

UC Santa Barbara

Educational Materials

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North Campus Open Space Walking Tour 2020

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Welcome to the



Walking Tour



UC SANTA BARBARA



1. Main Entrance/Visitor Plaza – NCOS Overview

Welcome to the main entrance and the Visitor Plaza of UCSB's North Campus Open Space (NCOS). This site was the location of the 9-hole Ocean Meadows golf course that was constructed in 1966 by filling the historic northern extent of Devereux Slough with soils removed from adjacent land. The golf course was closed in 2013 when the property was purchased by the Trust for Public Land and subsequently donated to UCSB with the goal of restoring the estuary that once was. In the subsequent 7 years this vision has been largely realized. In 2017, approximately 350,000 cubic yards of soil (the equivalent of 29,000 dump truck loads) were excavated and placed back on the adjacent land from which it was removed when the golf course was constructed. The movement and careful grading of the soil prepared the site for the creation of more than 100 acres of increasingly rare salt marsh, vernal wetland, coastal sage scrub, and native grassland habitats. Over the last 3 years, more than 300,000 native plants have been fastidiously planted in these habitats by restoration technicians, UCSB student workers, and community volunteers. With continued plantings and invasive vegetation removal efforts in the coming years, these restored habitats will form established, self-sustaining communities that will house an array of wildlife, including threatened and endangered species.



This restoration project was funded with state and federal grants designated to protect and enhance wildlife, special status species, wetlands, public access, improve resilience to climate change, reduce flooding, and improve water quality. The long-term management of the site for its ecological functions and the educational opportunities for K-12, university and community members still requires funding through the development of an endowment. We welcome your support and suggestions (ncos@cber.ucsb.edu).

2. Whittier Pond – NCOS Hydrology and Water Quality

The Devereux Slough watershed drains 3.62 square miles of land and is bounded to the north by the foothills of the Santa Ynez Mountains, to the west by Ellwood Canyon, and to the east by Storke Ranch and Isla Vista. The newly restored upper portion of Devereux Slough at North Campus Open Space is fed by four tributaries: Whittier creek (which, during high rainfall, flows under the bridge you are currently standing on) along with the Storke Ranch culvert (which flows underneath Storke road into the slough from the east) comprise the two smaller tributaries that empty into the northeast arm of the slough. The wetland's primary freshwater inflows come from Devereux Creek, (which drains from Sandpiper Golf Club through Ellwood at the west end of the site), and El Encanto/Phelps Creek (which flows under the westernmost trail bridge from the north).

Prior to the restoration activities in the upper slough, flooding was a common occurrence, especially during major rain events. This was because half of the slough's water holding capacity was eliminated when the former golf course was constructed in the 1960's. Flooding presented a major threat to nearby roads and homes, and made the golf course unusable during portions of the rain season. With the slough restored, the potential for seasonal flooding has been reduced significantly and the functionality of the habitat for wildlife has been significantly increased.

The slough also serves as a biofiltration system for urban runoff before it reaches the ocean. Urban runoff can contain oil and other chemicals, pathogens, and other harmful contaminants. Through a series of natural processes involving contact with slough sediments, vegetation, and micro-organisms, many of these pollutants are extracted, broken down, and isolated from downstream ecosystems.



Green Heron

3. CCBER Overlook – Monitoring Restoration Progress

To ensure that the habitat restoration at NCOS reaches the project goals, regular monitoring is vital. CCBER is monitoring several aspects of the project, and two key components are vegetation and wildlife.

Vegetation surveys are conducted annually in the summer in five of the main plant communities/habitats being restored: salt marsh, transitional habitat, coastal sage scrub, grassland and riparian woodlands. Much has changed on site since planting began in late 2017, and each of these communities is on track to meet the performance criteria as a result of intensive weeding and planting efforts.

Another indicator of the quality of the habitat created is its ability to support wildlife. CCBER monitors wildlife in collaboration with the Audubon Society to track birds on a monthly basis through sight and sound and a program to map the location of each bird observed. This will allow us to identify areas of the project that are particularly successful or that may need some change in management. In addition, CCBER staff and UCSB students monitor fish through seining and aquatic invertebrates through regular collection and identification. Fish that can withstand very high salinities are the only ones that can survive in the slough. These include killifish, long-jaw mudsuckers, top smelt, mullet, and the endangered tidewater goby. Some introduced, non-native species, such as mosquitofish and red swamp crayfish are also present, but primarily in the freshwater creeks and ponds.

CCBER also regularly monitors bat activity on site using a handheld “bat detector” and has initiated a small mammal sampling protocol in association with a UCSB field ecology class.

4. Phelps Creek Bridge – Connecting the Community with Nature

An important aspect of the success of the NCOS project is ensuring there is harmony between the function of the ecosystem and human enjoyment of this valuable natural space. Because of the proximity of the project site to the surrounding urban area, the local community will continue to impact and enjoy the restored environment. This coexistence requires communication, education, and accommodation for the needs of both entities.

Community members value NCOS for the easily accessible opportunity to interact with a peaceful and diverse natural environment. The 2.5 miles of walking trails and benches offer a scenic route for walkers, joggers, or bicyclists. Dog walkers are welcomed and provided with bags and trash cans for dog waste. In return, we ask that dogs are kept on leash when visiting to help preserve the restored habitats, as well as in consideration of other visitors who may not be comfortable around dogs. It is important to stay on the trails to avoid disrupting sensitive plants and wildlife.

NCOS has the benefit of serving as an educational platform for helping the community understand their relationship to ecosystems around them. Site tours, seminars, and youth education programs such as Kids in Nature are ways that CCBER teaches the public how to be great stewards of natural areas. The NCOS Second Saturday volunteer days, scheduled for the second Saturday of every month, are great opportunities for members of the public to have the rewarding experience of restoration work and learn more about the techniques. Check the CCBER website for information on when these events take place.

5. Seasonal Ponds – Valuable Wildlife Habitat and Ecosystem Function

Here in the western arm of NCOS, two large vernal marshes provide habitat for migratory birds, and pacific chorus frogs. Stands of water-adapted vegetation provide cover and forage for wildlife and absorb excess nutrients that flow in from the surrounding area during rainfall events. The ponds improve water infiltration and groundwater recharge by slowing or preventing the flow of water into the slough. The western arm was graded less than the rest of the project area and is designed to provide a gradient of elevation to support salt marsh vegetation as sea level rises. An unusually high water table (groundwater close to the surface) in this area is already supporting salt marsh habitat and nesting by the state endangered Belding's Savannah Sparrow.

6. Vernal Pools – A rare and unique habitat

In addition to the large salt marsh wetland of the upper slough, NCOS houses several seasonal freshwater ponds that hold water from the beginning of the rainy season in October or November until they dry in the summer. These vernal pool and marsh habitats are some of the rarest in California, with over 90% having been lost to a combination of urban development, agriculture, and weed infestation.

Here in the southwest corner of the project, ten vernal pools covering two acres were developed or enhanced between 2012 and 2016 as part of a mitigation restoration for UC Santa Barbara faculty housing construction.

Vernal pools hold less water than vernal marshes but support a very delicate ecosystem of plant and invertebrate species that rely on a shorter period of water inundation to outcompete invasive plants and complete their life cycle. These pools are adapted to low nutrient seasonal rainfall from small watersheds and cannot tolerate off season water inputs or nutrient rich runoff. As the water in these pools slowly evaporates from late spring into the summer, concentric rings of low-lying vegetation mature, creating the appearance of a target when viewed from above.

In addition to these ten pools, eight more were created in the middle of NCOS in 2018 on top of the clay soils that were excavated from the former golf course and placed on what we call the NCOS Mesa. The establishment of these pools provides the opportunity to bring rare vegetation and invertebrate species back from the brink of destruction.



7. Mesa Grassland Overlook

The south-central section of North Campus Open Space, also known as “The Mesa”, is where most of the soil from the upper slough excavation was placed. These clay soils were the ideal location to restore a 15-acre perennial grassland of purple needle grass, the state grass of California. Due to development and invasion by aggressive European annual grasses, native grasslands are one of the most heavily impacted ecosystems in California and one of the most challenging to restore. Using a no-till drill seeder that was generously loaned by S&S seeds, 90 pounds of purple needle grass seed was sown to form the foundation of this habitat. In addition, 20 species of complementary forbs are currently being tested in experimental plots throughout the grassland to determine what mix of plants will be most suitable.

Looking out over the mesa is a great way to see some of the special features designed to provide a diversity of habitats for wildlife. The bare upright tree trunks and prostrate logs throughout the grassland are repurposed trees that were cut down from the former golf course during the initial stages of the project. Throughout the year you can see these snags and logs occupied by all types of birds, from Western Bluebirds to Loggerhead Shrikes, Red-tailed Hawks and Turkey Vultures. The small mounds that dot the landscape are hollows dug out and filled with salvaged concrete from the old golf cart paths along with other materials layered into structures called hibernacula. These are designed to offer refuge for amphibians, reptiles and small mammals, and to the delight of CCBER staff and local bird enthusiasts, they are also being used by over-wintering Burrowing Owls, a species experiencing habitat loss and a decreasing population that has not been seen in this area for many years. Habitat features designed more specifically for Burrowing Owls will be created this fall.



Purple Needle Grass



Burrowing Owl

8. Venoco Bridge – Devereux Slough Overview

“Venoco” road marks the border between North Campus Open Space to the north and Coal Oil Point Nature Reserve to the south. From this bridge, you can directly compare the recovering upper portion of the Devereux Slough to the remnant lower portion. The lower portion is the primary reference site for the restoration of the NCOS wetland, meaning that the make-up of its habitat features serves as a template for the design of the upper half of the slough. The dense pickleweed stands, wet sub-tidal channel, and wide open sand, mud and salt flats you see to the south all represent the ideal sustained habitat throughout the entire slough for the future.

In 2020, three years after breaking ground for the NCOS project, the new habitat is a natural extension of the lower slough. This is in stark contrast to the former Ocean Meadows golf course. The NCOS restoration project has enhanced the area’s hydrologic functionality and its suitability for special status, rare, and threatened native plants and animals, and has also created scenic walking trails and educational opportunities for diverse members of the community. Perhaps the most striking change from the golf course is the expansion of the main channel running through the upper portion of the slough. The narrow, densely vegetated creek in the golf course has been widened and deepened to hold more water from the Devereux watershed during the rainy season. The upper slough now features a much larger, open body of water when it is at full capacity, and has become quite an attraction for birds, fish, and humans alike.

Devereux Slough is an intermittently tidal estuary. This means that most of the time the mouth of the slough is closed off from the ocean by a sand berm. However, when the slough reaches maximum water capacity, the berm usually breaches and opens the system to tidal influence. Upon breaching, the slough drains into the sea until it reaches equilibrium with the tide. The mouth can remain open for a few days or up to a few weeks at a time before sand deposited by waves rebuilds the sand berm, and depending on the rainfall in a given year, the mouth can reopen and close several times in a season. When the mouth is open to the ocean, the influx of tidal water influences the volume and salinity of the water in the estuary and the open mouth allows for the possibility of migration of fish and other aquatic life into the slough from the ocean.

The intermittent nature of this system results in highly variable conditions throughout the year, as well as throughout the site. The slough water is typically brackish, as it is a mixture of freshwater and seawater, though salinity levels of the slough can be much lower or much higher than the ocean. If, in a given year, the slough mouth does not breach, the lack of seawater input could leave the slough with more freshwater. Conversely, if the slough is not refilled by rain after it empties, evaporation through the summer months can create hypersaline conditions. The possible differences in water levels also mean that some of the low salt marsh zones may be inundated for weeks or months, or not at all. Because of this variability, plants and animals must have special adaptations to thrive in these highly variable and extreme environments.



9. Cheadle Overlook – Habitat Enhancement for Special Species

Habitat loss has unfortunately threatened the persistence of certain species to the point of receiving special status by designating organizations like USFWS and California Department of Fish and Wildlife. The NCOS restoration project has been especially attentive to the needs of such species known to occur in the region.

A few special status plant species are included in this effort. Most notably is the endangered Ventura marsh milk-vetch, which has been successfully planted in the sandy flat across the slough that can be seen from this overlook. Believed to have gone extinct in the 1960s, Ventura marsh milk-vetch was re-discovered in 1997 and was designated as an endangered species by the federal government in 2001. With permits in place, and the expert touch of CCBER nursery management, more than 200 of these plants were grown and have been established in a suitable location on the slough's edge. This thriving stand now represents the largest population of the species anywhere in the world.

The sandy flat also highlights a feature of the site designed to support an important threatened bird species: the Western Snowy Plover. This zone resembles the annual breeding grounds of the snowy plover as seen on the adjacent Coal Oil Point Reserve to the south, where breeding is consistently observed. The absence of trees and shrubs on this landscape means less opportunity for predators to hide or perch and thus offers a safer nesting area for the plovers. In each of the first three years after its creation, this sandy flat hosted nesting snowy plovers and several fledglings. However, they are challenged by predation from raccoons, crows, and skunks, whose populations are unusually high due to an overabundance of food provided by us humans in our trash and petfood as well as a lack of natural predators. To help snowy plovers succeed in the breeding season, nests are sometimes caged to deter predators.

Fish restoration efforts of the project aim to enhance habitat for the endangered Tidewater Goby, an endemic species in California that has been challenged by waterway modification and water quality changes in much of its habitat in estuaries along the coast. It usually thrives in shallow, brackish, and relatively still water characteristic of lagoons, marshes and sloughs. Throughout the main NCOS channel, you can see small inlets called eddy ponds. These pools provide refuge for fish during high flow events such as the breach of the slough mouth or heavy storms. Additionally, the confluence with the slough at the Phelps creek tributary is structured with step-pool style grade controls, which maintain fresh water in the creek and brackish water in small pools along a short salinity gradient to the main channel. Tidewater goby presence has been intermittent in the lower slough in recent years, but hopefully the restored goby habitat will suit a consistent and growing population in years to come.

The Belding's Savannah sparrow is an endangered subspecies which only occurs in Southern California and Northern Mexico's coastal marshes, with Santa Barbara county as the northern extent of its range. The immense loss of these wetlands throughout this region has impacted populations for decades. These sparrows nest in pickleweed, which is the dominant vegetation in the low marsh zones of the Devereux slough. As pickleweed continues to establish on NCOS, Belding's savannah sparrows will have more ideal habitat in which their populations can continue to recover.



10. Long Bridge – Restoration of Local Native Plants

Ecosystem restoration is the primary goal of the North Campus Open Space project, and healthy and diverse plant communities are the foundation of a healthy ecosystem. The Cheadle Center for Biodiversity and Ecological Restoration collects native plant seed from local source populations and through a partnership with the nursery, Santa Barbara Natives Inc., propagates and plants over 100 different native plant species including rare and endangered plants.

In addition to providing habitat for rare organisms, another added benefit of most native plants is their ability to tolerate drought. Only requiring irrigation during the establishment phase of the project, the vegetation at NCOS will eventually require no water besides rainfall. This stands in stark contrast to the vegetation profile of the former Ocean Meadows Golf course, which required hundreds of thousands of gallons of water per year. With the availability of potable water becoming an increasing concern on the south coast, drought tolerant plant communities like those being restored at NCOS play a crucial role in water conservation efforts.

