

SUMMER 2013

Volume 36, Number 2

Tideline



Don Edwards / Antioch Dunes / Ellicott Slough / Farallon Island / Marin Islands / Salinas River / San Pablo Bay

Black Oystercatchers a “Shore” Sign of Ecosystem Health

By Michael D'Agostino

Alongside the jagged coastal cliffs of Marin Islands National Wildlife Refuge, U.S. Fish and Wildlife Service (USFWS) staff in 2012 conducted the first-ever annual reproductive success survey for the black oystercatcher (*Haematopus bachmani*). These efforts are part of the larger Audubon California/USFWS California State Black Oystercatcher Survey whereby biologists and volunteers are ardently working together to gather significant baseline data about this uncommon bird species.

A black oystercatcher is hard to miss, albeit rare. It is a large, conspicuous shorebird sporting all-black plumage, a long, thick red-orange beak, stocky pale-pink legs, and beaming yellow eyes surrounded by a reddish eye-ring. They are sexually monomorphic meaning males and females bare identical coloration. Female oystercatchers, however, are slightly larger, heavier and possess a longer beak.

The black oystercatcher's garish, almost cartoonish appearance is matched by its distinctively boisterous call, consisting of a series of shrill, whistled “wheeps,” or a clamorous chorus of “kek-kek-kek-kekdedee!” Indeed, it has been said that oystercatchers are often heard before they are seen. These birds are highly territorial, vociferously defending their nesting area against potential predators and other oystercatchers.

Established in 1992 as the 479th National Wildlife Refuge, Marin Islands NWR contains one of the largest heron and egret rookeries in northern California.

Located in San Rafael Bay north of the Richmond-San Rafael Bridge, this refuge remains closed to public access as it supports critical breeding grounds for snowy egrets, great egrets, great blue herons and black-crowned night herons. The refuge consists of two tiny, rocky islands, aptly named East Marin and West Marin Island that are 10 and 2.8 acres large, respectively. The major-

is Alcatraz Island.

These birds are found along the Pacific coastline ranging from the Aleutian Islands in Alaska down through Baja, California; they live and breed exclusively in North America. Only 10,000-12,000 black oystercatchers are estimated globally with 50-70% or more residing in Alaska and British Columbia. The black oystercatcher popula-



Photo by Brad Kelly

ity of the 339-acre ecological sanctuary consists of submerged tidelands supporting these unique island ecosystems.

While black oystercatchers were first documented on the refuge's shoreline in 1988 and a single pair has been recognized nesting annually on Marin Islands NWR since 1993, this infrequent avian species is finally receiving an individualized focus. The refuge is one of only two known locations in the San Francisco Bay where black oystercatcher nesting occurs yearly. The other site

tion in California likely comprises about 4,000 individuals. The species' southernmost range coincides with the topographical shift from rocky to sandy coastline.

Black oystercatchers are designated a USFWS “Species of Concern,” due to the birds' low overall population numbers, restricted range and vulnerability to critical habitat loss via natural and human-caused events. Chemical pollution and coastal

continued next page

urbanization are especially precarious for these distinctive shorebirds. Oystercatchers require quiet, restful, rocky shorelines for nesting, breeding and foraging.

“We are conducting these surveys in order to track the status and trends of this population which, like all populations of black oystercatcher, face numerous threats,” explains Refuge Biologist Meg Marriott. “These threats include invasive and native predators, disturbance, oil spills, and the effects of climate change, including sea level rise and changes in prey availability.” Data collected on individual oystercatchers, including the population inhabiting Marin Islands NWR, are compiled and analyzed to better understand the intricacies of this inimitable species throughout its limited global range.

Black oystercatchers are also acknowledged as a “Focal Species” under the Service’s Migratory Bird Program. This classification signifies that the birds have a high conservation need and are representative of a broader group of marine species sharing similar environmental challenges to habitat quality and longevity. The Focal Species initiative aims to maintain black oystercatcher numbers at healthy and sustainable levels through increased research efforts and resulting land and water management strategies.

Recognized as a keystone species throughout the entire north Pacific coastline, Marriott explains black oystercatchers are “considered a strong indicator of the overall health of the rocky intertidal community.” By monitoring and safeguarding this sensitive species, biologists ensure that the oystercatchers’ nautical ecosystem is equally fit for countless other coastal wildlife species.

In 2012, a total of five black oystercatcher nests were identified and monitored on both East and West Marin Island. The nesting survey was conducted entirely from boat using spotting scopes and binoculars so as not to disturb any incubating birds. A nest is determined to be present when biologists detect an adult oystercatcher incubating at the same location during multiple visits. Biologists’ observations are recorded in 30-minute intervals several times a week once a nesting pair has been identified. Low-tide is the optimal time for detecting oystercatchers’ presence, as they nibble along the stony coastline.



Can you see the egg behind the right leg of the oystercatcher on the left side?

Photo by Kerry Wilcox

Refuge biologists confirmed that 10 adults were present on the two islands during the 2012 breeding season. “On one survey, we saw all 10 fly around the islands as a group [collectively known as a “parcel” of oystercatchers]—it was amazing!” Marriott explains.

Biologists also confirmed oystercatcher eggs present in two nest sites. At one nest, researchers were actually able to get close enough to observe the eggs with their naked eyes. At the second location, eggs were identified only after carefully scrutinizing a photograph taken at that site. Black oystercatcher nests can additionally be recognized if one observes an “incubation exchange,” since both males and females take turns caring for the eggs and warding off pesky trespassers.

Oystercatcher nests are inconspicuous, consisting of a simple “scrape,” or shallow depression, made in ground sediment. The birds line this circular nest bowl with small shell fragments, pebbles, and rock flakes, tossing the materials with a sideways, backward or occasional forward flip of their beak. Nests are built well above high tide on gently sloping gravel, pebble, or rocky shorelines or on elevated sea-cliffs.

Black oystercatchers sometimes build multiple nests within their established territory, with males taking on the brunt of the labor. Females choose which nest to use. These birds form seasonal and often life-long monogamous pairs, typically returning to the

same nesting site year after year called high mate and breeding site fidelity.

One to four eggs are laid in May or June; a clutch of three eggs is standard. Egg incubation lasts for 26-32 days. The eggs are well camouflaged, bearing creamy/olive colored shells and a variety of speckles and blotches ranging from blackish-brown to grayish-purple. If eggs are lost due to predation or other causes, sometimes a second, and rarely, a third nesting attempt will occur.

Chicks all hatch within 4-6 hours of one another in July or August. The semi-precocial young are able to leave their nest soon after down feathers have dried. The mobile fledglings are intermittently brooded for their first 23 days. Contrasting with most shorebirds, black oystercatchers provide food for their young. One adult sentinel chicks, while the other forages for macroinvertebrates during low tide.

Despite their namesake, these outlandish birds rarely consume oysters. Instead, black oystercatchers feast upon mussels, mollusks, clams, crabs, barnacles, isopods and sea urchins. Using their strong, sharp bills, oystercatchers quickly sever the adductor muscles of open clams and mussels, allowing the hungry birds to eat the soft, meaty insides of the shellfish using their beak tips. They are also adept at prying organisms from rocks, jabbing the creatures with their pointed beaks and nibbling the tasty, fleshy tissues of their dislodged meal. Black oystercatchers’ presence thus signifies healthy levels of these intertidal marine invertebrates, indicating a

balanced and robust coastal ecosystem.

Young are slow in learning how to feed themselves and even at 50 days old, parents provide fledglings with over half of their nutritional sustenance. The fledglings are not capable of flight until they are 30–40 days old and have been observed diving under water to avoid predators. Adult alarm calls warn youngsters of potential dangers, and the chicks will lie flat against the ground or hide among rocks or vegetation accordingly. Common predators include gulls, hawks, falcons and ravens. Juveniles regularly remain with their parents until the subsequent breeding season.

In the 2012 refuge survey, no oystercatcher chicks were observed on either East or West Marin Island. Biologists were unable to witness first-hand any egg or chick predation. Future monitoring is required to determine whether human and/or avian disturbances were responsible for the nesting failures on Marin Islands NWR. Human disturbance is especially worrisome as it can lead to flushing of the nest, attracting predators to the location of the birds' eggs.

Low reproductive success, however, is typical for black oystercatchers, meaning that the Marin Islands NWR is likely on par with other nesting sites throughout the northern Pacific coast. Yet low reproductive success is also a reason why this bird is especially

susceptible to calamities such as oil spills. Hatching success (eggs hatched/eggs laid) typically ranges from 34–70% and fledging success is only 12–39%. Oystercatcher broods on rocky islands tend to have higher survival rates than those on stony mainland beaches. Thus, a trade-off appears evident between the more facile foraging opportunities available on cobble mainland beaches versus the lower predator presence on island cliffs.

Oystercatchers are a long-lived species, aging 15 years or more, provided that ample foraging and nesting habitat is attainable. The birds begin breeding when four to five years old. Black oystercatchers have a low tendency of returning to their birthplace to mate (known as natal philopatry or natal homing). It is hypothesized that such behavior may be significant in disbursing and maintaining genetic diversity within the species' narrow global population.

Most black oystercatchers along the Washington, Oregon and California coast are resident birds, remaining at or near established nesting territories year-round. The birds in Alaska and Canada, however, are known to migrate undetermined distances; details remain elusive. During cold winter months, tens to hundreds of black oystercatchers will flock together near protected, tidal mudflats filled with abundant mussel beds in bays and inlets, providing shelter

from unruly winter storms. Future research is required to determine nonbreeding black oystercatcher distribution patterns and migratory connectivity between breeding and wintering environments.

In the face of increasingly urbanized alterations along California's serene seascape, Marin Islands NWR endures: a resolute beacon of safety and stability for San Francisco Bay's black oystercatchers and their oft-marred maritime ecosystem.

Serving and protecting America's extraordinary wildlife species, Marriott says, is the most satisfying part of her career. These birds "cannot advocate for themselves," Marriott reminds us.

That responsibility is ours.

A list of references is available upon request.

Michael D'Agostino was an eight-month Environmental Education Intern at the San Francisco Bay National Wildlife Refuge Complex. He possesses a Bachelor of Science in Biology, minors in Chemistry and Film Studies, and a Certificate in Public & Professional Writing from University of Pittsburgh. Michael is currently an Outreach Coordinator for the NYC Health Department, where he aspires to further his career as a public health professional.

Sequestration can be a good thing

Lately, the term "sequestration" has developed a bad rap. For most Americans today, it calls to mind the recent legislative effort to resolve the debt-ceiling crisis by setting an inflexible cap on government spending. It was meant to be a disincentive that no one expected to trigger, but you know the rest of the story.

Instead, I'd rather think about sequestration from a hopeful point of view with respect to fish and wildlife; specifically "carbon sequestration." Sequester is defined as "to remove or set apart" and is derived from the Latin word *sequestrare*, meaning "to give up for safekeeping." Carbon sequestration is the process of capturing and storing carbon dioxide (CO₂) that would otherwise be released into the atmosphere by the burning of solid waste, wood and wood products, and fossil fuels (oil, natural gas, and coal). Since the industrial age, CO₂ and other greenhouse gases have been accumulating and trapping heat at greater rates, resulting in global warming. The deliberate act of sequestering carbon has thus been proposed



as a means to mitigate or deter climate change.

Deforestation, habitat degradation, and other land conversions are also significant sources of atmospheric carbon, because fewer plants and less soil means less CO₂ naturally converting to oxygen and biotic material. The Intergovernmental Panel on Climate Change (IPCC) promotes habitat restoration as an important strategy to sequester carbon from the atmosphere. Scientists have concluded that coastal wetlands in particular are a more valuable carbon sink per unit area than any other ecosystem.

Collaborative efforts throughout San Francisco Bay to restore wetland habitats will consequently have multiple benefits for adapting to and mitigating the challenges of climate change. In addition to conserving fish and wildlife populations and enhancing flood protection, restored wetlands will sequester carbon for the long term. Our National Wildlife Refuges serve a critical role as a secure land base for safekeeping these resources in perpetuity.

In 2007, the U.S. Fish and Wildlife Service launched an innovative partnership with The Conservation Fund and its Go Zero initiative that gives individuals and organizations a voluntary, non-regulatory way to offset their carbon emissions by contributing funds to plant native trees on National Wildlife Refuges. This partnership expects to plant at least 400,000 trees annually, which equates to sequestering some 300,000 tons of carbon over 90-plus years. We will be exploring the feasibility of applying this same concept to support tidal marsh restoration in the San Francisco Bay area.

Microbiologist Inspires Future Generation of Scientific Researchers

By Carmen Minch

Three young students who have not yet reached the legal driving age are providing valuable data to a researcher studying the microbial community dynamics in salt marsh ponds. Molly, Rachel, and Felicia – all under the age of 14 years – attended a recurring program offered by Dr. Wayne Lanier last summer and were inspired by his research on salt marsh microbes.

Dr. Lanier offers the Life at the Bottom of the Food Chain program at the Don Edwards San Francisco Bay National Wildlife Refuge where he takes samples of microorganisms in LaRiviere Marsh for

ing, and use of scientific equipment. The information gathered so far has proved immensely valuable.

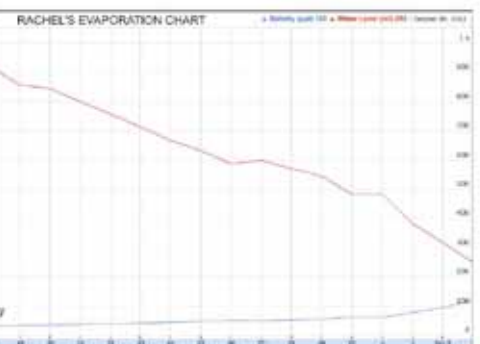
The project is to develop a predictive model of microbial community dynamics in salt marsh ponds that are tidally influenced. It is clear through the girls' data collection that tiny differences in the volume of water in the ponds can make a profound difference in the changing salinity of the pond, thus making an equally profound difference in the microbial mat composition of the pond. Until these measurements were available, we had not realized the rapidity with which the salinity of the ponds changed,

climbed to as high as 62-parts per thousand (PPT) of water in Pond 5. Bay water is generally 34-PPT.

Just seven days later, there was water again in Pond 3 with salinity of 34-PPT. Between the 10th and the 17th, the ponds had been tidally washed. The maximum tide came on September 15 and must have been the day when the tide was high enough to wash all the ponds, resetting them back to Bay salinity values of 34-PPT. Calculations indicate that the pond height was only about 0.1-meter below the maximum tide height at this time, enabling us to roughly fix the highest Pond 3 height and predict how its salinity might increase and when it might dry up again.

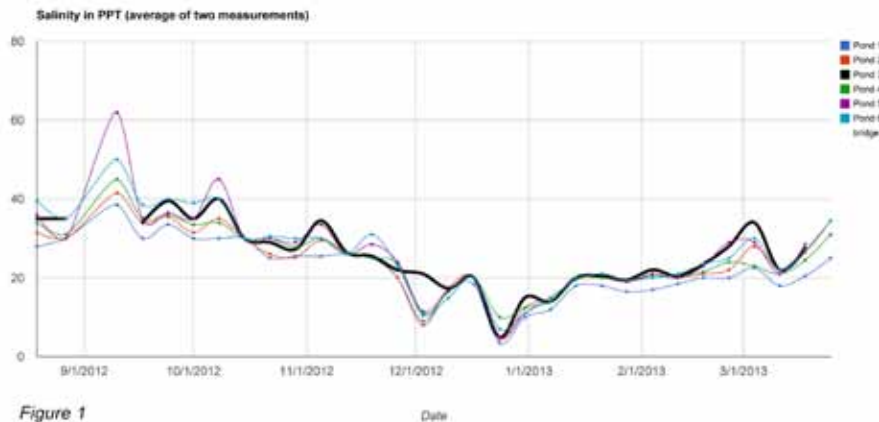
We had expected to see the long, steady decrease of salinity with the approach of winter. We had not expected the rapid fluctuations in salinity over short periods. This indicates that these six ponds are subject to small changes in the daily tidal height which drive rapid fluctuations in salinity.

These findings inspired the student scientists to undertake a research project of their own - determining the rate of evaporation of saline water at one of their homes. They filled a cylindrical jar with a weighed amount of sea salt and tap water. They then measured the daily salinity of their jar. The result was a straight line of falling salinity as the water evaporated, leaving the salt behind.



In Figure 2, Rachel plotted her home experiment. We were able to extrapolate from her experiment the estimate of the maximum volume of Pond 3 at about 13.5-gallons.

continued next page



participants to view up close. He explains that the cyanobacteria, diatoms, plankton, protozoa, algae, etc, that make up the community (and the base for food webs) can produce as much daily oxygen as a giant tree with a 30-foot canopy and a 50-foot root base. These microbial communities can change quickly with changes in salinity. He charges that salt ponds cannot be successfully restored or managed until we can predict how our restoration and maintenance activities affect food webs for wildlife and the very air we breathe. This is the basis of his current research.

When Molly, Rachel, and Felicia heard this, they wanted to know how they could help. Not wanting to pass up an opportunity for free assistance, Dr. Lanier, with the girls' parents' blessings, recruited them to aid him in collecting data by measuring salt marsh pond salinity every week. During the process, the students learned about data collection techniques, proper recordkeep-

nor had we seen evidence that the salt marsh itself contributes to the overall Bay salinity when the tide goes out.

The students developed a spreadsheet (Figure 1) for data collected from August 19, 2012 to March 25, 2013. Pond 3, the smallest pond, is emphasized in the graph by a thick line. Notice there is no thick line for Pond 3 in early September, and all the other ponds had a spike in salinity.

When the student scientists came to measure salinity on September 10, they found Pond 3 was completely dry. The tides had been so low that slough water from the Bay, which feeds into these ponds via the tides, did not reach any of the ponds. Because Pond 3 dried up, tracking the tide height during this time enabled us to determine the lowest height of Pond 3. In the other ponds, the salinity had

Local Group Gets Inked for Butterflies at Antioch Dunes

By Kirsten Wahlquist,
Visitor Services Intern

When people think about ways to help endangered species, “get a tattoo” usually doesn’t dominate the list - but that’s exactly what a group called Tatzoo does. Last summer, they turned their attention to the Lange’s metalmark butterfly (*Apodemia mormo langei*), which makes its home at Antioch Dunes National Wildlife Refuge.

Tatzoo is a local group led by Molly Tsongas. They harness the power of creative arts to raise awareness about endangered species and develop projects that support conservation efforts. For 10 weeks in the summer, a group of emerging conservation leaders develops skills in areas such as communications, media, and event planning. They then split into smaller teams to develop projects that support species that they have chosen to highlight. At the end of the whirlwind program, each fellow gets a tattoo in honor of their chosen species and has a story that they can share with others. In the summer of 2012, they focused on three species found in the Bay Area: the blue whale, the San Francisco garter snake, and the Lange’s metalmark butterfly.

Very few Lange’s metalmark butterflies remain. As the dunes disappeared and humans encroached further, the shifting sands became overrun by non-native plants. Today, only a handful of these rare butterflies still exist, and they can only be found at Antioch Dunes National Wildlife Refuge.

When Tatzoo stepped in, one of their first tasks was to determine what type of

project would be of most benefit. Rachael Van Schoik, one of the fellows on the Lange’s metalmark butterfly team, recalled going through many ideas before finally settling on a series of three events: a butterfly count, a kite festival, and a restoration party. The plan allowed them to not only help protect habitat, but also educate the local community. First up, the butterfly count at Antioch Dunes National Wildlife Refuge helped provide an idea of how many butterflies were present. By looking at the data year over year, biologists can identify trends in the population and determine if current efforts are effective. At the second event, the Tatzoo fellows shifted gears and focused their efforts on educating the local community through a kite festival. They set up camp at a local park and invited families to come out and decorate a free kite. Finally, the last event was a restoration work party. The public was invited to help pull invasive plants at Antioch Dunes to leave more room for the butterflies’ preferred buckwheat and two endangered plants to grow.

According to Van Schoik, the events drew broad range of community members that were eager to pitch in. As they worked, they got the chance to talk to biologists and learn about the butterflies and the restoration efforts going on at the refuge. Not only did the participants share their time and energy, but they left with knowledge of the plight of Lange’s metalmark butterflies and a more personal connection to them.

At the end of the summer, the Tatzoo fellows could finally stand back and look at their accomplishments. In just 10



Tattoo of Lange’s metalmark butterflies and naked stem buckwheat on Yasmir Navas.

weeks, they had learned the skills needed to develop, promote, and lead conservation events. They delved into the issues surrounding an endangered species and then put their newfound knowledge to use, providing a better habitat for the butterflies and ensuring that other people recognize the need to protect them. They brought these skills back to their day jobs and carried on the connections that they made with local conservation groups. Finally, they earned a new tattoo that will remind them of their efforts to help the Lange’s metalmark butterfly.

Microbiologist Inspires from page 4

The results described so far only begin to report the ideas these measurements have led to.

The student scientists will continue measuring pond salinity for a full year-cycle to next September. Getting all the measurements right and verifying the numbers calculated in different ways is how we make sure our ideas can accurately predict what really will happen in the salt marsh.

Bright futures are ahead for Molly, Rachel, and Felicia. The scientific community will be fortunate to have them should they decide to enter that field.

Wayne Lanier, BS in Mathematics and PhD in Microbial Genetics, has been conducting research on the Don Edwards San Francisco Bay National Wildlife Refuge salt marsh since 2005/2006. Since retiring, Wayne has studied microbial ecology in the Bay salt

marshes and in desert salt and alkaline lakes. His photomicrographs and videomicrographs of the salt marsh microbial community have appeared on the Discovery Channel, in textbooks, in Bay Nature, and even in Astronomy Magazine. Every quarter, Lanier leads lecture hikes on the refuge called “Life at the Bottom of the Food Chain”, and either “Monster Bacteria and Other Suspicious Critters” or “Explore the WEEP.” Check the activity section for dates and times.

CONNECT • CREATE • CELEBRATE

GET TO KNOW CONTEST



CONTEST RUNS FROM:
APRIL 8TH - NOVEMBER 1ST

The Contest invites you to get outside and create original works of art, writing, photography, videography and music inspired by nature. Get Outdoors and “Get to Know Your Wild Neighbors”. The goal is to be as creative as possible. For inspiration, come to the refuge and take part in one, or all of the programs listed below. Submit your work for a chance to win cool prizes. Get started today!

Go to <http://www.get-to-know.org> for more information. View some entries already submitted!

- **Beginning Bird Drawing for Families and Adults**
- **Intermediate Bird Drawing**
- **Outdoor Drawing for Families and Adults**
- **Nature Drawing for Kids**
- **Nature Drawing for Teens & Adults**
- **Photo Scavenger Hunt**
- **Poetry in Nature**

For program descriptions,
see the activity pages in this newsletter.



National Fishing & Boating Week • June 1-9

Learn how to fish on the
Dumbarton Fishing Pier in Fremont!

Saturday, June 8

9:00 a.m. – noon

Space is limited to 50 people. All equipment will
be provided. Please come on time.

Call 510-792-0222 ext. 363 for reservations.

For more information, see page 10.

**Don Edwards San Francisco Bay National Wildlife Refuge,
City of Newark and REI Outdoor School
present**

The Amazing Refuge Race

August 17, 2013 • 2:15 p.m.

Armed with GPS units, you and your team will “race” against other teams by attempting to complete required challenges on the refuge first. Teams will be given a set of coordinates where they must try to locate using a GPS unit. Once at that location, teams must work together to complete a challenge. When that task is completed, teams will receive the next set of coordinates. Those who complete all challenges and arrive at the finish first wins!



Intrigued? Log on to http://www.fws.gov/refuge/don_edwards_san_francisco_bay or call Carmen at 510-792-0222 ext. 476 for additional information and rules. Don't have a GPS unit? Borrow one from REI Outdoor School the day of the race at the refuge.

Registration is required! You may register up to 5 people for your team. A minimum of 2 people per team. The refuge may place individuals on teams containing fewer than 5 people to ensure maximum participation. Registration deadline is August 10. Go to <http://www.newark.org> to register. Go to quick links at the top of the page and select “register for classes.” There is no cost to enter.

Introduction to GPS Workshop

REI Outdoor School's Steve Wood will demonstrate how to use hand-held Global Positioning Units and will have limited number of units to practice on. No reservations necessary.

When: August 17, 2013

Where: Newark Slough Learning Center
2 Marshlands Rd

Time: 1:00 p.m. - 2:00 p.m.

Fremont, CA 94536

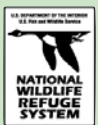
Cost: FREE!

No reservations necessary.

Don Edwards San Francisco Bay National Wildlife Refuge

2 Marshlands Road, Fremont, CA 94555

510.792.0222 ext. 363



Thank you San Francisco Bay Wildlife Society Donors!

*We gratefully acknowledge the following donors who have made gifts to the San Francisco Bay Wildlife Society between January 1, 2013 and March 31, 2013. These gifts will be used for publishing **Tideline**, capital, environmental education, habitat restoration, and interpretive programs at the Don Edwards San Francisco Bay National Wildlife Refuge.*

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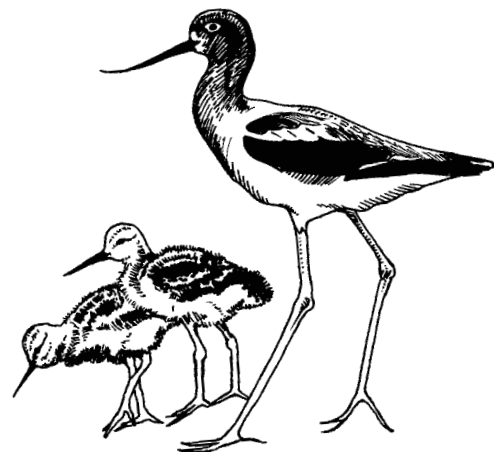
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**Mail your donation to: San Francisco Bay Wildlife Society, P.O. Box 234, Newark, CA 94560.
You may also become a member at www.sfbws.com.**

For a gift membership, call 510-745-8170.

San Francisco Bay Wildlife Society is a not-for-profit 501(c)(3) organization which raises money and awareness for the San Francisco Bay National Wildlife Refuge Complex.

YES! I want to support San Francisco Bay Wildlife Society and its programs with my membership. My dues include a subscription to *Tideline* and 15% discount at the Don Edwards SF Bay National Wildlife Refuge bookstore. Enclosed is my contribution of:

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Alerts, Announcements, and Notices for Don Edwards National Wildlife Refuge

- Detour to the Environmental Education Center in Alviso: Sections of Zanker Rd and Los Esteros Rd will be closed due to the installation of underground utilities. Exit at North 1st St from Hwy 237, right on Nortech, and left onto Disk Dr, and right onto Grand Blvd.
- The Environmental Education Center in Alviso will be closed for the summer beginning June 3 for building renovations. Trails remain open during daylight hours and weekend programs will continue. Check the web site for updates.
- Mallard Slough Trail near the Environmental Education Center in Alviso is now open. Trek the new alignment of the trail.
- A small trail section of Bair Island is now open to the public! After several years, this restoration project is nearing completion. Access to the trail is available through the new pedestrian bridge by the parking lot on Bair Island Road. Check the Don Edwards Refuge website for updates and new regulations.
- The Comprehensive Conservation Plan is now available for download at <http://www.fws.gov/cno/refuges/planning/ccp.cfm>. A limited number of CDs and paper copies is also available by contacting Winnie Chan, refuge planner, at sfbaynwrc@fws.gov or calling her at 510-792-0222.

Education Efforts Support Endangered Salamanders

By Michael D'Agostino,
Environmental Education Intern

Students from Renaissance High School in Watsonville, California, joined U.S. Fish and Wildlife Service staff to facilitate planting native vegetation on the Ellicott Slough National Wildlife Refuge.

In January, refuge staff and volunteers planted 130 individual plants consisting of California blackberry, coffeeberry, deerweed, coast live oak and sticky monkey flower. These native floras will supplement a newly excavated, manmade pool called Prospect Pond, a managed freshwater wetland providing critical breeding habitat for the federally-endangered Santa Cruz long-toed salamander.

Renaissance is an alternative high school that provides small class sizes and specialized educational and counseling resources that allows at-risk students to graduate meeting California State Standards. Students have been assisting refuge staff with habitat management efforts for about 10 years, and the unique partnership is benefitting people and wildlife alike.

"This is an exciting project," said Refuge Environmental Education Specialist Tia Glagolev. "We have the opportunity to track the changes of our restoration efforts from the very beginning. It's a fantastic learning and management tool." Renaissance students are the first volunteers to assist with enhancing this newest aquatic habitat.

Renaissance science educator Shoshana Coplan, who coordinates with Glagolev to make these restoration education efforts so fruitful, enthusiastically agrees. "I have



Students from Renaissance High School plant native vegetation and learn about USFWS habitat restoration strategies.

Photo Credit: USFWS

been able to incorporate the native plant restoration and projects into my science curriculum," Coplan said. "The students have benefitted by experiencing an on-going, real life scientific endeavor."

Coplan's pupils also develop a deeper understanding about local biota, protected species and environmental threats in their own suburban neighborhoods, such as chemical pollutants and non-native invasive plants. Such dangers are especially detrimental to the refuge's delicate amphibian species.

In addition to safeguarding the imperiled Santa Cruz long-toed salamander, Ellicott Slough NWR is also home to federally-threatened California red-legged frogs and California tiger salamanders, making the students' hard work all the more meaningful.

Refuge Biologist Christopher Caris explains, "By far, the most rewarding part of the project is seeing amphibian eggs deposited. Ellicott Pond (located near the new Prospect Pond site) did not get enough

water to support breeding this year, so all breeding on the Ellicott Unit of the refuge will occur due to the addition of Prospect Pond." Revegetating the surrounding wetland area with native flora is thus vital, because it provides an optimal habitat for the breeding and survival of rare amphibians.

Energizing and empowering youth through hands on habitat restoration efforts is a critical component in allowing the Service to accomplish its conservation mission. "When we engage our citizens and explain the how and why of species conservation," Caris notes, "we secure a place in the future for wildlife and their habitats."

Future projects on the Ellicott Slough NWR, planned in cooperation with Renaissance High School students, include tracking native vegetation growth, checking cover boards to inventory additional reptile and amphibian species, and collecting new data on the number and variety of bird species present. Coplan then takes this environmental knowledge from the field and back into her classroom. "In our classes we talk about how ecosystems are all connected and how when one ecosystem is healthy and balanced all other ecosystems benefit. Ellicott is not a separate entity."

Established in 1975, Ellicott Slough NWR today encompasses over 200 acres of land and water. It is one of seven refuges included in the San Francisco Bay National Wildlife Refuge Complex.

"This is what it's all about," Glagolev says, "Getting people involved...volunteers assist us on every level. Their efforts are critical to our success."

Summer Activity Schedule

June

Saturday, June 1

Nature Walk for Health

Visitor Center, Fremont

10:00 a.m. - 11:00 a.m.

Take a break from your busy schedule and refresh your spirit with nature at the refuge. Take a guided nature walk on the Tidelands Trail and hear what makes this National Wildlife Refuge unique. The 1.3 mile walk traverses through endangered species habitat and offers great views of south San Francisco Bay. Meet in front of the Visitor Center.



Drawbridge Van Excursion

Environmental Education Center, Alviso

2:00 p.m. – 4:30 p.m.

There's a ghost town in the San Francisco Bay? That's right! Nestled on an island in the salt marshes of South San Francisco Bay, the town of Drawbridge once boomed. Was it a quiet, peaceful town full of nature lovers, or a rip-roaring town full of two-fisted rowdies? We'll start with a slideshow and then take a short van excursion to view Drawbridge across Coyote Creek. Program is intended for adults and space is very limited. RESERVATIONS ARE ESSENTIAL. Call Debra at 408-262-5513 ext. 102. (Note: we do not visit the town itself – we go to the closest spot that one can legally view Drawbridge.) Led by Ceal Craig.

Night Sky Party!

Environmental Education Center, Alviso

8:30 p.m. – 10:00 p.m.

Join our amateur astronomers as we learn about constellations. Make a star chart and then venture outside to view the night sky through a telescope. Bring your own binoculars or spotting scopes if you have them. Dress warmly. Program will be canceled only if it is pouring rain. RESERVATIONS REQUIRED. Call Debra at 408-262-5513 ext. 102.

Saturday, June 8

Connections to Pier Fishing

Dumbarton Fishing Pier, Fremont

9:00 a.m. – 12:00 p.m.

Have you ever wanted to try fishing but didn't know how to begin? Learn the fundamental basics of catch-and-release fishing at the Dumbarton fishing pier! Discover the types of wildlife living in the San Francisco Bay, learn the safety and ethics of fishing, and then try your luck out on the pier with our fishing poles. All participants receive free box with tackle. No fishing license needed. Space is limited. You must arrive at 9 a.m. to participate. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363.

Sunday, June 9

Story Hunters

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this series by Art Garibaldi. After a brief introduction on how to use our GPS units, we'll give you a set of coordinates that will lead you to the landmarks that embody the rich human history that helped shaped refuge lands. GPS units are available for loan. Call 510-792-0222 ext. 363 for reservations.

Saturday, June 15

*Monster Bacteria & Other

Suspicious Critters

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Let's explore the salt marsh's hidden habitats! See monster bacteria, of which some love rotten eggs, and some make the air we breathe. Join Microbial Ecologist Dr. Wayne Lanier for a short hike where we will use field microscopes to dive down into a tiny world – an ecology hidden from view. Ages 8 to 80 and beyond! Call Debra at 262-5513 ext. 102 for reservations.

Beginning Bird Drawing for Families and Adults

Environmental Education Center, Alviso

11:00 a.m. – 12:30 p.m.

Learn how to draw birds! Increase your confidence in drawing and learn skills to help you draw what you see. We will practice techniques for making life-like bird drawings and for getting the proportions right. Appropriate for ages 8 to adult. Children, bring an adult with you who would like to participate. Adults without children are also welcome. Bring a sketch pad and pencil or use ours. All skill levels welcome. Call Debra at 408-262-5513 ext. 102 for reservations.



Intermediate Bird Drawing

Environmental Education Center, Alviso

1:30 p.m. – 3:00 p.m.

Learn techniques to help your bird drawings come to life! The earlier class emphasized quick sketches and basic shapes while this class will emphasize the 3-dimensional form. Appropriate for ages 8 to adult. Children, please bring an adult with you who would like to participate. Adults without children are also welcome. Bring a sketch pad and pencil or use ours. All skill levels welcome. Call Debra at 408-262-5513 ext. 102 for reservations.



The Remarkable Gray Fox

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

What is the typical annual lifecycle of a gray fox? What makes them different from all other foxes? Gray foxes are highly successful survivors. We will observe their habitat during our walk and learn the answers to these questions and more. Good walking shoes recommended. Led by The Fox Guy – Bill Leikam.

Sunday, June 16

*Life at the Bottom of the Food Chain

Visitor Center, Fremont

10:00 a.m. – 12:00 p.m.

Wetlands microbes are often called "the lungs of the earth." Explore the dynamics of microbial communities in LaRiviere Marsh ponds. Join microbiologist Wayne Lanier, PhD for a brief presentation; then a microscope hike and view the most ancient creatures on earth. See how they produce the oxygen we breathe and take up the carbon dioxide we produce. We will also have a research report from three Student Scientists who have measured varying pond salinity since September. Easy short hiking level. Ages 9-90 years. Call 510-792-0222 ext. 363 for reservations.

Geology Walk of the Coyote Hills

Visitor Center, Fremont

2:00 p.m. - 3:00 p.m.

Ever wonder what the dirt on the trail is made of, what the rocks are by the shore, and how wetlands are created? Join Park Ranger Jose Garcia as he deconstructs the area around you and explains how geology influences the landscape. Discover how knowledge of geology helps rebuild wildlife habitat and provides flood protection for us all. Trail is 1.3 miles and family friendly. Call 510-792-0222 ext. 141 for more information.

Bicycle Tours of the Refuge

Meet at the Alviso Marina, Alviso

10:00 a.m.

Take a docent-led bicycle ride on the levee trails at the Don Edwards Refuge and see what's going on with the South Bay Salt Pond Restoration Project. The tour is an easy paced 9-mile ride with a few stops. The levees are unpaved but level. Helmet required. Water and a snack recommended. Rain cancels. Call 510-792-0222 ext. 141 if you are interested.

Saturday, June 22

Habitat Under Construction Bike Ride

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

The South Bay Salt Pond Restoration Project is engaged in an effort to convert former salt ponds into lands for wildlife habitat, wildlife-oriented recreation, and natural flood protection. Join Park Ranger Jose Garcia in this bike ride and learn about the structure of several different habitats which make up the bay front. Helmets required. Water and other safety gear recommended. PowerPoint will be substituted in case of inclement weather. Call 510-792-0222 ext. 141 for more information.

Twilight Marsh Walk

Visitor Center, Fremont

7:30 p.m. – 9:00 p.m.

Experience the salt marsh at twilight on an easy stroll along Tidelands (1.3 mile) Trail. At the setting of the sun we will observe the beginning of nature's night shift. Come discover the sights, sounds, and smells of the refuge as night descends. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222 ext 363. Led by Mary and Gene Bobik.

Sunday, June 23

Nature Drawing for Teens and Adults

Visitor Center, Fremont

10:30 a.m. – 12:30 p.m.

Learn the basics of sketching nature. We will learn how to draw with negative shapes and shadows, and how to use color and light to add dimension. We will discuss how the changing horizon lines can offer depth. Paper and pencils will be provided.



Children under the age of 16 must be accompanied by an adult.

*Trails are generally level. Surface and trail conditions vary. Please call for accessibility information.

Dress for the weather. Program begins in the pavilion. Program is for ages 13 and up. Call for reservations at 510-792-0222 ext. 363. Led by Travis Turner.

*Mysterious Mr. Fox!

Environmental Education Center, Alviso

11:00 a.m. – 12:00 p.m.

Have you ever wondered what makes the mysterious little fox so popular? Or questioned what makes many different cultures so interested in them? Come join us on a journey of discovery into the world of foxes! RESERVATIONS RECOMMENDED – All ages are welcome. Call Julie at 408-262-5513 ext. 104.

Nature Photography Scavenger Hunt

Visitor Center, Fremont

3:00 p.m. – 4:30 p.m.

Test your observation skills to see if you can find all the natural objects described on our scavenger hunt list. Document your findings by taking a picture with your digital camera, or borrow one of ours. Enter your find in the Get to Know contest by November and you may win fabulous prizes. Go to <http://www.get-to-know.org> for contest rules. Program is intended for youth under 19 years old. Call 510-792-0222 ext. 363 for reservations. Led by Roy Sasai.



Saturday, June 29

Moffett Bay Trail – 6.7 miles roundtrip Sunnyvale. Directions Below

8:30 a.m.

Meet new people while getting fit and healthy! This trail is a compacted dirt levee that is flat and level. The walk is self-paced and you may turn back at any time. No reservations are needed. Hats, water, and sunscreen are strongly recommended. Ken Roux will be there to greet you. Driving Directions: From Hwy 101 or 880, exit onto Highway 237 towards Alviso. From 237, take the Caribbean Dr. exit and head north onto Caribbean Dr. (not Lawrence Expy). Turn right on Borregas Ave. At the stop sign in front of the sewage treatment plant, take a left onto Carl Rd and park in the far parking lot.

*Family Bird Walk

2:30 p.m. – 4:30 p.m.

Visitor Center, Fremont

Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal bird watching field guides, and then head out onto the trails to find those birds. A limited number of binoculars are available to borrow. Recommended for children ages 5-10. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363.

Sunday, June 30

*Salt Marsh Walk

Visitor Center, Fremont

10:00 a.m. – 11:30 a.m.

Take a walk with docent Gregg Aronson around the wetlands of the wildlife refuge and learn about its history. See examples of salt collection ponds and learn what is being done to convert them back to their original, natural salt marsh state. Hear how wildlife is affected by the two types of habitat. Call 510-792-0222 ext. 363 for reservations.

Nature Yoga

Visitor Center, Fremont

9:30 a.m. – 11:00 a.m.

Enjoy the benefits of Yoga outdoors with great views of the salt marsh. Through story and postures, learn what attracted people and wildlife to the Bay. There will be a short hike to the site from the Visitor Center.

Bring a yoga mat. A limited number of mats are available for borrow. Wear comfortable clothing. Consult with your doctor before participating. All ages and abilities welcome. Reservations are required. Call 510-792-0222 ext. 363. Led by Carmen Minch.

JULY

Saturday, July 6

Drawbridge Van Excursion

Environmental Education Center, Alviso

9:30 a.m. – 12:00 p.m.

There's a ghost town in the San Francisco Bay? That's right! Nestled on an island in the salt marshes of South San Francisco Bay, the town of Drawbridge once boomed. Was it a quiet, peaceful town full of nature lovers, or a rip-roaring town full of two-fisted rowdies? We'll start with a slideshow and then take a short van excursion to view Drawbridge across Coyote Creek. Program is intended for adults and space is very limited. RESERVATIONS ARE ESSENTIAL. Call Debra at 408-262-5513 ext. 102. (Note: we do not visit the town itself – we go to the closest spot that one can legally view Drawbridge.) Led by Ceal Craig.

Nature Walk for Health

Visitor Center, Fremont

9:00 a.m. – 10:00 a.m.

Take a break from your busy schedule and refresh your spirit with nature at the refuge. Take a guided nature walk on the Tidelands Trail and hear what makes this National Wildlife Refuge unique. The 1 1/3 mile walk traverses through endangered species habitat and offers great views of south San Francisco Bay. Meet in front of the Visitor Center.

Twilight Marsh Walk

Visitor Center, Fremont

7:30 p.m. – 9:00 p.m.

Experience the salt marsh at twilight on an easy stroll along Tidelands (1 1/3 mile) Trail. At the setting of the sun we will observe the beginning of nature's night shift. Come discover the sights, sounds, and smells of the refuge as night descends. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222 ext 363. Led by Mary and Gene Bobik.



Saturday, July 13

Habitat Under Construction

Bike Ride

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

The South Bay Salt Pond Restoration Project is engaged in an effort to convert former salt ponds into lands for wildlife habitat, wildlife-oriented recreation, and natural flood protection. Join Park Ranger Jose Garcia in this bike ride and learn about the structure of several different habitats which make up the bay front. Helmets required. Water and other safety gear recommended. PowerPoint will be substituted in case of inclement weather. Call 510-792-0222 ext. 141 for more information.

A Trip Back in Time

Visitor Center, Fremont

10:30 a.m. – 12:00 p.m.

Revive the vanishing knowledge of the history of the Don Edwards Refuge grounds by strolling the trails with docent Ray Studer. Using a collection of old photographs, the last vestiges of a way of life such as

Summer Activity Schedule

salt production, the old railroads, and homes can be traced back to the 1850s that led to the construction of the town of Newark in 1876.

Sunday, July 14

Nature Drawing for Kids

Visitor Center, Fremont

10:30 a.m. – 12:30 p.m.

Does your child have an interest in the arts? Introduce your child to outdoor sketching in this workshop by Travis Turner and increase their observations skills. We will learn how to draw what we see by incorporating common shapes, and learn about color value. Paper and pencils will be provided. This program takes place outside. Kids age 7-12 only! Call for reservations at 510-792-0222 ext. 363.



Bugs of the Bay

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

Come and learn about the many different insects that call the San Francisco Bay home. Insects are an integral part of the wetland ecosystem, and play many different roles in the health of our wetlands. RESERVATIONS RECOMMENDED – All ages are welcome. Call Julie at 408-262-5513 ext. 104.

Saturday, July 20

Water, Water, Everywhere

Environmental Education Center, Alviso

10:30 a.m. – 12:00 p.m.

How much water is there and where does it come from? Where does it go? How much of the Earth's water supply can we use? Learn about the water cycle and watersheds. Build a model of a watershed and see if you can predict where the water will go. Open to all ages but best suited to third grade and up. Led by Ed Kantack. Please call Debra at 408-262-5513 ext. 102 for reservations.

*Family Bird Walk

2:30 p.m. – 4:30 p.m.

Visitor Center, Fremont

Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal bird watching field guides, and then head out onto the trails to find those birds. A limited number of binoculars are available to borrow. Recommended for children ages 5-10. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363.

Sunday, July 21

Bicycle Tours of the Refuge

Meet at the Alviso Marina, Alviso

10:00 a.m.

Take a docent-led bicycle ride on the levee trails at the Don Edwards Refuge and see what's going on with the

Children under the age of 16 must be accompanied by an adult.

*Trails are generally level. Surface and trail conditions vary. Please call for accessibility information.

Summer Activity Schedule

South Bay Salt Pond Restoration Project. The tour is an easy paced 9-mile ride with a few stops. The levees are unpaved but level. Helmet required. Water and a snack recommended. Rain cancels. Call 510-792-0222 ext. 141 if you are interested.

*Salt Marsh Walk

Visitor Center, Fremont

10:00 a.m. – 11:30 a.m.

Take a walk with docent Gregg Aronson around the wetlands of the wildlife refuge and learn about its history. See examples of salt collection ponds and learn what is being done to convert them back to their original, natural salt marsh state. Hear how wildlife is affected by the two types of habitat. Call 510-792-0222 ext. 363 for reservations.

Story Hunters

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this series by Art Garibaldi. New coordinates will lead you to two new landmarks that embody the rich human history that helped shaped refuge lands. We'll begin with a brief introduction on how to use our GPS units. GPS units are available for loan. Call 510-792-0222 ext. 363 for reservations.



Friday, July 26

*Nocturnal Wonders

Environmental Education Center, Alviso

8:30 p.m. – 10:00 p.m.

Experience the refuge after the sun has set as we learn about nocturnal wildlife. We'll learn what makes these nighttime creatures unique. We'll test our own abilities to survive in the dark. We will mostly be outdoors, so come prepared for cool weather. Program led by Intern Jennifer Fraga. Call Debra at 408-262-5513 ext. 102 for reservations.

Saturday, July 27

Redwood Shores Trail – 5 miles

Meet in front of Marriot Towne Place Suites.

Directions Below.

9:00 a.m.

Meet new people while getting fit and healthy! This trail in Redwood Shores is flat and level. The walk is self-paced and you may turn back at anytime. No reservations are needed. Hats, water, and sunscreen are strongly recommended. Jennifer Fraga will be there to greet you at 9 a.m. Directions: From northbound 101, take the Holly St/Redwood Shores Parkway exit. From southbound 101, take the Holly St/Brittann Ave exit. Head east towards Redwood Shores Parkway. Turn right on Twin Dolphin Dr. and meet at 1000 Twin Dolphin Dr, Redwood City. Meet in parking lot in front of Marriot Towne Place Suites.

Outdoor Drawing for Families and Adults

Environmental Education Center, Alviso

10:00 a.m. – 11:30 a.m.

Spend a pleasant morning drawing in our native plant garden. We will focus on drawing plants, but possibly animals as well. Increase your confidence in drawing and learn skills to help you draw what you see. We will provide materials, but you are welcome to bring your own. Appropriate for ages 8 to adult. Children, please bring an adult with you who would like to participate. Adults without children are also welcome. All skill levels welcome. Led by Kathy Kleinstreiber. Call Debra at 408-262-5513 ext. 102 for reservations.



Sunday, July 28

Nature Yoga

Visitor Center, Fremont

9:30 a.m. - 11:00 a.m.

Enjoy the benefits of Yoga outdoors with great views of the salt marsh. Through story and postures, learn what attracted people and wildlife to the Bay. There will be a short hike to the site from the Visitor Center. Bring a yoga mat. A limited number of mats are available to borrow. Wear comfortable clothing. Consult with your doctor before participating. All ages and abilities welcome. Reservations are required. Call 510-792-0222 ext. 363. Led by Carmen Minch.

*Chompers and Stompers

Environmental Education Center, Alviso

11:00 a.m. – 12:30 p.m.

Ever wondered why birds come in so many shapes, sizes, and colors? Come find out why some birds exhibit wacky behaviors. We will examine different bird specimens we have collected over the years to see how birds have adapted some extraordinary features. Then take a guided walk around the refuge to see these marvelous creatures. All ages are welcome. Call Julie at 408-262-5513 ext. 104.

Nature Photography Scavenger Hunt

Visitor Center, Fremont

3:00 p.m. - 4:30 p.m.

Test your observation skills to see if you can find all the natural objects described on our scavenger hunt list. Document your findings by taking a picture with your digital camera, or borrow one of ours. Enter your find in the Get to Know contest by November and you may win fabulous prizes. Go to <http://www.get-to-know.org> for contest rules. Program is intended for youth under 19 years old. Call 510-792-0222 ext. 363 for reservations. Led by Roy Sasai.



Bugs on the Bay

Environmental Education Center, Alviso

1:00 p.m. - 2:30 pm.

Come learn about the many different insects and other small creatures that call the San Francisco Bay Area their home. Insects are an integral part of the wetland ecosystem and play many roles. Led by Devin Leach. Appropriate for ages 7 and up. Call Debra at 408-262-5513 ext. 102 for reservations.

AUGUST

Saturday, August 3

Nature Walk for Health

Visitor Center, Fremont

9:00 a.m. - 10:00 a.m.

Take a break from your busy schedule and refresh your spirit with nature at the refuge. Take a guided nature walk on the Tidelands Trail and hear what makes this National Wildlife Refuge unique. The 1 1/3 mile walk traverses through endangered species habitat and offers great views of south San Francisco Bay. Meet in front of the Visitor Center.



Bay Bike Ride

Visitor Center, Fremont

10:00 a.m.

Go on an 11-mile bike ride with docent Gregg Aronson along Marshlands Road and on the Shoreline Trail to observe birds and the occasional leopard shark! The paved and dirt trails are almost flat and trail and hybrid bicycles highly recommended. Helmets are required. Recommended for more experienced bicyclists. Program cancels if it rains the day before and the day of due to mud. Call 510-792-0222 ext. 363 for reservations.

A Trip Back in Time

Visitor Center, Fremont

10:30 a.m. – 12:00 p.m.

Revive the vanishing knowledge of the history of the Don Edwards Wildlife Refuge grounds by strolling the trails with docent Ray Studer. Using a collection of old photographs, the last vestiges of a way of life such as salt production, the old railroads, and homes can be traced back to the 1850s that led to the construction of the town of Newark in 1876.

Twilight Marsh Walk

Visitor Center, Fremont

7:00 p.m. – 8:30 p.m.

Experience the salt marsh at twilight on an easy stroll along Tidelands (1 1/3 mile) Trail. At the setting of the sun we will observe the beginning of nature's night shift. Come discover the sights, sounds, and smells of the refuge as night descends. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222 ext 363. Led by Mary and Gene Bobik.

Saturday, August 10

Habitat Under Construction

Bayfront Park, Menlo Park

10:00 a.m. - 12:00 p.m.

The South Bay Salt Pond Restoration Project is coming to the end of Phase 1 restoration and beginning Phase 2. Take a nature trail walk with Park Ranger Jose Garcia and enjoy the abundant wildlife. Come see and be a part of the exciting transition. Location: Bayfront Expy and Marsh Rd Menlo Park, CA 94025. Call 510-792-0222 ext. 141 for more information.

Nature Drawing for Teens and Adults

Visitor Center, Fremont

10:30 a.m. – 12:30 p.m.

Learn the basics of sketching nature. We will learn how to draw with negative shapes and shadows, and how to use color and light to add dimension.



Children under the age of 16 must be accompanied by an adult.

*Trails are generally level. Surface and trail conditions vary. Please call for accessibility information.

We will discuss how the changing horizon lines can offer depth. Paper and pencils will be provided. Dress for the weather. Program begins in the pavilion. Program is for ages 13 and up. Call for reservations at 510-792-0222 ext. 363. Led by Travis Turner.

*Family Bird Walk

2:30 p.m. – 4:30 p.m.

Visitor Center, Fremont

Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal bird watching field guides, and then head out onto the trails to find those birds. A limited number of binoculars are available to borrow. Recommended for children ages 5-10. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363.

Sunday, August 11

*Cutting the Mustard

Visitor Center, Fremont

11:00 a.m. – 12:00 p.m.

The mustard plant was introduced from the Mediterranean region to California over 200 years ago. Hear the legend on how it arrived and spread throughout the state, eventually invading into our wild places and displacing native habitat. We'll collect seeds from the plant to reduce the seed bank and make a mustard condiment. Led by Carmen Minch. Call 510-792-0222 ext. 363 for reservations.

Mysteries of Wastewater Treatment

Environmental Education Center, Alviso

1:00 p.m. – 2:00 p.m.

The San Jose-Santa Clara Water Pollution Control Plant treats hundreds of millions of gallons of wastewater from millions of people every day using some of the most advanced treatment technologies available. Come and learn what it takes to make this interesting process happen through a slideshow and hands-on activity that treats "wastewater." A tour of the Water Pollution Control Plant is not included as a part of this program. Call Julie at 408-262-5513 ext. 104.

Saturday, August 17

Bike the Levees

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Join Ed Kantack for an easy 4-mile bike ride along the levees on the Mallard Slough Trail and along the spur trail that offers views of Drawbridge. Helmets are required and knobby tires are recommended. Open to all ages. Space is limited, so please call Debra at 408-262-5513 ext. 102 for reservations.

All About Owls

Environmental Education Center, Alviso

1:30 p.m. – 3:00 p.m.

Learn all that you've ever wanted to learn about owls here at the refuge! Where do owls eat? How do we not hear them when they flap their wings? Through an interactive presentation and owl pellet dissection, we'll find the answers to all these questions. Led by Paul Bridges. Call Debra at 408-262-5513 ext. 102 for reservations.

Introduction to GPS Workshop

Learning Center, Fremont

1:00 p.m. – 2:00 p.m.

See page 7 for details.

Amazing Refuge Race

Visitor Center, Fremont

2:15 p.m. – about 4:00 p.m.

See page 7 for details.

Sunday, August 18

Drawbridge Van Excursion

Environmental Education Center, Alviso

9:30 a.m. – 12:00 p.m.

There's a ghost town in the San Francisco Bay? That's right! Nestled on an island in the salt marshes of South San Francisco Bay, the town of Drawbridge once boomed. Was it a quiet, peaceful town full of nature lovers, or a rip-roaring town full of two-fisted rowdies? We'll start with a slideshow, and then take a short van excursion to view Drawbridge across Coyote Creek. Program is intended for adults and space is very limited. RESERVATIONS ARE ESSENTIAL. Call Debra at 408-262-5513 ext. 102. (Note: we do not visit the town itself – we go to the closest spot that one can legally view Drawbridge.) Led by Ceal Craig.

Bicycle Tours of the Refuge

Meet at the Alviso Marina, Alviso

10:00 a.m.

Get a new perspective on the valley. Take a docent-led bicycle ride on the levee trails at the Don Edwards Refuge and see what's going on with the South Bay Salt Pond Restoration Project. The tour is an easy paced 9-mile ride with a few stops. The levees are unpaved but level. Helmet required. Water and a snack recommended. Rain cancels. Call 510-792-0222 ext. 141 if you are interested.

Story Hunters

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this series by Art Garibaldi. New coordinates will lead you to two new landmarks that embody the rich human history that helped shaped refuge lands. We'll begin with a brief introduction on how to use our GPS units. GPS units are available for loan. Call 510-792-0222 ext. 363 for reservations.

Nature Photography

Scavenger Hunt

Visitor Center, Fremont

3:00 p.m. - 4:30 p.m.

Test your observation skills to see if you can find all the natural objects described on our scavenger hunt list. Document your findings by taking a picture with your digital camera, or borrow one of ours. Enter your find in the Get to Know Contest by November and you may win fabulous prizes. Go to <http://www.get-to-know.org> for contest rules. Program is intended for youth under 19 years old. Call 510-792-0222 ext. 363 for reservations. Led by Roy Sasai.



Saturday, August 24

Mallard Slough Trail – 4.3 mile-loop

Environmental Education Center, Alviso

9:00 a.m.

Meet new people while getting fit and healthy! This trail is compacted dirt, flat and level. The walk is self-paced and you may turn back at any time. No reservations are needed. Hats, water, and sunscreen are strongly recommended. Ken Roux will be there to greet you at 9:00 a.m.

Summer Activity Schedule

Habitat Under Construction Bike Ride

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

The South Bay Salt Pond Restoration Project is engaged in an effort to convert former salt ponds into lands for wildlife habitat, wildlife-oriented recreation, and natural flood protection. Join Park Ranger Jose Garcia in this bike ride and learn about the structure of several different habitats which make up the bay front. Helmets required. Water and other safety gear recommended. PowerPoint will be substituted in case of inclement weather. Call 510-792-0222 ext. 141 for more information.

The Remarkable Gray Fox

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

What is a typical annual lifecycle of a gray fox? What makes them different from all other foxes? Gray foxes are highly successful survivors. We will observe their habitat during our walk and learn the answers to these questions and more. Good walking shoes recommended. Led by The Fox Guy – Bill Leikam.

Sunday, August 25

Nature Yoga

Visitor Center, Fremont

9:30 a.m. – 11:00 a.m.

Enjoy the benefits of Yoga outdoors with great views of the salt marsh. Through story and postures, learn what attracted people and wildlife to the Bay. There will be a short hike to the site from the Visitor Center. Bring a yoga mat. A limited number of mats are available to borrow. Wear comfortable clothing. Consult with your doctor before participating. All ages and abilities welcome. Reservations are required. Call 510-792-0222 ext. 363. Led by Carmen Minch.

Wetlands Water Cafe

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Wetlands can be filled with all sorts of nutrients and organisms that build a diverse web of life. Participants will use our lab to observe wetland critters up close and learn about the important role they play in the ecosystem. RESERVATIONS RECOMMENDED. All ages are welcome. Call Julie at 408-262-5513 ext. 104.

*Poetry Walk

Visitor Center, Fremont

2:00 p.m. – 3:00 p.m.

Go on a short walk and discover poetry riddles along the way. Then we'll delve into our creativity to create our own poetry to describe an animal, natural feature, or the landscape. Enter your creation by November and you may win fabulous prizes. Go to <http://www.get-to-know.org> for contest rules. Program is intended for youth under 19 years old. Led by Carmen Minch.



Children under the age of 16 must be accompanied by an adult.

*Trails are generally level. Surface and trail conditions vary. Please call for accessibility information.

Field Trips to the Refuge

General Education Program Information

We offer FREE field trip programs at two sites at the Don Edwards San Francisco Bay National Wildlife Refuge. Wetland Round-Up field trip programs are offered at our Headquarters in Fremont, and Wetland Round-Up and Living Wetlands are offered at the Environmental Education Center in Alviso. These programs actively involve teachers, adult volunteers, and students in investigating the diverse habitats and wildlife at the refuge. The hands-on, small-group activities are designed to teach basic ecological concepts and to introduce endangered species, migratory birds, and wetland habitats to the students. *All programs have been correlated to the appropriate State of California Education Standards.*

Educators and adult leaders conduct their own field trips after attending a Field Trip Training or Workshop. The Trainings and Workshops allow you to design and conduct your own field trip. In addition, adult volunteers must be recruited to lead the activities at the different learning stations and to chaperone the rotation groups of students. We provide easy to follow “scripts” for each station, but both “leaders” and “chaperones” are strongly encouraged to attend a Field Trip Workshop. New teachers must attend the New Teacher Training. It is our policy that lead educators must attend a workshop every third year. Location of activities and trail conditions may vary. Please call for accessibility information.

Field Trips at the Learning Center in Fremont

Explore the habitats of the refuge! Investigate the creatures of the mudflats, collect plankton from the slough, and taste the pickleweed from the marsh. This field trip is designed for grades K-6, for up to 65 students.

Information about Fall Field Trips will be announced on our website in August. Visit http://www.fws.gov/refuge/Don_Edwards_San_Francisco_Bay/Environmental_Education.html

Contact the Environmental Education Staff at Fremont:

Office: (510) 792-0222 x 475 Cell: (510) 377-7269

E-mail: ee.hq.intern@gmail.com

Field Trips at the Environmental Education Center in Alviso

Wetland Round-Up Field Trips - Investigate the butterflies in the butterfly garden, taste pickleweed in the salt marsh, or discover the creatures that live in the slough water on a Wetland Round-Up Field Trip. This field trip program is designed for up to 65 students in grades K-6.

Information about Fall Field Trips will be announced on our website in August. Visit http://www.fws.gov/refuge/Don_Edwards_San_Francisco_Bay/Environmental_Education.html

Contact the Environmental Education Staff at Alviso:

Office: 408-262-5513

Email: eec.refuge@hotmail.com

Living Wetlands Education Program

The Living Wetlands Program provides a first-hand learning environment for students and educators to explore the topics of watershed health, wetlands, and habitat preservation. Activities and presentations focus on the relationship between personal habits and their effects on local wetlands. Living Wetlands is an environmental education program offered at no cost through the cooperative efforts of the City of San Jose, U.S. Fish and Wildlife Service, and the San Francisco Bay Wildlife Society.

Living Wetlands Program Offerings:

Integrated Field Trip Program (5th – 12th grades): This program incorporates multiple activities related to wetlands and watershed health. Participating classes will receive one pre-classroom presentation from Living Wetlands educators, a field trip to the Don Edwards Refuge, and one post-classroom presentation. All include hands-on activities and demonstrations. For the Integrated Program, participating classes must be from the following cities: San Jose, Alviso, Milpitas, Santa Clara, Saratoga, Monte Sereno, Los Gatos, Campbell, and Cupertino. There is a limitation to 60 students per field trip, and a 1:10 chaperone to student ratio is required.

Classroom Presentations (5th – 12th grades): Presentations include an in-depth look at the habitats of the south bay along with the pathways of indoor and outdoor water use. Students will have a better understanding of the role they play in the health of their watershed and what personal actions they can take to help. The presentation takes approximately one hour. Please contact us for specific classroom presentation needs.

Field Trip and Guided Tours for other Schools, Colleges, Universities, and related organizations: General presentations and guided tours are available and are generally 1.5 hours in length.

Educators are encouraged to contact us to discuss options

for customizing field trips and classroom presentations. Reservations for the Living Wetlands program are on a first-come basis. For more information, or to make a reservation, call Julie Kahrnoff, the Living Wetlands Program Coordinator at 408-262-5513 ext. 104 or email at livingwetlands@sfbws.com.



Scout and Youth Group Programs

The Don Edwards San Francisco Bay National Wildlife Refuge offers free hands-on, programs for youths. During the programs participants learn about endangered species, migratory birds, wetland habitats, and the relationship between personal habits and their effects on the San Francisco Bay. These programs are designed to meet badge/patch requirements of Scout Groups, but anyone can participate. Because of the popularity of such programs, reservations are required. **Badges are not provided.**

Below are the names, dates, and descriptions of the programs. Programs at the Environmental Education Center are sponsored by the Santa Clara Valley Urban Runoff Pollution Prevention Program and the San Francisco Bay Wildlife Society.



Photo Jolynn Lacasse

Youth Group Programs at the Environmental Education Center in Alviso

Note: Ratio of 1 adult per 5 children maximum. Space is limited to 20 people, including siblings. Once the program is full there will be a waiting list. Call Debra at 408-262-5513 ext. 102 for reservations.

Saturday, July 20

Webelos Naturalist Badge
Environmental Education Center, Alviso
2:00 p.m. – 4:00 p.m.

Anyone out there need to earn a Naturalist badge? We've got the program that's right for Webelos! Learn about birds, migration, flyways, food chains, human impact, and the importance of wetlands. Then take a walk and use our binoculars to spot birds in the wild.

Saturday, August 3

*** Junior Girl Scout Wildlife Badge**
Environmental Education Center, Alviso
10:00 a.m. – 12:00 p.m.

Calling all Junior Girl Scouts of Santa Clara County! Anyone out there need to earn a Wildlife badge? We've got the program just for you! Come to the wildlife refuge and learn about features of different creatures, observe animal behavior, see how you can help wildlife, and so much more. Take a walk to explore the habitats at the south end of the bay.

***Brownie Eco-Explorer Try-It Patch**
Environmental Education Center, Alviso
2:00 p.m. – 4:00 p.m.

Come and learn about habitats, food chains, and how you can help wildlife. Then take a walk to explore the habitats at the South Bay. We'll have a special craft to round out the day. Space is limited to 20 people and program fills quickly.

Youth Group Programs at the Refuge Headquarters in Fremont

The Refuge Headquarters offer Webelos programs for up to 15 Webelos. Call 510-792-0222 ext. 363 for reservations. All programs are led by June Smith.

Saturday, June 22 Saturday, July 13

Webelos Naturalist Program
10:00 a.m. – 12:30 p.m.

Attention Webelos! Earn your naturalist badge in just 2.5 hours. During this hike, learn about birds, flyways, food chains, and the importance of wetlands. Bring your binoculars, or borrow one of ours.

TIDELINE

Published quarterly by San Francisco Bay National Wildlife Refuge Complex, with funding from San Francisco Bay Wildlife Society.

Volume 36, Number 2

Editor: Carmen Minch

To receive *Tideline*, email carmen_leong-minch@fws.gov, or write to: *Tideline*, San Francisco Bay National Wildlife Refuge Complex, 1 Marshlands Rd, Fremont, CA 94555

San Francisco Bay National Wildlife Refuge Complex

Administered by the U.S. Fish and Wildlife Service, San Francisco Bay National Wildlife Refuge Complex exists to preserve wildlife habitat, protect threatened and endangered species, protect migratory birds, and provide opportunities for nature study. Seven refuges are managed from the headquarters in Fremont: Antioch Dunes NWR, Don Edwards San Francisco Bay NWR, Ellicott Slough NWR, Farallon NWR, Marin Islands NWR, Salinas River NWR, and San Pablo Bay NWR.

Project Leader: Anne Morkill
Wildlife Refuge Specialist: Val Urban
Don Edwards Refuge Manager: Eric Mruz
Don Edwards Wildlife Specialist: Melisa Helton
Don Edwards Warm Springs Unit Manager: Ivette Loreda

Farallon Refuge Manager: Gerry McChesney
Farallon Wildlife Specialist: Jonathon Shore
North Bay Refuges Manager: Don Brubaker
North Bay Wildlife Specialist: Louis Terrazas
South Bay Refuges Manager: Diane Kodama
Public Affairs Officer: Doug Cordell
Refuge Planner: Winnie Chan
Chief of Visitor Services: Jennifer Heroux
Park Ranger/Outdoor Recreation Planners: Joseph Garcia and Carmen Minch
Environmental Education Specialists: Tia Glagolev and Genie Moore
Volunteer Coordinator: Paul Mueller
Law Enforcement Officers: Jared Klein and Chris Wilson
Biologists: Joy Albertson, Christopher Caris, Susan Euing, Allison Fuller, Meg Marriott, Cheryl Strong, and Rachel Tertes
Administrative Staff: Lucinda Ballard, Patricia Compton, and Ellen Tong
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San Francisco Bay Wildlife Society

A nonprofit 501(c)(3) cooperating association established in 1987 to promote public awareness and appreciation of San Francisco Bay and fund education and outreach programs at San Francisco Bay National Wildlife Refuge Complex.

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Visit our web sites at

http://www.fws.gov/refuge/antioch_dunes

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SUMMER 2013
 Volume 36, Number 2

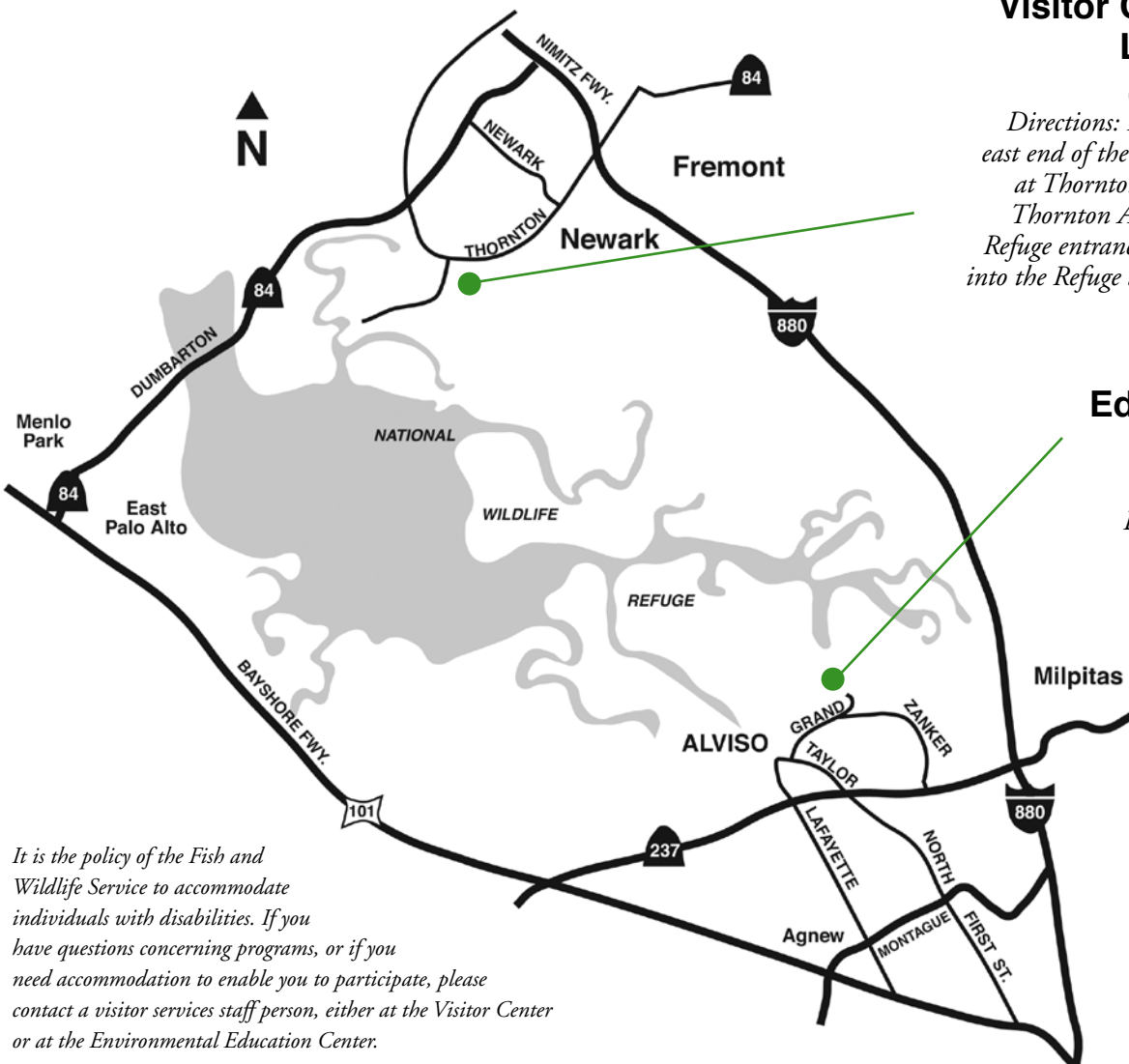
Tideline



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Don Edwards / Antioch Dunes / Ellicott Slough / Farallon Island / Marin Islands / Salinas River / San Pablo Bay



Visitor Center, Fremont Learning Center

(510) 792-0222 ext. 363
 Directions: From Highway 84 (at the east end of the Dumbarton Bridge), exit at Thornton Avenue. Travel south on Thornton Avenue for 0.8 miles to the Refuge entrance on the right. Turn right into the Refuge and follow the signs to the Visitor Center.

Environmental Education Center, Alviso

(408) 262-5513
 Directions: From I-880 or Highway 101, exit on Highway 237 toward Mountain View/Alviso. Exit North 1st St. and head north. Turn right onto Nortech and then left onto Disk Dr. Turn right onto Grand Blvd.

It is the policy of the Fish and Wildlife Service to accommodate individuals with disabilities. If you have questions concerning programs, or if you need accommodation to enable you to participate, please contact a visitor services staff person, either at the Visitor Center or at the Environmental Education Center.