

# Jewel of California's Central Coast

**One of the largest coastal dune systems in North America is always undergoing change and under threat.**

By Kristie Scarazzo, Colleen Grant, Debora Kirkland, and Christopher Kofron

Photographs by Chuck Graham

In the spring and late summer, the dunes transform into buzzing blankets of color. Wildflowers—vivid yellows, hot pinks, purples, cream whites, and sage greens—burn unforgettable memories into the minds of anyone lucky enough to see them. And while at times they are seemingly bleak, the dunes are laden with wildlife large and small. They are the ancestral homeland of the Chumash—a people with a rich and storied history—and where this group still practices its cultural heritage.

The dunes were once home to the artistically creative “Dunites” of the early twentieth century, attracting such cultural icons as Upton Sinclair, John Steinbeck, and Ansel Adams. In 1923, Hollywood filmmaker Cecil B. DeMille

used the dunes as the site for his epic film, *The Ten Commandments*, with a crew of over 3,500 and the largest film set ever created.

In 1974, the Nipomo Dunes-Point Sal Coastal Area, stretching eighteen miles along the coast in the counties of San Luis Obispo and Santa Barbara, was designated a National Natural Landmark by the National Park Service in recognition of its unique natural heritage, pristine condition, and great species diversity.

Today, the dunes attract more than two million visitors per year, many drawn to Oceano Dunes State Vehicular Recreation Area, the only place along the California coast where off-highway vehicles can lawfully drive on







many native plants and animals because they function like oases in the arid landscape.

Formation of the coastal dunes is attributed to several specific episodes of dune advance that occurred as a result of dramatic sea level rise caused by melting of the North American and Eurasian ice sheets during the Holocene glacial retreat. Sands deposited at that time are estimated to have formed between 18,000 and 4,000 years ago.

The ultimate source of sand for these dunes was and continues to be the Pacific Ocean, where wave action moves sand upward from the ocean floor and deposits it onto the adjacent shore. The Santa Maria River provides a source of sand for southern portions of the dunes complex, which is emptied into the Pacific Ocean and then moved back to land.

Wind and waves are fundamental to all the ecosystem processes within dune systems. Dune ecosystems are highly dynamic and rely on the wind to move the sand. Plants establish, gain in stature, and then may quickly be buried or destroyed by high winds and pounding sand in a consistent cycle of dune creation and demolition.

Inland from the sea, the open beach strand of the dunes begins just above the high tide line, which is largely unvegetated. Environmental conditions this close to the open water are harsh because of intense wind and wave action,

moving sand, heavy fog, and high salinity. Few plants can tolerate this environment. Most of the debris required for dune genesis is derived from the beach strand zone.

Northern elephant seals have been observed resting along these beaches. Some of the more common species of birds found within the coastal strand habitat include western gull, long-billed curlew, western sandpiper, California brown pelican, and American pipit.

A bit further inland, terrestrial plant species begin to appear in the pioneer dune vegetation community. Here, rocks, pieces of driftwood, sea wrack, and other types of debris found along the shore blow inward. Plants that survive and populate in this area are the most salt tolerant and readily root at the nodes when broken to easily reproduce. They can withstand whipping and even burial from blowing sand and may have long tap root systems to find deep water reserves. Examples of species that live in the pioneer dune region include non-native sea rocket, ice plant, New Zealand spinach, highly invasive European beachgrass, and native beach bur.

The federally Threatened western snowy plover, one of California's smallest shorebirds, nests on the open, sandy beaches and lays eggs in shallow depressions that generally are devoid of vegetation. Western snowy plovers primarily forage on invertebrates in the wet sand and among surf-cast kelp within the intertidal zone as well as in the dry, sandy foredunes above high tide. The federally Endangered California least tern also frequents the dunes, flying over the beaches and feeding in the surf. California least terns typically feed by hovering and then plunging for fish near the water's surface without submerging completely.

As one moves further inland away from the sandy beach, the cover, structure, and species diversity of the vegetation increases. With increased vegetation, the sandy soils accumulate more organic matter and moisture, and the dunes continue to stabilize. Common plants found in the foredunes include sand verbena, California croton, dune evening primrose, dune morning-glory, sea scale, and California orach, along with species also found in the pioneer dunes.

Environmental conditions frequently strip the newly established vegetation because the sand is ever-shifting. Wind events regularly result in blow-outs or

the beach. To the south is the Guadalupe Dunes Oil Field, which ceased operations in 1994. Clean-up and restoration of the former oil field continues today. Portions of the dunes region are collaboratively managed by federal, state, county, and private land managers.

Other parts of the dunes are more remote and wild. A keystone of the 22,000-acre dune complex is the U.S. Fish and Wildlife Service's Guadalupe-Nipomo Dunes National Wildlife Refuge (NWR), established in 2000 to help conserve the native plants and animals that live within the dunes and their ecosystems.

While visitors enjoy easy public access to adjacent county and state beaches, such as Rancho Guadalupe Dunes Preserve and the Oso Flaco Lake Natural Area, Guadalupe-Nipomo Dunes NWR is only accessible following a two-mile hike from the nearest public parking.

The Guadalupe-Nipomo Dunes region is home to a vast range of flora and fauna, including six species that are federally protected under the Endangered Species Act, some of which are among the most critically imperiled in the nation—three plants: La Graciosa thistle (*Cirsium scariosum* var. *loncholepis*), marsh sandwort (*Arenaria paludicola*), Gambel's watercress (*Nasturtium gambelii*); two birds: California least tern (*Sternula antillarum browni*), western snowy plover (*Charadrius nivosus nivosus*); and one frog: California red-legged frog (*Rana draytonii*). The wetlands in the area provide especially important habitat for







lizard favors the edges of clearings and trails in coastal dune scrub habitat but can be found nearly anywhere on the refuge. In contrast to the coast range fence lizard that prefers clearings in coastal dune scrub, the legless lizard lives a subterranean life. It tends to favor the sandy soils of coastal dune scrub that possess leaf litter from native plants.

In the spring and early summer seasons, the patches of open sand between the shrubs become carpets of colorful wild-

flowers, including a diversity of annual and perennial herbs: California poppy, purple sand verbena, fiddleneck, dune paintbrush, sand aster, woolly bluestar, phacelia, popcorn flower, and many more.

Two dune mint species, crisped monardella and San Luis Obispo monardella, pepper the coastal dune scrub, with showy purple flowers that host an array of pollinators with their strong aromatic foliage. This flowery, resinous, herbal scent coats your pant legs when you walk through it and lingers long after you have left. Collectively, the rare species of the coastal dune scrub are iconic and quintessential to the Guadalupe-Nipomo Dunes region, but can only partially describe the special, utter magic of this place.

There are also several charismatic and unique plant species within the coastal dune scrub assemblages including the strange and parasitic sandfood; the carnival poppy, which has alternating white and lemon yellow petals; giant coreopsis, that looks like a character in a Doctor Seuss book; and the flaming orange-and-yellow succulent, live-forever. This vegetation community type is considered a sensitive habitat

slips, and even steep, vegetated dunes can be easily destroyed.

Birds found in the coastal foredunes include Brewer's blackbird, American pipit, horned lark, and turkey vulture. Mule deer can also be found in the foredunes and beach areas, as well as wetlands.

As one moves even further inland, the dunes continue to become more stabilized by the vegetation and plant species diversity and structure becomes even more complex. These communities are farther along in their succession and are developmentally older. As a result, the soils are richer from the leaf litter, less salty, and there is a lot more shade from the taller vegetation. Woody shrubs frequently encountered within this vegetation community include mock heather, silver dune lupine, coyote brush, California sagebrush, deer weed, and coast buckwheat.

Three lizard species commonly found in this area include the coast range fence lizard (*Schelopus occidentalis bocourtii*), legless lizard (Family: *Anguillidae*), and California alligator lizard (*Elgaria multicarinata*). The coast range fence

because it has a limited distribution and supports an array of rare and endemic plant species. Some of the other most notorious and characteristic rare species that occur within the coastal dune scrub include coastal goosefoot, dune larkspur, leafy daisy, dune wallflower, Kellogg's horkelia, dune ragwort, sand almond, and California spineflower.

California quail, spotted towhee, wrentit, bushtit, and California towhee are commonly found in coastal dune scrub, along with the fluttering Morro blue butterfly and Oso Flaco patch butterfly. Coast garter snakes, California striped racers, and Southern Pacific rattlesnakes are all common throughout coastal dune scrub habitat.

Unfortunately, this beautiful and diverse habitat is being rapidly converted to vast monoculture stands of non-native, invasive perennial veldtgrass. This species was introduced to the California Coast in the 1930s for erosion control and forage but disrupts dune ecosystem processes by prematurely stabilizing the dunes, increasing organic content of the sandy soils, and by outcompeting and displacing the native coastal dune scrub species. Perennial veldtgrass is a prolific seeder and resprouts after fire, making eradication a significant challenge for land managers.

Wetlands serve as an important water source for wildlife because water is so limited within this dry, harsh environment. However, wetlands are under stress from a lowering groundwater table due to expanding agriculture and extensive suburban and residential development in the surrounding communities.

Dominant species within dune marshes and swales include woody riparian plants such as arroyo willow, poison oak, California blackberry, and wax myrtle. Dune ponds with more permanent hydrology support cattail, tule/bulrush, bur-reed, water parsley, duckweed, sedges, and rushes, while shallower dune wetlands and swales can be dominated by saltgrass, cinquefoil, non-native poison hemlock, and stinging nettle. Persistence of these features depends on annual groundwater recharge and supplementation from surface runoff.

Due to this lack of standing freshwater, many species that rely on water for a majority of their life cycle, such as waterfowl and amphibians, tend to be less common. And with groundwater decline and climate change, many of the wetland features in the dune ecosystem do not hold enough standing water to support breeding for amphibian species. U.S. Fish and Wildlife Service biologists created Myrtle Pond at Guadalupe-Nipomo Dunes NWR in 2013 to provide much-needed water and habitat for amphibian species and other wildlife. Following the pond's creation, California toads were observed breeding, and thousands

of tadpoles were observed a few weeks later, in the water. The pond also provides important habitat for the federally Threatened California red-legged frog, a species that has historically used many of the freshwater marshes and ponds in the dune ecosystem for breeding. In 2019, Myrtle Pond was documented as the only wetland holding permanent surface water on Guadalupe-Nipomo Dunes NWR.

Among the diverse range of flora and fauna that call the Guadalupe Nipomo Dunes region home are some of the most imperiled plant species in the nation, some of which are found nowhere else on Earth. La Graciosa thistle, Nipomo Mesa lupine, marsh sandwort, and Gambell's watercress are among the rarest plants on the planet, all facing common threats of invasive species, groundwater decline, climate change, and habitat loss. U.S. Fish and Wildlife Service biologists are working with neighboring land managers and conservation partners to support recovery efforts for these species, including propagation and re-introduction.



Like no place else on Earth, the Guadalupe Nipomo Dunes region possesses a vast and peaceful calm, a harshness and solitude, and a hypnotic blaze where the sand, wind, sun, and sea unite to create the distinct, sheer magic of this place. Formed and re-formed over thousands of years, the dunes are an ever-changing jewel of California's Central Coast.

Botanist **Kristie Scarazzo**, biologist Colleen Grant, refuge manager **Debora Kirkland**, and recovery permit coordinator **Christopher Kofron** are with the U.S. Fish and Wildlife Service in Ventura, California. **Chuck Graham**, freelance writer and photographer based in Carpinteria, CA, is a regular contributor to *Natural History*. His last story, "Cache as Cache Can," appeared in the April 2020 issue.