

Tideline



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

This place is for the birds – Or is it?

Restoration of former salt ponds to tidal wetlands benefits fish populations too

By James Hobbs and Nicholas Buckmaster

When Sir Francis Drake first arrived to San Francisco Bay in 1579, the intertidal margins of the South, Central and much of North Bay were covered in a low lying succulent plant endearingly known as pickleweed for its similar appearance to pickles. Historically this tidal salt marsh plant encompassed 300 square miles of tideline, or an area the size of New York City. All that remains are small pockets of pickleweed marsh constituting less than 1/3 of its former expanse. Pickleweed marshes support vast numbers of shorebirds and are home to endangered species such as the California Clapper Rail and the salt marsh harvest mouse. Salt marshes are also home to the longjaw mudsucker (*Gillichthys mirabilis*), a small nocturnal fish that makes its home in high intertidal creeks amongst the pickleweed. The mudsucker have adapted to the high marsh lifestyle by developing the ability to breathe air and produce a moist, sticky slimecoat to protect themselves from drying out. In fact, mudsuckers are found primarily in these pickleweed marshes, and so it goes without saying that they too, have experienced significant habitat loss, much like the endangered clapper rail and salt marsh harvest mouse.

Not only has the longjaw mudsucker experienced extensive loss of habitat, it has also been a much sought after fish in local bait shops around the bay area. Because of its hardy nature and soft, rotund body it is considered a prize “bait fish” for striped bass fishermen. From the 1950s to

the 1980s, the longjaw mudsucker, more commonly known among fisherman as the “bullhead,” was commonplace in bait shops throughout the bay area. In the mid-1980s, as populations of this prized bait began to dwindle, other species filled their niche in bait buckets including the Pacific staghorn sculpin and the non-native yellowfin goby (accidentally introduced through ship ballast waters from Asia). In fact the yellowfin goby has taken over much of the remaining pickleweed marsh in the North Bay, all but extirpating mudsuckers from the marshes along the Napa and Petaluma River. The Asian goby competes with the longjaw mudsucker for food in the intertidal creeks during high tides but moves into the large sloughs during low tide to avoid exposure to the air. Also, the yellowfin goby has also been found to prey upon the young of longjaw mudsuckers, making the very existence of the species tenuous at best.

Found below the tideline, salt marshes are linked by meandering branched sloughs, which form a network of underwater “highways.” These sloughs serve as a link between the main embayment and the deep interior of the salt marshes. The sloughs encompass both pelagic food webs originating from the bay, and detrital food webs originating from the salt marsh. This creates many possible sources of food for the resident fishes and serves as a nursery for the young life stages of many migratory species, such as Pacific herring, northern anchovy, leopard sharks and bat rays.

In 2003, a consortium of state and



Longjaw mudsucker (Gillichthys mirabilis). Photo by Levi Lewis



Longfin smelt are a threatened species under the state endangered species act. Photo by Amy Chandos, UC Davis

federal agencies began the largest tidal salt marsh restoration project west of the Mississippi River purchasing over 15,000 acres of salt ponds from the Cargill Corporation. The restoration of these former salt-producing ponds to tidal wetlands will result in benefits to shorebirds, waterfowl and native fish populations including the threatened steelhead trout.

One possible side effect of restoration efforts is the redistribution of legacy contaminants (such as mercury) that had been deposited in the sediments of salt ponds from mining activities in the mid-1800s. To

continued next page

prevent and/or minimize the spread of these contaminants, an adaptive management plan incorporating a comprehensive approach to restoration was deemed necessary. A consortium of state, federal, and university scientists are to monitor the restoration process by examining the distribution and abundance of birds, fish, marsh plants, and mercury. The findings will assist managers in making informed decisions when developing future restoration plans.

Much of our work has focused on the marshes in and immediately adjacent to the Alviso salt pond complexes on the Don Edwards San Francisco Bay National Wildlife Refuge (Alviso Slough, Coyote Creek Slough, Artesian Slough and Mud Slough). These sloughs were not always the productive ecosystems that we see today. As early as 1870, contamination from untreated human waste and inadequate exchange with the Pacific Ocean led to seasonal depletions in dissolved oxygen, effectively creating a “dead” zone throughout the southern-most portions of the



Fish food. N. kadiakensis from one of the Island Ponds. Photo by Matt Young, UC Davis

Bay, especially in the vital slough habitats. Conditions were so bad that in the 1960s plans were made to fill much of South San Francisco Bay for development, citing the rotting stench as the primary reason for such an action. Fortunately, advancements in wastewater treatment technology allowed for reduced nutrient runoff and better water quality conditions, even before the enactment of the Clean Water Acts of the late seventies and early eighties.

Today these productive sloughs are frequented by more than 30 different species

of fish and 70 invertebrates throughout the year which can be loosely grouped into two main categories: salt marsh resident species and seasonal migratory species, which are primarily young fish using these habitats as nurseries. Of the fish species, approximately 95% are native to the San Francisco Bay. Typical salt marsh residents, such as the longjaw mudsucker, are present year round and complete their life cycle in the marsh, whereas other fish tend to come and go seasonally. These migratory species include both summer visitors - such as bat rays, leopard sharks, anchovies and surfperch, as well as winter ones - such as white sturgeon, Pacific herring and the longfin smelt - a species that is listed as “Threatened” under the state endangered species act.

In 2006 during the pilot phase of the South Bay Salt Pond Restoration Project, three salt ponds, located on Station Island on Coyote Creek on the Don Edwards Refuge were reconnected to the bay by breaching the levees that held back the tides. The breaching of what is now known as the

Island Ponds opened up 475 acres of former salt pond to the tides. With tidal flow restored, the salt ponds transformed from an empty gypsum layer into a vibrant mud-flat ecosystem capable of sustaining plants and algae. Early colonizers, like the pickleweed plant, play an important part in the restoration of tidal marsh by facilitating the accretion of sediment within the ponds. Remnant borrow ditches, dug out to build up the levees encompassing the ponds became the predominant drainage systems for the ponds. These ditches act as extensions of Coyote Creek Slough, adding approximately six miles of slough-like habitat to the Alviso marsh complex.

However, there are some important differences between the borrow ditches and the extant sloughs of the Alviso marsh that our surveys have indicated might be important. Because Coyote Creek Slough is fed by both Coyote Creek and the San Jose/Santa Clara wastewater treatment plant it has a peren-



Bat Ray. Photo by Norm Ponferrada.

nial source of freshwater. This fresher water is pulled downstream at low tide, and often times it is pushed into one of the Island Ponds as the tide turns. Because freshwater is considerably less dense than saltwater, these freshwater “pockets” tend to stay within the Island Ponds throughout the tide cycle. Once in the shallow ponds this water creates a semi-permanent, warm environment that is nearly perfect for zooplankton and phytoplankton growth. One large species of zooplankton - a mysid shrimp known as *Neomysis kadiakensis* - is particularly adept at exploiting these environments and can achieve extraordinary population densities within the borrow ditches. Elsewhere in San Francisco Bay mysid shrimp are very important as fish forage and their phenomenal abundances (over 1000 per cubic meter of water) within the salt pond restoration area is a very positive indication of the success of the restoration.

It would appear that this bounty has not gone unnoticed by the fishes. The areas in and around the ponds appear rather attractive to many fish species. Our surveys have shown higher catches of fish the further upstream you travel, with the highest being immediately adjacent to the restored ponds. Additional surveys indicate that some fish actually move into the ponds as the tide comes in. Northern anchovies and three-spine stickleback, for example, reach very high densities within the borrow ditches at high tide, presumably moving from the slough into the ponds in order

to feed. Likewise, bat rays, which cannot tolerate the freshwater of Coyote Creek Slough at low tide, will migrate several miles upstream to feed as the bay water pushes the freshwater back. Fish such as Pacific staghorn sculpin, a species that seeks lower salinity water by moving upstream along the bottom, will move into the borrow ditches at high tide and remain within the ponds during low tide along with high densities of prey.

The native fish abundance and diversity of organisms using the newly restored salt ponds demonstrate the promise of restoration programs such as the one currently underway in the South San Francisco Bay.

The addition of 475 acres of intertidal marsh along Coyote Creek has created a vibrant habitat for many species, and is adding large quantities of food for fish. The continued restoration of 15,000+ acres will provide new habitats for many species of fish and return South San Francisco Bay to its former glory days. In a time when fisheries worldwide are in decline, one can take heart in seeing results such as these, happening in our very own backyards.

James A. Hobbs, PhD is an Associate Research Scientist in the department of Wildlife, Fish and Conservation Biology, and the associate director of fish otolith studies for the Interdisciplinary Center

for Plasma Mass Spectrometry at the University of California, Davis. James has over 15 years of experience studying the fishes of San Francisco Bay and Delta. He is currently the President Elect for the California-Nevada Chapter of the American Fisheries Society.

Nicholas Buckmaster, received his B.S. in Wildlife, Fish and Conservation Biology at UC Davis in 2010, and is currently a Jr. Specialist in the laboratory of Dr. Peter Moyle at UC Davis.

Partnerships Make it Happen

Our staff achieves great things but they can rarely do them alone. Partners frequently collaborate with us on everything from environmental education to non-native species control. Partners share their talents, their time and often their money, along with other resources that make it possible to accomplish shared goals. We are fortunate that the conservation community around San Francisco Bay is strong. The Refuge Complex relies on this community to help carry out our mission. As an example, I would like to mention a few projects that would not be possible without partners.

The first involves our efforts to address non-native house mice living on Farallon NWR. Mice were probably introduced unintentionally when early settlers in the 19th century visited the island. Today the island is overrun with mice, which is disrupting the ecosystem of the largest seabird breeding colony south of Alaska. We are working with the Environmental Protection Agency, California Department of Fish and Game, PRBO Conservation Science and Island Conservation on ways to eradicate the mice without undue damage to the seabirds and other species. With these partners we expect to release an Environmental Impact Statement next year that will help us deter-



Refuge Reflections

by Mendel Stewart

mine the best way to improve the natural balance on the island.

Partners are also helping us restore and enhance a variety of degraded wetlands. Ducks Unlimited (DU), an international leader in wetland conservation, is helping us implement several of these projects. At San Pablo Bay NWR, over 1400 acres will be restored to tidal water circulation that has been lost for almost a century. On the Don Edwards San Francisco Bay NWR, the second phase of restoring tidal water circulation at Bair Island near Redwood City is also beginning. These projects would not be possible working alone. While many partners make these projects possible, DU has been indispensable.

We also work closely with the California Coastal Conservancy. This State agency provides both technical and financial assistance for wetland restoration and non-native species control on our refuges.

Through the non-native *Spartina* control program, the Coastal Conservancy has been a leader in the effort to eradicate this plant species thereby benefiting species such as the salt marsh harvest mouse and the California Clapper Rail. We could not be as successful without them.

And finally, I must mention our outstanding partnerships with the San Francisco Bay Wildlife Society, City of San Jose and the Watershed Watch Program of Santa Clara County that helps us by providing staff who educates the public about water conservation and pollution prevention from our Environmental Education Center on the Don Edwards NWR.

These are just a sample of the many partnerships that make our jobs not only easier but also a lot more fun and interesting. We never forget that partnerships make conservation happen.



The San Francisco Bay National Wildlife Refuge Complex is now on Facebook!
Like us and receive timely updates about the Complex.

Don Edwards San Francisco Bay National Wildlife Refuge reels in new partnerships

Collective cries of ooohs and aaaahs were heard as kids and adults crowded around Thomas as he tugged on his fishing rod. Dangling at the end of the line was a 24-inch leopard shark. As he hoisted the fish over the railing, help from all sides came to disengage the hook. Thomas stood grinning with his mother and his catch as he posed for photographs, not only for refuge staff, but for most of the families who had attended this special event at the Don Edwards San Francisco Bay National Wildlife Refuge in Fremont.

In 2010, the US Fish & Wildlife Service (FWS) and National Environmental Education Foundation collaborated to give health care providers the background and tools to encourage their patients to visit National Wildlife Refuges. A growing body of research has indicated that people who recreate outdoors regularly tend to be more fit, have lower levels of stress, and appreciate nature and the environment.

One study conducted by Howard Frumkin, M.D., the director of the National Center for Environmental Health/Agency for Toxic Substances and Disease Registry at the U.S. Centers for Disease Control and Prevention, found evidence that healthy adults who partake in wilderness experiences such as hiking, fishing, and camping help them make healthier lifestyle choices. Similar activities are often used to relieve psychological disorders and developmental disabilities. Other studies show that those who exercise outside where there are trees and grass are often less stressed and depressed than those who exercise inside a gym.

As part of the FWS's Let's Go Outside campaign and First Lady Michelle Obama's Let's Move Outside initiative, FWS teamed up with health care providers, ranging from school nurses to pediatricians, to "prescribe" their patients to visit their local National Wildlife Refuge. Incentives would be rewarded to those with repeated visits.

For the past year, the Don Edwards



Thomas and his mother pose with their leopard shark. Carmen Minch, USFWS

Refuge had been working with a team of pediatricians from Hayward (Dr. Paul Espinas), Santa Clara (Dr. Charles Owyang), and Mountain View (Dr. Vickie Chou). Recognizing that transportation may be a limiting factor for some to visit, the refuge received a small grant from the FWS's Pacific Southwest Region to host a fishing clinic that provided transportation to the Dumbarton Fishing Pier for patients referred by Drs. Espinas, Owyang, and Chou. The purpose of the event is fourfold: introduce fishing as a recreational pastime; demonstrate how people, ecosystems, and wildlife are interconnected; explain how our actions can affect the environment; and familiarize the public about what

a National Wildlife Refuge is and what they have to offer.

Once on the pier, participants were welcomed with a brief introduction about the refuge and were handed a tackle box with hooks, surf leaders, and sinkers. Participants were led through stations to learn about safety and ethics, protecting our watershed, knot tying, and rigging. After tying their surf leader onto a fishing rod, they received a bag of bait and were free to try their hand at catching the "big one." Plenty of volunteers were on hand to help operate the rod if needed, and to detangle lines. A large bucket was also available to put any fish caught for temporary observation, and crab traps and shrimp traps were also set.

Only two of the 43 people who attended the event had ever been to the Don Edwards Refuge and all claimed they will be back. The Don Edwards Refuge plans to continue to build on the relationships with the current pediatricians and hopes to expand the partnerships to other local health care providers.

If you are a health care provider and are interested in the Nature Champions program, contact Carmen Minch at 510-792-0222 ext. 476, or email Carmen_leong-minch@fws.gov.



Angler enjoying the sunshine while fishing.

Boy Scout Troop 164 helps Don Edwards Refuge with Eagle projects

By Scouts Martin Yao and Kendrick Jin Sullivan

Boy Scout Troop 164 and Don Edwards San Francisco Bay National Wildlife Refuge have established a connection that is beneficial to both parties. This win-win relationship first began when a needy Life Scout from Troop 164 was given an Eagle Project. One of the most herculean tasks a Life Scout faces before attaining the Eagle rank is to find, fund and create a project that serves as a benefit towards the community. This arduous process of finding an acceptable project can be prolonged if the troop's committee of parents rejects the plan for either being underprepared or not challenging enough for the creator.

It is at this stage of the scout's path that Don Edwards Refuge is able to help. Don Edwards Refuge, a federal agency whose mission is to protect wildlife and habitat, relies heavily on volunteers for a variety of projects from restoration to visitor services. The refuge notifies Troop 164 regularly about new project opportunities for Life Scouts in need. These projects are often challenging, useful, and manageable. They are frequently approved by the troop's board.

The troop's most recent Life Scout to have taken advantage of the projects offered by the refuge is Robin Hu, a senior attending Irvington High School. On Saturday October 1, 2011 Robin Hu completed his Eagle project on Don Edwards Refuge. His project was to replace the butterfly trail in an undeveloped area. Robin, with the help



Boy Scout Troop 164 with Jin Sullivan's compost bins.

of the troop, extended the trail by 109 feet, and created an observation area along the trail. Robin's plan was to dig out the old pathway and place a foundation of gravel under a layer of golden sand to make the new trail. Materials were scarce, but Robin was able to secure additional supplies without having to lengthen the project timeline. He sent others to pick up the supplies while he continued to work on and supervise the trail project. It took all day but the trail was completed by 6:00 p.m.

Other Eagle projects that were completed on the Don Edwards Refuge by Troop 164 were: the construction of two permanent 10'x12'x5" compost bins for restoration projects by Jin Sullivan; design-

ing and constructing sturdy potting benches for the native plant nursery by Michael Althausen; the installation of a utility sink and building of a workbench by Chris Swan; making a protective box for a water pipe by Kevin Yao; habitat restoration by dispersing native grass seeds on the refuge by Ricky Oliver; construction of another compost bin by Casey Huggins; and the fabrication of planting tables for the nursery by Adam Jungers.

Current Life Scouts working on projects at Don Edwards Refuge include Martin Yao and Alex Erikson. The partnership between Troop 164 and Don Edwards Refuge has been extremely positive and is inspiring for future Eagle Scouts from Troop 164 Milpitas.



Save the Date

San Francisco Bay Flyway Festival

February 10-12, 2012

<http://www.sfbayflywayfestival.com>

by Bryan White, Visitor Services Intern

This year the Don Edwards San Francisco Bay National Wildlife Refuge Complex has been working hard to offer the best in educational programs, volunteer opportunities, public events, research, and land management practices that the United States Fish and Wildlife Service can offer. The following summaries are just a sample of what some of our refuges have been busy doing for the last year:

Antioch Dunes National Wildlife Refuge

Over the last year wildlife managers at Antioch Dunes Refuge were occupied with implementing strategies to assist in the population recovery of the endangered Lange's Metalmark Butterfly (LMB), a species that can only be found on Antioch Dunes Refuge. Some of the strategies currently being implemented to preserve this butterfly include a captive breeding and release program, weeding, planting naked stemmed buckwheat – the host plant of the LMB, and annual count surveys. Unfortunately, surveys conducted over the last several years show that this endangered



Lange's Metalmark Butterfly.
Photo by Alan Wight

species is still on the decline despite great efforts. In addition to managing for the LMB, Antioch Dunes Refuge implemented management strategies for two other endangered species, both of which are plants: the Contra Costa wallflower and Antioch Dunes evening primrose. News for these two plant species is more encouraging. Surveys have shown that over the last five years densities of these plants are trending upwards. Some strategies that appear to be working for these two species include disturbance of the soil



Youth Conservation Corp clears a trail on the Don Edwards Refuge. USFWS photo

and by seeding and planting the endangered plants. These strategies helped increase numbers for both the evening primrose and wallflower.

In addition to management strategies for these three endangered species, Antioch Dunes Refuge has been hard at work with several other programs. Some of the programs that the refuge undertook during the 2011 year included: habitat restoration, coastal cleanup, and docent-led tours. Organizations and companies such as the Cub Scouts of America, Antioch Alive, Verco Decking Inc., and other volunteers have been extensively involved helping with these activities

Antioch Dunes Refuge also has big plans for next year. Staff hope to bring in large amounts of sand to help recreate the dunes that disappeared from Antioch years ago due to mining. Refuge staff is excited to take on this restoration project and looking forward to creating a more natural habitat.

Don Edwards San Francisco Bay National Wildlife Refuge

Don Edwards San Francisco Bay National Wildlife Refuge has had a busy year indeed. Research surveys and public outreach activities have been the hallmark

of the 2011 year. One of the key surveys conducted was mapping weeds on approximately 2/3 of the refuge. These maps are important for future implementation of the refuge's Weed Management Plan. In addition to weed mapping, several bird surveys took place to assist with developing management strategies for critical species. In 2011 the refuge and U.S. Geological Survey (USGS) surveyed nest sites on islands in pond SF2 in East Palo Alto. The goals were to determine which bird species use these islands and to analyze the potential impacts viewing platforms and trails have on these species. Another dual effort project between the refuge and USGS was gull depredation on other bird species. Researchers examined the effects of nest predation on snowy plover and Forster's tern nests. Using camera systems, researchers could identify species and individual interactions at the nesting sites. Currently, data for the 2011 year is still being processed for analysis.

In addition to research, Don Edwards Refuge has reached out to the community in a variety of ways. Interpretive programs and education opportunities abound as evident in each issue of *Tideline*. The Youth Conservation Corp program was in its second year and provided teens first-hand knowledge and experience with careers in the conservation field. Keeping the public

engaged is of particular importance for a wildlife refuge located within a major metropolitan area. Some noteworthy public events have included the Endangered Species Poster Contest, South Bay Bird Fest, Summer Camps and National Wildlife Refuge Week events. This year's Shark Day was such an amazing success with over 500 guests attending.

Ellicott Slough National Wildlife Refuge

Many interesting and noteworthy events have taken place at Ellicott Slough Refuge over the last year. Ellicott Slough Refuge, home to two federally listed amphibians, has been the center of research for both the Santa Cruz long-toed salamander and the California red-legged frog. During the summer of 2011, a federally threatened, California red-legged frog tadpole was caught during a dip netting survey at Calabasas Pond. This was the first tadpole recorded in over eight years on the Calabasas Unit. Unfortunately, *Chytridiomycosis* (a deadly fungus that has been linked to dramatic population declines or even extinctions of many amphibian species around the world) was found to be present in the pond.

Besides these interesting discoveries Ellicott Slough Refuge had many noteworthy public outreach and volunteer achievements in 2011. Through a seven-year partnership between the refuge and neighboring Renaissance High School, several restoration projects that involved planting native plants on the refuge were undertaken. Students planted coast live oak seedlings that they had propagated over the previous three years. In 2012 Ellicott Slough National Wildlife Refuge looks forward to moving onto a new project site to continue these volunteers' amazing work.

Salinas River National Wildlife Refuge

Salinas River National Wildlife Refuge will remember the 2011 year as a year of cooperative events. Thanks to USFWS Coastal Program grant funding, Salinas River Refuge will partner with the Big Sur Land Trust to control invasive, non-native

grasses that can be found in the sand dunes. These actions will lay the footwork for future native plant restoration projects. Additionally, a new Monterey Bay Office in Watsonville has been completed. These offices will be used by Ellicott Slough and Salinas River Refuges staff, and by personnel from Ventura Fish and Wildlife Office and the California Department of Fish and Game. The completion of this office will offer staff more opportunities to forge new cooperative projects and partnerships in the local community.

San Pablo Bay National Wildlife Refuge

The year 2011 will be remembered as the year of expansion, research, and outreach at San Pablo Bay National Wildlife Refuge. Over the last year San Pablo Bay Refuge made two major land acquisitions including the 3,310-acre Skaags Island. The expansions total over 4,000 acres of

a Watershed (STRAW) program where volunteers and classrooms full of kids come and restore salt marsh transition zones.

Marin Islands National Wildlife Refuge

This past year at Marin Islands Refuge was primarily dedicated to continuing the hard work managing and surveying the heron and egret rookeries on the islands. These rookeries are perhaps the largest along the Northern California coast. The surveys conducted over the last several years will help track long term population trends and the status of the rookery. In addition to surveys, refuge staff implemented various projects as part of their vegetation management plan. The vegetation management plan is necessary because the islands are infested with invasive plant species, namely, French broom, fennel, Italian thistle, Bermuda buttercup, *Erharta erecta*, ivy, acacia, and vetch. *Vicna sp.* and Himalayan



A salt marsh harvest mouse's measurements are taken during a small mammal survey at San Pablo Bay NWR. USFWS photo

much needed restorable wildlife habitat to the refuge. Over the last year San Pablo Bay Refuge continued to add data to some of the largest survey data sets for several critical species such as the California Clapper Rail and the salt marsh harvest mouse. Long term data sets such as these not only establish trends, they also provide information regarding climate change and sea-level rise. Volunteers have been instrumental in some of the surveys and management practices. One such noteworthy group includes the Students and Teachers Restoring

blackberry are also a great threat because of the monoculture that they tend to create. These projects depend on amazing volunteers who work hard on the islands. Some of these volunteer groups include Bay Area Sea Kayakers, Audubon groups, California Native Plant Society, and Friends of San Pablo Bay among many others. Refuge staff are enthusiastic for the 2012 year and hope to start monthly work days and an environmental education program that would give the public a chance to visit an otherwise closed island in San Francisco Bay!

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 June 30, 2011 and September 30, 2011. 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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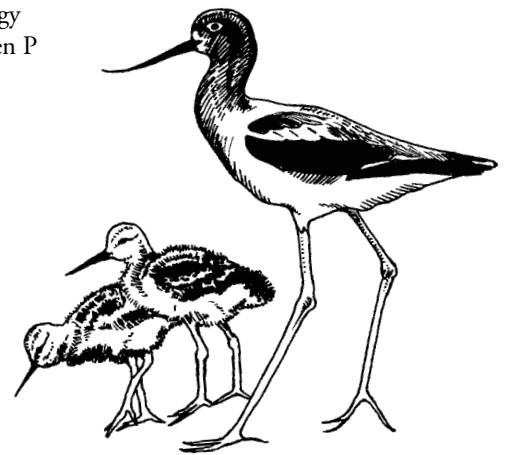
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Help Us Help the Refuge

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

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San Francisco Bay Wildlife Society Celebrates Silver Anniversary

by Sue Ten Eyck

In 2012 the San Francisco Bay Wildlife Society will celebrate its twenty-fifth year of operations. With financial assistance from the Coastal Parks Association, the idea of a not-for-profit organization supporting the San Francisco Bay National Wildlife Refuge became more than a dream. On February 6, 1987, the San Francisco Bay Wildlife Society (SFBWS) filed Articles of Incorporation with the California Secretary of State. At the first Board meeting held May 11, 1987, the SFBWS designated Alameda County as the principal office for transaction of business. SFBWS received not-for-profit status as a cooperating association with U.S. Fish and Wildlife Service in July of 1987.

The first project for the newly formed society was the publication of a quarterly newsletter to be called *Tideline*. It has been published quarterly since 1988. To support the funding of *Tideline*, SFBWS opened a bookstore in the Fremont Visitor Center. The merchandise offered for sale – books, field guides, trail maps, and such – reflects the purpose of Don Edwards San Francisco Bay National Wildlife Refuge. The bookstore later opened a branch at the Environmental Education Center in Alviso.

Every purchase at the bookstores helps *Tideline's* publication!

The San Francisco Bay Wildlife Society was an instant success. In 1988, the Society was asked by Klamath Basin National Wildlife Refuge Complex if they could partner with the SFBWS bookstore. SFBWS would manage the inventory and a portion of the profits would be used to support environmental education programs at Klamath Basin NWRs. Moreover, in 1990 Sacramento NWR bookstore began operations as part of SFBWS bookstore and Malheur NWR in Oregon opened a branch of SFBWS bookstore in 1993. SFBWS set aside a portion of the profits to support environmental education at these refuges. SFBWS was inspired to assist the other refuges establish friends groups and bookstores because of the generous assistance they themselves received at the beginning. Between 2001 and 2004, the refuges SFBWS had assisted were then able to establish their own cooperating friends groups.

The SFBWS is more than bookstores. Contracts with the City of San Jose and Santa Clara Valley Urban Runoff Pollution Prevention program, managed by the Society, fund Environmental Education

Specialists at the Don Edwards Refuge Environmental Education Center (EEC) in Alviso. These two SFBWS employees lead the Slow the Flow and the Watershed Watchers programs, aimed at educating K-12 and the public about their impact on the environment, watershed protection, and impacts on the Don Edwards San Francisco Bay NWR. In addition, these SFBWS employees help the refuge keep the EEC open on weekends. With the Federal cut-backs to the Fish & Wildlife Service budget, our support of environmental programs is more important than ever. This we do with the generous support of SFBWS members and grants from local companies and organizations. We are thankful for past support from companies such as: NUMMI, Cisco, Oracle, Sony Electronics, Sobrato Development Co. and Starbucks, to name just a few. As the Society moves forward, we hope to further collaborate with other environmental groups such as POST, Coastal Conservancy and San Francisco Foundation. Most important is you and your continued support. Thank you for your support of 25 years of successful environmental education and assistance to the Don Edwards San Francisco Bay NWR through the San Francisco Bay Wildlife Society!

Don Edwards San Francisco Bay National Wildlife Refuge

BioBlitz

December 10 & 11 • 2:00 p.m. - 2:00 p.m.
Environmental Education Center, Alviso



Meet scientists and naturalists at this first-ever BioBlitz on the refuge! Become a field scientist and help the Don Edwards Refuge document every living thing at the Environmental Education Center.

- Fish Surveys
- Bird Migration Surveys
- Reptile and Amphibian Treks
- Nocturnal Mammal Camera Trapping
- Bat Detection
- And More!

Turn in your documentation sheet and receive an official certificate and credit as a Contributing Field Scientist on the final report. Call 408-262-5513 ext. 103 to let us know you're coming. Open to all ages.

For a full day's schedule and more information, log on to our website at <http://www.fws.gov/desfbay>.

Contributing partners: Bay Area Amphibian Reptile Society, California Native Plant Society, City of San Jose, Northern California Bats & the Western Bat Working Group, San Francisco Bay Wildlife Society, San Francisco Bay Bird Observatory, San Francisco State University, Santa Clara Valley Audubon Society, University of California, Davis, University of Central Missouri, US Department of Agriculture, US Geological Survey, and Youth Science Institute

Winter Activity Schedule

DECEMBER

Saturday, December 3

Ethical Bird Photography for Beginners

Environmental Education Center, Alviso

9:30 a.m. – 11:30 a.m.

Have you ever wanted to photograph that snowy egret stalking its dinner in the shallows? Join docent and published wildlife photographer Mark Bohrer to discover where to find those wary birds, what behavior to look for, and how to ethically capture them on pixels or film. You'll need a lens extending to at least 300mm (400mm or longer preferred) on your digital SLR, or the 35mm-equivalent on your advanced point-and-shoot camera. Tripods are recommended, but not required. Please be familiar with your camera's operation, dress for muddy conditions, and expect to do some walking. Recommended for ages 16 and up. Anyone under 18 must be accompanied by a parent. Reservations required. Call Debra at 408-262-5513 ext. 102.

*Marshlands of Dreams

Visitor Center, Fremont

10:30 a.m. – 11:30 a.m.

Join Paul Mueller 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.

Sunday, December 4

Intro to Nature Drawing for 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 light to add dimension. We will discuss how the changing horizon lines can offer depth. There will be opportunities to practice these techniques on the trail. Paper and pencils will be provided. Program begins in the pavilion. Dress warmly. Bring binoculars if you have them. Call for reservations at 510-792-0222 ext. 363. Led by Travis Turner.



Story Hunters - Part 1

Visitor Center, Fremont

2:00 p.m. – 3:00 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this new 3-part 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 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, December 10

Community Service

Visitor Center, Fremont

9:30 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us for a community service project. We will do either a trash cleanup or a planting/weeding project. Dress appropriately for the task and for the weather. We will have gloves to lend and will provide the tools. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required since the project may be a different location. For more information, or to make reservations, call 510-792-0222 ext. 363.

Twilight Marsh Walk

Visitor Center, Fremont

4:00 p.m. – 5:30 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.

December 10 & 11

BioBlitz!

Environmental Education Center, Alviso

2:00 p.m. – 2:00 p.m. (24 hours)

Join us for the 24-hour BioBlitz, a species survey of every living thing at the refuge! We will organize the natural history talents of local scientists, naturalists, and YOU to document the biodiversity present at the Environmental Education Center in Alviso. Come for guided programs like fish surveys, early morning owling, bird migration surveys, water quality monitoring, native plant tours, bat detection, nocturnal mammal camera trapping, reptile & amphibian treks, and so much more! Anyone who turns in their legible field documentation sheet will be eligible to receive an official certificate of participation along with citation as a Contributing Field Scientist on the final published report. For the full day's schedule and more information, log on to <http://www.fws.gov/desfbay> or call 408-262-5513 ext. 103. Open to all ages. Call us to let us know you're coming!

Sunday, December 11

*Duck Walk

Visitor Center, Fremont

10:00 a.m. – 11:30 a.m.

Thousands of ducks winter in the San Francisco Bay every year. Hear a short lecture on duck identification. Then we'll head out on the trail to try your new skills. A limited number of binoculars are available to borrow. Dress warmly. Led by Carmen Minch.

*The Salt Marshes: Then and Now

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Approximately 85% of San Francisco Bay's wetlands have disappeared over the last 200 years due to industry and development, impacting the wildlife that lived in and around them. Some of the plants and animals have made a comeback. Learn the history of the salt marshes and the plant and animal life affected by the changes. The presentation includes a slideshow in the pavilion followed by an optional walk (approximately 45 minutes, weather permitting) to view a salt marsh and the remains of a salt evaporation pond. Led by Gregg Aronson. Call 510-792-0222 ext. 363 for reservations.

*Chompers & Stompers

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Ever wondered why birds come in so many shapes, sizes, and colors? Come and find out why some birds exhibit wacky behaviors. We will examine different bird specimens to see some of the extraordinary adaptations birds have. Come admire the wonders of the bird kingdom and then take a guided walk around the refuge to see these marvelous creatures in action! RESERVATIONS RECOMMENDED- All Ages are welcome. Call Eric at 408-262-5513 ext. 104

Saturday, December 17

Ravenswood Hike

Bedwell Bayfront Park, Menlo Park

10:30 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 510-792-0222 ext. 139 for information.

*Family Bird Walk

2:00 p.m. – 4:00 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, Dec 18

Rise of Coyote Hills...

It's about time

Visitor Center, Fremont

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

Join Roy Sasai on a hike to learn about and view the inner core of Coyote Hills. What forces created this magnificent hill along the bay? What forces continue to move and shape the vista we see? What forces made a huge portion of Coyote Hills disappear? We will meet at the Visitor Center to begin our adventure, then hike 1.5 miles on steep terrain to view the core of Coyote Hills. This hike is recommended for the young and young at heart. Dress warmly, bring binoculars, rain gear, and camera. Reservations are not required.

*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

JANUARY

Saturday, January 7

Ethical Bird Photography for Beginners

Environmental Education Center, Alviso

9:30 a.m. – 11:30 a.m.

Have you ever wanted to photograph that snowy egret stalking its dinner in the shallows? Join docent and published wildlife photographer Mark Bohrer to discover where to find those wary birds, what behavior to look for, and how to ethically capture them on pixels or film. You'll need a lens extending to at least 300mm (400mm or longer preferred) on your digital SLR, or the 35mm-equivalent on your advanced point-and-shoot camera. Tripods are recommended, but not required. Please be familiar with your camera's operation, dress for muddy conditions, and expect to do some walking. Recommended for ages 16 and up. Anyone under 18 must be accompanied by a parent. Reservations required – Call Debra at 408-262-5513 ext. 102.

*Marshlands of Dreams

Visitor Center, Fremont

10:30 a.m. – 11:30 a.m.

Join Paul Mueller 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.

Sunday, January 8

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 shading value. We will then head out onto the trail and practice the various techniques. Paper and pencils will be provided. This program takes place outside so dress warmly. Rain cancels. Kids age 7-12 only! Call for reservations at 510-792-0222 ext. 363. Bring binoculars if you have them.

Saturday, January 14

Community Service

Visitor Center, Fremont

9:30 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us for a community service project. We will do either a trash cleanup or a planting/weeding project. Dress appropriately for the task and for the weather. We will have gloves to lend and will provide the tools. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required since the project may be a different location. For more information, or to make reservations, call 510-792-0222 ext. 363.

Gardening at the EEC - Community Service

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Come help in our native plant garden by removing non-native plants, pruning, mulching, or various other jobs that help protect wildlife and clean up our gardens. We'll be starting preparations for planting native species. 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 18 and under must be accompanied by a chaperone. Call Debra for reservations at 408-262-5513 ext. 102.

Twilight Marsh Walk

Visitor Center, Fremont

4:00 p.m. – 5:30 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, January 15

*Duck Walk

Visitor Center, Fremont

10:00 a.m. – 11:30 a.m.

Thousands of ducks winter in the San Francisco Bay every year. Hear a short lecture on duck identification. Then we'll head out on the trail to try your new skills. A limited number of binoculars are available to borrow. Dress warmly. Led by Carmen Minch.

*Wetlands Water Cafe

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

Wetlands are often considered 'nature's grocery store'. Want to know more? Come to this very special program where we will explore the edible aspects of wetlands with a focus on food chains and macroinvertebrates. Join us for a closer look at what feeds the organisms of our wetlands! A short talk will be followed by a hands-on activity, and then a guided walk around the marshlands. RESERVATIONS RECOMMENDED – All Ages are welcome. Call Eric at 408-262-5513 ext. 104.

*The Salt Marshes: Then and Now

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Approximately 85% of San Francisco Bay's wetlands have disappeared over the last 200 years due to industry and development, impacting the wildlife that lived in and around them. Some of the plants and animals have made a comeback. Learn the history of the salt marshes and the plant and animal life affected by the changes. The presentation includes a slideshow in the pavilion followed by an optional walk (approximately 45 minutes, weather permitting) to view a salt marsh and the remains of a salt evaporation pond. Led by Gregg Aronson. Call 510-792-0222 ext. 363 for reservations.

Winter Activity Schedule

Saturday, January 21

Ravenswood Hike

Bedwell Bayfront Park, Menlo Park

10:30 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 510-792-0222 ext 139 for information.

Story Hunters - Part 2

Visitor Center, Fremont

2:00 p.m. – 3:00 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this new 3-part 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.

Sunday, January 22

*Tracking Through The Slough

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Come and get your hands dirty during this fun and educational program about mud creatures. We will investigate a sample of mud collected from the salt marshes of the San Francisco Bay and observe some of the thousands of incredible organisms that live their lives worming and squirming through the mud! A short talk will be followed by a hands-on activity, and then a guided walk around the marshlands. RESERVATIONS RECOMMENDED – All Ages are welcome. Call Eric at 408-262-5513 ext. 104

Saturday, January 28

Nature Drawing for Families and Adults

Environmental Education Center, Alviso

1:30 p.m. – 3:00 p.m.

Have you always wanted to make realistic drawings? Increase your confidence in drawing while exploring natural objects from the refuge and beyond. We will carefully observe all manner of cool objects and learn skills to translate these observations into realistic drawings. Appropriate for ages 8 to adult. Children, please bring an adult with you who would like to participate. Adults without children are welcome as well. Bring a sketch pad and pencil or use ours. All skill levels welcome. Led by Kathy Kleinsteinber. For reservations, call Debra 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

Winter Activity Schedule

Night Sky Party

Environmental Education Center, Alviso

6:00 p.m. – 8:00 p.m.

Meet the stars of Winter! 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. Afterwards, warm up with some hot chocolate. Bring your own binoculars or spotting scopes if you have them. Dress warmly, as it gets cold in the evening. Fun for the whole family! RESERVATIONS REQUIRED. Heavy rain cancels. Call Debra at 408-262-5513 ext. 102.

Sunday, January 29

*RSI - Refuge Site Investigation

Visitor Center, Fremont

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

The clues are everywhere if you know what to look for. Help Roy Sasai find clues to tell us what has been here, what has been devoured, and which direction it went. We will prepare our investigation by interviewing key eye witnesses who saw them last, and learn how to spot the clues to find their location. We will comb hill and marsh in search of these clues. Geared for the young at heart. Level walking for 1 mile. Wear hiking shoes, dress warmly, bring rain gear, binoculars, notebook, and a camera.

FEBRUARY

Saturday, February 4

*Marshlands of Dreams

Visitor Center, Fremont

10:30 a.m. – 11:30 a.m.

Join Paul Mueller 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.

Sunday, February 5

*Duck Walk

Visitor Center, Fremont

10:00 a.m. – 11:30 a.m.

Thousands of ducks winter in the San Francisco Bay every year. Hear a short lecture on duck identification. Then we'll head out on the trail to try your new skills. A limited number of binoculars are available to borrow. Dress warmly. Led by Carmen Minch.

Saturday, February 11

Community Service

Visitor Center, Fremont

9:30 a.m. – 12:00 p.m.

If you are interested in improving the refuge for visitors and for wildlife alike, join us at the Visitor Center for a community service project. We will do either a trash cleanup or a planting/weeding project. Dress appropriately for the task and for the weather. We will have gloves to lend and will provide the tools. Bring your own water bottle. Meet in the parking lot at the Visitor Center. Driving an additional 2.5 miles may be required since the project may be a different location. For more information, or to make reservations, call 510-792-0222 ext. 363.

Gardening at the EEC - Community Service

Environmental Education Center, Alviso

10:00 a.m. – 12:00 p.m.

Come help in our native plant garden by removing non-native plants, pruning, mulching, or various other jobs that help protect wildlife and clean up our gardens. We'll be starting preparations for planting native species. 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 18 and under must be accompanied by a chaperone. Call Debra for reservations at 408-262-5513 ext. 102.

*Winter Birds in a Restored Salt Pond

Ravenswood Unit (SF2), Menlo Park

1:00 p.m.

Bid good-bye to the overwintering shorebirds and waterfowl before they leave San Francisco Bay to return to their northern nesting grounds. Docent Jane Moss will lead you on a 1.5 mile round-trip hike along Don Edwards Refuge's newest interpretive trail and introduce you to the South Bay Salt Pond Restoration Project. Trail is easy and level. All ages and abilities welcome. Meet at the Ravenswood Point parking area on the west side of the Dumbarton Bridge. For information and directions, please call 510-792-0222 ext. 139.

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? Are owls the brainiacs of the bird world? Through an interactive presentation and owl pellet dissection, we'll find the answers to all these questions. Paul Bridges will lead the way. Call Debra at 408-262-5513 ext. 102 for reservations.

*Oh Where, Oh Where is the Little Grey Fox?

Visitor Center, Fremont

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

Come learn about the California grey fox, the only canine which can climb trees. What do they look like? Where do they live? What do they eat? Where have they been seen? What's in our habitat that makes them unique to the Bay Area? Program is a 1-mile hike on level terrain. Dress warmly, bring binoculars and rain gear. Led by Roy Sasai.

Sunday, February 12

Mysteries of Wastewater Treatment

Environmental Education Center, Alviso

2:00 p.m. – 3:30 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 about what it takes to make this interesting process happen through a slideshow and hands-on activities at the refuge. RESERVATIONS RECOMMENDED – All Ages are welcome. Call Eric at 408-262-5513 ext. 104. (This program DOES NOT include a tour of the Water Pollution Control Plant.)

*The Salt Marshes: Then and Now

Visitor Center, Fremont

2:00 p.m. – 3:30 p.m.

Approximately 85% of San Francisco Bay's wetlands have disappeared over the last 200 years due to industry and development, impacting the wildlife that lived in and around them. Some of the plants and animals have made a comeback. Learn the history of the salt marshes and the plant and animal life affected by the changes. The presentation includes a slideshow in the pavilion followed by an optional walk (approximately 45 minutes, weather permitting) to view a salt marsh and the remains of a salt evaporation pond. Led by Gregg Aronson. Call 510-792-0222 ext. 363 for reservations.

Saturday, February 18

*Discovering Salty

Environmental Education Center, Alviso

10:30 a.m. – 12:00 p.m.

Can you name an endangered species that is essentially in your own backyard? Come to the refuge to learn about Salty, our endangered salt marsh harvest mouse. We'll discover facts about this tiny, elusive critter such as where it lives and what its favorite food is. We'll take a short hike to get a closer look at its ideal habitat and make a craft to take home. Fun for all ages! Call Debra at 408-262-5513 ext. 102 for reservations.

Story Hunters - Part 3

Visitor Center, Fremont

2:00 p.m. – 3:00 p.m.

Discover what stories lie hidden on the Don Edwards Refuge in this new 3-part series by Art Garibaldi. The last of this series will provide you with coordinates that will lead you to the final landmark that embodies 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.

*Nocturnal Wonders

Environmental Education Center, Alviso

2:30 p.m. – 4:00 p.m.

What happens in the marsh when the sun goes down? Which nocturnal creatures are stirring when we're ready for bed? Join us and learn about the nighttime critters who visit the refuge. We'll explore their habitats, follow in their footsteps by making tracks, and take part in a few other fun activities! Fun for all ages. Call Debra at 408-262-5513 ext. 102 for reservations.

*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

*Twilight Marsh Walk

Visitor Center, Fremont

4:30 p.m. – 6:00 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.

Sunday, February 19

*Water Wizards

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Life on the "Blue Planet" would not be possible without our most precious resource, water. Join us at the EEC to learn more about the unique properties of water through hands-on activities, a presentation, and a guided wetlands walk. We will investigate what makes water such an important resource to people and wildlife, and probably get a little wet too! RESERVATIONS RECOMMENDED – All ages are welcome. Call Eric at 408-262-5513 ext. 104.

Saturday, February 25

*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, February 26

Intro to Nature Drawing for 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 light to add dimension. We will discuss how the changing horizon lines can offer depth. There will be opportunities to practice these techniques on the trail. Paper and pencils will be provided. Dress for the weather. Bring binoculars if you have them. Call for reservations at 510-792-0222 ext. 363. Led by Travis Turner.

Winter Activity Schedule

The Visitor Center in Fremont and the Environmental Education Center in Alviso will be closed on Dec. 24 and 25, and Dec 31 and Jan 1.

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

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.

Saturday, December 10

Webelos Naturalist Badge

Environmental Education Center, Alviso

10:00 a.m. – 12:00 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, January 7

* Junior Girl Scout Wildlife Badge

Environmental Education Center, Alviso

2:00 p.m. – 4:00 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.

Saturday, January 14

* Brownie Eco-Explorer 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.

Saturday, February 25

* 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.

Youth Group Programs at the Refuge Headquarters in Fremont

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

Saturday, December 17

Sunday, January 22

Saturday, February 11

Webelos Naturalist Program

10:00 a.m. – 12:00 p.m.

Attention Webelos! 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.

*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 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 Slow the Flow field trips 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. The trainings 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. In addition, 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

Wetland Round-Up

The Wetland Round-up field trip program in Fremont will resume for the Spring 2012 season.

The field trip is designed for grades K-6, for up to 65 students. Wetland Round-up will be offered Tuesday-Friday from March-May, 2012. Mail-in reservations for Spring 2012 will begin on December 1, 2011.

MAIL-IN RESERVATION PROCEDURES can be found on our website at http://www.fws.gov/desfbay/EE_Registration.htm

Contact the Environmental Education Staff at Fremont:

Office: (510) 792-0222 ext. 475

Cell: (510) 377-7269

E-mail: ee.refuge@yahoo.com

Field Trip Orientation Dates at the Learning Center in Fremont

To be announced.

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-May, 2012. **Field trips start Thursday, March 1, 2012 and end Thursday, May 31, 2012.**

We will begin scheduling Spring 2012 field trips on Tuesday, December 13 from 4:00 p.m. - 5:00 p.m. Call 408-262-5513. We will be answering the phones in person.

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

Announcing our NEW Field Trip Training and Orientation Program! Please note the following changes. *Thank you to all the teachers and parents who have provided us feedback so we could restructure our training program to better serve you!*

New Teacher Field Trip Training

Teachers that have not yet attended a field trip orientation **must** attend one of the following **New Teacher Field Trip Trainings** listed below.

Training to be announced.

Returning Teacher and Parent Workshop

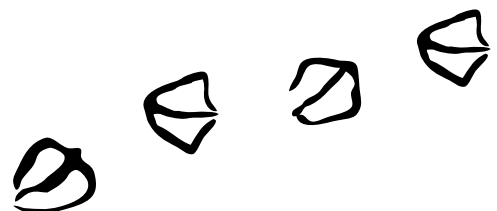
Returning Teachers and Parents will be offered a separate Returning Teacher and Parent Workshop. **It is a requirement that returning teachers must attend one of these workshops once every three years.** We highly recommend that Parent Activity Leaders attend one of the following workshops. In addition, we **strongly encourage** returning teachers to attend the workshop with their parent volunteers.

Workshop to be announced.

For more information call the EE Staff at Alviso:

Office: 408-262-5513 ext. 100

Email: genie_moore@fws.gov



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 cooperative efforts of the City of San Jose, U.S. Fish and Wildlife Service, and the San Francisco Bay Wildlife Society.

Slow the Flow Program Offerings:

Integrated Field Trip Program (5th – 12th grades): This program incorporates multiple activities. Participating classes will receive two full-length classroom presentations from Slow The Flow educators, including hands-on activities and demonstrations, and will also participate in a field trip to the Don Edwards Refuge. Upon special request, the field trip may be combined with a tour of the San Jose-Santa Clara Water Pollution Control Plant (when available). 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 limit of 60 students per field trip, and a 1:10 chaperone to student ratio is required.

Classroom Presentations (5th – 12th grades): Currently there are three classroom presentation activities available, *Watersheds and Wetlands*, *Mysteries of Wastewater Treatment*, and *Marsh Lab Study*. Each of these presentations 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 1.5 hours in length.

Educators are encouraged to contact us to discuss options for customizing field trips and classroom presentation. Reservations for the Slow the Flow program are on a first-come basis. For more information, or to make a reservation, call Eric McKee, the Slow the Flow Program Coordinator, at 408-262-5513 ext. 104 or email at sfbay.slowtheflow@gmail.com.



PLEASE NOTE CONSTRUCTION AT THE ENVIRONMENTAL EDUCATION CENTER:

The salt ponds (A16 and A17) adjacent to the Environmental Education Center will be undergoing construction for the South Bay Salt Pond Restoration Project. Restoring A16 and A17 will create 130 acres of tidal marsh habitat and 240 acres of shallow water foraging habitat for migratory birds, including nesting islands. *Thank you for your patience during this exciting restoration project!*

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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Deputy Project Leader:.....John Bradley

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Don Edwards Wildlife Specialist: Melisa Helton
Don Edwards Warm Springs Unit Manager: Ivette Loreda
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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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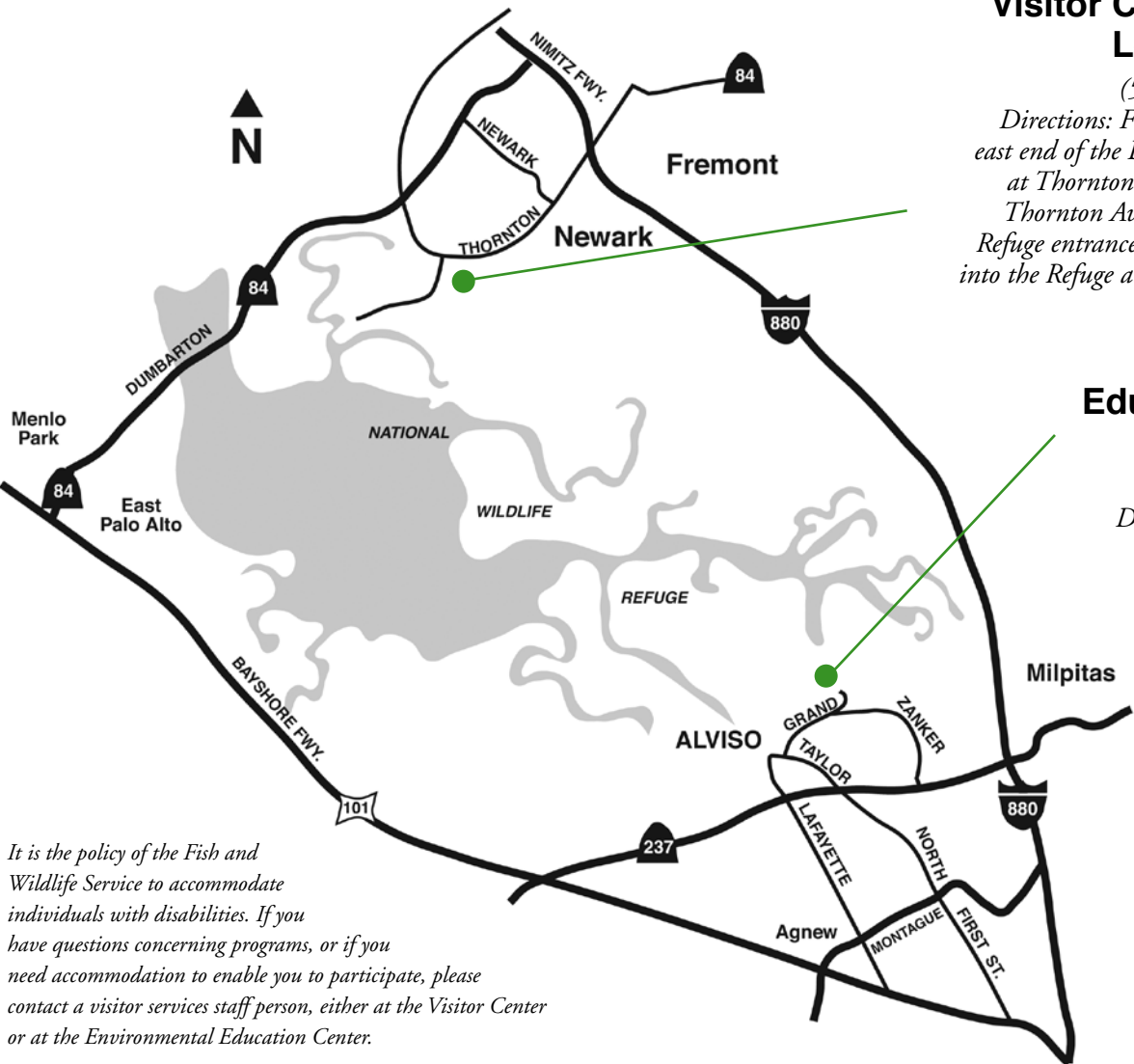
Tideline



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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. 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.