

SAN DIEGO BIRD ALLIANCE

Sketches

Celebrating More than 75 Years of

SEABIRDS ON THE EDGE

Warm Ocean Waters
Mean Fewer Fish for
Hungry Birds

PLUS

Surveying Brandt's Cormorants

La Jolla's Colony Offers Rare Close-up
View of Breeding Cycle

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Seabirds Face Dire Conditions Along California Coast

by LaTresa Pearson, Sketches Editor

When I meet Azi Sharif, founder and executive director of Wildlife Jewels, at La Jolla Cove in May, the area is jam-packed with tourists. As passersby gawk at the California Sea Lions on the beach below and peer through the fence at the Brandt’s Cormorants nesting just a few feet away, I wonder how many of them notice the scattered sun-bleached remains of Brown Pelicans on the rocks below.

It’s been a tough year for seabirds in San Diego County and along the California Coast up to Monterey, and conditions may get worse. *For suggestions on what you can do, please see box on page 3*

“The last two and a half months (March through May) have been a nightmare,” says Sharif, whose organization trains volunteers to help monitor marine life and aid in rescue efforts in San Diego and Orange County. “We would see cormorants come to the sand, confused, pretty much dying cormorants, and many people didn’t know because the birds make themselves look alert as a protection,” she says, adding that they tried to help rescue as many as they could, but many birds died on the way to the rehabilitation facility or within 24 hours of arriving.

Tammy Russell, a postdoctoral researcher and marine ornithologist at Scripps Institution of Oceanography, has had similar experiences this year. “What’s been really upsetting is how quickly the birds are dying when they come to shore,” says Russell. “I’ve seen two cormorants just walk to the beach and then die.”

On one of the occasions, she was leading an activity in Imperial Beach with her undergraduate students when a cormorant came to shore and immediately died, leaving the students shocked and upset. “It is so upsetting seeing these birds that you love just collapsing,” says Russell. “I feel like that’s one of the things that I have found very different and dramatic about what’s happening now.”

As of June, SeaWorld Rescue, the primary seabird rescue and rehabilitation facility for San Diego County, had rescued 241 seabirds, while International Bird Rescue had admitted 381 seabirds to its Southern and Northern California rehabilitation facilities between March and June. Countless other seabirds have died.

“In Los Angeles County, it’s the people grooming the beaches who find all the dead birds,” says Rebecca Duerr, senior director of research and veterinary science for International Bird Rescue. “They were sending us pictures just so we could ID the species for them. It’d be like a pickup truck bed full of Brandt’s Cormorants with one pelican and a couple murre. It was like that every

week for a while.”

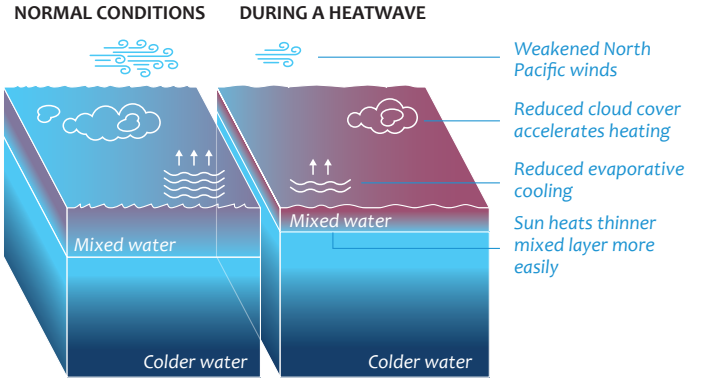
Duerr says though she had a Rhinoceros Auklet come into the rescue, most of the impacted birds have been Brandt’s Cormorants, Common Murres, and Brown Pelicans. Most recently, she has seen fewer cormorants but an uptick in injured Brown Pelicans that are taking increased risks in search of food.

The primary cause of death of the seabirds has been starvation, according to the California Department of Fish and Wildlife, which attributes some of the seabird deaths to last year’s particularly productive breeding season for Brandt’s Cormorants. But Russell believes that’s only a small part of the story.

“When birds have a really good breeding season, often there is increased mortality the following year,” she says. “There’s more juveniles out there, so we expect that they would die. But we’re also seeing a lot of adult birds, too. And so, if that was the driver of this, we would expect to see very few adults. All of these things may play a role in what we’re seeing, but because of the size, because of the impact across species and age classes, it’s these broader oceanographic conditions that are driving this.”

The broader oceanographic conditions Russell is referring to are driven by an extreme marine heatwave off the Southern California coast, which has sent fish, such as sardines and anchovies, into deeper, cooler waters out of reach for many seabirds.

Russell says she first noticed unusual conditions in January when she was doing an at-sea survey on a CalCOFI (California Cooperative Oceanic Fisheries Investigations) expedition, which is run by Scripps Institution of Oceanography, NOAA (National Oceanic and Atmospheric Administration), and the California Department of Fish and Wildlife.



“The water was really warm,” Russell says. “We saw some Masked Boobies, and that was the cruise that saw a Waved Albatross. It could have been a fluke and not related to warm water,” she says of the Waved Albatross, a Critically Endangered bird that breeds thousands of miles south in the Galápagos Islands. “We don’t know. It’s only one bird, but it was a really interesting year, at least compared to last year.” (See “Marine Heatwaves Mean More Booby Sightings for San Diego Birders” on pages 6–7.)

Once she returned from the expedition, it quickly became evident that it was going to be not only an interesting year, but also a deadly year for seabirds off the Southern California coast.

“That was really when things started flaring up with the dead birds and the birds coming into rehab facilities, and the water was just getting warmer and warmer,” says Russell. “We’ve collected the sea-surface temperature off Scripps Pier since 1916, and many of the days during that time were breaking records.”

According to scientists from NOAA and Scripps, marine heatwaves occur when ocean temperatures are much warmer than usual for an extended time. One of the most common ways that scientists measure the ocean’s temperature is through the sea-surface temperature, such as measurements taken off Scripps Pier.

Off the coast of California, a deviation of 1 degree Celsius (roughly 2 degrees Fahrenheit) from the average temperature can indicate a marine heatwave. A deviation of 2–3 degrees C. (about 4–6 degrees F.) is considered an extreme heatwave event. According to readings taken at Scripps Pier, we’ve already had 40 days with record-high sea-surface temperatures this year, with some days as much as 4 degrees C. (>7 degrees F.) above average.

Changes in wind patterns are the main drivers of marine heatwaves along the California coast. Our coast is heavily impacted by a process known as *upwelling*. When wind blows from the north toward the south, deeper, colder, nutrient-rich waters rise to the surface, displacing warmer surface waters. These cool, nutrient-rich waters attract the fish on which seabirds depend. Conversely, weak winds or winds blowing from the south toward the north can shut off or even reverse upwelling, allowing surface waters to warm. Scientists hypothesize that large marine heatwaves along our coast are related to the winds that drive upwelling. When upwelling winds weaken or reverse, coastal waters tend to warm.

Though marine heatwaves are part of the natural variability of Earth’s climate system, scientists have confirmed through long-term sea-surface temperature records that human-caused

warming is triggering more frequent and more extreme marine heatwave events.

We’ve had large marine heatwaves in each of the past seven years (2019–2025), and of those, six were among the largest heatwaves on record for the eastern North Pacific. (California is on the eastern edge of the North Pacific. Monitoring began in 1982.)

The most detrimental of these marine heatwaves, known as “The Blob,” occurred between 2014 and 2016 and coincided with one of the strongest El Niños on record. Marine heatwaves and El Niño cycles both cause ocean waters to warm, but for different reasons. NOAA declares an El Niño when temperatures in the equatorial Pacific are 0.5 degrees C. above average for several consecutive months and when an air-flow pattern called the “Walker circulation” breaks down, shifting warmer water toward South America.

The deadly combination of “The Blob” and the very strong El Niño conditions in 2015 and 2016 led to a record number of tropical cyclones in the Pacific and in the Caribbean, severe droughts in parts of Africa, toxic algal blooms in many locations, and record die-offs of marine animals, including the loss of half of the Alaska population of Common Murres (about 8 million birds).

Similar conditions to “The Blob” could occur this year and into next year. According to NOAA’s National Weather Service, El Niño has developed in the tropical Pacific and there’s now a 63% chance of “very strong” warming conditions. That means sea-surface temperatures may warm 2 degrees C. above average between November and January.

“I think we’re all gearing up for it to get worse,” says Russell. “I almost feel it’s beyond prediction at this point, and that’s what’s kind of scary. Things are happening in such rapid and unexpected ways this year.”

What You Can Do

- Look for signs that a seabird is in distress:
 - In unusual locations
 - Allowing people to approach it
 - Isolating itself from other birds
 - Entangled in fishing gear
 - Beaching or remaining on shore (Common Murres do not come on land unless something is wrong.)
- If you see a seabird or marine mammal in distress, call SeaWorld Rescue at (800) 541-7325. For seabirds and other wildlife, call San Diego Humane Society Project Wildlife (619) 299-7012. If possible, remain nearby and keep watch until responders arrive.
- If you see a seabird on the freeway or in a roadway, do not approach it. Call the California Highway Patrol immediately at (858) 293-6000.
- If you find a dead seabird, do not touch or move it. Keep pets and people away and report the bird to the California Department of Fish and Wildlife, using the mortality reporting form linked here: <https://wildlife.ca.gov/Conservation/Laboratories/Wildlife-Health/Monitoring/Mortality-Report>.
- Join the Wildlife Jewels Rescue Crew or the EYES program to help monitor local seabirds and marine mammals and coordinate rescue efforts: <https://www.wildlifejewels.org/>
- Donate to wildlife rescue and rehabilitation organizations.

Photo: Tammy Russell, Illustration by Tim Downs

Up Close and Personal with La Jolla's Colony of Brandt's Cormorants

by Alex Rubenstein

It's 8 A.M. on a Sunday, and I'm counting nesting Brandt's Cormorants at La Jolla Cove. Between my well-worn San Diego Bird Festival hat, the binoculars and camera dangling from my neck, and the binder with a laminated nest map and data sheet in my hands, I must look like an authority because every few minutes someone asks me, "What kind of birds are those?" I watch a couple rein in two young boys as they try to climb up onto the white fence for a better view of the nests.

When three strangers walk up next to me, adorned with binoculars and cameras, and ask me what cormorant species these are, I happily tell them. Before I can say another word, they start freaking out. It's their first Brandt's Cormorants. I put down my binder and start pointing out the cormorant chicks and the nearby gull species. Their joy is infectious, and I spend 45 minutes with them. We walk from above the Cove beach out to the Children's Pool wall, scanning for all the birds we can see and enjoying the breathtaking coastline.

Before I moved to San Diego for a one-year master's program in climate science and policy at UCSD Scripps Institution of Oceanography, I worked as a naturalist and photo instructor for passenger expedition cruises with National Geographic-Lindblad Expeditions, so guiding these enthusiastic birders around the Cove came naturally.

When I started at Scripps, I was already several years deep into my own birding addiction, so it was no accident that within weeks I would find the only person there studying seabirds, Tammy Russell. A post-doctoral researcher and amazing seabird biologist, Dr. Tammy welcomed me into her lab with open wings and asked me to help lead a project she had wanted to do for years: survey the seabirds at La Jolla Cove and, come January, begin nest surveys of Brandt's Cormorants.

Over the past eight months, with the help of students from the UCSD Bird Club, we've conducted bimonthly seabird surveys from the Children's Pool, northward along the coastline of the Cove, ending at the platform at Goldfish Point. Maybe you've even seen us—a group of spunky UCSD students adorned with binoculars waving around a wacky antenna device that we use to

detect banded Brown Pelicans for the nonprofit Pelican Science.

We divided up the Cove into 30 sections to perform "point-count" surveys, where we count all the individual seabirds in each section. These data help us understand which bird species are using which habitats—islands, beaches, rocky cliffs, vegetation—throughout the year. These surveys reveal the incredible abundance and diversity of species that rely on the Cove as a crucial stopover habitat for migrating and resident birds along the Pacific Flyway. They also help validate conservation measures implemented along the coast, such as the seasonal closure of the Children's Pool beach or the permanent closure of Point La Jolla, intended to limit human disturbance and to protect wildlife.

The seasonal closure of the Children's Pool beach, for example, not only gives space for pupping Harbor Seals but also creates vital space for seabirds to rest and forage. In May, we counted dozens of Western Gulls and Heermann's Gulls, as well as hundreds of migrating Brown Pelicans passing through. Habitats such as Point La Jolla, which were closed to the public only three years ago, not only provide protected California Sea Lion habitat but

now also have become crucial refuge sites for migrating seabirds. On any given day, you can easily see dozens of Brandt's Cormorants, Western Gulls, Brown Pelicans, Heermann's Gulls, Royal Terns, Elegant Terns, and many shorebirds. In early May, our surveys counted more than 1,500 Elegant Terns just at Point La Jolla. Two weeks later, we observed more than 1,600 Brown Pelicans across the entire area, including more than 160 at Children's Pool Beach and 230 at the Point. It's unlikely that the same abundance of migrating seabirds would be resting here if humans could wander about freely.

La Jolla Cove is home to one of the only mainland nesting colonies for Brandt's Cormorants in Southern California. Its proximity to hard cliffs, nutrient-rich upwelling, and fish-filled kelp forests provide a perfect combination of conditions for nesting Brandt's Cormorants. As a resident species, they are one of the few flying animals that choose the Cove to raise their young, historically (and to this day) nesting on the steeper cliffs near

Goldfish Point. But the small stretch of cliff space just above the Cove beach is a newer nesting habitat. Several decades ago, most of this cliff section was covered in vegetation. Now, it seems that the loss of vegetation in this section has spread, and more cormorants have moved in, competing each winter for nest space.

Like many other birds, Brandt's Cormorants tend to return to the same nesting sites year after year, so we can expect this spot to become even more important going forward. However, this newer section of nests lacks consistent observation and data collection, which are essential in understanding long-term trends and changes to breeding success. That's why this year we wanted to begin collecting what we hope will become foundational baseline data for this section of the Cove.

We spotted our first cormorant eggs at this site in mid-January. We then labeled and tracked more than 70 nests. Week after week, we counted each nest's eggs and the stages of chick growth (from hatching to downy to near-fledged), adding new nests along the way. After 4 months of weekly nest surveys in this narrow cliff section, we observed 68 nests where breeding pairs produced any eggs or hatchlings. On average, mating pairs laid 2.76 eggs, which is consistent with typical clutch sizes for this species.

Chicks that made it to the near-fledged stage and then were not seen in the following survey were assumed to have fledged from the nest. By mid-May, our initial findings revealed about 73 fledglings, for an average fledgling success rate of 1.07 chicks per active nest. Without multiple consecutive years of observation, it is difficult to say whether this is a particularly low rate of breeding success for this colony, but it does compare with the lower range of rates at other colonies.

Brandt's Cormorants are well known as a "boom-or-bust" species. Their breeding success varies widely by colony and

by year and can dip quite low in marine heatwave years, when prey is harder to find, then bouncing back in colder years, particularly cooler La Niña weather conditions. When prey is farther away, such as with shifts in availability of anchovy versus rockfish, cormorants must make longer foraging trips to meet the energy demands of themselves and their chicks.

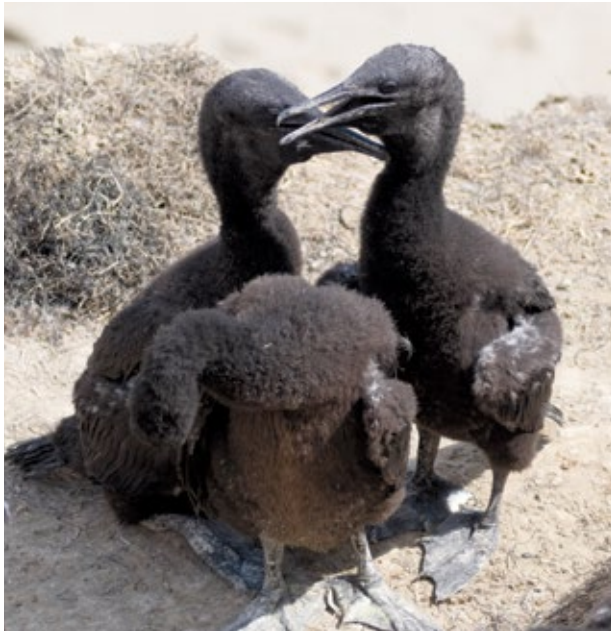
Given that this is a relatively newer space for nest building, it's possible that younger adults are coming here to breed, which could explain the lower rate of fledgling success (breeding success increases with age). Nests on the edge of this colony also performed noticeably worse than nests in the center, closer to denser congregations of nests along the cliff; it is common for both edge nests and younger parents to underperform compared to center nests and older adults, respectively. Without knowing the ages of these cormorants, it is difficult to assess whether age or other factors, such as high sea-surface temperatures and reduced prey availability, can explain this relatively lower rate of breeding success. This is why we need consistent monitoring of this section to understand how their reproductive success changes over time.

There is something truly magical about seeing a colony of nesting seabirds up close for the very first time—from the first pipped crack in an egg one week to the thrilling emergence of a naked, featherless hatchling the next. For most of us surveyors, this was our first time seeing Brandt's Cormorants flying to the nest carrying mouthfuls of nesting materials, then making wing-waving and sky-pointing courtship displays

to their blue-throated partners and beginning the laborious tasks of incubation and raising young.

But there is also something just as exciting—watching *other* people experience being this close to wildlife for their first time. Over the past six months of bird surveys at the Cove, I've watched dozens of times as families of all ages decide to peer past the sidewalk fence above the beach and unexpectedly find themselves mere feet away from this stunning colony of nesting Brandt's Cormorants. They gawk in awe and curiosity as chicks beg for food, shoving their bills uncomfortably deep into their parents' mouths, becoming nearly engulfed in their endless desire for regurgitated fish.

That's the gift of places such as La Jolla Cove, where these kinds of magical experiences occur daily. This kind of proximity to wildlife brings people closer to the natural world. It allows us to understand and connect with nature. That understanding and connection breeds affection, which ultimately inspires a sense of responsibility to protect and care for wildlife.



Photos: Brandt's Cormorants by Alex Rubenstein



Marine Heatwaves Mean More Booby Sightings for San Diego Birders

by Shari Dorantes Hatch, Sketches Associate Editor

The name *booby* probably comes from the Spanish *bobo*, meaning “stupid”—possibly because mild-mannered boobies were easily captured and eaten by Spanish sailors. As some Scripps researchers found out, however, boobies are pretty smart about adapting to the climate crisis, expanding their range northward as their native Mexican waters warm.

Tammy Russell, Ph.D., and her team of researchers at UC San Diego’s Scripps Institution of Oceanography have discovered news that may please many San Diego bird lovers, though the underlying cause is concerning. Russell’s team studied data on the populations of five species of boobies—Nazca, Cocos, Blue-footed, Red-footed, and Masked Boobies—using datasets from 2002 to 2022. Early in the 21st century, data showed that these boobies were located too far south for San Diego birders to observe them.

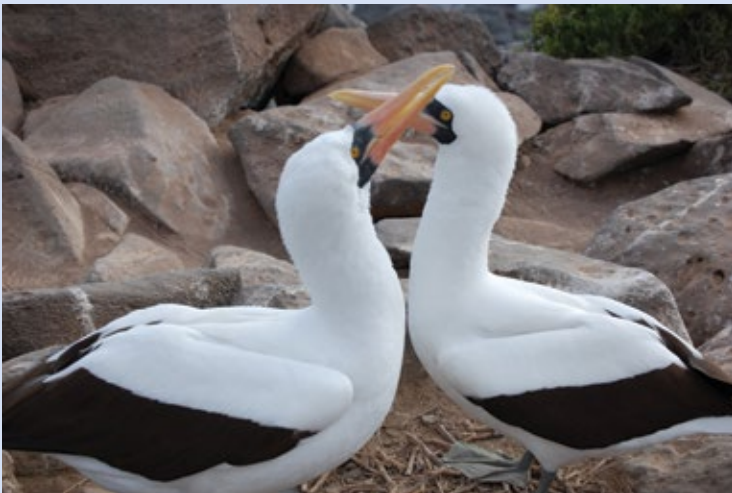
Since then, however, a series of marine heatwaves have warmed the boobies’ native Mexican waters and have been linked to increases in booby sightings in relatively cooler San Diego waters. With each marine heatwave in Mexican waters, Russell and her colleagues documented that boobies’ abundance in San Diego waters often increased many times over. These data suggest that the boobies are increasingly fleeing from warming Mexican waters toward San Diego’s relatively cooler water, due to the climate crisis.

The boobies’ most distinctive features are their webbed four-toed feet (“totipalmate”), often in distinctive colors. During incubation, boobies’ feet keep their eggs warm by increasing the vascularization (blood circulation); they neither have nor need brood patches. When adults need to cool off, they use evaporative cooling at each end. They open their moist mouths while fluttering their gular pouches at the front end, and they excrete liquid feces onto their feet at the back end.

Boobies are well equipped for their deep-diving pursuit of fish. They ascend about 80 feet up then streamline their bodies to power-dive deeply under the water to catch unsuspecting fish. Their eyes are positioned to give them binocular vision for pursuing fish, and they have no external nares (nostrils) where water could enter during a dive. After catching prey, they don’t carry it in their bill or with their webbed feet. They swallow it, then regurgitate it to feed their young. As this photo spread shows, boobies are strikingly attractive birds.

NAZCA BOOBY

The Nazca Booby was once considered a subspecies of the Masked Booby but was recognized as a separate species in 2002 based on genetic differences. It closely resembles the Masked Booby but is smaller and typically has a more orange-pink bill rather than bright yellow.



COCOS BOOBY

During El Niño currents, most Cocos Boobies don’t even try to nest, so these currents are especially tough on this species. Since the 1990s, this booby has moved not only northward, but also westward, observed breeding as far west as the mid-Pacific Palmyra Atoll—which puzzles ornithologists. Unlike some boobies, the Cocos Booby’s feet aren’t remarkably colorful, but the gular (throat) pouch of the male is greenish-blue in highly fit males and blue in less-fit males.



RED-FOOTED BOOBY

Red feet! Sexy! And the redder, the sexier! Unlike other boobies, male Red-footed Boobies don’t strut; instead, they hop about to show off their feet. Red-footed Boobies have many color *morphs*—a wide variety of plumage colors within the same species (called “polymorphic”). As adults, the Red-footed Booby may weigh as little as 30 ounces, making it the smallest of these five boobies. Given its small size, it may be adaptive for Red-footed Boobies to be the only boobies to nest in trees or on shrubs, out of reach of most land predators; all other boobies nest on the ground. Also, because they spend a lot of time in trees, they’re more likely to hop from limb to limb than to walk like other boobies.

MASKED BOOBY

The Masked Booby looks similar to the Nazca Booby but is much larger. Weighing up to 83 ounces, it’s the largest booby. In contrast to Blue-footed Boobies, Masked Boobies are entirely oceanic, breeding and roosting on ocean islands around the world. They often forage hundreds of miles from the nearest land. They seem to follow schools of dolphins or tuna, which chase prey fish to the ocean’s surface. Even with this help, these boobies dive deeply, rarely making shallow dives.



Photos: Nazca Boobies courtesy Pixabay, Cocos Booby by Tim Downs, Red-footed Booby by Herrcut, Blue-footed Booby by Diego F Parra, Masked Booby by RP Martins



BLUE-FOOTED BOOBY

Blue-footed Boobies have an “If ya got it, flaunt it!” approach to attracting the opposite sex. Partners will make exaggerated foot lifts while walking, to show off the brilliant blue of their feet. More intense blue generally indicates a better diet and better health. The Blue-footed Booby is more coastal than other booby species, rarely seen straying farther than 19 miles from shore.

BORN TO THE SEA

The Extraordinary Adaptations of Ocean Birds by Tim Downs, Sketches Art Director

The ocean is a formidable landscape to call home. Whether living a life at sea, as pelagic birds do—often spending years without touching land—or along the fertile ribbon where land meets sea, as coastal seabirds do, each bird group has evolved physiology and behavior to thrive in environments where no terrestrial bird could survive.

THE WANDERERS

Albatrosses live at sea their entire lives, except to breed and to raise their young. These seabirds exhibit several physiological and lifestyle adaptations that set them apart from all nonpelagic birds. They differ from wingtip to bill, to conquer the challenges of energy depletion, lack of fresh water, scarcity of food, and constant environmental changes.

The Wing

The 12-foot wingspan of the Snowy Albatross (*Diomedea exulans*) is the longest of any living bird, but the Black-footed Albatross (*Phoebastria nigripes*), pictured here, is probably the only albatross you will see off the coast of San Diego. Though smaller than the Snowy, its wingspan still reaches 8 feet. More than just wingspan allows it to soar for days at a time; aspect ratio does, too. *Aspect ratio* is

the relationship between the wing's length and its width; long, narrow wings have a higher aspect ratio than short wide wings. High aspect ratios maximize wing lift while minimizing *drag* (friction that slows air speed). Albatrosses have a high aspect ratio, with very long, narrow wings, like blades, giving them great lift with low drag.

Albatrosses also use *dynamic soaring*, which exploits the differences in wind speed across ocean waves, minimizing the need to flap their wings to fly. By zigzagging upwind and downwind between the differing wind speeds near the water's surface and higher above the waves, they can conserve energy and let the wind power their flight rather than having to use their muscles. To watch a Snowy Albatross dynamically soaring, please see

<https://macaulaylibrary.org/asset/201843821>.

Along with the Giant Petrel (*Macronectes giganteus*), albatrosses have evolved a biomechanical mechanism to “lock” the wings into a fully extended position. They use a distinctive tendon, which runs the length of the leading edge of the wing and seats into a bony notch on the bird's shoulder. This mechanism provides support and rigidity, relieving the pectoralis muscles from having to engage to keep the wings extended while soaring. As the forces of wind intensify, the tendon tightens, further maximizing efficiency in flight.

The Salt Gland

If a purely terrestrial bird drank seawater, much like a shipwrecked sailor on a lifeboat, it would suffer severe dehydration and salt poisoning

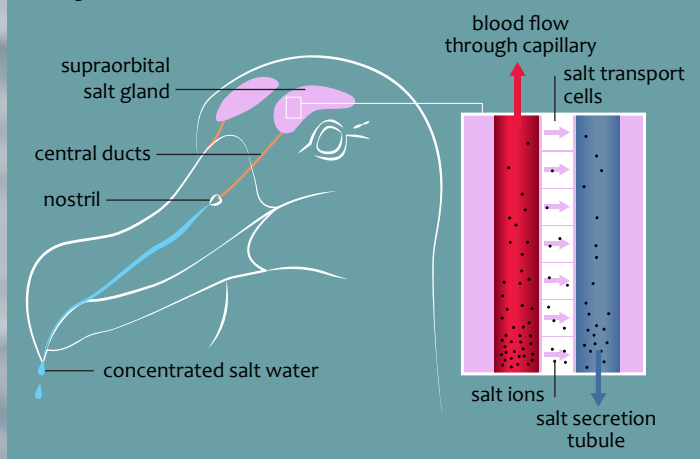
(*hypernatremia*). Its kidneys would be overwhelmed and would fail. Many birds that live on or near the ocean have evolved the ability to drink seawater, and for the albatross, this ability allows it to remain at sea for years at a time. Its salt glands (beneath the skin above its eyes) extract salt from its bloodstream and excrete concentrated brine from its external tube-shaped nostrils. Birds with these specialized nostrils, nicknamed “tubenoses,” belong to the Procellariiformes order of birds, which includes albatrosses, petrels, shearwaters, and storm petrels.

Smell over Sight

The tubenose's olfactory system has evolved for hunting and navigating by smell, rather than by sight. Most other birds' brains are dominated by large optic lobes for vision processing to hunt or forage primarily by sight. Instead, the tubenoses' olfactory bulbs occupy more than one third of their brains, dramatically increasing their ability to detect and process smell.

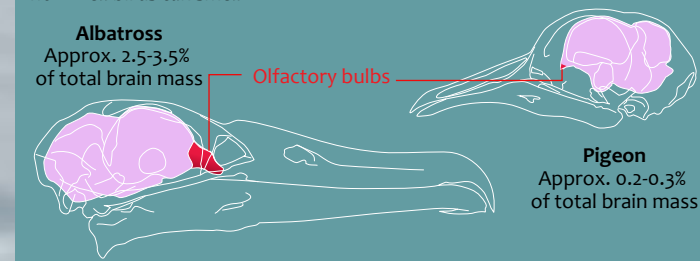
HOW SALT GLANDS WORK

Salt ions are extracted from capillaries in the salt gland by salt transport cells through tubules that drain into a central duct, and exit the nostril.



HOW SEABIRDS TRACK THEIR PREY FOR MILES

The size of the olfactory bulbs, relative to total brain size, determine how well birds can smell.



Researcher Gabrielle Nevitt, in a series of groundbreaking papers (1995–2008), demonstrated that albatrosses, petrels, and shearwaters can detect

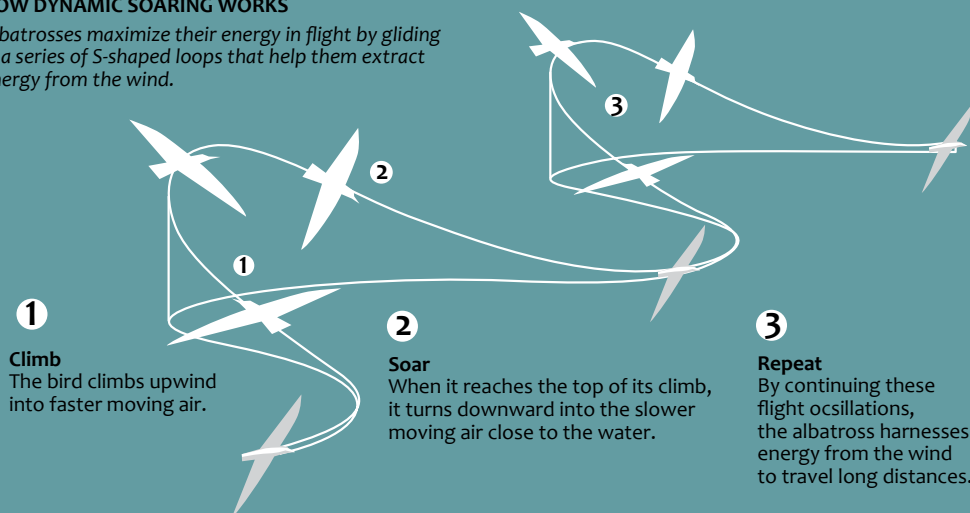
The Long Game

Living in the unpredictable and harsh world of the open ocean, the albatross has evolved a life of efficiency and longevity with larger species living up to 50–60 years or more. With a slow breeding strategy, laying a single egg per clutch, the Great Albatross breeds only every 2 years. These albatrosses devote immense time and resources to raising their single chick, requiring 5–9 months of near-constant feeding before fledging. Many long-lived pelagic birds exhibit delayed reproductive maturity, not breeding for their first 7–12 years.

distinctive chemical signatures across vast distances to locate prey. Flying across the wind, these birds can zero in on their prey by zigzagging through the scent to narrow down its direction. Procellariiformes use the chemical scent landscape not only to find food, but also to map the world around them—to find their nest after months or years at sea and even to detect the smell of their long-term partner.

HOW DYNAMIC SOARING WORKS

Albatrosses maximize their energy in flight by gliding in a series of S-shaped loops that help them extract energy from the wind.



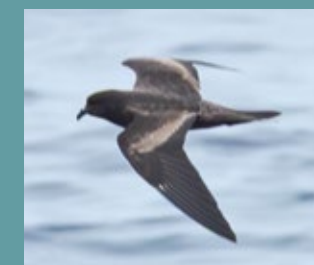
OCEANIC ADAPTATIONS



Pink-Footed Shearwaters nest in burrows on only three islands off the Chilean coast. Their epic migratory journey takes them from Chile to southeastern Alaska in non-breeding years.



Scripps Murrelets have nearly eliminated the vulnerable nesting stage by evolving highly precocial chicks that leave the nest within 2 days of hatching, flying directly to sea.



The **Ashy Storm Petrel** is non-migratory but spends most of its life at sea, only coming to land to breed, primarily in the South Farallon Islands, with smaller colonies on the Channel Islands. Though individuals have been recorded living at least 31 years, they were listed as endangered by the International Union for Conservation of Nature in 2018.

THE COAST HOLDERS

The Brown Pelican (*Pelecanus occidentalis*) has taken a different path from its seafaring cousins. Living on land but feeding exclusively in the ocean, this large, prehistoric-looking bird has evolved several distinctive adaptations to ensure its survival in the harsh coastal environment. (Pelican fossils date to about 36 million years ago.)

The Dive

Diving from as high as 65 feet above the water, the Brown Pelican survives each violent impact with the water's surface through both technique and morphology. When it spots prey, the pelican will angle down, its wings forming a V-shaped silhouette for maximum aerodynamic efficiency. Just before hitting the water, these pelicans push their wings back behind the body to protect their fragile bones from being broken. Before they dive, *subcutaneous air sacs* (extensions of the respiratory system, under the skin)

fill with air, to act as "shock absorbers," lessening the impact on their internal organs and bones, especially the neck and spine. Pelicans don't dive deeply to chase prey underwater; instead, they feed on prey directly below the water's surface. Their subcutaneous air sacs slow the bird's descent into the water and help them stay buoyant.

The Gular Pouch

During the dive, the pelican opens its bill to fill its *gular pouch*—the distinctive stretchy throat skin, which acts as a net, often catching more than one of the targeted prey. The upper mandible

of the bill is rigid and tapered toward the tip to pierce the water's surface, but the lower bill is built differently. Two bones called the *mandibular rami* bow outward sideways to physically support the expanding gular pouch, which can hold 2.5 or more gallons of water. Upon surfacing, the upper bill closes over the gular pouch, and the mandibular rami squeeze inward, expelling water out the sides. After forcing out the excess water, the pelican tips its head back and swallows the prey whole.

The gular pouch is also highly *vascularized* (dense with blood vessels) for thermoregulation on hot days. When

overheated, pelicans and many other birds can use gular fluttering to evaporatively cool the blood, thereby lowering the body's core temperature. In *gular fluttering*, the bird flutters the skin of the gular pouch while pumping warm blood through the capillaries near the surface of the skin.

Binocular Vision

The Brown Pelican's eyes face forward, giving them keen eyesight with superlative depth perception. As visual hunters, they can see distant schools of fish below the surface of the water. When spotting prey underwater, pelicans face a complex physics problem. You've probably noticed this phenomenon when looking at a straw in a glass of water; the straw's location appears distorted because water refracts the light. The same thing happens in the ocean; under the water, fish are not actually located where they seem to be. By the time seabirds are experienced enough to hunt for their own prey, they have learned to adapt to this perceptual difference and to dive where the fish are, rather than where they seem to be.

At the Mercy of the Coast

Whereas oceanic albatrosses can find their way to cooler waters to avoid temporary environmental changes, Brown Pelicans can't. Because they're tied to the coast, they're more vulnerable to food source insecurity created by localized weather anomalies. This makes these birds an indicator species of the overall health of the local marine ecosystem.

PLUNGE DIVING

Brown Pelicans dive at up to 40 mph to fill their gular pouches with fish swimming close to the surface.



Spotting prey from as far away as 60 feet, the pelican prepares to dive, angling steeply toward the water.



It takes a deep breath to fill air sacs under the skin of the breast and belly to protect vital organs and to add buoyancy after the impact.



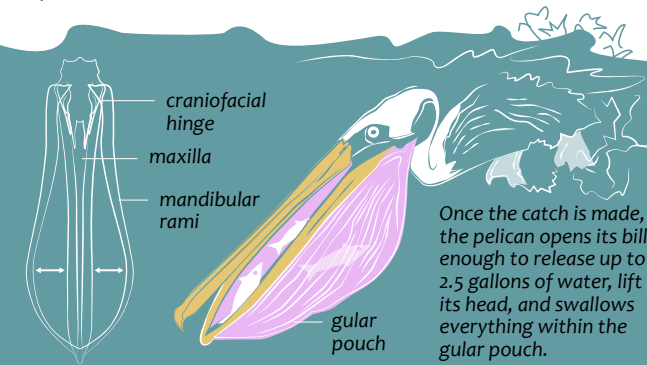
It banks left in flight to protect its esophagus and trachea (which are located on the right side of its neck.) Its wings pitch back into a V-shape to maximize speed.



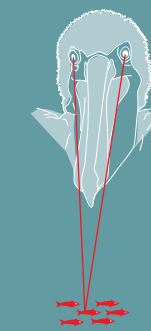
As it hits the water, the pelican throws its wings behind its body to protect fragile bones.

FROM BILL TO NET

The Brown Pelican's jaw (maxilla) is hinged to the skull to allow for maximum mouth opening, while the flexible lower jaw (mandibular rami) can bow from two inches (resting) to six inches (fishing) to transform the gular pouch into a net.



Once the catch is made, the pelican opens its bill enough to release up to 2.5 gallons of water, lift its head, and swallows everything within the gular pouch.

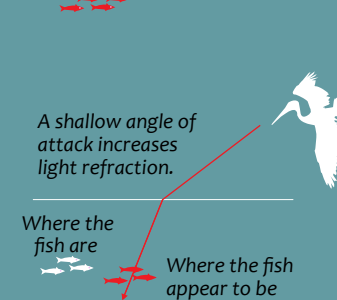


BINOCULAR VISION

Pelicans have well-developed binocular vision (the ability to focus both eyes on a single point) giving them 3-D vision to help them track schools of fish from a great distance and to accurately judge depth in a dive.

LIGHT REFRACTION

Light bends under water. Pelicans learn to adapt their hunting approach to minimize this distortion. By diving at an angle between 60 and 90 degrees above the surface of the water, they reduce the light refraction present when spotting prey.



A shallow angle of attack increases light refraction.

Where the fish are

Where the fish appear to be

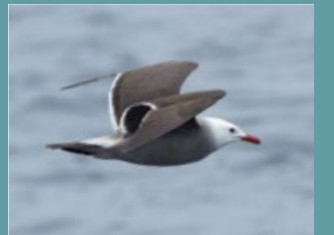


A steeper angle of attack reduces light refraction

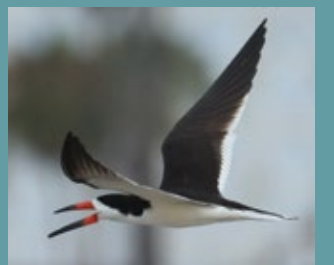
COASTAL ADAPTATIONS



The **Brandt's Cormorant** trades waterproofing for the ability to dive and swim after prey. Its feathers become fully soaked, reducing buoyancy and allowing it to forage deep underwater where plunge-divers such as the Brown Pelican, gulls, and terns can't reach.



About 90% of **Heermann's Gulls** breed on a single predator-free island in the Gulf of California, called Isla Rassa. Like many other gulls they have developed a foraging strategy called *kleptoparasitism*, where they steal food from Brown Pelicans as they drain their fish-filled pouches.



The **Black Skimmer** essentially hunts "blind" by dipping its longer lower mandible below the water's surface until it touches its prey, then it snaps the bill shut to secure a meal.



It Took a Community to Help Protect Mission Bay's Birds from Fireworks

by Communications Manager Alexis Guerra Luz, Director of Conservation Andrew Meyer, and Conservation Manager Amie Aguiar

In a big win for Mission Bay's nesting seabirds and other resident species, SeaWorld San Diego announced that it is drastically reducing summer fireworks displays and transitioning to drone shows instead. While the park will still launch fireworks on July 4th, it has replaced nightly summer fireworks displays with an "Ocean of Dreams" drone show, which will run nightly through August 9, and then on weekends only, through September 7.

Local conservationists had long expressed concerns about the effects of fireworks on the nearby nesting populations of California Least Terns. In 2024, however, Mission Bay also hosted one of the world's largest nesting colonies of Elegant Terns, heightening concerns about the impacts of fireworks during a critical breeding season. Conservationists warned that fireworks could trigger nest abandonment, cause collisions during nighttime flight, increase stress during nesting and chick-rearing stages of life, and cause nighttime disturbances. Their fears were realized when damaged eggs, as well as dead juvenile and adult Elegant Terns, washed ashore the morning following 2024's July 4th fireworks displays.

As Lesley Handa, lead ornithologist for SDBA, points out, "Globally recognized Important Bird Areas such as the Mission Bay-San Diego River Estuary and South San Diego Bay, should not be host to fireworks due to the potential harm to breeding birds and disturbance to natural

behaviors of diurnal and nocturnal birds using the area."

To better understand the impacts of fireworks displays on the nesting seabirds in Mission Bay, researchers monitored bird behavior, collected field observations, and conducted geospatial analysis to identify sensitive habitats and to map bird roost sites in relation to fireworks launch locations. Additional observations shared by Handa highlighted the varied ways that fireworks affect coastal bird populations across Mission Bay and Imperial Beach. The monitoring documented that breeding colonies and species assemblages can shift dramatically from year to year, while different species respond differently to disturbance.

Illegal fireworks often compounded the impacts of permitted displays, causing birds to flush from roosting areas and creating hazardous flight conditions. Handa also noted concerns for both diurnal and nocturnal species, including Elegant Terns, Black Skimmers, and night herons, whose natural roosting and foraging behaviors can be disrupted by fireworks. Their findings clearly demonstrated how fireworks disturb nesting and roosting habitats across Mission Bay.

Using this research and monitoring data, San Diego Bird Alliance organized community partners, volunteer scientists, and coastal conservation organizations, including San Diego Coastkeeper, San Diego Pediatricians for Clean Air,

Fiesta Island Dog Owners Association, Friends of Rose Creek, and Friends of Rose Canyon. Together, this growing coalition of environmental, health, and community organizations elevated the issue to local decision-makers through public hearings, recommendations, and advocacy meetings with the Mission Bay Park Committee, Council President Joe LaCava, SeaWorld San Diego, and the California Coastal Commission.

As a result of these collective efforts, the Mission Bay Park Committee voted to oppose fireworks, and Council President LaCava publicly took a stand against them. SeaWorld later announced plans to transition to drone shows and reduce fireworks launches. We hope this success inspires communities around the nation to use science, collaboration, and public engagement to create meaningful change for wildlife and habitat conservation.

There are still many unknowns about the effects of drones on the nesting colonies, as well as on the birds that forage or migrate at night, so the San Diego Bird Alliance is staying vigilant. We are monitoring birds during and after drone shows and will be out on July 4th again to map the locations of all the fireworks launches in Mission Bay, the San Diego River Mouth, and Imperial Beach. If you'd like to help, please contact the San Diego Bird Alliance conservation team at conservation@sandiegobirdalliance.org.

Photo: Muriel Spooner

PUBLIC PROGRAMS

Birding Together: Celebrating Community at Chollas Lake

by Sandy McCann, Director of Education

This spring, Chollas Lake Park became a gathering place for three special celebrations of birds and belonging. Through collaboration with and guidance from Makeda "Dread" Cheatom and the WorldBeat Cultural Center, San Diego Bird Alliance (SDBA) has deepened and expanded its programming at Chollas Lake, and that work continues to take flight in meaningful ways.

It started on March 1, when Chollas Lake Park welcomed more than 150 participants, including students and their families from City Heights-based Ocean Discovery Institute, for a community birding outing, capping off the San Diego Bird Festival. Festival keynotes Kenn Kaufman, Jason Hall, Marilu Lopez Fretts, and Cheatom led outings alongside SDBA and the SoCal Bird Nerds, with representatives from Bushnell Corp. on hand to share their passion for optics and for the outdoors. It was a joyful, high-energy send-off for the festival and a powerful statement about

what birding can look like when community is at the center.

On May 9, SDBA returned to Chollas Lake in partnership with San Diego Parks and Recreation for a community outing in honor of World Migratory Bird Day—a global celebration of the birds that travel thousands of miles across continents and of the habitats that sustain them along the way.

Then on May 30, SDBA joined WorldBeat Cultural Center and the SoCal Bird Nerds for an outing as part of Black Birders Week. Founded in 2020 to celebrate Black birders, naturalists, scientists, and outdoor enthusiasts, Black Birders Week advocates for inclusion, safety, visibility, and environmental justice in outdoor spaces. This year's theme, "Flyways & Freedom: Advocacy, Action, and the Future," organized by Black AF in STEM, used the lens of migratory birds to imagine a world where everyone can move through outdoor spaces without barriers.

All three events called Chollas Lake home for good reason—it's a treasured neighborhood outdoor space where participants of all ages and experience levels can slow down, connect with local wildlife and native habitat, and experience natural beauty close to home. Binoculars were available to borrow, and guides were on hand throughout each outing.

Together, these three outings are a reminder that birding is for everyone. A special thank you to the Black leaders who brought the Black Birders Week outing to life: Cheatom, Andrew Hawkins, Caliph Assagai, Roslyn Rivas, and Tammah Watts. SDBA is proud to be part of building this community and grateful to WorldBeat Cultural Center, the SoCal Bird Nerds, Ocean Discovery Institute, and San Diego Parks and Recreation for making it all happen.

Follow SDBA on social media or keep an eye on our Events Calendar for upcoming BIPOC outings at Chollas Lake Park and other venues.



College Corp Fellow Danna Aguilar, Outdoor Experience Leader Tim Cooper, SDBA staff Thais Thomazini, Willow Eichler, and Roslyn Rivas welcome guests to Chollas Lake on World Migratory Bird Day.



Birders of all ages gathered to celebrate Black Birders Week at Chollas Lake.

Photos: (bottom left) Hailey Matthews, (bottom right) Dennis Wood



Makeda Dread Cheatom (second from left) of WorldBeat Cultural Center and Marilu Lopez Fretts of Cornell Lab of Ornithology (third from left) gather with young birders at Chollas Lake during the San Diego Bird Festival.

SANCTUARIES

How Do Chaparral Plants Survive Rainless Summers?

by Dylan Lau, Silverwood Coordinator

Silverwood Wildlife Sanctuary, nestled in the foothills of Lakeside, is home to swaths of chaparral. As the dominant habitat of Southern California, chaparral has adapted to our Mediterranean climate, with its mild winters and hot summers. But have you ever wondered how chaparral plants and the animals that depend on them can survive hot summers that see little to no rain? Some plants such as Chamise (*Adenostoma fasciculatum*) have deep root systems, up to 25 feet, to tap into groundwater far below the surface. Other plant species have adapted by going into dormancy, a kind of hibernation for plants. Species such as California Sagebrush (*Artemisia californica*) and Bush Monkey Flower (*Dipacus aurantiacus*) drop their leaves to conserve water, making them appear dead. Once the rains return in the winter, these plants come back to life with explosive growth.

Many other chaparral plants, such as Sugar Bush (*Rhus ovata*), are evergreen and keep their leaves all year long. They do this by relying on fog. Even though Silverwood is 20 miles away from the coast, you can often feel a sea breeze when hiking on the ridges. On colder nights, that breeze can carry moisture from the ocean up into the foothills where Silverwood lies. Some plants have adapted to draw that moisture out of the atmosphere. Laurel Sumac (*Malosma laurina*) has large waxy leaves that point downward, channeling the droplets down to its roots. The dew that collects on plants

also acts as a critical water source to animals. Animals such as coyotes have been known to lick the morning dew off of plants. Many herbivores meet their water needs by consuming the leaves whole. You can still find some plants that bloom in the hot summer months, such as California Buckwheat (*Erigonium fasciculatum*). Pollinators such as hummingbirds and native bees get all the water they need from the nectar they drink.

Fog and dew occur less frequently during the summer months, but it is the only time of year when dew and fog produce more water than rain does. Chamise, the dominant plant at Silverwood, can take water from the air, allowing it to stay evergreen. The amount of fog Southern California sees has been declining since the mid-20th century, largely due to the climate crisis. Marine heatwaves, such as the one we're experiencing now, can reduce coastal fog, wind strength, and marine-layer density. This layer impacts the extent to which cool coastal air reaches inland areas, such as Silverwood.

During the harsh summers in the chaparral, native plants and animals have incredible adaptations to collect and store water. If you want to check out these plants for yourself, come by Silverwood Wildlife Sanctuary on our open days: Wednesdays 8 A.M. to 12 P.M., and Saturday 9 A.M. to 4 P.M.



Laurel Sumac



Chamise



Sugar Bush

AVERAGE TOTAL RAINFALL IN INCHES

April 2014 to April 2026 from weather data near Oakoasis County Preserve



Photos: Dylan Lau

SANCTUARIES

Exploring Anstine and Silverwood After Sunset

by Hannah St. John, Anstine Coordinator

During San Diego Pollinator Week in May, the Anstine Nature Preserve hosted an Exploring Nocturnal Pollinators workshop in collaboration with our Conservation team. We partnered up for an evening exploration of lesser-known nocturnal pollinators such as bats, moths, and other critters that come out after dark. We were joined by educator and naturalist Don Endicott, author and artist Janell Cannon, and Project Wildlife volunteer Cindy Myers, each of whom shared their vast knowledge of bats.

As dusk fell, our bat experts led us toward the restored coastal sage scrub trails, where we viewed many bats flying energetically over the scrub—gorging on the mosquitos that were biting some of the observers, we hoped! In addition to seeing bats, we used acoustic equipment to listen to bat calls that fall outside typical human hearing. The equipment remained at Anstine for an additional six days to get a better understanding of which species of bats visit the preserve. The equipment recorded the calls of at least five different species: Yuma Myotis (*Myotis yumanensis*), Big Brown Bat (*Eptesicus fuscus*), Mexican Free-tailed Bat (*Tadarida brasiliensis*), Western Red Bat (*Lasiurus frantzii*), and Canyon Bat (*Parastrellus hesperus*).

The nighttime exploration didn't end there. A moth "sheet" with a blacklight attracted various insects, including Western Tussock Moths (*Orgyia vetusta*). We also viewed an impressive California Root Borer (*Prionus californicus*) and a large orbweaver (*Araneus sp.*) chowing down on its beetle prey. The evening wrapped up with a wrestling match



Educator and naturalist Don Endicott shares his knowledge of bats in a workshop about nocturnal pollinators.

Participants get a close-up look at a California Root Borer beetle.



in the pond between two bulky bullfrogs (*Lithobates catesbeianus*), as many more bullfrogs either sang or peered at us with just their eyes above the murk.

If this sounds like fun, join us for Anstine After Sunset on Friday, July 10th, and Silverwood After Sunset on Friday, July 24th. We'll keep an eye out for bats flying over the coastal sage scrub as the sun sets, then set out with flashlights and headlamps to explore the rest of the trails. We'll listen for hooting owls and singing frogs and see whether any of the local nocturnal mammals cross our path. When we loop back to the parking lot, we'll have a moth "sheet" and blacklight set up to check out some bugs! See our Events Calendar for more details and for registration. Space is limited.

In addition, we encourage you to visit the Anstine Nature Preserve and Silverwood Wildlife Sanctuary during our regular open hours to see the awesome things nature can show you on your own, or at one of our future events. Please just make sure to come prepared with plenty of water as you explore this summer!

Anstine and Silverwood are open throughout the summer on Saturdays from 9 A.M. to 4 P.M., and Silverwood is also open Wednesday mornings from 8 A.M. to 12 P.M. Both preserves are subject to closures due to extreme heat or other weather events, so please refer to our social media when planning your next visit, for the latest information and events.



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It's a life full of stories, of moments of wonder, and mind-enriching experiences. Come join us on the trail—there's so much to see!

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We encourage you to become a member of San Diego Bird Alliance, especially if you are already a National Audubon member.

To become a member, visit:

sandiegobirdalliance.org/joinourflock/become-a-member.html

SAN DIEGO BIRD ALLIANCE

Sketches

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of the National Audubon Society*



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