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THE PLANET

THE GROWTH ISSUE | SPRING 2019



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Merrideth McDowell***DEAR READER,**

Perhaps an overused metaphor for personal growth, the transformation of the caterpillar to the butterfly is no less apt. Cozily tucked away, the caterpillar's tireless efforts pay off as it rests inside its cocoon. Protected from danger, the caterpillar dissolves before emerging, almost unrecognizable from its former self, as a delicate butterfly.

Even after turning into a glob of goo, butterflies retain their memories from life as a caterpillar and use that knowledge to inform their actions. While slightly less dramatic of a metamorphosis, people change significantly through their lives too. It can be so easy to stay safe inside our comfort zones, sheltered from unfamiliarity and the uncertainty of the future, but if we do not learn from our pasts and share that knowledge, the world will become a far less vibrant place.

We all experience growth at some point in our lives. It is an inescapable force of nature, for better or for worse. It can be encountered in a multitude of ways, from the intangible development of emotional maturity to the tangible cultivation of a plant, but no matter where we look, growth and the environment are almost always intertwined.

On every page of this magazine, you will be presented with stories of development and change. You will be enveloped by the actions one Leavenworth resident is taking to protect his home, and his town, from the ever increasing threat of wildfire. You will follow the Woodland Park Zoo's efforts to save an endangered turtle, and witness in the discovery of a new deadly fungus that their hard work may have spread. You will even experience the dark side of the anti-vaccination community in the face of recent measles outbreaks, and the consequences of leaving it all behind. And hopefully, you will learn from these stories.

This magazine is an encouragement to continue to face the constant changes that life challenges us with, to learn from our failures, to rely on one another, and to continue to grow.

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*This magazine was created on the land of the Lummi Nation and Nooksack Tribe.

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Just 20 years ago, geologist Myrl Beck's research on Mount Stuart uncovered evidence that could force geologists to rethink the way the tectonic formations of the Pacific Northwest were created. Now retired, his research is being carried on by Western Washington University geologist Bernie Housen.

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After 90 years of absence in Western Washington, the first pair of grey wolves, called the Diobsud Creek pack, have made their home on the west side of the Cascade Mountains. Scientists, local residents and state officials alike wonder what this reintroduction will mean for the ecosystems and people of the Pacific Northwest.

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In the city of Leavenworth, Washington fire is an increasingly familiar visitor, one which residents Ross Frank and John Callahan are working hard to prepare for.

ON THE COVER

Trying to make a butterfly stay still for a photograph is no easy task. Thankfully, the biology department at Western Washington University had several immobile specimens ready for a photoshoot. Looking through the viewfinder of my camera, I was immediately enthralled by the complexity and beautiful symmetry of the monarch's wings, a natural wonder I had never seen up-close before. Their wings are in fact made up of thousands of individual scales, overlapped like roofing shingles. *Lepidoptera*, the order of insects that includes moths and butterflies, directly translates to "scale wing."

PHOTO BY LEE DEUTSCH





PACKING UP THE BOXXES

STORY BY DAPHNE HULSE PHOTOS BY MERRIDETH MCDOWELL

About five miles east of downtown Ferndale, Washington, a gentle whir flows through the fields at Boxx Berry Farm. Mike Boxx navigates his striking orange four-wheeler along dirt paths. The jitney, as Boxx refers to it, hushes as it comes to a halt. Up ahead, treetops far in the distance meet the skyline. To his right lies a sea of sprawling green, and to his left are rows of lofty blueberry bushes taller than a man; their branches bear soft leaves and dusty pink buds.

There are no plump strawberries or lush blueberries ripe for the picking just yet. Although summer harvest is on the horizon, so too is the Boxx family's goodbye.

AFTER NEARLY 60 YEARS in the field, the Boxx family is preparing for their final year on the farm. On March 12, 2019, the farmers announced the land was for sale. Mike Boxx, the current co-owner, and his family made the decision to retire. Passing down ownership to the next generation is no longer a feasible option. Since the beginning, Boxx Berry Farm has fostered relationships with the local community, and their imprint on the people of Whatcom County will last long after their doors have closed.

The Boxx's have accumulated a grand total of 32 hectares of farmland throughout the years, but only 10 hectares are on the market. For two homes and multiple farm buildings, the family is asking \$2.1 million. For \$1 million more, buyers can purchase additional hectares of farmland. The property has piqued the interest of potential buyers.

"I don't know that money is as much of an issue as the workload," Mike Boxx said.

Between strawberries, corn, blueberries, flowers and nursery trees, these fields produce all colors of the rainbow. Such variety necessitates specialized planters, cultivators, rototillers and sprayers, Mike Boxx said. All must fit to the different needs of each plant. To get the most bang for their buck, the Boxx's invest in used equipment, and manually harvest crops. It is all hands on deck.

Lack of additional hands proved to be a major issue at the farm. Between food safety, water regulations and general farm management, there was a need for a full-time bookkeeper to document and organize the family's operation. The farming industry is riddled with obstacles, said Western Washington Professor Gigi Berardi, who studies food systems. Newcomers entering the agricultural sector will find the cost of land, financing and farm equipment can add



up quickly.

"Some people are turning to the community itself to see if they can borrow from community organizations," Berardi said.

When Bill and Charlene Boxx decided to hang up their hats in 2013, they distributed the land among their three sons. With retirement of Mike Boxx and his brothers close at hand, and their children opting for careers in other job sectors, passing on the farm is not an option. Mike Boxx's son may have been interested in running the farm, but he lacked the funds to buy out the land from his two uncles.

"The transition of generations is difficult," Mike Boxx said.

Boxx Berry Farm's presence extends beyond its home in Ferndale. Within the last decade the Bellingham Food Bank collected an average of more than 18 metric tons from the Boxx's each year. During one fruitful growing season, the Boxx's supplied more than 45 metric tons of produce to the bank. The sheer quantity the farm contributes is unparalleled in Whatcom

County, said Bellingham Food Bank Executive Director Mike Cohen.

"Farmers retire just like everyone else, but it will be sad to potentially lose that much donated produce," Cohen said, "and potentially lose relationships with a very generous and inspiring family."

The food bank collaborates with more than a dozen Whatcom County farmers through two methods. Either volunteer gleaners take the produce farmers have deemed unfit for sale, or the food bank purchases crops from the farmers at or below their wholesale price.

"I'll miss working with the food bank," Mike Boxx said. "That's always been fun."

The Boxx's also fostered a bond with Hagen Food Grocery Store. For more than 30 years, the farm has supplied berries and corn to the stores, said Brent Chambers, Assistant Sales Manager of Produce.

Counties in western Washington account for 43% of the state's farms but occupy only 7% of the farmland space, according to an article from the *Journal of Agroecology and Sustainable Food Systems*. On the west side of the state where berries are grown, production is dense and intensive, said Berardi.

The family's multigenerational homestead has been a piece of the community since 1960, when Mike Boxx was born. Newlyweds — and newly parents — Bill and Charlene Boxx first



OPPOSITE: Blueberries, raspberries and strawberries are all grown on the Boxx Berry Farm. After nearly 60 years in operation, the family farm will be closing its doors.

(Photo Courtesy of Hannah Gabrielson)
ABOVE: The farm offers fresh berries off-the-vine to the local community, and as far south as Seattle. U-Pick berries take place each summer.

LEFT: Mike Boxx, current co-owner of Boxx Berry Farm, is nearing retirement. He has spent the majority of his life on the farm and hopes it will continue to be a berry farm under new owners.

laid the framework for their business on an initial eight hectares. As more land became available over the next few decades, they jumped at opportunities to expand the farm. Although her roots trace back to a dairy farm in Whatcom County, Charlene Boxx said she never intended to live on a farm, much less marry a farmer. Their union was her change of heart.

“Seeing things grow is my delight,” Charlene Boxx said.

Bill and Charlene Boxx’s business began as a commercialized raspberry farm complete with machine harvesters, Mike Boxx said. In the 1980s, the Boxx’s experienced price fluctuations in the raspberry market. The family shifted away from commercial farming and toward a retail-oriented business in the 1990s to combat financial instability.

Diversification toward vegetables, flowers and confections meant they no longer depended solely on berry production. U-Pick, where customers harvest berries from the field themselves, became a business staple. People from across Whatcom County are welcome to visit the fields and shop at the farm’s store. Agritourism, bringing in visitors to experience agriculture, has become a fundamental feature of Boxx Berry Farm.

“People are more and more removed from agriculture,” Mike Boxx said. “They live in the city and they never get to go see a farm.”

Rows of blueberries, strawberries and raspberries comprise eight hectares this year. A small portion of land is dedicated to Charlene Boxx’s wedding bouquets, and six rows of cilantro, broccoli and cauliflower are nurtured by

the Bellingham Food Bank. The back of the farm features a hilly, wooded wedding venue. When it is not in use, U-Pick customers can enjoy the shade with their families.

The majority of raspberry farming in Washington state is concentrated in Whatcom County due to its coastal environment and favorable soil, according to a 2009 article from the International Journal of Fruit Science. At the Boxx Berry Farm soil is sandy – an advantage for the raspberry farmers. Excess water drains through the porous ground during the rainy off-season,

but it means the soil requires more water come summertime.

After they sell the farm, the Boxx family intends to remain in Whatcom County and enjoy a calmer lifestyle. Working alongside her children and watching the farm come alive, Charlene Boxx said, was the best part of the experience. The family hopes to see the next owner carry on the legacy of Boxx Berry Farm and continue to collaborate with the people of Whatcom County.

Mike Boxx said, “We take pride in what we’ve built here.” 🍓



ABOVE: Rows of raspberry bushes stand tall, as their blossoms start to show. In the coming months these bushes will be full of fresh berries to pick.

LEFT: Boxx Berry Farms provides a multitude of other products in their shop. This includes pies, sauces and flowers from Mike Boxx’s mother, Charlene Boxx.



DAPHNE HULSE is a Huxley College freshman studying environmental journalism. She is passionate about understanding the inner-workings of natural resource policy.

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LONG LIVE THE MONARCH

STORY BY QUESTEN INGRHAM PHOTOS BY LEE DEUTSCH

Along the coast of California in the town of Pismo Beach, halfway between San Francisco and Los Angeles, a tree shimmers and flashes vibrant orange as sunlight hits. Clusters of thousands of monarch butterflies cling to it like leaves. The monarchs are waiting for spring, so they can begin their migration back north. It's a journey that involves multiple generations and a thousand miles back to the Pacific Northwest. Despite the seeming ubiquity of the monarch butterfly, the numbers of the western population that go to California overwintering sites like Pismo Beach have dwindled.

SINCE 1997, THE XERCES SOCIETY for Invertebrate Conservation has organized volunteers every autumn to count the monarchs at known sites. In the first year, they counted over 1 million. Last year they counted fewer than 28,500.

"Everyone's very concerned about that number. It's unprecedented," said David James, an associate professor at Washington State University's Prosser campus. "It's obviously the lowest number ever recorded. There are some biologists that think it's at the level where they can't recover. I don't believe that."

Numbers have dropped low before, only to spring back above 100,000 the next year. This is, in part, why James remains somewhat hopeful.

"If I was a betting man, which I'm not, I wouldn't mind placing a bet that it would substantially recover. If it got to 50,000 or 100,000, that would be a substantial recovery." James said. "I don't think it's going to get any lower. If it does, that is really serious."

As the declining population hits a new low,

researchers and conservationists are trying to figure out ways to prevent the population's demise. Some groups, including the Xerces Society, petitioned in 2014 to protect the monarch under the Endangered Species Act. This June, the U.S. Fish and Wildlife Service, an agency in charge of protecting endangered species, is planning to announce its decision.

The causes for the decline are not completely understood. Scientists speculate the use of long-lasting neonicotinoid insecticides may have had ruinous effects on the population. While the effect of these insecticides have been shown to harm monarch caterpillars, how they affect adults and the population as a whole is still being researched. Some scientists think neonicotinoids are driving the decline in bees as well.

Another potential cause is growing use of herbicides, which began after the introduction of genetically-modified "Roundup Ready" crops. Herbicides are one reason milkweed, the plant that monarch caterpillars must feed and mature on, has declined. The Xerces Society is planning

ABOVE: A monarch alights on a plant in the Pacific Science Center in Seattle. Monarch butterfly larvae rely on one type of plant, milkweed, on which to eat and mature.

to study the level of pesticides found in milkweed this year said Emma Pelton, a conservation biologist and Western Monarch Lead for the Xerces Society.

The monarch's life is unusual among butterflies, said Ann Potter, a conservation biologist with the Washington Department of Fish and Wildlife who specializes in pollinators such as butterflies. In 1998, she aided in the rediscovery of the previously thought extinct island marble butterfly, native to the San Juan Islands.

"Very few species have a life history like the monarch that have this remarkable migration," Potter said.

The generation that hatches in southern British Columbia and eastern Washington develops there from late July through August, then migrates southward all the way to California.

They are called the super generation.

This generation can live up to nine months, as energy for sexual reproduction in the body is diverted for travel and stored in fat. At the start of spring, they begin to travel north and settle on milkweed to reproduce. It is the next two or three generations, which can only live up to six weeks, that return to the Northwest.

The monarch population west of the Rockies is much smaller than their eastern counterpart, whose migration to Mexico is measured in hectares rather than number, due to sheer size.

This makes getting the monarch listed as endangered challenging. No distinction is made between invertebrate populations under the act, Potter said. So when considering the western monarch population, the much larger eastern population will also be taken into account, a population which saw a 144% increase in 2018, according to the World Wildlife Fund. However, that increase does not reverse the significant declining trend in eastern monarch population size over the last 20 years.

Protection under the Endangered Species Act is one way for the overwintering sites in California to get much needed legal protections and active management, Pelton said. Pelton was at the count this past year and saw what she described as “the worst year anybody had seen.”

“If we can’t protect our overwintering sites from destruction, we can’t correctly manage them. We’re going to have a really uphill battle to reverse this trend,” Pelton said.

Another way to reverse the decline is for states to discourage the use of pesticides, Pelton said. “Planting milkweed makes everyone feel warm and fuzzy, but talking about changing

practices that are engrained and having hard conversations with our food supply and farmers—that can get a lot hairier.”

Neonicotinoids have been banned for outdoor use in the European Union.

“Ultimately, I think we can learn a lesson from them,” James said.

James, however, worries that listing the monarch as endangered could bring legal restrictions that might stifle citizen scientist participation. He relies on that for his annual rearing and tagging project. Since 2012, James has directed this project, conducted by inmates at the Washington State Penitentiary and by citizen scientists.

Volunteers raise the collected eggs, which increases the chance of the larvae making it to adulthood, according to James. When a released butterfly with a tag is found and reported to him, he logs and maps the data. A study from this effort was published June 2018, which demonstrated that monarchs in the Pacific Northwest migrate to California.

“Prior to that work, biologists assumed that all our monarchs flew for overwintering to California. No one had actually proved it through tagging,” James said.

There are exceptions to where some monarchs go. A portion of those released east of Walla Walla seem to make their way in the direction that eastern populations would take to Mexico, though few are ever recovered.

“That might contribute to reduced numbers in some years in California. I don’t think that that explains why we only had 28,000 last year though. There is obviously more going on than them choosing direction,” James said. Smoke

from wildfires along their path might affect their migration. He hopes to continue to explore these questions through his research.

Potter wrote a 2018 report which documented the integration of monarch conservation strategies into the state action plans of Idaho and Washington. As part of this effort, the Xerces Society contributed by developing an online interactive data tool called the Western Monarch Milkweed Mapper, which allows the public to report sightings of milkweed and monarchs to be collected for conservation research.

The Xerces Society and the U.S. Fish and Wildlife Service, meanwhile, are attempting to persuade land managers to stop spraying and mowing milkweed - which still occurs, even on public land, Potter said.

While conservationists and scientists are figuring out the best ways to reverse the monarch’s decline, they all agree that there is something special about the butterfly that resonates with people.

Pelton likes to think of the monarch as a “gateway” bug.

“Even if someone doesn’t really like insects, you probably like monarchs and you probably remember seeing one as a kid,” she said.

Potter speculates that the migration of monarchs is what captivates us humans, as we are another species with vast migrations.

“I think that story really catches us,” she said.

James was fascinated by the monarch from a young age. It was a very rare visitor to England, where he grew up. He ended up doing his PhD thesis on monarchs in Australia, where they can also be found.

“For a lot of people, it’s a part of their childhood memories. As soon as they realize it’s in danger and could disappear they suddenly realize, ‘Oh, I haven’t seen one for a while.’ They get very interested and want to do something about it,” James said.

In June, when the endangered species status of the monarch is expected to be announced, the grandchildren and great-grandchildren of the nearly 28,500 monarchs will be making their way into Washington, feeding, fluttering and reproducing until the migratory generation is born around August to start the journey southward all over again. 🦋



One theory for the monarch butterfly decline is their exposure to a type of pesticide called “neonicotinoids.” When a monarch butterfly lays their eggs on the milkweed plant, they are exposed to the pesticide.

QUESTEN INGRAM is a journalist who studies philosophy and anthropology. He is motivated by his childhood captivation of the natural world, which is under threat.

LEE DEUTSCH is a passionate landscape photographer and Huxley student at Western Washington University pursuing a degree in urban planning and sustainable development.



ANOTHER DAM STORY

STORY BY LIAM BATEMAN
PHOTOS BY LAVEE HESS

At the northern edge of Washington's Olympic Peninsula runs the Elwha River. Upstream, remnants of white cement are plastered against the dark, stone walls of the ravine. Further up the river, a set of imposing cement walls form lookouts on either side. Perched atop them, signs recount the history of the Elwha: the largest dam removal project in history. These are the former sites of the Elwha and Glines Canyon dams.



Due to the dam removal, much of the reservoir is gone and will continue to be studied, in hopes of the salmon population increasing.



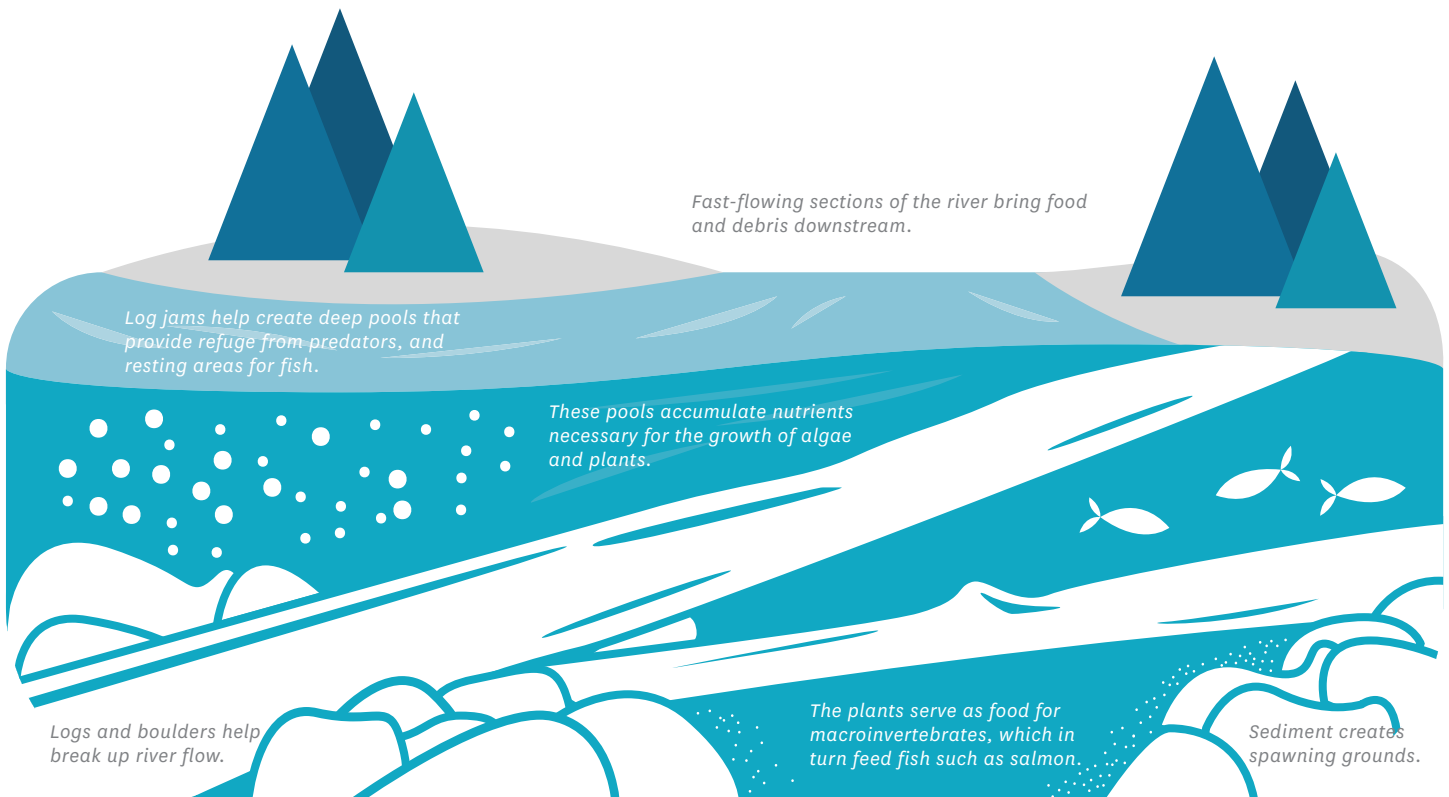
TOP: Rebecca Paradis, project biologist for the Lower Elwha Klallam tribe who studies lamprey in the Elwha River.

WITH DAM REMOVAL complete, the Elwha River is on the rebound from nearly a century of hydraulic congestion. Vegetation is returning to reservoir beds. Many species of migratory fish are swimming upstream once again. The river is in recovery, and scientists are working on restoration and taking notes along the way. Future dam removals may depend on the results of this historic project.

The Elwha and Glines Canyon dams were installed in the early 20th century to supply hydroelectric power to the surrounding towns. The dams helped fuel an economic boom for cities such as Port Angeles, but disturbed habitat for salmon and other species important to the Lower Elwha Klallam Tribe. After decades of political wrangling, the United States Congress passed the Elwha River Ecosystem and Fisheries Restoration Act in 1992, which legalized a plan to remove the dams. The project officially began in 2011, initiating a number of dramatic changes to the river. Now, five years after the completion of the project in 2014, the Elwha continues to morph. Nowhere is this more evident than at the mouth of the river.

“This has totally changed since I was out here a couple weeks ago,” Rebecca Paradis, a biologist for the Lower Elwha Klallam Tribe, shouted over the wind as she walked along the beach.

Anatomy of a Log Jam



In front of her, the Elwha flowed into the Salish Sea. Beach grass and willow saplings popped up between pieces of driftwood. Overhead, an eagle squabbed with a crowd of seagulls.

Newly deposited sediment and woody debris once trapped behind the dams have added 80 acres of new beach to this once rocky estuary, according to Paradis. This altered habitat has shifted which species live there. Birds such as thin-legged oystercatchers and fish, like the small, endangered eulachon, have found a suitable home in the marshy terrain.

Upstream, the river has been shifting as well. In the past few years it has meandered through a campground and cut out a road leading to the upper dam site. Paradis doesn't expect any more dramatic changes, but acknowledged there's no way to be sure.

"We have this kind of saying in our office," she said. "If it's the Elwha, expect the unexpected."

In addition to natural changes, organizations such as the National Parks Service and the Lower Elwha Klallam Tribe have engineered the ecosystem in some ways to speed up the restoration process. However, Mike McHenry, fisheries habitat manager for the tribe, hopes this intervention will be temporary.

"What we're trying to do is restore natural processes so that the rivers and their populations of wildlife maintain themselves," he said.

Much of this work has involved aiding the return of salmon and other migratory fish. This has been done in a few ways. Constructed log jams slow the water and vary the sediment size to create niches for different fish to spawn. The Klallam hatchery also breeds steelhead trout, chum and coho salmon to release into the river, in hopes they will return. Many other fish in the Elwha are anadromous. These fish are born in the river and then leave home to spend most of their adult lives finding food in the marine environment. Once they've matured, they return to

spawn the next generation. Dams, such as those once on the Elwha, pose a problem by blocking their migration.

Anadromous fish are vital to many river ecosystems because they bring enriched nutrients from the ocean to the river, allowing the nutrients to enter the food web and contribute to the health of plants and animals. If river nutrients are the packaged ramen of wildlife cuisine, then marine nutrients are beef bourguignon.

Scientists are using every trick in the book to monitor these fish populations. Researchers estimate fish numbers using everything from radio-tracking tags and sonar, to dawnning wetsuits and snorkeling up tributaries counting fish.

In Indian Creek, a tributary to the Elwha, Paradis worked with a team to check one of three screw traps the tribe operates. From the outside, these large metal contraptions look something akin to small space capsules. They rotate, squirt water in various directions, and funnel fish into a box where they are scooped out and examined by the team. Paradis dropped two nearly identical fry into a glass observation container. She identified one as chinook and the other as coho, and then dumped them back into the stream.

Eventually, the team pulled out a squat, brown fish with a wide mouth and spiny fins: a sculpin.

"I love sculpin," said Justin Stapleton, a natural resource technician for the tribe, as he picked up the fish to clip its tail fin. They do this with all the larger fish so they know if they catch them again.

"Are they your favorite, Justin?" teased Paradis.

"Yes," replied Stapleton with a grin.

So far, researchers have seen some encouraging signs of recovery. Most native fish species are returning to the river in greater numbers. In 2016, more than half of the coho that returned to the Elwha were



TOP: The Glines Canyon Dam was removed on September 17th, 2011. Scientists have found that recovery takes time when adjustments are made to the environment surrounding the area.



BOTTOM: Pacific lamprey like this parasitic larvae were negatively impacted by the building of the dams.

not from hatcheries. A 2017 study from the American Fisheries Society also suggests the return of fish will have positive impacts for wildlife, including birds such as the American dipper.

“Time will tell,” said Jeff Duda, a research ecologist with the U.S. Geological Survey, “There are people all over the world that have looked towards the Elwha with interest to see what the outcomes are going to be.”

Duda, like many scientists studying the river, views the Elwha dam removal as a large-scale experiment.

“Looking to apply not only how the dams were removed but how you kind of study and understand the ecosystem, the Elwha really has served kind of as a model for larger dam removal projects,” Duda said.

In 2018, 82 dams were removed across the U.S., and more removals are planned for the future. The Klamath River, which stretches from Southern Oregon to the northern coast of California, is the site of the largest imminent project, involving the removal of four large dams starting in 2020.

As dams continue to fall across the country, the Elwha River will likely remain a model of ecological and cultural resilience. McHenry is skeptical the river will ever be as it was before the dams, but he also feels good about the recovery.

“Can it be a productive, self-sustaining river, that allows the tribe to express at least some of its cultural treaty rights?” McHenry pondered, “Absolutely”. 🌊

LIAM BATEMAN was born and raised in the Pacific Northwest, and is currently pursuing a degree in environmental science in the Huxley College of the Environment at Western Washington University.

LAVEE HESS is a business and sustainability student who loves capturing beauty through photographing. She enjoys being outdoors and living life to the fullest.



New Zealand mud snails in a vial at the invasive species stop before boats are allowed to enter Lake Whatcom. They are small and able to rapidly clone, building up quickly in places like Lake Padden.

INVASION OF THE HABITAT SNATCHERS

STORY BY OLIVIA MARSH PHOTOS BY MERRIDETH MCDOWELL

A glaring yellow sign interrupts the otherwise soft hues of brown and green reflected in the ripples across Lake Padden. “ALERT!” it reads, warning any passerby of a threat that is barely the size of a grain of rice. It is one of two areas around the lake cordoned off from Bellingham residents to prevent the accidental spread of a tiny invader. This is not the first time New Zealand mud snails have staked a claim in waters that do not belong to them.

“It just takes one snail and you can have a whole new population,” said Teagan Ward, Aquatic Invasive Species (AIS) Program Coordinator for the City of Bellingham. Lifting a vial filled with all-female, self-cloning snails to eye-level, she jokingly acknowledges they sound like something from science fiction.

AQUATIC INVASIVE SPECIES are spreading across the Pacific Northwest threatening native organisms and inflicting billions of dollars in damages. They take advantage of unsuspecting fishers, boaters and animals to spread. Most of these invaders are impossible to get rid of. Last year, the Western Governors' Association released a list of the top 50 invasive species in the western United States. New Zealand mudsnails ranked third among aquatic organisms. On September 10, 2018, the Washington Department of Fish and Wildlife confirmed the presence of New Zealand mudsnails in Whatcom County.

Aquatic invasive species like New Zealand mudsnails, Eurasian watermilfoil, zebra mussels and quagga mussels are capable of disrupting the flow of energy in a food web. In a healthy ecosystem, aquatic plants float through the water taking in energy from the sun. This is breakfast for many of the species commuting the currents. Native invertebrates, such as snails, feed on these plants and become lunch for growing fish scouring the sediment bed of a lake floor.

New Zealand mudsnails are tough to incorporate into local food webs because of their strong defense against predators. They possess an operculum: a movable plate which allows them to completely seal themselves inside their shells and pass through digestive systems unharmed.

"They're sort of like empty calories for fish, that fish can fill up on but don't really digest," explained Mark Sytsma, emeritus professor of Environmental Science and Management at Portland State University.

BELOW: As boaters pull up to the invasive species station at Lake Whatcom, they are greeted with instructions and a team of inspectors. The station is equipped with tools for cleaning and inspecting many boats each day.

The tiny mudsnails out-compete native species for resources, quickly reaching densities greater than 300,000 snails per square meter. They can achieve these high densities due to their parthenogenetic nature, meaning the females can clone themselves to produce offspring.

New Zealand mudsnails made their first appearance in the United States in 1987, staking their claim on a stretch of Idaho's Snake River. The zebra mussel arrived a year later in the Great Lakes, followed a few years later by their cousin the quagga mussel. Eurasian watermilfoil was ahead of the game, having established in New York more than 100 years earlier. The list goes on.

Each intruder comes prepackaged with a unique set of threats to the habitats they invade, perhaps none more so than the zebra and quagga mussels. Washington is one of the places where these fingernail-sized mollusks have never been confirmed. Yet they are at the top of the list for many officials dealing with invasives. In the Columbia River Basin, there is an emergency response plan in case the mussels are found in any body of water. Similar to the mudsnails, the mussels can accumulate in high densities and glue themselves to surfaces with root-like appendages called byssal threads. This threatens infrastructure when the mussels enter and clog pipes — a concern in the Colorado River, where some populations are established.

The state of Washington has not been as lucky with other aquatic invasive species. Eurasian watermilfoil, number one on the Western Governors' Association list, has been growing in Lake Whatcom since the 1970s. This feathery-looking plant grows in mats across the surface of the lake, with its long stems weaving intricate patterns. It can deoxygenate water by limiting the amount of atmospheric oxygen that can reach the water's surface and dissolve into



ABOVE: Zebra and quagga mussels are spreading into Whatcom County. They grow rapidly and can easily damage boats and other aquatic equipment.

the lake. It can also displace native plant species and alter habitats, making them more suitable for other invasive species that follow them.

Since eradicating an invasive species is tricky, prevention is the primary goal. New Zealand mudsnails were discovered in Olympia's Capitol Lake in October of 2009. The Washington Department of Fish and Wildlife attempted to remove them by draining the lake and freezing out the snails by exposing them to the frigid air. However, the species persists.

"When I looked in the bucket and all the sand grains started moving, I realized it was just millions of New Zealand mudsnails," Sytsma said, recalling a sample discovered in the Columbia River Estuary, where the species has been present since 1996.

They have continued their migration northward, all the way to Whatcom County. Slips in defenses against intruders happen, but the Pacific Northwest region is taking steps to seal those gaps. An inspection station stopped a boat in



Montana last month carrying quagga mussels, according to Ward. That boat was destined for Bellingham.

Ward works at the forefront of prevention efforts implemented by the City of Bellingham to catch invasive species before they can infest places like Lake Whatcom, which supplies water to approximately 100,000 people. Inspectors run boat inspection stations around Whatcom County to look for any standing water harboring invasive species. As of 2018, they have conducted over 50,000 boat inspections and intercepted 2,000 because they risked spreading invasive organisms.

“The City of Bellingham is doing some great and really progressive work to prevent invasive species and also manage them,” said Justin Bush, the executive coordinator of the Wash-

ington State Invasive Species Council.

While similar inspection stations operating at the state and federal level have been established at borders between states, Bellingham’s stations are the first municipal program of their kind in Washington.

Ward is hopeful that prevention can be taken a step further with emerging techniques. Environmental DNA, or eDNA, is capable of picking up any cells or tissues in the water originating from invasive species. It was used after mudsnails were first detected in Lake Padden to measure their pervasiveness. Officials at Flathead Lake in Montana are trying to get eDNA set up to act as a smoke alarm for invasive species, according to Ward.

Ward and her team have been successful in keeping other unwanted visitors like zebra

and quagga mussels out of Whatcom County, but there is only so much they can do to monitor what is coming and going from these lakes. Preventing the spread of invasive species like the mudsnails relies largely on education outreach so the community can be aware of their own role. Without the means and awareness to combat the problem, aquatic invasive species can continue spreading across the United States.

Ward said, “We need the community’s help if we’re going to prevent their spread.” 🌱



ABOVE: Bellingham’s invasive species team is out rain or shine to shield Lake Whatcom from invasive species. From the Left: Tate Wilcox, Dylan Iverson, Jamie Halpin, Teagan Ward, Travis Kurtz and Rachel Wilkins.

RIGHT: Lake Padden has become the home of the invasive New Zealand mud snail. The mud snail can have a negative affect on native wildlife.

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HOLEY TURTLES!

STORY & PHOTOS BY MELODY KAZEL PHOTOS BY LAVEE HESS & MELODY KAZEL

Animal Keeper Stephanie Miller reaches into a black plastic tub and retrieves a turtle no bigger than the palm of her hand from beneath the water and brushes away a tangle of green leaves. The turtle, number A37, tucks its head inside its shell and fills the room with the smell of rotten broccoli. While this pungent defense mechanism is enough to make Miller scrunch her nose, it has no effect on the fungal threat these creatures currently face.



LEFT: A Western Pond Turtle that was hatched in September from the Woodland Park Zoo.

FOR THE PAST 30 years, the Woodland Park Zoo in Seattle, Washington has been working with partners to help save the endangered western pond turtle. The zoo began working to save this species by taking baby turtles from the wild and raising them in captivity, before releasing them when they are bigger and stand a better chance of surviving. At first the turtles numbered fewer than 350. Over the past three decades their numbers have increased to nearly 1,000 at six different sites in Washington. Threats including invasive bullfrogs have been completely removed in some areas. But bullfrogs are just one of many perils facing these turtles.

Since 2003 western pond turtles have fallen victim to a new threat: a fungus that slowly

eats away at their shells. In 2012 the fungus affected more than 30 percent of the turtles. Today this shell disease affects half of the turtles in Washington, said Jennifer Pramuk, an animal curator at the Woodland Park Zoo. The fungus is *Emydomyces testavorans*, which means “freshwater turtle shell devourer.”

It was named by University of Illinois grad student Dan Woodburn, who encountered the fungus while studying turtles for his master’s thesis. After attempting all the usual techniques for culturing fungi and failing, Woodburn ground up the shells of dead turtles and added that to the culture. The fungus fed off the shell remnants and began to grow. From there, he started mapping its DNA and realized it was a new species.

“It’s similar to the other reptile pathogens and the other reptile skin pathogens,” Woodburn said. “They all eat keratin. That’s what they’re designed to do.”

Keratin is the main component in turtle shells. The fungus feeds on the shell and causes, what Woodburn calls, the “swiss cheese” effect.

As the fungus destroys the shell, the turtle loses something more than just a protective covering. Turtle shells are responsible for helping regulate metabolism, making blood cells and storing calcium.

Because of its effects, the Washington Department of Fish and Wildlife (WDFW) views shell disease as a major threat to the western pond turtle. This led them to launch a study in 2013 to find ways to treat the disease, and to understand what causes it and how it harms the turtles. Katherine Haman, a veterinarian with the WDFW, is leading the research with help from Pramuk.

One of the theories to come out of Haman’s research is that time in captivity may be causing the disease. Haman explained they have ruled out the zoo’s capture and rearing program as the lone culprit, because they’ve found turtles with shell disease that haven’t been part of the zoo’s program. But the other diseased turtles had spent time in other captive breeding programs.

Before this theory was presented, the zoo kept its captive turtles in a much different environment.

Today, turtles at the Woodland Park Zoo are kept in tanks with water filtration systems designed to resemble their natural environment. The animal keepers drain the water and replace it once a month to prevent bad bacteria and turtle poop from piling up.

“These tanks used to be drop and fill, meaning this filtration wasn’t there,” Miller said. “We dropped the water out every day.”

“ A LOT OF PEOPLE SEEM TO THINK THAT TURTLE SHELLS ARE LIKE A PLATE OF ARMOR, BUT THEY’RE A REALLY DYNAMIC LIVING ORGAN, AND THEY’RE SENSITIVE ”

**- DAN WOODBURN,
UNIVERSITY OF ILLINOIS
GRADUATE STUDENT**



ABOVE: Emily Butler, Washington Department of Fish and Wildlife Assistant District biologist, inspecting western pond turtles for shell disease.



ABOVE: Western pond turtle is hatched at the Woodland Park Zoo. They are raised until they are big enough to avoid falling prey to invasive species, including bullfrogs.



ABOVE: Emily Butler, Washington Department of Fish and Wildlife Assistant District biologist, searching for western pond turtles that have signs of shell disease.

Over the next couple months Haman's research team will be working on a risk assessment study to see if human contact is causing shell disease. They will compare turtles who've spent time in captivity to those who haven't.

The Woodland Park Zoo and its partners are continuing their catch-and-release work to keep the population of western pond turtles viable while research is being conducted, Pramuk said.

Regardless of the possible consequences, the WDFW still views the zoo's project as a success. Even though this shell-devouring disease may be caused by contact with animal keepers, curators, college students and veterinarians during captivity, Haman said the zoo's efforts have still made a difference. When these reptiles were nearly extinct, the program brought their numbers back into the thousands, she said. Western pond turtles are the only native freshwater turtles in the Puget Sound region, and are one of two native freshwater turtles in all of Washington. They play a crucial role in their ecosystem by acting as a food source and controlling plant growth. Where western pond turtles are suffering, the watershed probably is too.

Since shell disease emerged, Haman and her team have been working daily to learn more about it so they can continue capturing and rearing in the right way.

Emily Butler, an assistant district biologist with the WDFW, is in charge of monitoring turtles for signs of shell disease. Every day during the spring, she walks down to a WDFW pond in Tacoma, wades into the muck, and checks the traps for turtles. Lifting up a hooped net, she reaches in and pulls turtles out. If they have a pink dot, meaning they've already been examined, she releases them into the water. If not, she carries them up the hill to her office to check for shell disease.

Signs of disease aren't always easy to spot. In the early stages, discoloration of the shell as well as shell flaking are faint. Butler often has to feel along the shell to check for any abnormalities such as soft spots or bumps. Turtles who have more severe shell disease show very obvious signs. There are deep cuts in the shells that make them look like rotting jack-o-lanterns or, at the worst stage of the disease, raw hamburger meat.

"You look at this turtle, and its shell is just completely riddled with holes and grossly remodeled in areas and you wonder how the turtles are even alive," Haman said.

While the wildlife agency has come up with a treatment method, turtles who have undergone it still bear scars of shell disease. Treatment is very invasive, explained Haman. Veterinarians surgically remove pieces of infected shell and fill the holes with putty and bone cement,

which are dental implements designed to help regrow bone. This leaves scars where the turtle's shells were cut apart and re-formed. Sometimes the veterinarians can't remove all of the lesions because the disease has penetrated the turtle's body cavity and found its way into their lungs.

"You can't really dig out lung tissue and have the animal survive," said Haman.

The WDFW won't know if treatment is effective for a long time because they have only been treating turtles since 2015. They repeat CT scans every year but with only five years of data, they don't have enough information to say whether or not treatment is working.

"A lot of people seem to think that turtle shells are like a plate of armor, but they're a really dynamic living organ, and they're sensitive," Woodburn said. "The turtles can feel everything. So be nice to turtles." 🐢

MELODY KAZEL studies journalism at Western Washington University; When she's not reading, talking, or dreaming about turtles she's trying to forget what pictures of advanced shell disease look like.

LAVEE HESS is a business and sustainability student who loves capturing beauty through photography. She enjoys being outdoors and living life to the fullest.



SHOTS FIRED

STORY BY **BECCA DUDEK** PHOTOS BY ISABEL LAY

ABOVE: Brooke Fotheringham, a former anti-vaccination advocate, has decided to become a pro-vaccination activist. She recently had to file her first report of possible terrorism to the FBI as a result of online threats.

It was after the birth of her first child that Brooke Fotheringham initially encountered the anti-vaccination community. Whispering in her ear, her trusted midwife attempted to persuade her out of vaccinating her son. Later, when she tried to catch her son up to his kindergarten shots, a philosophical exemption form signed by her naturopathic doctor was on the clinic's counter waiting for her without request.

“Just turn it in, it is easier this way,” Fotheringham recalls the receptionist telling her, when she stated she requested shots and not a form.

That's when Fotheringham started to wonder that the receptionist was trying to persuade her out of vaccinating her son. Little did she know that she would be joining the anti-vaccination ranks shortly after.

ANTI-VACCINATION ACTIVISM is growing with the age of the internet. With the recent measles outbreaks in Washington State reaching 72 cases, people are wondering why and how measles are returning after their eradication in the United States in 2000. This is not the first outbreak since then; another measles outbreak occurred from 2014 to 2015 in California. Among the 110 California patients, only 13 had received the Measles, Mumps, and Rubella (MMR) vaccine.

Now a prominent vaccination advocate, Fotheringham recalls her experience both inside and outside the anti-vaccination community. She works to educate those who are wary, and advocated for HB 1638, a bill that was signed into law with a partial veto by Governor Inslee on May 10th and eliminates the personal, or philosophical, exemption from the MMR vaccination.

Fotheringham, a Seattle resident, has two sons. She advocates for vaccinations by testifying on the floor of the Washington Legislature, and contributes to pro-vaccination websites and The Olympian newspaper.

She was raised in a family where nature was their religion. The message was: “it's not nice to fool mother nature,” she said. However, she was vaccinated growing up. Back then, Fotheringham said, her family didn't have issues with vaccinations.

Fotheringham joined the anti-vaccination community as a concerned parent after she Googled some of the potential risks associated with vaccinations. Her family naturopathic doctor convinced her to vaccinate later than the recommended CDC schedule, claiming it was safer, especially for MMR, said Fotheringham. She was able to avoid the vaccination by signing a personal exemption.

“That's a big loophole,” said Greg Anderson, a doctor at Bellingham

Bay Family Medicine. “To get into kindergarten, you need your kindergarten shots and people can just say ‘Oh, well I'm philosophically opposed to that.’”

When fewer people are vaccinated it compromises herd immunity. Unless a majority of people are vaccinated, those who are not vaccinated - whether for medical or personal reasons - are put at risk of contracting the disease. The World Health Organization recommends 95 percent of children be vaccinated against measles for herd immunity to be most effective.

Many of Anderson's patients question the vaccinations, whether from fear or possible misinformation.

Fotheringham's break with the anti-vaccination movement started when she found that papers cited by vaccine opponents didn't support the claims they were making. When she asked about these sources, Fotheringham said she was either kicked out of the forum, ignored, or attacked. Eventually she left the anti-vaccination movement altogether. Today, the energy she once put into opposing vaccinations now goes into promoting them. In the depths of the night, after her children have succumbed to slumber, with her face lit up by her laptop, she searches through anti-vaccination communities online to find those who are teetering between the anti- and pro-vaccination ideologies.

“Lately, and this will probably change, but for the last couple of years I've been doing one-at-a-time outreach, infiltrating anti-vaccination groups, and seeing who has questions like I used to,” Fotheringham said.

People in anti-vaccination communities aren't necessarily against science, said Fotheringham. Rather she thinks they have fallen for anti-science beliefs disguised as revolutionary scientific findings.

Many may think the community is just not exposed to science,



ABOVE: A vial of the measles, mumps and rubella vaccine. Measles are one of the most contagious diseases. If someone is exposed, nine out of ten people close to that person who aren't protected against the disease can contract measles.

which is false, said Matthew Hornsey, a professor at the University of Queensland who studies climate skepticism and anti-science beliefs.

"The other lazy stereotype is that they don't care about others," Hornsey said. "But for anti-vaxxers they're doing what they're doing because they do care about others; they care about the health of children, and they're concerned about what they see to be corruption in the medical industry."

When conversing with anti-vaccination communities on Facebook, Fotheringham regularly ran into people who connected the common MMR vaccination with autism. She also saw people connecting vaccinations to "gender confusion." When she sees these people's claims on the forums, she attempts to discuss the legitimacy of their sources.

"There's always been anti-vaxx elements in society," said Hornsey. "But their numbers were super-charged by the now discredited 1998 article by Andrew Wakefield linking the MMR vaccine with autism."

Wakefield's study is still used in the community today, said Fotheringham.

Lack of education does not contribute heavily to anti-vaccination attitudes, according to a 2018 study by Hornsey. Though there are some like Fotheringham, who didn't know how to correctly read a scientific article, Hornsey's study took conspiracy beliefs, disgust, resistance to conformity, and the cultural ideology of individualism and hierarchism into account.

The prick of a needle elicits screams from many children. The fear of needles follows many into their adulthood and these fears can develop into avoidance of vaccinations claimed Hornsey. A common conspiracy theory is that Big Pharma overstates the benefits and downplays the risks of vaccines. In many Western countries, there's a correlation between conspiracy beliefs and anti-vaccination attitudes, according to Hornsey's study.

Government control is a common concern cited by some opposed to HB 1638.

"This horrific bill just passed in [Washington] state," Ingri Cassel, the director of Vaccination Liberation for the state of Idaho, wrote in an email. "If parents are smart, they will force the state, administering MDs and schools to accept medical liability prior to complying with the MMR requirement for school in Fall 2019."

When informed about the theme for the publication, "Not sure what the vaccine issue has to do with growth," Cassel wrote. "Unless we are



ABOVE: A measles vaccine is prepared for a patient. This vaccine has decreased the number of measles cases found in the US by 99%

talking about the growth of fascism with the state claiming ownership of our bodies."

In some cases, Fotheringham's work has touched even on threats of violence. Some individuals expressed their explicit views on autism, claiming they wouldn't judge someone who killed their child if they had autism. Others made explicit threats against the government and vaccine research labs, which Fotheringham captured in screenshots and reported to the FBI before sharing them with The Planet.

"I wanna start getting together people that would actually use their guns before letting government and pharma have total control," reads one individual's comment on a Facebook group screenshot by Fotheringham. "I'm talking about people who are 100% ready for a Civil War. It's time to make connections and prepare."

In another Facebook group, when talking about bombing vaccination labs, one individual commented: "The best way to stop murder is to kill the offender isn't it!"

This isn't just the United States either. There are anti-vaccination communities all over the world. Seventeen states, including Washington, allow personal exemptions from vaccinations. After the measles outbreak in California, both California and Vermont passed legislation that eliminated personal exemptions. Washington is partially following suit as the bill only eliminates personal exemptions from the MMR vaccination.

Though the outbreak is alarming, on April 29th, 2019, Clark County, the state's outbreak hotspot, declared the measles outbreak over after no new cases in six weeks. But as of May 15, a rash of four new measles cases cropped up in Snohomish, Pierce and King counties.

Fotheringham has been travelling carefully since the recent measles outbreak.

"We drove through Clark County on the way to Portland a few weeks ago," Fotheringham said. "I was like 'Um, we're not stopping for any bathroom breaks here.'" 🚫

BECCA DUDEK is an environmental policy major with a minor in journalism. She's always had a knack for combining social and environmental issues and relating the two.

ISABEL LAY is a junior studying visual journalism and graphic design. When she's not outside taking photos, she's climbing, hiking, or kayaking.



GEOLOGIC FRICTION

ABOVE: Myrl Beck explains the specific type of tectonic plate movement that would be able to transport rocks long distances, a known phenomenon relevant to the Baja-B.C. hypothesis.

STORY BY MICHELLE MCDANIEL PHOTOS BY LEE DEUTSCH

Along Highway 2, near the town of Leavenworth, Washington, the base of Mount Stuart is speckled with quarter-sized holes where Western Washington University geologist Myrl Beck and his team drilled into the granite rock to collect samples.

Approximately twenty years ago, Beck, research associate Russ Burmester, and three graduate students were in a race to see who could collect the most rock samples in one day. They were conducting fieldwork in the North Cascades atop granite-rich Mount Stuart, accessible only by helicopter.

“We all worked our ass off. Russ and I beat them, and they had to buy the beer,” said Beck, now 86 years old and retired.

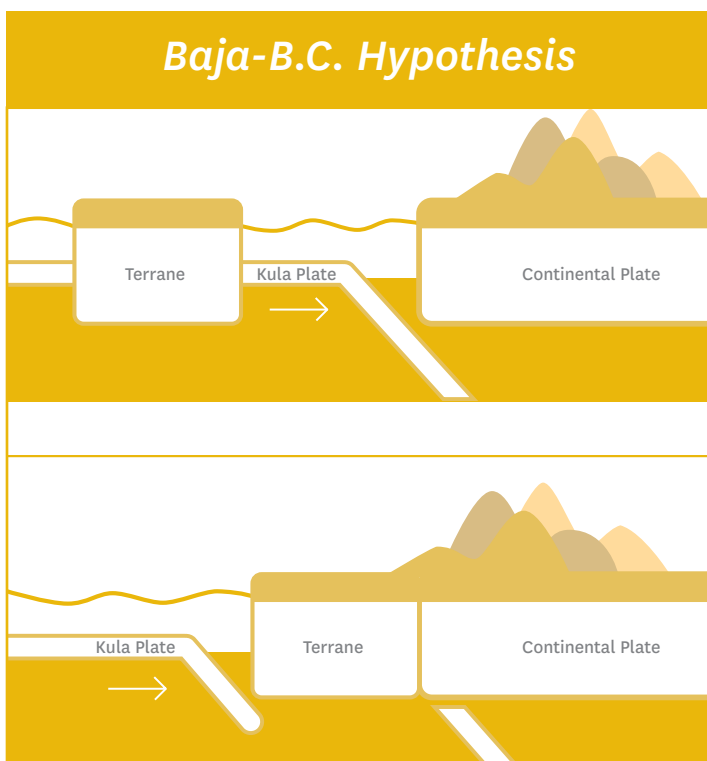
The Pacific Northwest Paleomagnetism Laboratory at Western Washington University houses the instruments used to determine the magnetic signature of a rock when it was formed. They are enclosed in a magnetically shielded room to make sure the Earth's magnetic field does not interfere with the studies.

BECK USED THE rock samples collected from Mount Stuart to support his controversial claim known as the Baja-British Columbia hypothesis. The hypothesis suggests the rocks that formed the mountain, and many others throughout the Pacific Northwest, gradually moved from Mexico to British Columbia over a span of 30 million years. His theory reshapes the geological history of the Pacific Northwest.

Beck, alongside geologist Edward Irving from the Geological Society of Canada, pioneered the hypothesis and coined its name. Geologists sometimes refer to them as 'paleo-magicians.'

On the mountain, Beck and his team were looking for paleomagnetic signatures in each rock. Paleomagnetism is like a geological passport stamp that can tell geologists where a rock originated based on its distance from the earth's poles. The stamp on the Mount Stuart rocks corresponded to a position much farther south. The Baja-BC hypothesis suggests they moved northward thousands of miles atop the ancient oceanic Kula Plate between 45 million and 75 million years ago.

The Kula Plate was formed deep under the Pacific Ocean, and moved north towards Alaska until it sank beneath the Earth's crust 40 million years ago. As it moved, the plate carried exotic rocks called terranes along with it, said Nick Zentner, a geologist at Central Washington University.



The Baja-B.C. hypothesis states that rocks like those found on Mt. Stuart originated in the South and traveled North. A terrane is a piece of exotic rock that is broken off and transported. The terrane rode the Kula plate and stopped when it ran into the continental plate. The terrane stopped moving, and the Kula plate subducted into the Earth's mantle.

Geological mapping conducted in 1978 by University of Washington geologist Darrel Cowan and a handful of graduate students sparked interest in the Baja-BC hypothesis. They discovered exotic rocks, like ribbon chert, at Deception Pass that originated from an unknown location. Cowan began to wonder where they came from, and thought they may have traveled from the south. Beck's research backed up that theory.

However, not everyone agrees with the Baja-BC hypothesis.

"If I had to vote for it, I probably wouldn't vote in favor of it," said retired Western Washington University geologist Ned Brown.

Brown thinks it's more likely the rocks in western Washington came from the east, and that vast geologic forces scrambled the ability to accurately read their magnetic signal.

"That area is tectonically active, the magnetism of the rocks could have been disrupted since it was first formed," said Brown. "It's also possible that the host rocks could have tilted themselves and re-crystallized."

Beck, on the other hand, thinks people who don't believe the Baja-B.C. hypothesis are relying entirely on coincidence.

"There's no reason why Mount Stuart being tilted would cause volcanic rocks in British Columbia to be magnetized incorrectly," said Beck.

Even if the rocks could have recrystallized, he believes that still doesn't explain their southern magnetic signature. He points to different types of rocks found in the Pacific Northwest that match the magnetic signal he found.

"It caught the attention of a lot of people, it was pretty negative attention because it's just human nature," said Beck, "You don't like to think that all your fundamental ideas about how something works are wrong."

For now, the jury is still out on whether the theory can be verified.

Bernie Housen, a geologist at Western Washington University, has continued Beck's Baja-BC research. He leads the Pacific Northwest Paleomagnetism Laboratory that was founded by Beck in 1970. Seemingly futuristic lab instruments, including a cryogenic magnetometer and a spinning magnetometer, are used to study the paleomagnetism of exotic rocks retrieved from the San Juan Islands.

"I don't think more geologic mapping in the Cascades, British Columbia, or Southeast Alaska will advance our thinking," said Cowan.

Exotic rocks may not be the only thing that moved with the Kula plate millions of years ago. In 2015, a tyrannosaurid dinosaur fossil was found partially embedded within an exotic rock formation in the San Juan Islands. It's quite possible this dinosaur dominated the lands of Mexico, and not the Pacific Northwest. 🦖

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THE DIOBSUD DUO

STORY BY JOE SHUGART

PHOTOS BY MERRIDETH MCDOWELL



“I was about 30 to 35 feet from him,” said Marvin Kempf, a landowner in Skagit County, Washington, as he pointed to the edge of his lawn where, two years prior, he pointed his camera at a wolf. The grass, long and dry in the photo, is cut now, and there are no wolves in sight. Looking out at the shaded forest above the fields of Kempf’s property, it’s easy to imagine a black, fluffy tail vanishing behind the towering cedars.

The wolf retreated further into the field, threw his head back and hollered, recalled Kempf. “Let her rip! It’s just incredible,” he said.

TOP: Shali, a female grey wolf at Wolf Haven International in Tenino Washington. Wolves have been absent from western Washington for nearly 90 years. (Photo Courtesy Hannah Gabrielson)



AFTER NEARLY 90 years of absence, wolves have finally returned to western Washington. Although there have been sporadic wolf sightings west of the Cascades for several years, circumstances took a turn late 2018 when scientists confirmed two wolves were traveling together, filling the criteria for an established wolf pack. One of those wolves was the one Kempf spotted on his Marblemount, Washington property. The pair, dubbed the Diobsud Creek pack, marked the beginning of potential wolf recovery in the region. Now, scientists are wondering how these wolves may alter the local ecosystem and deliberating policy for wolf management.

Western Washington is more affected by humans than any other wolf recovery area in the American west, said Chase Gunnell, Communications Director of Conservation Northwest. “It’s going to be something different than what we’ve seen in Northeast Washington or Yellowstone or Wyoming and nobody quite knows what that’s going to look like.”

Gray wolves were common throughout much of Washington before hunting, ranching, and farming by European-American settlers spread across the state in the 1800s. Wolves were deemed incompatible with livestock and seen as a nuisance. Through a combination of high prices for wolf hides, bounties, and government-sponsored predator control programs, they were believed to be completely eliminated from the state by the 1930s.

Only sporadic sightings occurred in the following decades until 2008, when the first pack in over 70 years was photographed in Okanogan County. Since then, Washington’s wolf population has grown at a rate of around 30% per year. Similar to population growth in Oregon and the Idaho-Montana-Wyoming region, this rate stems from available habitat, a suitable prey base, and adequate protection.

What constitutes ‘adequate’ protection for gray wolves in Washington remains a matter of intense debate. Conservation groups such as the Center for Biological Diversity argue that the state is killing

too many wolves. However, state killings can reduce wolf-livestock conflict in specific, chronic situations according to a 2018 Public Library of Science study. The Washington Department of Fish & Wildlife, which is responsible for counting and managing wolf populations, continues to search for common ground with conservationists, ranchers and landowners.

Whether for wolves or against them, the fact remains: in Washington state, an average of six wolves have died every year since their reintroduction. In the last two years alone, 26 wolves have been killed by human hands. As wolves begin to spread into western Washington, it’s unclear whether the controversy surrounding them will follow.

After sighting the wolf, Kempf made a number of calls. He soon learned that he wasn’t the only one surprised by the wolf’s appearance on human-populated land. Or, in this, case, his backyard. Within hours, members from the Skagit, Lummi, Swinomish, Snoqualmie, Sauk Suiattle, and Upper Skagit Tribes, as well as representatives from several state and federal wildlife agencies were on the property. By the end of the day, their vehicles filled the road, Kempf said.

Government wildlife representatives initially questioned the authenticity of the photographs, continued Kempf, adding that they asked him if he was sure the photo was taken on his property as they walked around with laptops in hand. Moments later, a friend of Kempf’s chimed in.

“If you want to see the wolf, there he is now walking across the field!” Kempf recalled his friend saying with a smile, followed by the rapid raising of cameras.

Kempf noted that perhaps there is something to learn now that wolves have come back, right to the doorstep of the Snoqualmie: the wolf people.

TOP: *The North Cascades offers vast stretches of protected lands for the wolves to re-occupy. Looking northwest from inside Kempf’s property, one can glimpse snow capped El Dorado Peak.*



Top: Marvin Kempf was a few meters away from the wolves in Skagit County. He holds a print of a wolf he has seen and on the right.

“[The Snoqualmie] people, when the wolf comes, there’s a few things that happen, and we’re starting to see that work. It pulls us together. Or it can be a war, right? A warning. But this is pulling us together.”

Robert Waddell, a biologist with the state Department of Fish and Wildlife, has been monitoring the male wolf of the Diobsud Creek pack since in 2017.

The wolf over here has been quiet with only a few chickens killed. Since then it hasn’t killed livestock, said Waddell.

“We caught it on camera once with a grouse in its mouth” said Waddell. “It’s probably been killing small prey.”

Currently, the Diobsud Creek pack’s range only occupies the heavily-forested region of Eastern Skagit and Whatcom counties, but as the wolf population spreads into the rest of western Washington, there is a wealth of open habitat for them to inhabit. But the presence of packs does not mean they will stay.

“These dispersing wolves can really travel a serious distance,” said Waddell, describing how one young wolf, born and collared in Northeastern Washington, made the trek all the way to Yellowstone National Park in Montana.


This dispersal is by no means a one-way street – Washington’s wolves could be making the opposite journey or could simply be trickling down from British Columbia.

The ecological effects of reintroduction are difficult to predict. Currently, the state Department of Fish and Wildlife is working on a several-year-long project in Eastern Washington monitoring collared wolves, cougars, mule deer, white-tailed deer, and elk. The project’s goal is to understand how the relationship between predators and prey are altered by factors such as species reintroduction. However, habitat west of the Cascades has thicker vegetation, providing prey with more escape cover than in the east. Due to this, the outcomes of predator reintroduction may be different in eastern Washington compared to western Washington.

Even in Yellowstone, where wolves were reintroduced as early as 1995, ecosystem studies indicate the effects of wolf predation on their primary prey, elk, range from substantial to quite modest. In western Washington, Waddell believes wolves could benefit elk herds suffering from hoof disease by weeding out diseased elk.

To further complicate the issue, wolves are listed as endangered under both federal and state law in the western Washington. This means if the state wildlife department coordinates with federal wildlife officials they will be able to trap and collar wolves, and investigate illegal killings. Otherwise state officials primarily use nonlethal deterrence and communication with local landowners to manage wolves.

Referring to his neighborhood community and its unexpected but welcome new residents, Kempf said simply,

“Things are coming back, they need to be protected.” 

JOE SHUGART, pursuing his interests in both the natural world and prose, will graduate in the Fall with a double major in environmental science and creative writing.

MERRIDETH MCDOWELL is double majoring in visual journalism and art history. She loves all opportunities to work with environmentalism and sustainability through photography, art and social media.



ON THE BACK BURNER

STORY BY NATE SANFORD

PHOTOS BY LAVEE HESS & HANNAH GABRIELSON

Leavenworth, Washington resident Ross Frank is no stranger to fire. Since moving to his nearly 60 hectare farm in 1978, he's seen dozens of wildfires burn through the valley on the eastern edge of the Cascade Mountains. In 1994, he was forced to evacuate as three massive plumes threatened to engulf his home. Fires are a natural part of life in Leavenworth, but in the past few decades, Frank has seen them grow in both scale and intensity. To live in this wildfire country, he says, the human population will have to adapt and learn to coexist with fire.

"It took us a hundred years plus to screw up the fire cycle and the fire regime, and it's going to take us at least that long to turn it back around" Frank said.

ACROSS THE AMERICAN West, wildfires are getting bigger and more frequent. The danger is especially high in rural communities like Leavenworth, where the odds of a single house catching fire is roughly one in a hundred — higher than any other community in Washington State according to a 2018 study by Pyrologix for the U.S. Forest Service. As the effects of climate change escalate, the fires are projected to get worse. Through local grassroots organizations, residents like Frank are trying to help people prepare themselves. But for many, the problem remains on the back burner.

Leavenworth is particularly vulnerable because of its unique geography, according to Corrine Hoffman, the director of the Chumstick Wildfire Stewardship Coalition (CWSC). The

mountainous slopes surrounding the town create a unique wind system that can carry fires for miles and switch directions at a moment's notice.

The isolated nature of Leavenworth also elevates risk.

"There's almost always just one way in and one way out," said Hoffman. "So if there is a fire at the mouth of your canyon, you're stuck. And that's a terrifying prospect."

John Callahan moved to a rustic house in one of these canyons eleven years ago. He takes fire safety very seriously.

Rows of evenly-spaced sprinklers capable of spraying 60 feet in any direction stand guard on his lawn. They are hooked up to a backup generator, which will only be used if he "really

wanted to get tough about it” he said. He keeps his grass trimmed to three inches, so it will burn out quickly in the event of a fire. Everything within five feet of his house is non-flammable. The only exception is a small decorative shrub, which he has been debating removing for some time.

The only trees on Callahan’s property are a row of aspens that protect the northern, more exposed side of his lawn. They contain high volumes of water and cellulose, which makes them particularly resistant to forest fires. His vents have been upgraded to be less than a third of a centimeter in diameter. If they were any larger, sparks could fly into his house.

According to Callahan, during fires, firefighters aren’t always able to devote resources to houses that aren’t properly defended.

“They’re gonna work a lot harder to save this place because I’ve tried and theoretically they haven’t,” he said. “The number one thing is you don’t want to risk lives, be it the firefighter or the property owner”.

Four years ago, a wildfire came within about twenty feet of Callahan’s home. An evacuation order was declared, but Callahan, feeling confident in his defenses, chose to stay and watch the fire burn.

“Sheltering in place is something that, for homeowners like [Callahan] who have done this work, is definitely an option,” said Hoffman. “For people who haven’t done the work, they’re taking a serious risk”.

Unfortunately, Callahan’s home is an outlier. Many of Callahan’s neighbors have wooden decks, overgrown lawns, and patches of trees encroaching on their homes.

Roughly 45 of the houses in Leavenworth are vacation homes, many of which are owned by people who come from areas like western Washington, where fire dangers are less well known, said Hoffman. To address this issue, the Chumstick coalition provides education through radio interviews, public meetings, direct mailings, and one-on-one contact. With this education, the coalition has been able to help some residents upgrade their property, but many others are either unwilling or unable.

“It’s not etched in their mind yet that this is a part of life, like taking the garbage out every Sunday for the pickup,” said Frank. “It’s not cultural yet.”

Many people either don’t care, or are

LEFT: Fires are natural part of life but in recent years the size and intensity of wildfires has increased in the Western United States. (Photo Courtesy of Hannah Gabrielson)

RIGHT: In 1994 and 2004, a small fire burned in the middle of the Chiwaukum Creek Trail, near Leavenworth, Washington.



simply too busy to protect their homes, said Hilary Lundgren, coordinator for the Washington Fire Adapted Communities Learning Network. For others, lack of money can be a significant factor. Removing fuels from a property is expensive. Clearing a single acre can cost between \$1,500 and \$2,000, according to Frank. The CWSC receives grants from several government organizations to help residents pay, but this is not always enough.

“In some areas, some people are struggling to keep a roof over their head and food on their table,” said Lundgren. “So, is it appropriate to ask them to work on their home when it might not be their priority?”

During the Eagle Creek Fire of 2013, Frank thought the sight of massive flames coming over the top of the valley would convince the whole town to start preparing. But by the next spring, only 10 to 15 percent of residents had responded to the CWSC’s efforts.

After that, his perspective changed. “It finally dawned on me, ‘Ross, quit arguing with bureaucrats, quit working with the national agencies, quit trying to roll the rock up the hill. Start going back to grassroots orientation and work at the micro level,’” Frank said.

Along with education and outreach, the CWSC also has a program, where for two weeks they will remove fuel sources from any landowner’s property for free. They also work on clearing forests in preparation for controlled burns, which they helped introduce to Washington in 2016. “We just keep chipping away, home by home, resident by resident, neighborhood by neighborhood,” said Frank.

On average, there are five times as many large fires in Washington than there were in the 1970s according to a 2016 Climate Central Study. The same study claims that in the next thirty years, things are only going to get worse. Many residents, like Frank and Callahan, have put in the work to properly prepare their homes, but many others haven’t.

“Mother nature is gonna have the last word,” said Frank, “and the last word around here is fire.” 🌲

NATE SANFORD is a journalism major at Western. He hopes to continue exploring environmental policy issues while also running and playing music in his free time.

LAVEE HESS is a business and sustainability student who loves capturing beauty through photography. She enjoys being outdoors and living life to the fullest.



John Callahan, homeowner in Leavenworth, Washington, is very protective over his home. Unlike many of his neighbors, he surrounds his home with a powerful sprinkler system to be able to prevent his house from burning.



Wildfires can have a huge impact on the ecology of an area. As demonstrated by this charred Douglas fir.

THE PLANET CLASS SPRING 2019



BACK ROW: *Joshua Diaz, Liam Bateman, Warren Cornwall, Cole Russom, Joe Shugart, Lavee Hess, Nate Sanford, Kaitlin Mainwaring, Lee Deutsh, Danielle Lambert, Daphne Hulse, Merrideth McDowell*

FRONT ROW: *Maddie Smith, Questen Inghram, Michelle McDanielle, Carly Stewart, Sophia Galvez, Isabel Lay, Olivia Marsh, Becca Dudek*

NOT PICTURED: *Melody Kazel, Jiarrel Michael, Rachel Jilek*

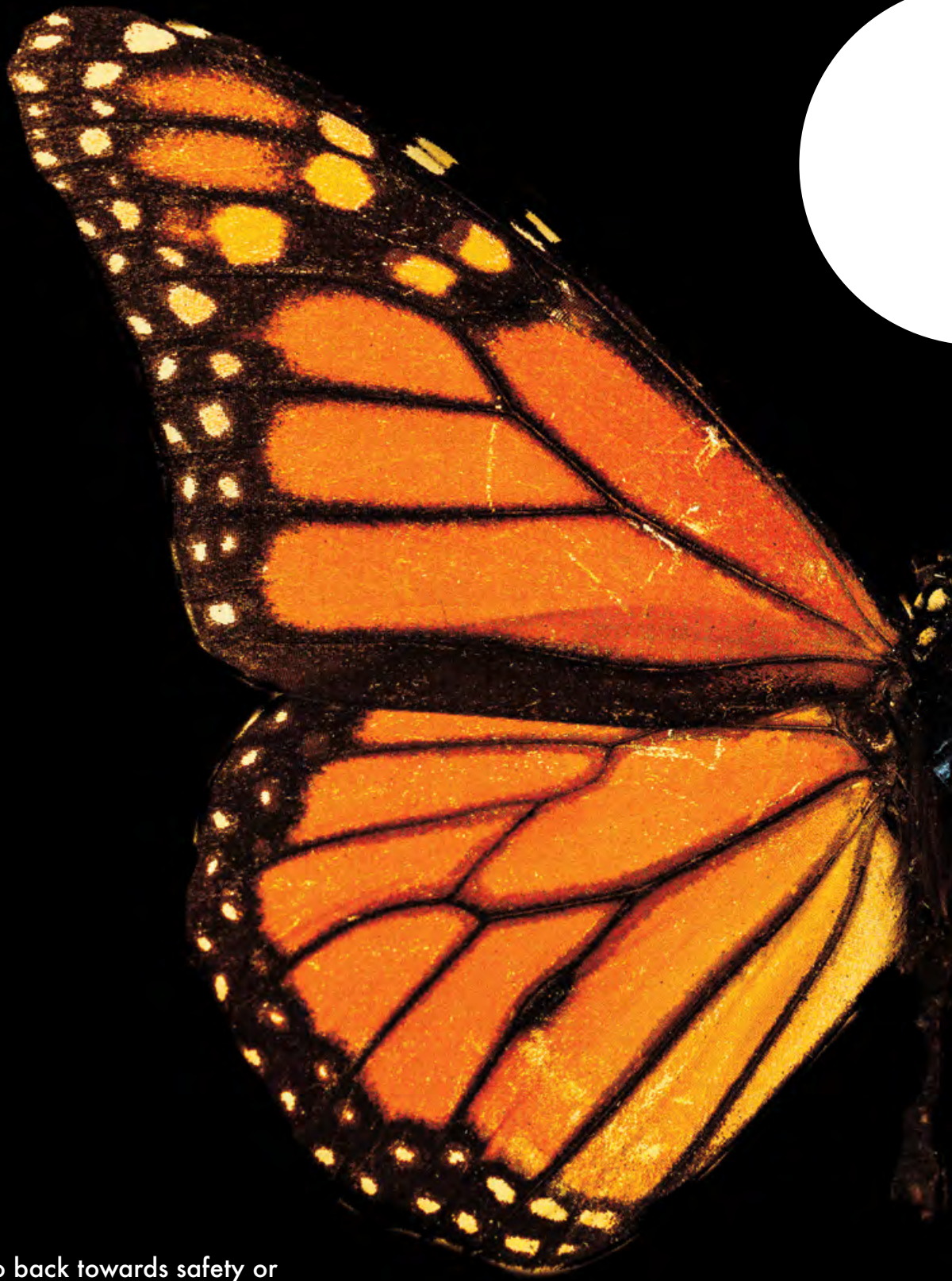
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"One can choose to go back towards safety or forward toward growth. Growth must be chosen again and again; fear must be overcome again and again" – Abraham Maslow