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Dear Reader,

The title of this issue might make you think, “Oh brother, more depressing stories about the environment.” But as you read, you may notice a more subtle theme emerging; we explore not just death but the tension between death and life. Death is a natural and necessary part of life. Yet humans are causing unnatural and unnecessary death.

You'll read about everything from local groups replenishing nutrient-limited streams with dead salmon to a local farmer creating energy from manure that, if improperly disposed, would kill aquatic life. You'll read about how fire, which some may see as a deliverer of death, is fostering biodiversity or how the recurrence of oil spills is generating more efficient cleanup technologies. You'll read about a growing interest in unconventional but more environmentally friendly human burials. You'll also read about people who think environmentalism is dead. In order to regain vitality, some say we need to scrap the movement's identity and start over. Yes, there are negative environmental trends that we cannot ignore. And yet people are seeing these trends and doing something about them.

Death gets our attention. When drivers see an accident, they slow down. We hope this issue will make you slow down, too. We want these stories to make you think about death, not only in a dark way, but in a way that leads to life. If you read something that disturbs you, get out there and get involved. On your way home today, pick up a handful of soil and take a deep breath. That is the healthy smell of death. Let's keep more of that around.

Laurie Ballew

Laurie Ballew

Cover photo by Chris Taylor
Retired forester Thom Pence came across this deer skull while working on his prairie-restoration project on San Juan Island's Cady Mountain.

Thanks to: Memorial Ecosystems, Whatcom Land Trust, Washington Department of Fish and Wildlife, Olympic National Park and Colin Shanley for help with photos. Laurie Rossman, Dave Ellison and the rest of the publishing staff. And all those in the community who answered our questions and told their stories.

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FIRE TO FLOWERS
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For years, prairie ecosystems in the San Juan Islands thrived with the periodic jolt of wildfire. Now, burning restrictions and other factors are reshaping the landscape.

The Planet magazine is published three times yearly and is dedicated to environmental advocacy and awareness through responsible journalism. The magazine is written, designed and edited by students through Huxley College of the Environment.
Along the Nooksack River, the Nooksack Salmon Enhancement Association restores damaged habitats that have left salmon populations dwindling. In the waters between the San Juan Islands, orca populations suffer as a result of the declining salmon. Farther north is the habitat of the Cherry Point herring, a primary salmon food source that the Northwest Ecosystem Alliance is petitioning to have listed as an endangered species. The decline of these species in Whatcom County reflects an alarming global trend.

More than 99.9 percent of all species that have ever lived on Earth are extinct — the result of five mass extinctions. Seven out of 10 biologists say humans are causing a sixth mass extinction, according to a recent Public Broadcasting Service poll. Mass extinctions are part of Earth's history. Never before, however, has one species single-handedly provoked the extinction of such large numbers of organisms. Because of this, local and international organizations are spearheading conservation projects despite the inevitability and recurrence of local species loss.

"I think a lot of times folks will say (species loss) is so big and complicated," said John Thompson, the Endangered Species Act resource planner for Whatcom County Public Works. "It's just sort of a rationalization to throw up your hands and say, 'Well, we can't do anything.' My personal perspective is that there are some things that we can do that we have sufficient documentation to justify, and we have a responsibility to do them. Whether we are ultimately successful, we'll see."

The Northwest Ecosystem Alliance is a group dedicated to protecting and restoring local wild ecosystems.

"It's not just a matter of ethics and whether it is wrong to drive a species to extinction," said Hudson Dodd, the outreach coordinator for the alliance. "We need healthy, functioning ecosystems. That's where our water supply comes from. That's where our air comes from. That's where our recreation and solace come from, and we can't reconstruct these things once they are gone."

In the late '60s, Paul Ehrlich was a pioneer in revealing the dangers of overpopulation with his book, "The Population Bomb." He continues to research the issue today.

"We are well into causing the biggest extinction in 65 million years," said Ehrlich, a professor of population studies and president of the Center for Conservation Biology at Stanford University.

Mass extinctions are difficult to define as they occur in varying degrees. Thor Hansen, a Western Washington University geology professor, said mass extinctions include mass species loss across all borders, from land to sea, and occur over geologic time, which refers to the millions of years it takes for geologic structures to form.

"One of the important things to emphasize is that even the so-called mass extinctions weren't events where, over the course of 25 years, there was a dramatic, noticeable loss," Western biology professor Merrill Peterson said. "Even those events were prolonged over thousands of years, so had humans been there, they would have been as blind to those events as they are today."

Niles Eldredge is one of the leading researchers studying the correlation between mass extinctions and the present biodiversity crisis.

"Humans are transforming the globe and are the direct cause of the sixth extinction," said Eldredge, the curator for the division of paleontology at the National Museum of Natural History. "Earth is home. It is beautiful. And we, in trashing the natural world, are ruining the beauty of the world. ... Ultimately, the fate of Homo sapiens does depend upon the fate of the planet."

Extinction is a natural process, as ecosystems are constantly changing. The appearance of some species and disappearance of others defines the basis of evolution, said Mohammad Rafiq, the head of biodiversity for the International Union for the Conservation of Nature.

"When evolutionary processes take place in full appreciation of the context of the ecosystem, everything evolves together," Rafiq said. "Human-influenced extinctions lead to other things."

Humans are altering the planet so quickly and aggressively that estimates place species loss 1,000 to 10,000 times higher than the natural rate of one species every four years, according to the union.

"Global biodiversity is changing at an unprecedented rate because of land conversion, pollution, climate change and the introduction of new species," said Brennan Van Dyke, the director of the North American regional office of the United Nations Environment Program.

In Whatcom County, local organizations work to protect and rehabilitate threatened habitats and species.

The Northwest Ecosystem Alliance utilizes various outlets to achieve its objectives. In addition to acquiring land, the group raises
funds to purchase timber rights, influences public-land management, pushes to pass laws and works to list local species as endangered, Dodd said.

Through grants and private donations, the Whatcom Land Trust works to acquire lands and rights to protect against development, said Ann Russell, a Whatcom Land Trust conservation specialist. For example, in 1998, trust board member Rand Jack and the trust finalized a $3.6 million deal for 2,300 acres called the Canyon Lake Creek Old Growth Community Forest. The land includes 700 acres of the second oldest old-growth forest in Washington — trees some 800 to 1,000 years old — that otherwise would have been clear-cut.

Jack said it is rare to find old growths more than 500 years old because large fires usually sweep through within this time span. “It’s almost like a laboratory of ancient trees and the things that go with ancient trees that you can’t reproduce,” Jack said. “It’s an opportunity to try and understand the ecological relationships in the context of a laboratory where those ecological relationships have been working themselves out for a thousand years.”

The trust endows a conservation easement to the Canyon Lake area that restricts development, Russell said. Whatcom County and Western Washington University mutually own the land for public recreation, environmental education and scientific research. Old-growth forests are an archetype of biodiversity. “One of the things that’s interesting about old-growth forests ... is that there are species that only survive in old-growth forests,” Jack said.

While the trust and the alliance work to preserve such ecosystems, Whatcom County continues to grow and develop, pushing species to the fringes of their habitats and existence. With the help of two streamside crews and community work parties, the Nooksack Salmon Enhancement Association works to restore sustainable salmon runs that have suffered from development, said Lindsay Taylor, the association’s education coordinator.

The nonprofit organization uses grant money and federal funds to restore and protect riparian areas. Landowners either contact the association or the group surveys areas potentially in need of help, Taylor said. Endangered species, such as the chinook salmon of the Nooksack, are victims of thousands of years of rapid human
progression, including the cultural and industrial revolutions and
the post-World War II biomedical revolution that led to a pop-
ulation increase of 2.5 billion to 6 billion people worldwide.
Ehrlich said.

"For the first time, the land surface changed dramatically,"
Ehrlich said, referring to the agricultural revolution of 10,000
years ago. "Instead of wandering around like any other mammal,
we started planting monocultures."

Stationary living differs from the nomadic lifestyle of hunters
and gatherers, whose impact on the environment was negligible,
Western anthropology professor Todd Koetje said.

The stability of a stationary lifestyle allowed civilizations to
grow, leading to overpopulation, Koetje said. Hansen said the rate
of species loss mirrors the rate of human growth. The current pace
of species loss is unlikely to stabilize if human population growth
does not, Ehrlich said.

"The inter-workings of ecosystems are so complex that we are
only beginning to realize how complex they are," Dodd said. "We
aren't able to save them, let alone reconstruct them. We can't
artificially recreate ecosystems. We can do repair work, but even
that is in its infancy."

Conservationists like Dodd say scientists are far from a
technical advancement to help restore these systems that are
scarcely understood.

"We are just beginning to figure out the complexities of
ecosystems. They are mind-boggling," Dodd said. "We take it for
granted. We look for technology to save us and fix our problems.
... Keeping an ecosystem healthy with all its intricate parts is on a
scale that scientists aren't even within the realm of offering a tech-
nological solution to."

As groups like the Whatcom Land Trust, Northwest Ecosystem
Alliance and The Nooksack Salmon Enhancement Association
focus their efforts on conservation projects and preserving imperiled
species, the loss of biodiversity continues locally as it does
globally. And as the growth rate of Homo sapiens carries on in its
swelling manner, the rate of species loss will continue at mass-
extinction pace.

Sophomore John C. Davies has been published in The Western
Front, The (McMinnville, Ore.) News Register and The Planet.

Bottom: Jack talks with James Agee, a fire ecology professor at the University of
Washington, on a tour of the Canyon Lake Creek area. Photo courtesy of Whatcom
Land Trust.

Below: In 1998, Jack and the Whatcom Land Trust finalized a $3.6 million deal to
protect 2,300 acres of old-growth forest called the Canyon Lake Creek Old Growth
Community Forest. Photo by Jamie Clark.
Sliding his hand under the slimy salmon’s gill cover, Michael Masters grabbed the dead fish and lobbed it into the woods to rot.

From October to December 2004, Masters, an intern for the Stilly-Snohomish Fisheries Enhancement Task Force, and other volunteers dispersed more than 500 dead coho and chum salmon from the Stillaguamish Tribal Fish Hatchery into the Stillaguamish River watershed.

Pacific Northwest salmon spend two to seven years of their lives in the Pacific Ocean, where they absorb nutrients such as nitrogen, phosphorus and carbon. When they return to their streams of birth to spawn and die, their nutrient-packed bodies become a rich natural fertilizer essential to the health of stream ecosystems. Because of human impact, salmon runs are declining; fewer salmon are returning to streams to spawn. Only 6 percent to 7 percent of marine-derived nitrogen and phosphorus that salmon once carried to their Pacific Northwest birth streams is returning, according to a 2000 study by the American Fisheries Society.

In 1990 the Washington State Legislature created regional fishery enhancement groups to involve local communities with recovery efforts. The task force, one of 14 such groups in the state, usually devotes its resources to restoring habitat for salmon. But for the past two years it also has been distributing dead salmon along tributaries of the Stillaguamish to restore nutrients to salmon habitat.

Plants near the stream absorb nitrogen and carbon from salmon carcasses. This in turn benefits salmon. Plants, such as alders, shade the stream and provide more than 90 percent of the organic nutrients that support other aquatic life, according to the Washington Department of Fish and Wildlife.

"Adult salmon acquire a majority of their body mass in the ocean," said Beth Sanderson, a research scientist for the National Oceanic and Atmospheric Administration. "They bring nitrogen upstream when they spawn. After spawning, most salmon species die and increase the overall productivity of the stream and forest ecosystems by becoming fertilizer."

Replacing nutrients in streams is vital to salmon-recovery efforts because after the spawning fish die, their carcasses feed more than 40 species, including juvenile salmon, said Jessica McAloon, who works as a U.S. Fish and Wildlife river ranger at the Marblemount Fish Hatchery during winter.

"It is important to the cycle for the parents to die and remain because the bugs feast on the parents and the young feast on the bugs," McAloon said.

Because not enough adult salmon are returning to provide nutrients to their offspring, the young salmon need a jump-start, said Scott Lentz, a district fisheries biologist for the U.S. Forest Service.

For the past two years, the Forest Service has worked with the National Park Service, Washington Department of Fish and Wildlife, the Upper Skagit Tribe, Puget Sound Energy, Fidalgo Flyfishers and Skagit Fisheries Enhancement Group in an effort to restore nutrients to the upper Baker River, as well.

In September 2004, the Forest Service distributed 1,200 frozen salmon carcasses to nutrient-limited streams. Volunteers loaded 14,000 pounds of salmon into containers by hand. They connected the containers to a helicopter and dumped the carcasses from 100 to 200 feet above the ground—similar to firefighting drops, Lentz said.

"The drops are aimed at the small side channels so that during floods they won't wash away," Lentz said. "Accuracy does count to a certain degree; however, we're not just doing this for the fish. Eagles and bears will like them just fine, wherever they land. It is possible to enhance nutrients with inorganic

They bring nitrogen upstream when they spawn. After spawning, most salmon species die and increase the overall productivity of the stream and forest ecosystems by becoming fertilizer.

Beth Sanderson
National Oceanic and
Atmospheric Administration research scientist
Right now, only about 50 salmon a year for the last two years have been returning. This is not a good amount for the entire basin.

Scott Lentz
U.S. Forest Service
District fishery biologist

fertilizers like pellets, but using fish carcasses to enhance the nutrients benefits bears and eagles as well.

Animals, such as bears and eagles, play an important role in the nutrient cycle. When predators and scavengers leave behind remnants of their meals and defecate in the woods, they disperse nitrogen-rich fertilizer farther into the forest.

Tom Reimchen, a biology professor at the University of Victoria, British Columbia, found that during a 45-day spawning period, a black bear can catch approximately 700 chum salmon and leave roughly half of each salmon carcass in the forest. The rotting salmon contribute approximately 120 kilograms of nitrogen per hectare of land, Reimchen said.

"The vegetation along the riverbank is very productive as a result of the salmon recycling," said Chris Morgan, director of Insight Wildlife Management Inc., a company that specializes in bear research and education. "Wherever salmon and bears coexist, their populations will benefit each other and their ecosystems."

Decomposing salmon carcasses lure bald eagles from Alaska to scavenge in Skagit Valley. One of the largest wintering populations of bald eagles in the continental United States flocks to the Skagit River to devour the dead fish, which attracts flocks of bird watchers to locations such as the Marblemount Fish Hatchery.

The hatchery provides salmon for the upper Baker River nutrient rehabilitation project. When the salmon return to spawn and die, the hatchery collects the carcasses and freezes them until it can disperse them.

A template of what has been going on in British Columbia for roughly 15 years, this idea has only been used in this region
Jessica McAloon, a U.S. Fish and Wildlife river ranger, kneels inside the freezer of the Marblemount Fish Hatchery where fish carcasses are preserved until they are distributed to nutrient-limited streams. Photo by Khale Walltimer.

Senior Sarah Kuck studies environmental journalism. She has been published in The Planet.

for about five years, said Dave Steiner, a project manager for the task force.

“We know generically that this is doing good things for enhancement based on years of Canadian research,” Steiner said. “This technique helps produce bigger fish. Bigger fish equal healthier fish, which equals a better chance for survival.”

It is still too soon to tell if the efforts are making a difference in Washington, Lentz said.

A returning population of 10,000 to 20,000 salmon, on a consistent basis, would benefit the upper Baker watershed and its salmon populations, said Steve Fransen, a biologist for the National Oceanic Atmospheric Administration.

“Right now, only about 50 salmon a year for the last two years have been returning,” Lentz said, regarding the upper Baker River. “This is not a good amount for the entire basin. We will expect to see results in 10 years, possibly much less. The main reason we are not seeing results is that we are not placing enough fish in to make a difference.”

In order to disperse more fish, Lentz and salmon-enhancement groups, such as the task force, need more funding for such projects.

“We aren’t expecting much in the way of funds from the government for the next four years,” Masters said. “We are going to be leaning heavily on grants and volunteers.”

The emphasis on the need for salmon enhancement will not go away while political conditions are ever-changing, Steiner said.

“We need to protect what’s out there to preserve what we have left,” Steiner said. “Making it happen on a local level and uniting as a community is what is going to accomplish things in the environmental field. We have to decide as a society if we want the fish here and if we want to do something about it.”
Stephen Trinkaus is the owner of the organic grocery stores Terra Organica and Bargainica.

There’s been times when we’ve really struggled to make it. I had to think of ways that I could reinvent myself and do something different.

Stephen Trinkaus
Terra Organica owner

There's been times when we've really struggled to make it. I had to think of ways that I could reinvent myself and do something different.
"On the one hand, the integrity of the product goes down. On the other hand, these products make it into mainstream grocery stores and into people's hands who never would have bought it," Trinkaus said.

Small companies in general have a more difficult time than large businesses. Regulations and subsidies work in favor of large business, making it difficult for small businesses to stay competitive. Taxes, insurance, permits and other operating costs can keep small businesses from effectively competing against large conglomerates. Environmental companies balance these challenges with trying to maintain the integrity of their product and practices.

"It's challenging to run an environmentally friendly business because everything you do is going to cost you more money. A non-environmentally friendly business is just going to throw their fluorescent lights in the garbage, and they've got mercury in them. You need to recycle them. But the public doesn't know that. The public doesn't know if you use recycled paper or not. Of course it makes it harder to compete," Trinkaus said.

Terra Organica is almost entirely organic, Trinkaus said. He said he is proud to carry products from companies with high integrity. But at the same time, he understands that he has a business to run.

"I think being in business, you never lose sight of the bottom line because if you do for a second, you'd go out of business," Trinkaus said. "The natural-food business is a highly competitive market. There's hundreds and hundreds of companies making thousands of products all competing for shelf space."
Terra Organica's shelves once were home to a line of organic products named Fare Thee Well Foods. Halley Manion started Fare Thee Well Foods not because she wanted to get rich but because of her belief in the importance of organic foods, she said. Manion measured the success of the company by the satisfaction of her customers rather than company profits, which often were just enough to pay the bills. Fare Thee Well Foods made organic, non-wheat baking mixes, snack bars and cereals.

Fare Thee Well foods was never large. Typically run by only three employees, it managed to distribute its products all over the country. Manion filed bankruptcy two years ago because the company simply wasn't making enough to survive.

"The bottom line of our survival is the soil," said Manion. "If we don't take care of it, we're gone."

Perhaps Manion's bottom line was just too different from the bottom line her competitors embraced.

But it is not just food-related companies that are trying to minimize humankind's footprint on Earth. Renewable energies, organic clothing, energy-efficient buildings and ecotourism are taking advantage of the "green" market.

Environmental-cleanup companies represent another sector of the environmental market. Klean Earth Environmental Company, founded in 1992, treated toxic heavy metals in soil with technology that surrounds ions in silica.

"Silica does not degrade in the environment, so it was the perfect medium to use," said Jim Roma, the former executive vice president of KEECO. "People had been trying to use it for fifty years, but nobody had actually figured out how to make it work ... To make

Jim Roma was the executive vice president of Klean Earth Environmental Company, which marketed a technology to treat soil and water contaminated with toxic heavy metals. Photo by Jamie Clark.
silica from a solid into a liquid, surround the particle, and then turn it back into a solid in seconds was a Really novel process.”

KEECO, started in Lynnwood, developed its technology and built its company from the ground up starting in the early ’90s. Roma became involved with the company in 1993. He saw a possible business opportunity as well as an opportunity to help the environment, he said.

“I think it’s becoming more and more understood now that water is the future. If we don’t figure out how to solve our contaminated water issues, then we can’t go forward. As mankind, we’ve got to resolve that,” Roma said.

KEECO’s technology also was effective at treating radioactive wastewater. KEECO’s META-LOCK treatment process cleaned radioactive waste such as depleted uranium to below detectable levels.

“This technology promises a new and more effective method of heavy metal remediation than alternative remediation techniques,” Sen. Patty Murray, D-Wash., wrote in a letter endorsing the company. “For this reason, I believe KEECO could play a role in achieving our cleanup goals at Hanford and other contaminated government sites.”

But large corporations dominate the market for nuclear cleanup, so penetrating that market — even if one might have superior technology — is difficult, Roma said.

“We felt like we were the perfect technology at the perfect time to address those issues,” Roma said. “And we were. Getting over that big hump is the difficult part. So many good ideas and technologies never make it because they can’t get past that big hurdle of getting financed and being brought to the market.”

KEECO filed bankruptcy in 2003 and is in the process of transferring the technology over to a company named Ten-X.

In a capitalist economy, bankruptcies and business failures are a given. The question is whether some companies lose sight of the competitive market because of environmentally motivated views.

“There’s definitely a disadvantage of buying into the whole green thing. You certainly run a risk by doing that,” said Dean Fearing, director of the RE Store in Bellingham.

The RE Store is a nonprofit business that sells salvaged building materials to recover as much material as possible from the waste stream. Simply keeping its head above water can be a daunting task.

“We’ve had our bad years. Last year we had such a bad year that if we continued to operate that way, we wouldn’t have survived,” Fearing said, referring to the company’s discontinued deconstruction service. “When you’re competing against places like Wal-Mart, it’s tougher. You really don’t stand a chance competing against them.”

Light Green Advisors, a Seattle-based investment consultant firm, looks to invest in companies with favorable environmental records. Its philosophy is that companies with the best environmental records better sustain shareholder value long term. According to this philosophy, striving for sustainability likely will be a better business practice than those that attempt to maximize short-term profit.

Companies such as Terra Organica, Fare Thee Well Foods, KEECO and the RE Store are battling to make it easier for industry and nature to work together.

There’s definitely a disadvantage of buying into the whole green thing. You certainly run a risk by doing that.

Dean Fearing
Bellingham RE Store director

“It’s a trend in that it’s catching on more and more, but I don’t see an end in sight. There’s a lot of room for us to expand,” Fearing said.

Roma has a similar outlook.

“I do see growth in this field,” Roma said. “I wouldn’t say that I see a downward trend. You really have to do it by your bootstraps, and you really have to be determined, a little bit lucky and persevere through everything.”

Trinkaus also sees growth in the environmental sector.

“I think it’s inevitable that the organic industry will continue to grow at the rapid pace that it has been,” Trinkaus said. “There’s an impression that organic and natural products are very expensive and only hippies eat it — or only Volvo-driving, soccer-mom liberals eat it. I think in the long run it needs to be marketed to the mainstream. The things that we are selling are as wholesome and American and mainstream as what anybody else is selling.”

Junior Andrew Bernhardt studies environmental science. This is his first published piece.
rendered invisible

BY DARCEY MAHER.
PHOTOS BY JAMIE CLARK

Traditionally, Plains Indians used almost every part of the buffalo they killed, from the tail to the gall bladder. Early settlers in the Northwest salvaged animal parts for clothing, tools and soap. These subsistence cultures used almost the entire animal out of necessity. The practice continues today in the form of rendering, although on a much larger scale.

Rendering is the process of turning dead animal parts into useable products. Rendering facilities cook and press animal matter to separate fats from solids. The resulting materials — tallow and meat and bone meal — become ingredients in everything from animal feed to explosives.

Other legal methods of disposal in Washington include burial and incineration. But only rendering puts almost every part of the animal to use.

According to the Whatcom County Code, the preferred method of dead-animal disposal is rendering, said Bill Angel, the Whatcom County Health Department's environmental health specialist. In Whatcom County, this is because rendering has been around a long time, and it is a good recycling opportunity, he said.

Because of public reaction, renderers rarely advertise their services. Dick Hinthorne, the general manager for Baker Commodities Inc., a rendering company with a collection facility in Whatcom County, said few people are familiar with animal life cycles and processing. The general public has a sanitized vision of agriculture, he said. Although widespread in the United States and abroad, rendering is known as "the silent industry," avoiding public scrutiny.

"People are disconnected from agriculture," said Dennis Luckey, Baker Commodities' executive vice president. "They think products just magically appear in the supermarket; they are very removed from the process."

In November 2004 the United States commercially slaughtered more than 11.5 million cows and pigs, according to the U.S. Department of Agriculture. The leftover entrails, bones, skin and hooves serve as the raw materials in the rendering process.

Whatcom County is home to approximately 112,417 cattle, including about one-fourth of Washington's dairy herd, according to the 2002 Census of Agriculture.

Linsey Hoekstra, the owner of Tri-County Dead Stock Removal, makes his living transporting the animal carcasses these dairy and livestock herds generate. Using a Ford L8000 truck and a hydraulic winch to load his deceased cargo, Hoekstra delivers to Baker Commodities' Ferndale station five days a week.

"It's usually dairy cows who've gone down, but I get horses and calves, too," Hoekstra said.

Butcher shops also produce material for renderers. Rick Biesheuvel, the co-owner of Lynden Meat Co., said roughly 40 percent of a butchered cow is packaged for consumption. The other 60 percent, including hooves, skin, bones and entrails, becomes material for rendering. Renderers collect grease from restaurants, as well. The grease and byproducts of the beef and dairy industry supply the bulk of renderers' raw material — but not all of it.
Penny Cistaro, the executive director of the Whatcom Humane Society, said the society's Animal Control and Rescue squad picks up stray dead animals and road kill and takes them to the county animal shelter. Baker Commodities collects these animals along with the shelter's euthanized cats and dogs.

At Baker Commodities' Ferndale station, employees salvage hides for leather production before fleets of covered trucks transfer the remaining animal matter and restaurant grease down Interstate 5 to Baker Commodities' Seattle processing plant.

Positioned between the railroad and the Green River, Baker Commodities looks like a typical industrial facility. Steam vapors waft skyward as trucks pull in and out of the access gate. A faint smell distinguishes the plant's function.

Meat rendering products

Raw materials

- Tallow
  - Soap
    - Oleic acid
      - Lubricants
        - Textiles
        - Emulsifiers
        - Cleansing creams
    - Glycerine
      - Inks
      - Glues
      - Solvents
      - Antifreeze
      - Explosives
    - Stearic acid
      - Rubber
      - Tires
      - Lubricants
      - Esters
    - Linoleic acid
      - Esters
      - Lubricants
      - Paints
- Meat and bone meal
  - Livestock feed
  - Poultry feed
  - Pet food
- Hides
  - Leather
  - Shoes
  - Garments
  - Upholstery

You don't adjust to the smell. You learn to breathe around it.

Ben Cameron
Baker Commodities assistant area manager

"A rendering plant has existed at this location since 1936," assistant area manager Ben Cameron said.

On a Monday morning, Cameron had to shout above the noise of routine facility maintenance. Two 60-foot blue silos at the front of the plant hold processed meal, he said. To the left, in a large ventilation structure, air-scrubbers wash vapor with chlorinated water. A thermal oxidizer burns additional odors at 1,200 degrees Fahrenheit, he said. With a hose, Cameron sprayed a chlorinated, mint-smelling foam that also reduced odor.

"You don't adjust to the smell," he said. "You learn to breathe around it."

Trucks from the transfer stations unload their cargo into raw-material pits, each capable of holding 25 tons. The process starts with an initial grind-up. Then a 68-foot screw, 20 inches in width, transfers material over a magnet to remove stray metals, such as...
old barbed wire and other stray metals cows might have eaten. After more grinding, the material goes into a "finishing hoger" for final breakdown.

Baker Commodities uses a steam "continuous processing" method to process large amounts of animal byproduct, Cameron said. Used restaurant cooking grease fuels water boilers for the steam cooker. From a touch-screen computer, Cameron can monitor the cooker's heat and processing speeds. Rotating screws enclosed in pipes transfer the material between the different steps in the rendering process, so the material is seldom visible or handled by human employees.

Water, which comprises half of all raw material, evaporates during cooking. A cooking shaft, the length of a bus and 6 feet in diameter, draws raw material through one end and pushes baked material out the other. Pressing separates the grease, or tallow, before further refinement. The resulting "cakes" of meat and bone meal are reground, dried and shaken to remove hair. Processed solids resemble dirt the consistency of corn meal.

"We try to recover everything," Flinthorne said. "Our objective is not to have to send anything to the dump."

Renderers throughout the country process 36 billion pounds of inedible animal byproduct a year, according to the National Renderers Association Inc. The solid and fats that result from rendering become ingredients for a variety of products. Paint, lubricant, shampoo, tires, explosives and ink contain ingredients derived from tallow. The solids — meat and bone meal — are important ingredients in livestock feed, poultry feed and pet food.

Baker Commodities sells tallow and meat and bone meal in bulk quantities to markets in Asia, Luckey said. Baker Commodities exports almost 100 percent of its products from the Northwest region.

Rendering's status as "the silent industry" changed in 2003 when authorities found a case of bovine spongiform encephalopathy, or mad-cow disease, in Washington, attracting media attention.

Baker Commodities' Spokane processing plant rendered the infected animal, Flinthorne said. By the time the Animal and Plant Health Inspection Service identified the diseased animal, 13 days had passed, and the cow had been processed. Flinthorne said careful documentation allowed Baker Commodities to identify the cow as Canadian in origin and isolate infected material.

We try to recover everything. Our objective is not to have to send anything to the dump.

Dick Flinthorne
Baker Commodities general manager

"We knew exactly which animal it was, where it came from and where the contaminated material had been shipped to," Flinthorne said.

In reaction to this case, APHIS began an enhanced mad-cow disease surveillance program. Now, testing occurs at slaughterhouse's on-site rendering plants and collection facilities. Of more than 175,000 cows tested in 2004, zero tested positive for the disease, according to the APHIS Web site.

In 1997, The Food and Drug Administration prohibited ruminant animals, such as cows, sheep and goats, from being processed into feed for other ruminants. In response to the Washington case, the FDA is considering stricter feed laws to prevent the spread of mad-cow disease. Proposed regulations would prohibit specific animal material from entering meat meal and bone meal that other animals eat. Luckey said this move would make rendering those materials economically unfeasible.

"We have to let science play out," Flinthorne said, referring to APHIS testing. "The tests will be done in November, and we are waiting for the FDA's rulings then."

Regardless of restrictions, the rendering industry will continue to operate, Luckey said. More un-rendered material, however, will probably end up in landfills if the feed ban tightens, he added.

In 2004, world meat production was 253.6 million tons, and this increases every year, according to the Department of Food and Agriculture Administration of the United Nations. Renderers play an integral part in processing the waste this production generates. Having already lasted years in silence, renderers plan on outlasting current health issues in the public's view.

"We are not a glamorous industry," Luckey said, "but we provide a valuable service to society and the environment."

Senior Darcey Maher studies environmental journalism. She has been published in The Western Front and The Planet.
Environmentalism is dead.

At least according to Michael Shellenberger and Ted Nordhaus, two environmental and political strategists, who wrote "The Death of Environmentalism: Global Warming Politics in a Post-Environmental World," to encourage a rebirth of the movement.

"I felt that having lost all three branches of the government to anti-environmental extremists, having poured $15 million to beat Bush, (and) while having failed to achieve any national legislation on global warming, that we did not only have a right, we had a responsibility to challenge basic environmental assumptions about everything," Shellenberger said.

While many disagree with this opinion — Internet searches yield volumes of debate — Shellenberger said the 30-page essay has received an encouraging amount of support.

"Young people especially have been really supportive. We see this as the next generation of progressive Americanism in our country," Shellenberger said. "We've also been getting incredible support from those who grew up in the '60s."

In Whatcom County, younger, second-generation environmentalists, as well as veterans from the '60s, see the movement as spread too thin and without a unifying direction to take on problems as intimidating as global climate change or overpopulation. Most say the movement is dead nationally but still vibrant in its grass roots.

Bob Keller, a board member of the Whatcom Land Trust, has been an active environmentalist in the county for more than 50 years.

"I'm not sure how accurate it is to talk about the movement dying if it never was totally alive," he said. "There never has been a national centralized leader, like King in the civil-rights movement."

He described the environmental movement as a blanket term strung over independent clusters of people concerned about the Earth who work on a local level. Large-scale success, however, is contingent upon others doing the same across the globe, which is not happening, Keller said. This lack of organization, he said, limits public discussion of the movement's national direction, siphoning its life away.

"Policies are not being framed in a way so that the public can sit back and say, 'This is what that means to me,' or 'I know how this helps so I support that action.' This understandably separates people that have good sense; they're just not included," said Dave Werntz, the science director for Bellingham's Northwest Ecosystem Alliance.

The alliance has worked to keep the Northwest's wild lands safe through forest conservation and endangered-species protection since 1988. Werntz said he has noticed a big change in the movement since the '70s. He cited former Sierra Club President Adam Werbach's speech, "The Death of Environmentalism," to explain how the movement no longer conveys its vision of policy creation to the public.

"What is dead within the movement is the insider gain game and holding dialogues on policy at a table with power brokers, while not communicating with the public about what these decisions mean," Werntz said.

Shellenberger and Nordhaus wrote about how a movement that started as a group of concerned citizens has become bureaucratic and something to which citizens cannot connect.

"The environmental movement fetishizes technical policy solutions and as a consequence, they have now lost the minds of the American people," Shellenberger said. "What is more powerful than any piece of legislation is shaping the values and world views of the American people. In that part, economic and religious fundamentalists have been more progressive than environmentalists."

In effect, environmentalism is a movement that says "no" to certain sectors of the population. Local environmentalists agree this is not an enduring vision by itself. People are failing to see the values backing these types of restrictive legislation, Werntz said.

For example, in 1990 Sen. Richard Bryan, D-Nev, nearly passed a fuel-economy standards bill, falling one vote shy in the Senate.

Dave Werntz is the science director for Bellingham's Northwest Ecosystem Alliance.
Instead of talking about raising CAFE standards by X amount, we really should be explaining how much money the country will be saving through more economical cars and how security is increased in the same way.

Seth Cool
Northwest Ecosystem Alliance conservation associate

I think the words "environmental movement" may be dead. Those words are so small and limiting for where we need to go and do. It is about recasting our relationship with the land and each other.

Robyn du Pré
RE Sources program director
Then in 2002 Sens. John McCain, R-Ariz, and John Kerry, D-Mass, tried again to raise Corporate Average Fuel Economy standards and were shot down 62-38.

Shellenberger and Nordhaus wrote that the progression from one vote away to 22 votes away 12 years later hints at a poorly proposed bill with no core values as backing. Environmental bills will have no carrying effect without showing they are derived from conscientious and well-meaning ideals.

This stance of environmental legislation that excludes people and organizations is dead, Shellenberger said.

"The environmental movement started with new ideas," said Lynn Robbins, a Huxley College of the Environment professor. "The atmosphere at the time made it evident that feminism, classism, race, poverty and health rights were in mind with the environment; that is what we thought environmentalism was."

Robbins has been involved in civil and environmental rights since the '60s. He said that special interest environmentalism left behind the other "isms" of that rebellious generation.

Robbins and Keller said they were proud of the worldwide awareness the movement generated. They said that amid political hardships in recent years for environmentalism, overall awareness around the globe is more hopeful than it was 50 years ago.

"People's cultural concepts don't change very fast," Keller said. "Life in our society is predicated on the automobile. This is an example of how hard it is to change cultural concepts."

Although many people's cultural concepts are slow to change, Shellenberger said it is time to incorporate these people into a progressive vision and encourage cultural shifts.

"So really the problem around global warming is going to be solved in the same way as problems of poverty, economic opportunity and the freedom of women and young people," Shellenberger said. "That (solution comes) from developing an American citizenry that is oriented towards progressive values and a progressive vision of the future."

He wrote that this orientation does not describe global climate change as a problem of carbon, but of idealistic disagreement. The fresh vision sees the change as an opportunity to finally unite industry leaders, labor unions, civil and women's rights activists and environmentalists toward an economic revolution — A New Clean Deal.

Seth Cool, a conservation associate at the Northwest Ecosystem Alliance, said he was encouraged when he read former Sierra Club President Adam Werbach's speech titled "The Death of Environmentalism."

"Instead of talking about raising CAFE standards by X amount, we really should be explaining how much money the country will be saving through more economical cars and how security is increased in the same way," Cool said.

Shellenberger and Nordhaus outlined in their essay how renovating America's infrastructure with cleaner practices would reinvigorate a hurting automotive industry seeking to send its factories overseas. The plan involves improved health care, greener energy systems, a boost for job creation and most importantly, it sets an international example for the direction of modern development.

This vision is not a mirage. It is as solid as some of its supporters. Sen. Maria Cantwell, D-Wash, is one of the founding members of the Apollo Alliance. The alliance is uniting labor unions, industry leaders, government representatives and national environmental organizations. Werbach, Shellenberger and Nordhaus also were part of its formation.

Apollo is not an environmental movement; it is an effort of industry and labor leaders to renovate America's power sources.

The Washington State Labor Council, the AFL-CIO, Rep. Jay Inslee, D-Wash, and the Seattle NAACP were some of the first to endorse Apollo's ideals of job creation and economic revival through sustainable energy renovation in Washington state and the nation.

Apollo has partnered a 9-kilowatt photovoltaic solar-energy system in Renton. When completed, it will be the largest solar-power installation in the Northwest, training and employing local technicians and electricians.

Werntz and Cool have been working on forest conservation but with an angle of including loggers and the U.S. Forest Service. Their efforts, which focus on including the communities of Packwood and Randall, exclude regulative policy.

"When litigation was being used as a last resort on Gifford Pinchot National Forest, everyone was losing," Cool said. "People were still unemployed, and old growth was still at risk."

A field tour with all interested parties led to cooperation that created jobs in logging, decommissioning road construction, streambed restoration and local mill operations, Werntz said.

"By going into these communities and talking to people directly, we've found a pretty broad set of values that we all agree upon, and as a result, Forest Services have not been planning cuts in old growth and we're creating jobs," Werntz said. "I think this is exactly what many of these death-related analyses are talking about; getting all of the people who have a stake in the issue and finding all the places where we can agree and move forward."

RÉ Sources program director Robyn du Pré has worked with Bellingham and Seattle residents for several years on environmental issues. Her organization incorporates builders and contractors into a sustainable vision of development. She said she does not think the movement is dead, or should be.

"I think the words 'environmental movement' may be dead," du Pré said. "Those words are so small and limiting for where we need to go and do. It is about recasting our relationship with the land and each other."

Once people recognized the degree of environmental death in the '60s, they fired up radical practices to fight against it, and Congress passed certain protections. Forty years later, some are realizing environmentalism is not as effective as it could be, and they are calling out radical suggestions for reform.

Senior Evan McLean studies environmental journalism. He has been published in The Western Front and The Planet.
WANTED...
DEAD OR ALIVE?

BY ERIK PETERSON

Mountain goat populations in the North Cascades have been decreasing for the past 40 years. Photo courtesy of Colin Shanley.
"My days usually begin with a couple of hours driving and a couple of stiff cups of coffee," said Chris Danilson, the Sauk-Suiattle Tribe’s wildlife biologist. "I put together a lightweight pack so I can move quickly. Then it’s beatin’ the feet up the trail, usually 2, 4, maybe 5,000 vertical feet in a day, in search of the goats. Then I get back down the mountain safely and hopefully, before dark."

In the North Cascades, the native mountain goat population is in trouble. Scientists are conducting a research project to reverse the species’ 40-year population decline. Meanwhile, on the other side of Puget Sound in Olympic National Park, mountain goats are not native. There, the goat population is thriving, but threatened.

The park's preferred alternative, according to a draft environmental-impact statement, is to eradicate the goats by shooting them from helicopters. The public, however, is divided on the issue.

Disappearing from the North Cascades

"The mountain goat is vital to my heritage," said James Joseph, the Sauk-Suiattle natural resources director. "When I introduce myself to another Indian, I give them my Indian name, Quil Ish Ka’ Nim. Then I tell them, ‘My clan is the Mountain Goat.’"

The Sauk-Suiattle Tribe, located near Darrington, has great cultural, spiritual, social and economic ties to the mountain goat. Anthropological evidence dates the tribe's relationship with the mountain goat back nearly 8,000 years, Joseph said.

"We've been here for generations," Joseph said. "We used to go up into the hills to collect their wool to make sweaters, hats and socks. In September and October, we had expeditions to harvest goats for meat. We used their horns for tools and their hides for leather clothing. We used the wool to trade with other tribes."

Unlike most Western Washington tribes, the Sauk-Suiattle are mountain people. The mountain goat symbolizes their connection with the North Cascades.

Coastal tribes look to the killer whale for spiritual meaning because they spend most of their time by saltwater. Up here, we look to the mountain goat.

James Joseph
Sauk-Suiattle Tribe natural resources director

The mountain goat is a vital part of the Sauk-Suiattle Tribe’s tradition and symbolizes its people’s connection with the North Cascades. Photo courtesy of Colin Stanley.

"Coastal tribes look to the killer whale for spiritual meaning because they spend most of their time by saltwater," Joseph said. "Up here, we look to the mountain goat."

For the past 30 years, the tribe has chosen not to hunt mountain goats or make clothing from their wool because of the ongoing population decline.

"Everyone knows mountain goats are out there, but they are not a bread-and-butter species for the department," said Cliff Rice, a Washington Department of Fish and Wildlife research scientist. "They tend to be pushed to the side. Then, periodically, the department says we need to pay more attention to what's going on."

In 1960, an estimated 9,000 goats lived in the North Cascades. Only 3,000 to 4,000 remain.

"We don't know what exactly caused the current decline of mountain goats in the North Cascades, but all of the possible causes are interconnected," Rice said. "The most prominent one is that hunting limits were set too high in the past, but that doesn't explain the decline entirely. The decline also coincided with a lot of the timber-harvest activity."

In the past, the hunting limit for mountain goats was the same as all other ungulates, or hooved animals, Rice said. Mountain goats, however, have lower reproductive rates than other ungulates, so they cannot rebound as quickly when their numbers decline.

Timber harvesting also potentially impacts the goats. During the winter, mountain goats move down into forested habitats adjacent to cliffs, Rice said. Less snow accumulates under the shelter of mature, closed-canopy forests. Because of this, more forage is accessible to the goats, compared to more open areas that are buried under snow. Forests of the young, open-canopy variety do not have enough food resources for goats.
On Mount Adams and throughout the North Cascades, radio collars on mountain goats allow scientists to track goat movements throughout the year. Photo courtesy of Colin Shanley.

Above: Cliff Rice (left) and a veterinarian (right) immobilize a goat in order to attach a radio collar. They perform an ultrasound to check the goat's health. Photo courtesy of Washington Department of Fish and Wildlife.

Researchers dart goats using a tranquilizer gun. Then the researchers give each immobilized goat a physical examination and a Global Positioning System radio collar. Every three hours, the radio collars record each goat's location.

One project goal is to map the year-round habitat mountain goats use throughout the North Cascades. The other project goal is to increase the aerial survey accuracy of the goat population. Project leaders will make management recommendations to the state from the project's results so that scientists can better manage the species in the future.

"It's possible that we could suggest augmenting the goat population in places like the Darrington area in the future," Rice said.

One way to augment the North Cascades goat population could be removing non-native mountain goats from Olympic National Park and putting them in the Cascades.

The non-native problem

"The (Olympic National) park exercises mind control over the public," said Ron Judd, a Seattle Times columnist who has written several books about recreation and the Pacific Northwest. "They don't want the public to associate mountain goats with the park. In
fact, you now cannot buy anything from the park with a goat on it, not a postcard, nothing.

Fifteen thousand years ago, the Cordilleran Ice Sheet separated the Olympic Peninsula from the rest of Washington state. The following period of isolation led to the creation of many localized species, found only on the peninsula. Today, the peninsula has 35 endemic plant and animal species, such as the Olympic marmot and Piper's bellflower, a plant goats eat.

The ice sheet also barred many species found in the North Cascades from dispersing to the peninsula. Mammals historically found in the North Cascades but absent from the Olympics include the grizzly bear, wolverine, lynx, pika and mountain goat.

In the 1920s before the establishment of Olympic National Park, 12 mountain goats from Alaska and Canada were introduced for hunting purposes near Lake Crescent on the Olympic Peninsula. The goats thrived in their new alpine environment, quickly expanding south and east across the park at a rate of six kilometers per year. By 1983, the estimated goat population in the park soared to nearly 1,500.

Some park officials dislike mountain goats in Olympic National Park because the goats are not native to the park.

"Parks are for preserving pieces of the United States with naturally functioning ecosystems," said Patti Happe, the Olympic National Park wildlife branch chief. "Mountain goats are not a part of this ecosystem, and they shouldn't be."

Some park scientists say the mountain goats' presence threatens alpine environments in Olympic National Park, which contain many fragile plant species.

"With exotic species, the time when you want to control them is not when the population is huge and causing resource damage," Happe said. "You want to get them before they spread because that's when the population is small and you actually have the ability to control them."

According to National Park Service policy, a control or eradication program can be justified if the species is non-native, the species threatens the park's natural resources or public health and control of the species is prudent and feasible. Happe said the mountain goat meets these three criteria.

From 1981 to 1989, the park removed 407 goats while control of the species was prudent and feasible. Park personnel in helicopters used tranquilizer guns and net guns to immobilize the goats. Then personnel tied the goats up, put them in sacks and helicopters whisked them away.

Parks are for preserving pieces of the United States with naturally functioning ecosystems ... Mountain goats are not a part of this ecosystem, and they shouldn't be.

Patti Happe
Olympic National Park wildlife branch chief
The preferred alternative from the draft EIS was to kill the remaining goat population by shooting them from helicopters.

Barb Maynes
Olympic National Park public information officer

Three hundred and sixty of the 407 goats were relocated to various regions across the Western United States, including an unspecified number to the North Cascades. Twenty-eight died during the capture process. Scientists killed 19 others for scientific purposes. The park discontinued the removal program after 1989 because of increasing cost.

In 1995, Olympic National Park officials wrote a draft environmental-impact statement.

"The preferred alternative from the draft EIS was to kill the remaining goat population by shooting them from helicopters," said Barb Maynes, the Olympic National Park public information officer.

The park estimated the preferred alternative to be the cheapest and most efficient way to eradicate the park's goat population. The 1995 estimated cost for this alternative was roughly $820,000. The figure would likely be more expensive today.

In 2000, the Conservation Biology Institute examined all the scientific data on mountain goats in the park. The review concluded mountain goats were never native to the Olympic Peninsula and that controlling mountain goats would be prudent and feasible. The report also concluded, however, that insufficient data exists to establish that mountain goats are negatively impacting the alpine vegetation more than other natural phenomena.

Some people support the park's policy for the mountain goats, but others vigorously oppose it.

Judd questions the validity of evidence that blames goats for vegetation damage and said he believes goats should remain in the park.

"The early science for goat management in the park was a sham," Judd said. "Their survey technique was fraudulent. They put out salt blocks to attract goats from 30 miles away to places like Hurricane Ridge. So then, of course, the goats created wallows near these salt blocks. Then the park took pictures of the wallows as proof of the (plant) damage the goats were causing. It's a joke."

Dave Wernitz, the Northwest Ecosystem Alliance science director, said he supports Olympic National Park's position on non-native mountain goats.

"Plants that are subject to herbivory develop mechanisms to deal with this stress," Wernitz said. "The alpine plant communities in Olympic evolved without herbivory by mountain goats. Hence,
they have not developed mechanisms to cope with it. To solve this problem, the goats need to be removed. Are the people opposed to removal suggesting that we should accept parks in a degraded state? I don't think we should.”

Judd said that national parks are supposed to preserve natural functioning ecosystems while providing for the public. Thus, by their very nature, parks are degraded to some extent.

“Keeping the park in its natural state is a fallacy,” Judd said. “People impact the park, too. They don’t have a program to eradicate black slugs. It’s hypocritical of them to seize on goats. The truth is the ecosystem will never be pure. If it were, they would keep people out.”

Periodically, Olympic National Park conducts an aerial census of its goat population. In 1983, the first census estimated 840 to 1,510 goats. Census estimates following the removal program have held steady, ranging from roughly 200 to 400 goats. The summer 2004 census estimated 259 to 320 goats.

“The goats have not rebounded (since the removal program) as quickly as people would have thought, but we are now beginning to see some indications that they are starting to rebound once again on the west side of the park,” Happe said.

An uncertain future
In the Olympics, the future of the non-native mountain goats is uncertain. Current research is attempting to establish a clearer connection between the goats and perceived negative impacts to alpine vegetation. In the short term, however, the park has no plans to further control the population. Public opinion might ultimately decide the goats’ fate in the Olympics.

Meanwhile, in the North Cascades, the results of the current research project likely will lead to new conservation measures to promote mountain goat recovery. The Washington Department of Fish and Wildlife has already undertaken a preliminary measure by reducing the annual number of hunting permits issued each year for mountain goats. The number dropped from 218 in 1991 to 26 in 2001.

“In the future, the (Sauk-Suiattle) tribe would like to have a viable, healthy population in their historic hunting and wool-gathering grounds, close to their numbers before the decline,” Danilson said.

Some individuals have suggested relocating goats from Olympic National Park to the North Cascades.

“That’s definitely a possibility. If they start removing goats from the park again in the future, I could definitely see that happening,” Rice said.

Danilson also said he believes relocation is a possibility in the future.

The mountain goat population in the North Cascades may or may not grow to what it once was. But relocating unwanted goats from Olympic National Park to the North Cascades could be a productive solution to the state’s mountain goat dilemma.

Senior Erik Peterson studies environmental science. This is his first published piece.
WHEN WILDERNESS WRITER, ACTIVIST AND CURMUDGEON EDWARD ABBEY DIED IN MARCH, 1989, HIS FUNERAL REQUEST WAS MODELED AFTER HIS APPROACH TO LIFE: SIMPLE, NO FRILLS AND GIVING A RESOLUTE MIDDLE DIGIT TO THE STANDARD AMERICAN CONCEPT OF FUNERALS. TWO CLOSE FRIENDS WRAPPED ABBEY'S BODY IN HIS OLD SLEEPING BAG, PLACED HIM IN THE BACK OF A PICKUP TRUCK AND BURIED HIM IN AN UNMARKED GRAVE, SOMEWHERE IN THE SUN-BLASTED DESERT OF ARIZONA'S CABEZA PRIETA WILDERNESS.

"If my decomposing carcass helps nourish the roots of a young juniper tree or the wings of a vulture — that is immortality enough for me," ABBEY WROTE, "AND AS MUCH AS ANYONE DESERVES."

ABBEE'S COHORTS, DAVID PETERSEN AND DOUG PEACOCK, HAD TO BREAK THE LAW TO GRANT THE AUTHOR HIS FINAL WISH — A SIMPLE FUNERAL WITH NOTHING TO SPARE HIS BODY FROM NATURE'S EFFICIENT PROCESS.

SIXTEEN YEARS LATER, SUCH "GREEN BURIALS" ARE GAINING RECOGNITION AS AN ENVIRONMENTALLY FRIENDLY ALTERNATIVE TO THE TWO MOST WIDELY RECOGNIZED CHOICES AVAILABLE TO AMERICANS: CREMATION OR BURIAL, WHICH OFTEN INVOLVES EMBALMING, A ROT-RESISTANT COFFIN AND A GRAVE LINER. ABBEY-LIKE INTERMENT CAN BE DONE WHILE RESPECTING THE LAW, THOUGH NOT WITHOUT SOME LOGISTICAL PROBLEMS.

KIMBERLEY CAMPBELL IS THE VICE PRESIDENT OF MEMORIAL ECOSYSTEMS, A FOUNDATION SHE RUNS WITH HER HUSBAND, DR. BILLY CAMPBELL. THE CAMPBELLS ARE PIONEERS OF THE GREEN-BURIAL CONCEPT IN THE MODERN UNITED STATES, AND THEY ALLOW ONLY ECO-FRIENDLY FUNERALS AT THEIR RAMSEY CREEK PRESERVE — A 32-ACRE PARCEL OF WOODLANDS IN RURAL SOUTH CAROLINA. ESTABLISHED IN 1996, MEMORIAL ECOSYSTEMS HAS PERFORMED APPROXIMATELY 40 BURIALS IN THE PRESERVE, ALL ADHERING TO THE REQUIREMENTS THAT THE BODY NOT BE EMBALMED, THE COFFIN BE MADE FROM BIODEGRADABLE MATERIALS AND NO GRAVE LINER OR VAULT BE USED TO PROTECT THE COFFIN.

THE DEATH OF BILLY CAMPBELL'S FATHER SPARKED HIS INTEREST IN STARTING A CEMETARY THAT WOULD BE AN ALTERNATIVE TO THE GOLF-COURSE TYPE SETTINGS FOUND THROUGHOUT THE COUNTRY, KIMBERLEY CAMPBELL SAID.

"THE WAY WE BURY PEOPLE AT RAMSEY CREEK IS NOTHING NEW — WE DIDN'T INVENT IT," CAMPBELL SAID IN HER MELODIOUS BRITISH ACCENT. "THIS IS THE WAY PEOPLE HAVE BEEN BURIED FOR THOUSANDS OF YEARS, IN ALL SortS OF CULTURES, ALL ACROSS THE WORLD. FRANKLY, IT'S BECAUSE IT'S A VERY EFFICIENT AND SAFE WAY OF DISPOSING OF THE DEAD."

Photos courtesy of Dr. Billy Campbell, Memorial Ecosystems

The Campbells' idea for the nature reserve and cemetery allowed them to achieve two goals at once: preservation of endangered forestland and creation of a cemetery space where environmentally minded folks could achieve the ultimate in composting. Campbell said an important benefit of green burial is that they require some planning since they are not a readily available option in most places. Planning requires dialogue within the family about the normally taboo subject of death, thereby easing survivors' worries about what to do when death arrives.

"IT GIVES PEOPLE A WAY TO FEEL THAT THEY HAVE A BIT MORE CONTROL RATHER THAN HAVING THE PROFESSIONALS COME IN AND TAKE CARE OF THE DEAD," CAMPBELL SAID.

She noted that funerals at Ramsey Creek have involved family members in opening and closing the grave, building the casket and lowering the body into the earth.

Green burials also forego the generally unnecessary and potentially environmentally harmful practice of embalming. Campbell said, adding that Americans have somehow been fooled into believing that embalming is necessary for sanitation and disease prevention.

"REALLY, THAT'S A LOAD OF CODSWALLOP," SHE SAID. "THERE'S MORE DANGER FROM A BODY BEING EMBALMED WITH NOXIOUS CHEMICALS, THEN PUT IN A BOX WITHIN A BOX, THEN PLACED IN A CEMETARY WHERE THEY USE ALL SORTS OF FERTILIZERS AND HERBICIDES THAT ARE WASHING INTO THE STORM DRAINS."

Another plus for the economically minded consumer is that green burials are much less expensive than their traditional counterparts. Cutting out the cost of embalming and a showy casket can save thousands of dollars, according to Lisa Carlson's do-it-yourself book, "Caring for the Dead: Your Final Act of Love."

The average cost of a traditional funeral in 2004 was approximately $6,500, according to the National Funeral Directors Association. Campbell said interment at Ramsey Creek costs $1,950 for the plot, $250 for opening and closing the grave and $25 plus engraving charges if the family wishes to have a rock marker on the grave. The cost of the coffin is left up to the customer, Campbell said. It may be as simple as wrapping the body in a shroud or placing it in a pine box.

Photos courtesy of Dr. Billy Campbell, Memorial Ecosystems
A typical burial site at Memorial Ecosystems' Ramsey Creek Preserve is situated in a natural setting, rather than a traditional golf-course-like cemetery.

Kimberley Campbell
Memorial Ecosystems vice president

This is the way people have been buried for thousands of years, in all sorts of cultures, all across the world.

Kimberley Campbell
Memorial Ecosystems vice president

I have a very strong feeling that we've got to give back to Earth. It supports and provides for us.

Babs McDonald
U.S. Forest Service environmental educator

purchased plots two years ago after reading about alternative burials in a USA Today article. McDonald said the green-burial concept was consistent with her values of how humans should view their environment and planet.

"I have a very strong feeling that we've got to give back to Earth," McDonald said. "It supports and provides for us. The natural way of things is that when we die — when anything dies — our bodies provide nourishment for Earth."

The setting of Ramsey Creek proved to be an important factor in McDonald's choice. Tucked in the foothills of the southern Appalachians, the preserve is located near her work and home and is only 20 minutes from where her husband proposed marriage. The combination of hominess with the natural beauty of the area was irresistible, McDonald said.

"It's wonderful to walk around there," McDonald said. "It's peaceful. Ramsey Creek is lovely. There are trails all over. It's such a different feeling than walking through a normal cemetery."

It appears that the idea of green burials is spreading. Soon after Campbell's woodland cemetery was established, the Glendale Memorial Nature Preserve in Florida's panhandle and the Ethician Family Cemetery in Eastern Texas followed suit. California's first green cemetery — Forever Fernwood in Mill Valley — has yet to open.

In Washington, Dennis McPhee, the program manager for the state's Funeral and Cemetery Office, said no state laws prohibit green burials — the same is true in most other states.

"Once a cemetery is licensed by the state, they can set aside a section of the cemetery for green burials," McPhee said. "The concept is not as new as you might think. I think a lot of cemeteries probably permit burial of human remains right now without caskets. And no cemetery requires embalming."

He emphasizes, however, that any burials within the state must take place within a designated cemetery. Unauthorized disposal of human remains — including the scattering of cremation ashes — outside an approved cemetery is a misdemeanor in Washington, punishable by up to 90 days in jail, a $1,000 fine or both. And, in order to get the body, one probably would have to steal it from a hospital or morgue — creating another misdemeanor and potentially doubling the perpetrator's jail time and fine.

No one in Washington has yet requested to set up this type of cemetery, McPhee said, and he is unaware of any mortuaries that are
There is substantial interest in green burials. The more discussion that takes place, the more people will request green burials, and the more likely they will be made available.

Ellen Leslie
Vancouver's Memorial Society of British Columbia executive director

actively offering green burials as an alternative to traditional burial or cremation.

“It will be a little bit hard to sell the public on it,” he said. “But there are probably a fair number of people out there that it would appeal to.”

Ellen Leslie is the executive director of Vancouver’s Memorial Society of British Columbia, a nonprofit organization founded in 1956 to provide access to low-cost, simple and dignified funeral services for members. The society has been investigating the concept of green burials for the past four years. Although the society’s members have expressed interest in the idea, no green burials have taken place in British Columbia. Leslie attributes this to the fact that, like in Washington, all burials must take place within a cemetery.

“Virtually all cemeteries accept unembalmed remains and biodegradable coffins,” Leslie said. “But most insist on grave liners to facilitate lawn maintenance.”

A grave liner is a large concrete box around the coffin to keep the ground from caving in after the coffin and remains have decomposed. Such sinkholes would create lawn-care difficulties and present a slightly macabre eyesore for visitors, Leslie said.

Since the society’s minimum definition of green burial prohibits the use of grave liners, Leslie said it is looking for alternatives to traditional cemeteries.

“There is substantial interest in green burials,” she said. “The more discussion that takes place, the more people will request green burials, and the more likely they will be made available.”

John Moles is the owner of Jones-Moles Funeral Home & Cremation Service, a mortuary company with funeral homes in Bellingham, Ferndale and Lynden. He runs the only privately owned cemetery in the county, Ferndale’s Greenacres Memorial Park, and is the fourth generation of his family to run the business. His great-grandfather, John Wesley Moles, started the funeral home in 1890 on the same site it occupies today.

Moles is a brisk, handsome 30-something, lively and talkative. He said he has heard some buzz about green burials but has yet to have a request for one.

“If we did receive a request, we would make it happen,” Moles said. “We pay attention to what the families want.”

He has space at Greenacres that he could turn into a woodland reserve and cemetery if he saw a demand for green burials.

“We’ve got hundreds and hundreds of years of space,” he said. “There’s a public misconception that there isn’t enough burial space, and that’s driving a feeling that we need to conserve. There’s also a misconception that it’s better for the environment to choose cremation over burial. Cremation, I believe, has more of a negative impact on the environment.”

Moles cites the carbon released from the burning body and casket as pollution sources, as well as the amount of natural gas used in the three- to four-hour process.

The number of people choosing cremation over burial is increasing, too, Moles said. More than half of his customers now choose the convenience and generally lower costs of cremation over burial. That trend is not just a local phenomenon. According to the National Funeral Directors Association Web site, the nationwide percentage of cremations is expected to rise from 28 percent now to 36 percent in the next ten years. By 2025, that number is forecast to increase to 46 percent.

“The majority of families that come to us and express concern over the environment typically select cremation,” Moles said. “If I were to create an option for these families, I would tend to want to do green burials.”

He said he envisions having a few acres of land set aside for green burials in the future, with native plants creating a woodland setting and unobtrusive natural markers for the graves. Some maintenance of the land would be necessary to ensure access and aesthetics, but it would not be on the scale of work required to keep up acres of well-manicured grass.

Moles said he believes people might embrace the idea of green burials, but there is a lack of awareness.

“Our industry can only change so fast because it’s based almost entirely on cultural norms,” he said. “We’re not there yet, but I think in my lifetime I could see this being something that may happen in our county.”

Senior Gig Schlich studies environmental journalism. He has been published in Klipsun, The Western Front and The Planet.
Less than a mile from the Canadian border amid the rural landscape stands a nondescript, concrete structure no more than a few feet tall. Steve Vander Haak, manager of the Vander Haak Dairy farm, stands atop the 50 foot by 100 foot mass of concrete and pipes. Inside the structure beneath his rain boots, bacteria decompose several hundred thousand gallons of poop. The Vander Haak Dairy farm methane digester converts batches of cow manure into kilowatts of electricity.

"(The digester) utilizes anaerobic bacteria to convert organic materials into gas — primarily methane — which can be used as an energy source," said Craig MacConnell, chair of the horticulture department with the Washington State University Whatcom County Extension.

The digester, which is modeled after similar digesters in the Midwest, is the first commercial digester in Washington state. The digester prevents disease-causing bacteria in the manure from entering streams, lakes and rivers.

"Anything that biodegrades can go in there: corn, silage waste, fruit waste, anything that rots," said Brian Van Loo, the project manager for the digester and owner of Andgar Corporation.

Using cow manure to create electricity, Darryl Vander Haak, owner of Vander Haak Dairy, turns brown into green. The Vander Haaks sell the electricity to Puget Sound Energy's Green Energy Program. According to the Department of Energy, the majority of electrical power in the United States comes from the combustion of coal, petroleum and natural gas. Burning these fossil fuels is a major
source of air pollution and uses up nonrenewable resources. Locally produced and renewable, the methane the Vander Haak digester extracts provides energy from domestic animals instead of shrinking coal reserves.

Digesters also serve as a solution to increasingly strict policies for disposal of agricultural waste.

"As regulations have changed, dairy farmers have had to modify their operations, particularly in the way they deal with animal waste," said Tuana Jones, the area director for the U.S. Department of Agriculture's Northwest Washington region. "An anaerobic digester allows the animal waste to be utilized to produce energy for on-farm use and, in some cases, to sell back to the grid."

Whether collected in a digester or left in a containment pond, manure will emit methane gas as it decomposes. Burning the methane on-site to generate power, however, prevents the gas from entering the atmosphere.

"Methane is a climate-changing gas," MacConnell said. "Agriculture is the largest source of controllable emissions."

According to the WSU Climate Friendly Farming program, methane is a greenhouse gas with 23 times the insulating effect of carbon dioxide. Instead of escaping into the atmosphere and acting as a solar insulator, the methane anaerobic digesters create is captured and burned.

Processing manure through the digester reduces the amount of manure in runoff entering streams. It also contains manure emissions and odor.

MacConnell contrasts the raw manure material with manure that has cycled through the digester: "There's a significant difference in odor — the material smells. The anaerobic digester captures odor and destroys it through heat and pressure."

Less than 100 yards from the digester, a concrete and steel barn houses the source of the manure: dairy cows. The digester is located 1.5 miles from the main farm, where 600 cows live.

An advocate of everyday recycling, Vander Haak began to question how he could improve his cow-manure-management practices to be more environmentally sound and economical. With the use of his digester, he is now able to recycle the largest source of waste on his farm.

Vander Haak approached Van Loo to inquire about the possibility of building a digester. They began researching anaerobic digesters by visiting sites in the Midwest. Andgar Company began constructing the digester the first week of July 2004 and finished Oct. 1.

During the two years between initial research and the completion of the digester, the pair developed a positive relationship, Van Loo said.

"We commend (Darryl) for being the first in the area to try this and for the environmental soundness," Van Loo said.

Vander Haak and Van Loo apply a barnyard metaphor to explain the relatively simple way the digester operates.

"Basically, it works like a cow's stomach," Vander Haak said. Using this metaphor, the first step in the process begins where the cow's stomach leaves off. Each day, the Vander Haaks can add up to 45,000 gallons of manure, Van Loo said.

The manure that enters the digester is a mix of liquid and solid materials. The workhorses of the digester are anaerobic bacteria. They break down the manure — changing the chemical composition of both the solid and the liquid waste.

Each day, the new manure pushes the older manure progressively farther along, Steve Vander Haak said, as he gestured toward the back of the rectangular-shaped concrete box.

Following a U-shaped path through the inside of the concrete apparatus, the manure travels twice the length of the structure. Throughout the 22-day trip, bacteria in the digester brake down the manure, separating it into three byproducts: gas, liquids and solids. A series of pipes carries a foamy substance to a containment pond where it will stay until applied to fields as fertilizer. Another pipe moves solids to a separating mechanism where they are broken

As regulations have changed, dairy farmers have had to modify their operations, particularly in the way they deal with animal waste. An anaerobic digester allows the animal waste to be utilized to produce energy for on-farm use and, in some cases, to sell back to the grid.

Tuana Jones
Department of Agriculture's Northwest Washington region area director

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up and piled. And a pipe at the top of the digester carries the gas, 60 percent methane, to a building that houses the gas-combustion generator.

Inside the building, an orange Caterpillar engine fills the room with a rhythmic cacophony. Van Loo raised the volume of his voice to just below a shout to be heard over the roar. Methane from the digester, he said, fuels the engine which in turn powers the generator, producing electricity. PSE buys this electricity and resells it as green power.

The entire operation produces such a small amount of emissions that an air-quality permit is not necessary, Van Loo said.

At a gray electrical panel, Van Loo flipped open the clear plastic cover and began pressing buttons. A small screen illuminated, displaying the constant stream of data reflecting the engine and generator performance. Flipping past the current production numbers, he stopped at the total operation figures.

During the first four months of operation, the Vander Haak digester produced 285,000 kilowatts of electricity. According to the Environmental Protection Agency, the average home uses 10,700 kilowatt hours annually. After four months, the digester produced enough electricity to power 26 homes for an entire year.

The digester is processing approximately 18,000 gallons of manure a day, less than half of its capacity, Van Loo said.

In addition to the manure produced on-site and piped from the main farm, participating farmers also truck in manure. The digester also processes some food waste, mainly from local fish processing plants, Vander Haak said.

The generator burns the methane gas and the liquid waste fertilizes the fields. The solid remains are the only component of the process unaccounted for.

After passing through the digester and piling in large mounds, the solid waste resembles potting soil more than it resembles poop. The Vander Haaks use it as bedding for the cows, but Van Loo and others see additional markets developing.

Immediately out of the digester, the solids smell faintly of ammonia, but in a few weeks, the solids are indiscernible from normal soil. They are 99 percent free of pathogens and contain no weed seeds, Van Loo said. He pointed toward an ongoing soil test. In a cardboard box, rows of green grass were sprouting out of the digester's solid byproduct, testifying to the fertility of the solid waste.

The development of additional markets for the waste products of digesters encourages more projects like the Vander Haak digester. But the large capital costs of digester technology and construction remain a crucial hurdle.

The total project cost for the digester was $1.2 million. A grant from Agriculture's Rural Development Program paid for 25 percent, Van Loo said.

Vander Haak said it is too early to tell how successful of an
investment the digester could be and emphasized the importance of government support.

"There's some good potential," Steve Vander Haak said. "We've got some markets to develop with the solids. It's new technology, so you've got to learn some things."

Van Loo said he estimates a seven-year payback on the Vander Haak's investment. But his calculation accounts for a 5 percent annual return only possible if running at full capacity.

"Basically, it's sustaining the Whatcom County agriculture, and it will pay back with the returns," Van Loo said.

The role of government assistance on the Vander Haak project was important but could have an even larger impact on a national scale.

"We are optimistic that projects, such as this one for the Vander Haak Dairy, can be started with some seed money from USDA, become proven technology and then replicated by other such operations across the state and around the country," Jones said.

Digester technology is one solution to the problems poop poses.

"I think there's a bigger picture here — there's only so much land. What you do with the land is ultimately important to society, whether it goes to sprawl or to production, to sustain agriculture," MacConnell said. "This is one of the ways to ensure we do."

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Top left: Brian Van Loo, project manager for the digester, helped build the first methane digester in Washington state.

Top right: Darryl Vander Haak's methane digester can process 45,000 gallons of cow manure a day, using the methane to produce electricity. In four months' operation, it has produced a total of 285,000 kilowatts of electricity, which is enough energy to power 26 homes for a year.

Lower left: Methane from the digester fuels an internal combustion engine. The engine powers a generator to produce electricity. Puget Sound Energy buys this electricity and resells it as green power.

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Senior Greg Bachmeier studies environmental education. This is his first published piece.
CAPTAIN STEVE MAYO, a tall, slender man with a perfectly trimmed gray mustache, steers the Western Gull out of Squalicum Harbor and into foggy Bellingham Bay. He maneuvers the 73-foot skimmer with ease and carefully checks the safety equipment, log book and radar. His crew meticulously prepares for the day’s training. Today, they will test the agility of the vessel and the effectiveness of its oil-collecting equipment. Mayo is a 20-year employee of Clean Sound Cooperative Inc., a nonprofit company the oil industry created in 1971 to respond to marine oil spills in Washington state. Mayo emphasizes the importance of frequent practice.

“It helps immensely. It’s extremely important,” Mayo said, “Training has to do with being professionally able to use our equipment, which increases our speed of response.”

Almost 14,000 oil spills are reported nationally each year, according to the Environmental Protection Agency. After oil spills, the difference between life and death for marine ecosystems depends on the readiness and effectiveness of cleanup. According to the Washington State Department of Ecology, more than 15 billion gallons of crude oil pass through Puget Sound each year. According to the Puget Sound Action team, approximately 418,500 gallons of oil spilled into the sound from 1993 to 2003. An estimated 70 percent of the spilled oil came from vessels.

As the Western Gull pulled into dock after the drill, a rainbow sheen on the water caught Mayo’s attention. He saw another crew with a cleanup operation underway. The crew had placed a containment boom around an old, rickety vessel, which stopped further
Spread of the toxic diesel. The response team dropped absorbent mats into the water to extract the oil.

"There is always potential for an accident," Mayo said. "If something happens or breaks on the oil barges and tankers, we could have a serious spill."

On Oct. 14, 2004, an oil spill in Dalco Passage highlighted the need for increased spill protection and training. A ConocoPhillips tanker leaked 1,000 gallons of oil into the passage. Shortly after 1 a.m., a tugboat skipper reported the oil. Nearly six hours elapsed before the initial response team arrived. Cleanup crews waited for daybreak to assess the spill, but a thick fog settled at dawn and slowed the response yet again. Because of this sluggish reaction, the oil fouled 21 miles of Puget Sound shoreline.

"Once oil reaches the beach, cleanup becomes a lot harder," Mayo said.

Gov. Gary Locke visited Vashon and Maury islands to see the effects of the Dalco Passage spill. An oil-slicked coastline littered with bags of waste awaited his arrival. After two weeks of restoration, the cleanup crew had collected 1.4 tons of debris. Locke urged the creation of a task force that would consider new ways to clean up oil and analyze Washington's preparedness and response system.

Shortly after the Dalco Passage spill, Ecology requested $2.2 million for response training, spill prevention and cleanup equipment.

Several different people in the cleanup community also began devising cohesive plans to guarantee that a spill like Dalco Passage would not be repeated. Local organizations responded to the tragedy by assembling volunteer networks, engineering new equipment and creating strategic plans to improve future responses.

"The only thing that's constant is change," said Fred Felleman, the northwest's director of Ocean Advocates.
After a spill, involved parties and engineers review the response. Some post-spill remedies include technological advancements. Annual northwest ad hoc equipment meetings address the need to consistently update cleanup machinery. The meetings are comprehensive forums that encourage federal, state and private companies to improve technology for spill response.

Emit Burke, who attended the 2005 ad hoc meeting, presented a pump that generates micro-bubbles. These tiny bubbles attach themselves to oil so that skimmers can easily collect floating contaminated debris.

"With this equipment, we could speed up our skimmers and run these bubbles. They would attach themselves to the surface and it would improve the recovery rate of oil," said Steve Knutson, the Coast Guard's district response advisory team leader.

Fred Colbert, founder and president of Colbert Infrared Services, was another presenter at this year's meeting. His handheld infrared camera would enable its operator to see the extent of spilled oil.

"This would also allow us to see oil from the air at night, so we have a chance of getting to the spill faster. It gives us another tool to help detect oil," Knutson said.

Despite technological improvements, oil spills keep occurring in Puget Sound. On Jan. 28, 2005, another spill polluted the waters of Dalco Passage. But in this case, the silvery sheen was discovered during the bright morning hours, which enabled a quick reaction. The Coast Guard deployed a King County Sheriff's Office helicopter, equipped with infrared cameras. Using these cameras may have expedited cleanup of the previous Dalco Passage spill.

"Most of the effort should be placed on the prevention of oil spills," said Sven Eklof, the spill prevention and response manager of Naval Base Kitsap at Bangor.

Current training is rigorous, and crews participate in many yearly meetings. Clean Sound Cooperative Inc. requires its employees to attend courses such as hazardous-waste operations and emergency response, damage control, equipment deployments and night operations.

"We have a lot of tools in our tool bag, but they're useless unless we know exactly how to apply them," Mayo said, as he prepared for the drill on the Western Gull.

The Oil Pollution Act of 1990 requires individual facilities, counties, states and federal authorities to have specific contingency plans. These plans are tools that assist in timely cleanup.

"A good contingency plan is simple. The first part establishes spill notification and initial emergency procedures. The body of the plan establishes contingency procedures and an organized command and control structure," Eklof said.

We have a lot of tools in our tool bag, but they’re useless unless we know exactly how to apply them.

Steve Mayo
Captain of the Western Gull

Ecology works with local industries to improve proposed strategies. During 2001, Ecology required Washington's 35 oil-handling facilities to present their spill-prevention procedures. Whatcom and Skagit county refineries were first to submit their plans.

On Feb. 14, 2005, a strong contingency plan assisted in saving the waters at ConocoPhillips' Bellingham dock. A tug boat leaked a barrel of oil at the harbor. The refinery responded quickly, which lessened the damage and eased the cleanup.

"Due to good training, the refinery put some containment booms in the water, which enclosed most of the oil," Mayo said, the day after his crew responded to the incident.

The tug spilled only 45 gallons of oil and the facility's quick response eased cleanup, but Mayo's crew worked for a full night and into the next day. A spill of thousands of gallons could take months of work.

According to the EPA, the United States uses approximately 250 billion gallons of oil each year. One accidental spill could wipe out entire shorelines and ecosystems. This risk is why groups such as Clean Sound Cooperative are working to reduce the probability of such large spills from occurring.

Sophomore Tessa Gardner-Brown studies environmental journalism. This is her first published piece.
A rutted dirt road emerges from a dense thicket of Douglas fir on San Juan Island's Cady Mountain. Patches of scorched earth heal from fires that swept through the Garry oak savanna last summer. Green wildflower shoots break the surface of the blackened prairie. The oak savanna habitat on Cady Mountain has begun to reappear after more than a century of hiding.

Were it not for 100 years of fire suppression, more oak savanna and prairie ecosystems would be present on Cady Mountain. But without a natural force like fire to keep opportunistic species in check, Douglas fir have colonized these ecosystems and threatened the mountain's biodiversity. Thom Pence, a retired forester living on Cady Mountain, is working to restore oak and prairie habitat and would like to reintroduce fire to the landscape. A Natural Resources Conservation Service grant funds Pence's restoration project. The grant covers some of the cost of removing non-native species and planting native vegetation, but the service does not support his desire to prescribe controlled burns to the mountain.

"These are fire-generated ecosystems," Pence said. "Without fire, restoration is impossible."

Natural fires and those intentionally set by American Indians for agricultural purposes played a vital role in maintaining oak savanna and prairie habitat. Frequent, low-intensity fires curbed conifer encroachment and promoted the growth of native prairie species.

With the presence of periodic fire, grasses and wildflowers dominate the prairie ecosystem. As Europeans suppressed fire from the ecosystem during the past 100 years, prairies and oak savannas have nearly disappeared throughout the San Juan Islands.

"It was incredible," Pence said, recalling the moment he discovered the large Garry oak population on his property. "So much was hidden by the forest that I didn't even realize (the oaks) were out there."

Pence discovered a large number of oaks on Cady Mountain when he moved there in 1999, but most of the area was overgrown with Douglas fir trees.

"We are literally swimming in a sea of Douglas fir," said Peter Dunwiddie, the director of research programs for The Nature Conservancy. "They are very effective at invading prairies."

Dunwiddie said considerable acreage on Cady Mountain was historically grassland and oak savanna; the site, however, has been severely degraded. Eighteen of the 29 grass species on Cady Mountain are non-native grasses that were planted to support livestock grazing.

Pence said extensive restoration, including removing Douglas fir trees and reintroducing fire to the landscape, is necessary to turn the tide of succession.

These are fire-generated ecosystems. Without fire, restoration is impossible.
"Prairies are a fire-maintained community," Dunwiddie said. "From a conservation perspective, if proactive steps are not taken to restore the community, the native biodiversity will be lost."

Fire maintains the structure of the site and holds back Douglas fir seedlings. Many of the non-native grasses, however, respond well to fire, and burning could facilitate unwanted growth.

"We will probably never get back to a natural habitat," Pence said, crouching down and pointing to tiny fir seedlings sprouting up amid the dead winter grasses. "These guys are growing uninhibited and will continue without the use of prescribed fire."

The Nature Conservancy identified the prairie ecosystem as one of the most crucial habitats for conservation in Western Washington because of its biodiversity.

Pence funded the first three years of restoration himself and performed all the manual labor. He involved neighbors when he found out he could receive federal grants for the restoration effort.

The site now includes approximately 175 acres. In October 2003, Pence received a $160,000 grant from the Natural Resources Conservation Service. The grant pays 75 percent of the costs to remove conifers and invasive species and plant native grasses during a 10-year period. Although the service identifies prairie ecosystems as one of the most biologically diverse west of the Cascade Mountains, the grant does not fund burning.

Rachel Maggi, the west area biologist for the Natural Resources Conservation Service, said that while it supports prescribed burns in other states, the service's policy prohibits the funding of burning in Washington state for legal and safety reasons. The Department of Natural Resources considers Cady Mountain a high-risk area for fire.

Pence said further efforts to fund burning have come up short.

"It's ironic," Pence said, shaking his head. "This is a fire-dependent ecosystem, yet we can't get funding for fire."

Pence, who retired in 1999 after 30 years in the U.S. Forest Service, said he is the only landowner on the mountain with expertise in fire ecology.

After burning small areas on his property, Pence said he has seen wildflowers grow back more densely. In the spring, Cady Mountain is painted with deep purple shooting stars and camas and bright yellow buttercups, all native prairie flowers.

"It's the eye candy — the wildflowers and the wildlife," Pence said. "If we could bring back the blue birds or butterflies, it would be a saving grace to the project."
Dunwiddie said it might not be realistic to completely restore Cady Mountain to its native grassland habitat because it lacks the density of native species. Cady Mountain might only have three to five native species per square meter, Dunwiddie said.

Yellow Island, however, has more than 20 native species per square meter.

The Nature Conservancy bought Yellow Island, which is tucked between Shaw and San Juan islands, in 1980. Dunwiddie said its vision was to restore the landscape to a prairie dominated by grass species.

Yellow Island’s native prairie survived because the 10-acre island was too small for agricultural use and has no fresh water. Evidence also indicates that American Indians burned on Yellow Island.

The Nature Conservancy’s goal is to use fire on Yellow Island to mimic the historical regime and produce specific results. The Nature Conservancy has refined its ecological goals for Yellow Island since restoration began in 1998.

Phil Green, the Yellow Island Preserve steward, said that when restoration began, the focus was clearing native snowberry and ocean spray bushes, which had grown more dense in the absence of fire.

Green said Douglas fir is a native species in prairie habitats but did not exist in thick stands with the presence of fire. The firs on the island are “lone wolf” trees; they grow in an open environment as single trees, with branches spreading widely to the ground. Several 200- to 300-year-old conifers grow on the island.

After 20 years of restoration and the return of fire to the ecosystem, a greater diversity of native flowers has emerged.

“The goal is not to achieve a snapshot but to perpetuate a dynamic landscape which keeps changing over time,” Dunwiddie said.

In 2002, The Nature Conservancy put a regular burn schedule into place. Green said the conservancy burns roughly one to two acres annually and is working to instill a five- to six-year fire cycle.

Dunwiddie said no answer is clear as to what the desired future condition is because no truly native prairies still exist, and historical data records do not go back far enough to determine the island’s original state. The goal of The Nature Conservancy is to protect the best example of the native biodiversity that once existed on the San Juan Islands.

“Even if it is considered unnatural, we must restore fire management to sustain the community,” Dunwiddie said. “We will lose great species biodiversity if we don’t.”

Restoring grasslands is only the beginning to restoring the degraded landscape. More unidentified plants and animals exist in the ecosystem. Dunwiddie said it is a great challenge to restore an ecosystem when only a small percentage of what the community once consisted of is known.

Since prairies consist of more than plants, Dunwiddie sees replanting and burning as only the beginning. The return of other species will mark the success of the restoration.

“It’s not a build-it-and-they-will-come situation,” Dunwiddie said. “We’re missing the big picture and hoping the rest will come.”

Senior Emily Nuchols studies environmental journalism. She has been published in Klipsun, The Western Front and the Skagit Valley Herald.