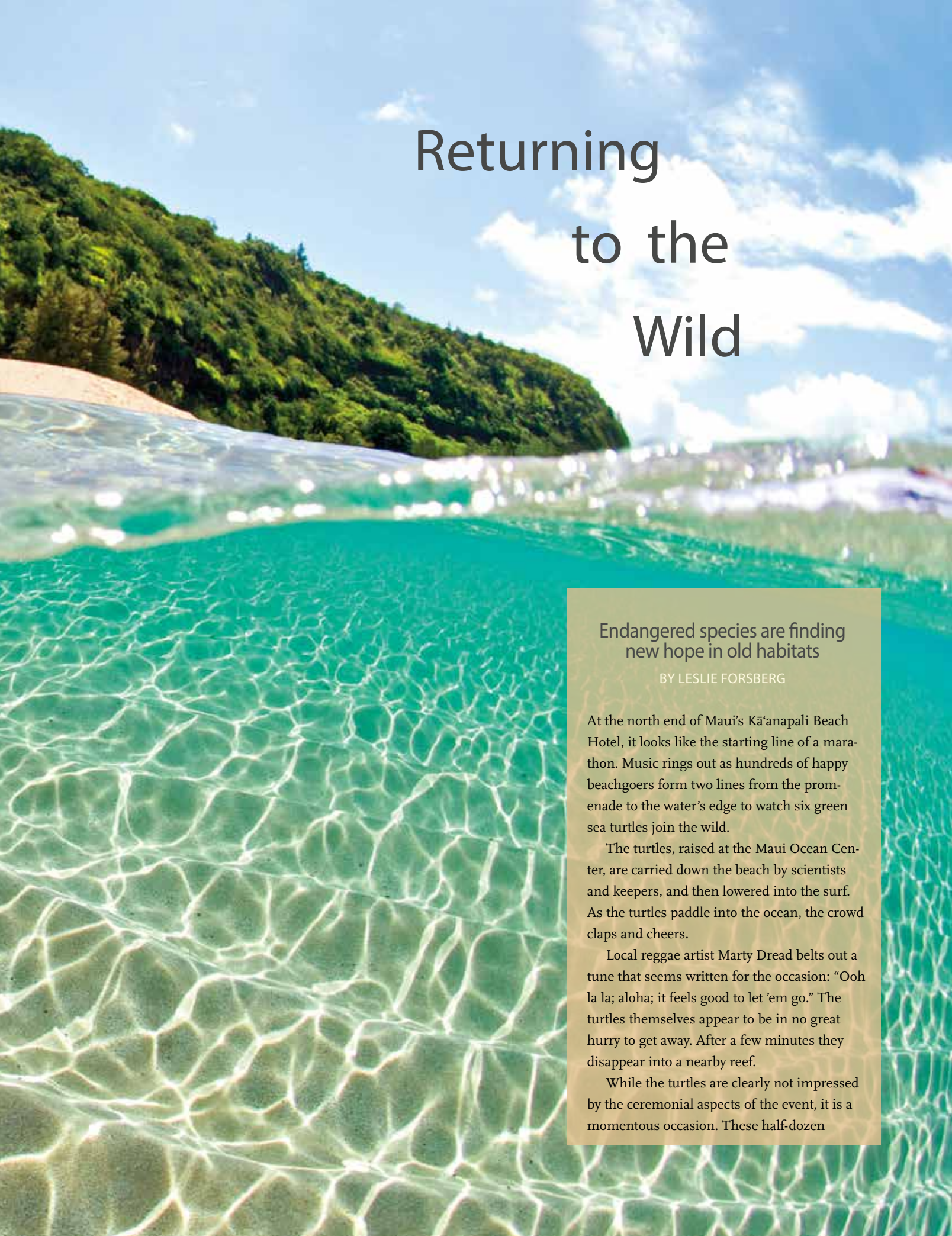
A green sea turtle swims in the surf near Waimea Bay on the North Shore of O'ahu.

CLARK LITTLE PHOTOGRAPHY



Returning to the Wild

Endangered species are finding new hope in old habitats

BY LESLIE FORSBERG

At the north end of Maui's Kā'anapali Beach Hotel, it looks like the starting line of a marathon. Music rings out as hundreds of happy beachgoers form two lines from the promenade to the water's edge to watch six green sea turtles join the wild.

The turtles, raised at the Maui Ocean Center, are carried down the beach by scientists and keepers, and then lowered into the surf. As the turtles paddle into the ocean, the crowd claps and cheers.

Local reggae artist Marty Dread belts out a tune that seems written for the occasion: "Ooh la la; aloha; it feels good to let 'em go." The turtles themselves appear to be in no great hurry to get away. After a few minutes they disappear into a nearby reef.

While the turtles are clearly not impressed by the ceremonial aspects of the event, it is a momentous occasion. These half-dozen

(CLOCKWISE FROM TOP) GLENN FUENTES; CAMERON DUARTE-WHALEN; DOUG LINDSTRAND / AWCC (2)

2-year-old *honu* (green sea turtles) are being released into their native environment to do what Hawai'i's wild sea turtles do every day: forage on algae along the reefs, swim freely wherever they wish and bask in the sun on sandy beaches. With luck they'll survive to maturity and add their own progeny to a population that continues to grow after facing near-extinction just a few decades ago.

The sea turtle release is part of a much larger story taking place around the nation and world as conservationists, zoologists and volunteers band together to give nature a boost where needed, helping to increase the odds of survival for endangered species. After years of managed breeding and reintroduction programs, many isolated populations of extremely vulnerable animals are beginning to turn the corner in terms of viability.

Alaska's wood bison, Washington's Columbia Basin pygmy rabbits and Hawai'i's green sea turtles are among the animals returning from the brink of extinction and, in the process, helping restore the health of entire ecosystems.

Left: Supporters look on as Scott Benson, a diver for the Maui Ocean Center, releases an adolescent green sea turtle into the surf at Kā'anapali Beach. Below: The upper shell of a juvenile turtle is measured during a regular checkup at O'ahu's Sea Life Park.

Alaska Bison Return

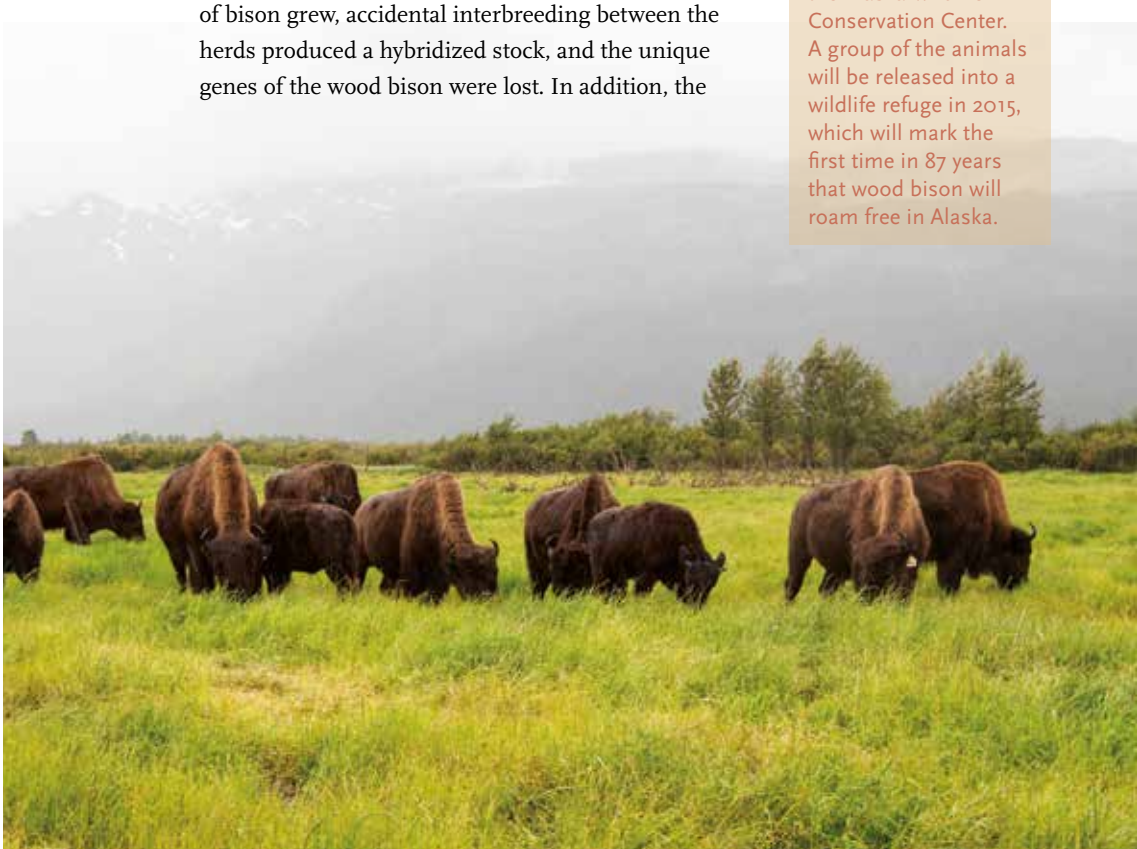
The Innoko River in Alaska's interior is bordered by expansive wetlands that are dotted with low-growing shrubs and crisscrossed by streams. It's a marshy breeding ground for vast populations of geese and ducks, which form fluttering clouds that sweep across the virescent landscape.

This gentle riparian nursery will soon nurture a far different animal: the massive, powerful wood bison—North America's largest native land mammal—which once roamed freely here. Much larger than its southern cousin, the plains bison, wood bison can measure up to 6 feet tall at the shoulder and 10 feet in length, and weigh more than a ton. Once plentiful in parts of Alaska and northern Canada, the bison population was nearly wiped out by hunting and habitat loss.

By 1900 there were fewer than 300 animals in Canada, and in 1928 only three lone wood bison bulls were spotted in Alaska, near Fort Yukon. Soon, the species vanished from Alaska altogether. In 1922, to protect and help reverse the decline of the last known wild herd of wood bison, the Canadian government established Wood Buffalo National Park in Alberta.

Canada also imported thousands of plains bison from the United States. While the overall population of bison grew, accidental interbreeding between the herds produced a hybridized stock, and the unique genes of the wood bison were lost. In addition, the

Below left: A young wood bison calf stands close to its mother at the Alaska Wildlife Conservation Center in Portage. Below: A herd of wood bison graze at the Alaska Wildlife Conservation Center. A group of the animals will be released into a wildlife refuge in 2015, which will mark the first time in 87 years that wood bison will roam free in Alaska.



plains bison brought with them brucellosis, a serious infectious disease that also weakened the herd. By 1940 wood bison were declared extinct.

Seventeen years later, Canadian wildlife officers experienced a stroke of luck while in the process of conducting an aerial survey over a remote section of Wood Buffalo National Park. They spotted a tiny, isolated band of bison. Genetic testing showed that, against all odds, the animals were pure wood bison, likely the last in the world.

In a last-ditch attempt to save the species, 18 of the shaggy survivors were airlifted to the newly created Mackenzie Bison Sanctuary in the Northwest Territories, west of Great Slave Lake, to become breeding stock. In time, their progeny were released into the Mackenzie Delta and eight other Canadian locations. Today, more than 50 years later, there are 5,000 to 7,000 genetically strong, disease-free wood bison in Canada. A program is now underway to bring the wood bison back to its native habitat in Alaska. In 2006, with the aid of the Alaska Department of Fish and Game, 13 genetically pure wood bison were trucked from the Yukon territory to the Alaska Wildlife Conservation Center (AWCC) in Portage, 47 miles southeast of Anchorage.

The first wood bison born in the state of Alaska in nearly a century were calved in 2007. One year later, 53 additional calves were brought from Elk Island National Park in Alberta and added to the small group at the conservation center. Since then, the AWCC herd has grown to more than 135, with staff members expecting another 45 calves to be born this spring. Mike Miller, founder and executive director of the center, feels a moral imperative to help wood bison thrive in their original habitat.

MICHAEL DURHAM / OREGON ZOO

Meghan Martin, a research associate at the Oregon Zoo, holds a Columbia Basin pygmy rabbit that was bred in captivity and then released into its natural habitat in Eastern Washington.

"If this was a mistake made by man, we have the opportunity to right that wrong," Miller contends.

The task is daunting. Routine maneuvers such as running bison through chutes, drawing blood samples, vaccinating and microchipping are not only challenging, they're dangerous. Each fall the center selects breeding bulls to manage the genetics.

"What we look for in bulls is aggressiveness. The ones that paw the ground and try to kill me are the ones we choose; they'll have better odds in the wild," Miller says.

Making a Comeback

The following are three examples of successful programs that are helping to bring certain species back from the brink of extinction.

California condors—the largest flying land birds in North America—once ranged from Baja, Mexico, to Canada. Yet by 1982, environmentalists could find only 22 of the birds left in the wild. The low number of condors led the Los Angeles Zoo and the San Diego Zoo to develop an innovative captive propagation program in which researchers climb canyon walls to reach nests and remove eggs, which are hatched in an incubator. The egg loss spurs female condors to lay a second egg. Human handlers stay out of sight and use condor puppets to feed and care for the newly hatched incubator chicks, which are later introduced to taped condor calls and a "mentor" condor to help them learn life skills. Eventually, they're released into remote canyons in California, Arizona and Mexico.

California Condor.

By early 2013 the population of California condors had grown to 417, with 240 returned to the wild. Many dangers remain for condors, but their increasing numbers have proven encouraging. Condors can be seen at the San Diego Zoo Safari Park and the Los Angeles Zoo. The Oregon Zoo is opening a new condor exhibit on Memorial Day weekend.

The recovery of another denizen of the American West,

Black-footed Ferret.

the black-footed ferret, is very close to reality. Threatened by farming, grazing and disease, black-footed ferrets were near extinction in 1979. When the population of the last-known colony dropped to 18, an all-out effort to save the cute critters began, including using computerized DNA testing and artificial insemination.

The ferrets' captive population is now about 8,000. They still face an uncertain future, but these swift, sleek animals are proving that with help, they can survive in their native prairie habitats.

A decidedly slower creature is making a comeback in Washington state. The hand-size Western pond turtle, once abundant in wetlands from Puget Sound to Baja, Mexico, nearly disappeared due to habitat loss, harvesting and the introduction of invasive bullfrogs. Only 150 were known to exist in 1991.

Now, the Western Pond Turtle Recovery Project, initiated by Seattle's Woodland Park Zoo, hatches pond turtle eggs and rears the young until they're large enough to fend for themselves and then releases them into protected areas. Today, there are more than 1,000 Western pond turtles in the wild. —*L.F.*

Western Pond Turtle.

(FERRET) COURTESY: CHEYENNE MOUNTAIN ZOO; (TURTLE) RYAN HAWK/WOODLAND PARK ZOO

In April of next year, 60 animals—a mix of younger bison with more potential breeding years and older cows that have better instincts—will be released into the remote, 751,000-acre Northern Unit of the Innoko National Wildlife Refuge, where they will be able to wander at will as they graze alongside the Innoko River, returning to a landscape that was devoid of their presence for more than 80 years.

COURTESY: WDFW

The Columbia Basin pygmy rabbit population is now recovering from near extinction.

Rabbit Rebound

In Eastern Washington, the region's semi-arid terrain once burgeoned with life. Rolling waves of sagebrush were home to strutting greater sage-grouse with drumlike mating calls and darting Columbia Basin pygmy rabbits.

In the mid-20th century, when Columbia River dams first brought irrigation water to Eastern Washington, many areas of rocky, marginal soil and sagebrush were tilled, creating farmland. The spread of farm fields pushed native animal species into smaller, fragmented parcels of land, and the remaining scraps of undisturbed sage too often fell victim to wildfires.

With the loss of sagebrush land, the sage-grouse population has declined, but continues to survive in the wild. The Columbia Basin pygmy rabbit proved to be not as adaptable. With fluffy bodies, button eyes and tiny, twitching noses, the pygmy rabbits—small enough to fit within cupped hands—build their burrows in deep soil beneath sagebrush, and the plant is their primary food source. An important part of the ecosystem, the rabbits fertilize and loosen the soil for plants, and serve as a food source for coyotes, birds of prey and other local predators. Isolated from pygmy rabbit populations in other Western states for at least 10,000 years, Columbia Basin pygmy rabbits are genetically distinct from other populations. With unlimited shrub-steppe habitat, they once bred, well, like rabbits. Due to such factors as habitat loss and fire, the Columbia Basin pygmy rabbit population had shrunk by the late 1990s to a single, isolated colony.

Biologist David Shepherdson, deputy conservation manager at the Oregon Zoo, joined staff from the Washington Department of Fish and Wildlife (WDFW) to conduct one of the last Columbia Basin rabbit population surveys at the agency's 12,500-acre Sagebrush Flat Wildlife Area, on a cold, rainy spring day in 2001.

So few active burrows were seen, it was clear this final colony was heading toward collapse. The WDFW sped into action to develop a plan that would allow the surviving pygmy rabbits to breed with Idaho pygmy rabbits, in a process that would strengthen the Columbia Basin rabbits' genetics while also retaining as many

unique characteristics of the species as possible. It wasn't clear, however, that the tiny remnant population could withstand being bred in captivity. As a starting point, wildlife officials captured more-abundant Idaho pygmy rabbits on which to practice captive breeding. Officials from the Oregon Zoo, Northwest Trek (an animal preserve about 30 miles south of Tacoma) and Washington State University joined in the effort.

Despite the cliché, breeding wild pygmy rabbits turned out to be difficult. Challenges included the stress of captivity, diseases, small indoor spaces and specialized diet. Still, there was no time to build the perfect environment. In 2002, 16 wild Columbia Basin pygmy rabbits were captured at Sagebrush Flat, and the few left behind soon disappeared. The WDFW, The Nature Conservancy and other organizations teamed up to help restore the shrub-steppe habitat at Sagebrush Flat and other areas in Eastern Washington with help from the USDA Farm Bill, which authorized funds for wildlife-habitat recovery. At the same time, biologists teamed up to care for and manage breeding of the few surviving Columbia Basin pygmy rabbits.

There were many surprises. For instance, pygmy rabbits can climb. While that much was known, it was a revelation to scientists just how well they could do so. At the Oregon Zoo, staff members put males and females in separate enclosures divided by chicken wire, to manage the breeding.

"We didn't bother putting tops on these cages," Shepherdson says. "We came back the first morning and found out the rabbits were back together. They had climbed up 6 feet and down the other side to be with each other." Breeding yielded another surprise. Typically, captive wildlife breeding takes a scientific approach, comparing the DNA of potential mates to select the best option for preserving important genes.

However, a graduate student decided to study what difference choice makes when pygmy rabbits select their mates. In a wild kingdom version of *The Dating Game*, the Columbia Basin rabbit does were offered a choice of two or three different Idaho rabbit bucks with which to breed. The result? They preferred to breed with a known

male—one from an adjacent pen, rather than one they'd never before seen. To everyone's surprise, the litter sizes from these matings were larger than litters from scientifically matched pairs. Yet one more revelation: The offspring of "love-match" litters were more likely to survive their first year.

Despite the work of the captive-facility employees, they were not able to breed enough rabbits to sustain large-scale releases to the wild.

Beginning in 2011, the WDFW and conservation partners tried a different strategy. They released the descendants of the original 16 rabbits, placing them in 6- and 10-acre enclosures at Sagebrush Flat Wildlife Area, along with pygmy rabbits from other states. Living in their rehabilitated native environment worked like a charm.

In 2012, more than 150 kits were born in the enclosure, and in 2013, 380 were born, requiring the building of additional enclosures. The plan calls for building more interconnected habitat areas over time with additional pens to allow for a growing rabbit population. In the winter of 2012–13, with 5 inches of snow on the ground, Penny Becker, a conservation biologist who oversees the various endangered species recovery efforts for Washington state, headed out with other researchers to take a rabbit census of Sagebrush Flat.

"It was so quiet and peaceful; the only sound was our footsteps crunching in the snow. I looked down at my feet and followed tiny tracks weaving through sagebrush leading to the burrows. At every burrow, we took a sample of rabbit pellets. From these we can pick up on the DNA and compare them to our database of all released rabbits," she says.

The scientists had expected 10 to 20 percent of the rabbits they'd released in 2012 to survive the winter. When the lab results came back, the researchers were astonished to find that nearly 40 percent had survived. There was yet another surprise to come: "Mystery" rabbits that didn't match the genetic database turned out to be the offspring of the rabbits that had been released by scientists—the first generation of healthy babies born in their native shrub-steppe habitat.

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Honu Homecoming

In a vastly different environment, another animal success story is being written as Hawai'i's green sea turtles are enjoying an astonishing rebound.

On a recent vacation in Hawai'i, I found myself floating above a magical scene while swimming in opalescent 'Anaeho'omalu Bay, on the northwest side of Hawai'i Island. Below me were the shifting shapes of a half-dozen honu as they paddled along the reef, munching on algae with the loud, crunching sounds you'd more expect of cows chewing hay.

Just a few decades ago, this experience would have been extremely unlikely due to the declining population of these legendary creatures. Their revival is one of the best examples of helping a species come back from the brink of extinction.

In 1973, George Balazs, who is now team leader of the Marine Turtle Research Program for the NOAA Pacific Islands Fisheries Science Center, was monitoring green sea turtles at their primary nesting spot, in the remote French Frigate Shoals, northwest of the main Hawaiian Islands. Earlier researchers had presumed the population was abundant, since they drew upon reports of many sea turtles basking in the sun. Balazs took a different approach.

"We sat out all night long waiting for turtles to come up to lay their eggs, and then sweated in a tent all day long trying to sleep," he recalls.

Surprisingly, only 67 mother turtles were identified throughout the entire nesting season. This extremely low number triggered lobbying that resulted in the 1975 ban on the commercial harvesting of green sea turtles in the Hawaiian Islands. Additional conservation measures have helped the turtle population edge back up, and in 2011, 857 mature female turtles were counted on the French Frigate Shoals' East Island.

For decades, O'ahu's Sea Life Park—in Waimānalo, located 14 miles east of Honolulu—has played a small but significant role in the rebirth of Hawai'i's honu. In the mid-1960s, the park collected a small number of mature green sea turtles for research and public education, and a decade later it

built a Turtle Lagoon exhibit with a sand beach at one end where the turtles could sun themselves. The park consulted Balazs, who said that the small "beach" would be great for a display, but he told exhibit planners, "I don't think they'll breed there."

To everyone's surprise, several years after the installation opened, baby turtles began popping out of the sand. Thus began Sea Life Park's unexpected role as nursery attendant. Each year when the baby turtles hatch, they're weighed, measured and tagged with a tiny microchip. Most are released at the nearest beach, with the hope that they will return to the same place to nest once they reach sexual maturity, at between 20 and 30 years of age. Since the beginning of the program, Sea Life Park has been responsible for releasing some 13,000 2- to 3-day-old honu to the wild, with some of the earliest turtles that were released now nesting in the Hawaiian Islands.

Life in the wild is a gauntlet for baby sea turtles, with hazards both natural and man-made. With predation by seabirds, fish and stray animals, ingestion of trash, entrapment in fishing nets and other dangers, it is estimated that only one in 1,000 of the turtles survive to adulthood. The Maui Ocean Center is among several Hawai'i conservation programs working to improve the odds for these tiny hatchlings. Sea Life Park provides the center with a half-dozen 5-week-old hatchlings each year. The center raises them until the turtles are large enough to have a better chance of surviving, at around two years of age. Then they're released in a joyful celebration filled with songs and blessings by native Hawaiian cultural practitioners.

Human-aided reintroduction is only part of the answer to the imperiled status of endangered species, but it's an important and heartwarming aspect of the story. Turtles may not care for ceremony, but the hundreds of supporters on the beach at Kā'anapali do. And that may be the most encouraging aspect of all: human care and compassion for the creatures with which we share the planet, and concern for the ecosystems that sustain a diversity of life. ▲▲

Leslie Forsberg is a Seattle-based writer.