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By John Krist

Glimpses of a Younger Planet

A walk in UC Santa Barbara's Carpinteria Salt Marsh Reserve

Late afternoon sunlight washes over the salt marsh, which is rust-red in this autumn season. In spring it will be a mosaic of vibrant green and gold, but under the clouded skies of December the vegetation is subdued, hoarding energy against cool air and early twilight.

A white-tailed kite hovers overhead, maintaining its position over the haunt of voles and mice by a curious windmilling of its wings. The tide is ebbing, and ripples form in the meandering creek channels as their water seeks the sea with increasing urgency. Snowy egrets stalk the shallows, wriggling their yellow toes in the muck like kids at play, hoping to scare up a meal of tiny fish. Intent on their foraging, they ignore Amtrak's Coast Starlight as it thunders by on tracks that border the marsh to the north. They seem oblivious, too, to the steady drone of cars and trucks racing along the nearby freeway, a backdrop of white noise against which tiny marsh birds hurl their piping calls.

Clad in knee-high rubber boots, biologist Wayne Ferren Jr. wades into the channel, rolls up his sleeves, and leans down to grope in the clear, flowing water among the cobbles and mud. Triumphantly he hauls a rock aloft. It bristles with blue-black mussels, ovoid spikes that give the rock the appearance of a medieval weapon. Hidden among them are several flattish lumps with rough edges, a little bigger than a silver dollar. "Oysters," he says, rubbing the shells with a thumb. "It's very rare to find native California oysters now."

Much that lies hidden and protected here is rare along this or any other shore. The 230-acre Carpinteria Salt Marsh is all that's left of the coastal marshland that once stretched from Carpinteria Creek northwest to the polo fields near the mouth of Toro Canyon, and from the foothills of the looming Santa Ynez mountains to the shoreline. Much of Carpinteria stands on drained and filled wetlands, with only this fragment—known historically as *El Estero*, the estuary—remaining more or less in its original state. As scarce as their native habitat, several rare or endangered birds, plants, and other vanishing life forms call the reserve home, among them Belding's savannah sparrow, a paintbrush-like plant known as the salt marsh bird's beak, and the tiger beetle.

CURTIS C. O'SHOCK / COURTESY WAYNE FERREN

Despite civilization's squeeze, the 230-acre Carpinteria wetland is teeming with life.

Enormously fecund, complex in biological interaction, wetlands lack the charisma of grand canyons and snowy peaks: they are celebrations of life rather than of scenery. In the mud of an intertidal flat, where microbes at the base of the food chain cling to tiny particles of clay, nourished by the diurnal ebb and flow of water rich in organic debris, it is possible to imagine the first stirrings of life on a young planet.

The marsh's survival depends on numerous land owners and agencies, including the Land Trust for Santa Barbara County and the City of Carpinteria. The University of California runs about half of it, the Carpinteria Salt Marsh Reserve. As staff manager, Ferren oversees a remnant patch of a once-vast quilt of coastal estuarine wetlands, formed where fresh and salt water mingle. California has lost an estimated 91 percent of its wetlands—all but about 450,000 acres of the original 5,000,000 have been converted to agriculture, drained and filled for housing developments, paved over for parking lots, dredged for marinas and boat channels. And the disappearance of habitat has taken its toll: half of California's federally listed endangered plant and animal species are wetland inhabitants.

A tall man with graying beard and a resonant voice, Ferren is a thoughtful and quietly enthusiastic guide to the marsh's intricate mysteries. He's been conducting wetlands research since the 1960s, when he was at Rutgers University and the Philadelphia Academy of Natural Sciences. He came to UCSB in 1978, a year after the university acquired its *El Estero* property. In addition to managing the reserve, he is executive director of the university's Museum of Systematics and Ecology, which houses UCSB's plant and animal collections, and associate director of the university's Natural Reserve System, which preserves several valuable habitats for research, teaching, and conservation purposes, part of an extensive statewide system of reserves operated by the UC system.

"One of the concerns I've had is that there are many statements that California doesn't have wetlands, or has few wetlands—there's all this kind of Eastern dogma about what California is," Ferren says. "Having lived in the East and studied there, and having lived out here, I

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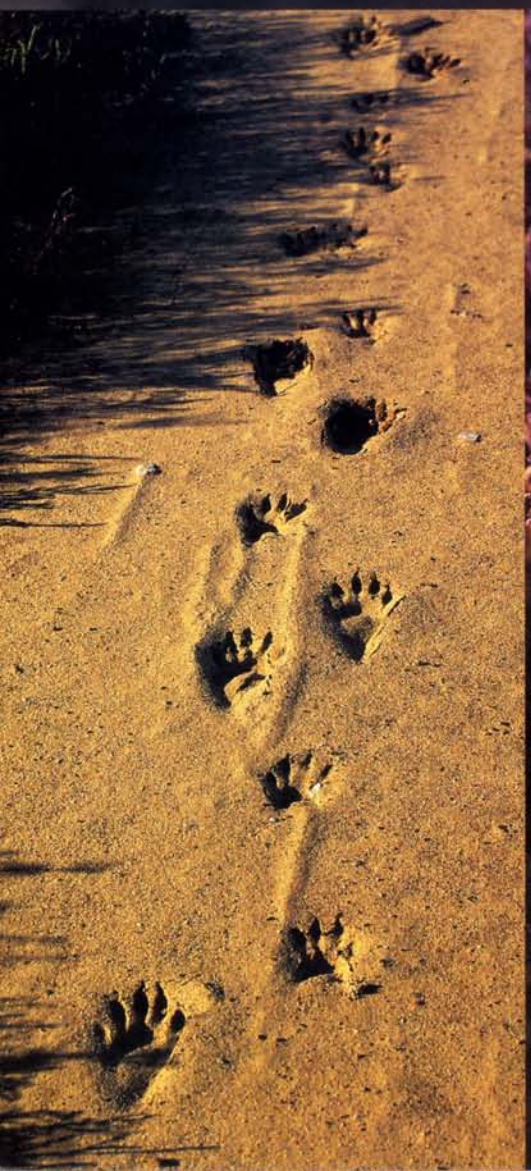
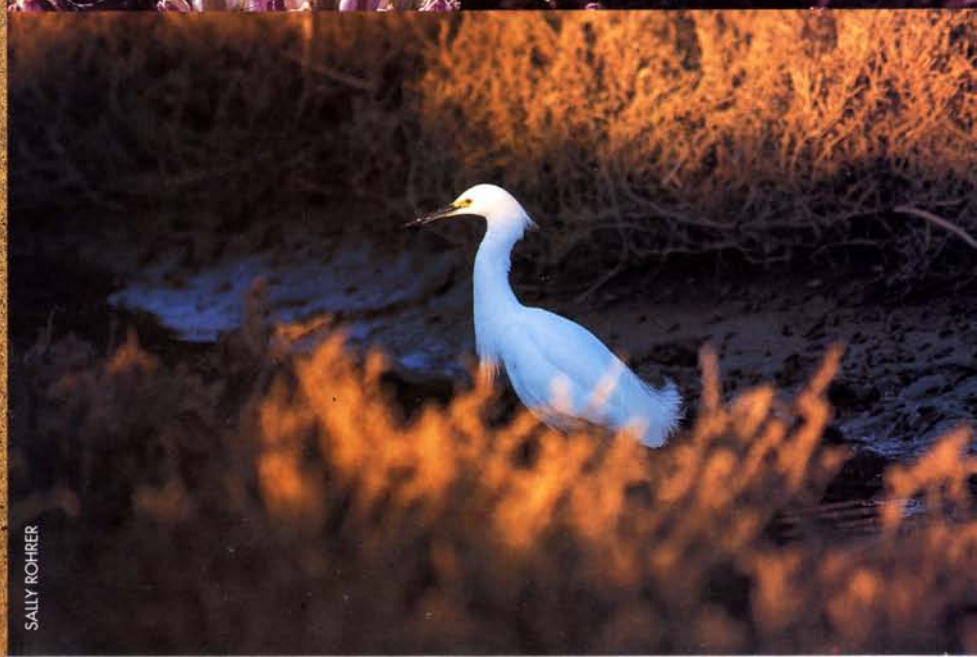
Clockwise from top: A great egret spreads its wings; salt marsh bird's beak is one of the endangered species found in the Carpinteria marsh; a snowy egret minds its business; after a rain, a foraging raccoon leaves pawprints on a berm adjacent to the marsh.



COURTESY WAYNE FERREN



SALLY ROHRER

know what wetlands are, and I know we have a lot of them. But they're often unique and small—fault sag ponds, and vernal pools, habitats that add to the richness of types. And this California wetlands heritage is enormous."

With a grant from the U.S. Environmental Protection Agency, Ferren and several colleagues have set forth a new system for the classification of wetlands in the Southern California coastal watershed. "One of the things we did was develop a classification methodology, a language to articulate the specialness of California wetlands. If you lump them into salt marsh, and freshwater marsh, and riparian forest, well, if you lose some, it may not seem significant. But if you realize that many of them are totally unique, that they have unique functions for endangered species or other issues, then it's not a matter of losing some riparian forest or some salt marsh, it's a matter of losing something that may occur nowhere else in North America, or on planet Earth."

Ferren suggests that virtually every wetland is unique, the product of a complex and unrepeatable interaction of water chemistry, geology, temperature, wildlife, and plant distribution. Close observation tends to support that notion: although the Carpinteria Salt Marsh is similar in many ways to the Goleta and Devereux Sloughs, for example, each is quite unlike the others.

"We have 27 species of fish related to this estuary, which is very high," Ferren says as he leads a visitor down a dirt road built into the Carpinteria marsh in 1945 during an unsuccessful search for oil. "I think Devereux Slough has four or five."

Richness is the elemental concept in the marsh, the summary term for all its sights and sounds and smells. The air is heavy with life's exhalations, with the tang of iodine and the slightly sour smell of mud exposed by the outgoing tide. Wetlands are critical as natural water filters, as shoreline storm buffers, as sponges that soak up floodwaters and minimize their destructive capacities. But it is the marsh's role as a harbor for life that most distinguishes it. Perhaps nowhere else on earth do plants and

animals, from the microscopic level upward, spring forth in such abundance and diversity: plankton, algae, burrowing anemones, sea pens, boring clams, sand clams, bristle worms, pea crabs, mud-flat crabs, bubble snails, horn snails, basket snails, snails that graze on algae or sift the ooze, mussels, oysters, dozens of types of fish, and a profusion of birds. A healthy wetland may rival the tropical rain forest in number and types of life forms per acre, exceeding in sheer volume of biological productivity even the most fertile farmland.

It takes time and close attention to see this. The marsh channels, which carry the runoff of the Franklin and Santa Monica Creek watersheds, appear quiet but are brimming with fish. "This is an important nursery for halibut, starry flounder, diamond turbot, and other marine fish," Ferren says, as we watch a willet march on its spindly legs in search of a meal. "And then there are the fish found only in estuaries that live here, and there are the marine fish that come in and forage and go out with the tide: sharks, stingrays, mullet, topsmelt. During the winter we have osprey here, and they eat the mullet. All of the egrets and herons love topsmelt and other estuarine species that occur here and don't go out with the tides—the long-jawed mudsuckers, and killifish and others."

Other animals also find the marsh to their liking. Feral cats and red foxes, neither of them native, prey on ground-nesting birds and eggs, and may have caused the disappearance of the marsh's last clapper rails—a federally listed endangered species of bird so rare that only about 500 are believed to live in California today. Skunks, opossums, raccoons, and weasels hunt in the marsh, leaving their footprints in the mud.

Despite the protection afforded the Carpinteria Salt Marsh by its management as a reserve, there are threats to all this diversity and richness. Private landowners hope to build expensive homes on vacant lots along the edge—lots that sell for more than a million dollars each. Sediments eroded from orchards on the hillsides are carried in by flood-control

channels. Concrete drains funnel contaminated runoff under the freeway and deposit it in the marsh, where oil and other automotive pollutants join nitrates and phosphates from fertilizer used by the extensive agricultural operations in and around Carpinteria. Locked in the marsh sediments are older and more threatening substances too: DDT and DDE, organochlorine pesticides that also are the legacy of agriculture. These chemicals are highly toxic and tend to be stored in body tissues when ingested, thus passing up the food chain.

As the autumn dusk falls, Ferren talks about plans for the future, about compromises and management plans and interagency cooperation, and about money

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—BIOLOGIST WAYNE FERREN JR.

that's been raised for an interpretive center and self-guiding nature trails. Freeway traffic hisses, and the fading sunlight is reflected dimly from the windows of extravagant new houses on lofty terraces carved into the mountains above the Carpinteria basin. A flight of mallards glides overhead. In the deepening dusk, the white-tailed kite continues its search for mice in the thick grass at the edge of the marsh.

"We have our task cut out for us," Ferren remarks as he locks the gate at the entrance to the reserve. "It's to really bring an appreciation to all this, and then to try to conserve and restore it, and make it available to people, too. This is not an exclusive club, this is something that's important to all of us." ≈

The Carpinteria Salt Marsh Reserve welcomes tours by school groups, researchers, educational organizations, and others. To arrange a visit, call 893-4127.