

SPRING 2010

Volume 31, Number 1

Tideline



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

Salt Marsh Life at the Bottom of the Food Chain

By Wayne Lanier

Look in any shallow salt marsh pond on a sunny day and you will see the foundation of life at the bottom of the food chain. A blue-green mat may cover the mud of the pond; or perhaps a yellow fuzzy mat may coat the stems of pickleweed growing in the water; or a thick green, yellow, red, or even multicolored mat may float on the surface of the pond.



Cyanobacterial Mat

Photo by Wayne Lanier

These colorful mats support a multitude of different microorganisms, collectively called “plankton.” Each microbial mat is characterized by one or more dominant species of bacteria or diatoms. Such mats are often mistakenly called “algae,” although algae is rarely the dominant species in a salt marsh mat.

Microbial mats constitute one of the most diverse and productive ecologies on earth.

Microbial mats are diverse because the number of species in a typical mat is enormous. Consider all the species of salt marsh

life that you can easily see: the birds; the animals; and, the marsh plants. At a stretch, this might number 100 species. The number of species of microbial life in the microbial mat of a salt marsh pond, as measured in DNA samples, exceeds 5,000 species.

Microbial mats are productive because they produce enormous quantities of oxygen and take up enormous quantities of carbon dioxide. Almost all the green and red bacteria are *photosynthetic* as are the diatoms and the algae. This means they use the energy from the sun to fix carbon dioxide into the chemicals of life, while releasing oxygen.

If the microbial mat is submerged, it is likely to be covered with very many tiny bubbles. These bubbles are almost pure oxygen, released during photosynthesis.

Surface tension keeps them attached to the mat until their size becomes great enough that their buoyancy detaches them and floats them to the surface. Counting the bubbles in a measured area and calculating their volume provides a minimum estimate of the amount of oxygen produced in a day. A 10-ft x 10-ft area of salt marsh microbial mat *minimally* produces *per day* as much oxygen as a large hardwood tree with a trunk more than one foot in diameter with a typical canopy more than 30 feet in diameter.

In addition to diversity and productivity, the biomass bound up in the microbial mat and in the microbes in the salt marsh mud exceeds that of all the other life in



Courtesy of Pelican Media

the salt marsh by 1,000-times. This makes sense, for salt marsh microbes are at the bottom of the food chain and *must support all the other life*.

Typically, the first step up the food chain is composed of the protozoa that live in and graze the microbial mat. Above them are the zooplankton, mostly the larvae of insects and marine organisms, such as mollusks.

When you see an Avocet sweeping the bottom of the pond or mud flat with its curved beak, it is sweeping up microorganisms from the mat, zooplankton, and the mollusks and worms that live in the mud. When you see a Clapper Rail pecking into the mud flat, it is feeding on mollusks that filter-feed on plankton that depend on the microbial mat. All of these steps in the food chain are vital for a healthy salt marsh, and it all begins *with the microbial life at the*

continued next page

bottom of the food chain.

Not only does the microbial mat support the food chain, it also purifies the salt marsh water by sequestering and removing the pollutants so that the other dwellers of the salt marsh can survive. The first stage in recovery of a damaged salt marsh is recovery of the microbial mat.

Microbial mats form in all salt marsh waters, from tidally-washed mud flats to deep salt ponds. The richest microbial mat communities form, however, in shallow ponds with tidal inlets above the *mean high tide*. Such shallow ponds are the most productive because the mat-forming microbial community is photosynthetic and less sunlight reaches the bottom of deep ponds. Ponds with tidal inlets at and above the mean high tide are most rich in species because such ponds are not washed by every tide, as is a mud flat, but are only tidally washed at irregular intervals of days or even weeks.

Every one of the many species in the microbial mat has a salinity at which it grows best. Below and above that salinity, growth diminishes, so the growth curve is shaped like a hill. Most algae grow fast in fresh or brackish water; most large bacteria and diatoms grow fast in water at or above the Bay salinity. Dinoflagellates grow at even higher salinities and Halobacteria only reach maximum growth at about 5-times the salinity of seawater.

Salinity is measured by the number of grams of salt in each liter of water. Since a liter of water weighs a thousand grams, this expressed as parts of salt *per thousand water* [PPT]. San Francisco Bay water averages a little below 35 PPT salinity.

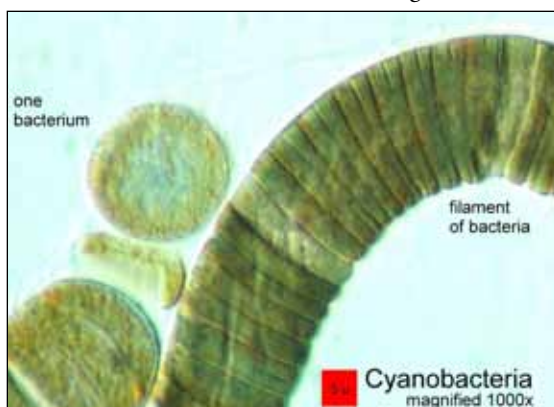
Every time a salt marsh pond is washed by the tide, its salinity is reset to the Bay salinity. If it is not washed again for several days, evaporation causes the salinity in the remaining water to rise. Depending upon its elevation above the mean tide, a salt marsh pond is tidally washed from once every day or so, to once or twice per month. This causes the salinity to vary between 30 to 35 PPT after washing, to as much as 50 PPT after weeks of evaporation. Salinity in evaporative salt ponds exceeds 200 PPT, where any Halobacteria or Dinoflagellates

may be swimming around salt crystals as the pond rapidly dries out.

As the ordinary salt marsh pond varies in salinity, each species in the microbial mat gets a time at the salinity of its optimum growth. These microbes have dormant states in which they can survive extremely unfavorable conditions. A salt marsh pond that varies widely in salinity will continue to support communities of very many species of microbe, each getting a brief time at optimum growth. This is why tidally-washed ponds are so rich in numbers of species. It is also one of the reasons why they are so productive in producing oxygen and taking up carbon dioxide.

The dynamics of salt marsh pond microbial communities are very complex and poorly understood. Not all microbes can form microbial mats. Among other requirements for mat formation is ability to either stick to a surface, or stick together while floating. Often microbial mat formers are filamentous.

Examples of filamentous mat formers are species of the Cyanobacterium *Oscillatoria*, which form dark green mats.



Filament of Cyanobacteria
Photomicrograph by Wayne Lanier

Another mat-former is the colonial diatom *Melosira*, which forms yellow or yellow-orange mats:



Colonial Diatom
Photomicrograph by Wayne Lanier

Many members of a mat community appear to engage in mutually beneficial relationships: One, perhaps, producing a growth pheromone required, while the other member provides shelter. These associations are very important in the microbial community, but are also poorly understood.

Although salt marsh microbial communities form the most important land ecosystems for producing oxygen and removing carbon dioxide from the atmosphere, they have been little studied until recently. In part this is because, traditionally, microbiologists have spent most of their efforts studying the 1-in-a-million microbial species that cause disease in humans. Only recently have microbiologists increasingly turned toward field microbiology.

Another reason for our limited knowledge is that microbes are much easier to study in the laboratory, but most ecologically important species do not grow well in the laboratory. Microorganisms are difficult to identify in field observations, requiring either culture or expensive DNA identification.

Finally, without the use of field microscopes, the novelty and beauty of these organisms are not easily recognized, and they are dismissed as “slime” or “smelly algae”.

All of life is beautiful and interesting, for it is part of the great web that has uniquely shaped this planet for more than three billion years. That is especially true in the salt marsh, for many species in the mat and almost all species down in the mud were not only around 3 billion years ago, but they built our present oxygen atmosphere. We cannot conserve the salt marsh and we cannot restore the salt marsh without its essential microbial communities.

Wayne Lanier, PhD in microbial genetics, spends his retirement studying microbial ecology in the San Francisco Bay salt marsh and in desert salt and alkaline lakes. He has been professor in university and medical school. He has also been Director of Research in several biotechnology companies; and a clinical studies consultant.

To see these microbial communities up close, go on a walk with Dr. Lanier on April 10 or April 11. See the activity section for details.

It is not all about the birds

As we develop plans for wetland restoration around the bay, we are occasionally reminded that a healthy San Francisco Bay ecosystem is much more than healthy bird populations. Fisheries are also important and should be considered when planning for habitat improvements to the San Francisco Bay. While we believe fisheries have been considered, this resource is often overshadowed due to the potential impact to some bird species that large scale marsh conversion could cause.

Wetland restoration in the San Francisco Bay Area involves restoring tidal flow to salt ponds that have been separated from the bay for decades, which has eliminated habitat for fish and other aquatic species. The reconnection of these areas to the tides, and the subsequent re-establishment of marsh that is expected to occur, will surely be beneficial to a host of aquatic species, from fish to benthic organisms. This reconnection with the bay will provide important nursery habitats for fish species such as steelhead trout, flounder and sturgeon. However, some bird species, such as Black-necked Stilts, American Avocets and Eared Grebes, among others, could be negatively affected if this conversion does

not leave enough of the open water habitats they prefer.

We also recognize that some methods of restoration can have negative impacts on fisheries, particularly the migratory species mentioned above. When the installation of

to modify our management procedures if impacts are found. We also monitor many water quality parameters such as dissolved oxygen, salinity, temperature and biological oxygen demand within managed ponds to ensure that we are doing our best not to



Refuge Reflections

by Mendel Stewart

pipes or other narrow openings is necessary to restore tides to former salt ponds, for example, fish entrapment may occur. Once fish swim into these ponds through the small openings, it is often difficult for them to find their way out. Entrapped migratory fish cannot complete their reproductive cycle, which, in turn, affects populations. To minimize this, we developed plans that require the structures be closed during fish migration periods.

In addition, we monitor our ponds regularly, sampling for fish. This allows us

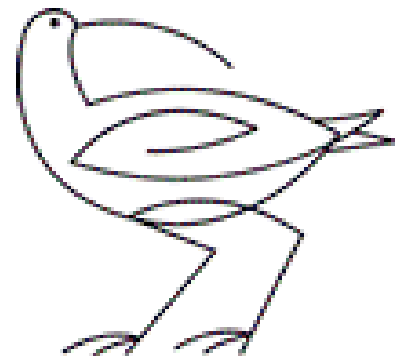
impact the bay from discharged water.

In cooperation with others agencies, we will conduct several research projects to determine the effectiveness of both the restoration efforts themselves and our management. One of those projects will look at the effects of restoration on fish species composition and health. To learn more about the fisheries work we are conducting as part of the South Bay Salt Pond Project and other science initiatives, visit www.southbayrestoration.org/science.

Don Edwards San Francisco Bay National Wildlife Refuge
Ravenswood Point, East Palo Alto

Earth Day Cleanup

Saturday, April 17, 2010 • 8:30 a.m. – 11:30 a.m.



**Help us protect wildlife and the environment while enjoying great Bay views!
Join us on our Annual Earth Day Cleanup at Ravenswood Point in East Palo Alto.**

We'll supply latex gloves and trash bags.

Wear sturdy shoes, a hat, and sunscreen. Prepare to work hard and get dirty!

RESERVATIONS REQUIRED! Call 408-262-5513 x106 to sign up.

Minors must be accompanied by an adult. Space is limited to 50 people.



Photo by Angela Tam

Berkeley Architecture Students Apply Creative Minds to Marshes

By Eric McKee

It is always encouraging to hear about the wide variety of projects, efforts, and challenges that are undertaken by the staff and volunteers around the San Francisco Bay National Wildlife Refuge Complex – from interns to managers, maintenance to biologists, and everyone in between. The Environmental Education Center (EEC) on the Don Edwards Refuge in Alviso is no exception. The EEC operates under the auspices of the Visitor Services team to create opportunities for the public to experience, understand, and connect with wildlife and other valuable Refuge resources. On any given day, the EEC is bustling with school groups, bird watchers, and other community members enjoying the marshlands of the southern San Francisco Bay. Recently, a group of aspiring architecture students from the University of California, Berkeley, expressed their interest in salt marshes in a very different way.

The students participated in the *Slow the Flow* program, an environmental education program made possible by an ongoing partnership between the City of San Jose, the San Francisco Bay Wildlife Society, and the U.S. Fish and Wildlife Service (USFWS). The *Slow the Flow* program

offers field trips and classroom presentations that raise awareness to the effects of home water usage on the salinity of south bay marshlands.

The class, Architecture 101 – Case Studies in Architecture, is a part of the College of Environmental Design at Berkeley, and is proctored by Professor Ronald Rael. One of the goals of the class was to create pre-fabricated salt marsh observation structures to be ‘installed’ at various locations around the Refuge.

The intent of the project was to provide real-life applications for the students to practice principles in architectural design, and their designs will not be implemented on Refuge land.

In order to get a better feel for the ecosystem, Professor Rael set up a field trip to the EEC where students received a presentation and tour by the *Slow the Flow* Program Coordinator Eric McKee. The class was introduced to the history of south bay wetlands, which led to thoughtful discussion of current management issues and the uses and values of local natural resources. The students made careful observations, took photos, and asked questions to gather information pertinent to the sites and design of their structures.

The observation structures were all based on the revolutionary studies of biologist Ernst Haeckel, who was noted for his studies of microscopic marine organisms called *radiolarians* and coined the terms “phylum” and “ecology.” Each student incorporated the organic features of radiolarians into their designs while also attempting to maintain valuable recreation uses and habitat elements. Each design included computer-generated images and scale models that were constructed in the University’s studio by each individual.

Upon completion of the assignment, the students donated their work for use in a temporary exhibit on display at the EEC. The exhibit titled “Salt Marsh Observation Creations” was on display for two weeks in December 2009. This exciting partnership is just a snapshot of the education, interpretation, and outreach efforts that take place year-round at the EEC and the Refuge. Special thanks to Ronald Rael, Justin Syren, Angela Tam, Brian Flaherty, Casey Amberger, Mondrian Hseh, Lily Zhang, Maya Taketani, Alexandria Lee, Janice Leong, Jenya Andreev, Felix Chow, Maricela Chan, and Calvin Tanikaya.

If you happened to miss the exhibit, you can see it online at <http://picasaweb.google.com/sfbay.slowtheflow/>



Teens take action!

BE A HABITAT HERO

July 20- 23, 2010



How to apply: Please submit a letter (one page) of interest (with your name, age, address, phone number, parent/guardian's name) indicating why you would like to participate AND a letter of reference from someone who knows you well (teacher, coach, neighbor, etc.). Application deadline is 5:00 p.m. on Friday, June 11, 2010. Participants will be notified by mail and subject to parent/guardian approval. Questions? Please call Tia at 510-792-0222 ext 474.

Please send your letters to: Habitat Heroes
c/o EE Specialist
9500 Thornton Avenue
Newark, CA 94560

If you are a teen entering 7th grade or above and have the desire to develop leadership skills through team-building activities and community service on a National Wildlife Refuge this is a program for YOU! Participants will also serve at one of our special events in 2010. We are specifically recruiting Junior Leaders for our Marsh-In Summer Camp later in the summer. The program is FREE, but space is limited. Applicants must attend all four days of the program and be able to fulfill the service component in 2010.



South Bay Bird Fest!

Fly by Saturday, May 1st from 12 to 3pm

**At Don Edwards San Francisco Bay National Wildlife Refuge
Environmental Education Center in Alviso.**

Where San Jose meets the Bay!

All Activities are FREE!

**Face
Painting**

Crafts

Games



**Hands-on
Activities**

**Live Bird
Show**

Exhibits

Guided Bird Walks

**Visit our website for directions and more information
at <http://www.fws.gov/desfbay/> or call (408) 262-5513.**

**South Bay Bird Fest is sponsored by: City of San Jose, San Francisco Bay Wildlife Society,
Santa Clara Valley Urban Runoff Pollution Prevention Program, and US Fish & Wildlife Service**

Tiny Antioch Butterfly to Gain Help from Voluntary Partnership

Proposed Safe Harbor Agreement with PG&E Should Help Endangered Species

By Al Donner

A proposed agreement between the U.S. Fish and Wildlife Service (Service) and PG&E is expected to provide significant habitat benefits for a tiny rare butterfly that has been fluttering on the brink of extinction in eastern Contra Costa County.

Termed a Safe Harbor Agreement (SHA), the voluntary pact between the federal government and the large utility will enable PG&E to improve native habitat on its property to help the Lange's metalmark butterfly. The agreement will cover two 6-acre parcels of mostly sandy dunes owned by PG&E. The two parcels lie on either side of a 14-acre unit of the Antioch Dunes National Wildlife Refuge. Each parcel holds a large transmission tower.

Under the draft SHA, PG&E is expected to actively manage non-native vegetation (including winter vetch, rip gut brome, and yellow star thistle) on the sandy southern bank of the San Joaquin River. The careful removal of non-native plants will help the butterfly's primary food plant, naked stem buckwheat, to grow, expanding opportunities for the butterfly population to grow. It will also allow refuge staff to work toward restoration of a native plant assemblage on the property.

In the last three years the Service, aided by butterfly experts and volunteers, has energetically been helping the species. A captive breeding program at Moorpark College in Southern California has returned dozens of Lange's to the site. Vegetation management continues to provide improved food conditions for the butterfly.

The attraction of a Safe Harbor Agreement is the protection it provides a landowner who might incidentally harm



a species protected under the ESA. The Service encourages such partnerships because they provide a net benefit to the imperiled species. In Antioch the large utility and the federal government are neighbors who plan to work together to help a tiny butterfly flutter back from the brink of extinction.

CCP Watch: Status of Comprehensive Conservation Plans (CCP) around the SF Bay NWR Complex

What is a CCP?

A comprehensive conservation plan is like a recipe for managing a wildlife refuge. These plans provide a 15-year guide, using the best available scientific knowledge, to help managers achieve the purposes for which each refuge was established, and to contribute to the mission of the National Wildlife Refuge System. The National Wildlife Refuge System Improvement Act of 1997 defined the mission for the Refuge System and requires refuges to have a CCP in place by 2012. The Act provides the U.S. Fish and Wildlife Service (Service) with guidance for managing refuges in a way that ensures the long-term conservation of fish, wildlife, plants and their habitats. CCP outline goals, objectives and management strategies for a refuge to achieve during the 15-year life of a CCP.

Farallon NWR

The Final CCP was completed and

signed in late September 2009. The final document will be published and available (on CD or in print) February 2010. The CCP prescribes several actions for the next 15 years focusing on providing and managing breeding habitat to benefit migratory seabirds, pinnipeds, and endangered species. Management actions include habitat restoration, removal of non-native house mice and predatory gulls, expanded ecosystem-scale research, climate change strategies, volunteer opportunities, and assessment of contaminants on and surrounding the refuge. Public opportunities will be provided through virtual access by web-camera and real-time interactions, off-site outreach and media trips.

San Pablo Bay NWR

Development of CCP alternatives is near completion and will be publicized in the next planning update in February 2010. A draft CCP is expected to be published for public comment in early spring 2010.

Ellicott Slough NWR

Development of CCP goals, objectives, and strategies continues. We expect to publicize draft goals in a planning update in spring 2010.

Don Edwards San Francisco Bay NWR

Public meetings to gather initial input for the CCP were held in late October and early November 2009. Staff is now in the process of reviewing public comments as well as developing a vision statement and goals. A planning update will be forthcoming in spring 2010.

For more information about the above CCPs, contact Winnie Chan at 510-792-0222 ext. 145. To learn more about CCPs, or to view CCPs from other National Wildlife Refuges, log on to <http://www.fws.gov/cno/refuges/planning/ccp.cfm>

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 October 16, 2009 and December 31, 2009. 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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Help Us Help the Refuge

Mail your donation to: San Francisco Bay Wildlife Society, P.O. Box 234, Newark, CA 94560. You may also fax your membership donation using a Visa or MasterCard number to (510) 792-5828.

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

San Francisco Bay Wildlife Society is a nonprofit 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:

- \$20 Student/Senior \$50 Family \$100 Participant \$200 Corporation \$500 Sustainer
 \$35 Individual \$75 Supporter \$250 Sponsor \$1,000 Leader

Check Visa or MasterCard # _____ Exp. Date _____

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Name _____

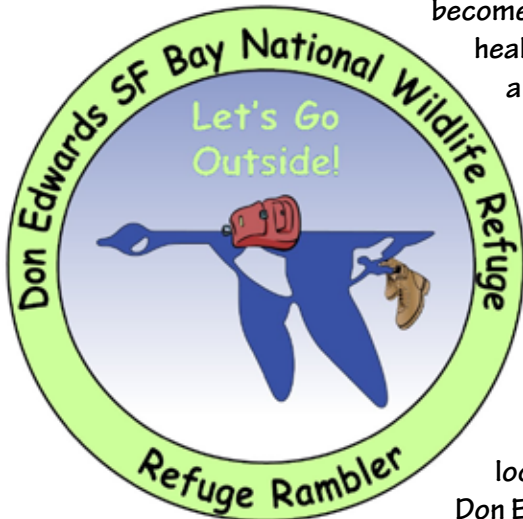
Address _____ City _____ State _____ Zip _____

Phone _____ **Thank you for your support!**

Let's Go Outside!

Be a Refuge Rambler!

The Don Edwards San Francisco Bay National Wildlife Refuge enters its third season of the Refuge Rambler club. This walking club is fun way to explore the Refuge, meet new people, and to



become physically healthier. Once a month from March to October, members of the Refuge Rambler club will gather at designated times and locations on the Don Edwards Refuge (or areas adjacent

to the Refuge) to walk Refuge trails together. Staff or a volunteer will be present to greet the group, check off trail passports and walk the trail. These walks will range from 1.5 - 9 miles and will be located in Fremont, Alviso, Menlo Park, Sunnyvale and Mountain View.

These walks are self-paced. Take your time to enjoy the outdoors, discover nature, and meet fellow nature-lovers. People of all ages are welcome.

Becoming a Refuge Rambler is easy and free. You are under no obligation. Complete the registration form below, or download the form on the refuge web site at

<http://www.fws.gov/desfbay>. Mail it to Carmen Minch, 9500 Thornton Ave, Newark, CA 94560. In a couple of weeks, you will receive a Refuge Rambler patch, a trail passport, a schedule, and a description of the trails featured for 2010.

The trail passport helps keep track of all the trails you completed. If you complete 7 out of the 8 trails featured, you become a Refuge Rambler All-Star! Submit your passport in person at the Visitor Center on October 16 and receive your 2010 t-shirt. Or, you can mail your passport to the Refuge by October 31 and the t-shirt will be mailed to you. All passports will be returned.

Want to join in on the fun but don't want to be a member? No problem. All trails will be advertised in Tide-line and on our web site. Choose the trails you want to walk and show up at the designated location and time. No reservations needed. Bring your friends! There are over 30 miles of hiking trails on the refuge just waiting to be explored!



Sign me up for the Refuge Rambler Club!

Complete the form below and receive a patch, a schedule, trail descriptions, and a passport.

Mail the form to Carmen Minch, 9500 Thornton Ave, Newark, CA 94560

Name: _____

Address: _____

Phone Number: _____

Email Address: _____

Spring Activity Schedule

March

Saturday, March 6

*Beginning Birding Clinic

Environmental Education Center, Alviso

9:30 a.m. – 12:00 p.m.

If you can't tell your egrets from your cormorants this class is for you! We'll learn about binoculars, identification books, and other birding basics through hands-on activities and conversation. Then we'll go out into the field to practice our new skills. Binoculars and books provided during the class. Be prepared to be outdoors in the weather for about an hour. Reservations Required. Call 408-262-5513 ext.106.

*An Eye for the Butterfly

Environmental Education Center, Alviso

10:30 a.m. – 12:00 p.m.

Have you ever wondered how a caterpillar transforms into a butterfly or why the patterns on its wings seem to look straight at you? Spring is near and butterflies are ready to take flight! Follow the stages of its life cycle from an egg to a butterfly with arts and crafts. Then learn to see and appreciate your environment with new eyes through a presentation and a guided exploration of the Butterfly Garden. Learn how you and your community can transform old habitats into new ones to help creatures like the butterfly to thrive. Suitable for ages 5 and up. Led by Renee Maningding. Please call Debra at 408-262-5513 ext. 102 for reservations.

*Marshlands of Dreams

Visitor Center, Fremont

10:30 a.m. – 11:30 a.m.

Join a refuge ranger on a 1- mile walk of the LaRiviere Marsh Trail to find traces of the past. Prior to marsh restoration, learn how Californians utilized the area for farming, quarrying, salt production, and transportation. There are opportunities for bird watching as well. Led by Paul Mueller.

In Search of: California Grey Fox

Visitor Center, Fremont

2:00 p.m. - 3:30 p.m.

Come learn about the California Grey Fox, the only canine that can climb trees. What do they look like? Where do they live? What do they eat? Where have they been seen? We will share information about this rarely-seen fox to optimize your chances of capturing a glimpse of them. The tour will be comprised of a 45-minute lecture followed by a 45-minute walk. Dress warmly. Led by Roy Sasai.

Saturday, March 13

Community Service

Visitor Center, Fremont

8:45 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us in Fremont for a community service project. We will do either a trash pickup or a planting/weeding project. Dress appropriately for the task and for the weather. Gloves and tools will be provided. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required if project takes place at a different location. To make reservations, call 510-792-222 ext. 363.

Exploring the Dunes

Antioch Dunes NWR, Antioch

10:00 a.m. – 11:00 a.m.

Here's your chance to explore this refuge that is usually closed to the public. This guided tour (1-1.5 mile) will focus on the wonders of Antioch Dunes National Wildlife Refuge. Wear sturdy shoes for the sandy hike along the dunes. All ages welcome. No reservations required. No facilities. Contact 510-521-9624 for additional information and directions.

Oliver Salt Works Hike

Eden Landing Ecological Reserve, Hayward

10:00 a.m. – 12:00 p.m.

Hidden among the salt ponds is one of the East Bay's most intriguing historical sites. The refuge and the South Bay Salt Pond Restoration Project are sponsoring this hike to the old Oliver Salt Works within the Eden Landing Ecological Reserve. We'll be walking into an area of the Reserve not yet open to the public so please be prepared to walk several miles on unimproved levees. Reservations required. Call 408-262-5513 ext.106

Twilight Marsh Walk

Visitor Center, Fremont

6:30 p.m. – 8:00 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. Led by Mary and Gene Bobik.

Sunday, March 14

*Beginning Bird Watching

Environmental Education Center, Alviso

9:30 a.m. – 11:00 a.m.

Ever wonder what bird species we have in our own community? This program is a great way to learn about many local and migratory birds. Start with a slide show indoors to learn how to recognize the regulars. Then take a walk to try out your new skills. All ages welcome. Binoculars are available to borrow. Reservations required – please call Debra at 408-262-5513 ext. 102.

*Excellent Estuaries

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Estuaries are considered to be one of the most productive and diverse ecosystems in the world! The San Francisco Bay Estuary is the largest estuary on the west coast and we are all connected to it. Join us at the Environmental Education Center for activities, demonstrations, and a guided walking tour of the southernmost salt marshes of the San Francisco Bay Estuary. RESERVATIONS REQUIRED – All ages are welcome. Call Eric at 408-262-5513 ext. 104.

Saturday, March 20

Hike, Bike, and Clean!

Dumbarton Fishing Pier Parking Lot, Fremont

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

This event aims to bring together hiking and bicycling enthusiasts. Hike, Bike, and Clean! gets participants to explore different areas of the refuge while conducting a cleanup along trails. Bicyclists may ride up to 4 miles to the Alameda Creek Trail but can stop and return at any time. Meet at the fishing pier parking lot located at the end of Marshlands Road 2.5 miles past the Visitor Center. Wear a shirt with long sleeves, long pants, sturdy shoes, and a hat. Bring gloves to pick up the trash. This event is weather permitting. Reservations are strongly recommended so that we can contact you concerning a weather cancellation. Call 510-792-0222 ext. 363. Led by Brian and Katrina Higgins.

Ravenswood Hike

Bedwell Bayfront Park, Menlo Park

10:00 a.m. – 12:30 p.m.

The 2.3-mile perimeter trail at Bedwell Bayfront Park offers great opportunities to discover winter wildlife and to discuss how future wetlands restoration will shape this piece of the Bay. Offered by the refuge and the Friends of Bedwell Bayfront Park. Meet at the main parking lot bathrooms at Bedwell Bayfront Park. Call 408-262-5513 ext. 106 for information.

*Shorebirds

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Just what is a shorebird? How many are there and what are they doing here in the San Francisco Bay Area? Join us for a short slide show and then take a walk along the levees to observe these interesting and sometimes comical visitors. Open to all ages. Led by Ed Kantack. Call Debra at 408-262-5513 ext. 102 for reservations.

Community Service

Environmental Education Center, Alviso

1:30 p.m. – 3:30 p.m.

Do you need to fulfill community service requirements? Or would you just like to come lend a hand? Volunteer in our native plant garden by removing non-native plants, pruning, mulching, or various other jobs that help protect wildlife. It's a great service project for scout groups, high school students, church groups, and home-schooled groups. Bring your own gloves or borrow a pair of ours – tools are provided. Dress in layers and bring water and sunscreen. Be prepared to get dirty! Ages 9 and up. Participants under 18 must be accompanied by a chaperone. Call Debra for reservations at 408-262-5513 ext. 102.

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

Visitor Center, 2 Marshlands Road, Fremont – (510) 792-0222 ext. 363 • Environmental Education Center, 1751 Grand Blvd, Alviso – (408) 262-5513

*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, March 21

In Search of: California Grey Fox

Visitor Center, Fremont

2:00 p.m. - 3:30 p.m.

Come learn about the California Grey Fox, the only canine that can climb trees. What do they look like? Where do they live? What do they eat? When is the best time to see them? We will share information about this rarely seen fox to optimize your chances of capturing a glimpse of them. The tour will be comprised of a 45-minute lecture followed by a 45-minute walk. Dress warmly. Led by Roy Sasai.

Saturday, March 27

Ravenswood Trail

4 mile loop, Menlo Park

Meet at the parking area.

9:00 a.m.

Let's Go Outside!

Meet new people while getting fit and healthy! This is the first walk featured in the Refuge Rambler club. This trail in Menlo Park is four miles, flat, and level. The walk

is self-paced and you may turn back at anytime. You do not need to be a Refuge Rambler to join this walk. To become a Refuge Rambler, see page 9. No reservations are needed. Hats, water, and sunscreen are strongly recommended. Refuge staff will be there to greet you at 9 a.m. **Directions:** Ravenswood Trail is on the west side of the Dumbarton Bridge. From the East Bay, cross over the Dumbarton Bridge and exit at the Ravenswood Unit sign. Drive east 0.3 miles on the frontage road until you see a parking area. From Menlo Park, drive Hwy 84 toward the Dumbarton Bridge. Exit at the Ravenswood Unit sign and drive east on the frontage road. Cross under the bridge and park on the left.

Sunday, March 28

*Wetlands Water Cafe

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

This program explores the exciting world of the salt marsh food chain. The smaller and not-so-cute organisms that inhabit our wetlands are often forgotten, but that doesn't mean they are not important. Come and find out how producers, consumers, and decomposers all contribute to the web of life – and how you can help! RESERVATIONS REQUIRED – All ages are welcome. Call Eric at 408-262-5513 ext. 104.

April

Saturday, April 3

*Marshlands of Dreams

Visitor Center, Fremont

10:30 a.m. – 11:30 a.m.

Join a refuge ranger on a 1-mile walk of the LaRiviere Marsh Trail to find traces of the past. Prior to marsh restoration, learn how Californians utilized the area for farming, quarrying, salt production, and transportation. There are opportunities for bird watching as well. Led by Paul Mueller.

*Beginning Bird Photography

Environmental Education Center, Alviso

3:00 p.m. – 5:00 p.m.

Whether you are interested in photography tips or would like to get to know some of the birds commonly sighted at the refuge, join us! We will discuss ideal sighting and photography conditions, lighting, composition, and equipment. We will also have a slide show to familiarize you with some common shorebirds at the refuge. Then we will go on an easy walk and try out our skills. Please be sure to bring your camera or binoculars and wear comfortable walking shoes. Led by Jen Woo. Recommended for ages 14 and up. Call Debra at 408-262-5513 ext. 102 for reservations.

Saturday, April 10

Community Service

Visitor Center, Fremont

8:45 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us in Fremont for a community service project. We will do either a trash pickup or a planting/weeding project. Dress appropriately for the task and for the weather. Gloves and tools will be provided. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required if the project takes place at a different location. To make reservations call 510-792-0222 ext. 363.

Coyote Creek Lagoon Trail

5 miles Roundtrip, Fremont

9:00 a.m.

Let's Go Outside!

Meet new people while getting fit and healthy! This trail is five miles, flat, and level. The walk is self-paced and you may turn back at anytime. Hats, water, and sunscreen are strongly recommended. You do not need to be a Refuge Rambler to join this walk. To become a Refuge Rambler, see page 9. No reservations are needed. Refuge staff will be there to greet you at 9 a.m. **Directions:** From Hwy 880, take the South Fremont Blvd/Cushing Pkwy exit. Drive south on Fremont Blvd on the west side of Hwy 880 until it dead ends. Meet at the parking lot on the right adjacent to 48481 Fremont Blvd.

Exploring the Dunes

Antioch Dunes NWR, Antioch

10:00 a.m. – 11:00 a.m.

Here's your chance to explore this refuge that is usually closed to the public. This guided tour (1-1.5 mile) will focus on the wonders of Antioch Dunes National Wildlife

Spring Activity Schedule

Refuge. Wear sturdy shoes for the sandy hike along the dunes. All ages welcome. No reservations required. No facilities. Contact 510-521-9624 for additional information and directions.

*Monster Bacteria and 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, some of whom love rotten eggs, and some of whom 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.

Salt Pond Restoration 101: An Introduction to the Project

Environmental Education Center, Alviso

11:00 a.m. – 12:00 p.m.

Restoration of 15,100 acres of South San Francisco Bay salt ponds to wetlands habitats has begun. Please join us for an overview of this incredible project happening in our backyard. Program will begin indoors but will move outside via an easy 1/4 mile trail to a view of the salt ponds. All are welcome!

Sunday, April 11

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 in the Visitor Center; then a microscope hike to LaRiviere Marsh where we will sample and view the most ancient creatures on earth. See how they produce the oxygen we breathe and take up the carbon dioxide we produce. Easy short hiking level. Ages 9-90 years. Call 510-792-0222 ext. 363 for reservations.

*Mysteries of Wastewater Treatment

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

Do you know where your water goes after you take a shower? Flush the toilet? Wash the dishes? What happens to all of that dirty water anyway? Come and find out in this interactive program. We will explore the treatment processes used to clean over 100 million gallons of wastewater at the San Jose-Santa Clara Water Pollution Control Plant. RESERVATIONS REQUIRED – All ages are welcome. Call Eric at 408-262-5513 ext. 104.

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

Visitor Center, 2 Marshlands Road, Fremont – (510) 792-0222 ext. 363 • Environmental Education Center, 1751 Grand Blvd, Alviso – (408) 262-5513

Spring Activity Schedule

Drawbridge Slide Show

Environmental Education Center, Alviso

1:30 p.m. – 3:00 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? Presented by Ceal Craig. Program is intended for adults and space is very limited. This program does not include the Drawbridge Van Tour. Call Debra at 262-5513 ext. 102 for reservations.

*In Search of: California Clapper Rail

Visitor Center, Fremont

2:00 p.m. - 3:30 p.m.

Come learn about the endangered and rarely seen California Clapper Rail. What do they look like? Where do they live? What do they eat? What are the best time and the best tide to view them? We will share information about this rarely seen bird to optimize your chances of capturing a glimpse of them. The tour will be comprised of a 45-minute lecture followed by a 45-minute walk. Dress warmly. Led by Roy Sasai.

Saturday, April 17

Earth Day Cleanup

Ravenswood Point, East Palo Alto

8:30 a.m. – 11:30 a.m.

Help us protect wildlife and the environment while enjoying great Bay views! Join us on our Annual Earth Day Cleanup at Ravenswood Point in East Palo Alto. We'll supply plastic gloves and trash bags. Wear sturdy shoes, a hat, and sunscreen. Prepare to work hard and get dirty! RESERVATIONS REQUIRED! Call 408-262-5513 x106 to sign up. Minors must be accompanied by an adult. Space is limited to 50 people.

Earth Day Community Service

Environmental Education Center, Alviso

10:30 a.m. – 12:30 p.m.

Do you need to fulfill community service requirements? Or would you just like to come lend a hand? Volunteer in our native plant garden by removing non-native plants, pruning, mulching, or various other jobs that help protect wildlife. It's a great service project for scout groups, high school students, church groups, and home-schooled groups. Bring gloves or borrow a pair of ours – tools are provided. Dress in layers and bring water and sunscreen. Be prepared to get dirty! Ages 9 and up. Participants under 18 must be accompanied by a chaperone. Call Debra for reservations at 408-262-5513 ext. 102.

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.

Sunday, April 18

*A Taste of the Refuge

Visitor Center, Fremont

11:00 a.m. - 12:30 p.m.

Take a guided walk on Tidelands Trail and discover which plants are edible or have medicinal uses. We'll taste some of these plants on the refuge, or in commercially made products. Led by Carmen Minch.

Saturday, April 24

All About Owls

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Learn all that you've ever wanted to know about owls at the refuge! What and 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! Paul Bridges will lead the way. Call 408-262-5513 ext. 102 for reservations.

*Habitat Exploration

Environmental Education Center, Alviso

1:30 p.m. – 3:00 p.m.

It's springtime! Join us for a leisurely walk on the refuge to observe seasonal changes to our habitats. Bring cameras and binoculars for possible wildlife newborn sightings! Open to all ages. Led by Ed Kantack. 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. Learn about the salt marsh habitat along the way. A limited number of binoculars are available to borrow. Recommended for children ages 5-10. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363.

Sunday, April 25

*In Search of: California Clapper Rail

Visitor Center, Fremont

2:00 p.m. - 3:30 p.m.

Come learn about the endangered and rarely seen California Clapper Rail. What do they look like? Where do they live? What do they eat? What are the best time and the best tide to view them? We will share information about this rarely seen bird to optimize your chances of capturing a glimpse of them. The tour will be comprised of a 45-minute lecture followed by a 45-minute walk. Dress warmly. Led by Roy Sasai.

May

Saturday, May 1

*South Bay Bird Fest!

Environmental Education Center, Alviso

12:00 p.m. – 3:00 p.m.

Join us for a day of exploration as we celebrate our feathered friends with guided walks, games, crafts, face painting, and various other hands-on activities. Explore avian antics in a LIVE BIRD SHOW showcasing bird behavior! Get up close and personal with live refuge birds and their habitats on the Flying Frenzy Expedition and learn about how you can help birds. Don't miss our annual bird-brained bash! Everything is FREE! Fun for the whole family! No reservations necessary. Visit our website for directions. For more information contact Debra at 408-262-5513 ext. 102 or Eric at ext. 104.

Saturday, May 8

Community Service

Visitor Center, Fremont

8:45 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us in Fremont for a community service project. We will do either a trash pickup or a planting/weeding project. Dress appropriately for the task and for the weather. Gloves and tools will be provided. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required if the project takes place at a different location. To make reservations call 510-792-0222 ext. 363.

Oliver Salt Works Hike

Eden Landing Ecological Reserve, Hayward

10:00 a.m. – 12:00 p.m.

Hidden among the salt ponds is one of the East Bay's most intriguing historical sites. The refuge and the South Bay Salt Pond Restoration Project are sponsoring this hike to the old Oliver Salt Works within the Eden Landing Ecological Reserve. We'll be walking into an area of the Reserve not yet open to the public so please be prepared to walk several miles on unimproved levees. Reservations required. Please call 408-262-5513 ext.106.

Exploring the Dunes

Antioch Dunes NWR, Antioch

10:00 a.m. – 11:00 a.m.

Here's your chance to explore this refuge that is usually closed to the public. This guided tour (1-1.5 mile) will focus on the wonders of Antioch Dunes National Wildlife Refuge. Wear sturdy shoes for the sandy hike along the dunes. All ages welcome. No reservations required. No facilities. Contact 510-521-9624 for additional information and directions.

Spring Gardening at the EEC

Environmental Education Center, Alviso

10:30 a.m. – 12:30 p.m.

Do you need to fulfill community service requirements? Or would you just like to come lend a hand? Volunteer in our native plant garden by removing non-native plants, pruning, mulching, or various other jobs that help protect wildlife. It's a great service project for scout groups, high school students, church groups, and home-schooled groups. Bring gloves or borrow a pair of ours – tools are provided. Dress in layers and bring water and sunscreen. Be prepared to get dirty! Ages 9 and up. Participants under 18 must be accompanied by a chaperone. Call Debra for reservations at 408-262-5513 ext. 102.

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

Visitor Center, 2 Marshlands Road, Fremont – (510) 792-0222 ext. 363 • Environmental Education Center, 1751 Grand Blvd, Alviso – (408) 262-5513

Return of the Swallows

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Join Roy Sasai and Art Garibaldi to view the cliff swallows and their nests by the Dumbarton Fishing Pier. Meet at the Visitor Center to take a ride in the van to the site. Learn about this species natural history, their habits, and unusual homes. Space is extremely limited. Reservations are required. Call 510-792-0222 ext. 363.

*Beginning Bird Photography Environmental Education Center, Alviso

3:00 p.m. – 5:00 p.m.

Whether you are interested in photography tips or would like to get to know some of the birds commonly sighted at the refuge, join us! We will discuss ideal sighting and photography conditions, lighting, composition, and equipment. We will also have a slide show to familiarize you with some common shorebirds at the refuge. Then we will go on an easy walk and try out our skills. Please be sure to bring your camera, binoculars, and wear comfortable walking shoes. Led by Jen Woo. Recommended for ages 14 and up. Call Debra at 408-262-5513 ext. 102 for reservations.

Sunday, May 9

*A Taste of the Refuge

Visitor Center, Fremont

11:00 a.m. - 12:30 p.m.

Take a guided walk on Tidelands Trail and discover which plants are edible or have medicinal uses. We'll taste some of these plants on the refuge, or in commercially made products. Led by Carmen Minch.

*Mother's Day in the Marsh

Environmental Education Center, Alviso

11:00 a.m. – 12:30 p.m.

Make this day a special one by taking mom on a family trip to your local National Wildlife Refuge in Alviso. Here you will have the opportunity to learn fun and interesting things about wetlands and wildlife while taking a guided tour of the salt marshes of the San Francisco Bay. Visitors will hear from a presenter, see a slideshow, and walk through the gardens and marshes at the Environmental Education Center. RESERVATIONS REQUIRED – All ages are welcome. Call Eric at 408-262-5513 ext. 104.

*Mother's Day Beginning Bird Watching

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Come join us for a special Mother's Day Beginning Bird Watching. This is a great way to spend time with family while learning about many local and migratory birds. Start with a slide show indoors to learn how to recognize the regulars. Then borrow binoculars and take a guided walk to try out your new skills. All ages welcome. Program is led by Ceal Craig. Call Debra at 408-262-5513 ext. 102 for reservations.

Saturday, May 15

Hike, Bike, and Clean!

Dumbarton Fishing Pier Parking Lot, Fremont

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

This event aims to bring together hiking and bicycling enthusiasts. Hike, Bike, and Clean! gets participants to see different areas in the refuge while conducting a cleanup along the trail. Bicyclists may ride up to 4 miles to the Alameda Creek Trail but can stop and return at any time.

Meet at the fishing pier parking lot at the end of Marshlands Road 2.5 miles past the Visitor Center. Wear a shirt with long sleeves, long pants, sturdy shoes, and a hat. Bring gloves to pick up the trash. This event is weather permitting. Reservations are strongly recommended so that we can contact you concerning a weather cancellation. Call 510-792-0222 ext. 363 for more information. Led by Brian and Katrina Higgins.

Cruisin' Towards Restoration

Environmental Education Center, Alviso

9:30 a.m. – 12:00 p.m.

The salt ponds of the South Bay are undergoing an amazing transformation! We'll journey by van out into this unique landscape to discover the rebirth of the Bay's edge through wetlands restoration. Recommended for ages 12 and over. Space is very limited. RESERVATIONS REQUIRED. Call Jennifer at 408-262-5513 ext. 106.

Bike the Levees

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Join Ed Kantack for an easy 5.5 mile bike ride along the levees. Get a glimpse of Drawbridge and see a variety of our spring and summer birds. Helmets are required and knobby tires are recommended. Open to all ages. Parental discretion is advised. Space is limited so please call Debra at 408-262-5513 ext. 102 for reservations.

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. Meet at the Visitor Center. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 363. Led by Mary and Gene Bobik.

Sunday, May 16

Return of the Swallows

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Join Roy Sasai and Art Garibaldi to view the cliff swallows and their nests by the Dumbarton Fishing Pier. Meet at the Visitor Center for a short presentation before taking a ride in the van to the site. Learn about this species natural history, their habits, and unusual homes. Space is extremely limited. Reservations are required. Call 510-792-0222 ext. 363.

Friday, May 21

*Night Sky Party!

Environmental Education Center, Alviso

8:00 p.m. – 9:30 p.m.

Meet the stars of Spring! Join amateur astronomer Bob Havner and some friends as we learn about constellations. Make a star chart and then venture outside to view the night sky through a telescope. Afterwards, warm up with some hot chocolate. Bring your own binoculars or spotting scopes if you have them. Dress warmly. Fun for the whole family! Program will go on sprinkling rain or shine. Program will be canceled only if it is pouring rain. RESERVATIONS REQUIRED. Call Debra at 408-262-5513 ext 102.

Spring Activity Schedule

Saturday, May 22

Shoreline Trail – 8 miles Roundtrip Dumbarton Fishing Pier Parking Lot, Fremont

8:30 a.m.

Let's Go
Outside!

Meet new people while getting fit and healthy! This is the third walk featured in the Refuge Rambler club. This trail near the Dumbarton Fishing Pier is eight miles roundtrip, flat, and

level. The walk is self-paced and you may turn back at anytime. Hats, water, and sunscreen are strongly recommended. You do not need to be a Refuge Rambler to join this walk. No reservations are needed. A refuge representative will be there to greet you at 8:30 a.m. **Directions:** See map on the back. Drive down Marshlands Rd until it ends in the parking lot.

Bike Tour on the Levees

Environmental Education Center, Alviso

9:30 a.m. – 11:30 a.m.

The salt ponds of the South Bay are undergoing an amazing transformation! Journey by bike into this unique landscape and discover the rebirth of the Bay's edge through wetlands restoration. Salt Ponds A16 and A17 will play a starring role in this leisurely 5.5-mile tour of the South Bay Salt Pond Restoration Project. Helmets are required and knobby tires strongly encouraged. Recommended for ages 8 and over. RSVP at 408-262-5513 ext.106.

Advanced Bird Photography

Environmental Education Center, Alviso

1:00 p.m. – 4:00 p.m.

Continuing where "Beginning Bird Photography" left off, this 3-hour workshop will first address aesthetics (e.g., advanced composition) and nature (animal behavior, seasons, tides). Then we will focus on photography topics (exposure, depth of field, flash, etc.). Material is geared toward SLR cameras, but much is applicable to any camera type. Lastly, we'll take an optional stroll on the refuge to practice what we've learned, so bring your camera if you have one. Not suitable for children. Program led by Paul Bridges. Reservations are required. Call Debra at 408-262-5513 ext. 102.

Sunday, May 30

Botany Bash

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

Can't tell a poppy from pickleweed? Then this program is for you! We will explore the fascinating world of flowering plants, pollinators, and seeds. The gardens at the Environmental Education Center have some great examples of native landscaping. Learn how you can incorporate these ideas around your home while helping the environment. RESERVATIONS REQUIRED. Recommended for ages 12 and up. Call Eric at 408-262-5513 ext. 104.

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

Visitor Center, 2 Marshlands Road, Fremont – (510) 792-0222 ext. 363 • Environmental Education Center, 1751 Grand Blvd, Alviso – (408) 262-5513

Field Trips to the Refuge

General Field Trip 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 Slow the Flow field trip programs 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 Orientation Workshop. The Orientation Workshop allows 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 Orientation Workshop. It is our policy that lead educators must attend training every two years. Location of activities and trail conditions may vary. Please call for accessibility information.

Field Trips at the Learning Center in Fremont

Wetland Round-Up

Explore the habitats of the refuge! Investigate creatures of the mud flats, collect plankton from the slough, and taste pickleweed from the salt marsh. This field trip is designed for grades K-6, for up to 65 students. Wetland Round-Up is offered Tuesday – Friday from March to mid June. **All dates have been filled for spring field trips. Mail-in registration for Fall 2010 will begin on August 31, 2010.** Questions? Please call 510-792-0222 ext. 475.

Field Trip Orientation Dates at the Learning Center in Fremont

Thursday, February 18	4:00 p.m. - 7:30 p.m.
Tuesday, March 2	4:00 p.m. - 7:30 p.m.
Thursday, April 8	4:00 p.m. - 7:30 p.m.
Saturday, March 13	9:30 a.m. - 1:00 p.m.

Call the Environmental Education Intern on our cell phone at 510-377-7269 to reserve your space at an orientation.

Field Trips at the Environmental Education Center in Alviso

Wetland Round-Up

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. Wetland Round-Up is offered Monday – Thursday from March to May, 2010.

We are currently taking reservations for Spring 2010. If you would like to make a reservation, or receive more information about how to schedule a field trip for the 2010-2011 school year, please call the Environmental Education Intern at 408-262-5513 ext. 103.

Field Trip Orientation Workshop Dates at the Environmental Education Center in Alviso

All Orientations are from 4:00 p.m. – 7:30 p.m.

Wednesday, February 10

Thursday, March 11

Wednesday, March 31

Wednesday, April 14

Tuesday, May 4

Call the Environmental Education Intern at 408-262-5513 ext 103 to attend an orientation. ** Please note: The cut off date to make a reservation is the Friday before each orientation date.

The Slow the Flow Program

Slow the Flow provides an experiential learning environment for students and educators to explore the topics of water use, wastewater treatment, and habitat preservation. Activities and presentations focus on the relationship between personal habits and their effects on local habitats. Slow the Flow is an environmental education program offered at no cost through the cooperating efforts of the City of San Jose, U.S. Fish and Wildlife Service, and the San Francisco Bay Wildlife Society. Slow the Flow programs are available to educators and groups located in San Jose, Alviso, Milpitas, Santa Clara, Saratoga, Monte Sereno, Los Gatos, Campbell, and Cupertino.

Programs are offered to 5th – 12th grade students, although a modified field trip is available for college groups. Educators are encouraged to contact us to discuss options for customizing field trips and classroom presentation activities and schedules.

Reservations for the Slow the Flow program are on a first – come basis. For more information or to make a reservation for Spring/Summer 2010, call Eric McKee, the Slow the Flow Program Coordinator at 408-262-5513 ext 104 or email at sfbay.slowtheflow@gmail.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.

Youth Group Programs at the Environmental Education Center in Alviso

Reservations for Spring programs begin on Thursday, February 25th between 3-4 p.m. and will continue until program is full. Call Debra at 408-262-5513 ext. 102.

Note: Ratio of 1 adult per 5 children maximum. Space is limited to 20 people, including siblings (no siblings under 5 yrs old). Once the program is full there will be a waiting list.

Saturday, March 6

Junior Girl Scout Wildlife Badge 2:00 p.m. – 4:00 p.m.

Calling all Junior Girl Scouts of Santa Clara County! Come to the Wildlife Refuge and learn about features of different creatures, observe animal behavior, see how you can help wildlife. Take a walk to explore the habitats at the southern end of the bay.

Saturday, March 13

Webelos Naturalist Badge 10:30 a.m. – 12:30 p.m.

Learn about birds, migration, flyways, food chains, human impact, and the importance of wetlands. Take a walk and use our binoculars to spot birds in the wild.

Saturday, March 13

Brownie Eco-Explorer Patch 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 southern end of the bay.

Saturday, April 3

Brownie Eco-Explorer Patch 10:30 a.m. – 12:30 p.m.

Same description as above.

Saturday, May 22

Webelos Naturalist Badge 10:00 a.m. – 12:00 p.m.

Same description as above.

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.

Sunday, March 7; Saturday, May 8; Sunday, May 23

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

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



TIDELINE

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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.

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Don Edwards Warm Springs Unit Manager: Ivette Loreda
Farallon Refuge Wildlife Specialist: Zach Coffman
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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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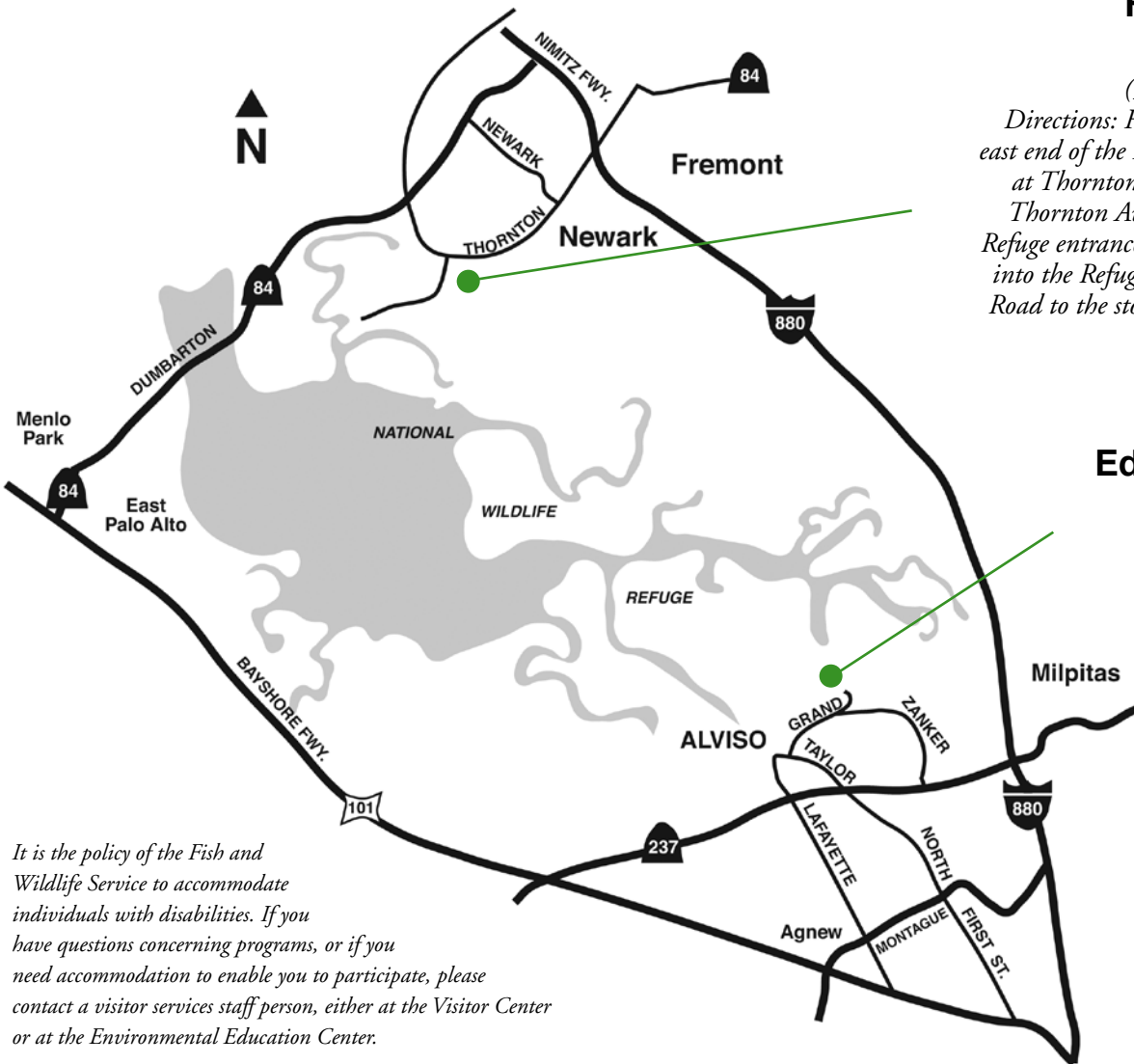
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Headquarters & Visitor Center

(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 Marshlands Road to the stop sign. Turn left into the parking lot.

Environmental Education Center

(408) 262-5513
Directions: From I-880 or Highway 101, exit on Highway 237 toward Mountain View/Alviso. Turn north onto Zanker Road. Continue on Zanker Road to the Environmental Education Center entrance road (a sharp right turn at Grand Blvd.) The distance from 237 to the entrance road is 2.1 miles.

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.