

Spring 2011

The Planet, 2011, Spring

Mitch Olsen

Western Washington University

Huxley College of the Environment, Western Washington University

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ANIMAL PLANET
SPRING 2011



EDITOR-IN-CHIEF*Mitch Olsen***EDITORS***Andrea Farrell
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Emmett Codd
Ray Flores
Marianne Graff
Elise Johnson
Cole Johnstone
Megan Jonas
Alana Linderoth
Samantha Oberholzer
Lisa Sulenes
Liza Weeks***PHOTOGRAPHERS***Crista Dougherty
Rachel Haemmerle
Jaynie Hancock
Lauren Owens
Brian Russell
Jordan Stead***COVER***A Northwestern Salamander,
Ambystoma gracil.
PHOTO: Jaynie Hancock***ADDRESS***The Planet
c/o Huxley College
Western Washington University
516 High Street, CF 220
Bellingham, WA 98225***CONTACT***(360) 650-3543
planet@wwu.edu***WEBSITE***http://planet.wwu.edu***BLOG***http://www.theplanetmag.blogspot.com***DEER READER,**

We devoted this edition of *The Planet* to animals because, well, we are a bunch of animals. Not just we – the editors – I mean we as mankind.

Although tamed by thousands of years of evolution and “civilized” society, just below our skin lurks a primal beast. An animal with profound abilities to communicate, love, hate, laugh, reproduce and destroy. We are a massive herd that crosses oceans, explores outer-space, conquers disease and occasionally blows each other up.

The term “human” tends to disconnect us from our animal roots. Often we lose sight of the role animals play in our lives, and at this point, coexistence requires devoted stewardship. Our purpose then is to bolster a deeper appreciation for our furry and feathered friends, because an investment in them is an investment in our selves.

Within these pages we explore animal consumption, controversy, population decline, protection, exploitation, transplanted and even landscaping. In some cases, human relationships with animals depend largely on their utility. Some creatures we defend to the bitter end, others go by the wayside.

But no matter how big or small, magnificent or pesky, cute or ferocious – the animal kingdom runs parallel and in sync with our own. Understanding their way of life is vital to assessing our own. Dogs remind us to play and love. The birds dared us to fly. Cats taught us to sleep in the sun. Simple animal wisdom is generally spot-on.

So if you’ve been neglecting your wild side and lost touch with the wonder of animals, take a few minutes to enjoy *The Animal Planet*. We had a lot of fun with this issue.

We appreciate your readership and welcome comments, suggestions and questions in the form of email, letters, conversation and high-fives.

Oh, and I almost forgot: Let the wild rumpus begin!

Thanks for reading,

Mitch Olsen
Editor-in-Chief

INSIDE ANIMAL PLANET



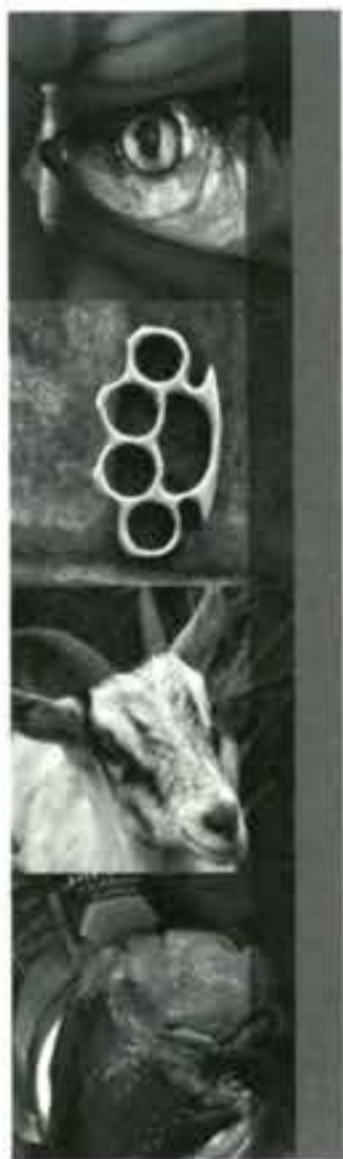
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Batches of freshly simmering crickets are prepared as part of a grilled teriyaki and pineapple dish.

STORY
EMMETT
CODD

//
PHOTOS
LAUREN
OWENS

A SAUTÉ PAN

full of grasshoppers sizzles on the stove. The intoxicating aroma of authentic Mexican cuisine floods the nostrils at La Carta De Oaxaca in Seattle's Ballard neighborhood. Stomachs gurgle in apprehension of a plate filled with bug-eyed creatures and crooked legs. The crunch is surprisingly sweet. Savory flavors of alfalfa, garlic, lime and chili spices explode across the tongue. Easily but eerily, they lightly tickle the throat going down the hatch.

The idea of eating bugs is enough to make many Americans cringe, gag, or vomit in disgust. But compared to beef or chicken, high nutritional values and drastically low environmental impacts could make eating insects a partial solution to environmental and world hunger crises. Surprisingly similar in taste to seafood and mushrooms, the creepy, crawling, flying insects that surround us can be far more appetizing than they look.

Despite their small size, insects have a place on this planet. It is estimated that more than 10 quintillion insects make up 80 percent of the world's species — about 144 million insects per person. Humans have been consuming more than 1,500 species of insects for thousands of years.

They are eaten in times of famine, harvested for medicinal uses and crushed for dyes and food colorings. Bugs are considered tasty delicacies in more than 113 countries and 3,000 ethnic groups, according to a recent UN publication on edible forest insects.

In Vietnam, Laos, Myanmar and Thailand, approximately 164 insect species are eaten.

Western Washington University senior Joy Pham grew up in Vietnam. She said her mom used to bring home yellow-brown worms, which she would cook in rice or fry on their own.

"They were very soft and smooth with an interesting taste. A little sweet," Pham said.

While not everyone in Vietnam eats bugs, Pham said it is less common in the cities because of other delicious Vietnamese food.

"If one day we don't have meat, I would rather eat bugs," Pham said. "Better to have something rich in protein than nothing."

Typically, American culture casts insects as pests, uses them as gimmicks in eating challenges or displays them as gross little buggers that make even distinguished cooks squeamish in the kitchen. No wonder people are hesitant to try them.

The movement is slow, but people are beginning to open up to the idea of insects as a sustainable food source and gourmet cuisine. We already eat bugs of the sea.

Crustaceans such as lobster, crab, and shrimp, are in the same Arthropod family as land insects. Despite their prevalence, early European settlers frowned upon eating lobster. Although abundant at the time, lobsters were generally reserved for slaves and indentured servants. It was not until the 1840s that these sea bugs became the socially accepted delicacies they are today.

But not all chefs are hesitant to cook with insects.

Bug chef David George Gordon said people are generally conservative about what they eat, and asking them to eat something new is an obstacle in itself.

"If you think about a culture that already has a bad attitude about bugs, asking people to eat them is a big hurdle, even if there is no rational reason behind it," Gordon said. "When I do my scorpion dish, it's breaded in cornmeal and kind of looks and tastes like a soft shell crab, so people don't really have a problem with it."

Along with the stigma of being dirty, eating a bug presents the challenge of eating a whole animal.

Cooking a live wax worm — head still on — may be difficult for some, but the process is similar to preparing a lobster.

"Insects are emblematic of a lot of foods that people gather from wild sources, which are really important parts to many people's diets in many parts of the world," said Western Fairhaven College ethnobotany professor John Tuxill.

Indigenous cultures have traditionally foraged for bugs. But in the U.S., wax worms, mealworms, cockroaches and other insects are commercially farmed for pet food and fishing bait. Just as large animals are selectively bred for human consumption, insects may also soon be reared for better nutritional values and taste. To ensure quality and lower costs, small-scale backyard farming may be one way to connect to these mini livestock.

Next time the opportunity arises, don't be afraid to try what innovative chefs are cooking. Be adventurous and explore making your own edible insect dishes to gross out or wow friends. If you are wary of eating bugs from a pet shop, buy some from an online distributor with a reputation for selling high-quality insects, such as San Diego Wax Worms.

If it is your first time cooking insects, avoid crickets. They smell putrid in the box and are expert escape artists. For the more experienced,

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**"IF ONE DAY WE
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crickets have an interesting crunch and tasty flavor — especially when simmered in soy sauce, skewered with pineapple chunks, grilled over charcoal coals, drizzled with teriyaki sauce and sprinkled with cilantro, chili flakes, scallions and sesame seeds.

Wax worms are much easier to handle.

"They are fatty, creamy and taste kind of like pine nuts," said edible bug spokesman David Gracer of Providence, R.I.

They do not get stuck in your teeth and make a great substitution for pine nuts in a zesty "pest"-o.

The world human population is already at 6.9 billion — expected to rise to 9 billion by 2050 — according to projections by the U.N. With an estimated 925 million people currently undernourished, this may be the perfect time to curb our cultural qualms and fry up some bugs. 🐛

EMMETT CODD is endlessly exploring the wilderness of the Pacific Northwest. He is graduating with a B.A. Fairhaven College Upside Down Degree in Culinary Arts.

LAUREN OWENS is a photographer, artist and environmentalist. She is creating a degree in environmental photojournalism.



IMAGES FROM TOP TO BOTTOM: Wax worm and stinging nettle pesto about to be ground by a food processor. Ingredients include wax worms, garlic, stinging nettle leaves, feta cheese, along with salt and pepper. | Grilled teriyaki glazed crickets are skewered with sweet pineapple. Crickets are 69.07 percent moisture and 3.2 percent fiber.

Roasted Wax Worm and Stinging Nettle Zesty "Pest"-O

INGREDIENTS

- 6 cups fresh nettle
- 3 garlic cloves
- 1/2 cup roasted wax worms
- 1/2 cup grated parmesan
- 1/3 cup extra virgin olive oil
- 1/2 lemon squeezed for juice
- Sea salt and ground pepper to taste

INSTRUCTIONS

Place about 1000 wax worms in a container with 1 cup of wheat bran or flax seed meal for 24 hours to purge digestive tracks. Place wax worms on a pan in an oven at 350 degrees for 20 minutes, or until crispy. Chill.

Wearing thick gloves, cut stinging nettle leaves with scissors into a pot of boiling water for 1 minute. Drain and chill. Place wax worms, blanched nettles, parmesan, olive oil, lemon juice, salt, and pepper into a food processor. Blend the mixture until the mixture is smooth, scraping down the side occasionally.

Place "Pest"-o into a clean container and pour a little olive oil over the top. Serve and enjoy!

A FISHY SITUATION

STORY ELISE JOHNSON | PHOTOS JORDAN STEAD



JUST PAST THE MURKY WAVES OF the tidelands lies a puzzling mystery. Here in the underwater foliage, the Cherry Point herring – once the mightiest herring stock in the Puget Sound – lay their eggs in dismal numbers.

Contrary to its counterparts throughout the state, the Cherry Point herring spawns in April, May and June instead of January and February. During the summer months, food is limited for predators such as salmon, seals, killer whales and surf scooters.

This places the Cherry Point herring in a crucial position in the area because several animals depend on them for survival.

“When you look at some of the endangered species that we have

locally, in particular the endangered Spring Chinook in the Nooksack River, at the time they return in the spring, the herring are a preferred food,” said North Sound Baykeeper Matt Krogh.

The herring’s important location in the food chain makes its decline all the more disturbing. According to the Department of Natural Resources (DNR), the amount of Cherry Point herring spawn decreased by 93 percent since studies began in 1973. Yet the cause remains a mystery.

Fish biologist Sam Wright said he is deeply concerned for the future of Cherry Point herring. He compared them to a group of Atlantic herring known as Icelandic spring-spawning herring, which went extinct in the 1970s.

Despite the vanishing population of herring at Cherry Point, herring from other stocks in Puget Sound can be bought as baitfish at sporting goods stores.

All of the suspects are contained within a complex system of cause and effect, making it nearly impossible to distinguish the root cause of the herring's decline.



"Their last resources survey before they went extinct had 700,000 adult spawners, and they went from 700,000 to zero," Wright said. While this species of herring was different from the kind found at Cherry Point, both species belong to a group known as forage fish that are sensitive to habitat changes.

Dr. Wayne Landis, Director of the Institute of Environmental Toxicology at Western Washington University, is working on solving the mystery of the Cherry Point herring decline.

Landis said the suspects in this disappearance case are changes in landscape from urbanization, cyclical oceanic warming and cooling, an increase in disease, and pollution from industry and agriculture.

Unfortunately, finding a culprit is never easy.

Landis and his colleagues conducted studies analyzing DNR data about the ages of the herring found in various locations around Puget Sound. Landis' analysis found the ages of the Cherry Point herring had decreased over time, which spells trouble for the population because spawning is done mostly by older

herring. The younger the herring, the less it can reproduce.

DNR data from other locations showed the entire Puget Sound herring population was also facing declines, although less serious than the Cherry Point stock. Further investigation determined the rate at which the population's age was decreasing, and Landis said he realized the Cherry Point herring population began decreasing in age in the 1970s when the DNR first started recording data.

Landis said this means the cause of the herring's decline existed before the 1970s and was occurring throughout the Sound, making it extremely difficult to determine the cause when it was happening so long ago and in such a broad area.

Herring fishing was a common activity throughout the Puget Sound and the Cherry Point area before the 1970s, and could be a possible cause for the initial decline. In the 1920s, fishing traps were built at Semiahmoo Bay and Point Whitehorn to catch herring as they came to shallower water to spawn.

They were devastatingly successful.

According to one of Landis' publications, fisheries in the Puget Sound area would catch an average of 800,000 pounds of herring per year between 1890 and 1935; these trap fisheries closed in the late 1930s. Two fisheries then opened in 1972 and 1988, which harvested herring eggs and damaged the population's ability to reproduce.

While the fishery could have contributed to the herring's decline in the 1970s, it was not the sole cause. The herring roe fisheries closed in 1980 and 1997, yet the population continues to shrink. According to a status review of the Cherry Point herring from the National Oceanic and Atmospheric Administration, it was unlikely the fishery harvests affected the decline in the 1990s.

Beyond over-fishing, another suspect in the case is the impact of industry, something Cherry Point is no stranger to. Its deep water is perfect for shipping ports, making it an attractive location for two oil refineries and an aluminum smelter.

The smelter was built in 1966, which fits into Landis' pre-1970



IMAGES FROM LEFT TO RIGHT: North Sound Baykeeper Matt Krogh works to protect local waters and the animals that inhabit them through actions with Re-Resources, a nonprofit environmental education organization founded in Bellingham in 1982. | An aerial view of the Cherry Point Marine Reserve looking north with Birch Bay just beyond the point. Herring populations in this area have been decreasing since scientists began recording populations in the 1970s. | Not all stocks of herring are in decline, and many other kinds can still be purchased at local sporting-goods stores.

herring decline hypothesis, but the herring decline cannot be solely attributed to the refineries because they were built in 1971.

Landis and his colleagues stated in a risk assessment paper that noise from vessel traffic, eelgrass habitat loss from pier construction and industrial pollution could be negatively affecting the herring population. However, a lack of data makes it difficult to directly connect industrial activity to the decrease in herring population.

"The industries say, and to a certain extent justifiably, that there is no concrete proof that they are causing the damage," Krogh said. "On the other hand, some people talk about it as a slow-speed oil spill because every year they have tens, or hundreds, or thousands of gallons of various kinds of crude or other pollutants discharged and [it is] the accumulation of that over time. Nobody has been testing it, nobody has been measuring it."

However, the severity of contaminants may not actually be as worrying as it first appeared.

"Cherry Point [herring] actually had lower contaminant concentrations than

the ones in other parts of Puget Sound," Landis said. "It's not clear why."

More direct research is necessary to determine exactly how the industries at Cherry Point are affecting herring decline, especially with plans for a new deepwater port.

Additionally, scientists are concerned that changes in local ocean temperatures are adversely affecting the Cherry Point herring. The ocean goes through normal cycles of warmer and cooler periods, known as the Pacific Decadal Oscillation. The warm periods of the cycle correlate with decreasing herring numbers, according to Landis' findings.

All of these suspects are part of a complex system of cause and effect, making it nearly impossible to distinguish the root cause of the Cherry Point herring's decline.

The evidence is conflicting and confusing in this mystery, revealing that the cause of the population decrease is anything but elementary.

"Just like if you were in a car or bicycle accident and you're all banged up, the thing that's causing you pain is probably the car accident," Landis said.

"That doesn't mean you don't have a cold, or some other disease too."

Landis compared the decline of the Cherry Point herring to a major pileup on the interstate. While working to find the major cause of the pileup, other contributing factors are lost in the mess of the crash.

"That doesn't mean nothing is happening," Landis said. "It just means we can't see it."

The case of the Cherry Point herring's decline will remain unsolved until further research is conducted — hopefully before time runs out. 🌱

ELISE JOHNSON is a freshman hoping to major in Environmental Science. She loves camping, ice cream and Bill Nye the Science Guy.

JORDAN STEAD is visual journalism major with an emphasis on photojournalism and an environmental studies minor through Huxley College.

JUSTICE IN THE WOODS

STORY RAY FLORES | PHOTOS CRISTA DOUGHERTY

Two fishermen troll Lake Samish on an early April morning.

HIS OFFICIAL TITLE IS FISH AND Wildlife Officer, but don't call him that. If you refer to him as anything other than the game warden he will send his friend Guido after you, and then you're in trouble.

Even though Officer Dave Jones prefers the traditional title of game warden, his roles in the community nominate him for many other labels: spokesman, educator, mole, interventionist and hunter are all appropriate for the man in charge of regulating Whatcom County's wild areas.

Riding with Jones in his tan F-150 pickup gives an idea of the vast scope of people and situations he encounters on any given day. The back seat of his truck is divided in two. One half is a plexiglass cage stained with eagle blood, where he puts offenders requiring jail time or the occasional injured wildlife. Four firearms, drug-testing kits, tranquilizer darts, night vision goggles and a plethora of other tools fill the other part of the game warden's truck, awaiting use in a job that is always changing.

"We aren't just Ranger Rick anymore," he said on a foggy morning while driving around Lake Samish looking for fishing violations.

For Jones, the most important tool in his truck is one he carries with him always: his communication skills.

"You've gotta know how to deal with people, and you have to be self-motivated," Jones said with what is left of his Boston accent. "If you

don't have those two things right there, you're just going to be an average everyday guy, and we don't have enough game wardens out here to have average guys."

Whether they are talking to a hunter carrying a shotgun, kids boozing in the woods or a drug addict under a bridge, Jones and his fellow wardens rely on superb communication for survival, safety and effectiveness.

But his job does not restrict his interaction to just criminals. Most of the hunters and anglers he comes across are legitimate, which allows him to forge relationships with people who share his interest in the outdoors. His job also has him working with other law enforcement agencies, wildlife scientists and the media.

Traditionally, the game warden has regulated big game and bird hunters, as well as fishers of inland waters. After a merger between fish and wildlife departments in 1994, game wardens started regulating marine anglers as well. And with the addition of general authority, Jones can deal with any other criminals he comes across. He supplements his time in the field with undercover work infiltrating poaching rings and black markets, a part of his job he is secretive about.

Jones said general authority can distract from his fish and wildlife duties, but it helps him be more efficient since he no longer has to wait or rely on the sheriff or state patrol.

The game warden encounters more than just hunters while





IMAGES FROM LEFT TO RIGHT: Officer Jones' truck is filled with gear he may need on any given day, including (seen here) night vision goggles, a tranquilizer gun, remote for an animatronic deer and a motion activated camera. | Tranquilization is an important step in preserving the safety of animals and humans when animals have to be transported. Fish and Wildlife Officers keep kits on hand, with a general formula that works on many large animals. | The back of Jones' truck offers a comprehensive snapshot of his duties as game warden.

“You can’t constantly be on point because almost everyone you’re dealing with has a gun.”

patrolling the woods, and sometimes has to use general authority. The MI4 Jones carries in the cab of his truck is for the meth labs and crackheads he comes across, although he said he has never used it. He has come across a few drug labs during his time as game warden, and said lesser drug violations and MIPs are more common.

When Jones is not busy busting poachers, drug addicts and woodland partiers, he spends his time educating the community by meeting with hunting clubs, talking to the press and fielding phone calls from sporting goods stores and other organizations. As an experienced hunter, Jones can offer tips on hunting technique and gear in addition to information on wildlife enforcement and hunting safety.

Keeping people aware of changing hunting regulations is a big part of Jones' job, he said. He often comes across hunters and fishers who claim to not know new rules and regulations, and it is up to Jones to decide whether they really do not know the rules or are maliciously breaking them. His most common educational opportunities present themselves in the field, but can easily cross into the realm of punishment if he thinks someone is trying to fool him. Most of the time

he is satisfied issuing a warning or citation, but occasionally he takes people to jail.

While some shadier hunters might not view the game warden favorably, most hunters recognize the importance of regulating fish and wildlife resources.

“It’s a niche that needs to be filled, without question,” said longtime bird hunter Les Hyatt, sipping a cup of black coffee. “There are people that will get greedy.”

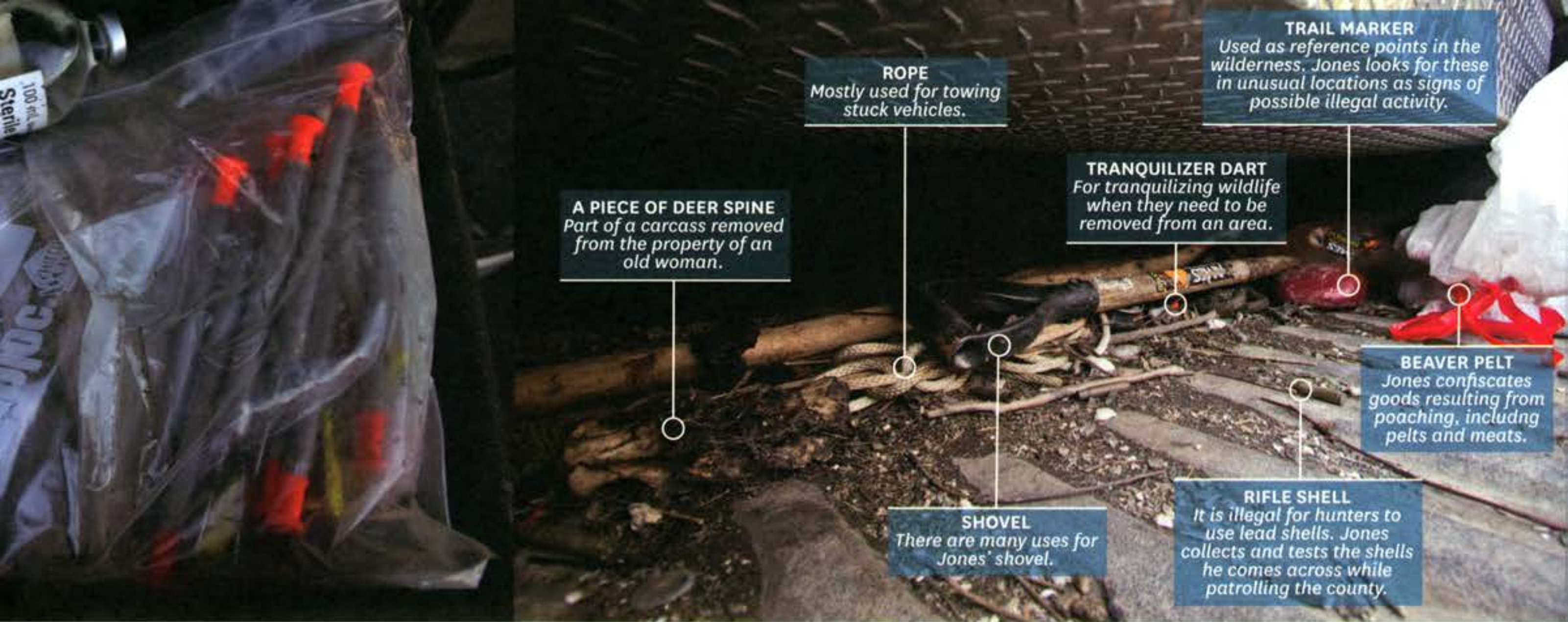
Hyatt said he thinks game wardens are an effective tool in regulating hunting resources.

Hyatt also recognizes the risk associated with law enforcement, especially being a game warden. “It’s not so bad here, but in some parts of the country being a game warden is a damn dangerous job,” he said.

Jones said he does not think much about the risks his job entails. He said to do so would be more detrimental to his health than any other associated risks.

“You can’t constantly be on point because almost everyone you’re dealing with has a gun,” he said. “If you did, you would always be worrying; you would die of an ulcer.”

Jones can only remember one time when a situation with armed individuals got sketchy. Several years ago, he



A PIECE OF DEER SPINE
Part of a carcass removed from the property of an old woman.

ROPE
Mostly used for towing stuck vehicles.

TRANQUILIZER DART
For tranquilizing wildlife when they need to be removed from an area.

TRAIL MARKER
Used as reference points in the wilderness. Jones looks for these in unusual locations as signs of possible illegal activity.

SHOVEL
There are many uses for Jones' shovel.

RIFLE SHELL
It is illegal for hunters to use lead shells. Jones collects and tests the shells he comes across while patrolling the county.

BEAVER PELT
Jones confiscates goods resulting from poaching, including pelts and meats.

encountered a group of hunters who had been drinking. He said that when he approached, they surrounded him and started using threatening language. A call for backup and some stern orders were all it took for Jones to diffuse the situation.

Busting meth labs and poachers contrasts sharply with the work Jones does alongside wildlife scientists and technicians, such as Washington Fish and Wildlife Technician Brad Otto.

On a sunny morning in April, Otto checked several wooden boxes around the Lake Terrel Wildlife Refuge near Ferndale, looking for ducks to tag and track. This is a man who, like Jones, loves being outdoors; eagerly climbing trees to reach duck boxes and tromping through marshy lakefront in knee-high waders looking for ducks and swans is his passion.

Communication between the enforcement and wildlife departments allows them to share information on the locations of certain species or individual animals. Also, Otto is able to provide Jones with valuable information on poaching and fishing, acting as an extra set of eyes in the huge swath of land Jones is responsible for.

Jones and one other game warden, Officer Ryan Valentine, are responsible for patrolling Whatcom County, which

is part of the area in Washington called Region 4 and also contains Skagit, Snohomish and King counties.

Before he was a game warden, Jones was a hunter. People think game wardens do not have time to hunt, but that is not true, Jones said. A game warden who does not partake in the resource he is regulating will have a hard time learning how people cheat the system.

The time, money and short season associated with big-game hunting prevents him from partaking in that activity. He said he has hunted deer and will occasionally participate in a muzzle-loading season, but when he hunts he usually goes for waterfowl and upland birds.

"I'm a fanatic; it's kind of a personal demon," he said. "When I'm done with my job, done spending time with my family and done hunting birds, the only thing I have time for is sleep."

"When I'm done with my job, done spending time with my family and done hunting birds, the only thing I have time for is sleep."

RAY FLORES is an environmental journalist who likes to write about people and spend time in the woods. He has been published in The Planet, Klipsun and The Western Front.

CRISTA DOUGHERTY is a Studio Art/Photography major and is hungry for knowledge.

GOATSCAPING

STORY COLE JOHNSTONE | PHOTOS RACHEL HAEMMERLE

ON A QUIET MORNING IN SEATTLE, in the backyard of a quaint, two-story house, magic is happening. Twenty-one bearded creatures are spread out across a steep bank, eating blackberry bushes in a fenced enclosure. Some goats are resting and grazing, but others are briskly exploring, hopping over trees and plunging into dense thickets, looking for tasty leaves and stems.

In the Pacific Northwest, non-indigenous Himalayan and Evergreen blackberry bushes grow out of control. Washingtonians have a long history of battling these plants with pesticides and large-scale machinery, but now an environmental alternative is available: *Capra aegagrus hircus*, the domestic goat.

Goats are gaining popularity across the country as a viable option for removing non-indigenous plants. An environmental alternative to gas-guzzling mowers and weed whackers, goats hardly impact soil and their climbing prowess allows them to scale near-vertical faces.

In the 1990s, firefighters in California used goats to remove undergrowth in wildfire country, and goat rentals quickly moved north to Washington state. Now, Seattle-based

businesses with 100 to 600 goats each are competing alongside fossil-fueled mulchers. Josh Farmer and Jill Johnson are the founders of "The Goat Lady," a large-scale goat rental business that regularly provides services for cities and private residential areas.

That morning in Seattle, Farmer was using his goats for a standard small-scale removal. Farmer cleared a perimeter and set up a low-voltage electric fence to ensure no goats escaped. On the steep slope, the goats were in full form.

For this project, the goat rental only cost \$650 for two days. In that time, the herd cleared 6,000 square feet.

In Washington, The Goat Lady is at the forefront of vegetation control. Farmer and his partner began their business with two goats and \$50. As a joke, they rented the goats out to a neighbor to clear his yard. Word spread, and within a few days, they bought 20 more goats to keep up with interested customers.

Farmer now has multiple franchises on the horizon, and the business has been featured in *The Wall Street Journal*. Farmer and Johnson are also in the process of filming a skit for "The Colbert Report."

One of The Goat Lady's largest customers, the City of Sammamish, hired the goats for \$7,000 to clear a 110-acre farm and turn it into a park. At the Arboretum in Lake Union, Farmer's goats were the only way to clear a nearly vertical slope. The job took them only 10 days.

Unfortunately, both goats and machinery have a hard time working during Washington's rainy winter and spring seasons; machines can get stuck in mud or leave large ruts, and goats often develop hoof infections.

Goats are not far behind machines in efficiency: one hundred goats can clear about half an acre of blackberries and Scotch broom per day.

But in dry, flat conditions, a single machine can do the work of a whole herd in half the time and at 10 percent of the cost, said Don Young, manager of Brush Wrangler LLC, a Marysville business that uses machines to clear vegetation.

Young said he is a fan of using goats when the situation calls for it, but thinks it is more cost-effective to use machines for plant removal.

"I understand it would be more ideal without fossil fuels," Young said. "But right now it's a great idea [to use machines]."



Young and his mulching tractor can remove 1 to 5 acres of English ivy, Blackberry bushes, and Scotch broom per day. Young said he would like to make the transition to green energy with biodiesel, biodegradable hydraulic fluid and new, less intrusive machinery — when it is not so expensive.

On the other hand, goat fuel is cheap. Farmer's 600 goats eat 5 tons of spent beer grain a week, a byproduct from the local Black Raven Brewery, which would otherwise go to a landfill. These animals also produce milk, and their manure can be used as fertilizer.

When compared to machines, goats are more adept at eliminating blackberries and their seeds from suburban environments. As fossil fuels increase in price, the backyard mower may soon be replaced with a grazing goat. 🐐

COLE JOHNSTONE is an environmental science major and is interested in chemistry and the great outdoors.

RACHEL HAEMMERLE enjoys spontaneous adventures and is a junior studying community based environmental education.

An environmental alternative to gas-guzzling mowers and weed wackers, goats hardly impact soil and their climbing prowess allows them to scale near-vertical faces.

IMAGES FROM LEFT TO RIGHT: Tammy Dunakin takes a moment to bond with her goats. | A "Goat Lady" goat reaching up to eat blackberry leaves. | Tammy Dunakin leads the herd into a new grazing area that needs to be cleared. | A goat poses for the camera while feeding on the lawn.



C102

Common Name

Phylum: Chordata

Class: Mammalia

Order: Artiodactyla

Family: Suidae

Genus: Sus

A pig fetus, found in a Western Washington University Biology lab, represents pig organs as the most common temporary substitute for patients waiting for a human donor. PHOTO: LAUREN OWENS

ORGANS ON DEMAND

STORY LISA SULENES | PHOTOS RACHEL HAEMMERLE & LAUREN OWENS

A PIG SLOWLY ROTATES OVER A BED of hot coals; fatty juices drip tantalizingly off the end of the spit. Bacon, pork chops, sausages and heaps of freshly sliced ham await. About a quarter of meat consumed in the United States comes from pigs, but cutting-edge medical research suggests that pigs are not just for dinner anymore.

Advances in transplant surgery first implemented in the 1950s have given people with organ failure and Type 1 diabetes an alternative to life support machines, insulin injections and death. In recent years a critical shortage of human donors developed, making life-saving transplants inaccessible to thousands of patients annually. The number of patients on the waitlist is more than three and a half times the number of available organs. On average, 18 people die each day waiting for an organ.

Researchers are turning to pigs for a solution. Genetically modified pig parts could provide life support for patients with organ failure or Type 1 diabetes. Cross species transplantation is called Xenotransplantation; although the name sounds like science fiction, it is a reality.

Pig insulin has been used by diabetics since the 1920s, and heart valves constructed partially from pig tissue have been available for more than 30 years. Although pig valve transplants are still available, synthetic human insulin produced in laboratories has since replaced pig insulin. Scientists

are now working to make pig parts into suitable replacements for failing human organs and a cure for Type 1 diabetes.

Dr. David K.C. Cooper, professor of surgery at the Thomas E. Starzl Transplantation Institute of the University of Pittsburgh, is leading a research project focused on transplanting insulin-producing cells, called islet cells, from pigs into diabetic monkeys, modeling potential human transplants. These pigs have both human and modified pig genes that help protect the pig parts from attack by the human immune system. Modifications include depleting pig genes that the human body recognizes as foreign.

Cooper's method requires pig cells be genetically modified, but a company in New Zealand, Living Cell Technologies, takes a different approach. Human bodies reject foreign cells to fight off infection and disease. Living Cell Technologies encloses pig cells inside a capsule to avoid rejection by transplant recipients. The capsule is the size of a sand grain and is studded with pores large enough for sugar and insulin to enter but too small for human immune cells. This way, the implanted pig cells are protected from the human body without the help of genetic modifications.

These encapsulated cells are currently in phase-two trials and are expected to become available to patients within the next couple of years.

Regardless of their specific preparations, transplanted pig cells

could not only change diabetics' lives, but for many, save them. Andrew Larson, a Western Washington University student, was diagnosed with Type 1 diabetes when he was 7 years old. Diabetes forced Larson to make drastic changes to his routine.

Diabetes prevents people from producing insulin, which breaks down food sugars in the blood. Despite careful monitoring, most diabetics experience highs and lows in their blood sugar levels, which can lead to life-threatening situations. Transplanted pig cells can produce insulin in response to blood sugar levels just like cells in healthy humans. Larson currently takes two types of insulin: Lantus, a long-acting insulin to keep his blood sugar steady all day; and NovoLog, a fast-acting insulin he injects whenever he eats.

If diabetics fail to monitor their blood sugar levels properly, there are dangerous consequences.

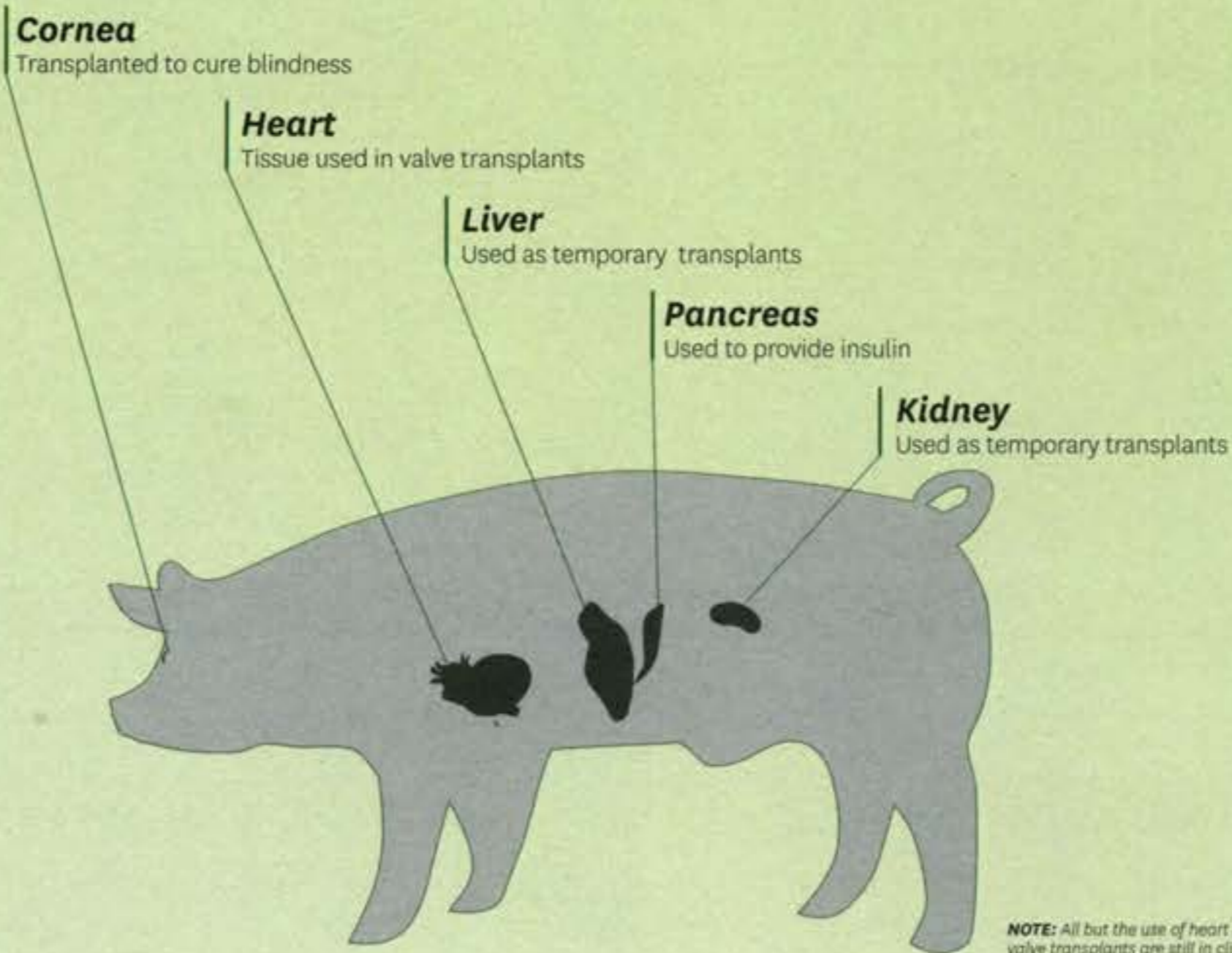
"You just feel sick. Picture yourself after a huge Thanksgiving dinner, full and groggy 24/7," Larson said, describing high blood sugar.

In addition to discomfort, high blood sugar can damage fragile blood vessels in the eyes, which can cause cell death and blindness; low blood sugar can cause seizures, coma or even death.

One morning last year, Larson awoke with blood sugar so low he found himself paralyzed. After what he said felt like 10 minutes, he managed to speed-dial his house, which alerted his mom downstairs.



PIG ORGANS AND THEIR USES



Size flexibility would allow doctors to match the size of the pig, and therefore its organs, to the size of the patient.

"It's the closest I've ever come to death," Larson said. "It could happen at any time if you mess up."

Larson said his diabetes constantly pervades his thoughts. A pig-cell transplant could release him from the disease.

Cooper's research demonstrates that pig organs can do the same for people with other diseases as well.

Cooper said his genetically modified pigs could eventually be used for whole organ transplants. These pigs are not quite ready to provide permanent transplants, but he said their organs could be used as a means of keeping patients alive while a suitable human donor is found.

In the United States, patients with kidney failure wait an average of three years for a human donor, according to the Organ Procurement and Transplantation Network website. The wait for pig organs would be much shorter.

Once a patient finds out his or her kidneys are failing, they could immediately receive a pig kidney, Cooper said. This would maintain better than dialysis until a human kidney becomes available, he said.

Having the option for a pig organ could particularly benefit those in need of a liver, for which there is no substitute mechanical device.

But why pigs? Non-human primates such as chimps and monkeys may seem like the obvious choice. These primates are our closest genetic relatives in the animal kingdom, but pigs make far superior transplant donors because chimp organs simply are not large enough for most adult humans.

Adult chimps weigh up to about 150 pounds and are only about 3 feet tall on average. Pigs, on the other hand, can range from a few pounds as piglets to almost 1,000 pounds as adults. This size flexibility would allow doctors to match the size of the pig, and therefore its organs, to the size of the patient. In addition, pigs can be large enough to provide diabetics with as many transplantable cells as two or three human donors are able to provide.

As chimps and other primates have never been domesticated, humans know very little about what viruses they carry. Conversely, pigs have been domesticated for hundreds of years, and we know exactly what viruses they carry.

People initially feared xenotransplantation from pigs would result in infection from porcine endogenous retrovirus in human recipients – a virus which resides dormant in all pig cells.

Cooper said primate test subjects who received pig cell or organ transplants have never tested positive for the presence of the virus, and there has been little evidence that the virus would become active and proliferate in humans.

Cooper said the human characteristics of chimpanzees and other primates invoke feelings of compassion, while people have grown accustomed to the slaughter of pigs. More than 113 million pigs are already raised and slaughtered in the United States each year for food, according to USDA annual livestock slaughter reports, suggesting people might be more accepting of killing pigs for their organs.

Pigs are also not subject to the same regulations as primates for medical research and use, which makes them more accessible.

Although pigs are better suited for xenotransplantation than primates, they still require numerous genetic modifications before they can be used as transplant donors. Cooper's research team uses pigs with modifications that help ensure the transplant is accepted. Pigs grown to provide cells for diabetics are equipped with modifications designed to specifically protect the insulin-producing islet cells.

These transgenic pigs will need to be raised in a controlled, sterile environment to prevent infection. Human organs cannot be as closely monitored, and Cooper said a tumor or infection will occasionally be accidentally transferred during human-to-human transplants.

Because of the controlled nature of this technology, pigs may eventually provide safer and more reliable organs to people in need of transplants. With the option for pig parts, patients could opt out of the burdensome treatments currently available and avoid the uncertainty of being on an organ waitlist.

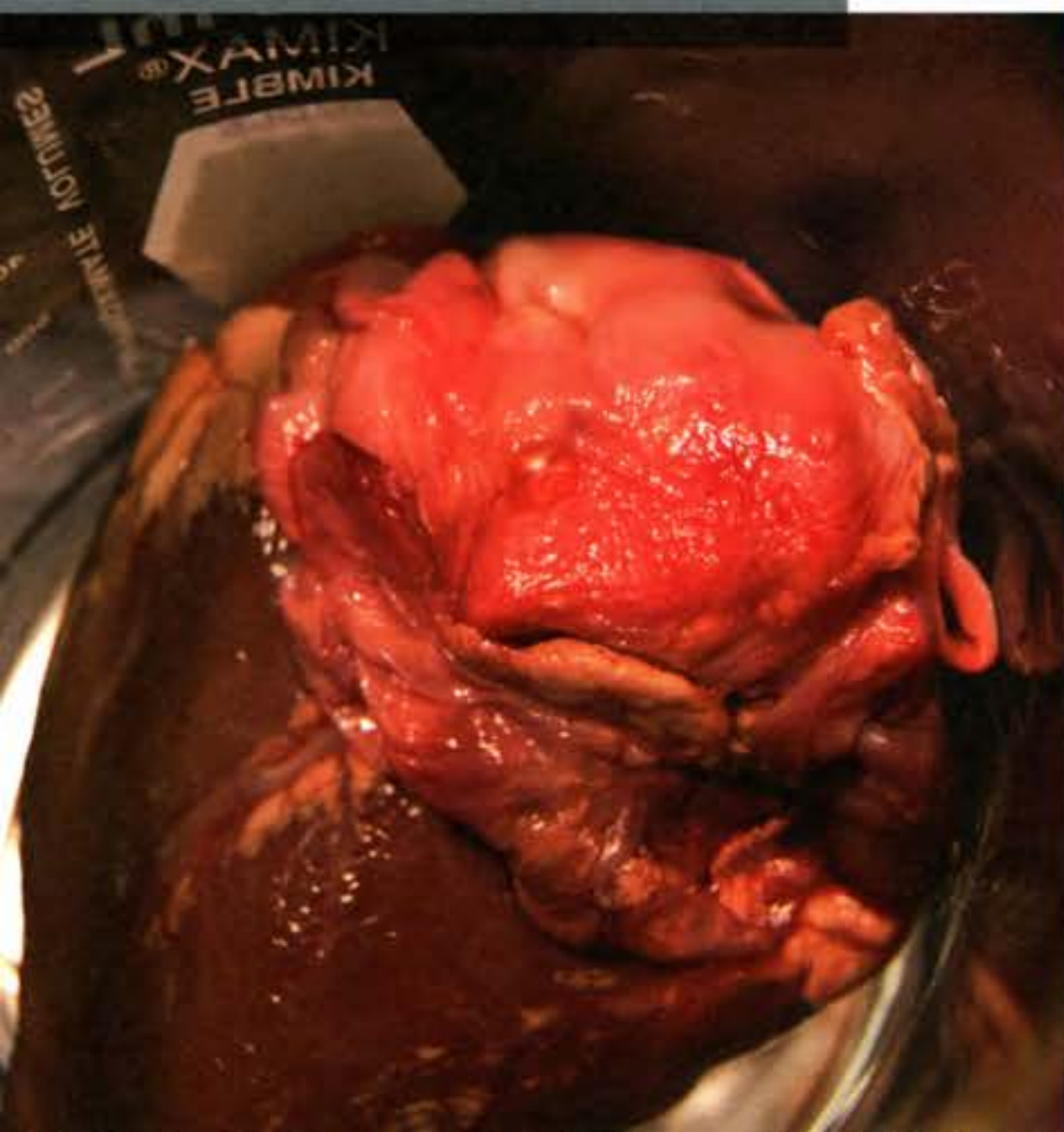
Pigs have long been a prominent food source for humans, but now, xenotransplantation is greatly expanding the utility of pigs, taking them from the dining room table to the operating room table. **E**


LISA SULENES is an environmental science major who adores park & rides, a perfect mix of bikes and besties.

RACHEL HAEMMERLE enjoys spontaneous adventures and is a junior studying community based environmental education.

The human characteristics of chimpanzees invoke compassion, while people have grown accustomed to the slaughter of pigs.

IMAGES FROM LEFT TO RIGHT: Andrew Larson draws insulin into a needle. | A pig heart sits in a beaker waiting to be examined. | Andrew Larson injects himself in the back of his left arm with a shot of insulin.





life after the lab

STORY MEGAN JONAS | PHOTOS JAYNIE HANCOCK

The smell of fresh straw infuses the air while Burrito lies on his side, his brown eyes gazing as if in a daydream. He and his hairy friends are relaxing now that the excitement of the lunchtime forage has passed. Chilly wind howls outside, but the enclosure is balmy. On a wooden platform, lips and tongues smack together as two females casually groom a third with their leathery-looking hands. A persistent, hollow thud comes from up in a corner, where a 34-year-old is pounding a troll doll against another toy.

This is a typical mellow afternoon for the seven residents of Chimpanzee Sanctuary Northwest in Cle Elum. But their days have not always been so carefree. For most of their lives, the apes now known as the "Cle Elum Seven" were held in desolate quarters and used for invasive biomedical research.

Kathleen Conlee, senior director for animal research issues with the Humane Society of the United States, estimates 1,000 chimps are currently being held throughout six U.S. laboratories, and 10 to 20 percent are being used for research at any time. The vast majority are being warehoused, waiting for the day they might be offered a proper retirement.

Chimpanzee Sanctuary Northwest, one of 10 U.S. sanctuaries for humans' closest relatives, has offered its chimps a space to heal from past trauma, discover greater freedom and relearn what it means to be chimpanzee.

About 500 chimps' lives could be transformed through sanctuaries if newly reintroduced legislation passes in Congress.

A Traumatic Past

At least two of the Cle Elum chimps were caught as infants in African jungles and brought to the U.S. for biomedical research, said Sarah Baeckler, the sanctuary's executive director. Wild chimpanzee importation was banned in the U.S. in 1977, one year after the U.S. Fish and Wildlife Service designated the chimpanzee as a threatened species under the Endangered Species Act and 13 years before the wild chimpanzee received endangered status.

Keith LaChappelle, who put his life's savings of more than \$200,000 into founding the sanctuary after reading an article in 2002 about chimpanzees waiting for sanctuary space, said some of the chimps were bred in labs to be used as research subjects.

"For all their lives, that's all they've known," LaChappelle said. Burrito, the group's only male, and Jamie, the boss, were used as pets and entertainers before they became too big to manage.

One way or another, by at least the early 1990s, the chimps became property of the Buckshire Corporation in Pennsylvania, which leases animals to labs. Baeckler said the chimps spent time at federal and private labs. This usually entailed being housed alone in a 5-by-5-by-7-foot steel cage with little to do.

LEFT: Annie relaxes after lunch at Chimpanzee Sanctuary Northwest in Cle Elum. Before the sanctuary, during her years in biomedical research, Annie had five babies: all of them were taken from her and also put into research. | **BELOW:** Foxy plays with toys after lunch in the corner of a platform at Chimpanzee Sanctuary Northwest in Cle Elum.



Some lab chimps have likely had 60 to 70 biopsies, which can decrease life expectancy.

The chimps were mainly used for hepatitis B vaccine safety testing. J.B. Mulcahy, the sanctuary's director of operations, said this involved inflicting liver trauma. Technicians routinely removed pieces of the liver to determine the vaccine's toxicity. Mulcahy said some lab chimps have likely had 60 to 70 biopsies, which can decrease life expectancy.

All of the females except Jamie also bred more captive chimps. Diana Goodrich, the sanctuary's director of outreach, said brief records indicate their babies were taken away immediately or within days after birth. Some mothers were even anesthetized and had their babies taken out of their wombs, Goodrich said. A moratorium is now in place on breeding government-owned chimps.

The demand for Buckshire's chimps eventually began to decrease. The Cle Elum Seven were warehoused for about a decade as they waited for a sanctuary, Goodrich said. They lived in a windowless basement and were given shredded newspaper to make nests.

Finally, a match was found. In June 2008, the new Cle Elum sanctuary run by graduates of Central Washington University's Primate Behavior program became a permanent home for the chimps.

A New Chapter Begins

It was not until the chimps arrived that Goodrich realized how terrible they looked. They resembled zombies with their atrophied muscles, sparse hair and pale skin, Baeckler said. Smart and dynamic Jamie had a large patch of hair missing from her belly. Out of boredom, Baeckler said, Jamie had plucked her own hairs.

"It was bare to the point where it looked like it had been waxed," she said.

The chimps were quiet as they took in their surroundings and did not display typical species behavior upon arrival, she said.

Soon, though, they started settling in. They began to play and make happy, healthy pant-hooting noises. She said it was the first time the chimps had caregivers focusing on the chimps' needs.

Each began to recover from past ordeals in his or her own way and time. Jamie, for the most part, stopped plucking right away. Many began building nests to sleep on out of blankets like chimpanzees do in the wild with tree branches. Jody has since built massive nests using up to 30 blankets, coiling them around herself and lying on top of them, LaChappelle said.

Foxie experienced one of the most compelling turnarounds, Baeckler said. Early on, Foxie was disinterested in people and enrichment objects.

Goodrich said Foxie's hair constantly stood up because she was on high alert. But Foxie's life changed in a matter of two months when a pink-haired plastic toy arrived.

As soon as Foxie saw the troll doll, she wanted it right away, Goodrich said. She cuddled it to her neck and carried it on her back like a baby. Baeckler said this adoption led Foxie out of her shell. She has since met hundreds more trolls, and she can often be seen knuckle-walking with a troll in one hand and another clenched in her opposable-toed foot.

Now approaching the shelter's third anniversary, the chimps continue to flourish. Negra, sweet-natured but withdrawn, usually prefers to be alone and covered with a blanket. Dr. Debra Durham, a senior research scientist and primatologist with the Physicians Committee for Responsible Medicine who has worked with the sanctuary to study chimpanzee trauma, said Negra showed symptoms of depression when she started living at the sanctuary.

Durham said this might have been an effect from when Negra was isolated from other chimps for a year when she was mistakenly thought to have an infectious disease. A follow-up survey with caretakers indicates Negra now exhibits fewer signs of depression. LaChappelle said she has recently become more active and interactive with the chimps.

"It's just a really beautiful thing—a real testament to what sanctuary can provide for these guys," LaChappelle said.





IMAGES FROM LEFT TO RIGHT: Jamie observes the volunteers around her at Chimpanzee Sanctuary Northwest. | Annie, left, plays with her good friend Missy on the catwalk of the playroom at Chimpanzee Sanctuary Northwest in Cle Elum. | This laboratory cage was used at Buckshire Corporation of Perkasi, Penn., where the seven chimpanzees were originally housed in a windowless basement. | During her years in biomedical research before she came to the sanctuary, all five of Foxy's babies were taken from her, including a set of twins. At the sanctuary, she has adopted a troll doll to care for.

“The chimpanzee is a poor model for illness research, and the vast majority of federally owned chimps are wasting away in government laboratories.”

The Future of the Seven

Baekler said the hardest part of her job is knowing the sanctuary cannot truly meet the chimps' needs because they do not belong in captivity. Durham said chimps who have only known captivity would not know how to survive if released in the wild. Coupled with the medical conditions they have been given in labs, it is not realistic.

Although the lives of the Cle Elum Seven are not ideal, they continue to improve.

The nonprofit has the funds to convert two acres of tree-lined sloped grass into a space for the chimpanzees complete with a bamboo garden and raised platforms. The chimps' current outdoor space is 20 by 30 feet and has a roof on for much of the year. LaChappelle said the electric-fence design of “Young's Hill” will be the first of its kind in the U.S. He said when the space opens at summer's end, it will be the first time many of the chimps will see the sky without a barrier and feel grass under their feet. Baekler said the hill will make an incredible difference because it will more closely mirror what chimps need: tons of space to run every day.

The Future of the Rest

A bill reintroduced in Congress in April could give many lab chimps a similar recovery. Washington Sen. Maria Cantwell is the lead sponsor in the Senate and Rep. Dave Reichert is a cosponsor of legislation called the Great Ape Protection and Cost Savings Act. The bill seeks to phase out invasive research on chimpanzees within three years and retire government-owned chimps to sanctuaries. Conlee said Chimpanzee Sanctuary Northwest is one reason Cantwell is so supportive.

“The chimpanzee is a poor model for illness research, and the vast majority of the 500 federally owned chimpanzees are just wasting away in research laboratories, resulting in millions of dollars of wasteful government spending,” Cantwell said in a statement.

Although chimpanzee and human DNA is 96 to 99 percent identical, whether chimps are useful for human disease research is still debatable. Worldwide, the scientific community is becoming hesitant to inflict a lifetime of trauma on chimps without significant, tangible results. Only one chimp out of hundreds infected with HIV in the '80s and '90s developed

and died from an AIDS-like disease. Conlee said scientists are noticing this pattern with hepatitis C, which is the current research focus. With advances in scientific research, alternatives such as biological samples often make for a better and less ethically controversial method.

The Humane Society of the United States is the lead organization pushing for the bill. Conlee said she feels confident it will pass by 2014 at the latest.

Durham said the U.S. and Gabon are the only confirmed nations still using chimpanzees for invasive research. She believes the legislators who have taken on the bill will see it through.

“I think we will see it pass, and I believe it's time,” Durham said. “We've waited until the last minute as it is.”

MEGAN JONAS is graduating this quarter with a news-editorial journalism degree. She is fascinated by the similarities between humans and other great apes.

JAYNIE HANCOCK is a visual journalism major with a concentration in environmental studies and the Arabic language.

COLD-BLOODED KILLER

STORY ALANA LINDEROTH | PHOTOS JAYNIE HANCOCK

FROGS, NEWTS, TOADS AND

salamanders make up more than 6,300 species of amphibians, a group of creatures that has roamed the earth for 350 million years. But amphibian populations are globally declining, rapidly pushing researchers to investigate these charismatic cold-blooded beings.

During the last two decades, the scientific community began to realize the true extent of amphibian declines. One-third of species are in a threatened status, 32 percent are globally threatened and 43 percent of species' populations are declining, according to a 2008 paper by scientists David B. Wake and Vance T. Vredenburg.

"Amphibians are odd because they are one of the most threatened taxonomic groups known, yet they are one of the most understudied," said Maureen Ryan, a biologist with the David H. Smith Fellows-Conservation for Biology and adjunct professor at Western Washington University.

Scientists like Ryan suggest the decline is in response to a potent cocktail of pesticides, pollution, habitat loss, invasive species, disease and climate change.

More mysterious than other threats is a recently discovered chytrid fungus known as *Batrachochytrium dendrobatidis*, or Bd. Only since 1998 have scientists become aware of the widespread fungus and its lethal potential. More than 20 percent of the amphibians sampled in the world are infected.

Amphibians live near water, where they lay eggs and spend the first phase of their lives. Some have wart-like, rough rubbery skin while others have slimy, slick, gooey skin. Some do not even have lungs, but rely purely on their porous skin to breathe.

Amphibians are often the first responders to change in the environment, said Deanna Olson, supervisory research ecologist for the U.S. Forest Service. Olson is working on mapping the global spread of Bd. Some evidence supports the theory that climate and weather may affect how deadly the fungus is.

"If amphibians are as sensitive as they appear to be in relation with environmental change, and they're experiencing a downward trend, then that begs the question of what's next?" said Charlie Crisafulli, research ecologist with U.S. Forest Service at the Olympia Forestry Science Laboratory.

"It behooves us to keep all of the pieces of the puzzle together."

Little is known about the fungus, including its origins, mode of transportation, and why amphibians seem to be its only host.

"It's a disease that appears to be able to affect a whole class of animals, and no other disease that we know of can affect an entire class like this," Olson said.

Olson said although it is not completely understood, Bd appears to hinder amphibians' ability to maintain a water balance and oxygen exchange. This can result in heart attacks and death.

"For a disease to survive, it can't cause its host to go extinct, it should be sub-lethal, but Bd has been the apparent cause of extinctions, which is something you hardly ever see from disease," Olson said.

So far, Pacific Northwest (PNW) amphibian populations appear to be fairly stable with a of couple exceptions, including the Cascades frog and Oregon spotted frog.

Crisafulli said both the Oregon Spotted frog and the Columbia Spotted frog are candidates for federal protection. The Oregon spotted frog used to live all around the Puget Sound, but now it is only found in three isolated areas.

"Smart planning and research now could really go a long ways toward maintaining populations and species diversity in the Pacific Northwest," Ryan said.

Ryan chose to base her research in the PNW partly because climate change is not expected to affect habitats in this region as dramatically as surrounding areas.

However, amphibians are not the exclusive owners of habitat in the region.

"What's disturbing about the amphibian populations in the PNW is the potential for the stress [caused by] fish combined with climate change leaves little ideal habitat for amphibians to thrive." Ryan said.

Since the introduction of fish in the 1940s, many water-dwelling amphibians gave up their deeper, more permanent homes to predators. They have moved to shallower habitats, making them more sensitive to environmental variation.

The PNW is home to roughly 15 amphibian species. In comparison to most other places in the country, the PNW has great amphibian biodiversity, Crisafulli said. If any one of these species goes extinct, there will be no replacing it.

Aimee McIntyre, biologist for the Washington State Department of Fish and Wildlife, described the tragedy of losing an opportunity to study unique characteristics just barely understood. One example is an amphibian's ability to regenerate tissue, which may one day

IMAGES FROM TOP TO BOTTOM: At the 338-acre Stimpson Family Nature Reserve, globs of salamander egg clusters can be found on sticks in shallow water. A variety of frogs, salamanders and other amphibians call the nature reserve home. | A 5-inch Northwestern Salamander, *Ambystoma gracile*, searches for a dark and moist place to hide. This salamander inhabits the Pacific Northwest, and can usually be found hidden under rotted logs and other covers on forest floors. | Western senior Andrew Majeske sits on a log after searching for salamander egg clusters at the Stimpson Family Nature Reserve. Majeske said he has been an amphibian advocate ever since he can remember.

allow humans or other animals to grow entirely new limbs. Amphibians have also evolved anti-fungal and medicinal properties with the potential for human application.

One of the biggest impacts amphibians have on their environment is the way they transport nutrients between habitats.

"Since most amphibians lay their eggs in the water, followed by a life on land, they create a flow of energy between the two parts of the ecosystem," Ryan said.

Amphibians are prey for many organisms, including ravens, weasels, garter snakes, fish, dragonfly larvae and shrews. They also prey upon organisms themselves, helping to keep insects and other parts of their habitats in balance.

"Amphibians are centrally nested in the food web," Olson said. "If you take them out of a food web, then it will collapse."

Scientific research will lead to a broader understanding of these animals and the obstacles they face, but what the future holds for amphibians remains to be seen. The creatures that resemble a cross between a fish and lizard have lived on this planet for millions of years, and with luck, will continue to thrive. 🐸

ALANA LINDEROTH is a senior majoring in environmental journalism. She has a lifelong passion for nature and the outdoors.

JAYNIE HANCOCK is a visual journalism major with a concentration in environmental studies and Arabic.



WOLF WARS

STORY LIZA WEEKS | PHOTOS BRIAN RUSSELL

FOR MILLENNIA, DOGS HAVE BEEN man's best friend. Many owners allow their dogs to sleep in bed with them, ride shotgun in the car and eat scraps from the dinner table. But the animals that dogs are direct descendants of – wolves – have had a tumultuous relationship with humans for generations, and today are seen as a nuisance and a threat.

When humans were living the hunter-gatherer lifestyle, they viewed wolves positively, like a brother in the hunt. However, as we began to settle into an agricultural lifestyle, wolves became serious competition, especially to those raising livestock.

Len McIrvin, co-owner of Diamond M Ranch in Laurier on the Canadian border, has lost three of his cattle to wolves. McIrvin said as a society, we have lost touch with our

ancestor's knowledge – homesteaders knew raising livestock for a living was not possible with wolves present.

McIrvin believes ranchers should be able to shoot wolves on sight. He said public schools are brainwashing younger generations into believing wolves are sacred animals, a sort of pagan animal worship.

"It's a terrible conspiracy going on," McIrvin said. "Making us believe wolves are something great when they're really just killers."

The Plymouth colonies placed the first bounty on wolves in 1624, said Ed Bangs, the Wolf Recovery Coordinator for the United States Fish and Wildlife Service. By the 1930s, Americans wiped them out completely through hunting and poisoned traps. Wolves from Canada crossed into the western U.S. but were

persecuted and unable to survive long enough to establish a pack, which is defined by the ability to reproduce. They were classified as an endangered species at the federal level in 1974 and in Washington in 1980.

Today, wolves have been reestablished in Montana, Idaho and Wyoming. One to two dozen wolves live in Washington, most of which likely crossed over from Canada and Idaho. Two or three packs live in Pend Oreille County and go back and forth between Washington and Idaho, said Mitch Friedman, executive director of Conservation Northwest. The Lookout Pack, which primarily lives in Methow Valley, is the only collared pack in Washington. The pack is now just two animals. The alpha female's collar went dead last spring at the same time she disappeared, indicating she was poached.



Behind bars, London spends his days well cared for but far from the wild at Wolf Haven.



Poaching is a concern for many of Washington's wolves. Wolves that live east of the Okanogan River are considered part of the Rocky Mountain wolf population, and are not federally protected by the Endangered Species Act. Wolves west of the river, including the Lookout Pack, are still protected from hunters.

Wolves are often killed for bothering livestock. But poachers may be punishing wolves for crimes they did not commit.

"Most damage to livestock by canines isn't done by wolves, it's either by coyotes or domestic and feral dog packs," Friedman said.

Jay Kehne, the Okanogan outreach associate for Conservation Northwest, said there is one confirmed pack in Okanogan County.

Kehne visits communities affected by wolves to hold educational workshops. He shows the movie "Lords of Nature," which depicts the role of major predators in the biological web. He also discusses what ranchers can do to minimize conflict with wolves, measures like removing dead carcasses and fencing in their livestock. Kehne said he believes that by increasing information, education and dialogue, ranchers and wolves can coexist.

McIrvin's community is definitely one affected by wolves. In addition to his three lost cattle, he said his neighbor had eight cattle killed by wolves without receiving any compensation. McIrvin received \$600 from the Defenders of Wildlife for his first dead animal, which he said was worth \$800, but to receive any additional compensation he has to show he attempted non-lethal prevention methods. On his 250,000-acre ranch, most of these methods, like fencing and increased human presence, are just not feasible; there is too much land to cover.

Wolves are so controversial, they are at the center of political battles across the nation. In Washington state, three bills pertaining to wolves were introduced to the legislature at the beginning of this year. Though the bills are now dead, they will be reintroduced next January.

House Bill 1107 looks at potential diseases wolves may carry and their effects on humans, and aims to set up outreach programs to mitigate these effects. The list of diseases ranges from rabies to the plague to the *Echinococcus granulosus* tapeworm.

According to the Department of Fish and Wildlife, this particular tapeworm lives in the organs of large

game and is transmitted to canines when they eat an infected organ. For humans to get the tapeworm, they have to ingest infected canine feces or drink water contaminated with it, which rarely happens.

"That tapeworm thing is just weird, weird, weird stuff. Farfetched grasping at straws," Friedman said. He said the threat of disease transmission is low enough that wolf researchers do not wear masks or gloves when handling wolves. For this bill to hold any merit, Friedman said it needs medical credibility, like backing from the American Medical Association.

House Bill 1108 pertains to the effects wolves can have on big game like deer and elk. It would make any existing wolf conservation and management plan void and remove gray wolves from both the state and federal endangered species lists.

Bangs said wolves will always have an impact on big game, like any predator-prey relationship. The size of that impact is variable, though, because wolf population numbers depend on food availability. Some big game populations are already suffering due to factors such as habitat degradation, and predation by wolves can accelerate the decline.

"Most damage to livestock by canines isn't done by wolves; it's either by coyotes or domestic and feral dog packs."

IMAGES FROM LEFT TO RIGHT: Because Red wolves often interbreed with coyotes, as few as one-fifth of Red wolves in the wild are pure bred. Concerned scientists have taken steps to preserve the species in captivity but the four living at Wolf Haven are all candidates for release. | Dane, a volunteer tour guide at Wolf Haven, explains which wolves are endangered and introduces some of the residents. | The gravestone of Rhett, a red wolf and member of a captive breeding program called the Species Survival Program until his death in 2009.



However, populations eventually level out due to lack of food for the predator.

Less big game means less of a surplus for hunters, which is partly to blame for the hubbub. However, in Idaho and Montana, where wolves have reestablished their numbers, success rates for hunters have remained constant, Friedman said. According to Fish and Wildlife, the presence of wolves pushes their prey to higher, forested elevations, which creates the misconception that populations are rapidly declining.

The final House bill pertaining to wolves, 1109, says the legislature must approve or reject the Department of Fish and Wildlife's Gray Wolf Conservation and Management Plan and Environmental Impact Statement.

The plan has been in the works since 2006. It encourages ranchers to take proactive measures to keep wolves from eating their livestock and provides them with technical assistance to do so. It also allows for lethal measures to be taken should wolves cause a serious problem to livestock, and compensates ranchers for livestock lost to wolves.

The plan went under scientific, public and peer review, generating nearly 65,000 comments that are being

incorporated into it. The finalized product will be presented before the Washington Fish and Wildlife Commission for consideration.

Bill 1109 is unprecedented – a legislature has never before been allowed to approve a conservation and management plan for an endangered species.

A similar provision was added to Congress' budget bill. Under this provision, federal protections of wolves in Idaho, Montana and parts of Oregon, Washington and Utah would be lifted. This would open wolves up to hunting.

Friedman said because the bills are unprecedented, they are easy to argue against.

"Does Congress really have the knowledge?" Friedman said. "Don't we want to keep these decisions based on science, not politics? But that's how it goes – wolves somehow inspire more passion in people than even spotted owls."

The bills in Washington state will be introduced before the legislature again next January, and citizen lobbyists can influence them again. Conservation Northwest sent an alert about the bills to its members this past January and legislators received 674 concerned comments from the public.

"We're going to stay diligent. So long as we do, I don't think those bills are anything to fear," Friedman said. "They're a matter of concern – we want to bring quality information and public opinion to bear, and wolves are going to need that. Nature always needs that to prevail over special interest."

McIrvin said if voters in Washington state decide to maintain protections on the "furry little varmints," they should also be responsible for compensating the ranchers affected by wolves. He said the Defenders of Wildlife compensated him because he was publically speaking out against wolves, and as the wolf activists in the area, they wanted to keep the ranchers happy. But the financial responsibility should fall on taxpayers, not advocates, he said.

As the debate rages on, both sides provide valid points. Aldo Leopold's wisdom recorded in *The Sand County Almanac* proves truer than ever: Only the mountain has lived long enough to listen objectively to the howl of a wolf. 🐾

LIZA WEEKS is an environmental journalism major. She once saw green fire in the eyes of a wolf, and hopes never to see that fire die.

BRIAN RUSSELL is a cinematographer taking every opportunity to tell compelling stories in a visual way.

TAILING THE TERNS

STORY PAULINA BIELAWSKA | PHOTOS BRIAN RUSSELL

A DOUBLE BARBED-WIRE FENCE RUNS along the perimeter of the site. Remnants of brick buildings, dressed in graffiti, cast long shadows among rusted pipeline and jagged glass. Piercing calls of birds combine with fog horns, creating a symphony of chaos, while factories on the horizon plume smoke against a crimson sky. Oddly, this decrepit wasteland is beloved by one species: the Caspian tern.

Caspian terns sport a glossy, black cap and a vibrant, red beak. They have a sleeker, more angular silhouette than the common gull. However, the tern's most distinctive feature is its call, a harsh, rasping squawk.

With all the natural beauty the Pacific Northwest offers, the terns were drawn to an unlikely spot: the abandoned site of the Georgia Pacific pulp mill in Bellingham, Wash.

Unknowingly, an optimal tern paradise was created when the paper mill shut down in 2001. Over the years, amid

the pollution and contamination, eggs hatched. At the end of the summer of 2010, hundreds of terns were born in these unlikely conditions.

The Georgia Pacific mill site provides ideal conditions for these opportunistic nesters.

The abandoned pulp mill is in close proximity to the water, with an abundance of fish for the birds to eat. A flat, concrete surface provides a 360-degree panorama, similar to that of a deserted island. The fencing offers protection from coyotes and humans.

Although the terns have thrived undisturbed during the past two years, the Port of Bellingham has plans of great magnitude for the future of the site.

The Port of Bellingham purchased the site in 2005. Plans to launch a multi-million dollar cleanup and removal of residual toxicants will tentatively start within the year. The proposed mixed-use waterfront will offer jobs, parks and possibly an expansion of Huxley College of the



This decoy predator was placed as a deterrent on the property adjacent to the Port's land. Not a single bird dared touch the ground in the area.

“*[The terns] sound kind of ominous—there’s just a million of ‘em, circling, going crazy.*”

Environment. The terns, however, are not on the agenda.

Joe Meche, president of the North Cascades Audubon Society, spent the summer of 2010 among the terns. With special permission from the Port, he set up his office just a few feet away from the heart of the nesting area.

Misty-eyed, Meche recalled the experience of watching tern chicks hatch from eggs, on concrete warmed by the July sun.

“I was totally in my element, in my own form of heaven,” Meche said.

Like any devout Audubon member, Meche is never without his handy notebook. Small, orange and worn, his bird diary holds the avian secrets of the Bellingham tern population.

Terns are a migratory species, occupying every continent except Antarctica. Tern colonies in Eurasia spend winter months in Old World tropics, while birds of North America winter in Colombia and Venezuela.

The terns are commonly sighted during their breeding season from March to October, according to the Seattle Audubon.

Meche said he will never forget his first tern sighting in Bellingham this year, in April 2011.

“I heard one bird first, just froze in my tracks – because I’d been waiting for them to come back,” Meche said.

Local residents and business owners are familiar with the terns’

sharp call, which usually comes with the rising sun or late in the evening.

Some say the birds’ calls evoke thoughts of warm weather and tropical places. Local bike shop owner Kyle Morris has a different perception.

“They sound kind of ominous – there’s just like a million of ‘em circling, going crazy,” Morris said.

Morris said although they are intriguing, he questions the birds’ importance.

“What do they do for us?” Morris said.

Port Security Officer Neil Clements said the purpose of the Port is to create economic development. For both monetary and safety reasons, the Port is not in favor of keeping the birds.

Currently, passive measures are being used to deter the birds, which are protected from harm by the international Migratory Bird Treaty Act. However, silt fences, Mylar tape and dummy decoys seem to be successfully keeping the terns at a distance.

Mike Hogan, Port Environmental Analyst, said he hopes this is the ticket to a bird-free site.

But community values will determine the fate of the terns. A choice must be made between the opportunities brought by development and the preservation of nature.

“[Development of the site] has gone through an extensive community vision process,” Clements said.


With diminishing habitats, the

terns’ search for a home is becoming more challenging. According to Meche, terns in Washington have traveled all over the state, from Dungeness Spit on the Olympic Peninsula, to the mouth of the Columbia River. Whether they are escaping from predators or simply unwanted by humans, the nomadic creatures seem to be constantly seeking a new home.

So far this year, an estimated thousand terns have landed in Bellingham, according to Meche’s observations. Populations tend to peak in the later spring and early summer months.

These patterns suggest it is too early in the season to account for all the birds. Clements and Hogan play the waiting game to determine the effectiveness of their deterrents.

Time will tell where the birds will go next. Their resilience has enabled them to thrive in places once considered uninhabitable, creating homes wherever opportunity calls.

Right now, that home is Bellingham. 

PAULINA BIELAWSKA is a toxicology student at Huxley College and enjoys exploring whimsical places and collecting funny earrings. This is her debut publication for *The Planet*.

BRIAN RUSSELL is a cinematographer taking every opportunity to tell compelling stories in a visual way.



A flying Caspian tern near the Port of Bellingham. PHOTO COURTESY JOE MECHE.

Caring **FOR** Critters

STORY MARIANNE GRAFF | PHOTOS BRIAN RUSSELL & JORDAN STEAD



Intern Jessie Paoello feeds a baby raccoon at the Northwest Wildlife Rehabilitation Center in Deming, Wash. This raccoon, along with three others, was found under a home after occupants complained of a foul scent. The mother of the four young pups had died from reasons unknown. PHOTO: JORDAN STEAD

A black bear stares down from the top of a tree. His mother and sibling have been hit by a car, and wildlife enforcement officer Bruce Richards has been called to capture him. Richards loads a gun with a tranquilizer dart and shoots into the branches, sending the cub tumbling into a net.

The bear has a broken leg, but whether it is from the fall or a previous injury, Richards cannot tell. It is late summer of 2010, and this is the first of three orphaned cubs being taken to Sarvey Wildlife Rehabilitation Center near Arlington, Wash.

When animals are found orphaned, sick or injured, wildlife rehabilitators help them recover so they can survive in the wilderness. Thousands of wild animals, from squirrels to cougars, are taken to centers each year in Washington. Although often fewer than half can be released, rehabilitators strive to provide individual care for every wild animal in need.

The Washington Department of Fish and Wildlife oversees 56 licensed wildlife rehabilitators throughout the state. About two-thirds of them are located in western Washington.

Tammie Rohr, the administrative director at Sarvey, said the center takes in about 4,000 animals annually. Most small mammals Sarvey receives are victims of cat attacks, while larger mammals are often hit by cars or orphaned by poaching.

According to the Department of Wildlife, rehabilitation usually includes evaluations, veterinary care, medication, a proper diet and physical therapy. In order for an animal to qualify for release, it must be able to recognize and obtain food, select appropriate mates and show fear of potential dangers such as humans and predators. If these criteria are not met, the animal is usually euthanized.

"Our service as rehabilitators is two parts: it's one part to save the ones we can and the other part to provide a quick and painless death for the ones we can't," Rohr said. "If nothing else, they don't suffer."

Rehabilitators must teach young animals how to identify food sources and forage. Although hunting is instinctual for many animals, recognizing proper food is not, Rohr said. Young carnivores are usually tested with live prey before they are released.

Because humans provide contact on a regular basis, Rohr said rehabilitators take precautions to make sure animals keep their natural fear of humans. Bears, as well as fawns and raccoons, can become easily attached to humans.

"Fawns and raccoons, if you catch them too young, tend to think humans are just the most wonderful things," Rohr said.

To keep this from happening, rehabilitators at Sarvey cover their faces with netting before interacting with the animals. This limits eye contact and hides facial features. The only time they expose their faces is to perform exams or other uncomfortable acts so the animals associate "bad" with humans. Infant animals are handled more often, Rohr said.

"When they're infants you give them what they need, and when they can eat on their own you limit contact and by the time they are ready to go they should hate you," she said.

Stacey Wise, the clinic director at Northwest Wildlife Rehabilitation

"Our service is two parts: one part to save the ones we can and the other part to provide a quick and painless death for the ones we can't."

Center near Bellingham, said infant animals must sometimes be fed every four to five hours. Baby raccoons are bottle-fed, while baby squirrels are nursed using a syringe.

Extensive care means rehabilitation can be costly. The Progressive Animal Welfare Society, known as PAWS, is one of the largest centers in Washington and spends about \$800,000 annually on rehabilitation, according to their 2009 report. Jennifer Convy, the wildlife director, said most of the funding comes from individual donations. Primary expenses are staff salaries, utilities, food and medical procedures, which are performed on-site.

Animals in rehabilitation can be kept up to six months without special permission from the Washington Department of Fish and Wildlife, Rohr said. Average release times depend on the species, but smaller mammals and birds can be released in as little as six to eight weeks.

Convy said average release rates range from 30 to 50 percent nationwide. Release rates are calculated differently at each center and the Department of Wildlife does not require centers to report rates.

"We do not measure our success purely on [release] rates," Convy said. "There are many animals that

come through our doors that have to be euthanized immediately. Most of the animals that come in are injured through human-related problems. For us, it's reversing these problems and giving back."

The animal populations which benefit the most from rehabilitation are threatened or endangered species, as well as large mammals, said Patricia Thompson, a biologist for the Department of Wildlife. Because these animals start with smaller population sizes, the rehabilitation and release of one animal is significant. For smaller mammals and songbirds, rehabilitation probably does not make much difference in the population, she said.

"For those who care about these animals, it's a success to release even one," she said.

Despite the best efforts on the parts of rehabilitators, many animals die of natural causes or are too injured for release.

Leslie Henry, the clinic director at Sarvey, said animals that do not meet release criteria are either euthanized or placed in a permanent educational program. Placement for educational purposes depends on the animal's age, temperament and the educational facility, Henry said.

Sarvey has 26 permanent animals, most of which are birds used for education or to teach other birds



“For those who care about these animals, it’s a success to release even one.”





FROM LEFT TO RIGHT, TOP TO BOTTOM: Exchanging curious looks, this barn owl is one of the few animals available for visiting educational groups to admire. | Tammie Rohr, Administrative Director at Sarvey Wildlife, helps an intern with the paperwork for an incoming donation. | This eagle, who is one of four temporarily housed at Sarvey, has a piercing stare leaves no question that these animals are indeed still wild. | In April, baby season was just beginning at Sarvey. This young opossum had been separated too soon from his mother. PHOTO: JORDAN STEAD.

wild behavior. The resident bobcat is Baxter, a 3-year-old who was kept because he had grown too accustomed to humans as a kitten. In contrast, PAWS does not keep any animals for educational purposes.

"If you take an animal out of the wild, you should place it back into the wild. We don't believe [captivity] is the best choice for the animal," Convy said. "Anything that can't be released is humanely euthanized."

A small wren, slightly larger than a golf ball, is brought into the back room at Sarvey and gently placed on a gleaming metal table. Henry brings out a vial and slowly fills a syringe, which she shoots into the tiny bird. Its breathing slows, then stops. After a few minutes she checks for a heartbeat, the stethoscope almost completely covering the bird's body. Satisfied the creature has died peacefully, she strips off her blue latex gloves.

The wren suffered from a fractured wrist, Henry said, an injury that could not heal properly. She said any animals that need to be euthanized are put under anesthesia to render them unaware.

Despite the necessity of euthanizing many animals, successful rehabilitation is what makes the job rewarding, Convy said.

The three black bear cubs from Sarvey, Dean, James and Winchester, are scheduled to be released at the start of June with the assistance of the Department of Wildlife. Officers will take them on a "hard release," which is common for bears and involves shooting them with bean bags and using the department's Karelian bear dogs to chase them into the woods, away from humans.

Through the hard work of rehabilitators, the cubs have each reached almost 100 healthy pounds, and with their natural fear of humans intact, they will be ready to reenter their natural habitat, leaving their human caretakers behind.

Rehabilitators share a common love of wildlife and a desire to see it flourish in a world heavily touched by humans. **E**

MARIANNE GRAFF is a senior majoring in journalism. She has also been published in Klipsun and The Western Front.

BRIAN RUSSELL is a cinematographer taking every opportunity to tell compelling stories in a visual way.

"If you take an animal out of the wild, you should place it back into the wild."

THE PLIGHT OF THE HONEYBEE

STORY SAMANTHA OBERHOLZER | PHOTOS JAYNIE HANCOCK

SUNLIGHT CATCHES THE WINGS buzzing in and out of the double-stacked grey box. Silhouettes of honeybees dart across the garden. Some fly to the sweet springtime aroma of neighboring cherry blossom trees; others fly over Old Fairhaven Parkway in search of nourishment. The monotonous buzz is never-ending. As temperatures in Bellingham, Wash. begin to warm, our tiny pollinating friends zoom from plant to plant, and hobbyist beekeeper Michael Jaross finds himself forearm-deep in bustling beehives.

While honeybees are plentiful in Jaross' humming hives, a recent United Nations Environmental Programme (UNEP) report states populations are globally declining.

The research suggests a variety of factors to blame for the decline: climate change, mites, negligent beekeeping activities and agricultural practices. The global agriculture industry relies heavily on pollination via honeybees, and their survival depends on how humans treat the environment.

The decline of bee populations serves as another reminder that pushing our natural world too far not only harms species in the immediate future, but will prove to affect our own lifestyles as well.

Jaross said he understands this in a way many people do not. He began beekeeping six years ago in an effort to provide his family with their own natural sweetener, and uses the bees to pollinate his vegetable garden. He said he began keeping bees to prepare for a post-petroleum society.

However, Jaross said he sees his bees as more than a plan for the future and appreciates his three colonies of bees on an extremely personal level. He has no shame in admitting he talks to the bees when he works with them and often enjoys sitting outside watching the fuzzy flyers.

His knowledge of honeybee hives and colonies is enough to satisfy the boundless curiosity of any elementary-school student mesmerized by the wonder of insects. As a swarm catcher and board member of the Mount Baker Beekeepers Association, he encourages and educates people interested in the sweet and sticky hobby of beekeeping.

Despite his delicate care of the hives, Jaross, like many other beekeepers, is accustomed to loss. Of the four hives he had last season, only one survived.

This tale is not uncommon among hobbyist and commercial beekeepers. Eric Olson, a commercial beekeeper in Yakima, lost more than half of his 14,000 hives last season; Peter Willing, a hobbyist beekeeper in Squaticum Valley, lost his fifth beehive this past April.

According to the UNEP report, "Global Honey Bee Colony Disorders and Other Threats to Insect Pollinators," bee populations have been declining for decades. It was estimated that populations of honeybees decreased 31 percent from 2006 to 2007, and 36 percent from 2007 to 2008. Ten to 20 percent is considered a normal loss. This becomes a

serious issue when crop pollination is taken into consideration — honeybees are responsible for pollinating 71 plant varieties that provide food worldwide.

The research in UNEP's report also lists factors such as habitat degradation, air pollution, pesticides and invasive species. All of these driving forces interfere with honeybees and their habitat.

Although bees are powerless against human actions, their global decline impacts our own nutrition. The pollination honeybees provide for our agricultural industry is pro bono work, but does require us to offer and maintain an environment that is conducive to their service.

Dr. Timothy Lawrence, commercial beekeeper and scientist from Washington State University's Apis Molecular Systematics Laboratory, said he believes the common denominator in all cases of lost hives is the dreaded mite *Varroa destructor*.

According to the University of Kentucky's College of Agriculture, *Varroa destructor* feeds on the blood of adult honeybees and their eggs. The mite spreads across colonies when a worker bee carrying the mite encounters other bees.

As Lawrence explained, no chemical or non-chemical treatment of the hives will completely kill the mites. The mites are resistant and can quickly reproduce, putting the colony in danger once again. If a hive has survived the mite, the honeybees in the colony may be susceptible to weakened immune systems because of chemicals used in the treatment.

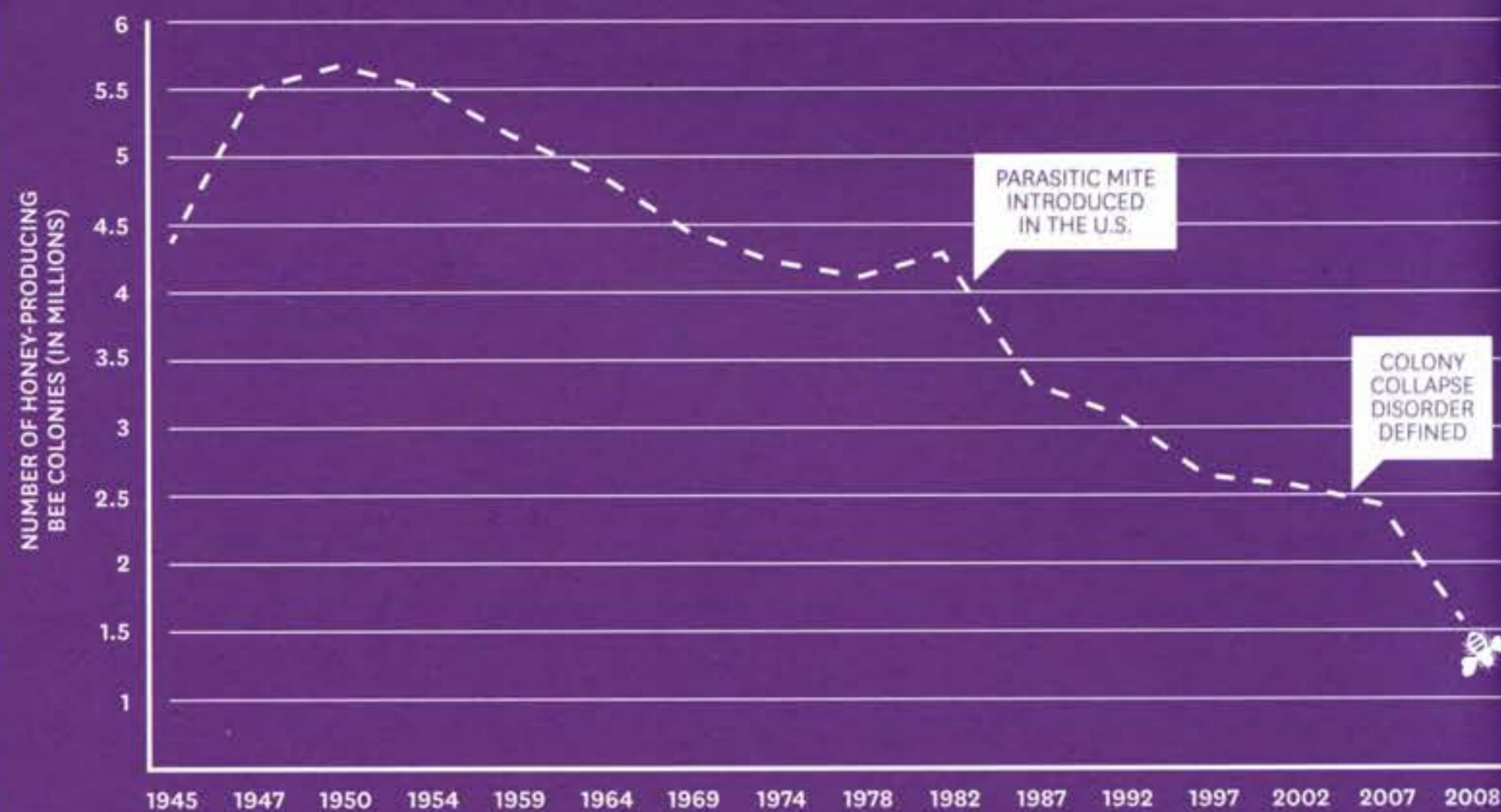


According to the United Nations Environmental Programme (UNEP), bee populations are globally declining. Factors include climate change, mites, negligent beekeeping activities and agricultural practices.



IMAGES FROM TOP TO BOTTOM: To the left, a queen bee fulfills her sole duty — laying eggs. Queen bees can lay up to 2,000 eggs a day. | Western graduate student Jody Gerdts carefully inspects her honeybees for any problems.

DECLINE OF HONEY-PRODUCING COLONIES IN THE UNITED STATES



DATA SOURCE: U.S. Department of Agriculture's National Agricultural Statistics Service

"There's no silver bullet out there that will be able to solve the problem," Lawrence said.

Jaross is working on alternative treatments for the mites.

At a Mount Baker Beekeepers Association meeting in March, Jaross introduced veteran beekeepers, as well as 10 new beekeepers, to a new organic chemical that could be used to treat colonies for mites. The treatment is reportedly milder than other chemicals on the market. He calls it a "sticky wicket."

Jaross also encouraged the beekeepers to sprinkle powdered sugar on their bees — when the bees groom themselves and clean the powdered sugar particles off their bodies, they will also pick off the mites. The mites fall below a grid on the bottom of the hive and cannot survive without a host. This method ensures no honeybee immune systems are weakened, and traces of harsh chemicals are not left in the beeswax when the honeybees build their hives.

"I finally feel like I've figured out a beekeeping pattern that generally keeps the bees alive and relatively happy," he said.

Western graduate student Jody Gerdts spends her spare time creating a management plan for her beehives. Gerdts is trying to find a maintenance style that keeps her bees alive and healthy, and would like to share this information with the greater beekeeping community. She said it is not true research because she is not starting with a question or running tests. She uses samples of her bees to look for and research *Varroa destructor*

and Tracheal mites, but said another option would be to send samples to Washington State's Apis lab where they run tests and check for mites.

Gerdts, like Jaross, said she cares for her bees in a hands-on way.

"[Bees] have been bred for a long time to have a relationship with humans," she said.

Jaross seems to have found a balance of letting things in the hive play out on their own, while keeping an eye on the queen and her production levels. As complex and self-involved as the bees are, they still depend on him for survival.

With the tutoring Jaross gives to new beekeepers, they may learn how important their role is in combatting the population decline of honeybees. He said he wants to help all the beekeepers he can, but he needs to let them know the challenges of caring for a beehive. It is a reminder of the cyclical rhythm between humans and the environment.

For Jaross and other beekeepers, it seems the hobby is more than a noble attempt at reducing human impacts on the natural world: it is an example of our deep connection to nature and all of its complexities. 🐝

SAMANTHA OBERHOLZER is a senior studying journalism and anthropology.

JAYNIE HANCOCK is a visual journalism major with a concentration in environmental studies and Arabic.



A FAREWELL FROM CAPTAIN PLANET

The future will be better than the present.


I believe this in part because of the social and technological progress I experienced between graduating from Western and Fairhaven in 1973 and returning to teach and advise Huxley's Planet magazine in 2006. While much remains to be done, I've seen a revolution for the better in tackling environmental challenges. The same is true of attitudes on gender, race, sexual orientation, health, diet, safety, religion and culture. Scientific understanding has exploded. Life is more frenetic, but technology is cleaner and more efficient. Point pollution has declined dramatically at tailpipes, sewer pipes and smokestacks.

I also believe in a bright future because of the Planet students I've met the past five years. They are smart, committed and creative, and are joining a fast-growing cadre of college-educated globalists from around the world. There are far more bright and worldly minds solving environmental problems today than at any time in world history. While too many recent graduates went underemployed in the recession, in the long run they'll be in high demand as the American workforce ages.

I leave Huxley College to focus on my own writing, but with mixed feelings. I'll miss collegiate youth and energy. I'm proud Planet was founded by students, has thrived for thirty-two years and will promote positive change long after I'm gone. Population growth, climate change and resulting political upheaval will pose grave tests in the 21st Century. The good news is that the next generation is taking its legacy of environmental lemons, squeezing out new insights and making lemonade.

Take over, Planeteers. I'm looking forward to it.

Bill Dietrich
Captain Planet



If all the beasts were gone, men would die from a great loneliness of spirit, for whatever happens to the beasts also happens to the man. All things are connected. Whatever befalls the Earth befalls the sons of the Earth.

—Chief Seattle of the Suquamish Tribe,
letter to President Franklin Pierce