of light," a chalky white mineral that ignites spontaneously and gives pizzazz to matchsticks and fireworks. Theories suggest it even arrived on Earth in a fiery meteorite crash billions of years ago.

The fifteenth element could also be called the bearer of life. Wound into DNA and RNA, phosphorus forms the backbone of our genetic material and provides cellular energy as adenosine triphosphate or ATP. It also makes up the fertilizer that provides global food security.

But phosphorus supplies are shrinking. Eighty-five percent of the world's readily available reserves are located in Morocco where, with conflict and political strife, it is mined from phosphate rock and auctioned to an ever more competitive market.

Although phosphorus can't be manufactured or synthesized, it can be recovered and recycled. New technologies have emerged to help salvage the precious mineral—including a portable "struvite machine" at the Washington State University Puyallup Research and Extension Center.

The nutrient recovery system, as it's formally known, transforms cow manure into a dry, sand-like fertilizer called struvite, composed of magnesium, ammonium, and phosphate. It was developed by WSU professor of animal science Joe Harrison together with research associate Liz Whitefield '07 MS and Keith Bowers of Multiform Harvest.

The idea hinges on the fact that animals and humans excrete nearly all of the phosphorus they take in as food. Traditionally, phosphate-rich manure and human waste were returned to the soil as fertilizer. Not so much today.

"Seventy percent of the phosphorus dairy cows consume stays on the farm as phosphate in feces and urine," says Harrison. "Only about 27 percent leaves the farm in milk cartons."

Washington dairies often spread that manure in fields where the phosphate accu-

mulates over time. Harrison says they want to lower the buildup and bring the farms back into "phosphorus balance." With the mobile recovery unit, excess phosphorus can be extracted from manure on any of the 400 dairy farms across the state. The resulting struvite can then be used as fertilizer or sold to other farms.

Harrison first learned of the concept from a poster at a national manure conference. Bowers, an engineer, had invented the method as a way to recover phosphate from swine feces.

When Bowers later moved to Seattle, he and Harrison formed a partnership that eventually led to the debut of the portable struvite machine. Bowers also went on to found Multiform Harvest, a company that recovers phosphorus from municipal wastewater plants.

Harrison says the struvite they create is dry and coarse like sand, and very user-friendly compared to the wet slurry products produced by earlier techniques.

In essence, manure from a dairy lagoon is pumped into their cone-shaped machine and mixed with chemicals that precipitate struvite at the bottom. Excess liquid runs out the top and back into the lagoon.

"The material we capture is a good source of fertilizer," he says. "It's easily transported and it gets the buildup off the farms."

"It's also environmentally friendly. You can actually put seeds right into the soil with struvite with no burning effect."

Hoping to balance the phosphorus cycle on an even wider scale, Harrison is now working with forage growers in eastern Washington.

He says while phosphate accumulates on dairy farms west of the Cascades, it is simultaneously being depleted in hayfields east of the mountains. Nutrient-rich alfalfa and timothy hay grown in the Columbia Basin, for example, is regularly shipped to western Washington to feed dairy cows.

"Seventy percent of the phosphorus that was in the hay stays on dairy farms," Harrison says. "So, let's capture it as struvite, put it in super sacks, and let the empty hay trucks carry it back to eastern Washington." *

"Life can multiply until all the phosphorus is gone, and then there is an inexorable halt which nothing can prevent. We may be able to substitute nuclear power for coal, plastics for wood, yeast for meat, and friendliness for isolation—but for phosphorus there is neither substitute nor replacement."

—Isaac Asimov

Plums

BY LARRY CLARK

Of all the fruit trees, it sometimes seems like the most common backyard resident is the plum. Whether you live in Lynden or Lind, if you don't have a nearby plum tree, chances are you can find one. A neighbor might even give you a big bag of purple fruit.

Although apples, pears, and cherries dominate the commercial tree fruit of Washington, the state produces the second-most plums in the nation. To be fair, California commands that sector, with 97 percent of the plum market.

That doesn't diminish the plum as a tasty addition to any home-grown suite of fruit. In fact, Washington State University Extension recommends that plums, along with peaches and apricots, might be a good substitute for apples or cherries, because plums "are not regularly attacked by troublesome insect pests, so they may not require multiple pesticide applications during the growing season."

As Extension educators have noted, "Plum trees are usually vigorous and productive, less prone to disease and nutrition problems than other stone fruit kinds, and can be used not only for fresh eating but also for canning, drying, fruit leathers, and other culinary uses."

A home gardener can choose from an array of plums to grow, with fruit colors ranging from "classic" purple to bright green, dark yellow, red, gold, and almost black. Although there are a number of cultivars, they are generally classified as European, Asian, and hybrid plums.

The European plum, *Prunus domestica*, probably originated around the Caucasus region at least two millennia ago. Writings from the ancient Middle East also talk about early cultivation of the Damson plum, *Prunus insititia*, in the area around Damascus.

On the other side of Asia, the Japanese plum, *Prunus salicina*, was first domesticated in China thousands of years ago. They were developed further in Japan and spread around the world. Japanese plums are the most common fresh plum available for sale due to a longer shelf life than European plums.

In the United States, plum varieties that dehydrate without fermenting are called prunes. They have high sugar content, and notoriously large amounts of dietary fiber that have a laxative effect.

The image of grandpa's prune juice has led marketers to begin calling their product "dried plums" in recent years.

That fiber is good for you, though, and plums—and prunes—have a number of other health benefits. A medium-sized plum contains over 100 milligrams of potassium, which can help manage high blood pressure and reduce stroke risk. Anthocyanins in the reddish-blue skin of some plum varieties may protect against cancer by picking up free radicals. Plums can also help reduce the risk of type 2 diabetes, as they rank low on the glycemic index and could help control blood sugar.

Growing plums in the Northwest is fairly easy on both the west and east sides of the state, and European and Japanese plums are consistently successful. Some varieties recommended by WSU Extension for the maritime climate of western Washington are Shiro, Methley, Early Laxton, Mirabelle, and Stanley. The European varieties are generally the easiest to grow.

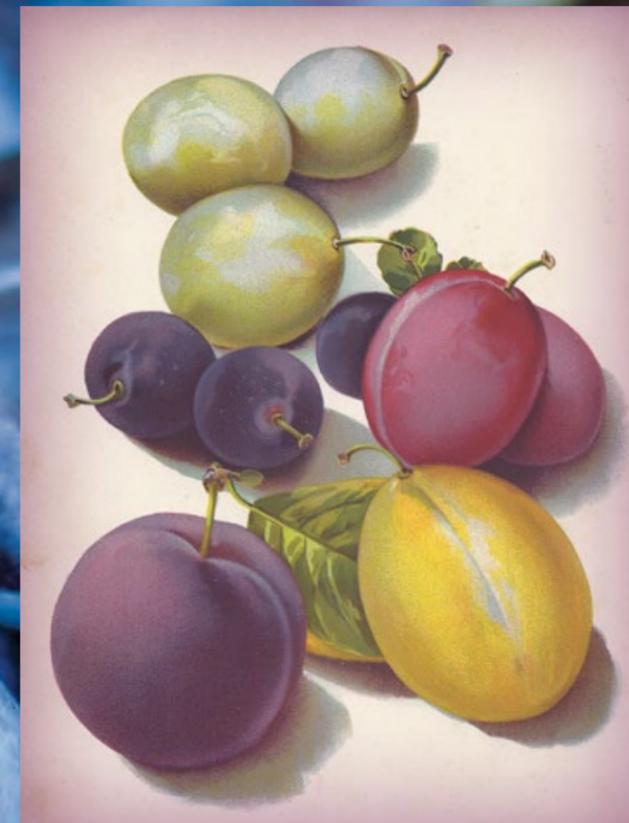
As with all fruit trees, plum and prune trees need to be, well, pruned. The Washington Tree Fruit Research and Extension Center in Wenatchee recommends that you prune very lightly for the first five years. Prune mature trees more heavily, especially if they've shown little growth, when all danger from fall or early winter freeze has passed, but before full bloom in spring. Prune the top portion of the tree more heavily than the lower portion.

If you want something a bit different, you can grow Damson and small, round "bush" plums. "They are often quite tart for fresh eating. However, they are very productive, supplying plenty of fruit for jelly, jam, and even wine," according to Extension.

Plums typically ripen between mid-July and mid-September and flavors range from tart to very sweet. European types have firm-fleshed fruit that is freestone, often used for drying and canning. Japanese and hybrid types have very juicy fruit that is clingstone, and are not well adapted to drying or canning. Some do make excellent jelly.

While you can eat many plums fresh, they're also great for sauces, compotes, or baked in desserts. Plum sauces match particularly well with pork or poultry.

Dried, salted, or pickled plums make a tasty snack. Many cultures ferment the fruit into plum wine or a kind of cider, such as plum jerkum in England. *



Various cultivars of plums from a 1909 Brown Brothers Nurseries Catalog (from top, left to right): Imperial Gage, Damson, Lombard, Maynard, and Yellow Egg. Illustration by Alois Lunzer. Source Wikimedia

CHELAN PLUMS (PHOTO DANITA DELIMONT)

SIDELINES

Game changer

BY DAVID WASSON

A SMALL, BROWNISH DRY SPOT IS VISIBLE ON THE NINTH FAIRWAY AT PALOUSE RIDGE GOLF CLUB.

Superintendent Mike Bednar is unbothered, which might seem a bit surprising given the course's enviable reputation among national golfing groups.

"This is designed to play hard and fast," says Bednar '92, '04, explaining Palouse Ridge needs to be a bit on the dry side to deliver the kind of gameplay challenge that's kept it atop national rankings ever since its 2008 opening. "We've got an irrigation system that lets us water only when and where it's necessary."

The design isn't just about gameplay, though.

As water becomes increasingly valuable, golf course operators are experimenting with a range of strategies to use less. Specialized irrigation systems and precision application. Greater use of reclaimed water. Development of drought-tolerant turfgrasses.

Palouse Ridge, owned by Washington State University and located on the northeast portion of the Pullman campus, was built with conservation in mind. Wetlands were preserved and now serve as water hazards. Native grasses outside the fairways were left largely intact. Special sensors track soil conditions and the course's roughly 2,300 sprinkler heads can be individually controlled for precision watering.

But most of America's courses were built decades ago, when water use issues were less prominent. Trade organizations have since made conservation a top priority and are pushing for greater research into practical strategies ranging from moisture-thrifty course designs and specialized irrigation to development of turfgrasses that require less water.

William Johnston, who retired last year from the WSU Crop and Soil Sciences Department, and research technician Charles Golob '79, '86 MS spent a year testing the effectiveness of irrigation soil sensors. Their research plot located

just west of Palouse Ridge includes sensors at varying depths that monitor everything from soil temperature to moisture content, enabling them to know when and where water is most needed.

Johnston says the sensors helped reduce water use by about 25 percent while maintaining robust turf conditions. The key was precision watering.

"The reason it's so effective is because soils are so variable," he explains. "Even a slight elevation difference ... or something like the direction that a slope is facing, can affect the amount of water you need in that particular location."

Newer irrigation systems, like at Palouse Ridge, use individually controlled sprinkler heads rather than multiple-head irrigation zones. "That's important because you may only need water in one area at a particular time, but if you're having to run an entire zone it means you're over-watering everywhere else," Johnston says.

He and Golob predict that computerized irrigation systems soon will be making those

kinds of adjustments automatically based on the readings from soil moisture sensors.

"Initially, the computers will need people to tell them what should be done based on a particular reading but after that they'll probably be able to run something like this quite efficiently," Johnston says. "With these instruments, you can know what's going on before you can see it with your eyes."

So far, sensor technology is being embraced primarily within the agriculture industry and other commercial irrigators. Johnston hopes affordable residential versions will be developed and embraced by homeowners and others.

Although it may be golf courses that get a lot of attention when water shortages are looming, residential yards comprise the greatest amount of irrigated turf in the United States. "It's not even close," says Johnston, who specializes in turfgrass. "Turf is the biggest irrigated crop in the country."

Science is just one piece of the puzzle. Much of the transition will involve consumer acceptance as well.

Golf course operators, for example, often find themselves caught between competing expectations. On the one hand, they're asked to become better stewards of community water resources while at the same time somehow preserving the lush conditions that have become symbolic of U.S. golf courses.

Back at Palouse Ridge, finding ways to reduce water use is a continuing exercise.

Bednar says about 250 of the course's sprinkler heads have been turned off after watching golf patterns to identify areas that aren't being used. Also, the course discontinued watering much of the driving range, turning on sprinkler heads only at specific target areas to help golfers track their shots. Palouse Ridge is equipped to irrigate with recycled or reclaimed water but Pullman lacks the infrastructure to get it from the city treatment plant across town to the golf course.

"We want to use as little water as possible," says Bednar, explaining the course is just in its second season of using the new irrigation software and wants three to five years of data before making comparisons.

"I think people are realizing you can have good, challenging gameplay with a few brown spots out there," he adds. "It's this perception issue that all golf courses are dealing with but I think Palouse Ridge is helping overcome that." ✨



PALOUSE RIDGE GOLF CLUB SUPERINTENDENT MIKE BEDNAR (PHOTO: ZACH MAZUR)



ALIVIA BROWN (COURTESY: WSU ATHLETICS)

PLAYING IN THE MOST COMPETITIVE COLLEGIATE CONFERENCE FOR WOMEN'S GOLF HAS ITS CHALLENGES.

It also has its benefits.

"We get to play with some of the best golfers in the world," says Kelli Kamimura, who is starting her ninth season as coach of Washington State's women's golf team. "The Pac-12 is tough. It's definitely the powerhouse conference right now."

Sixteen of the past 25 national championships have been won by Pac-12 schools, including current champ Arizona State, which in May set a Division I record with its eighth NCAA golf title. Two other Pac-12 teams also won trips to nationals last spring.

Washington State, which began fielding intercollegiate women's golf teams in 1982, is holding up well against the pressure.

Last season, WSU women tied for second in the Cougar Cup and notched four top-5 finishes. On the individual side, junior Alivia Brown earned her second bid to the NCAA Regional Tournament in three years, becoming WSU's first female golfer to secure multiple trips to regionals, and notched a career-best second place finish last fall in the Golfweek Conference Challenge.

"We made some really big strides," says Kamimura, who as a collegiate player led the University of Washington to five tournament victories, two NCAA championship berths, and then spent six years as an assistant coach with national contender Pepperdine. "We're really getting the program to where we want to see it going."

That means getting creative.

Washington State is the only golf program in the Pac-12 that has to cope with the kind of extreme winter weather that shuts down courses for the entire season. The Cougars' home course, Palouse Ridge Golf Club, is a great, challenging place to train and compete, says Kamimura, but it closes each fall.

The University has an indoor training facility with an artificial putting green and hitting bays, but is hoping to get some upgrades to remain competitive. The men's and women's teams also travel regularly to Clarkston, which sits in a warmer valley nearly an hour south of Pullman. And, they travel to Arizona to give players actual time on golf courses during the long winter break between fall and spring portions of the annual season.

Meanwhile, Pullman's reputation within golf circles is growing.

Palouse Ridge is ranked among the top collegiate courses in the nation. It was the site of the Pac-12 women's championship tournament in 2012 and the men's conference championship in 2015. It's set to host its second NCAA men's regional in 2019, and its first women's regional in 2020. ✨

Streaming solutions

BY REBECCA PHILLIPS

High in the Cascade and Olympic Mountain snowfields, pristine rivulets trickle into brooks that descend through forest, farmland, and town. Streams merge into rivers and sweep through cities until finally breaking into Puget Sound and the marine waters of the Pacific.

There, in the southern arm of the Salish Sea, the waters mingle in a fertile estuary teeming with biodiversity.

“Looking out at the waters of Puget Sound, you see the sunset, the beautiful mountains, and people think, ‘Everything is good, we’ve got the orca.’ But we have invisible problems,” says Chrys Bertolotto, natural resource programs manager at the Washington State University Snohomish County Extension office in Everett.

Indeed, the region’s rich natural resources have attracted a booming population complete with homes, schools, industry, and the inevitable waste products they generate. Much of it, unfortunately, ends up in the Sound. At least 63,000 pounds of toxic chemicals *each day*.

Before the passage of the 1972 Clean Water Act, unfiltered wastewater from smelters, pulp mills, and sewage treatment plants was freely discharged into the Duwamish River and other Sound waterways. Regulations and permits have successfully decreased industrial pollution but a dozen or so Superfund sites remain in remediation.

Today, it is estimated that 75 percent of Sound contamination is unwittingly produced by citizens. Hidden residues from everyday activities are carried by stormwater runoff over miles of paved highways, paths, and parking lots that have essentially become an extensive new system of “rivers.”

With every rainfall, a toxic slew of animal manure, roofing materials, vehicle debris, home and garden chemicals, and sewage from failing septic tanks is washed down those conduits into the Sound.

The estuary also suffers from a slow rate of water exchange, allowing chemicals and bacteria to linger in bays and inlets. It all adds up to an ailing ecosystem, with negative effects on plants, wildlife, and humans alike. Rivers and streams once thick with Coho and Chinook salmon now see a fraction returning to spawn. Bacterial contamination of shellfish beds and swimming beaches is common. Water supplies are vulnerable.

In 2007, an alliance of concerned citizens and organizations formed a state agency called the Puget Sound Partnership whose goal is to restore the Sound to health by 2020 and safeguard it for future generations.

Their progress can be tracked by a “Vital Signs” wheel that colorfully highlights six major areas of concern, each with specific indicators of the Sound’s health such as eelgrass habitat and economic vitality.

It’s an enormous undertaking that relies heavily on regional and local efforts. Hundreds of state, federal, municipal, tribal, and nonprofit organizations work together to keep recovery on track. Among those participating is WSU Extension.

From Puyallup to Bremerton, Port Townsend to Everett, WSU Extension and research centers are immersed in Puget Sound revitalization through a combination of investigation, stewardship, and educational outreach programs.

Bertolotto, who directs the Snohomish County Beach Watchers program, is just one of many Extension agents who use the latest

Inset, right: Beach Naturalists with the Kitsap Water Stewardship Program. *Courtesy WSU Kitsap Extension. Background:* View of Hood Canal and the Olympics from Scenic Beach State Park. *Courtesy TripAdvisor*





Inset, above: Renee Johnson, water stewardship program coordinator for Kitsap County Extension. *Staff photo.* *Background:* Clear Creek Floodplain Restoration Project. *Photo Karyl Williams/Flickr*

scientific discoveries to design locally relevant community projects and train volunteers to become citizen scientists.

It may be surprising that WSU, whose original campus is 300 miles away in dryland farming country, can be a partner in marine and freshwater recovery efforts.

But as Bertolotto says, “We’re a well-kept secret.”

On a sunny day at the Puyallup Research and Extension Center, tulips and even the grass seem jubilant as John Stark walks out of the tidy brick admin building en route to his outdoor laboratory.

The New York native and WSU professor of ecotoxicology is one of the original members of the Puget Sound Partnership Science Panel and helped design the Vital Signs wheel.

“Every slot on the wheel is very important,” he says. “We try to cover all major issues affecting quality of life in the Sound, from scientific to social impacts.”

The panel advises Partnership directors on the best ways to protect the Sound while improving ecosystem health. The panel was key in pinpointing stormwater as today’s biggest source of contamination.

Much of that data came from the Washington Stormwater Center—a collaboration between WSU Puyallup and the University of Washington Tacoma since 2010. Stark, who directs the center, leads Puyallup researchers in the study of low-impact development emphasizing conservation and the use of natural features.

Instead of traditional gray stormwater measures like pipes, sewers, and manholes, Stark’s team uses green stormwater techniques to slow rainwater runoff and allow it to filter naturally into the ground.

“We’re studying things like bioswales—gently-sloped roadside drainage ditches—rain gardens, and permeable pavements,” he says.

Permeable concrete and asphalt are made of porous materials that allow water to percolate through to the earth rather than glide over the surface. The materials also trap sediment and filter out pollutants.

Stark says rain gardens use a similar principle. The shallow pond-like areas are filled with a mixture of soil and compost that filters runoff from rooftops, driveways, and other hard surfaces.

“People ask me if our stormwater facilities will be a toxic dump in 30 years—are the chemicals and other pollutants building up in the soil?” he says. “But, no, it’s a living system of algae, bacteria, fungi, and other microbes that eat and break down the pollutants.”

Some of those pollutants are analyzed indoors at a lab containing an unsettling smorgasbord of toxic vehicle debris. “Every time you hit the brakes, copper dust and asbestos are expelled,” Stark says. “Tires wear down, spewing carbon black, hydrocarbons, and metals. They’re all really toxic. Then there are bits of oil and radiator fluid that drip on the catalytic converter and drop cadmium, another toxic metal, on the road.”

He also analyzes roofing materials and the contaminants they release during storms.

It all amounts to a recipe that takes a heavy toll on salmon and other aquatic species. The evidence was recently confirmed by Stark and aquatic toxicologist Jenifer McIntyre together with NOAA Fisheries and the U.S. Fish and Wildlife Service. Their studies showed that 60–90 percent of stream-spawning salmon like Coho die before laying their eggs due to stormwater pollution.

“Untreated stormwater from Seattle freeways is extremely toxic to fish and the aquatic insects they eat,” he says. “But allowing water to run through rain gardens completely eliminates that toxicity.

“The number one reason the Puget Sound Partnership was established was in response to the decline of wild salmon populations. It’s a fact that certain species are threatened or endangered.”

With continued funding from the Environmental Protection Agency and other organizations, Stark hopes to discover ever better ways to control stormwater. For example, using carbon fiber from jet wings to strengthen permeable pavements.

His research findings not only impact state policy decisions but are also reflected in many Extension programs around Puget Sound.

Set in the shadow of the Olympic Mountains, the Kitsap County Extension office in Bremerton is home to both WSU land-grant and University of Washington Sea Grant programs. Their mutual goal is to enhance public outreach efforts.

“We have a unique partnership here—one of only a couple in the state to share an office and expertise,” says Renee Johnson, water stewardship program coordinator for Kitsap County Extension.

Her UW counterpart is Jeff Adams, a marine ecologist with the Washington Sea Grant program. He is also a coordinator for the Beach Naturalists program.

Johnson says Kitsap County is very progressive when it comes to stormwater management with city and county leadership taking a big-picture watershed approach. “The health of Puget Sound begins in the watersheds,” she says. “Our small lowland streams have been called the lungs of the Sound.

That thinking is evident in the city of Silverdale, a mecca of low-impact development where rain gardens, permeable asphalt, and permeable paving stones are common and even adorn a local roundabout. The latest in green engineering techniques are also on display at the Clear Creek restoration site, where the long-neglected stream is getting a massive overhaul.

Kitsap Extension supports these efforts through a palette of environmental stewardship programs. Stream Stewards, for example, trains volunteers to restore and monitor the health of freshwater habitats like Clear Creek. One way they do that is by sampling aquatic insects. The types and numbers they find are related to the amount of pollution in the waterway.

“Stream bugs are a sentinel for stream health,” Johnson says. “If we find many pollution-sensitive species, like mayflies, it can mean the water quality is better.” It’s also better for the salmon who depend on those insects for food. In fact, monitoring bugs is an easy way to help gauge the general health of salmon populations.

Clear Creek eventually empties into the estuary at Dyes Inlet on Puget Sound. It is here that Johnson visits homeowners with information about the Shore Friendly program for removing beachfront retaining walls known as bulkheads.

“The shoreline is part of a delicate ecosystem and when it’s blocked with a bulkhead, it can’t function properly,” she says.

Bulkheads are placed to prevent bluff erosion, but Johnson says the sea walls can actually increase beach erosion as well as disrupt natural shoreline habitat. Shade plants are lost along with terrestrial insects that feed juvenile salmon. Changes in beach sediment also block forage fish like smelt from spawning which leads to a subsequent decrease in the salmon who eat them.

“The cumulative effect on Puget Sound is big,” Johnson says. “But once you remove bulkheads, the beach can recover to a more natural sand-gravel mix that fish and other creatures can dig into.”

The health of those marine creatures is of keen interest to Adams, who leads volunteers in the Beach Naturalists program. At the Bremerton public marina, he points out a few while lying on his stomach on the dock. He calls it “belly biology.”

There, just below the water’s surface, hundreds of fluffy white anemones wave their tentacles. Sea squirts join a montage of feather duster worms, giant barnacles, sea slugs, and one red rock crab eating a mussel.

“These aggressive crabs are an important defense against the invasion of European green crabs,” Adams says. “On the east coast, green crabs damaged the soft-shell clam industry—they eat everything including eelgrass and smaller crabs.”

Adams trains Beach Naturalists to trap and identify native crabs in hopes of finding and eliminating nonnative invaders. Just this spring, more than 50 green crabs were discovered near Sequim on the Olympic Peninsula. The fear is that, once established, the crabs could disrupt the Puget Sound ecosystem.

He also monitors sea stars. “We used to have hundreds of purple stars on this pier,” Adams says. “Now, if you search, you might find one.”

The paucity stems from a devastating viral outbreak of sea star wasting that began in 2013 and has killed many millions of starfish along the west coast. Although die-offs have occurred in the past, Adams says they were never of this magnitude. Researchers suspect warming waters played a role.

“A year and a half ago, we saw lots of sea star babies and got excited but they all disappeared and we haven’t seen many since,” he says. “In the past, populations have recovered in a number of years.”

“Sea stars play a big role in the ecosystem; they eat barnacles, mussels, clams, even dead mammals. If they disappear, it changes the ecology of the area—all the way down to the plankton.”

At the far end of the dock, he finally spots one lonely starfish clinging to a post—it’s a giant pink star, one of the largest species in the world.

Near a beach in Port Townsend, the Jefferson County Extension office stands guard over Puget Sound like a blustery outpost. The white clapboard building is sea weathered and quaintly topped with a cupola.

Inside, Bob Simmons, associate professor of water resources, pores over a map showing where he and his team have installed local rain gardens.

Simmons’s office, like Kitsap Extension, places a major emphasis on stormwater management and watershed protection with programs specifically geared toward the needs of rural communities.

Small hobby farms are common in Jefferson County and manure is easily washed into streams by rainfall. Rural areas also rely on septic systems of which 5–10 percent can be failing at any given moment, spilling coliform bacteria into waterways and eventually the Sound.

“Government can’t do it all. It really needs to be addressed at the individual level if we’re going to make a difference,” says Simmons.

It also takes an extensive partnership with nonprofit organizations, tribes, and local city and county governments. Those rain gardens, for example, were built with support from Master Gardeners, the city of Port Townsend, and the local Marine Resources Committee.

“We provide the time and expertise to train people to put a rain garden together,” Simmons says. “But we’re really building the capacity of the community to tackle these projects on their own.”

Like Kitsap County, they also offer a Beach Naturalists program, led by Cheryl Lowe. The six-week, entry-level course provides scientific training taught by regional experts. Once certified, trainees commit to 40 hours of volunteer service with local marine-related programs.

Two of those volunteers, Amy Does and John Conley, are visiting the beach at Fort Townsend State Park. Both became Beach Naturalists in 2013—an adventure, they say, that enriches their lives and communities as well as the health of the Sound.

Does is a retired community college biology instructor who tackles projects ranging from green crab and sea star monitoring to forage fish egg sampling and Olympia oyster restoration work.

“It only takes a few days a month. It’s not a huge commitment,” she says. One of the perks Does enjoys is meeting citizen scientists from all walks of life—IT, engineering, social work, and more. Each connects with a web of other volunteers to ultimately form a very large network.

Conley, a retired public health director, puts his training to use as a docent at the Marine Science Center where he shares his enthusiasm for marine life with schoolchildren.

He also works with SoundToxins, a monitoring program that gives early warning of toxic algal blooms. Puget Sound is home to several species of algae that produce poisons that can harm humans and wildlife.

“The program augments the resources of local health departments,” he says. “We provide data that helps the department decide whether or not to close a beach to shellfish harvesting due to biotoxins.”

“It’s fascinating. It’s so much fun to sit for a couple hours with a microscope and plankton,” he says. “It’s particularly gratifying to



Inset, above: Puget Sound sea star. *Photo Jeff Adams. Inset, below:* Bob Simmons, associate professor of water resources with Jefferson County Extension. *Staff photo. Background:* Looking across Admiralty Inlet toward Port Townsend from Fort Casey State Park. *Photo Jim Simandl*



people like me who love to eat shellfish and are happy to be part of a program monitoring their safety for eating.”

While Conley is analyzing plankton, Does takes part in a similar project with the Puget Sound Restoration Fund. She is on one of seventy teams that collect and test mussels for paralytic shellfish poisoning through the State Department of Health. She says volunteer help is critical to effective widespread monitoring.

In Edmonds, Snohomish County Extension volunteer Rick Albright swaps a federal science career for his new role as a Beach Watcher. To say he's enthusiastic is an understatement.

“When I first heard about the program, I thought it was too good to be true,” he says. “It’s getting me back to my roots with marine biology.”

Recently retired, Albright was a staff biologist at UW before joining the Environmental Protection Agency Region 10 office in Seattle, where he directed the hazardous waste program and, later, the Superfund program which oversees the Lower Duwamish Waterway cleanup plan.

“The opportunity to get involved with Beach Watchers refreshed me,” Albright says. “It’s a deep passion of mine. It’s more than I expected, and I think WSU deserves a lot of credit for conceiving this program and supporting it.”

The program is directed by Bertolotto and coordinated by Yolimar Rivera Vazquez.

Beach Watchers is a step up from Beach Naturalists, with volunteers receiving an extensive, 80-hour training course. They also agree to 80 hours in service over the next two years.

Albright volunteers on “beach patrol” where he tells stories and answers questions about things like sea star wasting and ocean acidification. He also maps profiles of intertidal beaches, monitors water quality, and conducts rain garden assessments.

He and Bertolotto also hope to team up with UW to study eelgrass, a Vital Signs indicator for healthy marine habitats. The aptly-named sea grass grows near the shoreline, providing an important food source for tiny organisms as well as cover for juvenile salmon, molting crabs, forage fish, and more.

Bertolotto says one of Beach Watcher’s main priorities is to introduce people to the outdoors, especially the intertidal areas where volunteers explain the beach creatures, their life cycles, and environmental sensitivities. “We’re hoping to build a lifelong love and appreciation for Puget Sound and its resources,” she says.

That includes story time and activities for children. “Research shows that preschool is the age when humans start making connections to the outside world, so it’s an important age to reach out to,” says Bertolotto.

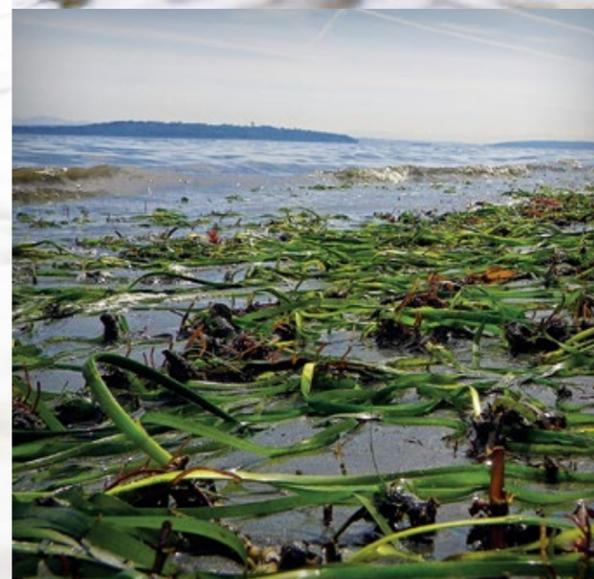
Indeed. Big hands, little hands. All lifting, measuring, teaching, counting, repairing, cleaning, building, planting, healing. The work is far from over.

In the latest Vital Signs report, statistics show that Puget Sound interventions have made some progress, at least on local levels. Several indicators have improved, but others, such as salmon and

orca populations, remain uncertain or in decline. Unfortunately, few indicators are on target to meet their 2020 goals.

Guardians of the Sound are more crucial now than ever. Bit by bit, their hands help stem beach erosion so surf smelt can spawn in the sand. Watershed creeks are restored and more salmon survive the trip upstream to nest. Shellfish harvests stay open a few days longer and crabs can safely molt in the eelgrass.

The efforts accumulate and with enough time and care, even the sea stars could return to brighten the rocks and pilings of America’s second largest estuary. *



fly down streams into Puget Sound: magazine.wsu.edu/extra/streaming-views

build your own rain garden: magazine.wsu.edu/extra/rain-garden

Insets, left to right from top: Jefferson County Extension Beach Naturalists (including John Conley and Amy Does, second and third from left) with leader Cheryl Lowe (center). *Photo John Fillers.* Snohomish County Extension Beach Watchers in Edmonds, Rick Albright in orange. *Photos Cordell Hauglie.* Eelgrass is a Vital Signs indicator for healthy marine habitats. *Photo David Ayers/USGS.*

Background: Water streams into the Sound at Picnic Point Park, North Lynnwood. *Photo trinterphotos.com*



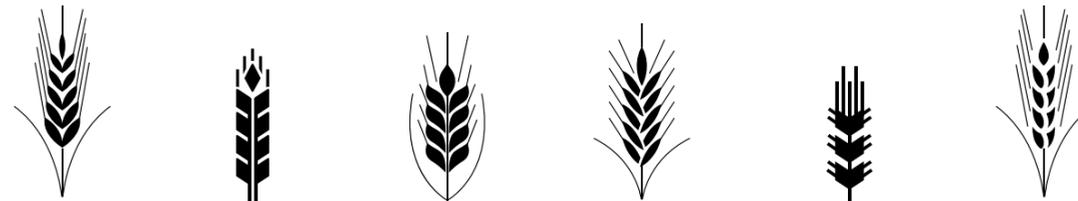
Genetic diversity may be a lifeline



for humans trying to grow enough to eat



while dealing with the wild variability of changing climate



PLANT FOR THE FUTURE

BY BRIAN CHARLES CLARK

Somewhere in the dryland wilds of eastern Washington, Michael Neff and his wife stop the car. "I've always wanted to hike these dunes," he says to her. "I could not believe the grasses that were stabilizing those dunes!" Neff says later. He refuses to identify where, exactly, the dunes in question are located. "It's those little pockets of diversity that we need to identify and preserve," he explains, almost—but not quite—apologetic.

Trained as a botanist and now a professor of molecular biology at Washington State University, Neff expands on why this is important: "If we're going to be resilient in the face of climate change—or whatever the world is going to throw at us—we need those genetic resources."

We often think large swaths of rainforest or savannah need preserving. Small corners of the Palouse and elsewhere also need protection, Neff says. "The giant cedars on top of Moscow Mountain, or the abandoned orchards on Steptoe Butte, where a supposedly extinct apple variety was rediscovered. Or old graveyards," where native plants find their last refuge.

Increasingly, global warming is driving extreme climatic variability, bringing floods, droughts, and pests, all stressors that plants adapt to, if they are able, with genetic variations. A diverse, local population means there's a greater chance of an individual member of a species finding an adaptive response to environmental stress—and then passing that adaptation on to its progeny.

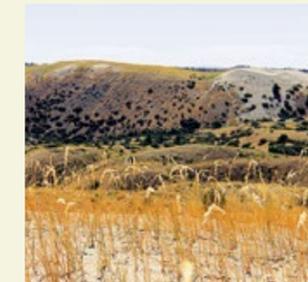
And while the Pacific Northwest in the near term will likely be largely shielded from the worst, most dramatic effects of climate change, people in other parts of the world are already living on the knife's edge. That's why soil microbiologist Lynne Carpenter-Boggs is working on how to bring new life to ancient soils in Malawi, and why growers on a defunct tea plantation in India found new ways of earning a living diversifying their farms. And it's also why WSU crop researcher Kevin Murphy is hauling seeds to Ecuador and Africa.

THE HUNGRY SEASON

Barley and quinoa breeder Murphy is working with farmers outside Cañar, an Ecuadorian village at about 13,000 feet in the Andes. Local farmers are distressed at the loss of their quinoa crop to early rains. Quinoa seeds don't go dormant the way wheat and other grains do. They have to be kept dry. If rained on, quinoa starts sprouting right away. As Julianne Kellogg, one of Murphy's grad students in Pullman, will later say, rain on quinoa before harvest results in a field full of chia pets. It's a charming image—until you picture the people whose lives depend on that harvest. Then it is very distressing indeed.

Half a world away, there's a drought in Rwanda. Murphy arrives and, by coincidence, the rains come, too. Indulging in a little magical thinking, the locals don't want the *mzungu*, the Bantu word for white person, to leave, fearing he'll take the rains with him.

Southeast of Rwanda, Murphy visits farmers in Malawi. There, too, the wet and dry seasons are out of whack. In a country that already deals with a "hungry season" when supplies of the dietary



ABOVE: DUNE GRASSES AT JUNIPER DUNES WILDERNESS (COURTESY BUREAU OF LAND MANAGEMENT). BELOW, FROM TOP: KEVIN MURPHY PURCHASING QUINOA IN A MARKET IN COTACACHI. JULIANNE KELLOGG '17 DOCUMENTING THE NEOTROPICAL AGROECOLOGICAL CLASS IN ECUADOR IN 2016. (COURTESY AGROCOUGOLOGY)





the things they didn't like about it was that they couldn't eat it with their hands, the way they do *nsima*, their national food, which is made of ground maize. So we worked with some Malawian researchers to come up with a mix of maize and quinoa they like. They grind the quinoa in with the maize to make *nsima*. Quinoa supplements both agronomically and nutritionally."

Adding a little diversity to their food system may help ward off the growling bellies of the hungry season. Instead of a single crop with one plant date and one harvest date, multiple crops, and multiple varieties of each, can be planted and harvested across a range of dates. Maintaining diverse populations of crop plants offers the hope that scientists and farmers will find varieties able to adapt to the stresses of a warming world.

THE FUTURE IS BENEATH US

Carpenter-Boggs hopes that fungi and an old law will help loosen the hard red clay of Malawian soil. That, and a little water, might improve crop yields and help villagers prosper.

Carpenter-Boggs explains the old biological Law of Minimums with a drawing of a rain barrel made of staves of varying lengths. Each stave, she explains, represents something a plant needs to grow: water, CO₂, sunlight, nitrogen, phosphorus, and a slew of other nutrients. Just as the barrel will only hold as much liquid as its shortest stave, so too a plant will grow only to the limit of the scarcest resource. You can have all the CO₂ in the world available for photosynthesis, but it's going to be useless unless there is parity in the amount of available water.

"If you can feed a legume more phosphorus, an essential macronutrient, you end up with more nitrogen, too," she says. She's talking about growing beans in the ancient, acidic, and nutritionally depleted soils of Malawi. Carpenter-Boggs recently won a Fulbright award that will fund her work in the landlocked African country for the first five months of 2018.

The problem is, many soils in Malawi are clays that love to bind up phosphorus in ways that make it unavailable to a plant. She can think of a couple ways around this predicament—but is eager to collaborate next year with Malawian scientists and farmers to figure out what's actually going to work. Getting nitrogen-fixing beans to produce more of that essential fertilizer would be a boon to local agriculture.

One way would be to encourage mycorrhizal fungi to grow in the roots of plants. The fungi form a symbiotic relationship with the plant, essentially expanding the volume of its root system. The symbiosis enables the plant—and its fungal partners—to draw from a much larger well of moisture and nutrients.

The challenge is to find a strain of fungus that is at home in Malawi's soils—and that's not a given. Carpenter-Boggs has reason to be optimistic, though, as her previous work in nearby Tanzania yielded some promising results. Those results are in a freezer in Pullman, just waiting to be tested under African skies again.

Another way to slip plants nutrients is through their leaves. Foliar feeding, as it's called, works by spraying a nutrient solution directly

staples maize and cassava run low, climate variability spells disaster for one of the most densely populated regions on Earth.

"Climate change is on everyone's radar," Murphy says. "In recent memory, people in Ecuador had distinct rainy and dry seasons. They used to know to plant in March during the rainy season, and harvest in September during the dry season before the rains return. That's not the case anymore. They no longer have that predictability."

And all these regions are working with limited genetic resources in their local food systems. To Ecuador, Malawi, and Rwanda, Murphy brings backpacks full of diversity—lots and lots of barley and quinoa seeds—hoping to do a little to bolster local resiliency.

This isn't some kind of aid, Murphy insists. Rather, Murphy, his students, and local farmers are together learning ways of innovating local agricultural systems in order to adapt to greater climate variability. "And we're often trading seeds," he adds, meaning he gets to bring genetic diversity back to his Pacific Northwest breeding program.

Quinoa is a new crop to Malawi and Rwanda. Murphy first took quinoa seeds to Malawi in 2012. "We measure success if local farmers adopt quinoa as a crop," he says. Exact data on how widely quinoa has been adopted is impossible to come by. "But talking to local scientists and people who travel around the country," he adds, "we do know it is."

Not only are Malawians growing quinoa, they are eating it, too. "We ask people what they think of quinoa," he says. "We had a grad student, Morgan Gardner, who spent time with the women in nine villages in Malawi, to see what their acceptance of a new crop is. Because once they're done being polite, you get down to what their true thoughts are. And while they like the flavor of quinoa, one of

OPPOSITE, FROM TOP: CHILDREN IN MALAWI, WHERE QUINOA WAS ASSESSED FOR ADOPTION BY MORGAN GARDNER (COURTESY SCHOOL OF THE ENVIRONMENT); WSU SOIL MICROBIOLOGIST LYNNE CARPENTER-BOGGS (PHOTO ROBERT HUBNER). BELOW: QUINOA DIVERSITY IN THE JIRIRA REGION OF BOLIVIA (PHOTO PATRICIO CROOKER/ARCHIVOLATINO)

on leaves, where it enters via the cuticle and stomata, the openings that also enable plants to take in CO₂ and expire oxygen. And while stomata are pretty limited in the volume of nutrients they can take in, they might be able to sip enough phosphorus to promote root growth, thus bringing in more water and nutrients.

What Carpenter-Boggs learns in Malawi may be applicable to the soils of eastern Washington. The soils of Malawi, Tanzania, and the Palouse have something in common: They've been acidified over a long period. Most crop plants don't do well in acidic soils, and the nitrogen-fixing bacteria that form relationships with legumes like chickpeas and lentils don't like it much either.

The reason farms in the Palouse, and many other parts of the world are becoming acidic is a long-term effect of the use of ammonia fueled a Green Revolution. But as ammonia gets converted to nitrate, a plant-available form of nitrogen, it kicks out hydrogen ions—acids.

It's that Law of Minimums again. Proper pH is one of the minimums needed for optimal plant growth. When soils become acidic, water-use efficiency declines.

NO SILVER BULLETS

There is no magic genetic bullet that is going to make plants thrive in high-stress environments, says Michael Neff.

"Here's the challenge we face," he says. "As soon as we say this is the hormone or process involved in drought tolerance, well, there's a tradeoff because it's also involved in other responses." A single gene might be implicated in multiple biological processes, a function called pleiotropy. And, just to make the science really gnarly, multiple suites of genes may redundantly regulate a single process critical to existence. Neff and lots of other WSU researchers are busy combing through these tangles of genes, looking for the patterns that lead to useful traits—and resilient adaptations.

Neff explains that a change in one trait often leads to an unwanted one. For instance, wheat farmers in Washington want a seed that germinates right after planting. Indeed, says Neff, "Seed dormancy is being bred out of certain crops," wheat included. But come harvest, that lack of dormancy can mean pre-harvest sprouting if rains come early.



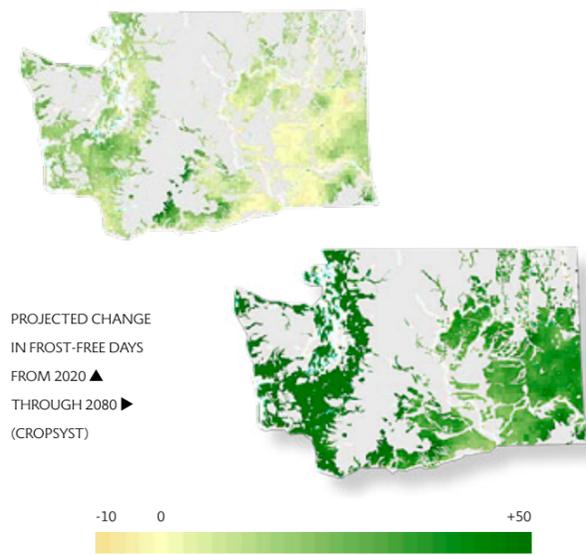
The same is true with drought tolerance. Scientists can breed plants that are more tolerant by targeting certain hormones—but there are consequences. Plants take in CO₂ through their stomata but, if water is scarce, the stomata close to reduce moisture loss—and photosynthesis slows down. And with stomata closed, a plant can't regulate its temperature through transpiration, adding further stress to the system—and producing a smaller crop. Worse, water scarcity causes the plant to favor reproduction over pretty much everything else—including disease and pest resistance.

RESKILLING THE FUTURE

What Julianne Kellogg '17 MS, experienced as an undergraduate researcher on an agricultural cooperative in India may be a clue to the future of resilient farming. As she tells the story, the cooperative emerged in the wake of the failure of a tea plantation owned by a British company. For decades, it had been standard practice to recruit Nepali workers to tea plantations in the Darjeeling region. But as competition increased, the value of the crop declined and business failures were inevitable.

When the tea plantation collapsed some 50 years ago, the workers simply stayed on the land and created what is now the Sanjukta Vikas Cooperative. They brought in a few cattle and grazed them on the tea bushes, which were succumbing to pests anyway. Eventually, a dairy cooperative was formed, and the former monocultural plantation was turned into a diverse system producing dairy products, as well as high-value turmeric, ginger, and citrus.

One lesson Kellogg took away from her experience in India was that farmer autonomy is critical. She says that although the Green



CROPSYST (BELOW) CAN MODEL THE PERFORMANCE OF VARIOUS CROPS UNDER A WIDE RANGE OF ENVIRONMENTAL VARIABLES. THE OPEN SOURCE SOFTWARE WAS DEVELOPED BY WSU RESEARCHER CLAUDIO STÖCKLE AND CONTRIBUTING COLLEAGUES FROM WSU AND OTHER INSTITUTIONS. (COURTESY BIOLOGICAL SYSTEMS ENGINEERING)

Revolution did a lot of good, it didn't work for everyone. In fact, it may have "deskilled" some farmers, Kellogg says, by handing them readymade solutions: seeds, inputs, and technology. After a generation or two, local knowledge was lost.

But when something changes—input costs go up, or the weather becomes highly variable—farmers no longer have the skills to deal with change. "They only know how to farm with these inputs," Kellogg says.

Working with Kevin Murphy, Kellogg investigated an approach to plant breeding called evolutionary-participatory breeding. The participatory part of that formula comes from the farmer. Working with growers on Washington's Olympic Peninsula, Kellogg set up quinoa trials using genetically diverse populations. The typical university approach would then have the breeder-researchers walk the fields, making selections based on a checklist of desirable traits.

Participatory breeding, while still involving the scientists collecting data, adds another layer by inviting farmers to cruise the fields, too. Kellogg uses the case of Nash Huber, a longtime organic farmer near Sequim, to illustrate her point.

Huber needed a new variety of kale because, as Kellogg relates, the commercially available varieties from seed companies produced plants that were too short. Huber didn't want workers having to stoop to pick kale. He crossed kale with a tall Brussels sprout to produce a variety that could be harvested at waist height. Kellogg laughs and asks, "What university breeder would think of that?" She shrugs.

"A farmer would think of that, not a breeder. The farmers can see the *je n'ais se quoi* of a plant and say, "That's it! That's what I've been looking for."

Kellogg's point is not to say that university breeders are unnecessary. Universities have the resources to test genetics, to find genes that express resistance to pests and other stresses. But farmers have local knowledge that we can all leverage to create a robust and resilient food system.

"Farmers need to be given the resources to innovate with their own traditional knowledge of farming and their knowledge of their landscape," Kellogg says. "Outsiders can help facilitate but not direct."

THESE ROOTS ARE LOCAL

We're placing a high-risk and potentially high-reward bet on our future, says Claudio Stöckle, a biosystems engineer and cropping systems modeler at WSU. By not diving into greenhouse-gas mitigation efforts immediately, Stöckle says, we're gambling on a technological breakthrough, like fusion power, that will solve all our energy needs—and eliminate humans' carbon emissions.

But it's hard to see how that solves food security problems in regions of the world profoundly affected by climate variability. Short of massive direct aid, people in Malawi and elsewhere are going to have to deal with poor soils, unpredictable rainfall, and a limited genetic resource pool with which to adapt.

climate migrants flocking to the Pacific Northwest? magazine.wsu.edu/extra/climate-migration



JUNIPER DUNES WILDERNESS (COURTESY BUREAU OF LAND MANAGEMENT)

As Stöckle argues, mitigation will matter in the long term but now, especially in the northern latitudes, what matters are adaptive systems that can buy us some time so that the gamble we are taking with our collective future has time to pay off.

If we are going to try to buy time, then what can individuals do in the near term to make resiliency more effective?

Soil scientist Carpenter-Boggs, along with hydrologist Jenny Adam and limnologist Stephanie Hampton, are adamant: We need to take care of our soils.

Hampton, director of WSU's Center for Environmental Research, Education and Outreach, says that in North America, "soils are our gold. We have some of the richest soils in the world, and we should be paying a lot more attention to them. The health of our soils is a big part of being resilient. A healthy soil, far too frequently overlooked, can make crops more efficient in their water use and keep soil moisture in place, as well."

Like Carpenter-Boggs, Hampton is deeply concerned about the quality of soils in other parts of the world, such as Africa. "They are barely getting enough water to support crops," Hampton says. "And in large parts of Africa, the soil doesn't really have any organic matter. So droughts there are catastrophic."

One of the innovations Hampton sees playing a potential role in future food production is the perennialization of crops. WSU researchers have been working to perennialize wheat, for instance. With perennial crops, the farmer plants only every few years, or even just once, to get a crop year after year.

Perennial plants hold soil in place and, as Hampton points out, hold moisture, too—a real boon for farmers in the dry and drying regions of the planet.

Michael Neff wants to go back to those dunes. He wants to get back to his roots as a botanist and spend a few days identifying the grasses he saw there. He wants to do it in part because botany's just plain fun. But, too, his gut tells him there might be something out there, a gene quietly working away that, when crossed with some other species of grass, will let him breed grasses that sip water while holding soil and moisture in place.

After all, plants have had millions of years to evolve under all sorts of climatic regimes. While some scientists work at the molecular level and others with whole plants, we are all still learning to leverage those genetics resources to develop resilient food systems that will keep the hungry season at bay. *

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CASH CASH "MUST BE THE MONEY" TOUR CONCERT AT WSU, OCTOBER 2016. (PHOTO COURTESY TINGTING WU)

Live from New York ...



PHOTO JOHN TURNER/TBS

When [Ana Cabrera '04](#) first set foot on Washington State University's Pullman campus in 2000, she had no idea she'd be live on national television in 17 years.

She didn't know she'd go on to work as a weekend anchor for CNN and live in New York City. She was unaware that she'd cover major stories like riots in Ferguson, marijuana legalization, and immigration—or that her life would soon be at the 24/7 mercy of the "news gods." And she certainly couldn't predict that the president of the United States would call her and her fellow journalists the "enemy."

What she did know was that she was home.

"Oh man, I can't wipe this smile off my face," Cabrera said, grinning as she settled into a chair in Studio B in Jackson Hall. "I feel like my heart is pumping outside my body coming back to WSU."

In Pullman for the forty-second annual Murrow Symposium in April, Cabrera credits her successful journalism career with the hands-on education she received at WSU. She had access to professors with real world experience and Cable 8, WSU's student-run TV station. There, she produced her own shows and gained experience in front of and behind the camera.

A distance runner for WSU's track and cross country teams, Cabrera was no stranger to overcoming discomfort. She applied that mental toughness to her education, building industry connections and completing two internships before her senior year. She still uses those skills today to hold even the highest-ranking officials accountable on live television.

After graduating from WSU with degrees in communication and foreign languages and cultures, Cabrera worked as an anchor and reporter for KHQ and KAYU in Spokane. In 2009, she moved to Denver and anchored the top-ranked daily morning news program at ABC affiliate KMGH 7 News. In 2013, Cabrera joined CNN as a Denver-based correspondent. She covered major stories, including the unrest in Ferguson, Missouri, after the shooting of Michael Brown and the legalization of marijuana in Colorado.

In March, CNN promoted Cabrera to weekend primetime anchor in New York City. She is on air for nine hours every weekend. Cabrera spends her days reading news stories, researching facts and statistics on the latest issues, writing scripts, and brainstorming with her producers about prospective guests. It often makes for crazy hours.

"There have been some 80-hour weeks. There have been days where I've had just a couple hours of sleep over the course of a few days," Cabrera says. "I go back to my old days as a cross country athlete and that perseverance and endurance."

Then there's the challenge of being a journalist in the age of fake news and alternative facts. For Cabrera, it's made her want to work even harder to find the truth and be the best journalist she can be.

"I feel like my job has never been more relevant or more important to our communities and beyond, to our country," Cabrera says.

She knows she'll meet the challenge, with Edward R. Murrow's brand of courage and truth, "right now, in terms of the role of the free press to be a government watchdog, to inform, to educate, to shed some light on disheartening realities sometimes, to hold people accountable." *

ALUMNI profiles

Where the trouble began

"Fiction is a document of trouble," says novelist James Thayer '71. The trouble began for Thayer as a teenager reading Bram Stoker's *Dracula* on his father's wheat farm in Almira.

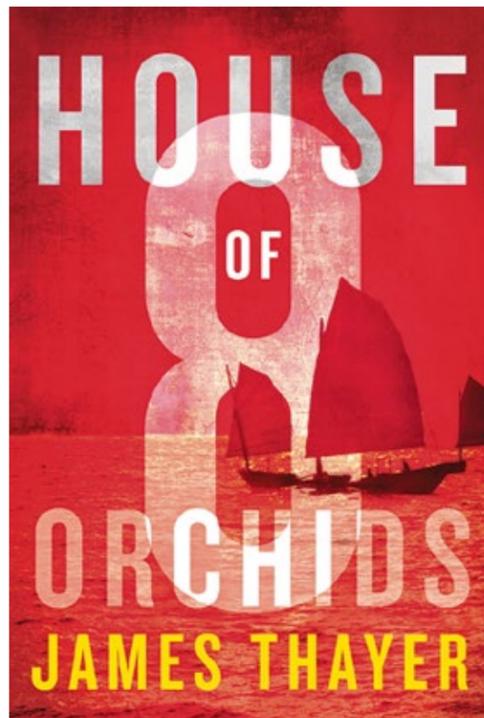
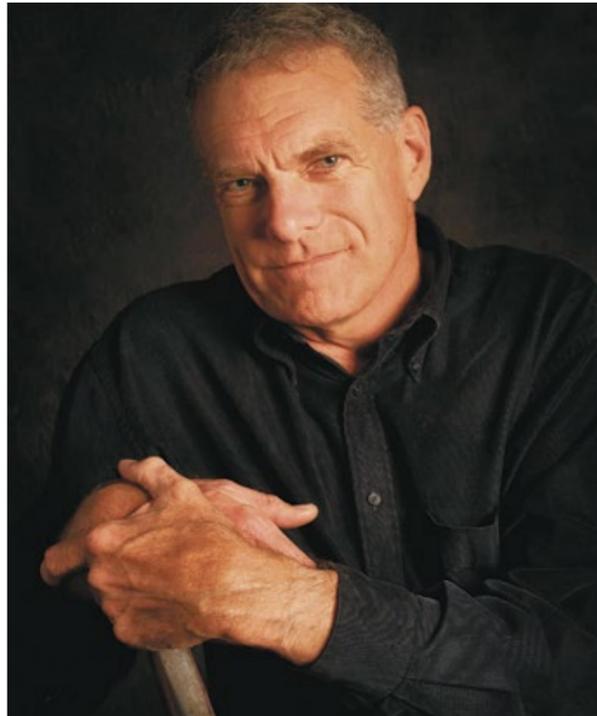
"The narrator sees the Count leap to a window frame—and then crawl down the exterior of the castle wall like a lizard!" Thayer exclaims. "That scene scared me to death! It was a revelation as to the power of fiction."

Now, decades later, the Seattle-based author of 14 novels teaches fiction writing through the University of Washington's continuing education program.

"The main thing that keeps people from writing a novel is that it takes a year—or two, or three—of considerable effort to produce one. And it's just easier not to do it. But I figured that if I spent a couple years writing one, at least I'd have that. And then I could take the next step: finding a publisher."

The young novelist was also a young lawyer. "I started my first novel when I was in law school," Thayer says. He based that first thriller on things he learned while at the University of Chicago Law School. "Enrico Fermi had his secret lab in the squash courts beneath the football field," Thayer explains, which led to his novel's devious web of intrigue involving Nazi spies, an American secret agent, and the specter of atomic destruction looming in the background.

Thayer loves setting, which explains his penchant for placing the characters of his smart, fast-paced novels not just in Chicago, but in contemporary Hong Kong, pre-World War II Chongqing, post-war Singapore, and other locations around the world.



Thayer's imagination has served him—and readers—well. He weaves fiction and fact together seamlessly because, he says, "everything in a novel should be interesting. I used to pay a few bucks a year for a UW library card. I'd go into the basement where no undergraduate had gone for years to unearth a dusty old book just to look up a fact."

His vivid imagination goes back to his own WSU days. In Charles Drake's bacteriology class, Thayer says, "every lecture he'd talk about a new bacterial disease. I'd sit there and start to itch. And my tongue would turn yellow, and my eyeballs would start to leak—and by the time I left class I'd have that disease!" *

The Hess Cross, 1977

The Stettin Secret, 1979

The Earhart Betrayal, 1980

Pursuit, 1986

Ringer, 1988

S-Day: A Memoir of the Invasion of England, 1990

White Star, 1995

Five Past Midnight, 1997

Man of the Century, 1997

Terminal Event, 1999

Force 12, 2001

The Gold Swan, 2003

The Boxer and the Poet: Something of a Romance, 2008

House of Eight Orchids, 2016

PHOTOS COURTESY JAMES THAYER

Stephen B. Smart reads excerpts: magazine.wsu.edu/audio

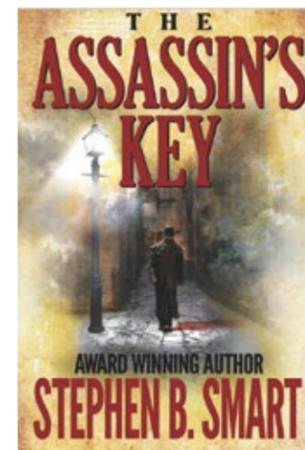
The accidental novelist

What began as a way to avoid going stir crazy while recuperating from a nearly fatal equestrian accident has become an award-winning western genre trilogy that blends suspenseful mystery and the allure of lost fortunes with good old-fashioned frontier fortitude.

Landscape architect STEPHEN B. SMART '75 calls himself an unlikely novelist. He's spent most of his life outdoors, designing everything from elaborate gardens and water features to a driveway gate cleverly concealed to appear as a fallen ponderosa pine. And in his free time, he's more likely to be found atop a favorite mule exploring the Pacific Northwest backcountry than sitting at a keyboard for hours at a time.

But his inaugural effort, *Whispers of the Greybull*, ended up as a 2012 finalist for a Western Writers of America's Spur award. And the prequel, *Vanishing Raven*, was a runner-up in the 2015 Will Rogers Medallion awards. His latest tale, *The Assassin's Key*, was just released last winter.

"It seems like a lot of writers say they always knew this is what they wanted to do, but I really didn't have this big desire to write," says Smart. "I hadn't really even read that much. But after my accident, I was laid up, couldn't even get out of bed, and didn't want to watch any more TV."



That was in 2003 and Smart, a physically fit guy who had built a successful Spokane-based landscape design and construction company along with a commercial nursery, was in bad shape.

He'd been out for a ride alone one morning when his mule, Butch, started to shake, then reared up in what later would be determined was a heart attack and toppled backward on top of Smart. They crashed down a hillside along the seldom-used trail north of Spokane and the next thing Smart remembers is waking to find his shattered leg in an unnatural position across his lap.

He drifted in and out of consciousness. Chest injuries prevented him from yelling for help, though he finally mustered enough strength to gasp as loudly as he could. Eventually, a nearby fisherman who was testing the volume range of his new hearing aid picked up the faint pleas for help.

"I remember waking up a few times as the paramedics were working on me," he explains. "By this time I was in a lot of pain and every time the ambulance hit a bump in the road it was excruciating."

Smart came through surgery fine but was bedridden and heavily medicated. He slowly came to terms with what would be a lengthy recovery.

"I knew I couldn't just lay there and watch TV," Smart says. "That's when I started to come up with the idea for a book."

He calls his first, initial efforts embarrassingly bad. "I was still on painkillers when I started and when I read back over it later, a lot of it didn't make any sense," he recalls with a laugh.

But he stuck with it and before too long had what he considered a decent plot and outline. His mother was a gifted storyteller and Smart says he drew on childhood memories of her ability to spin interesting, interwoven tales that inspired and captivated whoever was listening.

His decades of business experience ended up serving as unexpectedly fertile training for an adventure novelist as well. Just like his elaborate landscapes, Smart's novels feature layers of creativity that combine to form detailed glimpses into the wild



challenges of frontier life. And the multiple, intersecting narrative arcs are managed with the kind of experience gleaned from juggling a dozen or more construction projects at a time.

Smart even drew on his WSU roots.

The protagonist in *Whispers of the Greybull* is a fictional former WSU quarterback whose football career was cut short by a knee injury. He instead takes a job on a Wyoming ranch after graduation and stumbles into a lucrative mystery that requires brains and not just brawn to solve.

Like life on the frontier, very little of Smart's transition to novelist was simple. He sent his manuscript to dozens of book publishers but none bought it. He decided to publish it himself.

"So I had all these books and I didn't know anything about selling them," he says.

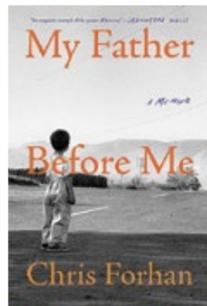
An agricultural supply store in Spokane Valley agreed to display his first book and not long after that he got a welcome call. "They told me all the books I'd left there had sold and they wanted more," Smart says.

From there, the book continued to draw attention, readers contacted Smart's nursery to find out if he'd written any other books, and online sales picked up. The Western Writers of America awards brought the novel even more attention.

Smart, however, has continued to self-publish and total sales have topped 9,000 copies so far. He says his third book will be his last—at least for a while.

"I can't really look at doing another until maybe after I retire," says Smart, now 65. "It takes a lot of concentration and with businesses to run and projects to do I don't have the space in my brain for that, but maybe I'll have room when I retire." *

PHOTOS COURTESY STEPHEN B. SMART



My Father Before Me: A Memoir

CHRIS FORHAN '82
SCRIBNER: 2016

As Chris Forhan approached his mid-forties, feelings about his dead father began erupting in dreams and poems. Ed Forhan killed himself at age 44 in 1973, leaving behind his wife and eight children, including his son Chris, without explanation. Questions left unanswered in Chris's family for so many years drove him to face, with an unrelenting eye, the legacy of the father who had abandoned him at 14.

As Forhan writes: "...A suicide leaves behind it a wake of silence. I have wanted to fill that silence."

This memoir, told in crisp and emotional tones, winds through Forhan's life as he witnesses his father's unhappiness and unexplained absences and then, after the suicide, Forhan's long struggle to understand the reasons and to penetrate the stoic resistance to the subject.

Forhan unravels his father's life story, and then his own as a kid in Seattle, and eventually at Washington State University, where Forhan connected to poetry and other writers while working for the public radio station. He found that poetry had "risen from that silence," and spoke to that which is "wreathed in uncertainty."

That self-expression led Forhan, now an award-winning poet and professor at Butler University, to write this heart-wrenching book that drills to the core of silence in families, the hidden mysteries of the people closest to us who are often distant.

—Larry Clark



Privacy, Surveillance, and the New Media You

EDWARD LEE LAMOUREUX '80 MA
SPEECH COMM.

PETER LANG: 2017

You open your browser to your favorite news site, and there on top is an ad for Cougar logo socks. "Wait a minute," you might ask yourself. "How did they know I just looked at a tweet about Cougar socks?" Or you might not even think about it.

That slightly creepy sensation of losing one's privacy, and the often accompanying "So what?" shrug, sit at the heart of Edward Lamoureux's book. He digs into the pervasive and unprecedented collection, sale, and purchase of our personal information in the era of internet dominance. It is easy to see the benefits of the digital age, from GPS to streaming radio and news, but as Lamoureux notes, there's a fly in the ointment: digital leaves tracks.

In the United States, we do value privacy. We can get arrested for inappropriate recordings, we vote in a private booth or by mail, and we don't typically welcome direct surveillance. But technology, especially over the last 20 years, has grown more sophisticated and less comprehensible for the average user. Privacy and the protection of one's own information has become very difficult to maintain.

Lamoureux, a communications professor at Bradley University who has also written about intellectual property and rhetoric, approaches the issues as a dissenter who believes privacy is dead, and as a voice to raise consciousness that American-style democracy itself might be at risk.

He writes that his driving question throughout the book is simply, "Given how much we have known, for a very long time, about new media's threats to our privacy, why on earth have we capitulated and given up a fundamental right so quickly, thoroughly, and easily?"

To answer the question, Lamoureux documents first the harm and dangers of too few protections for individual privacy. Economic losses from hacking, mismanagement of private information that can damage due process and other constitutional guarantees, and uneven financial gain in favor of industries, all contribute to loss of trust.

After showing the risks, the book describes electronic privacy principles laid out as far back as the early 1970s, known as Fair Information Practices, which articulate how the U.S. government should handle personal data. These FIPs prohibit personal-information databases whose existence is secret, lay out ways for individuals to find what information is kept and how to correct misinformation, and prevent unintended use of personal information.

These practices are still touted in Europe and the United States, but the burgeoning data marketplace and increased surveillance since 2001, combined with convoluted terms of service and other consumer-unfriendly information gathering, have eroded the high ideals of the FIPs, asserts Lamoureux.

The more we use Facebook, Twitter, and even email, the greater our exposure to loss of privacy. It could be a hacker stealing credit card numbers or a targeted ad that legally purchased your buying preferences. But no matter the method, it creates an environment that people would probably resist, if they could.

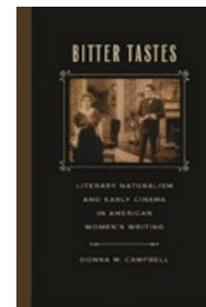
Lamoureux concludes with a number of recommendations for government, corporations, and consumers, with an eye toward practicality. He understands that the internet, social media, and digital interactions are not going anywhere. Starting from that spot, he suggests that "the Internet, digital and computational new media, and the data marketplace are complex systems requiring holistic and concerted efforts toward improvements."

His recommendations begin with a consumer privacy bill of rights (based on the FIPs mentioned earlier) at both the federal and

state level. He also calls for federal agencies to act in consumers' best privacy interests, such as legislation to enshrine the "right to be forgotten," curtailing unwanted, interminable storage of private information. Among other ideas, Lamoureux says that law enforcement should refrain from mass data collection that compromises innocent people, in favor of targeted approaches. Through dozens of recommendations, Lamoureux offers corporate, judicial, legislative, technological, and consumer ideas to improve the sorry state of privacy protection.

Lamoureux's book shines a bright spotlight into the dark corners of data tracking, surveillance, and invasions of privacy. For anyone who uses social media or the web, and that's most of us, his work gives a better understanding of the current state of privacy practices and a roadmap toward greater accountability.

—Larry Clark



Bitter Tastes: Literary Naturalism and Early Cinema in American Women's Writing

DONNA M. CAMPBELL
UNIVERSITY OF GEORGIA PRESS: 2016

In 1921, Edith Wharton became the first woman to win a Pulitzer Prize in fiction for her novel, *The Age of Innocence*. Wharton was part of a new generation born in the 1860s and 1870s who, equipped with new biological theories, challenged conventions of the Victorian era.

Deriving its title from one of Wharton's remarks that Americans preferred the "ice-cream soda" of popular fiction over stories

that conveyed reality and the often harsher truths of life, *Bitter Tastes* explores the way dozens of women writers approached their work around the turn of the twentieth century.

Donna M. Campbell, a professor of English at Washington State University, walks readers through the various works of women who redefined naturalistic fiction—which aims for accuracy and objectivity, and creates realistic, often grim, portrayals of people and their environment.

Like naturalism, film was also an emerging medium used to document the social truths and realities of modern life. Women played a large role in shaping the way these stories played out in early cinema, as nearly 40 percent of film writers were women.

Both men and women naturalists wrote with themes of determinism, Darwinism, and death. Women, though, also explore emotions, disability, and concerns of social justice in their writing. Campbell presents stories from women laboring in fields to stories of women laboring in childbirth. She explores the way women approached stories that revolved around living on the edge of poverty, and issues of sexuality, class, race, work, disability, slavery, and violence.

In *Bitter Tastes*, Campbell uncovers and highlights work from dozens of American women writers of the nineteenth and twentieth centuries, including Edith Wharton, Kate Chopin, Willa Cather, and Ellen Glasgow. In doing so, Campbell asks the reader to consider the boundaries of this genre, extends the context to film, and recognizes a more inclusive and diverse group of authors and their body of work than is typically taught or explored.

—Rachel Webber

BRIEFLY NOTED
The Positive Leader: Five Leadership Strategies for Attaining Extraordinary Results

HOWARD GAUTHIER '81
SPORTS LEADERSHIP PUBLISHING COMPANY: 2016

Through a series of parables, this book gives leadership strategies designed to build successful teams in the workplace, on the playing field, or in the boardroom. Gauthier is

a former college basketball coach and athletic director, and is currently an associate professor of sports science at Idaho State University-Meridian.

Midwives and Mothers: Medicalization of Childbirth on a Guatemalan Plantation

SHEILA COSMINSKY '64 MA
UNIVERSITY OF TEXAS PRESS: 2016

In this exploration of birth, illness, death, and survival on a Guatemalan sugar and coffee plantation, Cosminsky looks at the tension between traditional and contemporary medical practices through the lives of two local midwives and the women they served. Cosminsky, professor emerita of anthropology at Rutgers University-Camden, also recommends ways to accommodate and integrate biomedical and traditional birthing systems.

AND NOTES-WORTHY

The WSU School of Music produces and promotes many albums showcasing its faculty and students. Recent releases include:

Gator Tail by the faculty quartet of Brad Ard, David Jarvis, Brian Ward, and Greg Yasinitsky, playing contemporary hard bop and featuring a classic Hammond B-3 organ.

Singular Vision by the student WSU Jazz Big Band performing jazz blues and funk.

Solitary Freedom by faculty hornist Martin King playing modern solo works for horn.

Just a Thought—a collection of solo tuba and euphonium works by Chris Dickey and accompanied by Karen Savage on piano (both faculty).

Shadowplay: New Music for Oboe and English Horn in which faculty oboist Keri E. McCarthy performs new music for oboe and English horn from artists in Southeast Asia and the United States.

Listen to samples of all the music above at magazine.wsu.edu/extra/cougutunes.

CLASSnotes

BY LARRY CLARK

After 30 years of shepherding environmental and energy efficiency projects around the Northwest, **JENNIFER ESKIL '81** retired last spring with accolades.

Her employer, the Bonneville Power Administration, certainly recognized her achievements. BPA Administrator Elliot Mainzer presented the Walla Walla resident with the agency's highest honor, the BPA Meritorious Service Award.

Eskil received the distinction during the U.S. Department of Energy's 2017 awards program in March. The award recognizes individuals who have made extraordinary contributions to BPA's mission through excellence in their chosen field for 10 years or more. Eskil was the industrial and agriculture sector lead in energy efficiency.

"Eskil is regarded as an exceptional leader whose honest, straightforward approach to project and team management over the past 30 years has helped shape BPA's role as an economic engine



COURTESY BONNEVILLE POWER ADMINISTRATION

of the Northwest and as an environmental steward," said Mainzer.

It's not the first recognition for Eskil. In 2013, the American Council for an Energy-Efficient Economy gave a Champion of Energy Efficiency Award to Eskil for her role as industrial sector lead on BPA's Energy Smart Industrial Program. The program helps companies better manage their energy use and reduce costs, and in 2015 BPA and Northwest publicly owned electric utilities reported a collective savings of more than 647 million kilowatt-hours of electricity—enough energy to power nearly 60,000 homes for a year—in partnership with 473 industrial companies over six years.

Her leadership as program manager for Waterwise, a BPA irrigation conservation agreement, also resulted in Eskil and three coworkers receiving a U.S. Department of Energy conservation award.

Originally from Sunnyside, she graduated with a bachelor's degree in communication from WSU. ✨

40 **CHARLOTTE WIRTH** ('48 Phys. Ed., '55 MAT) and **MARDA MCCLENNY** ('74 Phys. Ed.) were inducted into the Washington State Girls Basketball Coaches' Hall of Fame. McClenny coached the Walla Walla girls basketball team to three state tournaments and Wirth coached Walla Walla prior to Title IX. Wirth is also known for working to get equal practice time and equipment for the developing girls sports programs during the 1960s and 1970s.

50 **PAUL C. ANDERSON** ('55, '60 MA Poli. Sci.) taught political science at Yakima Valley College from 1961-94 and then retired to Port Townsend. He was a Delta Chi and lettered in golf at WSU in 1953-54. Paul was president of the Pacific Northwest Political Science Association in 1989, and also taught school in Yelm and Tacoma.

70 Chief marketing officer for PEMCO Insurance **ROD BROOKS** ('75 Comm.) was inducted into the Word of Mouth Marketing (WOMMM) Hall of Fame in April. ✨ **GREG GILLESPIE** ('78 Agro.) was named chancellor of Ventura County Community College District. He will begin this summer. Gillespie has been the president of Ventura for four years. ✨ President and CEO of Swire Coca-Cola, USA, **JACK PELO**

('78 Acc.) was honored by *Utah Business Magazine* with its Lifetime Achievement Award. Pelo has led Swire Coca-Cola, USA for about 20 years, but he began working summers in the industry as a kid growing up in Walla Walla. ✨ **TERRY JONES** ('79 Mktg.) was named the 2017 Distinguished Alumna for Pierce College. Jones was a student at Pierce College while it was still called the Fort Steilacoom Community College, and then transferred to WSU. Jones is president of US Bank's South Sound Market, serves as board member of both Tacoma-Pierce County's Economic Development Board and Chamber of Commerce, and sits on the board for Junior Achievement of Washington.

80 **ANNA ANDERSON** ('80 HBM) was recently hired as general manager of Halcyon, a hotel in Cherry Creek, Colorado. She has more than 25 years of industry experience opening and managing lifestyle hotels across the nation. ✨ Burien City Council voted to hire **BRIAN WILSON** ('80 Crim. Jus.) as their new city manager. He most recently was the commission chair for the Corral Springs Water District in Douglas County, and before that worked for Federal Way as chief of staff, city manager, police chief, and deputy

police chief. ✨ **MARTY HEIMBIGNER** ('81 Acc.) was named chief financial officer by Seattle digital media startup theMaven Inc. He has many years of financial leadership experience with software and professional service businesses, such as BSQUARE Corporation and Tatum, LLC. ✨ Mineral Mountain Resources Ltd. has announced **CURT HOGGE** ('82 MS Geol.) as the chief geologist of a technical team to explore its Rochford Gold Project located along the Homestake Gold Belt in South Dakota. ✨ **STEVEN MCCULLEY** ('83 Crim. Jus.) is Atherton's new police chief. He was a Washington State Patrol trooper for 27 years, where his jobs included criminal investigations detective, criminal information and technology section commander, statewide bomb squad commander, and rapid deployment force commander. He firmly believes in the motto that no call is too small for a police officer. ✨ **GUY WILLIAMS** ('83 Comm.) is the new human services manager for the city of Renton. Williams has more than 20 years of experience working within the public sector including various health and human services positions, education director at Seattle Public Schools, and worked most recently with Casey Family Programs. ✨ Puget Sound Bank announced that **TONY**

30,000 COUGS

Want You to Join Them (and Us).



ALUMNI
ASSOCIATION

Members Make the Difference.

Last spring, the WSU Alumni Association exceeded 30,000 members for the first time, ever! Members joined because of the amazing events, exclusive programs, special services, and fantastic discounts. When Cougs get together, the more the better. Become a member and help us reach 40,000—because it's Cougs like you who make the difference. Find us online at alumni.wsu.edu/join or call 1-800-ALUM-WSU.

also check out class notes online *

CHALFANT ('84 Fin.) will continue as chief credit officer and is being promoted to chief operating officer. He has been with the bank since its inception, and has 25 years in commercial banking. * **MAIA TIHISTA** ('84 Comm., Busi.) joined e-learning company OnCourse Learning as its new chief marketing officer. Tihista recently served as vice president of marketing for Flexera Software. She also has held marketing positions with LexisNexis, Sony, Hitachi, and Panasonic. * Central Washington University named **KREMIERE JACKSON** ('86 Comm.) as its new vice president of public affairs. In her more than 20 years of communications experience, Jackson has worked for Microsoft, Puget Sound Energy, KXLY in Spokane, the Washington State Department of Agriculture, and the Washington State Senate. * Animal scientist **MATT DOUMIT** ('87 Ani. Sci.) has been named the University of Idaho College of Agricultural and Life Sciences associate dean and director of academic programs. He has experience in both teaching and research and is scheduled to start at the end of July. * **ADRIENNE GEMPERLE** ('87 Comm.) has been named chief people officer of the company Plated after gaining over nine years of experience in senior human resource jobs with Starbucks and Restaurants Unlimited, Inc. * After many years as a research engineer at the Pacific Northwest National Lab, **ERIC NYBERG** ('89 M.S. Materials Science & Engineering) is now director of programmes at the newly constructed Brunel Centre for Advanced Solidification Technology with Brunel University in London.

90 Phoenix Life Sciences, Inc. appointed **JAMES BAUMGARTNER** ('92 PhD Biochem.) as its new CEO in May. Baumgartner will work toward federal approval for new drugs derived from cannabis. Phoenix Life works on products designed to treat pain, cancer, psychological, gastrointestinal, autoimmune, neurological, and sleep disorders. * **CURT FREED** ('92 Psych., '16 PhD Higher Ed. Admin.), previously the vice president for instruction at Whatcom Community College, has become the new

president of Morgan Community College in Colorado. * **YONG WANG** ('92 MS, '93 PhD Chem. Eng.) has been awarded the American Chemical Society's annual Industrial and Engineering Chemistry Division fellow award. Wang works with Pacific Northwest National Laboratory and has a joint position at WSU as the Voiland Distinguished Professor. * Esterline Corporation selected **JOE BADDELEY** ('93, '94 MS Mech. Eng.) as president for its interface technologies business group. The company is a specialty manufacturer primarily serving the aerospace and defense markets. * The family law firm of Goldberg Jones welcomed attorney **ROBERT BENNETT** ('93 For. Lang. and Lit.) to their Seattle team. Before turning his attention to family law, Bennett practiced international commercial arbitration abroad for seven years. He is also a decorated veteran of the Gulf War. * **DON MILLER** ('93 MBA), CEO of Gesa Credit Union, has been honored with the WSU Tri-Cities Distinguished Alumnus of the Year Award in recognition of his service, career achievements, and dedication to the promotion of educational excellence. He also serves on the board for Junior Achievement of Washington in the Tri-Cities. * **TIM TIMMERMAN** ('93 MFA), an art professor at the George Fox University in Newberg, Oregon, for 14 years, received George Fox's Faculty Achievement Award for Undergraduate Teaching. Timmerman teaches painting, sculpture, mixed media, contemporary art forms, drawing, and art history. He also oversees the university's art collection and gallery. * **WILL HOENIKE** ('97 Comm.) joined the College of Idaho in April as a website strategist. Previously he worked in marketing and advancement for the College of Western Idaho, as director of media and community relations at Idaho Sports Properties, and as a reporter and anchor at KIVI-TV. * After 20 years in sports management, **MIKE MACCULLOCH** ('97 Mktg.) was named vice president of business and baseball operations for Consolidated Sports Holdings International. He is currently responsible for upper level strategic support, planning, and operational

management for eight sports franchises: four baseball teams and four hockey teams in Washington, Oregon, California, Illinois, Iowa, and Texas. MacCulloch also coached baseball at the collegiate level and internationally. * **BENNIE SELTZER** ('97 Socio.), a former Cougar standout on the basketball court from 1990-93 and 20-year coaching veteran, returned to Pullman to join WSU men's basketball coach Ernie Kent's staff as an assistant men's basketball coach. Seltzer spent the last two years at Loyola Chicago as an assistant men's basketball coach. He was inducted into the Pac-12 Men's Basketball Hall of Honor in 2015. * **CARLOS DANIEL** ('98 History) was hired by University of Connecticut as director of men's basketball strength and conditioning. Daniel has more than 17 years of experience in athletic development and fitness at both the collegiate and professional levels. * CRN, a brand of The Channel Company, named workflow automation company Nintex's **JAANA LINSENMAYER** ('99 Busi.) to its 2017 Women of the Channel list, the third year in a row for her to receive the honor. Linsenmayer joined Nintex in 2015, and serves as global director of field and partner marketing. * Clark County District Court Commissioner **KRISTEN PARCHER** ('99 Socio.) was sworn in as the county's newest judge. The Brush Prairie resident succeeds Judge Vernon L. Schreiber, who died in April. She previously worked as a civil attorney and criminal defense attorney in Vancouver.

00 **JOHN MUNRO** ('01 MIS) has been appointed as vice president of national markets at BlackStone Discovery, a forensic and attorney review services company in California. * **LORI SELBY** ('01 PhD Ed.) joined Epic Trust Investment Advisors in Kennewick as vice president. She is a former vice chancellor for WSU Tri-Cities and worked at Utah State University as executive director of administration. * **HOLLY (WYASKE) JONES** ('02 English) published her first young adult novel, *I Want Everybody to Like Me*, inspired by her own upbringing. The book is available online. Jones is also the mother of future Cougs

Victor, Ricker, and two-year-old Irene Jean Jones. * North Mason School District recognized **RAY MOW** ('02 Arch., '06 Const. Mgmt.), an architect with Erickson-McGovern Architects in Tacoma, with a community leadership award. Mow, a graduate of North Mason High School, is a member of the North Mason Scholarship Foundation, local PTA, and lead architect of the new North Mason High School. * **KIM O'NEILL** ('02 Ag. Ed.) has been promoted to the position of associate vice president of development in advancement at the University of Idaho. She has worked at UI since 2005. O'Neill is also on the Moscow Chamber of Commerce Board of Directors, the Latah County Fair Board, and Farmers Market Commission. * **KEVIN REED** ('02 Civ. Eng.) was named operations manager for the west region of global engineering and professional services organization WSP | Parsons Brinckerhoff. Reed will manage the firm's civil, structural, traffic, planning, environment, and inspection services in the region, which includes Washington, Oregon, California, Nevada, and Hawaii. * **BRIAN DOTTER** ('03 DPH Pharm.) has been named interim senior director of pharmacy at St. Luke's Health System, where he will oversee the Treasure Valley Pharmacy operations. He joined St. Luke's in 2015, and has more than 14 years of experience in hospital pharmacy. * **JEREMY MILLER** ('05 Wildland Recreation) was selected for a city council seat in Grand Coulee. He graduated from the Federal Law Enforcement Training Center in 2000 and worked as a law enforcement officer with the National Park Service in the Lake Roosevelt National Recreation Area for 12 years. Currently he works in the Grand Coulee Dam Power office. * **VALERIE RASEY** ('05 Nursing) now works for Trios Medical Group as a pediatric hospitalist. She works primarily in the Family Birthing Center and Special Care Nursery at the Trios Women's and Children's Hospital in Kennewick. Rasey has over 20 years of experience working in neonatal intensive care units and caring for high-risk infants. * **MARK HURLEY** ('06, '07 MAR Arch.) is a principal associate at TCF Architecture in Tacoma and specializes



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CLASSnotes

BY LARRY CLARK

Many college students balance a full load of classes and activities, but it's pretty rare to juggle all that plus the crown of Miss Washington 2016. **ALICIA COOPER**, a senior at Washington State University Vancouver, works as a real estate broker as she studies personnel psychology and human resources—and she was third runner-up for Miss America in 2016 after winning the Miss Washington competition.

Cooper credits her grandmother with inspiring her. When she passed away after a 13-year battle with breast cancer, “I realized how significantly she impacted every person who knew her,” says Cooper. She took her grandmother’s lessons to heart, volunteering as a mentor at Rocksolid Community Teen Center and encouraging youth to be more positive, especially on social media.

WSU Vancouver also helped her succeed as Miss Washington. As a member of the WSU Vancouver HR Society and taking classes, “I have learned how to not only market an organization, but also market what I personally bring to the table. It’s greatly benefited me throughout my year of service, helping secure future



PHOTO JANET LIN ANDERSEN

events and speaking engagements,” says Cooper.

The location also was perfect for the 22-year-old, since she works with her mother selling real estate in southwest Washington. “I’ve always wanted to be a Cougar and attending WSUV allowed me to accomplish that goal while still being able to work full time and stay local,” she says. In addition to her main degree, Cooper is working toward a double minor in psychology and communications.

She’d eventually like to open her own real estate firm.

Since she works and won over \$40,000 in scholarships through the Miss America program, Cooper says she’ll be able to graduate in the spring of 2018 debt free.

The last year has flown by since Cooper took on the Miss Washington crown.

“I feel like it was just yesterday when I won Miss Washington and started my preparation for Miss America. I have loved how close-knit the organization is because it has allowed me to feel supported throughout this special year in my life.” ✨

in public industrial projects. He manages projects for Kitsap County and the cities of Tumwater, Shoreline, and Moscow, Idaho. ✨ **KATIE CAHILL** ('07 Poli. Sci.) joined the University of Tennessee’s Howard H. Baker Jr. Center for Public Policy as the new associate director. She will primarily be in charge of the Leadership and Government Initiative, which oversees student programs. Her research focuses on the effective implementation of public health programs in developing countries, including routine child immunization. ✨ **STEFANEY GIORDANO** ('09 Comm.) is currently a guest host for the Home Shopping Network and runs a blog called “A Host of Things” focusing on DIY and home entertainment. Her journey began with a special events internship at the Smithsonian during President Obama’s Inauguration events, and she has since worked for Disney Cruise Line in entertainment, opened a live entertainment show in Hawaii, and hosted cooking shows and classes on Holland America cruises.

10 GARY MCGARVIE ('11 MED) will be a new associate principal at Washougal

High School next year. McGarvie is dean of students at Cascadia Technical Academy, and he previously worked as the athletic director and dean of students at Union High School. ✨ **DANE LAWSON** ('12 Busi., Econ., '14 Master of Health Policy and Administration) was hired by Dingus, Zarecor & Associates P.L.L.C. as a document production specialist. ✨ Tsillan Cellars in Lake Chelan recently welcomed three Cougs to their winery. **ALEXA HAMMOND-VICK** ('14 Psych., Women’s Studies) was appointed tasting room manager for Tsillan Cellars’ new Woodinville Tasting Room in the center of the Woodinville wine country. **DEVON GRIFFITH** ('16 Ag.) will manage the winery tasting room and work with Tsillan Cellars’ longtime winemaker Shane Collins and vineyard foreman Bal Flores. **CARRIE MCGUINN** ('02 HBM) has been Tsillan Cellars Wine Club director for the last seven years and will now take on the position of office administrator in addition to her role as Wine Club coordinator. ✨ **AMANDA ROLEY** ('14 Comm.) joined KREM 2 News in March as a reporter. Previously she worked in Montana where she won the 2016 E.B. Craney award for

hard news coverage. ✨ **KATIE HARMON** ('15 English) joined the marketing team at Stemilt Growers as a marketing communications coordinator at their Wenatchee headquarters. ✨ The Moses Lake School District has hired **CAROLE MEYER** ('15 EDD) as its next assistant superintendent. Meyer was previously the principal of various schools throughout the Spokane area for a number of years. ✨ **COOPER ELLIOTT** ('16 History) was hired as the new marketing executive assistant for the Town Toyota Center, which hosts entertainment and sports events in Wenatchee. ✨ Two-year WSU football starter **SHALOM LUANI** (x'16) was drafted by the NFL’s Oakland Raiders in May. Luani finished his Cougar career as an All Pac-12 first team selection, with 159 tackles and eight interceptions. His selection makes this the fifth consecutive year that WSU has had at least one player selected in the NFL draft. ✨ WSU receiver **GABE MARKS** ('16 Socio.) signed as a free agent with the New York Jets in May. He finished his college career as the Pac-12’s all-time career leader in receptions. Marks also holds WSU’s career records for receptions (316), touchdowns (37) and receiving yards (3,453).

INmemoriam

30 CATHERINE C. HYSLOP (x'38 Ag., Alpha Gamma Delta), 100, May 4, 2017, Spokane.

40 LEILA B. KAYLER (x'40 Pharm.), 95, February 25, 2017, Odessa. **ELMA RYAN-BORNANDER ANDERSON** ('41 Speech and Hearing Sci.), 98, April 10, 2017, Seattle. **ROBERT ARLETH STIER** ('42 Gen. St.), 95, December 21, 2016, Olympia. **W. JAMES WRIDE** ('43 Phys. Sci., '46 MS Chem. Eng.), 95, March 17, 2017, Bartlesville, Oklahoma. **ROBERT J. BEAUBIER** ('46 Forest & Range Mgmt.), 99, September 17, 2016, Lewiston, Idaho. **BETTY J. SUNOFSKY** ('46 Home Econ.), 93, April 8, 2017, Long Beach, California. **ARTHUR R. MACKELVIE** ('47 Comm.), 94, April 10, 2017, Spokane Valley. **EUGENE G. SIVERTSON** ('47, '49 MA Math.), 91, February 11, 2017, Spokane. **SHIRLEY ANN HEER** (x'48), 87, January 30, 2014, Ephrata. **MAE LOUISE KELLY** ('48 Gen. St.), 92, March 17, 2017, Albuquerque, New Mexico. **GENE MCLEAN KERNS** ('48 Mat. Sci.), 92, May 12, 2015, Chandler, Arizona. **ROBERT ELDRÉD LARSON** ('48 Elec. Eng.), 92, April 1, 2017, Puyallup. **ANNABEL J. “SANDY” LEACH** ('48 Chem.), 91, March 25, 2017, Vancouver. **ROBERT J. ROACH** ('48 Ag.), 94, January 15, 2017, Cascade, Idaho. **CLEO DALE SCHWANT** ('48 Poli. Sci., Lambda Chi Alpha), 93, March 12, 2017, Delray Beach, Florida. **JAMES D. TAYLOR** ('48 Hort.), 96, May 1, 2017, Wenatchee. **SHIRLEY MARTIAL BASKIN** ('49 Socio.), 90, April 24, 2017, Centralia. **RICHARD C. CUPP** ('49 Busi.), 90, July 3, 2014, Oakland, California. **ALBERT HEGLUND JR.** ('49 Busi.), 91, March 4, 2017, Seattle. **JACKIE KAY MCKOWN** ('49 Music, Delta Delta Delta), 87, May 6, 2014, Wenatchee. **ROBERT BRUCE PATTON** ('49 Mech. Eng.), 90, November 19, 2016, Green Valley, Arizona. **IVAN LEE SETTLES** ('49 Psych., '53 MEd, '67 DEd), 93, March 29, 2017, Lynnwood.

50 JOSEPH ANDREOTTI ('50 Civ. Eng.), 92, May 4, 2016, Yakima. **ELWIN J. BIORSETH** ('50 Chem. Eng.), 88, April 17,

2017, Beverly Hills, Florida. **JOSEPH BUHALY** ('50 Forest & Range Mgmt.), 91, May 16, 2017, Tacoma. **RAYMOND A. DODGE JR.** ('50 HBM, Theta Chi), 89, May 25, 2015, Portland, Oregon. **WILLIAM L. FITCH** ('50 English, Lambda Chi Alpha), 91, April 16, 2017, Seattle. **SAMUEL J. GRANBERG** ('50 Civ. Eng.), 90, May 28, 2017, Tacoma. **ELEANOR LOUISE HENTO** ('50 AMDT, Kappa Kappa Gamma), 88, April 1, 2017, Portland, Oregon. **DOROTHY NAN KENNEMER** ('50 MS Phys. Ed.), 93, April 25, 2017, Bozeman, Montana. **HOMER EDWARD MCKOWN** ('50 Hort.), 88, February 11, 2016, Wenatchee. **LOUIS RICHARD WATERS** ('50 Forest & Range Mgmt.), 94, April 15, 2017, Temple, Texas. **LAWRENCE JOHN ALICE** ('51 Econ.), 87, April 10, 2017, Port Angeles. **J. KIRK BAREFOOT** ('51 Police Sci.), 89, March 22, 2017, Savannah, Georgia. **ANNE K. GEAUDREAU** ('51 Nursing), 88, November 12, 2016, Blanchard, Idaho. **ERVIN H. GRABER** ('51 Phys. Ed., Tau Kappa Epsilon), 87, March 2, 2017, Phoenix, Arizona. **CHARLES T. HIGGINS JR.** ('51 Wildlife Bio.), 90, April 23, 2017, Mount Vernon. **LAWRENCE C. MILLER** ('51 Civ. Eng.), 90, February 17, 2017, Grand Junction, Colorado. **GARTH SCHIMELPFENIG** ('51 Chem. Eng.), 89, March 21, 2017, Ridgefield. **BETTY LOU STERLING** (x'51), 88, August 16, 2016, Great Falls, Montana. **ROBERT EUGENE WELCH** ('51 Busi.), 92, November 7, 2016, Lynnwood. **MARGARET ANN CONDIT** ('52 Socio.), 88, March 1, 2017, Ellensburg. **WILLIAM DANA COWELL** ('52 Mech. Eng.), 85, January 19, 2014, Seattle. **OLIN MCLEAN HART** ('52 Geol.), 90, May 13, 2017, Colville. **WILLIAM G. HENDERSON** ('52 Police Sci.), 88, March 27, 2017, San Diego, California. **MILTON J. KOCH** ('52 Const. Mgmt.), 86, February 6, 2017, Burién. **JUANITA C. MCGUIRE** ('52 Ed.), 84, March 4, 2017, San Diego, California. **SAMUEL RIEGER** ('52 PhD Agro.), 94, November 26, 2015, Kenmore. **D. WILLIAM BANGS** ('53 Geol., Kappa

Sigma), 87, March 1, 2017, Seattle. **HUGH ARTHUR MUZZALL** ('53 Sci.), 85, May 18, 2017, Walla Walla. **RICHARD K. KUELPMAN** ('54 Busi., Phi Kappa Tau), 86, May 13, 2017, Little Rock, Arkansas. **PATRICIA A. MCGLASHAN** ('54 Busi. Ed.), 84, February 9, 2017, Stanwood. **BARBARA K. MILLER** ('54 Home Econ., Kappa Delta), 85, August 2016, Bellevue. **UTALEE MEDLEY MINDERHOUT** ('54 Home Econ., Pi Beta Phi), 85, February 2, 2017, Pacific Palisades, California. **JEANETTE E. SEILER** (x'54 Ed.), 84, April 10, 2017, Vancouver. **MAURICE HUGH TUGBY** ('54 Busi.), 84, November 26, 2015, Lynnwood. **MARDELLE J. BRUTZMAN** ('55 Gen. St.), 83, March 13, 2017, Kennewick. **DONALD GILBERT MOEN** ('55 Busi.), 85, March 24, 2017, Yakima. **RICHARD I. SMITH** ('55 Physics), 87, April 2017, Kennewick. **RICHARD S. THOMPSON** ('55 Poli. Sci.), 83, March 7, 2017, Bethesda, Maryland. **LEWIS HORTON CURTIS** ('56 Socio.), 86, May 4, 2017, Portland, Oregon. **JACK P. FREDRICKSON** ('56 Socio.), 83, March 11, 2017, Walla Walla. **R. E. HOLLINGSWORTH** ('56 HBM), 87, February 16, 2017, Wilsonville, Oregon. **ROBERT G. BRATTON** ('57 English), 82, May 3, 2017, Redding, California. **CAROL ANNE GREENWOOD** ('57 English, Kappa Delta), 82, April 5, 2017, Edmonds. **HELEN-JOANNE OLSON** ('57 MAT Phys. Ed.), 86, March 10, 2017, Renton. **GEORGIA ROSLUND** ('57 AMDT), 82, February 17, 2017, Bend, Oregon. **SALLY FARQUHAR SCHUSTER** ('57 Socio.), 79, January 13, 2014, Wenatchee. **GENE C. SPEASE** ('57 Busi.), 85, March 15, 2017, Belmont, California. **JOHN T. “JACK” MACPHEE** ('58 Comm.), 82, April 17, 2017, Plano, Texas. **CLELL NORTON** ('58 Acc.), 88, December 25, 2016, Seattle. **ELIZABETH J. PIERINI** ('58 English, Ed.), 80, March 16, 2017, Seattle. **SVEN RUNE ROSLUND** ('58 HBM), 82, February 17, 2017, Bend, Oregon. **MONA JOYCE WYNN** ('58 AMDT), 79, February 28, 2016, Kirkland. **IVAN DEE CLEMONS** ('59 Police Sci.), 85, May 18, 2017, Spokane. **DOUGLAS ARTHUR COREY** ('59 Elec. Eng.), 79,

In memoriam

March 24, 2017, Boulder, Colorado. **JOAN COART GOROW** ('59 Soc. St., Pi Beta Phi), 69, October 22, 2016, Issaquah. **JESSIE H. MURAKAMI** ('59 Soc. St.), 79, March 24, 2017, Kahului, Hawaii. **ROBERT ARNOLD "ARNIE" VIRTUE** ('59 Zool.), 80, May 11, 2016, Vancouver, British Columbia. **CARL T. "DUKE" WASHINGTON** ('59 Interior Des.), 83, February 16, 2017, Seattle. **DAVID ARTHUR YATES** ('59 Civ. Eng.), 85, April 2, 2017, Lacey.

60 CHARLES C. MELLINGER II ('60 Gen. St., Phi Delta Theta), 79, April 16, 2017, Tacoma. **MARILYN J. ROBERTSON** ('60 Ed.), 80, March 18, 2017, Vancouver. **HASSAN NAWAZ GARDEZI** (x'61 Socio.), 84, April 19, 2017, Peterborough, Ontario. **MILTON LOWELL SMITH** ('61 Ag. Econ.), 79, April 18, 2017, Bellevue. **WARREN L. CLARE** ('62, '64 MA English, '67 PhD Amer. St.), 78, February 13, 2016, Wenatchee. **WYATT W. CONE**

('62 PhD Entom.), 83, April 5, 2017, Prosser. **MICHAEL EDWARD LOWRY** ('62 Gen. St.), 78, May 1, 2017, Sumner. **CAROL ANN SCHWISOW** ('62 Ed.), 77, December 15, 2016, Spokane. **SHIRLEY ELAINE SMITH** (x'62, Gamma Phi Beta), 75, May 1, 2017, Bellevue. **B. ANN JENKINS** ('63 Socio.), 76, April 3, 2017, Carlton. **MICHAEL D. ALLEN** ('64 Busi., Sigma Alpha Epsilon), 75, May 7, 2017, Vancouver. **CORNELIS "CASE" CALISSENDORFF** ('64, '70 MS Agro.), 88, March 29, 2017, Mount Vernon. **LEE ROBERT ANDERSON** ('65 Soc. St., Sigma Alpha Epsilon), 73, April 12, 2017, Puyallup. **ROBERT D. BANISTER** ('65 Math.), 75, October 2, 2016, Cle Elum. **GERALD BOBBITT ALMY** ('67 Civ. Eng.), 73, January 9, 2017, Bremerton. **ELIZABETH J. "BETTY" BERARD** ('67 Home Econ.), 72, April 23, 2017, Bothell. **CLIFFORD HARRY BYRD** ('67 Agro.), 73, February 15, 2017, Casper, Wyoming. **DUANE ARDEN**

JACKLIN ('67 Ag. Econ.), 72, March 9, 2017, Post Falls, Idaho. **MARCUS CARTER MITCHELL** ('67 Gen. St.), 70, March 6, 2014, Castle Rock. **DAVID BACKMAN** ('68 History), 71, March 25, 2017, Seattle. **DONNA MARIE MITCHELL KNIGHTON** ('68 Gen. St.), 72, May 2, 2017, Goshen, Utah. **RAY ANGUS MACCULLOCH** ('68 Civ. Eng., Theta Chi), 72, March 27, 2017, Mount Vernon. **LOUIS HOMER COSNER** ('69 Ani. Sci.), 70, March 9, 2017, The Dalles, Oregon.

70 ROBERT LINCOLN DEMING ('70 Econ.), 68, October 3, 2016. **THOMAS EDWARD SCHULTZ** ('70 Ani. Sci.), 69, January 3, 2017, Chehalis. **DEANNA DELL BAALMAN** ('71 Busi.), 67, February 25, 2017, Richland. **WILLIAM L. BOYLE** ('71 MBA), 72, May 3, 2017, Spokane. **WILLIAM ARVID PETERSON** ('71 Nursing), 68, May 25, 2013, Spokane. **RONALD A. BLASEWITZ** ('72 Busi.), 63, January 6, 2013, Minneapolis, Minnesota. **DONALD W. TUTTLE JR.** ('72 Psych.), 66, January 29, 2017, Yakima. **GARY WAYNE CAMPBELL** ('73 Ind. Tech.), 71, April 14, 2017, Everett. **R. ALAN SENDERS** ('73 Socio.), 64, October 17, 2014, Hermiston, Oregon. **JEAN GORTON** ('74 MA Socio.), 82, April 7, 2017, Bellingham. **NORMAN LEE DESHAW** ('76 Gen. St.), 68, April 21, 2017, Olympia. **RICHARD L. FUSON** ('76 Landscape Arch.), 63, April 15, 2017, Lakewood. **WENDY WILLIAMS** ('76 History), 64, April 30, 2017, Pullman. **ALYSSA MYERS DODD** ('77 Physics, '83 MS Comp. Sci.), 61, April 15, 2017, Lexington, Kentucky. **GARY TOSHIO OTA** ('77 DVM), 69, April 4, 2017, Lanikai, Hawaii. **KURT DON SCHLECT** (x'77 Ag., Alpha Kappa Lambda), 62, February 5, 2017, Seattle. **JEFFREY ALLEN MCCOMAS** ('78 Forest & Range Mgmt.), 62, April 4, 2017, San Diego, California. **KEVIN MICHAEL SAND** ('78 Crim. Jus.), 60, April 3, 2017, Cle Elum.

80 DONNA MICHELE BURGESS ('80 Speech & Hearing Sci.), 61, July 7, 2016, Seattle.

GUY PATRICK LORENZEN ('80 Econ.), 59, July 12, 2016, Seattle. **PRICE L. WINEMILLER** ('80 Kinesio.), 60, March 3, 2017, Seattle. **GRETA OLSON** ('81 Home Econ.), 64, September 30, 2016, Portland, Oregon. **C. ALAN GRIDER** ('82 Ag., '85 MCE), 66, December 27, 2014, Taipei, Taiwan. **BRIAN J. GOETSCH** ('83 Mktg.), 54, April 13, 2016, Hayward, California. **SCOTT D. GOOTEE** ('83 Socio.), 58, May 23, 2017, Mill Creek. **NICK JOHN BEVANDA** ('84 Arch.), 54, May 7, 2017, Penticton, British Columbia. **PETER H. CRAIG** ('84 Const. Mgmt.), 58, April 16, 2017, Olympia. **RONALD PHILLIP ST. GEORGE** ('84 Police Sci.), 54, March 29, 2017, Freeland. **ROBERT EARL HERRINGTON** ('85 PhD Zool.), 68, April 6, 2016, Waynesboro, Georgia. **JARRENE SUE HIGGINS** ('85 MEd), 77, March 14, 2017, Fresno, California. **BRUCE TIMOTHY HOPMAN** ('86 Vet. Sci., '88 DVM), 56, February 1, 2016, Portland, Oregon. **JOHN T. HARDING** ('89 Ag. Mech.), 58, July 15, 2015, Palouse.

90 JAMES MICHAEL LEWIS ('91 Busi.), 44, September 17, 2015, Vancouver. **SUSAN L. MUNK** ('91 Comm.), 48, March 14, 2017, Portland, Oregon. **CHIRANJIV "CJ" SINGH** ('94 Elec. Eng.), 44, November 21, 2016, Tacoma. **SAMUEL BRANDT YOUNG** ('97 Busi.), 44, April 19, 2017, Richland. **ROBIN BLAKE DOOLEY** ('98 Poli. Sci.), 56, February 22, 2013, San Diego, California.

00 CHRISTINA MARIE CHESVICK ('02 Ani. Sci., '06 DVM), 36, March 14, 2017, Manhattan, Kansas. **LAWRENCE JOHN MCKENZIE** ('02 PhD Couns. Psych.), 63, June 20, 2015, York, South Carolina. **DIANNA M. GEORGINA** ('07 PhD Anthro.), 57, May 18, 2017, Duluth, Georgia. **TAWNY A. BROWN** ('08 HBM), 29, September 8, 2015, Snoqualmie.

10 BRIANNA LAURA (OAS) STRAND ('12 Ani. Sci.), 28, May 7, 2017, Port Orchard.

FACULTY AND STAFF

EVELYN A. AUGUSTIN, 86, Food Science, 1975-1992, March 26, 2017, Spokane. ✨ **BILL BAKAMIS**, 95, Vocational Technical Education, 1947-1982, May 18, 2017, Seattle. ✨ **WILLIAM BIERBAUM**, 91, Housing and Dining Financial Services, 1953-1957, 1975-1989, March 13, 2017, Pullman. ✨ **CORNELIS "CASE" CALISSENDORFF**, 88, Crop and Soil Sciences, 1966-1991, March 29, 2017, Mount Vernon. ✨ **WYATT W. CONE**, 83, WSU Prosser, 1961-1999, April 5, 2017, Prosser. ✨ **HOWARD O. DEMING**, 94, Music, 1948-1988, March 25, 2017, Rancho Mirage, California. ✨ **ESTHER GILLESPIE**, 95, Student Book Corporation, 1958-1981, March 18, 2017, Pullman. ✨ **CHELSEA GRAHAM**, 26, Veterinary Clinical Sciences, 2013-2017, May 18, 2017, Pullman. ✨ **THOMAS HEUSTIS**, 68, Design and Construction, 2005-2015, April 24, 2016, Eureka, California. ✨

ALBERTA HILL, 98, Home Economics, 1969-1982, March 18, 2017, Meridian, Idaho. ✨ **LOTHAR A. KRECK**, 89, Hospitality Business Management, 1987-1997, April 8, 2017, Pullman. ✨ **RICHARD D. KUNKLE**, 55, Energy Program, 1997-2016, March 3, 2017, Olympia. ✨ **LEON E. LEFORCE**, 68, Facilities Operation Services, 2016, December 22, 2016, Viola, Idaho. ✨ **JAAK PANKSEPP**, 73, Integrative Physiology and Neuroscience, 2006-2017, April 18, 2017, Bowling Green, Ohio. ✨ **BETTY J. REYNOLDS**, 95, Student Book Corporation, 1961-1982, September 9, 2016, Pullman. ✨ **WENDY WILLIAMS**, 64, Libraries, 1986-2013, April 30, 2017, Pullman.

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It's that time of year: Cougar IV is almost ready to release.

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WBC and the Cougar Collectors' Series are brought to you by the WSU Alumni Association, and celebrate the impact WSU alumni make on the wine industry. By becoming a WBC member and purchasing Cougar IV, you support scholarships for the next generation of WSU wine leaders, and other important WSUAA initiatives.

The Cougar Collectors' Series sells out quickly, so join WBC by September 9 to guarantee your bottle. You can sign up on winebycougars.com or by calling 800-258-6978.



winebycougars.com



CHUKCHI SEA POLAR BEAR (COURTESY U.S. GEOLOGICAL SURVEY)

Bear watching. The headlines paint a dire picture: By the 2030s, global warming could completely melt Arctic sea ice, imperiling the 19 known polar bear populations that range across the United States, Canada, Russia, Greenland, and Norway.

Could, as some fear, the trend spell extinction for *Ursus maritimus*?

For two of the country's premiere polar bear researchers—wildlife biologists **KARYN RODE '99 MS, '05 PhD**, and **DAVID C. DOUGLAS '86 MS**, both of whom work for the U.S. Geological Survey's Alaska Science Center—the answer is a decided “No.”

But neither is the future rosy for the animals, according to Douglas, who uses satellite tracking to monitor their movement and fill in “key information gaps” on how the bears use both the sea ice and land.

“If we let global warming get so bad that no polar bears in the Arctic can survive, then our planet has got a world of problems,” he says. “Nobody will care about polar bears at that point.”

Some studies suggest that there are 20,000–25,000 polar bears living in the wild, but exact totals aren't known. What is known is that their icy seal hunting habitat is under siege by rising temperatures. In March, sea ice measured 5.4 million square miles—larger than the United States by 1.6 million square miles; that compares with a historical average of 5.9 million square miles.

While the USGS has no say in discussions about limiting greenhouse gas emissions—the prime reason for the Arctic thaw, according to most scientists—the work of Douglas and Rode attempts to influence dialogue.

“We can't intervene, but we can communicate and try to make the message known as to what we see as the ramifications for polar bear habitats,” Douglas says. “We do our best to objectively inform decisions. That's the mission.”

For her part, Rode spends up to six weeks annually in the Arctic hinterlands, namely the Chukchi Sea, where she measures and takes blood work from sedated bears. She also observes behavioral patterns.

Sea ice losses have forced the bears to spend, on average, 30 more days on land while waiting for winter ice to form, at which point they can return to their hunting grounds.

“There's some food resources available on land, but for the most part they're resting through that time period,” Rode says. “Since 2011, we haven't seen it affect the condition of the population. We're continuing to closely monitor how some of these changes may or may not affect population dynamics.”

Mathematical models suggest that entire populations of polar bears could go extinct by the end of the century, “but it's important to keep in mind that polar bears have a large range, and across the circumpolar Arctic, the rates of sea ice loss vary,” Rode says. “In some areas, the projections for sea ice are not as dire.”

When they're on land, the bears are known to eat berries or bird eggs. Douglas says the animals are “kind of fasty,” meaning they've adapted to go for three or four months without eating seals. “All bears are sort of intrinsically adapted to a feast-and-famine lifestyle,” he notes. *

BY ANDREW FAUGHT

Alumni Association News

Bounty of the Palouse

Each fall, the WSU Alumni Association's wildly popular *Feast of the Arts* dinner series brings together some of the very best aspects of WSU for a can't-miss evening. These special dinners feature wines from a different Coug winery expertly paired with exquisite food courses by Executive Chef Jamie Callison of the Carson College of Business School of Hospitality Business Management and his talented students.

“I work with my students to craft a menu inspired by WSU-focused fare—like fresh vegetables from the WSU Organic Farm and Wagyu beef from the Premium Beef Program,” Chef Jamie explains. *The Feast* also incorporates the WSU Museum of Art, which hosts the reception prior to the dinner, and music from the WSU Marching Band, which leads the guests from the museum up to the dining room where the four-course dinner is served. The wineries are selected from among those featured by the WSUAA's Wine-By-Cougars Wine Club.

“*The Feast* is one of my all-time favorite Alumni Association events,” says Tim Pavish, executive director of the WSUAA. “It brings so many different departments together to celebrate our University, our alumni, and our students. It all makes for a fun, memorable evening for alumni and friends of WSU to enjoy the best food, wine, art, and music around.”

Through *The Feast*, the WSUAA is also able to promote the achievements of WSU alumni in the wine industry and showcase the talent of current students while they put the skills they have learned in the classroom to work in a real-world setting.

The Feast takes place the Friday night before most Saturday home football games. The dinners are perennial sell-outs. This year's lineup includes the Cougar-connected wineries of Doubleback (September 1), Cinder (September 8), Pepper Bridge and Amavi (September 15), EFESTÉ (September 22) Smasne (October 20), and Chateau Ste. Michelle (November 3).

Find out more and register at alumni.wsu.edu/feast.



PHOTO: ROBERT HURNER

ASK DRUNIVERSE



askdruniverse.wsu.edu

ILLUSTRATION ROB MCCLURKAN

HOW DOES WATER IN THE OCEAN MOVE? I THINK IT'S BECAUSE OF THE WIND.

—Case, 5, Yakima

Dear Case,

You know, most cats like to stay a comfortable distance from water. But when I got your science question about our big ocean, I was ready to jump right in.

Ocean water moves in all kinds of ways. Waves curl and crash on the shore. Big conveyor belts of water, currents, flow for thousands of miles around our planet. The tides go out and come back in.

And yes, the wind plays a big part in all of it. That's what I found out when I went to visit my friend Jeff Vervoort, a geologist and professor of oceanography at Washington State University.

If you stand on the shore, you can often hear and feel the ocean breeze. On windy days, waves start stirring. The smallest waves, called capillaries, start growing as the wind blows across their surfaces.

The stronger the wind blows, the bigger the waves can get. They can reach great heights—some as tall as six-story buildings. When the wave reaches shallower waters, it will start to curl, then break.

If you're anything like me, you might be wondering where the wind comes from, too. Vervoort explained that our planet is rotating around on its tilted axis. The sun heats the Earth unevenly as it turns. These conditions actually affect the air and wind patterns on the planet surface. All of this moving air pushes the water in the ocean around.

Vervoort pulled down an Earth-shaped beach ball from the shelf in his office. He explained that winds blow in different directions. If Earth wasn't rotating on a tilted axis, winds would blow very differently.

But, because of the Earth's spin, wind belts in the northern hemisphere bend to the right. It also makes the winds in the southern hemisphere go to the left. Ocean currents bend in the same way, caused by the Coriolis effect.

The moving water can sometimes also act like a food delivery system. Some currents deliver important sources of nutrients and oxygen down to animals that live in the deep ocean.

Other currents bring up nutrients for animals that live near the surface. These nutrients allow tiny organisms—plankton—to live and grow to great numbers. These very tiny plankton get eaten by bigger animals like krill. Krill are an important food source for even bigger animals such as whales.

Meanwhile, back up on the surface tides go in and out. While wind impacts the tides a little bit, they mostly happen because gravity from the moon, and a little less from the sun's gravity, pull water on Earth.

For the most part when it comes to water moving in the ocean, your hypothesis is correct, Case. It's wind that mostly keeps our ocean surface in motion.

Sincerely,
DR. UNIVERSE



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