

This Western pond turtle is being reared at the San Francisco Zoo as part of the Zoo's headstarting program. The turtles will eventually be released into wetland habitats like Mountain Lake in the Presidio. The turtles' population has been in decline because of habitat destruction and other threats.



SAVING SAN FRANCISCO ONE SPECIES AT A TIME

From the damselfly to the pond turtle, locals restore natural habitats

Story and photography by Nina Irani

A dark-gray bird stretches its wings open to the cool San Francisco morning air. The bird, a double-crested cormorant, is perched on a white buoy on the north side of Mountain Lake in the Presidio.

Mist hangs low over the water and the lake's southern shore is quiet and empty except for a pair of ducks walking along the beach. Below the surface, pond turtles and chorus frogs share the newly restored clean water.

On a brighter day, the turtles sun themselves on the logs that lie along the lake near Veterans Boulevard. The frogs' ribbits fill the air in the winter and spring, especially after rainfall.

As the sun rises and warms the Presidio, another bird, a hermit thrush, takes advantage of nearby El Polin Spring, dipping into its shallow waters. Chirps, trills, warbles, and bird songs fill the spring. One song is from a fox sparrow, who winters in the Presidio along its migration from as far northwest as Alaska.

Just west of the spring, a baby fence lizard takes refuge by a recently restored pond. The area, once a landfill overgrown with dense vegetation, now holds water even in dry conditions. A variety of wildlife, including coyotes, rely on this water.

Animals like these are thriving in the Bay Area once again in large part because of community conservation efforts — people working to restore their habitats.

Conservation does not have to mean "saving species in exotic, far-off places like the rainforests," explains Patrick Schlemmer, curator of invertebrates at the San Francisco Zoo and a City College alum. "We have animals that are just as threatened right here in our backyards."

Focusing locally means that "species may be easier for us to actually save, to pull back from the brink of extinction, because they are right here," Schlemmer adds.

"The more people are aware of them living here in their backyards, the better off these animals will be."

Over the last decade especially, many of San Francisco's natural habitats have been restored, making it possible for local

Although many animals and plants were lost, many are returning as the habitat becomes healthy again. "If animals can find this place, and there are resources that will support and attract them like food, water, and shelter, they are going to come," Young explains.

Now that a lot of the habitat is restored and the wildlife that can return on its own has, focus is shifting to reintroducing animals that cannot. This means identifying the species that were once here and lost and bringing them back, like the Western pond turtle, which has been reintroduced at Mountain Lake.

With longer-lived animals like turtles, success takes longer to confirm because they take more time to breed, Young explains. This year, the reintroduction project hit a milestone. "We found the very first baby Western pond turtle that was born in Mountain Lake, literally the size of a quarter," he says. This signals an

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wildlife that had disappeared, like variable checkerspot butterflies, coyotes, and silver digger bees, to return and thrive. "The rule of restoration is, if you build it, they will come," says Jonathan Young, wildlife ecologist at the Presidio Trust and a City College student.



City College student Katelyn Mann views the Ravenswood Open Space Preserve habitat and a few of the thousands of birds who rely on it.



The Ravenswood Open Space Preserve is located in the wetlands of San Francisco Bay. The restored habitat is used by thousands of shore birds, including Forster's terns, American avocets, and the threatened Western snowy plovers.



Professor Crima Pogge teaches a field class at the Ravenswood Open Space Preserve. She lectures students about the "biggest local restoration undertaken" to turn ponds once used for salt production into the preserve, which is now protected marshland habitat.

exciting stage for these animals, as "they are going to start having generations arriving and continuing for the long term."

Many animals like the pond turtle depend on the aquatic restoration work that began at Mountain Lake almost a decade ago. The lake was a "cess-pool ... contaminated with highway runoff," Young says.

Presidio staff and volunteers worked to remove the contamination and reintroduce aquatic wildlife like the rare California floater mussel, which is key. These mussels "filter the water ... they actually improve water quality," Young explains.

Pacific chorus frogs, which were almost extinct in San Francisco because of the loss of their wetland habitat, now flourish. California red-legged frogs, which are listed as threatened under the Federal Endangered Species Act, may be reintroduced as well, if permission to do so is granted from the U.S.

Fish and Wildlife Service.

The San Francisco forktail damselfly, a local endangered insect, is also experiencing a comeback, made possible in part by the restoration of the freshwater

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sources it relies on for breeding. The forktail damselfly is "only found in the Bay Area and nowhere else," Schlemmer says. "They are probably especially evolved for life right here. They are very special, just from that regard."

This tiny brown creature, with its long tail ending in points resembling a two-pronged fork, is beneficial. "They eat a lot of pest species such as mosquitos,

so they are good to have around," Schlemmer explains.

When the San Francisco Zoo began to breed damselflies for release into the wild, "There were an estimated 2,500 adults left on the planet," Schlemmer says. Thousands of damselflies are now born each year and volunteers have helped release thirty thousand into habitats like the Presidio.

The damselflies typically enter their habitats as juveniles called naiads and emerge as adults on their own in the wild. The Zoo is exploring other potential release sites, including Sutro Baths.

Schlemmer shares a little-known fact: The spot where the Sutro Baths were built in the late nineteenth century was actually known as naiad cove. "So I think that would be perfect if we could start releasing our naiads there again," he says.

Despite successes, climate change is making conditions in San Francisco drier, and drought is impacting the animals who

rely on wet habitats, like the San Francisco forktail. This creature is especially adapted for San Francisco's cool foggy conditions that are diminishing as climate change heats up the Bay Area.

Our expanding population has caused many problems, explains Dr. Donald Moore, wildlife biologist and zoologist in animal behavior and conservation biology. "The sixth mega extinction that we're seeing right now is caused by humans," he says.

This loss of life on Earth ranges from "the loss of mammals and keystone species like beavers, to the loss of fish in the sea because of overharvesting or polluting," Moore worries about the loss of pollinators too, "which we all depend on."

This is a local problem too. Military use of the Presidio until the mid-1990s degraded the landscape. "They did not export their trash and their chemical weapons. They just buried it all, like mustard gas and unexploded ordinances," Young says.

"Every species has a place in this world and a moment to exist."
— Bibit Traut

"Coastal wetlands were particularly hard hit from development over the last century," adds Schlemmer. Among them are the recently restored marshes at Crissy Field and Quartermaster Reach in the Presidio. California has lost all but five percent of these ecosystems, and the rising sea level caused by climate change threatens them further.

San Francisco's animals are under pressure. "Loss of habitat is the most common reason for losing species," Young explains. Although the city still has an abundance of animal and plant life, many species have gone extinct locally, like the California quail, our state and city bird that disappeared from San Francisco about fifteen years ago. "More urbanization tends to lead to more local extinctions, and even outright extinctions."

For some local animals, it is too late. They are not just gone from the Bay Area but gone forever, like the Xerces blue butterfly. The



This endangered forktail damselfly will be at the Zoo for a few more days before being released into a wetland habitat in the wild.



Patrick Schlemmer, curator of invertebrates at the San Francisco Zoo, works to save the rare San Francisco forktail damselfly. Juvenile damselflies, called naiads, spend their first three weeks in petri dishes, then complete the rest of their development in jars before being released into the wild.

Xerces lived exclusively in the Sunset District's sand dunes before becoming "the first butterfly ever known to science to have gone extinct off the face of the Earth due to humans," Young shares.

Conserving species and their habitats is important. "Every species has a place in this world and a moment to exist," says City College Biology Professor Bibit Traut. "It matters to us because we are members of the natural world."

The variety of life on Earth is critical to the existence of all species, including humans. It means a functioning and resilient ecosystem. Plants clean the environment. Having a greater variety of plants means they do a better job of filtering pollution. It also means more diversity of insects, which "can slow down the spread of diseases, as variety does not allow for one species to dominate," Traut says.

Diversity acts "as an insurance policy against a changing environment so species can adapt," she says. Evolution cannot continue without enough existing diversity.

Restoration of our local environment is part of the solution to the extinction crisis. Restoring plant life, which is the foundation of the ecosystem, means San Francisco again has the resources needed by many animals.

The data shows long-term positive trends at the Presidio. Many of the bird populations that depend on the habitat are either stable or increasing. "That is really encouraging," Young says.



Amy Chong, a biological science technician at the Presidio Trust, works to restore the Eastern Tributary habitat by pruning and picking up litter. Years of work have uncovered the watershed that had been contained in pipelines and paved over. It now attracts all kinds of birds like dente warblers, robins, cedar waxwings, and hermit thrushes.

He points to the significant recent discovery of high numbers of silver digger bees in an area restored to resemble San Francisco before the arrival of Europeans.

"That is a huge indicator that we're doing something right. The work we're doing here is able to support these obscure specialist species that thrive in only specific types of habitats and with only specific types of plants," he explains.

The volunteers, including students, who have restored the Presidio over the years have made an impact. "None of this would be possible without the volunteers. It requires way too much human effort," Young says.

He recalls one volunteer who restored a portion of the Presidio thought to be impossible to save. It is now a critical water source for wildlife. Young is receptive to renaming the area, currently called Landfill 8, after Bob Devor, the volunteer who saved it.

Young, now a professional ecologist, also began as a volunteer a decade ago. Back

then, he would never see the fence lizards and checkerspot butterflies who have now returned and are thriving on their own.

Young says it is significant that the Presidio has been preserved by the community "instead of sold to the highest bidder. It reflects our values as a soci-

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ety." Young feels those values are kept alive by educating new generations of San Franciscans, who he hopes will "carry the torch."

City College offers this education. Biology professors like Traut and Crima Pogge take students to various microhabitats around the Bay Area for field classes where they can engage in experiential

learning onsite. When students experience firsthand that "nature is dynamic and all around," they have an "aha moment."

Students are encouraged to "recognize that biodiversity is everywhere, even in an urban environment, and that altered habitats have conservation value," Traut says.

Focusing locally can also alleviate feeling overwhelmed by climate change anxiety. Many volunteers return year after year to connect with a like-minded community and witness positive changes. "You can actually see it happening. It gives you gratification, grounding and something tangible to do," Young says.

Although the stakes are global, the solutions can be local. "We're on this tiny planet ... it's the Goldilocks planet and nobody else nearby has life," Moore says. The hope is that the work will continue. Young encourages looking ahead and asks "how can we make the future?"



From left to right: Dale Danley, Alvin Wu, and Moses Alvarez finish a morning's work restoring and maintaining habitats near Immigrant Point Overlook in the Presidio. Animals who had disappeared locally, like coyotes and silver digger bees, have returned because of the work of volunteers like them.