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DEAR READER,

Let me tell you about a threesome that happens every spring. A black-haired, yellow-striped beauty buzzes onto the anther of a kale flower, gently grazing its fuzzy body against the pollen. After it’s finished, the bee travels to another blossom who is waiting with its carpel fully-exposed. As it makes a gentle landing on the erected stigma, pollen slowly trickles down the ovule.

That’s about as provocative as this magazine is going to get. While, understandably, that may be disappointing to some readers, in our search for environmental sex stories, we came across topics that are much more pressing, and much less benign.

The #MeToo movement that recently exploded in the media has unapologetically revealed the pervasive oppression of women in society. Allegations of sexual harassment across almost all industries are beginning to reveal a power dynamic that has been normalized for centuries. This includes outdoor agencies—ones that The Planet has worked with extensively in our reporting, including the Washington Department of Fish and Wildlife and the National Park Service. And I want to make it very clear that while the theme of this magazine is “Sex”, sexual harassment is not about sex. It’s about power.

In this magazine, we’re not shying away from this power play. We’re using the power of storytelling to bring awareness to the injustices and issues surrounding sex and the environment. We’ll dive into what’s killing Southern Resident baby orcas. We’ll hear from women who grew up running through apple orchards as they were sprayed in DDT, each of whom now have breast cancer. We’ll visit a group of Secwepemc indigenous women protesting the Trans Mountain Pipeline expansion. We’ll even hunt for a horny little clam that is disrupting entire lake ecosystems.

So, let’s talk about sex—whether that’s in the context of biological makeup, an abuse of power or just good ol’ fashioned pleasure.

To sex, a vital force of life on this beautiful planet,

Keiko Betcher
Editor-in-Chief
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ON THE COVER
During the summer of 2017, countless transient orcas made their way into the Puget Sound. I spent a lot of the summer on a small boat searching for them. On July 21st, I was lucky enough to have an encounter with T37B2, a baby transient orca. It was amazing to see how curious and playful it could be and also how caring and protective its family was. Getting to see orcas in the wild is truly spectacular and humbling. I will continue to spend my whole life chasing that feeling.

PHOTOGRAPH BY HANNAH GABRIELSON

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A HIT TO FERTILITY

STORY BY MOLLY GROSS
PHOTOS BY HAILEY HOFFMAN

Guests of the male fertility lab at the University of Washington (UW) don blue booties and scrubs patterned with snorkel-wearing, cartoon sperm. Taped to the door behind Charles Muller’s desk is a picture of himself wearing a photoshopped sultan hat. “Sultan of Sperm” is written across the top of the page. The lab is full of shiny equipment, microscopes, high-tech pipettes and other scientists bustling around in gloves and scrubs. All the while, Ariana Grande plays from a radio in the back.

THE CAUSE OF male infertility cannot be determined in about 50 percent of cases, according to the U.S. Department of Health and Human Services. Since 2010, Muller, director of the UW male fertility lab, and his team of five scientists have researched the impact of marijuana on male fertility. Muller studies the effects of THC on mice at a time of increased marijuana legalization in the U.S.

Tetrahydrocannabinol, or THC, is the active chemical in marijuana that changes brain function and causes a “high.” To see what it does to sperm, Muller and his team collected mouse sperm and bathed them in THC. After placing them under a microscope, they tracked the sperm’s movement. They found that 82 percent of the sperm swam well prior to THC exposure. After the exposure, that number dropped to just 35 percent.

“Sperm that have been exposed [to THC], are either swimming slower or more in a random path,” Muller said.

Muller’s research also tested the short-term effects of THC on the fertility of live mice. His team injected male mice with 50mg of THC before they mated and found the mice had 20 percent fewer babies.

Although Muller said he’s wary to claim his results apply to humans, he noted marijuana can have this effect on other mammals, and it’s likely there’s a subtle effect in humans as well.

Thomas Walsh is a doctor and specialist in male fertility at UW Medical Center. Walsh said he is concerned the public’s acceptance of marijuana and lack of research into long-term effects is comparable to how the public felt about tobacco 40 years ago.

“Everyone assumed that tobacco smoking was safe and that it wasn’t dangerous to one’s health,” Walsh said. “It took us decades to finally recognize that there were significant health implications to tobacco smoking.”
He also voiced concerns about the overlap between those who use marijuana the most—people ages 18 to 30—and men’s prime fertility-building years.

“We have a lot of patients that believe because it’s legal it doesn’t have any bad implications,” Walsh said.

Another study suggests some reason for concern. Research conducted between 2008 and 2012 in Denmark collected data on marijuana and other drug use from more than 1,200 men aged 18 to 28. Those who claimed to use marijuana more than once per week had a 29 percent lower sperm count than those who reported no use.

Emmett Branigan, a medical director at Bellingham IVF and Fertility Care, explained how data on this issue is poor because it’s hard to tease out the cause of semen quality with so many factors present.

It takes two to three months for semen to be produced. Branigan said lifestyle factors that might affect sperm during the production time period—use of marijuana, alcohol and other drugs—aren’t noticed until sperm is fully formed. By the time a sample is collected it’s hard to pinpoint what exactly impacted semen quality.

Branigan said the legalization of recreational marijuana makes it easier to collect accurate information for survey studies. He said there is better data on where people are getting marijuana and how much they’re using. People are also more likely to admit they use it. Although this helps for research, Branigan said there are still too many uncontrolled factors to draw a conclusion that marijuana is a cause of male infertility.

“Virtually any sperm study is incredibly difficult,” Branigan said. “The ones that might be able to get at it are the sperm banks because there, they’re collecting data on their sperm donors over time”.

The Seattle Sperm Bank tracks drug and semen history by collecting information from fertile donors, something Branigan said is missing in current research. Men typically seek fertility help only when they’re having fertility issues, leaving a gap in semen history.

Donors at the Seattle Sperm Bank are not disqualified from donating sperm if they use marijuana. Angelo Allard, compliance supervisor at Seattle Sperm Bank, said sperm recipients often know more about the donor than they do their own partner, including their drug history.

Allard said the sperm bank rarely deals with patient marijuana use directly because sperm donors at the Seattle Sperm Bank are required to be five times as fertile as the average male, effectively weeding out most men who chronically use marijuana.

In Muller’s lab, more than a dozen metal egg-shaped containers on wheels are corralled together in a corner. Muller pulls out a key to open a vat, a plastic sperm keychain dangling from the end. Mist from liquid nitrogen slowly escapes over the edge as it unseals. The ‘Sultan of Sperm’ pulls up a vial the size of a pinky finger and nonchalantly discusses the 10 million sperm preserved in the tiny bottle.

“On the scale of all the things that people do to themselves I don’t think [marijuana use] is really high up there,” Muller said. “It’s just that we don’t know, and that we have an opportunity to find out more.”

**“SPERM THAT HAVE BEEN EXPOSED [TO THC], ARE EITHER SWIMMING SLOWER OR MORE IN A RANDOM PATH,”**

- CHARLES MULLER, DIRECTOR OF THE UW MALE FERTILITY LAB

**MOLLY GROSS** is a Huxley student studying environmental studies. She spends her free time doing art and learning new things.

**HAILEY HOFFMAN** studies visual journalism and Spanish. Originally from Las Vegas, she fell in love with the beauty of the Northwest and spends her free time hiking, skiing and exploring.

**LEFT:** Sperm samples for Muller’s research are stored in large containers filled with liquid nitrogen to keep the sperm alive. There are dozens of containers, each one holding around 30 samples.
Asiatic clam shells found at Bloedel Donovan Park in Bellingham, Washington. Researchers use spaghetti strainers to search for the invasive clams in the sandy shallows of the lake.

STORY BY EMILY DIETZEL
PHOTOS BY NICK PINKHAM

THE CLAM BEFORE THE STORM
AT FIRST GLANCE, the Asiatic clam, Corbicula fluminea, seems harmless. It appears much like any other native mollusk, but its miniature size and raised, curved ridges give it away to the experienced eye. But for this clam, it truly is what’s on the inside that counts—reproductive versatility.

First recorded in the U.S. 80 years ago, these tiny clams have since made a big footprint. Teagan Ward, the aquatic invasive species program coordinator for the city of Bellingham, is working to protect the local community from these seemingly harmless creatures. The species is a harbinger for ecological change in freshwater ecosystems. It forces out native species, degrades water quality, and lays the groundwork for invasion by more overtly threatening organisms. Since 2011, the Asiatic clam has established a growing population in Lake Whatcom, Bellingham’s primary watershed.

Most clam species have the characteristics of only one gender and release clouds of eggs or sperm into the water to combine by chance. The Asiatic clam, however, does not rely on fate alone. As a hermaphrodite, the Asiatic clam possesses the sexual traits of both males and females. This means it can reproduce sexually, like most other clams, or asexually, using only its own genes to create offspring. The Asiatic clam may even opt to clone itself, creating identical copies of itself within its body. The parent protects the babies until they form small, soft shells and sticky bodies, perfect for hitching a ride on rubber boots, Frisbees and fishing boats, into uncontaminated lakes for colonization.

With more reproductive options than all other species of freshwater bivalve, these clams are strategic reproducers. Living up to four years, each clam is capable of producing 68,000 offspring every year.

Over the last century, the clam has dominated many continents, even reaching the top 100 Worst Invasive Species List in Europe. It was first noted in North America in 1938, and established itself in Lake Washington ten years later. Today, the shores of Lake Washington are littered with the clams.

“At times you’ll think you’re walking on gravel, and you’re actually walking on clams,” said Leo Bodensteiner, an aquatic ecologist and professor of environmental science at Western Washington University.

Upon its discovery in Lake Whatcom, it made the city of Bellingham’s Most Unwanted Invasive Species List.

This rapid reproducer is already changing the drinking water of about 100,000 people in Whatcom County. The Asiatic clam alters environments simply by eating and reproducing profusely. As a filter feeder, it sucks nutrients

It’s mid-April when Teagan Ward wades out into the frigid water of Lake Whatcom in her rubber thigh-high waders, armed with a dented spaghetti strainer and a bright-pink hula-hoop. Broken shells litter the shore of Bloedel Donovan Park, definitive evidence of her target’s presence. Ward and her team are on the hunt. Floating hula-hoops on the water mark areas to be searched, and the team shovels up chunks of sediment, sieving it through the strainers in search of their target. The first attempt yields only large pebbles and halved shells, but as the team probes deeper they find them: small, yellow-brown clams no larger than a quarter.
from water and sediment. The clams also take oxygen directly from the sediment and out of reach of native species.

The biomass of phytoplankton and zooplankton can decrease by up to 70 percent, because they are all the clam eats, according to a 2013 study by researchers at the University of Namur in Belgium. Ordinarily, plankton serve as the main food source for many native aquatic species, but because of Asiatic clams’ sheer numbers, they hog all of the lake’s resources. Like a tired toddler, these clams do not share well, and native species are paying the price. They suffocate and starve while the clams feast.

“Let’s say you love to go out on the lake and catch some fish out there. That fish is probably gonna be smaller and less abundant after Corbicula has moved throughout the lake,” said Jason Buehler, author of the most recent study done in his tone, but surely intended. “They don’t challenge. They don’t eradicate them, Bodensteiner said. Even if they were fruitless. Without the help of shovels, scuba gear, hull-whoops and ideal temperatures, her efforts were fruitless. An environmental engineer by trade, Steve Hood has an intimate familiarity with the species, and suggested Ward’s search would produce better results in the winter when the lake is low.

When the clams were first discovered in Lake Whatcom, Hood was on the scene, and his curiosity compelled him to taste them. “I love seafood, so I thought, ‘Oh, well fresh water seafood? Let’s give it a try,’” Hood said. He appreciated the experience enough that he recommended it to others. Hood offered local clambakes as an unorthodox solution to rising Asiatic clam populations.

Since their arrival, local government agencies have been working to contain the spread of Asiatic clams, but management options are limited. No targeted pesticides exist to easily eradicate them, Bodensteiner said. Even if they did, the nature of these clams pose a unique challenge.

“They can clam up,” he said—no pun reflected in his tone, but surely intended. “They don’t need to take in any water, in some cases for upwards of three days, maybe longer.” He said for this reason, any poisons used to remove the clams would have to stay in the water until they open up again.

Ward studies the efforts of other programs managing the species to learn the best way to respond to their presence. In New York state, the managers of Lake George have attempted an alternative to poisoning the clams called benthic mats, she said.

“They put these mats down you know, at the bottom of the lake, and the goal there is to completely suffocate the clams,” Ward said. “The challenge with that is it’s very costly for one, and secondly, it kills a lot of other species as well. Eradication is not really an option.”

Instead, Bellingham’s Aquatic Invasive Species Program focuses on containment. The species likely reached the lake through a contaminated vessel, as specimens were first found near a boat launch site, Ward said. They developed a boat monitoring system which became mandatory in 2014. Last year, her team conducted more than 12,000 inspections between Lake Whatcom and Lake Samish, with 60 percent of them taking place at Bloedel Donovan Park.

“We have a total crew of 16 inspectors across the two lakes, working at four check stations,” Ward said. “We’ll be here from dawn to dusk, seven days a week until the end of September.” As she spoke, a bright-red fishing boat was undergoing inspection. The owner answered questions regarding where and when the boat was last launched, while inspectors searched the vessel for any signs of mud or stagnant water, which could transport larval clams. However, some believe the program may not be doing enough to prevent the spread of this invasive species to unaffected lakes.

“There’s about a 70 percent compliance rate,” said Karlee Deatherage, the clean water policy analyst at RE Sources for Sustainable Communities, a Bellingham-based environmental group. “We do have some grave concerns about the lack of enforcement that happens during the peak boating season... It’s such a huge loophole.” Ward argues compliance rates actually range from 85 to 90 percent, and are rising every year as a result of educational efforts. Her program runs an online aquatic invasive species course which lowers boat permitting costs, incentivizing people to learn about the ecosystems they engage with. But with invasive species, even a one percent non-compliance rate may be enough for them to spread.

“More enforcement would probably help, but our job is always education first,” Ward said. “Most people, when they understand why we’re doing this, they’re on board, and we take steps to make it easy for them.”

Asiatic clams are not the only species threatening local drinking water. Many consider them a warning sign for two more dangerous mollusks—zebra and quagga mussels. The mussels invade in the same way as the clams, via mud or water on contaminated surfaces. These mussels can attach to hard surfaces, creating the potential to clog water pipes. If these species reach Lake Whatcom, they could block Bellingham’s water supply and cost thousands of dollars in repairs. Fortunately, they are not in Washington yet, but were spotted in Montana in late 2016.

Ultimately, the community plays a large part keeping these invasive species under control.

“There are still things that we can’t go back from, and despite all the technology and all the money we have, there’s no way to stop these things once they’re introduced,” Buehler said. “Once these invasives are in your favorite lake, they’re there forever.”

Emily Dietzel is an environmental studies major at Huxley College and an avid hiker. She has a passion for the Pacific Northwest and all of its unique ecosystems.

Nick Pinkham studies design and computer science. Before Western Washington University, he studied photography and design in Michigan. When he isn’t busy studying, he can usually be found out in the mountains.
Elisa Lopez-Crowder is a woman and wildland firefighter who joined the United States Forest Service in 2010 following a career in the U.S. Navy. In the Forest Service, she grew accustomed to suggestions that women shouldn’t be firefighters and sexually explicit comments toward her. The bulk of this harassment came from the assistant captain on her fire team, she said.

“I learned to let everything go in one ear and out the other,” Lopez-Crowder said. As a veteran, she was confident navigating a male-dominated field. But while enlisted, she said she never experienced such harassment.

One day, while performing a field exercise with the forest service, the abuse escalated. According to Lopez-Crowder’s account: While ignoring harassing comments from her assistant captain, she was grabbed and thrown to the ground. She looked up to see the assistant captain over her, pinning her down with his foot. She wasn’t released until another firefighter intervened, telling the assistant captain to “let her the fuck up.”

Shaken, but physically OK, she carried on with the exercise and finished out her workday.
THE FOREST SERVICE investigated more than 400 sexual harassment reports between September 2016 and December 2017. For decades, allegations of harassment and assault have plagued the U.S. Forest Service. In December 2017 Forest Service Chief Tony Tooke reported that following updated policies and an extensive investigation, the agency had identified and corroborated 34 cases of sexual harassment since the implementation of a stricter anti-harassment policy in September 2016. Three months later, in early March 2018, Tooke resigned in the wake of sexual harassment claims brought against him.

Tooke joined the Forest Service when he was 18 and and worked there for 38 years until he resigned. In his resignation letter, he denied the claims against him, but said his resignation was out of the best interest for the Forest Service and his family.

The Forest Service has acknowledged issues of gender and sexual harassment and vowed to address such issues through past legal agreements. In 1981, Forest Service Region Five—the region encompassing California—settled a sex discrimination class action lawsuit by agreeing to mandatory fair hiring, promotion and training programs for women. In 1995, civil rights advocate and former Forest Service employee Lesa Donnelly filed a lawsuit on behalf of 6,000 female forest service employees alleging harassment, abuse, and reprisal in the event of reporting. Donnelly claims this lawsuit was filed due to the backlash toward women who were hired under the earlier agreement, known as the Bernardi Consent Decree. In 1996 Donnelly filed another lawsuit, resulting in another court-ordered consent decree that was to last until 2006.

More recently, in December 2016, a congressional hearing was held to examine issues of sexual harassment and gender discrimination in the service. There, Lenise Lago, a top Forest Service official, testified in front of the House Committee on Oversight and Government Reform, and promised the agency had “worked diligently over the last five years to make meaningful progress toward a workplace where all employees are valued, safe and respected.”

But Donnelly and others say sexual harassment and gender discrimination are still very much a problem. They point to a 2017 internal survey that found most harassment in the Forest Service goes unreported. It was also found only one fifth of surveyed employees considered harassment and assault to be problematic in the agency.

The study also found employees who had been with the service for less than a year were less likely to view harassment as a problem within the agency, while their more experienced counterparts were more likely to perceive it to be a problem.

The 2017 survey found a variety of reasons given for not reporting instances of abuse. These include distrust of the system and fear that their careers will be threatened if the allegations were to come out. Of the surveyed employees who had filed formal harassment complaints, the majority felt their careers were hurt or jeopardized by their decision to make a report.

Hesitance to report can create a problem for administration officials who feel they cannot act unless they are made aware of such incidents.

“We will hold any employee who engages in harassing behavior accountable,” said Colton Whitworth, a spokesperson for the Mt. Baker-Snoqualmie National Forest, in an email. “We can only take action when we are aware of the behavior.”

For survivors of harassment and assault like Lopez-Crowder, reporting doesn’t necessarily result in a safer work environment. After filing a complaint, the assistant captain was put on temporary administrative leave. Yet, Lopez-Crowder found herself assigned to the same project as him upon his return.

“Everywhere I went to as far as project work, he was there,” she said. “He was even on the same fire that I worked on.”
Donnelly said agency rules require that the alleged abuser must be directly involved in the mediation process, often placed in the same room as the person they are accused of abusing. This practice is exactly what Donnelly and her colleagues advised the Forest Service not to do, she said.

"Mediation is not an appropriate venue for harassment," Donnelly said. "Accountability is the appropriate venue for harassment."

Lopez-Crowder said a fellow firefighter urged her to file a report after she was assaulted but she feared potential backlash from a formal complaint.

"If I said something, it would put a target on my back," she said.

It wasn’t until her coworker filed a complaint without her input that she felt compelled to file one herself.

Lawrence Lucas, President Emeritus of the USDA Coalition of Minority Employees (the Forest Service is part of the U.S. Department of Agriculture), condemns the reporting system. He claims it puts survivors at risk and allows supervisors to retaliate against those filing or planning to file complaints.

"In lieu of trying to solve the problem, they exacerbate the problem by covering it up and protecting those predators and individuals who are guilty of the abuse," he said.

Donnelly said she has personal experience with such reprisal. After filing the 1994 lawsuit, the Forest Service put her under investigation three times—once for criminal misconduct, she said. Her position in the agency was abolished and her responsibilities were reduced. Donnelly said for the final four years she worked in the agency she had very little work to do. She was formally suspended multiple times before retiring early to dedicate her time to advocacy.

"It was phenomenal how they came after me," Donnelly said. "If an employee speaks up, they go after your performance, they go after your conduct."

Reasons for such reprisal are widespread across Forest Service work sites, Donnelly said. Lopez-Crowder recalls a training where she met firefighters from all over the country and came to find out it wasn’t limited to her forest—it was happening nationwide.

Donnelly said the issue is one of accountability for inappropriate behavior.

"You learn that in kindergarten," she said. "But there are no consequences in the agency."

ROBERT MERCER is originally from Seattle, Washington, but moved to Bellingham to attend Fairhaven College of Interdisciplinary Studies. He is focusing on environmental justice and writing.

NICK PINKHAM studies design and computer science. Before Western Washington University, he studied photography and design in Michigan. When he isn’t busy studying, he can usually be found out in the mountains.
**HEALING WITH HORSES**

*STORY BY DAWSON FINLEY  
PHOTOS BY GRETA LOZADA*

Therapists Amy Schilder and Lorna Shepardson make their way through the empty barn. Natural light pours over the floor, revealing bits of straw and muddied footprints. From inside, the large opening at the end reveals green pastures. By the time they reach the entrance to the fields, there’s excitement in the air. “Let’s go meet the horses,” Schilder said.

**THE CIRCLE K RANCH** in Everson, Washington, works with the global Equine Assisted Growth and Learning Association (Eagala), a Utah-based nonprofit, to use equine-assisted therapy to treat people who have experienced trauma, including survivors of sexual assault. Equines include hooved mammals, like horses. Horse therapy can improve skills such as focus, self-observation and self-sufficiency, said Nina Ekholm Fry, director of Equine Programs at the University of Denver. While certain methods of equine-assisted therapy have seen success, it isn’t without its criticism.

Ideally, the horse compliments the therapy by enhancing the mental state of a client, Fry said. The idea is to place the client in a calm and natural environment where they don’t feel cramped in a therapy office, she said.

“The horse is not the therapist,” Fry said. “The horse is not providing the treatment, it would be unfair to make those statements both to the horse and to the client.”

Survivors of sexual assault are likely to develop post-traumatic stress disorder, which can have lasting emotional effects, according to a 2014 study in the Journal of Child and Family Studies. Using horses, therapists can mediate physical contact that’s not going to feel intrusive or sexual to the client, Fry said.

Schilder created Northwest Hearts United, an equine-assisted therapy service, to increase access to this type of treatment. Their barns, located throughout Western Washington, house retired and rescued horses that need social interaction, and don’t need any training to be helpful for therapy, she said.

Therapy sessions can focus on an individual or groups of people, with the average length of a session being one hour. Typical visits are once a week until the client feels like they are able to move on, Schilder said.

Shepardson, a mental health counselor and an equine specialist, has been with her private practice, Therapy N’ Motion, in Bellingham, Washington, for over ten years.

After getting a master’s degree in applied behavioral sciences, she practiced individual and group therapies for at-risk youth, including those who had experienced sexual abuse, before eventually attending an equine-assisted therapy workshop. That’s where she found her calling, Shepardson said.

Together with Schilder, Shepardson works with clients using the Eagala model of therapy, one of the many different types of equine-assisted therapy. In this model, horses are untethered and walk freely, allowing the client to interact with them. Two facilitators, a mental health professional and a qualified equine specialist, help guide the client through the therapy, Schilder said.

As of 2017, just under 50,000 clients have used the Eagala model for treatment according to their annual survey. More than 500 Eagala programs exist around the world.

Fry, however, has some criticisms of this approach. She said people are commonly undertaught in this model. In order to treat trauma, therapists have to be mental health professionals with additional training in equine-assisted therapy, she said. The Eagala model, on the other hand, doesn’t require the mental health professional to know how to work with horses because it employs a two-person model. Fry leads a certificate program in equine-assisted therapy with the goal of training practitioners with the latest research.

Shepardson, who acts as the equine specialist when working with Schindler, said she is aware of criticisms to the Eagala method, but above all believes in her work.

“No method is perfect, no matter what you’re doing,” she said.

When trauma is experienced, the hippocampus, where long-term memories are stored in the brain, is exposed to stress hormones and shrinks. This makes the traumatic memory seem constantly in the present, Fry said.

This can cause clients who have experienced sexual assault to misinterpret interactions from others because they’re prepared for something overwhelming and painful to happen again. This is where horses can help calm the client if they have a traumatic memory.

Back at the Circle K Ranch, Shepardson tells the story of a particular session. After four horses approached the client and one nuzzled her, the client apologized to the horse, she said. Based on this interaction, Shepardson asked the client if she had trouble setting boundaries, which she agreed with.

“It helped her to see where it wasn’t her fault in life that things had happened when people had hurt her,” she said.

Fry said she hopes equine therapists will become more professional in their training and continue the discussion of a horse’s role in therapy.

“In the longer run, the same relational patterns and assumptions we make with humans tend to show up in our relationships with other animals,” Fry said.

**DAWSON FINLEY** is a public relations major at Western Washington University. When not writing press releases he can be found looking for stories to tackle.

**GRETA LOZADA** is from Minnesota and is currently majoring in environmental studies with a minor in Spanish. She is a photographer, enjoys cooking, and names her plants.

LEFT: Amy Schilder prepares to bring her horse back to the barn at Circle K Ranch, in Everson, Washington.
Dawn Noren and her team make their way back to San Juan Island, Washington, after hours of collecting data in Haro Strait. Suddenly, the weather turns, creating waves up to a meter tall. A black dorsal fin rises and a killer whale comes eye-level with Noren as a pod of the mammals surfs the waves surrounding the boat. Noren, a research fishery biologist at the federal Northwest Fisheries Science Center in Seattle, Washington, has studied killer whales for years, but said this was one of the most memorable experiences of her career.
IT’S ALSO THE kind of moment imperiled by the decline of Southern Resident killer whales, one of the most iconic animals of the Pacific Northwest. Over the past two years, the majority of calves belonging to this endangered killer whale population have either gone missing or died. Only 76 Southern Resident killer whales remain today, a decline from their historical number of about 200 during the late 1800s, according to the Center for Whale Research. As these killer whales struggle to carry on their legacies, one of the biggest challenges they face is chemical contamination.

Toxic chemicals known as persistent organic pollutants (POPs) include synthetic contaminants commonly known as PCB, PBDE and DDT. These pose some of the largest threats to local marine species. Prior to the phase-out of certain PBDEs in Washington state in 2009, it was found in flame retardants used on everything from couches to children’s pajamas. As these products, which are still in homes, are washed, PBDEs get into waterways, making them one of the most prevalent contaminants in the Puget Sound. Manufacturing of PCBs and DDT have been banned in the U.S. since the 70s, but traces of these pollutants still exist.

“The DDTs and PCBs are more like legacy contaminants,” said Kim Parsons, a research scientist at the Northwest Fisheries Science Center (NWFSC).

Once introduced into the ecosystem, these chemicals work their way through the food web, accumulating in the fatty tissues of predator species. This poses a special challenge for killer whales, who sit at the top of the local food web.

The adult orcas acquire contaminants through their food, but orca calves are exposed even before they are born. Toxic chemicals can be removed from the body by transferring them through placenta or breast milk, according to a 2016 study by National Oceanic and Atmospheric Association. To further investigate this issue, Noren worked with captive killer whales at SeaWorld in San Diego, California, and studied their breast milk and blood samples. In her research, she found more contaminants were transferred during early stages of breastfeeding than later on. First-time mothers also tend to transfer more contaminants to their calves than experienced mothers, she said.

“If a female doesn’t have a calf until 15, she’s had 15 years to acquire contaminants and she’ll dump that to her first calf,” Parsons said.

Once a mother offloads contaminants onto her first born, she will have less to pass onto future calves. This transfer of contaminants can be an issue for the growth and development of calves.

“What’s interesting about [young] mammals is that they’re not fully developed neurologically,” Noren said. “Studies have shown that an influx of contaminants at a super young age right after birth leads to some neurological effects from PCBs.”

Along with neurological effects, POPs affect killer whales’ endocrine systems, which produce hormones that play essential roles in reproduction, metabolism, heat loss control and growth. Despite the potential correlations, Noren and Parsons can’t confidently say contaminants are the reason for the poor survival of orca calves. To find more answers, researchers looked to transient killer whales.

Transient killer whales are a genetically distinct group of orcas with different lifestyles than resident killer whales. Transients have much higher levels of contaminants than residents, but their populations have been moved from the body by transferring them through placenta or breast milk, according to a 2016 study by National Oceanic and Atmospheric Association.

Biomagnification is a big problem in marine environments. Here’s how it works:

1) Toxic pollutants like pesticides and industrial chemicals leak into the ocean and are consumed by microscopic organisms called zooplankton.

2) Small fish eat the zooplankton containing the pollutants, which are then eaten by larger fish like salmon. As the pollutants are transferred from one to the other, they increase in concentration.

3) Orcas eat the larger fish, consuming the concentrated chemicals they contain. Because many pollutants take years to decay and leave the body, the whales will suffer their effects for life.
growing steadily for the past 40 years, according to a 2016 study in Environmental Study and Technology. Southern Residents eat a variety of fish species, but endangered Chinook salmon are their main source of food. Transients, on the other hand, eat marine mammals, such as seals and whales, in addition to fish. Noren and Parsons suspect these two groups are set apart because one has less to eat.

Contaminants lay dormant in adult killer whales until the whales have too little to eat, Parsons said. The POPs are stored in their blubber so when they burn through fat, the contaminants are released into their bodies. A 2017 study from the University of Washington in collaboration with the Center for Whale Research and the NWFSC suggests that because of salmon shortages, the Southern Residents were experiencing this effect.

The Southern Resident killer whales are the official marine mammal of Washington state. Through the whale watching industry alone, they bring in as much as $60 million to the local economy annually, according to Executive Order 18-02. In 2018, Washington state Governor Jay Inslee signed this order, instating the Southern Resident Killer Whale Recovery and Task Force to implement potential solutions for their recovery.

To tackle the wide range of threats, one focus of the task force is minimizing salmon exposure to PCBs by strengthening fishery regulations. Additional efforts focus on restoring and protecting specific watersheds to encourage healthy Chinook salmon populations.

“[Killer whales] are amazing animals and are very iconic in this area,” Noren said. “I think losing them from this area would be tragic.”

-DAWN NOREN, RESEARCH FISHERY BIOLOGIST AT THE NORTHWEST FISHERIES SCIENCE CENTER

FRANCESCA TUAZON is a student at Huxley College. She has a passion for marine life and hopes to inspire a love of the environment in others.

HANNAH GABRIELSON is a marine ecology student and wildlife photographer. She believes the best way to make people care about something is to show them their beauty.
An aging yellow house sits at the top of a hill in Cashmere, Washington, overlooking hectares of orchards in bloom. Laughter echoes through the branches as children duck through apple trees, now speckled with pale pink blossoms. A sweet smell floats in the air, reminiscent of the beginning of spring, but there’s something synthetic about it. The roaring engine of a plane is heard in the distance.

The children in the orchard pause for a moment to look up at the sky, then resume playing. Their feet patter loudly on the dirt in their outdoor wonderland. As its metal body breaches the valley walls, the plane showers down a shroud of white dust on the trees. The light, airy powder engulfs the little farming town in a cloud, blanketing everything in its path.

If this had been a rain cloud, perhaps the children in the orchard and many others in the valley would have had very different lives. The dust is DDT. The children, Pamela, Charlton, Trudy, and Tina Tarver, who each recalled this scene from Cashmere in the 1960s, would each be diagnosed with breast cancer decades later. The diagnosis came so long after the exposure that the distant threat of DDT could almost be forgotten as a possible cause.

“I remember that best Golden Delicious tree just off the yard—it was huge,” said Trudy, who is now 64. “I was up in that tree and they just sprayed me. They were white apples, they had a film on them.”

The apples themselves were coated in a layer so thick, the crystallized outline of pesticide droplets could be seen by the naked eye, said Charlton, nicknamed ‘Peach’, who is now 70 years old.

“You’d just wipe it off on your pants and it would look like the apple was clean,” she said.

The youngest Tarver, Tina, was born in 1957 and remembers the notorious mist in the sky.

“It was kind of cool, really, to see the planes go over and the helicopters have all the stuff fallout,” she said. “It was kind of pretty. It would be like a cloud of mist that was falling. Everybody called it ‘spray dope.’”

As a woman in the Tarver family, cancer is a constant threat gnawing at the back of my mind. I chose to investigate this story for my mother, Tina, and my aunts Pam, Peach and Trudy because of the way it has affected our lives. The link between DDT and breast cancer is not set in stone, and possibly never will be, with its discontinued use in the U.S.

“I always think that cancer takes a long time to grow in your body,” Tina said. “So I think about what was happening all throughout my life and what I was exposed to. I always go back to the orchard.”

Heidi Sitton is a friend of the Tarver family who grew up with a very similar childhood down the road. She is now a nurse and lives in Monroe, Washington. She was first diagnosed with breast cancer in 2003.

“We literally would ride our bikes through it. They’d crop dust and it’d land all over us,” Heidi said. “We didn’t think twice to run for cover.”

Heidi said she and her friends thought of the spray as mosquito repellent because of its
Chemical Safety Advisory Committee. His research focuses on human exposure to environmental contaminants.

“You have a problem so you fix it, and then you learn later that the thing that you fixed it with is also a problem,” he said.

In this case, the regrettable substitution was DDT. By the 1960s, scientists were beginning to notice its long-lasting effects. The pesticide began to show up everywhere in ecosystems and made its way into the food web. It is known as a persistent and bioaccumulative toxin, because it degrades very slowly in the environment. DDT was found in livestock, fruits, vegetables and bodies of water—ideal places for it to make its way into the systems of humans and animals.

The pesticide wasn’t found to have any immediate effects on humans. As a result, very few took precautions in the presence of the spray when it was used between 1948 and 1972, Kissel said.

“You could tell when somebody was spraying. You could smell it before you could see it. It wasn’t an unpleasant smell but it definitely had a bit of chemicals in it,” Peach said. “I remember one time when Pam and I were riding down to the pool in the summer on our bikes and a sprayer came around the corner and we were just saturated with the spray.”

Out of all the breast cancer survivors I interviewed from Cashmere, including my mother, aunts and Heidi, similar stories and trends appeared that I couldn’t ignore. Each woman told me they had been waiting for someone to tell this story.

When bees began disappearing and birds were struggling to reproduce, DDT was suspected to be a cause. The chemical was used in the orchards for several decades starting in the late 1940s. But because of its chemical structure, it stays in the environment for years. It replaced the use of lead arsenate as a pesticide in 1948, which was found to be carcinogenic and persistent in the environment. Lead and arsenic can still be found in the soil in Eastern Washington today.

“There’s this thing that we call regrettable substitution,” said John Kissel, a professor at the University of Washington and member of the U.S. Environmental Protection Agency’s Chemical Safety Advisory Committee. His research focuses on human exposure to environmental contaminants.

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— CHARLTON TARVER, MEMBER OF THE TARVER FAMILY

ABOVE: Scott Milne’s pear orchard in Cashmere, Washington. The trees in the orchard range from one to over a hundred years old. Milne is currently working toward earning an organic certification for his orchard.
The chemical accumulates in fat cells, allowing it to linger in the body for years, and even decades, after exposure.

“With all of these things, if they don’t have an immediate acute toxic effect then we tend to think it’s fine,” Kissel said. “And then we find out later. It takes decades for people to resolve what’s going on and in the meantime lots of people get exposed.”

Scientists are finding the timing of exposure to a chemical is very important to determine the extent of its effects.

“[DDT didn’t] affect other people around the community, but it’s affecting those who went to Cashmere,” Heidi said. “That’s the weird part to me... It should have been affecting more than just Cashmere High School.”

America witnessed the heaviest use of DDT from 1959 to 1967, when my mom and aunts were young girls. A recent study found that high concentrations of DDT in the body were associated with a five-fold increase in risk of breast cancer for women who were exposed under the age of 14 or while in utero.

“You only heard ‘you have malignant cancer’ usually from a phone call from the doctor’s office,” Heidi said, recalling the moment when she learned of her diagnosis. ‘You just put the phone down and go, ‘Oh my god.’ And then you go hysterical.’

Heidi has connected with more than 30 people from Cashmere High School who graduated between 1969 and 1989 and have been diagnosed with cancer. Whether or not it is linked to DDT can’t be proven, so the evidence sits, left to interpretation.

“I mean, none of us were smokers. We weren’t heavy drinkers. None of us were obese. We lived clean and we had cancer,” Heidi said. “It’s a one in eight incidence of breast cancer in women. In Cashmere, it’s one in five.”

Out of those who have done genetic testing, she has heard of none with the BRCA gene, which increases the risk of breast cancer. Scientists suspect DDT could be linked to developing advanced-stage tumors because it is a synthetic estrogen and possible endocrine disruptor, according to a 2015 study in the Journal of Clinical Endocrinology and Metabolism. After entering remission in 2003, Heidi was diagnosed with cancer again in 2014, this time at a more advanced stage, like Trudy, Peach and Pam’s.

“They would have sent me home had I not said, ‘but there’s a lump there,’” Heidi said after she heard her mammogram was clear. “Then they came back and said, ‘We’re really sorry.’ So I ended up with a bilateral mastectomy and reconstruction.”
The valley where Cashmere lies is the best place on earth to grow pears, said orchardist Scott Milne, because of the way the mountains surround it. Every successful orchard sprayed DDT from 1948 to 1972, Milne said. It’s just what people did because it wasn’t known to have negative side-effects until animals and ecosystems started suffering. Milne has been working for 42 years on his farm in Cashmere, and grew up in the same area as Heidi and the Tarver sisters. He is now making the transition from conventional to organic farming, which takes a few years of not using synthetic pesticides. Since he began this three-year transition, he has noticed wildlife making its way back to his farm.

“Because we’re not using as many harmful pesticides, we’re getting animals back in here,” Milne said. “We’ve never had those in here before. We used to just have coyote and deer, mainly.”

He walks through rows of pear trees on his 18-hectare farm. The tree bark is a beautiful, bright white under the afternoon sun, but not from chemical sprays.

“For codling moth you’d have to spray like every 21 days throughout the year in the summer,” Milne said. “You’ve heard about stuff like Round Up, that it’s killing people, but the verdict is still up in the air so that’s another reason for me to step away from [pesticides].”

Though no longer used as a commercial pesticide in the U.S., DDT is still used today in Africa as a mosquito repellent to combat malaria.

The yellow house where the Tarver sisters grew up still sits on its plot of land in Cashmere, overlooking the valley of fruit in full bloom. It looks as if time stood still, conjuring images of the Tarver girls over 50 years ago at their childhood home.

“Even when I go back over there today, if they’re spraying anything that’s toxic they’re dressed in hazmat suits,” Heidi said with a chuckle. “I’m laughing only because it was just so common. We just didn’t think about it.”

The Tarver women, a family of four sisters, may never know what caused their breast cancer. Cancer doesn’t need a reason to strike, but the way it affected a whole slew of sisters and the population of Cashmere seems uncharacteristic to my family.

Hearing each of my aunts and my mom, one by one, face breast cancer diagnoses doesn’t get easier. None of us will ever be immune to hearing the word ‘cancer.’ They are lucky to have the support system to rely on each other through chemotherapy and radiation, but every diagnosis is a reminder of the cancer haunting our family.

Some lost their hair, others bear radiation tattoos. My aunt Pam was the first to be diagnosed in 1996, the year I was born. The most recent is my aunt Peach, who was diagnosed in the beginning of 2018 and is currently contemplating a double mastectomy. Over a span of 22 years, the women who had left Cashmere behind were still getting cancer.

The presence of DDT still haunts the beautiful orchards of Cashmere, even though it hasn’t been regulated for use in the United States since 1972. DDT can be found in the Wenatchee water basin today and where orchards grow. It sits deep down in the soil, tangled up in a web of tree roots, lurking under ruby-ripe apples, too tempting not to pick. And though it no longer rains from planes flying overhead, DDT’s harmful effects persist in the present.

“I thought we were really lucky that we escaped a lot of that stuff,” Peach said laughing. “Maybe not.”

REGAN BERVAR is a visual journalism student also interested in environmental journalism. As a writer and photographer she’s passionate about the earth and finding compelling ways to bring awareness to issues through storytelling.

NICK PINKHAM studies design and computer science. Before Western Washington University, he studied photography and design in Michigan. When he isn’t busy studying, he can usually be found out in the mountains.
Sun streaks through a tank that once held Aurora and Qila before their deaths at the Vancouver Aquarium. Now the tank holds the only remaining cetacean at the aquarium, Helen, a Pacific white-sided dolphin.

THE CETACEAN SITUATION

STORY BY LORIN LINDELL
PHOTOS BY MATTHEW PEARSON

When Lori Marino, an expert on marine mammal captivity, first set eyes on Aurora and Qila, the last two belugas in the Vancouver Zoo and Aquarium, she had no idea how little time the two whales had left.

“Whenever I saw them they would go around in circles. And they would do this endlessly, day by day... a sign of chronic stress in both humans and animals,” said Marino, who visited the animals in 2016.

Qila, 21-years old, died on Nov. 16, 2016. Her mother, Aurora, died nine days later. The Vancouver Aquarium performed an investigation into their deaths with inconclusive results, said Dr. Martin Haulena, head veterinarian at the Vancouver Aquarium, in a press conference this February.
AURORA WAS CAPTURED and brought to the Vancouver Zoo and Aquarium in the summer of August 1990. According to records from Zoocheck, a Canadian-based international wildlife protection charity, Aurora was captured off the coast of northern Manitoba, Canada. Aurora gave birth to three baby belugas—Qila, Tuvaq and Nala—during her time at the Vancouver Aquarium. She watched all three babies die in captivity.

The death of Aurora and her last offspring Qila stirred up public opinion regarding the captivity of cetaceans. Cetaceans are marine mammals including whales, dolphins and porpoises. After a series of protests and petitions against the aquarium, the Vancouver Park Board proposed the “Cetaceans at the Vancouver Aquarium” bylaw.

The initial bylaw was approved in May 2017, effectively ending the captivity of cetaceans. One month later, the Vancouver Zoo and Aquarium agreed to stop displaying whales and dolphins at its facility. The zoo then took the matter to the British Columbia Supreme Court, which ruled the park board was unable to enforce the bylaw past February 2018 because they lacked jurisdiction. The Vancouver Park Board filed an appeal on this ruling in March 2018 and it is currently under review.

Marino, a neuroscientist and former university researcher who founded and heads the Utah-based Kimmela Center for Animal Advocacy, has spent her life examining the conditions in which cetaceans are kept and the educational claims of zoos and aquariums regarding the captivity of these creatures. Beluga research in captivity presents limitations, such as stress and premature death, according to a 2011 study Marino contributed to.

“[Baby belugas] spend a long time learning from a social group, and that’s where they’re really at a disadvantage in captivity. They don’t have a natural family or social group to be born into and learn from,” Marino said.

Qila was born in captivity in 1995, and spent her life performing for the Vancouver Aquarium’s Beluga Whale Show. She was the only one of Aurora’s three offspring to survive in captivity. The other two babies included Tuvaq, who died at three, and Nala who died right before turning one. The Vancouver Aquarium has had 10 different cetacean births at their facility since 1997, according to Cetabase, a nonprofit organization that collects data on cetaceans.

Normal breeding behavior would consist of the male beluga chasing the female, warding off other males until they swim together in harmony, gently caressing each other until they both consent to sexual activity, according to the book, “The World of Arctic Whales”, published in 1995. Fourteen months later, if all bodes well, a new beluga will be brought into the world.

The Vancouver Aquarium does not currently have a breeding program, said Deana Lancaster, Communication Manager for the Vancouver Aquarium, in an email. A breeding program suggests the facility intentionally mates the animals to produce offspring.

“Over the course of the 50 years that beluga whales were in our care, the whales engaged in normal, healthy mating behaviors,” Lancaster said. “Since 2005, the only two belugas at the Vancouver Aquarium were mother and daughter Aurora and Qila, so there was obviously no breeding.”

Even though a breeding program does not exist at the aquarium, Gary Charbonneau, a
A Vancouver citizen, was concerned about their claims regarding conservation and education after attending one of the park board’s public meetings on cetacean captivity in July, 2014. He was shocked at the lack of information on the cetaceans’ health, he said.

“Every single mother at the Vancouver Aquarium watched her baby die,” Charbonneau said. “Every single one.”

Charbonneau investigated the claims the Vancouver Aquarium was making and reported his findings in a documentary he titled, “Vancouver Aquarium Uncovered.” Less than 30 days after the documentary was published, the aquarium filed a lawsuit against Charbonneau, alleging copyright infringement. In March 2018, the aquarium dropped the lawsuit. He contacted Canada’s Accredited Zoos and Aquariums (CAZA) to ask how they could still be accredited despite the criticisms.

“That’s when I discovered they were essentially governing themselves,” Charbonneau said.

CAZA is a private charity organization committed to animal welfare, conservation, science and education, according to their website. They currently accredit 32 facilities, including three aquariums. The Vancouver Aquarium is the last CAZA-accredited facility to have cetaceans.

“We certainly do not question at all the standard of care that was being provided to any of the animals at the Vancouver Aquarium,” said Greg Terry, associate director of CAZA. “They are one of the most professionally-run facilities that I am aware of.”

After 25 years as the Executive Vice-President and Chief Operations Officer for the Vancouver Aquarium, Clint Wright became the President of CAZA for two years starting in 2015 until he was replaced by Gary Galloway, senior director of the Calgary Zoo.

“Around the world accreditation from organizations like these have meant little if anything in terms of the quality of the facility,” Marino said. “It’s a little like the fox watching the henhouse.”

Julie Woodyer, the campaigns director at Zoocheck, recently put together a report challenging the education and conservation claims made by the Vancouver Aquarium. These claims involve the value of conservation research the aquarium was doing—particularly with Aurora and Qila.

“We found that the education being provided at the aquarium could be done equally as well without live cetaceans,” Woodyer said. “Even if you want to play an educational role you don’t need to put whales and dolphins in tanks.”

As the Supreme Court reviews the park board’s bylaw, they’re also in the process of reviewing Bill S-203, which would end the captivity of whales and dolphins. This bill is in its third reading of the Senate as of April 2018.

After the death of Aurora and Qila, the Vancouver Aquarium became home to only one cetacean, Helen, a Pacific white-sided dolphin, who spends her days alone in the aquarium’s concrete tanks.

While these legal matters are proceeding, the park board will not comment on the matter or their relationship with the Vancouver Zoo and Aquarium. The Vancouver Zoo and Aquarium declined to comment directly on the issue of captive cetaceans.

LORIN LINDELL studies communication and public relations. She hopes to change the scope of the media in terms of environmental studies and science. She spends most of her free time outside loving the earth and enjoying the Pacific Northwest.

MATTHEW PEARSON is constantly seeking new horizons to explore and stories to share. He works closely with emotions in environments and strives to deliver compelling narratives through photography.

BELOW: The family lineage of Aurora, a beluga whale. All of her children (Qila, Tuvaq and Nala) and her one grandchild, Tiqa, were born and died in captivity.
A quick Google search of “Save the Bees” will churn out dozens of webpages from environmental organizations, and even t-shirts with the phrase printed across the chest. The fact that bees are disappearing is old news—the 2007 Status of Pollinators in North America report found that overall, bee populations were on a downward trend. Even Cheerios, the cereal brand, started a campaign called #BringBackTheBees using their iconic honey bee mascot. But while the commercialized honey bee is taking center stage in pollinator conservation efforts, some are turning their attention to a wild pollinator called the mason bee.
POLLINATORS ARE ESSENTIAL to the reproductive processes that allow plants to bear fruit, but the mason bee is facing declines. Twenty-seven percent of the species is at-risk in North America, according to a 2015 report by NatureServe, a nonprofit wildlife conservation organization. Dave Hunter, owner of Crown Bees, a native-bee supplier in Woodinville, Washington, is working to restore these populations by introducing them to agricultural systems.

An engineer by trade, Hunter always found himself wondering how things worked. When he noticed his friend had significantly more apples growing in their backyard than he did, he met the mason bee, a native bee to Washington state.

The mason bee looks and acts differently from its well-known cousin, the honey bee. Often mistaken for a common fly, the bee has a metallic green or dark blue back. Fortunately for Hunter, the bees are about as harmless as a fly, and are very unlikely to sting. Males don’t have a stinger at all.

Their smaller size allows them to crawl further into blossoms and deep into their nests. They burrow into holes in the sides of logs, down plant stems and in the ground, even in the gaps between rooftop shingles.

The notable thing about mason bees is they are effective in pollinating within a small range. A single mason bee can pollinate enough blossoms to yield almost five-and-a-half kilograms of cherries, whereas it would take 60 honey bees to complete the same job, Hunter said.

Mason bees face threats including habitat loss, pesticides and climate change, according to the 2015 report. Once Hunter learned about native bees, he began to make his garden a mason-bee haven. After much trial and error, he developed a shelter in wooden tubes so the mason bees could burrow and lay eggs.

Hunter said attempting to save the pollinators is important because without them, there would be no flowers to spread seeds, ultimately disrupting the balance throughout all ecosystems.

“Can we raise them in mass and release them before it’s too late?” Hunter said.

LUCY CARRELL is a student at Huxley College. She studies environmental education in hopes of fostering a positive relationship between people and the natural world.

NICK PINKHAM studies design and computer science. Before Western Washington University, he studied photography and design in Michigan. When he isn’t busy studying, he can usually be found out in the mountains.
“Kinder Morgan and any other corporate colonial project that seeks to go through and destroy our nation and land will be refused passage. We stand resolutely together against any and all threats to our people, our women, our two-spirits, our children, our lands, the wildlife, the salmon, the waterways.” — Secwepemc Women’s Declaration Against Kinder Morgan Man Camps, November 2017

Artwork and protest signs decorate Camp Cloud, an indigenous-led occupation camp outside of the Kinder Morgan facility in Burnaby, British Columbia. Protesters, including the members of the Secwepemc Nation, have occupied the site for more than five months. They are resisting the construction of the Trans Mountain oil pipeline expansion through indigenous territory.
IN 2013, energy company Kinder Morgan proposed the expansion of its existing pipeline through British Columbia, Alberta and the northwest corner of Washington state. The project would move thousands of laborers to man camps—temporary housing built along worksites. The pop-up camps create an influx of transient male workers in rural locations.

According to Kinder Morgan’s National Energy Board application, the Trans Mountain Pipeline expansion involves the addition of more than 980 kilometers of pipeline, which they estimate will bring up to 5,500 construction workers in October 2018 if the project is approved.

Proponents of the pipeline expansion are facing opposition from First Nations including the Tseleil-Waututh and Secwepemc First Nations, who are focusing their resistance to the pipeline on land rights and man camps.

Kanahu Manuel is a First Nations woman who is part of the Secwepemc Women’s Warrior Society, an indigenous rights advocacy group. Manuel said she is standing up to Kinder Morgan to preserve land rights and protect her people from the potential effects of man camps on their communities.

“We’re fighting for our lives, we’re fighting for our existence,” Manuel said. “We’re fighting for our land and liberation.”

Kinder Morgan’s proposal for housing workers includes five full-service man camps across British Columbia and Alberta. One of the proposed camps in Blue River, British Columbia, would house as many as 1,200 workers, more than quadrupling the existing population. In their declaration, the Secwepemc explicitly oppose the Blue River camp, claiming that it continues a colonial pattern of abuse against indigenous women.

In 1994, the U.S. passed the Violence Against Women Act, putting $1.6 billion toward prosecuting violent crimes against women. But until a 2013 amendment, tribal police had no jurisdiction in sexual violence cases involving non-native perpetrators. These perpetrators are responsible for 97 percent of reported violence against indigenous women, according to a 2016 study by the National Institute of Justice.

Reports of forcible rapes in North Dakota rose from 143 to 243 cases in the decade leading up to the 2012 peak of the Bakken oil boom, according to a study by the North Dakota Bureau of Criminal Investigation. Increased reports of domestic violence and sexual assault can’t be explained by population growth alone, according to a 2014 study of the impacts of the growing oil industry in North Dakota published by the U.S. Department of Justice.

Manuel said she has several female family members who worked in man camps as cooks and housekeepers. Men approached them daily but they were afraid to speak up because they couldn’t afford to lose their jobs, she said. “They’re not looking out for the best interest of indigenous people,” Manuel said about Kinder Morgan. “They’re not looking out for the best interest of the safety of women and girls in our communities.”

Bret Weber, a professor of social work at the University of North Dakota, said man camps are not the cesspool of violence people think. Weber started a project with another professor in 2012, studying man camps in North Dakota. “We tried to dress the part,” Weber said of their visits to the camps, “although we usually looked like university professors dressing up like oil workers.”

“We’re fighting for our lives, we’re fighting for our existence, we’re fighting for our community,” Manuel said. “We have no choice but to stand up and organize amongst our nations.”

Kanahu Manuel, Member of the Secwepemc Women’s Warrior Society

Weber said he interviewed hundreds of workers and their families. He described the sense of community the camps created, which was strongest in tent and RV camps but almost absent in the army-like camps where workers were constantly on the move.

Overall, Weber said his interactions at the camps were positive. He believes the hysteria around crime in man camps is fed by the ‘us versus them’ mentality, which creates mutual mistrust between the outsiders and the local communities.

Almost universally people were incredibly friendly,” Weber said. “They were lonely and ready to talk.”

Camp Cloud built a women’s shelter in front of Kinder Morgan’s gates in Burnaby to create a safe space for female-identifying activists. It’s a small wooden cabin among the tarps, tents and haphazard structures that line the road leading up to the facility.

Manuel said First Nations continue to have hope and fight for their men, women and children. Young women shouldn’t feel like they have to hide every time they see an industry truck full of male workers pull into the gas station—they should feel safe, she said.

“It is the people who are strong, who are going to be able to say, in the face of one thousand men, that we don’t want this man camp here,” Manuel said. “We have no choice but to stand up and organize amongst our nations.”

Ceona Koch studies environmental science and Spanish at WWU. She is committed to diversifying the environmental movement by fostering cross-cultural alliances and bringing awareness to environmental justice issues.

Hailey Hoffman studies visual journalism and Spanish. Originally from Las Vegas, she fell in love with the beauty of the Northwest and spends her free time hiking, skiing and exploring.
Gretchen Albrecht watched four barn swallows dart across the sky, cresting tree tops in a fighter-jet like formation. Albrecht is a raptor keeper at the Woodland Park Zoo in Seattle, Washington who has studied the barn swallows living there for 18 years.

“They’re very falcony,” Albrecht said as the barn swallows twisted and turned through the air, sunlight reflecting off their iridescent blue feathers. The awe hasn’t left her voice even after almost two decades of studying swallows.

“They’re beautiful little birds,” she said.
OVER THE PAST 14 years, Albrecht has noticed a significant drop in the number of barn swallows nesting at the zoo. In 2004, there were nine active swallow nests in the zoo’s Raptor Barn and 13 in the Cow Barn. This year, those numbers have dropped down to only two and three, respectively. Barn swallows are migratory birds, some flying over 17,000 kilometers to and from their northern breeding grounds every year. They nest in man-made structures each spring and have raised their young alongside humans for generations. Barn swallow populations have steadily declined around North America for the past 50 years. This has been a common trend for many aerial insectivores, birds that hunt and eat insects mid-flight. It is likely human activity, such as the destruction of habitat and climate change, has played a large role in causing these population declines.

“We have sites that were active for eight years of the study that don’t have barn swallows, they just didn’t come back,” Albrecht said.

Like Albrecht, George Clulow, an active member of the birding community in Vancouver, British Columbia, has witnessed the aerial insectivore population decline. This year, on one morning in mid-April, he counted about 75 swallows of two different species at Deer Lake in Vancouver.

“A typical morning at the same time of year, say 10 years ago, would have recorded 400 swallows of four or five different species,” Clulow said.

Barn swallows have a very close tie to people. The beams and ledges of man-made structures in Europe, North America and Asia have been used by swallows as nesting sites for thousands of years.

“They will live right in our midst. It’s like they don’t care we’re here,” Albrecht said. “Anybody can enjoy them. They just show you their whole life.”

Keith Hobson, a professor and researcher from Western University in Ontario, Canada, worked with Albrecht at the Woodland Park Zoo to study barn swallow migratory paths. Hobson explained that as weather events become more extreme and unpredictable due to climate change, swallows are more likely to encounter storms that could lead to starvation during their migration.

In the study, Albrecht and Hobson attached miniature light-sensitive geolocators, weighing half a jelly bean, to barn swallows, allowing them to track the birds throughout their migration. They found that these teacup-sized birds fly from Seattle to as far south as Panama, and from New Brunswick, Canada to as far south as Argentina.

Sections of these migration paths can involve 640-kilometer, non-stop flights over open water, twice the distance between Bellingham and Portland. With climate change, weather conditions in the barn swallows’ northern breeding grounds are no longer as predictable. They might arrive after their journey to comfortable spring weather, only to be hit with snow storms a few days later, Hobson said. These severe weather fluctuations hit swallows hard because aerial insects are their main food source and the bugs they eat don’t fly in the snow. Swallows may go dangerous amounts of time without eating as weather becomes increasingly unpredictable.

“They just have to hope that they can make it through the cold snaps. They really commit themselves. There’s no going back,” Hobson said.

In addition to facing unpredictable weather, barn swallows now face unpredictable nesting conditions in their breeding grounds. As agriculture in North America has shifted from small local farms to massive industrial operations, the old buildings barn swallows have nested in for years are being replaced with new uninhabitable ones, according to the 2012 State of Canada’s Birds report.

Albrecht explained barn swallows frequently return to the same nest year after year. They make their nests on small, flat surfaces in high places using mud, grass and feathers. The nests are sturdy and can be reused for as long as 15 years with the occasional touch-up. At the Woodland Park Zoo, nests could be

BELOW: Gretchen Albrecht retrieves a swallow from a mist net at the Woodland Park Zoo in Seattle, Washington. She has studied swallows for years to help identify any significant changes in the species.
seen all around the Raptor Barn. From high pipes running along the walls to the lights on the ceiling, examples of swallow construction skills were on display. Now, the majority of these nests are empty.

“Swallows, like all animals, are uniquely adapted perfectly to what they do best,” Hobson said.

Barn swallows migrate thousands of kilometers and feed almost exclusively on insects caught while flying. They have adapted to human impacts on the planet by nesting in buildings and adjusting to landscape change, Hobson said.

Clulow explained barn swallows and humans have a supportive relationship. The fields and structures made by humans have historically provided perfect hunting and nesting grounds for swallows. In return, barn swallows have provided insect reduction services for farmers and gardeners.

“There is a direct connection between the way birds act and the way humans act too, it’s very close,” Clulow said.

Barn swallows have ingrained themselves into human society, which makes them a very easy species for people to connect with. This opportunity to connect with the natural world is being lost as fewer barn swallows return each year to breed. According to the North American Breeding Bird Survey, in the past 40 years, barn swallow populations have declined by 50 percent in North America, and in British Columbia alone, populations have declined by 89 percent.

“It’s not just good enough anymore to worry about what happens in our backyard,” Hobson said.

Albrecht and her fellow raptor keepers at the zoo reminisce about the days when the nests in their barn were all occupied. Albrecht pointed to one nest on a light above her head, remembering the swallow who came back to it eight years in a row. She joked about the swallow drama her and her colleagues noticed, and laughed about the time a pair of swallows built a nest on a fire extinguisher because all the other nests were taken.

Perhaps Clulow put it best when describing the worth of barn swallows.

“They have an intrinsic value, just like a great work of art has an intrinsic value,” he said. “Yes, we can put a monetary value on a piece of art but when it’s hung in a museum for the appreciation of everyone, it has a value that is not simply measured by dollars.”

Sources: Hobson KA et al. (2015), PLOS ONE

A NAUTICAL APPROACH TAKES FLIGHT

Geolocators are tiny devices that can be attached to birds to track their migration routes day by day. Despite being a relatively new piece of technology, the scientists who use them rely on the timeless methods of seafaring navigators to see where these birds go.

1. First, a bird is captured and tagged by hand.

2. At twilight of every day, the geolocator records the time and ambient light levels to determine the angle of the sun.

3. The angle of the sun allows the researchers to calculate the length of the day and the time when the sun is at its highest point, giving the researchers the latitudinal and longitudinal coordinates of the bird’s location.

Swallows travel along these routes yearly to their breeding grounds and back.

Geolocator placement

Sources: Hobson KA et al. (2015), PLOS ONE

CHUCK TOOKEY is an environmental science and Spanish double major. He developed an interest in birds after a study abroad trip to Chile.

MATTHEW PEARSON is constantly seeking new horizons to explore and stories to share. He works closely with emotions in environments and strives to deliver compelling narratives through photography.

TOP: Swallow populations are steadily decreasing, but Burnaby Lake in British Columbia still provides habitat for hundreds of them.
MORAL CORAL

Take a look behind the scenes at the Seattle Aquarium and watch biologist Andy Sim and his team grow coral fragments into adult colonies. This propagation program is leading the way in sustainable coral collection within a network of public aquariums that exchange fragments in efforts to avoid removing coral from the wild.

NORMAN ROCKWELL studies industrial design at Western Washington University. His ideal day consists of listening to his record collection, working on projects, and taking a fat sauna.
“Science is not only a disciple of reason but, also, one of romance and passion.”

— STEPHEN HAWKING