

BRENDA BALLACHEY

SEA OTTER BIOLOGIST

BY MARY KNUDSON



 *wonderwise*

Women in Science Learning Series

SCIENCE CAN BE FOR YOU.

This series of learning kits introduces you to women who have made science their career. The kits are produced by the University of Nebraska State Museum in Lincoln, Nebraska. The entire series has been funded by the Howard Hughes Medical Institute.

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A brown furry sea otter the size of a collie dives down into the clear blue water of Prince William Sound to search for food. Crabs, clams, sea urchins and mussels are all prey to sea otters in this beautiful wilderness in southern Alaska.

Overhead, sea gulls and bald eagles fly gracefully through the air. In the distance a whale emerges above the water's surface. Surrounding Prince William Sound are the majestic jagged snow-capped Chugach (pronounced Chew-gatch) Mountains, and beyond, to the south, the Pacific Ocean. Rocks, some the size of boulders, carve out a rough shoreline.

There on the rocks, fifty yards from where the sea otter dove for food, Brenda Ballachey, a wildlife biologist, peers through a telescope mounted on a tripod. She and a colleague, who both work for the U. S. government's National Biological Service, take turns watching and recording what they see. They spend the day observing the otters.

Sea otters stay underwater anywhere from 40 seconds to four minutes foraging for food and then surface. They roll over on their backs and float in the water, balancing their prey on their chests while they eat.

Brenda looks very carefully to see what type of food the sea otter found and how large the prey is. She also records how many prey an otter finds during a feeding session, and how long it took the otter to locate the prey during each dive.

Brenda's observations are part of a project the government is conducting to determine the effects a huge oil spill five years ago had on sea life in the Alaska waters.





Photo courtesy of Gary Hochman

Brenda surveys shoreline with possible oil spill damage.

In March, 1989, an accident occurred that severely damaged much of the area's marine life, including sea otters. A tanker, the *Exxon Valdez*, ran aground on a reef, spilling over 11 million gallons of crude oil into Prince William Sound.

It was the largest and most devastating oil spill in U.S. history. Alaska Department of Fish and Game officials said that wind and ocean currents spread the oil along 1,300 miles of shoreline. An estimated 3,000 sea otters and 300 seals died as a result of the oil spill. The oil also killed about 30,000 birds of many species and unknown numbers of fish. Damage occurred throughout the entire ecosystem.

A neighborhood in nature is known as an ecosystem. The ecosystem includes animals, plants and the environment they live in—water, ground and air that surrounds them. All living things within an ecosystem are closely interrelated, and many depend on one another to survive.



Photo courtesy of FOSEPIC

Attempted clean-up of the Exxon Valdez oil spill

As project leader for the sea otter oil spill studies, Brenda Ballachey is helping the government learn whether sea otters who survived and other residents of the community they live in have recovered from the oil spill.

One of many studies she oversees is the observation of otter eating habits. “By doing observations on a large number of dives for a large number of otters, we can get an understanding of the food sources used by the otters living in that area,” Brenda explains. “We eventually hope to determine if food availability may be limiting recovery of the otters in the oiled areas.”

At birth an otter weighs only about two to three pounds. But an adult female otter weighs 50 to 60 pounds, and an adult male otter typically weighs 70 to 90 pounds. “An otter eats up to 25 percent of its body weight in a day—which, for a hundred-pound-person, would be the equivalent of eating 25 pounds of food a day,” Brenda says. “They have to eat a lot of food in order to maintain their body temperature” in their cold habitat.

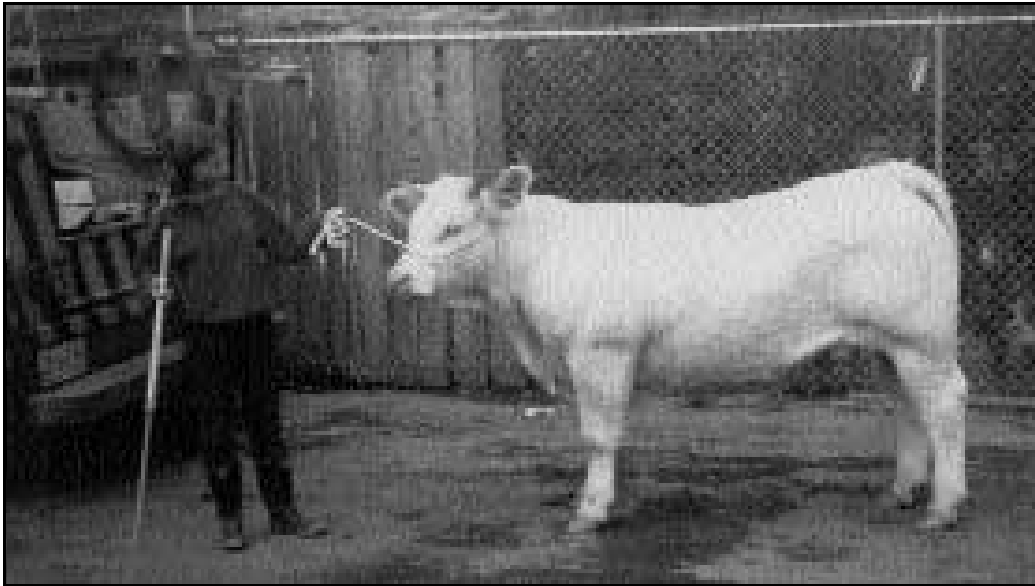


Photo courtesy of Brenda Balchey

Brenda, age 15, with a Charolais heifer at the Calgary Stampede, Alberta, Canada.

Brenda didn't know anything about sea otters when she moved to Alaska in November, 1989, to start working on the project team. But she did have a lot of experience working with large animals. She grew up on a cattle ranch and then she trained and worked as a livestock geneticist. Livestock geneticists are scientists who use genetic techniques for such purposes as increasing milk and meat production, causing animals to grow faster or bigger or improving their health.

Working outdoors and working with animals comes naturally to Brenda, a slim 42-year-old woman with short honey brown hair, who enjoys working in shirts and blue jeans and finds every day interesting and different from the day before. She grew up on a cattle ranch in Alberta, Canada, in the foothills of the Rocky Mountains. A creek ran through the middle of the ranch. As a girl, Brenda enjoyed playing there and in nearby beaver dams where she caught tadpoles, then turned them loose. She often spent a day with a friend riding horseback and exploring.

The western edge of the ranch bordered a large forest reserve filled with spruce, aspen and willows. The forest was home to lots of wildlife. Wolves, coyotes, mountain lions, black and grizzly bear, elk, moose, deer, squirrels, eagles, hawks, magpies, chickadees and sparrows all made their homes there.

The ranch had hundreds of acres of forest and meadows where the cattle grazed. Brenda's parents, John and Isamay Ballachey, said she got more involved with ranching than either her older sister or younger brother. Brenda helped with feeding, roundup, branding, vaccinating and overseeing the births of calves.

The Ballacheys put their children on horses at an early age. Brenda remembers when she was eight or nine, a man who worked for the ranch was heading out on horseback into a forested area that was thick with underbrush to round up some stray cattle. He asked the children who wanted to come with him.

Brenda eagerly volunteered, "because I knew where he was going, and I enjoyed that kind of riding," she recalled. "I called it bushwhacking. You're dodging branches and tree trunks, getting slapped in the face. It was a challenge."

There was no one moment when Brenda decided she wanted to become a scientist. Brenda thinks she may have turned toward science as a career because her sister became an artist and she didn't want to compete but preferred to travel a different road.

Brenda's mother said, "She was so enthusiastic about everything. The school had science projects. She always got very involved with that—experiments ranging from electricity to animal life."

"She was a little bit of a dreamer. She would stop along the way to watch what was going on as she walked to school, even if she was late to class," her father remembered. She was also very interested in observing insects in their natural habitat as they went about their daily life's chores. And she loved gazing at the stars at night.

Her childhood interests were not so very different from her adult pursuits as a scientist. They had at least five things in common: curiosity, observation, patience, a love of being outdoors and a desire to work with animals and nature.

After high school, Brenda got her undergraduate degree, a B.S. with distinction, in animal sciences, at Colorado State University in Fort Collins, Colorado, and then returned to work on the family ranch for several years. Then she went back to Colorado State to get a master's degree in animal science. She earned a Ph.D. at Oregon State in animal breeding and genetics.

Then she took a federal government job in Washington, D.C., and while living there, met her future husband, Michael Wenig, an environmental lawyer. Michael moved to Alaska and Brenda joined him six months later. They married and had a son, Joey.

A sea otter covered with oil.

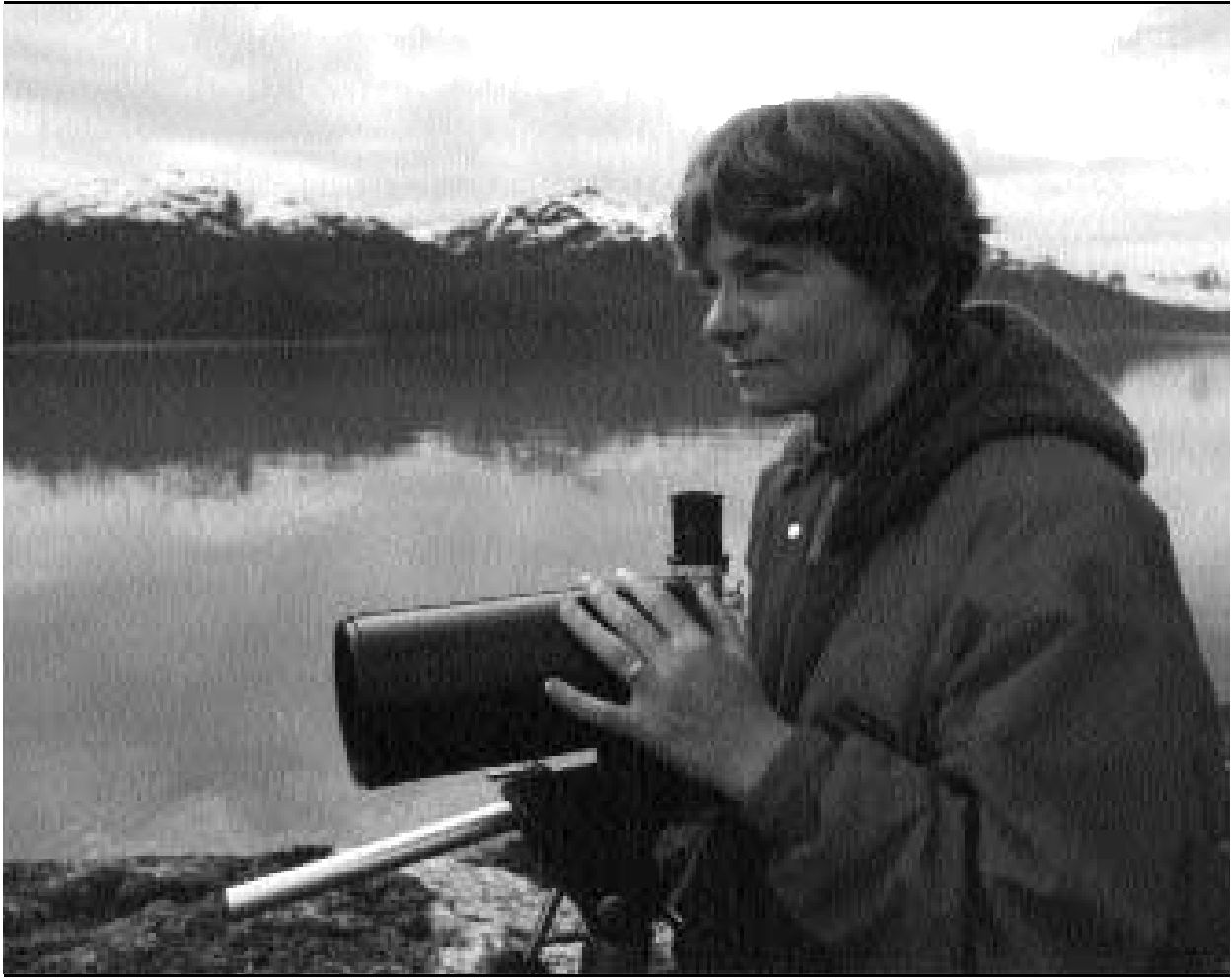


Photo courtesy of FOSEPIC

Trying to manage full-time jobs and parenting is difficult for any couple. Mike and Brenda find that life is easier and more fun for everyone now that Mike has quit a full-time job to do contract work out of an office in their home. Working at home allows him to spend more time with Joey. Mike, a big hockey fan, has been constructing an ice rink in their back yard. Weekends are special family times for Brenda, who sometimes feels disappointed that she is missing some of the growing-up moments of her son that her husband gets to be there for.

Mike says Brenda “has been very successful at both” her work as a scientist and being a parent. “Brenda’s one of those super women who has incredible energy,” he says. He describes his wife as spunky, strong, smart and beautiful. “She loves the outdoors,” he says. “I think she has the outdoors in her blood. I thought I was kind of an ‘outdoorsey’ person. But not at all compared to her.”

Mike, who has gotten to know many of Brenda’s fellow scientists socially, says: “Wildlife biologists are a distinct breed of people. They live for the outdoors in a way that I’ve really never seen.”



Brenda using a spotting scope to observe sea otters.

Brenda says a person has to love being outdoors to do this kind of research. To learn how the oil spill has affected sea otters, Brenda and her colleagues have been doing several kinds of studies. Shortly after the oil spill, they had veterinarians examine the carcasses of the dead sea otters to learn what they could about how the animals died. Brenda said the doctors found liver, kidney and lung problems related to the oil exposure.

“Probably, too, many otters died of hypothermia because the fur is critical in keeping the animal warm,” she said. “Unlike other marine mammals, otters don’t have a layer of blubber (fat) for insulation. They have to keep their fur fluffed up with an air layer against the skin. And when the oil hit the animals, of course they lost their ability to do that. They would not have been able to keep themselves warm in the cold waters.”

In the years since the oil spill, Brenda and the researchers working with her have continued to collect carcasses of sea otters that wash up



Photo courtesy of Gary Erc Imman

Brenda and her colleagues collect and record information about the sea otters.

on the beaches to determine at what age the animals died. It is to be expected that generally, animals found dead on the beaches are usually old or very young, she said.

But the year of the oil spill and the next couple of years, scientists found as they recovered carcasses from the beaches, that young adult to middle-aged otters represented a larger proportion of the dead animals than in previous years. This finding suggested “that survival of the animals in the two years following the spill was abnormal,” Brenda said.

When Brenda works directly on the otters or spends time observing them and collecting data, she calls it “working in the field.” Brenda’s field work often takes her out on a boat. When Jim Bodkin, a veteran wildlife biologist and diver, first met Brenda, he wasn’t sure he wanted her along on the boat as a fellow researcher, because, he says, she got terribly seasick. They were on a small boat, a 25-foot whaler, and the water got rough and began tossing the boat around. The cabin even



Photo courtesy of Gary Eochman

*Brenda
with an
assistant
using
radio
tracking
to locate
sea otters*

started falling apart, Jim recalls. Poor Brenda was so sick she couldn't be of any help. They found a place to spend the night, got the boat repaired and were back on it the next day.

Jim was in for a big surprise. "Over the course of the next year or so, Brenda took to the boats and the water like a marine mammal or a fish," Jim says. "Now you can't keep her from behind the steering wheel of the boat. She loves to go out and she doesn't get sick." After spending five years working with Brenda, Jim has grown to trust her. "I don't think I've ever enjoyed working with somebody for such an extended period of time as I have with Brenda," says Jim. He says she has an even temperament and an unusual ability to get along well with



Photo courtesy of Brenda Ballachey

Brenda and sea otter pup

people. Managing people well is not something scientists are trained in, Jim points out, and some scientists are not good at communicating well with people.

As part of their research, the scientists temporarily catch sea otters, implant radio transmitters in them, release them and then track them to see if they reproduce and how long they live.

When the biologists capture otters, they go out on a large vessel that has bunks to sleep on, a kitchen called a galley, and space for holding the otters and working on them. To capture the otters, they lay a net 300 feet long in the waters of Prince William Sound. Often the research team works through the night, getting only two or three hours of sleep. They check the nets every four hours to see if any otters are caught. As soon as otters are found, they are brought back to the vessel.

A veterinarian is there to perform the surgery required to implant a radio transmitter into the sea otter's abdomen. First the otter is given an anesthetic; then the veterinarian, with the biologists assisting, removes a small tooth that the animal doesn't need, for the purpose of judging the otter's age; takes some blood for testing; and implants the transmitter into the abdominal cavity.

After surgery the animal is given an injection that reverses the anesthesia. When the scientists are sure the otter is awake and alert, it is released back into the water.

On the boat, everyone pitches in and does what needs to be done. Although the work can be very tedious and the researchers often work in the rain and cold, there is great camaraderie.

Brenda says one of the most enjoyable aspects of her job is “the group of people I have worked with are a wonderful bunch and we’ve been supportive of each other.”

The scientists hope to capture no animals younger than a three-month otter which would weigh about 20 pounds. But they can’t control what swims into the nets they put out.

“Waah, waah, waah, waah!” The screaming sounds something like a bird screeching, but louder. It is coming from the wide-open mouth of a very young baby sea otter who is still dependent on his mother. Baby sea otters are called pups. The pup is upset because it got caught up in the net with its mother and now its mother is away while the scientists take some blood from her for testing. Usually a mother only leaves the pup’s side to dive under water for food for her baby and herself.

Ordinarily, the researchers know not to get closer to an otter than their work demands because the frightened animal may try to bite them in self defense. But with this very tiny cute pup, Brenda and another scientist on the boat take turns holding it, trying to soothe it until its mother is returned and they are let loose together.

In addition to catching sea otters, the long nets trap jellyfish, algae, small animals and plants that float in the water. After the sea otter capture operation is over, the scientists do what Jim calls the “less than pleasant” part of what has to be done. They take the net to a beach, stretch it out, and pick off all the slimy jellyfish and plants by hand. It takes four or five people several days to clean out the net.

Blue Mussels—one of the sea otter’s favorite foods.



Less adventuresome, but more comfortable, a typical day in the life of Brenda Ballachey does not find her out in the field. A typical day is spent in her office, analyzing data her team has gathered, plotting location of otters on a graphic in her computer, organizing an upcoming study and a scientific conference, and talking with and listening to other researchers and staff who often come in to her office or call on the phone.

She is working with a statistician to create a model that will show what recovery sea otters are making in Prince William Sound since the oil spill. Brenda explains: “We’ve got information on how many animals there were at the time of the spill, how many we think died, what the ages and sexes were of all those animals that died. We have some estimates of reproductive rates, of survival rates. We can put all of that into a model and predict how soon the population will be back at the pre-spill number.”

Scientists are under great pressure to publish their research in major scientific journals. Brenda says she cannot get promoted without frequent publishing. “You need to author or co-author several articles every year,” she says. “It’s important, if you’re collecting this information at great expense, to get it out where other people can access it.”

In addition to loving your work, an important thing you need to be a successful scientist is an ability to write, Brenda advises. Students who want to become scientists should get a broad education that includes chemistry, physics, biology, math, English, reading comprehension and writing, and perhaps a foreign language, she suggests.

“I think I was afraid of math.” Brenda says. “I remember being surprised when I took my SAT exam in high school because I did well in math. I didn’t expect to do well and it’s too bad that I didn’t expect to do well. I think that I fell into that same rut that many girls fall into.”

School was at times, however, difficult for Brenda. “I guess I was a good student in a lot of things, but I had a terrible time at times with chemistry, and physics was tricky, and there were times when I found math very hard in both high school and college,” she remembers. “Students shouldn’t think that they have got to have top grades or that they should sail through these classes in order to become a scientist,” she says.

Brenda enjoys being a scientist and she has come to know and respect sea otters as strong, resilient, well-adapted creatures. She appreciates why they are important to the balance of nature in their ecosystem.

“The otters increase the diversity of the environment,” Brenda explains. For example, they eat sea urchins who would otherwise multiply and eat up all the kelp which many other sea animals depend on. If there were no otters, some other animals who live amidst the kelp may disappear because their habitat did.

Finding answers through science is often difficult. The process of discovery and observation can yield conflicting information that is hard to interpret. Brenda and many other scientists, some working with her as a team, others working separately under contract to the government, have brought together much information in trying to determine whether the sea otters have recovered from the *Exxon Valdez* oil spill. But there is no clear-cut answer yet on the recovery of the otters.

“I would say that there are some indications that the population has recovered, but there are also some things that suggest that full recovery has not occurred,” Brenda says. “There are some differences in the blood chemistry between the oiled and non-oiled areas that may be related to oil exposure. Also, the number of otters in some of the oiled areas still seems to be low. They don't seem to be re-occupying those areas and that concerns us.”

During the next year, Brenda and her colleagues will continue to look at the feeding behavior of otters and conduct surveys of the otter population to see how dense it is and whether the otters have an adequate food supply. And they will try to determine the health of the animals, through blood tests and other observations.

Brenda enjoys her job as a government scientist, but she also would love to teach, and so some time in her future she thinks she may take a job at a university where she can both work as a scientist and teach. In the meantime, she continues her investigations of the oil spill and says she hopes she is making a meaningful contribution to the well being of Alaskan sea otters.

GLOSSARY

Algae – Plants that live in water or damp places.

Biologist – A person who specializes in working with the science of living things, such as plants and animals.

Colleague – A member of your profession, a fellow worker.

Ecosystem – A neighborhood in nature, including physical landscapes and all living things such as plants and animals, interacting together.

Forage – To search for food.

Geneticist – A person who specializes in the science of heredity.

Habitat – The home or place where an animal or plant is usually found.

Heredity – The passing along of genes from parents to offspring. Genes create characteristics such as hair color, shape and tendency to get certain diseases.

Hypothermia – What occurs when the body temperature drops below normal. Left untreated, it can be life-threatening.

Kelp – A kind of seaweed, a plant that grows in the ocean.

Jellyfish – A slimy, gelatin-like animal shaped like an umbrella, that has long tentacles and lives in the water.

Marine Life – Fish, animals and plants that live in or near water.

Statistician – An expert in putting together numbers and data to reveal certain information.

Veterinarian – A person trained to practice medical and surgical care of animals.