Fall 2007

The Planet, 2007, Fall

Page A. Buono

*Western Washington University*

Huxley College of the Environment, Western Washington University

Follow this and additional works at: https://cedar.wwu.edu/planet

Part of the [Environmental Sciences Commons](https://cedar.wwu.edu/planet), [Higher Education Commons](https://cedar.wwu.edu/planet), and the [Journalism Studies Commons](https://cedar.wwu.edu/planet)

Recommended Citation

https://cedar.wwu.edu/planet/50

This Book is brought to you for free and open access by the Western Student Publications at Western CEDAR. It has been accepted for inclusion in The Planet by an authorized administrator of Western CEDAR. For more information, please contact westerncedar@wwu.edu.
**Drowning in Drugs**
Pharmaceutical waste alters gender and delays development

**Invasive Species**
Cargo ships dump non-native organisms into local waters

**Heavy Baggage**
The shift from plastic to reusable bags
Dear Reader,

What we need to understand, above all else, is that it matters. This planet, our home, matters not only because human actions have put it in danger, not only because we depend on it, but because it was here long before us, and because it is highly complex and phenomenally beautiful.

Global warming is broadcast as the number one reason to change our lifestyles, to monitor our waste production, and to find alternative energy sources. While the threat of global warming has extracted many environmental issues from a confusing and conflicting place and forced them to the surface, it is not the only reason to change. In fact, it falls short in its demand for attention and change.

I encourage you, the reader, to look beyond the direct implications of environmental devastation to your lifestyle, because there is more to it. All living creatures are incredible and their lives are constant journeys and feats we as humans could never endure. They are role models, they are travelers—wise elders who have seen more. We can learn from them, and should. But, if their wisdom and uniqueness are not enough to maintain our interest, we can look beyond that. The simple, non-debatable fact is that we are all connected. We will continue to be affected by the harm we have caused, and will face the consequences of our current actions.

A number of the articles in this issue are unrelated to climate change, but raise red flags about the often mysterious disappearance of creatures and habitats. Your reaction to stories like these may well be, ‘why do I care? My lifestyle isn’t threatened. My bills won’t go up.’ And, you are probably right. Today, tomorrow—even years from now you won’t individually be affected by the loss of 85 percent of an Alaskan sea lion population, the logging of Blanchard Mountain, or the unexplained death of marine mammals. But, this doesn’t mean these alarming disappearances should be ignored.

The next step is sharing this information and encouraging those who change out their light bulbs for more efficient ones and recycle in an effort to reduce their impact to understand exactly what it is they are impacting. It is hard to be truly passionate about something of which we have no knowledge. If our changes come from a deeply passionate and broad understanding of all aspects of our planet, they will be long lasting and they will be successful.

The piece by Edward Abbey on the back of this issue is a wake-up call. Go play in the dirt and enjoy what it is we are trying to save.

Thank you for your readership. We welcome comments, suggestions and questions in the form of letters or email.

Sincerely,

Page A. Buono

 Corrections:
In the Spring 2007 issue, a photo in “Traveling Lite” was mislabeled. Jeff Miller was not surveying a canal for pollution. In the photo he was conducting a coral reef survey off the coast of St. John.

Thank Yous:
Special thanks to Bill (Captain Planet) for being a great mentor and for providing us with exciting opportunities. Thanks to Yuki for her dedication to accuracy. Thanks to all our sources for contributing their knowledge to our magazine. Last, but not least, thanks to our designers for putting in the extra hours.
Who's Protecting the Big Bad Wolf?

In the eastern one-third of Washington there is no resident population of grey wolves, yet they will be removed from the endangered list and lose their current protection.

Steller Sea Lions

Over the past three decades the Steller sea lion population has mysteriously declined over 85 percent, forcing them onto the endangered species list. The population is making a come-back, but the deaths remain a mystery and cause concern for future declines.

Ballast-Borne Blight

Puget Sound's ports are inundated daily with ballast water from shipping vessels. Ballast water, taken on by ships for stability in the open ocean and discharged at ports, can introduce potentially harmful invasive species to local ecosystems.

Wind Energy Blows Down Barriers

Clean, cost effective, inexhaustible and easily available, wind power is one answer to meeting our nations energy demands. Despite positive environmental benefits, wind energy faces storms of controversy from wind farm's neighbors and avian activists.

Liquid Gender Bender

A new cocktail of contaminants is flooding our water supply and altering the gender of fish. Hormones and antibiotics have a drastic effect on aquatic life and are in our drinking water.

Green Living

Simple solutions for dirty homes. Harsh chemicals cleaners can be harmful to your health and the environment. Check out our green living page for recipes to make your own safe household cleaners.

Bagging a Plastic Issue

For years grocery shoppers have been overwhelmed with plastic shopping bags in their homes and with their destruction of the environment. A new trend, the reusable bag, cuts down on plastic bag consumption.

Compromising Consent

Environmentalists are going to court to stop logging on Blanchard Mountain. This development occurred after the Blanchard Strategies Group decided on a compromise to log two-thirds of the mountain.

Dry Ice

Scientists predict Glacier National Park will lose all of its glaciers by the year 2030. Reporter Andrew Spanjer had the opportunity to spend the summer with some of these quickly disappearing glaciers.

Deep Sea Cacophony

Marine mammals must live in an ocean that is increasingly bombarded with noise. The sources of these noises are numerous, but one of the most contested is the noise from Navy sonar.
Over a century ago, gray wolves wandered across the green of the Cascade Mountains and the desert hills of Eastern Washington. The presence of these dignified creatures played a crucial role in limiting the populations of their prey, and maintaining a healthy ecosystem. Now, the gray wolves are endangered, and a link in the ecosystem is missing.
Bill Ligget, 54, stands in the wolf pen at Northwest Trek in Eatonville.
Fast forward. Houses clutter land once the territory of roaming wolf packs. Hoofed animals overpopulate due to the small amounts of predation, and as a result, populations of beavers and small rodents are dwindling due to the lack of shrubbery available to them.

Although the number of wolves is still slim, the United States Fish and Wildlife Service (USFWS) has proposed removing them from the endangered species list in the Rocky Mountain Range.

There are currently 1,200 wolves in the Rocky Mountain region, which includes all of Idaho, Montana and Wyoming and the eastern one-third of both Washington and Oregon, according to the USFWS. The wolves in the Rockies are on the endangered list, which protects the wolves from hunting. However, the USFWS decided that the population in this mountain range is large enough to remove the wolves from the endangered list, requiring each state to maintain only 15 breeding pairs, said Linda Saunders, the director of conservation at Wolf Haven, a wolf sanctuary.

The USFWS chose the region where wolves no longer need federal protection by measuring 250 miles from the Rocky Mountains. The line is arbitrary, since both Washington and Oregon measured where they believed the line should be and each state marked a different line than the USFWS, Saunders said.

In Idaho, Montana and Wyoming, the number of gray wolves is great enough for the USFWS to remove them from the endangered list, Saunders said. However, in both eastern Washington and Oregon there is no resident wolf population, and the source population would have to come from Idaho. Once the wolves are taken off the endangered list in Idaho, only 15 breeding pairs will be required. Hunters will have free range to shoot any wolves in excess of the 30 breeders, according to the USFWS. Idaho plans to allow hunters to shoot excess wolves, which will prevent Washington and Oregon from regaining their wolf population.

“You are wondering how much protection there will be in Idaho and Wyoming once they are taken off the endangered list,” Saunders said. “How can we guarantee that we will not end up in the same spot we were in 10 years ago?”

Once the Washington Department of Fish and Wildlife (WDFW) learned of the possible delisting of gray wolves in the eastern third of Washington, an 18-member citizen group formed to prepare a wolf protection plan. The members of this unnamed group include ranchers, biologists, and representatives from conservation organizations, Saunders said. This citizen group is expected to

*Distribution of Wolves*

![Map showing distribution of wolves](image-url)
complete its plan for the USFWS by Dec. 2007.

“Even though this plan will be [completed] by December, it will probably be another year before the wolf is actually federally de-listed, as there are still disagreements going on between the different states and the Fish and Wildlife Service,” said Rocky Beach, the WDFW Wildlife Diversity Division Director.

Paying people to protect these creatures will cost thousands of dollars, Ellis said. According to the Wyoming Game and Fish Department (WGFD), Congress currently allocates funds to each state for predator control, part of this devoted to wolf management. Once the wolf is de-listed, however, this funding will be dropped. According to the USFWS, when the gray wolf is de-listed, it will cost Idaho $837,325 per year, Montana $765,296 per year and Wyoming $615,900 per year in non-federal funds to address wolf related issues, conduct depredation investigations and control wolf actions.

“Those wolves became endangered because of their competition with man,” said Dave Ellis, the deputy director at Northwest Trek, a wildlife park for Northwest animals. “They were here first and we are the interlopers, but refuse to share our land with other creatures at the top of the food chain.”

Wolves don’t recognize property or state lines, and have repeatedly targeted fenced livestock. A study conducted by the Wildlife Society in Wyoming, Montana, Idaho and Alberta, Canada from 1987 to 2003 showed that even while endangered, multiple livestock killings by wolves were reported. In Alberta, wolves killed a total of 1,021 domestic animals during this time period compared to 861 domestic animals killed in Wyoming, Montana and Idaho combined.

Wolves are generally successful nine out of ten times while hunting. Contrary to the image many people have from “Little Red Riding Hood,” if a wolf makes a kill, it rarely includes a person, said Bill Liggett, Northwest Trek Animal Care Technician.

“There has never actually been a documented case of a healthy, well-fed gray wolf attacking a human being,” Liggett said.

Approximately 10 years ago, 66 gray wolves were reintroduced to Yellowstone National Park according to Scholastic News. The pack of wolves grew to 834 and have considerably helped the park’s ecosystem. The presence of a large predator at the top of the food chain heavily impacted the creatures lower on the chain.

The gray wolf reduced the abundant elk herd considerably after it was reintroduced to the park, allowing willow, aspen and cottonwood trees to grow back. This increased the amount of songbirds in the forest and allowed beavers to make a comeback because of their reliance on willow trees for dams and food. Also, wolves often leave half-eaten carcasses behind, a feast for carnivores such as eagles, ravens, bears and coyotes.

“Man tends to view the wolf as being direct competition for the top of the food chain, but fails to realize that we all live in a big web and everything is interconnected,” Ellis said. “We have to realize that we must keep things natural and give the wolf and other animals we do not like an opportunity to live.”

In order for Washington to regain the wolf population it had during the early 1900s, it is crucial that Idaho and other states in the Rockies continue protecting the gray wolf once it is removed from the endangered list, Minbashian said. If state or national governments implement the plan to only maintain 15 breeding pairs in each state, endangered populations in other states will not be able to add to their wolf packs.

Jenny Schroder studies communications. She has been published in The Western Front.
Steller Sea Lions
The Mystery Behind the Decline

Written by Kim Nachreiner Photographed by Kevin McMillon

Imagine a classroom of thirty students. Then, imagine them slowly leaving until only four or five are left. You would probably wonder why.

In a similar scenario, a sea lion population mysteriously declined 85 percent over three decades. For a population that diminished so rapidly, finding where sea lion bodies went would answer many lingering questions. But, there are no bodies to be found; not from starvation, not from disease, not even a single body part on the beach. They have just disappeared. With an average male weighing just under a ton, where did they go?

The Northern or Steller sea lion is divided into an eastern and a western stock. The eastern stock lives south of the Alaskan coast, extending down to California. The western stock lives in the Gulf of Alaska.

Both sea lion stocks have seen a net decrease in population, but the western stock has rapidly declined over the past 30 years. Meanwhile, the eastern stock, which is listed as threatened, has steadily increased 3 percent each year over the past 30 years, said Tom Gellat, program leader of the Alaska Ecosystem Research Program.

The western stock hit its lowest numbers in the '80s, a dramatic decline of 15 percent per year, said Lowell Fritz, research fishery biologist at the Alaska Fish and Science Center. The population dropped 5 percent per year in the '90s.

"For a population like this, it's like dropping off a cliff," Fritz said.

Before the decline, 250,000 western sea lions roamed the sea. At its lowest population in the year 2000, only 40,000 to 45,000 were left, Fritz said. In 1990, the National Marine Fishery Service listed the western sea lion as threatened, and then endangered in 1997. Fritz said.

No one knows why this population has seen such a dramatic decline, but many theories have surfaced. It's different each decade, Fritz said. Before the decline started in the '70s, there was no commercial fishing around the western sea lion habitats. Then, in the '70s, competition between fisheries depleted the sea lions food source; cod, herring, pollock, Atka mackerel and other fish. Without prey to feed on, the western sea lion growth rate slowed. Incidental net catches of sea lions also played a part in their decline.

Another sign the population was in distress was that the females started giving birth at later ages and fewer times in a lifetime.

Typically, a female can give birth around the age of four, Fritz said, but most likely around five or six. Females can give birth once a year and produce up to 20 sea lion pups in a lifetime, but instead they were giving birth every other year, and then every third year. Additionally, the small number of females hinders the ability for the population to bounce back.

In the late '70s and early '80s, a climate change warmed the water, which changed the distribution of many of the fish sea lions eat. This increase in temperature, accompanied by a change in food distribution is directly related to a decrease in reproductive and survival rates of the western sea lion, Fritz said.

"The decline in birth rates has not rebounded as much or as fast as it should have," Fritz said.

The last theory involves increased consumption of western sea lions by killer whales, because they are the only ones that eat them, Fritz said. But, sea lions make-up only 10 percent of their diet.

The decline in sea lions has not had a rippling effect on any other animal, including the killer whale, Fritz said.

Others disagree. In the late '90s, the sea otter population suffered from a dramatic decline as well, causing the whale population to relocate to the Gulf of Alaska. The decline in sea otters forced the whales to feed on the western sea lions and other seals, according to an article in Science Magazine. The decline in the western sea lions could have a similar effect on whale eating habits.

After researching the possible reasons for the decline scientists found some solutions. Protected habitats were established, marking off the areas identified as critical to the sea lion's recovery, Fritz said. These areas are not closed to use, but fishing is highly regulated and managed by the National Marine Fishery Service.

"It's challenging finding a solution to satisfy both economy and habitat," Fritz said.

Another practice aiding the recovering population is monitoring sea lion activity. However, extensive monitoring is extremely difficult, Gellat said. During the summer, aerial photos are taken of sea lion colonies lying on rock reefs or large rocks in Alaska, a place where pups are born and counted. Summer is when western sea lions breed and give birth.

Another way to track the population is to collect information on their life history or attributes, Gellat said. This is accomplished by addressing the questions of how long they live, how many pups a female can have in a lifetime and at what age females give birth. This way, if a female gives birth later than normal, researchers can figure out why, Gellat said.

Since the year 2000, the population of western sea lions has stabilized and in some cases has even increased slightly. Fritz said.

"We will continue to learn more," Gellat said. "We will never know why they declined so rapidly. We just hope to find out what's going on."

The decline of stellar sea lions remains a mystery. The population's recent increase gives researchers time to uncover the answers, and to design ways to prevent potentially more devastating declines in the future.

Kim Nachreiner studies journalism/public relations and English. She has been published in The Western Front.
Imagine if millions of gallons of seawater teeming with invasive organisms found its way into Puget Sound daily, endangering native species and altering the ecosystem. Sound preposterous? Far-fetched? Unconscionable?

It's true. On average, 2.5 billion gallons of ballast water, roughly nine times the volume of the Tacoma Dome, are discharged into Washington waters annually. Two-thirds of this volume is dumped into Puget Sound.

The introduction of invasive species to the United States poses a serious threat to local species and ecosystems, according to Puget Sound Partnership, a state agency for Puget Sound restoration and protection. Aquatic invasive species are often introduced via ballast water, which is used by shipping vessels for stability, and later discharged at ports to load cargo.

According to the Washington State Aquatic Nuisance Species Program (ANS), seven of the nine species deemed particularly troublesome are thought to be introduced through ballast water.

To stop the influx of non-native species, the Washington Department of Fish and Wildlife is working with neighboring coastal states and the U.S. Coast Guard to create a uniform standard for ballast water treatment.

As ships leave their port of origin, operators pump water into the ballast tanks of the vessel to maintain stability. These tanks, which can hold thousands of gallons of water, also serve as cargo space when emptied.

On the open ocean, improperly balanced ships can capsize during rough weather, especially if the ship isn't carrying cargo. Ballast water in the hull balances the ship and also helps with propulsion and maneuverability.

Once the ship reaches calmer waters or a port to load cargo, operators discharge, or 'deballast', the tanks, effectively dumping water and sediments rich in non-native species into a foreign ecosystem.

Puget Sound's ports are important centers of commerce, receiving ships laden with goods from all corners of the earth and exporting Washington's various commodities.

In 2005, more than 4,000 ships carrying 62 million metric tons of imported and exported goods passed through Washington ports, according to the U.S. Maritime Administration.

"It's widely known that ships bring invasive species every day into Puget Sound through their ballast water," said Dr. Russell P. Herwig, research associate professor and marine ballast water specialist at the University of Washington.

In Puget Sound more than 40 documented non-native plant and animal species have been introduced through ballast water.
A tanker sits moored off March Point near Anacortes. Tankers use ballast to keep their propellers underwater.

tive species of plankton, which are minute organisms suspended in water, frequently show up in the Sound but are extremely difficult to monitor, Herwig said.

Two highly adaptive crab species could wreak serious havoc in Puget Sound if introduced, according to the ANS.

The European green crab, Carcinus maenas, and the mitten crab, Eriocheir sinensis, likely reached the coast of Washington in ballast water but have yet to appear in Puget Sound, Herwig said.

Crab larvae go through a planktonic stage in which they are water-borne, and this is probably how these crabs were shipped to Washington, he said.

European green crabs are voracious foragers, preying heavily on bivalve shellfish such as oysters and mussels. They also feast readily on estuarine species out-compete native animals for nutrients, essentially starving them. This sort of destruction. Tolerant of lower salinities, this crab can reproduce exponentially, displacing native species by sheer volume.

Attempts to remove invasive infestations are often futile.

"It's like trying to find a needle in a haystack," Herwig said. "There are so many miles of coastline (in the Puget Sound). It's almost impossible to track down and eradicate an invasive species once it's been introduced."

The treatment of ballast water offshore is a widely accepted method to prevent invasion. The most common practice is mid-oceanic exchange, where a ship deballsasts in the open ocean and refills with water before coming into port. This procedure exposes ballast-borne organisms to a variety of inhospitable conditions.

"Coastal species often won't survive in the open ocean," said Dr. David H. Shull, marine biologist and professor at Western Washington University. "Salinity, food resources and various aspects of their lifestyle are incompatible with conditions in the open ocean."

Likewise, open-ocean species do not fare well in coastal waters.

Differences in salinity and food resources may kill the majority of organisms in the tanks, but mid-oceanic exchange isn't 100 percent effective, Shull said.

"Estuarine organisms, organisms that inhabit an estuary, can be exposed to widely fluctuating salinities," Shull said. "These organisms, as well as animals that can live inside the hull of a ship, could still survive the exchange."

Also, mid-oceanic exchange doesn't completely empty the ballast tanks; pumps in the hull of the ship weren't designed for such a procedure.

Water and sediment often build up inside the tanks even after exchanges, said Dan Stahl, Director of Marine Services at the Port of Bellingham.

As a cadet in the Navy, one of Stahl's duties included mucking out the tanks with a hose.

"I was knee-deep in mud, and there were these white crabs who hadn't seen the light of day in weeks," Stahl said. "Those crabs were thriving in there."

The shortcomings of mid-oceanic exchanges are well known in the shipping industry.

Mid-oceanic exchange is an imperfect solution, said Eric Johnson of the Washington Public Port Association.

Doing an exchange on a large vessel like an oil tanker can take an entire day, Johnson said. The tanks have to be emptied and refilled in a certain order to keep the ship balanced at all times. This is dangerous both for the crew and a ship itself, which isn't made to withstand such tremendous structural stress.

New technology for ballast treatment, such as ultraviolet sterilization, is promising, Johnson said. As water fills the tanks, it's channeled through a UV sterilizer that subjects any organisms inside to potent ultraviolet radiation. UV sterilizers effectively destroy a wide range of organisms but are extremely expensive.

Retrofitting one oil tanker with an UV system can cost close to $1 million, Johnson said.

Until the U.S. Coast Guard requires all ships to have on-board treatment systems, mid-oceanic exchanges will be the only federally regulated treatment, Johnson said.

The U.S. Coast Guard requires all vessels to perform a mid-oceanic exchange before crossing the Economic Exclusion Zone (EEZ), which lies 200 nautical miles offshore of the U.S. coast. Ship operators are required to allow Coast Guard officers to board the vessel and monitor the ex-

Differences in salinity and food resources may kill the majority of organisms in the tanks, but mid-oceanic exchange isn't 100 percent effective, Shull said.

"Estuarine organisms, organisms that inhabit an estuary, can be exposed to widely fluctuating salinities," Shull said. "These organisms, as well as animals that can live inside the hull of a ship, could still survive the exchange."

Also, mid-oceanic exchange doesn't completely empty the ballast tanks; pumps in the hull of the ship weren't designed for such a procedure.

Water and sediment often build up inside the tanks even after exchanges, said Dan Stahl, Director of Marine Services at the Port of Bellingham.

As a cadet in the Navy, one of Stahl's duties included mucking out the tanks with a hose.

"I was knee-deep in mud, and there were these white crabs who hadn't seen the light of day in weeks," Stahl said. "Those crabs were thriving in there."

The shortcomings of mid-oceanic exchanges are well known in the shipping industry.

Mid-oceanic exchange is an imperfect solution, said Eric Johnson of the Washington Public Port Association.

Doing an exchange on a large vessel like an oil tanker can take an entire day, Johnson said. The tanks have to be emptied and refilled in a certain order to keep the ship balanced at all times. This is dangerous both for the crew and a ship itself, which isn't made to withstand such tremendous structural stress.

New technology for ballast treatment, such as ultraviolet sterilization, is promising, Johnson said. As water fills the tanks, it's channeled through a UV sterilizer that subjects any organisms inside to potent ultraviolet radiation. UV sterilizers effectively destroy a wide range of organisms but are extremely expensive.

Retrofitting one oil tanker with an UV system can cost close to $1 million, Johnson said.

Until the U.S. Coast Guard requires all ships to have on-board treatment systems, mid-oceanic exchanges will be the only federally regulated treatment, Johnson said.

The U.S. Coast Guard requires all vessels to perform a mid-oceanic exchange before crossing the Economic Exclusion Zone (EEZ), which lies 200 nautical miles offshore of the U.S. coast. Ship operators are required to allow Coast Guard officers to board the vessel and monitor the ex-
change. Operators are also required to fill out a ballast exchange report that is kept with the ship at all times.

The Coast Guard only regulates mid-oceanic traffic, not coastal traffic, which occurs inside the EEZ. Also, the Coast Guard only checks the salinity of the ballast water to verify that it's been exchanged, and this isn't enough, Herwig said.

"Salinity by itself isn't a good indicator," Herwig said. "Water in ports tends to have lower salinity than open ocean water, but that's not always the case."

Alternate methods of evaluating whether ballast water has been exchanged are being developed, Herwig said. One idea is to identify chemical signatures in coastal water that don't exist in the open ocean and test for these differences.

To supplement the Coast Guard's regulations, Washington requires ballast exchanges 50 nautical miles before coastal traffic reaches port. Ship operators are required by state law to log their exchanges or to retain their ballast. Coastal traffic mainly includes ships from Alaska, Oregon and California.

According to the Puget Sound Partnership, 90 percent of the ballast water discharged into Washington ports in 2005 underwent mid-oceanic exchange. Although this percentage is impressive, just a single non-compliant vessel carrying the wrong species is enough to start an invasion.

In 2005, nearly 12 million gallons of un-exchanged ballast water were discharged into Puget Sound, with more than 95 percent of it originating in California, according to the Puget Sound Partnership.

Monitoring ballast water from California is one of Puget Sound's primary concerns, Herwig said. Many of the destructive non-native species from Asia and Europe are already established in Californian ports, including green and mitten crabs.

During lengthy overseas voyages, many planktonic organisms perish in ballast tanks, meaning a higher percentage of organisms will likely survive the short trip between California and Washington, Herwig said.

Existing populations of non-native species in Puget Sound are probably here to stay. But, in order to prevent potentially devastating invasions from neighboring coastal states, more stringent regulations must be implemented for traffic within the EEZ.

If the U.S. Coast Guard were to regulate both coastal and mid-oceanic traffic exchanges, ship operators on coastal vessels would face increased pressure to obey the law, Herwig said. In addition to the mid-oceanic exchange requirements, 200 nautical miles out by the Coast Guard and 50 nautical miles out by the state of Washington, heavy fines could be imposed upon vessels that violate exchange regulations.

Ballast water is only one of several possible entryways for invasive aquatic species to reach Puget Sound. By strictly regulating ballast treatment, especially from high-risk areas like California, the Washington Department of Fish and Wildlife strives to minimize the likelihood of future invasions.

According to the Puget Sound Partnership, the San Francisco Bay area is home to more than 234 non-native plant and animal species, most likely introduced by ballast water. These invaders account for up to 99 percent of the total biomass in the Bay.

Now picture the Puget Sound, with its fragile ecosystems and diverse denizens, silently succumbing to a wave of foreign invaders. The takeover will be imperceptibly slow and utterly irreversible. Familiar species could give way to these encroaching hordes, transforming the very nature of the Sound.

Peter Pearsall studies environmental journalism. He has been published in The Western Front.
Wind Energy Blows Down Barriers

Written by Michelle Rybolt
Photographed by Elizabeth Olwin

Acres of white wind turbines sweep the horizon of Central and Eastern Washington. Rising hundreds of feet above the earth, their enormous rotating blades carousel in the wind, generating energy for homes and businesses.

At a growth rate of 30 percent annually, wind energy is the fastest developing renewable energy technology in America, according to an investigation by the U.S Department of the Interior.

Currently, these carbon-fiber structures generate a little less than 1 percent of America's electricity. As of June 2007, the nation's turbines had the capacity to power over 3 million households, according to American Wind Energy Association (AWEA). In other words, all of the windmills in America generate little more than the energy required for Washington State's 2.6 million homes.

Washington's Governor Christine Gregoire is taking the issue of wind energy by storm. This October, Gregoire overruled the Kittitas County Board of Commissioners in order to fund the construction of 65 additional wind turbines at the Wild Horse Wind Farm near Ellensburg.

More than 100 locals of Kittitas County do not want Gregoire's plan to proceed. The 400-foot-tall turbines are scheduled to be built in some cases a little over 1,000 ft – the length of more than three back to back football fields – from their backdoors. Locals are not pleased about a tower two-thirds the size of the Seattle Space Needle in their yards, blocking views.

While some locals are opposed to new turbines, others are elated. According to Horizon Wind Energy, wind farms will increase property tax revenues by $2.8 million annually in Kittitas.

Last month, in a letter to the Washington Energy Facility Site Evaluation Council, Gregoire voiced concerns about Washington's need for an alternative energy source.

"It is clear that Washington is growing and with that growth our demands for energy resources also grow. It is the clear and compelling policy of the state to prefer new resources that have the least impact on our state's natural environment," Gregoire stated in her letter to the council.

Washington state voters approved Initiative 937 last year, requiring 15 percent of all public power to come from renewable energy sources within the next 13 years.

Energy generated by wind is favorable to citizens because it is clean and sustainable, according to the Northeast Sustainable Wind Association. Humans have harnessed wind power for thousands of years for sailing, pumping water and grinding food. Today's turbines catch gusts and convert their kinetic energy into mechanical energy.
Every megawatt of energy generated by wind power is one less megawatt acquired from burning fossil fuel. Turbines cut down on carbon dioxide emissions and waste products of coal, oil and gas. According to the AWEA, wind turbines require no fuel extracted by mining and drilling excavations.

"[Wind energy] is an efficient energy technology that can provide most of the U.S. carbon emissions reductions needed to reduce the atmospheric carbon concentration," according to the American Solar Energy Society.

The Renewables Global Status Report in 2006 found capacities of power generation from renewable sources has grown over the past year. The status report shows that at the end of 2005, 816 GW of power were coming from hydro power, 59 GW from wind energy, 44 GW from biomass power, 9.3 GW from geothermal power and 3 GW from solar and tidal power.

The Bush administration's 2007 budget includes $49 million for wind energy research, according to the U.S. Department of Energy. As a result of increased funding, our country's wind energy production will continue to rise.

Despite the political hype, not every aspect of wind energy is better for the environment. Wind turbines sometimes shred Golden Eagles and other types of birds, according to the Golden Gate Audubon Society. Audubon studies estimate that 75 to 110 Golden Eagles are killed each year by turbine blades located at the Altamont Pass Wind Resource Area in California. These majestic creatures are found on the ground without wings, decapitated or cut in half. Golden Eagles are pro-
tected under the Bald Eagle Protection Act, making it illegal for them to be harmed or killed.

Golden Eagles are not the only victims. Wind turbines cause over 26,000 bird deaths each year, but that is relatively low compared to other death factors. A study by Curry and Kerlinger, consultants to the wind power industry, estimated 100 to 900 million birds die each year from crashing into glass windows, 100 million from cats, 50 to 100 million by automobiles, 100 million from hunting, 67 million from agriculture and 1 to 2 million from oil and gas extraction.

A recent lawsuit against the Altamont Pass Wind Farm, one of the oldest wind farms in the U.S., was recently settled. The agreement called for immediate action over the next two years to reduce the number of birds killed each year by nearly 47 percent while keeping the wind farms annual loss to no more than 16 percent.

The growth of wind technology in the U.S. has high potential for further expansion of wind farms into the western states of Washington and Oregon. By channeling the $25 million dollars spent daily in Washington on oil to alternative power sources, this state's dependency on foreign oil will diminish along with pollution, while simultaneously strengthening Washington's economy with local resources.

Michelle Rybolt studies public relations and sociology. She has been published in The Western Front and Klipsun.
YOUR WATER IS A CONTAMINANT COCKTAIL
The glass of water you are drinking may not taste strange. It may look clean. But, it is brimming with contaminants, and you are swallowing hundreds of kinds of PPCPs.

"PPCP" stands for pharmaceuticals and personal care products: antibiotics, hormones, antidepressants, caffeine, painkillers, heart medications, cholesterol medications, anti-cancer agents, cosmetics and fragrances.

PPCPs are in bodies of water around the world. Most exist in very low concentrations, usually parts per billion (ppb) or parts per trillion (ppt).

Scientists were only recently able to detect PPCPs in public water supplies, but it is likely contaminants have been in our water for as long as people have stored them in their medicine cabinets. The long-term effects of chronic exposure to humans are unknown.

"This is a huge issue, and there's a reason it's huge," said Peg Wendling, laboratory supervisor of Post Point Wastewater Treatment Plant in Bellingham. "I don't know about you, but I don't want to be drinking estrogen."

The presence of hormones in water is of particular concern, especially where effluent, treated water from sewage plants, is released. These hormones, such as ethinylestradiol and estrone, are produced synthetically for contraceptive pills. Although effects on humans are still inconclusive, PPCPs affect aquatic life and other animals.

In 1998, Canadian scientists exposed laboratory fish eggs to 1,000 ppt ethinylestradiol. Every fish was born female. Even exposure rates of only 0.1 ppt increased female characteristics in fish, producing some specimens with both male and female characteristics, known as intersex organisms. Many intersex fish had no desire to breed. It is unknown whether this exposure could result in complete future infertility.

Antibiotics are also a major concern. Up to 40 percent of the antibiotics made in the United States are fed to livestock to enhance growth and milk production and prevent disease. The animals excrete the antibiotics into waste lagoons, some of which leach into groundwater and spread to other water supplies. Some scientists believe the presence of antibiotics in water sources may be contributing to bacterial resistance.

A growing number of infections, such as Methicillin-resistant Staphylococcus aureus (MRSA), no longer respond to common antibiotics. These infections can be fatal. A recent study found that MRSA kills more Americans than AIDS each year.

Researchers are studying the effects of antidepressants on fish and other aquatic organisms. One study by toxicologists at the University of Georgia in Athens showed that low doses of antidepressants may have caused problems in fish development and delayed tadpole development. While an unaffected tadpole grew limbs after 57 days of development, a tadpole exposed to fluoxetine (also known as Prozac) still had not grown limbs. This is particularly dangerous for frog species that lay their eggs in temporary wetlands. If tadpoles have not matured by the time the wetland dries up, they die.

"They're kind of our canaries in a mine," said Dr. April Markiewicz, assistant director of the Institute of Toxicology at Western Washington University. "They're an early detection system that something is wrong."

PPCPs differ from other water contaminants such as lead, arsenic, mercury and pesticides because they enter the water supply via human waste. The human body's ability to break down drugs depends on medication and the individual. Between 50 and 90 percent of a drug may not be absorbed by the body, according to a 1998 Science News Online article by Janet Raloff. The remaining portion of the drug is excreted and travels with the sewage to a septic system or the local wastewater treatment plant.

Traditional water treatment processes do not destroy PPCPs. Although the wastewater undergoes extensive treatment processes and is pronounced 95 percent pure, PPCPs are still present in the effluent. This effluent is piped out of the plant and dispersed into larger bodies of water, such as Bellingham Bay. Some of the effluent seeps into groundwater and aquifers, and eventually enters the drinking water supply.

Bellingham's drinking water comes from Lake Whatcom, and although no sewage effluent is dispersed into the lake, a septic system failure could release contaminants into the water.

"It's like not changing the oil in your car," said Pamela Cash of Bellingham's Roto-Rooter Plumbing Service. "A system that has not been maintained over the years will fail, and then you have a problem."

But, septic failure may not be the only concern, said Jeff Hegedus, environmental health supervisor at the Whatcom County Health Department. Septic systems release their effluent into a drainfield near the tank. This water still contains PPCPs, and may enter groundwater nearby or seep into Lake Whatcom.
"The bottom line is that septic systems are not designed to break down synthetic chemicals, and really I don't think municipal plants are either," Hegedus said. "It doesn't matter if you have a septic system failing or not. Pharmaceuticals will get into the lake."

Currently, Lake Whatcom is not tested for pharmaceuticals. A grant to test Bellingham Bay, Padilla Bay and Skagit Bay was proposed by Western's toxicology department, but was denied.

PPCP contamination is gaining more recognition worldwide. The issue is how to control it and prevent further environmental harm.

"In my mind, the main problem is that in nature there are thousands of PPCPs present and nobody can tell you what the effects of those mixtures are," said Dr. Thomas A. Ternes of the Federal Institute of Hydrology in Germany.

While some PPCPs may have small or no effects on their own, combinations of these drugs and contaminants can have much greater effects.

PPCPs can be reduced or destroyed with newer technology. This usually involves a combination of extended sludge retention time, ozonation, carbon filtration and membrane reactors.

Many existing wastewater treatment plants could reduce the amounts of PPCPs released in effluent simply by increasing the amount of time sewage sludge sits for treatment, according to studies by the Poseidon Project, a European organization dedicated to removing PPCPs and improving water reuse. An increased sludge retention time boosts microbial diversity in the organisms breaking down the sludge, making treatment more efficient. The recommended sludge retention time is at least 10 days.

Another method is ozonation, a water treatment method adopted by many treatment plants in Europe. Bombarding oxygen molecules with high voltages of electricity produces ozone gas, which is capable of oxidizing PPCPs. According to the Poseidon Project, ozonation is effective for reducing the concentration of most PPCPs in effluent, but it does not remove them all.

Carbon filtration is another treatment method in which water filters through carbon material with high surface area and a positive charge, attracting negatively charged contaminants. According to Ternes, both ozonation and carbon filtering can remove PPCPs to a large extent, but it is not clear which process is better.

Another new treatment option is a membrane bioreactor (MBR) system. MBRs use a membrane to separate solids from liquids and have extended sludge retention time. Snohomish and King Counties are building a treatment plant with an MBR system known as Brightwater near Woodinville. Construction began in 2006, and the plant should be operational by 2010.

The main issue with treatment processes is cost. Many new technologies are expensive initially, but may lead to cleaner and more sustainable water use, Ternes said.

One option is prevention instead of treatment, but that poses problems as well. Unlike typical pollutants, PPCPs come from untraceable sources. In theory, everyone is contributing to the contamination.

"I think we're still teasing out what's happening and how to address it, let alone clean up a system that has pharmaceuticals in it," Markiewicz said. "But it's easier to do the prevention first rather than trying to clean it up later."

PPCPs are an emerging issue, but action can be taken now. The technology exists to test for and reduce the effects of these contaminants. Aquatic life is being affected, and humans may be as well. Water is the resource that links us all. Look again at the glass you're drinking. PPCP-free water is possible. Would you rather be drinking contaminants or clean water?

Emily Linroth studies environmental journalism. This is her first published piece in The Planet.
green living

What you can do to reduce the impact of cleaning chemicals

Compiled by Abby Vincent

01 Make your own cleaning products.

02 Read the labels on cleaning supplies before buying them. Don't use products that say "Danger," "Caution," or "Poison." Buy cleaning supplies that list all the ingredients to make sure that this product is safe. Avoid products with volatile organic compounds which may be found in aerosol-sprays and air fresheners.

03 Let cleaning supply producers know you would like them to replace dangerous chemicals with safer ones.

04 Never combine chemicals. Ammonia + Bleach = deadly fumes.

05 Lobby your government to prevent companies from hiding the ingredients and to require dangerous chemicals to be replaced with safer chemicals.

---

### All Purpose

| 1 cup vinegar | 1 cup water |

### Window

| 1 cup vinegar | 4 cups water | in a spray bottle |

### Oven

| 1 tsp borax | 4 Tbsp liquid soap |

Mix in a spray bottle of warm water. Spray in warm oven. Let stand for **20 minutes**.

### Drain

Pour 1 cup baking soda followed by 2 cups vinegar

Cover with a pot lid for 10 minutes. Pour a kettle of boiling water down drain. Repeat until cleared.

### Bath/Sink

Sprinkle baking soda, scrub and rinse.

---

These recipes work best as part of a regular cleaning regimen

source: womenandenvironment.org
You know you have one. We all do. That special place we keep our collection of discarded plastic shopping bags. We hesitate to throw them away because we're well aware they end up in landfills, swirling in the ocean or drifting down the street.

But, opening your cupboard is like opening Pandora's box, and what seems like a never-ending supply of plastic crinkly bags comes cascading down on you. Whether the plastic bag invasion has hit home for shoppers or not, they are becoming more aware of this serious problem and are seeking alternative bag choices.

In order to reduce plastic bag consumption and offer shoppers an alternative, more stores are encouraging the use of reusable bags. For years, farmers' markets and stores such as the Bellingham Community Food Co-Op have promoted reusable bags. Recently, stores such as Haggen Food and Pharmacy and Fred Meyer have also joined the reusable bag movement by selling their own bags.

Plastic makes up 90 percent of all grocery bags and approximately 100 billion plastic bags are sold annually around the world, according to The Society of Plastics Industry (SPI).

Nine percent of landfill waste is plastic and half of that is plastic bags and film, according to SPI. However, plastic bags aren't always sent to landfills. Sometimes they litter places such as the ocean. Marine trash, mainly plastic, is killing more than 1 million seabirds and 100,000 marine mammals and sea turtles each year, said United Nations Secretary General Kofi Annan in a statement.

After seeing a presentation on plastic bag waste in the oceans, Penni Lemperes, solid waste specialist for Whatcom County Public Works Department, said reducing plastic bag use and having an alternative bag option are especially important for the environment.

"It just literally made me sick," Lemperes said. "[Plastic bags] get wrapped around the necks of birds and fish."

The Solid Waste Division of the Whatcom County Public Works Department educates the public on the importance of recycling. Every year they plan a special event for America Recycles Day on Nov. 15. This year, on Nov. 17, they distributed 3,200 reusable bags.
made of recycled pop bottles to 17 grocery stores such as Haggen, Lemperes said.

Consumers have asked for another bag option for years, said Becky Skaggs, a spokeswoman for Haggen Food and Pharmacy stores. Last spring, as a response, Haggen began selling a dark green bag made from a byproduct of the plastic manufacturing process, she said. The two significant features of the bag, aside from its light weight and portability, are its inexpensive price, 99 cents, and its ability to stand upright like a paper bag.

Ten thousand bags were sold in the first week of the bag’s debut in spring of this year, and another 12,000 have sold since, Skaggs said.

As an incentive to bring a reusable bag, Haggen customers receive a 5 cent discount every time they use one.

The Bellingham Community Food Co-Op has never offered plastic bags to customers, said store supervisor Michael Marques. Instead, the Co-Op offers paper bags and encourages customers to bring their own reusable bags.

One challenge customers face when trying to switch to reusable bags is bringing them to the store, Marques said.

Everett James, a 46-year-old Bellingham resident, said he’s been using fabric bags to carry his groceries for more than 10 years, but admits it’s hard to remember to bring them.

As a solution, the Co-Op also encourages customers to bring in their old paper and plastic shopping bags so they can be recycled or used by other customers.

“I’ve gone to other stores before and brought my own bag and have gotten a funny look [from the cashiers],” Marques said.

When he forgets his fabric bags at home, James chooses to use old plastic bags the store provides instead. He reuses the plastic bags from grocery stores to pick litter off the streets, and has purposely switched to smaller garbage cans in his home in order to use old plastic shopping bags as can liners.

Like Haggen, the Co-Op offers a discount incentive when customers choose to use their own bags. Customers receive a dollar off their purchases once they have filled up an Eco-Saver card, a card that rewards customers when they bring their own shopping bags or containers and use alternative transportation, Marques said.

In addition to providing old shopping bags to reuse, the store sells sturdy reusable bags ranging in price from $5 to $15 and come in a variety of shapes, sizes and materials.

Stores such as the Co-Op and Haggen also recycle plastic bags.

Northwest Recycling in Bellingham recycles plastic bags from community businesses. On average, they recycle approximately 15 tons of plastic film a month, said Marty Kujis, Northwest Recycling office manager. That amount is equivalent to the weight of approximately 13 Honda Civics. Plastic film includes plastic bags, stretch wrap and packaging plastic films.

“I think a lot of people don’t realize plastic film in general is recyclable,” Kujis said.

Many businesses throw away their plastic waste, but could save money in garbage fees by recycling, said Rodd Pembble, the recycling manager at the Sanitary Service Company (SCC) in Bellingham.

While SCC charges businesses for plastic collection and transportation to the Northwest Recycling facility, the charge is 30 to 40 percent less than what it costs to throw the plastic away, Pembble said.

The plastic recycled at the Northwest Recycling facility is usually shipped overseas to China, where it is processed and made into other products such as toys, plastic lumber and fabric used in polar fleece, Kujis said. Even if it is eventually recycled, shipping waste across the Pacific increases the negative impact of plastic on the environment.

If the average person used two less plastic bags per week, they would throw away at least one hundred fewer bags per year. If everyone in the United States did this, the sum of saved bags, tied together handle to handle, would make a rope long enough to wrap around the earth’s equator more than 126 times, according to “The Green Book,” a publication promoting green living.

The cupboard where you stuff your plastic bags is a glimpse of the current world where there is little reduction in plastic bag waste. So reconsider your options; paper, plastic or reusable?

Nancy Bruce studies journalism. She has been published in The Western Front and Klipsun magazine online.
Jonathan Seagrave (left), Amy Sattler, Dave Smith and Rudy Leaver look out over Skagit Valley at the Samish Overlook.
Driving west on the logging road that winds up Blanchard Mountain is a study in contrasts.

To the south is an old clear-cut with sweeping views of patchwork Skagit farmland stretching to Samish Bay. The other side of the road is a steep green forest. A grouse takes off, landing in the remains of an old snag.

“When you’re making a long-term decision about a place like this,” said Bellingham author and conservationist Ken Wilcox, “you have to do it right.”

The decision by the Washington State Department of Natural Resources in August 2007 to renew logging on two-thirds of Blanchard Mountain was a tipping point in a political firestorm brewing for more than 15 years. Those who support the decision call it a successful collaboration of environmentalists and timber; a balance of ‘working’ timberland and protected forest. To the opposition, however, the plan is a sell-out and a death knell for a rare and endangered living landscape.

“This forest is one of a kind,” said Ann Eissinger, a wildlife biologist and environmental consultant who has studied Blanchard Mountain for more than 15 years. “It’s a remnant of what historically persisted throughout this whole region, and it’s the last of it along the mainland coast of Puget Sound.”

On Sept. 12, the North Cascades Conservation Council and the Chuckanut Conservancy filed a civil lawsuit in King County Superior Court against the Department of Natural Resources (DNR) to halt the Blanchard logging plan they say is irresponsible and proceeding illegally.

The unanimously approved plan was the product of a year of meetings between conservation organizations and the timber industry. The lawsuit, therefore, raises a question: Even if conservation and timber can find common ground, collaboration’s biggest challenge is its most basic choice: Who’s on the guest list?

“The lawsuit is an appeal by the public,” Eissinger said. “It’s the only recourse the public has to be seated at the table on this decision.”

Blanchard’s 4,827-acre forest has been cut before, with logging on its lower slopes as recently as 2004. Yet, near the crest of the mountain is a swath of maturing forest that hasn’t seen an axe since the early 1900s, along with rare pockets of old growth. This forest core is at the center of the controversy.

For the state, which owns the land, there was never a question about logging the mountain. It’s located entirely within Skagit County, and the DNR has managed it since the 1950s with the sole purpose of using timber revenues to help fund Skagit County schools and other services.

Blanchard’s location, deep forests and stunning views have made the
Dave Smith, Outreach Coordinator for the Coast Watch Society, hikes along the crest of Oyster Dome on Blanchard Mountain.

mountain a jewel for hikers, paragliders and all who value a wild refuge amid an alarming disappearance of coastal Washington's forest and farmland. Blanchard Mountain shelters 19 threatened species. It also filters the waters of Oyster Creek and smaller streams, some of which are salmon spawning grounds. It is the last known coastal nesting area for the threatened marbled murrelet in the Puget Sound region.

Spurred by growing controversy, the Department of Natural Resources created the Blanchard Forest Strategies Group (BSG) in the spring of 2006, and asked them to find a solution that would set aside some forest for preservation and the rest for timberland. More than a year later the BSG's plan was officially adopted: a 1,600-acre protected forest core, including a narrow linkage to Larrabee State Park and the remaining 3,227 acres slated for rotating harvest.

With three of the 10 strategies group's seats held by representatives of conservation organizations and another by a recreation group, the plan was presented as a fair compromise.

"They all stood in each other's shoes and tried to see it from the other side," said DNR spokeswoman Jane Chavey. "Everybody in the strategies group was invested in the long-term."

With representation from the conservation community, land use groups, Skagit County and the timber industry, the plan was able to support interests on all sides, Chavey said.

"I beg to differ," Eissinger said. "The DNR hand-picked this group of people."

Activists have been working to protect Blanchard for 15 years, she said.

"None of those people in the strategies group have a historic memory of this issue, and none of us who do were included or represented in this decision."

The lawsuit claims the DNR's initial environmental review is seriously flawed, because it concluded an Environmental Impact Statement for Blanchard was unnecessary, according to court documents. If the case goes to trial it could buy time for conservation groups to petition for protecting the mountain, either in the form of a new Chuckanut park district or a larger and more protected forest core.

"I would love to see a bigger protected core," said Mitch Friedman, executive director of Conservation Northwest and member of the strategies group. "But this lawsuit's gonna go down in flames."

Friedman is intervening in the lawsuit on behalf of the DNR. He has a long history as a radical environmentalist and vocal opponent of the timber industry. During the mid-1980s he headed the Washington State chapter of Earth First!, staging tree-sits, dismantling logging equipment and blockading roads to protect old growth forest. His participation in the BSG and continued defense of the logging plan has infuriated opposing conservation groups who are holding out for a more protected mountain.

The areas slated for logging include approximately 10 percent of Blanchard's old growth trees, and one-third of the currently roadless area. The plan allows the DNR to log selectively within the protected core and to build any temporary roads needed to conduct the thinning, according to DNR documents. This has some conservationists questioning if a 'protected core' on Blanchard is an overstatement.
"I suppose there are people who would like to say I'm a lousy negotiator and I got rolled," Friedman said of his role in the strategies group. "But we did a good job."

Friedman's organization initially advocated a 2,400-acre core on Blanchard, but settled for the current 1,600 acres.

"The alternative was to go to war forever on the Blanchard core, and risk losing both conservation and good forestry," Friedman said. "If I'd held out we wouldn't have a deal at all."

Striking a deal is a new challenge for environmentalism, as dynamics between conservationists and timber interests change. Collaborative conservation is a catch phrase for a growing trend based on finding common ground solutions between these historically clashing agendas.

"It's part of the alliances that environmentalists are building," said John Tuxill, professor of conservation biology at Fairhaven College. "Certainly in timber, certainly ranching. You're starting to see it with the fisheries as well. These groups are discovering that they do have something in common."

So far, collaboration hasn't worked for Blanchard, Wilcox said. A member of the North Cascades Conservation Council and the Chuckanut Conservancy, Wilcox is helping lead the lawsuit.

"There is no doubt that development has the potential to be more destructive long-term," Tuxill said. In the big picture of forestry, the most important thing is that management decisions are grounded in science, but turning forest into timberland isn't a blanket solution.

"For species such as the spotted owl and marbled murrelet, logging has been devastating," Tuxill said.

For now, it seems the next chapter in Blanchard Mountain's history will be written in a courtroom. For the future of collaborative conservation, the biggest challenge might be in defining just how collaborative it is.

Jenny Lara studies cross-cultural journalism and environmental politics at Fairhaven College. This is her first published piece in The Planet.
A drip is the end of the line for Sperry Glacier, located in the heart of Glacier National Park.

The air was dry and warm hitting my face as I crossed the park on the Going-to-the-Sun road in a dusty S-10 pickup. My friend and I made the trek to the East side of Glacier National Park to see one of its most famous glaciers. What started out in a puttering tour boat continued on a thoroughly used trail to the glacier. A sign marking the glacier greeted us: "Here sits Grinnell Glacier." The only problem—no glacier.

Written and Photographed by Andrew Spanjer
Grey jagged rocks and a diminutive patch of snow were all that lay at our feet. As disappointment and confusion set in, I decided to walk on, resolved I'd soon find it.

Glacier National Park is on the verge of losing its heritage. By the year 2030 scientists predict all glaciers that remain in the park will be gone; victims of a changing global climate.

The implications of this retreat are far reaching both ecologically and for recreation.

The glaciers expand and recede, carving the landscape around them. As if painted by hand, the jagged peaks and bands of rock fold and curve creating a landscape unlike any other.

Nearly 3 million people visit this park every summer, which is located about eight hours from Seattle in Northwestern Montana.

In 1850 an estimated 150 glaciers existed inside the park, according the United States Geologic Survey (USGS). Today, that number has dwindled to less than 27. Between 1850 and 1979, nearly 73 percent of the ice melted. The glaciers that remain are steadily declining in size, and are but small puddles of their former glory.

I eventually found what remained of Grinnell Glacier on that day in August. Squinting at the glare that bounced off the surface, I was able to take in the blue and white cracks and crevasses. The sound of trickling water filled the air as the melting ice fed the streams below, where a small lake was forming.

Andy Bach, a geologist at Western Washington University, said glaciers are now supplying lowland stream flow.

In Glacier National Park this means hikers will have a harder time finding fresh water at higher elevations.

Backpacking to Fifty Mountain, one of the park's more remote spots, I encountered this very problem. All streams had run dry; no water source meant a parched throat for a few miles until I was able to reach a lower elevation.

Grinnell once covered 722 acres, twice the size of Western's campus. Today it has dwindled to less than a third of that, and wouldn't even begin to cover the campus.

As the ice recedes at Glacier National Park, forests are able to survive at higher elevations. Alpine species of vegetation and conifers grow in areas where there was previously no vegetation. A climate model by Daniel Farge of the USGS predicts coniferous forests will crest the highest peaks by the year 2100.

These changing forests are forcing many of the park's animals to leave their homes. The North American Pika, Wolverine and Marmot are being pushed to higher elevations, as advancing forests take over their normal rocky habitats, according to the park's Web site. Each animal faces an uncertain future.

Scientists are still uncertain to what degree glacier disappearance will impact animals, recreation, and geology. Changes are imminent though, as anyone visiting Glacier National Park will see.

As I sat at Grinnell for nearly an hour in the hot sun, I realized I was looking at something my generation would be the last to enjoy. I wanted to know what Grinnell was like in its former glory. Instead, the remaining ice is dwarfed by the now visible barren rock surrounding it.

Jumping into the melt water seemed fitting. A place once covered by ice is now a swimming hole hikers use to cool off. It was clear while I was swimming in what used to be glacial ice that the change isn't coming. It's here.

Andrew Spanjer studies environmental journalism. This is his second published piece in The Planet.
The deaths were prolonged. Slow, painful, broken gasps for air, the rise and fall of strained, unfulfilled breaths. One by one, the bodies of beached marine animals were found on shore, void of life. Eleven bodies in one month. The days and years following the deaths were muddied with confusion and mystery. What caused the deaths of harbor porpoises in Haro strait? The answer to the mystery lies in the dark, cloudy depths of the sea.
On the morning of May 5, 2003 a navy submarine, USS SHOUP, participated in an active sonar training exercise in the eastern part of the Strait of Juan de Fuca and Haro Strait in Washington State. The SHOUP was using mid-frequency sonar as part of a quarterly training exercise.

That same morning Dr. David Bain, assistant professor of psychology at the University of Washington and contractor with the National Marine Mammal Laboratory, was out on the water in Friday Harbor teaching a field methods class. Following the orca J pod on the western side of the San Juan Islands, Bain and his students noticed the group of whales turn abruptly towards the shore in an unusual location. Bain then began to hear the rhythmic pings of sonar through the hull of his boat.

Bain and his students, perplexed by the unusual behavior they were observing, documented the whale's activity.

Cetaceans, a scientific grouping which includes porpoises, toothed-whales and baleen whales, rely heavily on sound for location, feeding and socializing. Using both high and low frequency sounds intermittently, cetaceans are able to 'see' where they are going. When sound waves from external forces disturb or mask these sounds, the cetacean loses awareness of its surroundings, hindering its ability to locate food and communicate.

Commercial boats, seismic sonar, cruise ships, recreational boats and navy sonar are all contributors to ocean noise. Navy sonar is a huge concern to researchers because it uses low frequency sonar. Even if a submarine is testing sonar at a distance the low frequency sound waves can travel far enough to disturb a cetacean.

"Low frequency waves travel farther; that's why when you're in your car and someone has music blasting you can feel [the bass] from far away," Western Washington University Professor Alejandro Acevedo-Gutierrez said.

The Navy's official statement on the incident of the USS SHOUP was that the SHOUP's use of sonar on May 5, 2003 was not a factor in the stranding or deaths of the harbor porpoises discovered in the following days. The report also stated that the behaviors exhibited by the orca J pod on May 5 were not out of the range of normal behavior routinely observed for the species.

"It took us a while to connect it to the Navy exercise," Bain said. "So we took notes, video, sound and a description of the behavior. At first we didn't see any boats that could be the source of the noise, but then we observed the top of the SHOUP."

Bain and his students observed tail slaps and an unusual change in direction. The orcas also began traveling in a strange spatial arrangement. But, when the whales were no longer exposed to the sounds of sonar, their behavior went back to normal. As the SHOUP changed direction, exposing the whales a second time to the sound, the J Pod turned toward the shore again, stopping in a little bay. The pod stayed there until the SHOUP passed.

It took a while for the J pod to get back together, but all the whales survived with no measured permanent damage.

"The whales' behavior was definitely tied to the sonar," Bain said. "The Navy people don't have the same level of expertise on the behavior of whales, I am quite confident. They can take an individual behavior out of context and say 'yes killer whales do that,' but in a big package it is unusual."

Since 1996, five reports of mass strandings following Navy sonar testing have surfaced around the world. However, it is a struggle to prove the relationship between these events, the behavioral response and the beachings. Navy biologists say there is no strong evidence these beachings were related, while many researchers believe these events cannot be coincidence.

"It can be extremely frustrating that we don't have the smoking gun; it's all circumstantial," said Dr. Volker Deecke of the University of British Columbia. "If a whale flees from sonar and lands on a mud bank, linking it to an acoustic source is almost impossible."

Researchers argue the effect of sonar is largely behavioral and not biological, which explains why autopsies on stranded harbor porpoises have been inconclusive. In the case of the USS SHOUP, the autopsies of harbor porpoises revealed no physical damage.

"You put a once in 25-year event with the passing of a Navy boat using sonar, if that is not enough evidence for them, they may as well pack up and go home," said Dr. Lance Barrett-Lennard, a researcher at the Vancouver Aquarium.

Despite the rare orca and porpoise behavior in reaction to the USS SHOUP's sonar, Navy biologists said they can't be certain of the effect on marine mammals without greater evidence.
"Navy sonar is the object of much suspicion and misinformation," stated Sean Hughes, public affairs officer for Navy Region Northwest.

A careful examination of the facts and scientific evidence paints a different picture. For example, the National Marine Fisheries Service examined the remains of 11 porpoises whose bodies were found between May 2 and June 2, 2003. Some had been dead for several days, long before the USS SHOUP transited the area on May 5. In addition, other noise sources were present in Puget Sound at the time. The National Marine Fisheries Service investigation found no proof that sonar caused any of the deaths. Yet, some members of the public continue to blame sonar.

"If someone wants hard legal proof, they aren't a scientist. We rarely have tangible proof," Barrett-Lennard said. "We work with what is probable, what is likely."

The Marine Mammal Protection Act (MMPA), created in 1972, is legislation meant to protect the safety and treatment of marine mammals in the wild. The MMPA defines harassment as any act that injures or has significant potential to injure a marine mammal or marine mammal stock in the wild, or any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns.

The Navy is exempt from the MMPA but not the Endangered Species Act, which includes the southern resident orca. Endangered species have ultimate protection afforded by law. Regardless of the threat sonar poses to these endangered cetaceans, the Navy stresses the importance of sonar and sonar training in the waters of the Northwest.

"Forty-one nations have diesel-electric submarines, and more than 180 diesel-electric submarines operate in the Pacific Ocean," Hughes stated. "Detecting them with sonar is a complex, highly perishable skill that cannot be completely mastered only in simulators."

As complex as the subject may seem, small measures can decrease the level of ocean noise. "The quickest thing to do is increase the space between boats and whales," Bain said. "Not getting as close will make things quieter for whales."

Recreational boat owners can reduce their contribution to ocean noise significantly by replacing a loud boat motor with a more efficient silent one.

"We can easily make [boats] quieter, but we hear in the air so we don't really care," Barrett-Lennard said. "The boats that are quieter above water are usually the ones that are louder underwater."

Rerouting commercial and shipping vessels through different straights would greatly decrease motor effects on marine mammals.

Some scientists think national defense is not a valid reason for sonar testing in waters of high marine mammal populations.

"You have to wonder who the enemy is," Barrett-Lennard said. "I am not aware that Osama has submarines yet."

It is a bit of an easy way out, Deecke said. Of course, national security is important, but ideally there should be a middle ground. Deecke said a healthy marine system is as important as a safe homeland.

While bodies continue to wash ashore and the deep sea discord builds, the greatest danger to marine mammals may be the ocean noise debate that remains eerily silent.

Erin Miller studies public relations and communication. She has been published in The Western Front and The AS Review.
The pilot started up the old three-seater plane and the next thing I knew we were feet, then miles, above the ground. The turbulence made my stomach drop, so I focused on getting the shots. My head hit the window as we bumped along the clouds and I squeezed the camera tightly. I was amazed at the view and found myself just floating above the San Juan Islands amongst the clouds. Having fears of heights and flight, I never dreamed I would be up here.

-- Jane Gershovich, Photographer
One final paragraph of advice:
Do not burn yourselves out.
Be as I am-- a reluctant enthusiast... a part-time crusader,
A half-hearted fanatic.
Save the other half of yourselves and your lives for pleasure
and adventure.
It is not enough to fight for the land; it is even more
important to enjoy it.
While you can.
While it's still here.
So get out there and hunt and fish and mess around with your
friends,
Ramble out yonder and explore the forests,
Encounter the griz,
Climb the mountains,
Bag the peaks,
Run the rivers,
Breathe deep of that yet sweet and lucid air,
Sit quietly for a while and contemplate the previous stillness,
that lovely mysterious and awesome space.
Enjoy yourselves, keep your brain in your head and your head
firmly attached to your body, the body active and alive, and I
promise you this much:
I promise you this one sweet victory over our enemies, over
those desk-bound people with their hearts in a safe-deposit box
and their eyes hypnotized by desk calculators,
I promise you this: you will outlive the bastards.

--Edward Abbey