



Volume 26, Number 4

Preventing, Controlling, and Managing Invasive Chinese Mitten Crabs (*Eriocheir sinensis*) in the San Francisco Bay

By Jonathon Thompson and Jeffrey J. Herod

For many birdwatchers, National Wildlife Refuges (NWR) in the San Francisco Bay Area and the Sacramento/San Joaquin River Delta are meccas for their favorite pastime. Along the way in their quest for that rare bird, they may see other types of wildlife such as mice, snakes, and foxes. Because these terrestrial forms of life are relatively easy to spot, few may ponder about life forms that exist below the surface. An entire world of wildlife exists in bays, sloughs, rivers, and oceans, and they are just as susceptible to the impacts of non-native species.

Non-native species can prey on native species, compete with native species for food, or disrupt, disturb or destroy native species habitat. Some may be familiar with the story of the introduction of the brown tree snake in Guam and its effect on the local bird population. Many may have heard about the rapid spread of invasive eastern cordgrass in the bays and marshes of San Francisco and Willapa (Washington) and its effect on wildlife habitat.

We have chosen to tell the story of an infamous invader, the Chinese mitten crab (*Eriocheir sinensis*). Mitten crabs have become nuisance for recreational sport anglers, fish salvage operations (operations that salvage fish from state and federal water pumping facilities), levees, and the ecology of San Francisco Bay and its tributaries, including the Sacramento/San Joaquin Rivers and Delta. The information we are presenting can be found in the *National Management Plan for the Genus *Eriocheir**. This plan can be viewed online at http://www.delta.dfg.ca.gov/NIS/docs/MCMgmtPlan_FINAL_8404.pdf

In Greek, the term *eriocheir sinensis* means “wool hand, the Chinese”. This crab is called the

mitten crab because it has hair-like structures, or setae (hence the term “wool hand”), on its claws or cheliped. The crab is native to the South China Sea and its tributary rivers. The mitten crab is a catadromous species, which means adults spawn in the bay and their offspring move into freshwater to grow and mature. The mitten crab adults move downstream from freshwater rivers and streams *en mass* and reproduce in the high salinity waters of the Bay.

There are several early life stages of the mitten crab that require brackish water. These early life stages are planktonic, meaning that they are slightly motile

but mainly drift with the Bay currents and tides. At these stages, the mitten crab feeds on other planktonic organisms. Following the planktonic stages, the crab settles to the bottom and moves into the lower estuarine and freshwater habitats to live. In fact, this species has been known to migrate up to 775 miles upstream into freshwater. The mitten crab has been seen on NWRs as far away from the Bay as the San Joaquin River NWR and the Sacramento River NWR.



Dead Chinese Mitten Crab found at a site.

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Preventing, Controlling, and Managing Invasive Chinese

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Following the upstream migration, juveniles and adults burrow into river and stream banks and feed on decaying plant material, benthic invertebrates, dead fish, and anything else on the bottom of the river that provides an opportunity for a meal. The life cycle is complete in one to five years when the adults move back downstream into the Bay to spawn.

How did the crab come to call San Francisco Bay its home? The first report of a Chinese mitten crab in South San Francisco Bay was by shrimp trawlers in 1992. *The National Management Plan for Genus Erocheir* notes that “the mitten crab likely arrived in California



Jeffrey Herod excavating Chinese Mitten Crab burrows.

by one or more of three processes: a natural introduction, such as migration or drift of larvae from native habitat; an unintentional introduction associated with such activities as the importation of cargo or ballast water; or intentional introduction of the crab, for purposes including consumption or aquaculture establishment.”

Certain facts indicate the crab became established intentionally or unintentionally as a result of human activities. In some cultures the body and ovaries of the mitten crabs are highly prized food items. Live mitten crabs have been available for sale in the seafood markets of New York City’s Chinatown, where they are sold for up to \$40 per pound.

So what are the potential impacts of the mitten crab’s presence? The Chinese mitten crab received its fifteen minutes of fame in 1998 when migrating adults were so numerous that it interrupted normal operations at the fish salvage facilities. These operations are for the salvage of fish drawn into water diversion facilities in the south Delta.

In 1998, vast numbers of migrating adult mitten crabs physically clogged water pump-

ing facilities, halting fish salvage operations. During this migration, over 700,000 individual crabs were encountered at the facilities in Tracy, California. The reality was that the impacts from the mitten crab occurred almost everywhere in the Bay-Delta, depending on time of year.

There are other potential impacts of this aquatic nuisance species’ presence, such as effect on recreational and commercial fishing. The mitten crab can steal bait, damage gear, and compete with the commercially important red swamp crayfish (*Procambarus clarkii*) and signal crayfish (*Pacifasticus leniusculus*). Also, the mitten crab may contribute to bank erosion, which can threaten levee stability or alter the course of streams. Additionally, due to the crab’s popularity as a food item, there is concern about the human health effects associated with the accumulation of contaminants in the crab’s meat and the potential transmission of the Asian lung fluke (*Paragonims westermani*).

So what is being done about the mitten crab and how are NWRs involved? In 1999, a draft National Management Plan was developed by the Aquatic Nuisance Species Task Force (ANSTF), an intergovernmental body established by the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. A Mitten Crab Control Committee was developed to review and edit the draft plan. The broad and representative membership of the committee has worked cooperatively to complete a management plan that will best meet the needs of this evolving issue. The goal of the Chinese mitten crab management plan is to prevent or delay the spread of the mitten crab to new areas and to reduce the negative impacts of existing mitten crab populations in U.S. waters. On the basis of these goals, five primary objectives have been identified:

1. To prevent new introductions and the spread of mitten crabs in U.S. waters.
2. To develop methods of detecting new populations of mitten crabs in areas where they are not currently present.
3. To monitor existing mitten crab populations.
4. To reduce the negative impacts of existing populations.
5. To develop strategies and methods of control and manage existing populations.

As identified in the goals of the management plan, the partnership between the San Francisco Bay NWR Complex and the Aquatic Nuisance Species Program has the objectives to prevent, control, and manage the Chinese mitten crab. Efforts to detect and monitor new and existing populations are underway on the San Francisco Bay NWR Complex and the San Joaquin River NWR. We are partnering with

Mitten Crabs (*Eriocheir sinensis*) in the San Francisco Bay

several refuge staff including Clyde Morris of Don Edwards NWR, Christy Smith and Giselle Block of San Pablo Bay NWR, Louis Terrazas of Antioch Dunes NWR, and Eric Hopson of San Joaquin River NWR.

The managers and biologists assisted in various aspects of this collaborative process. We began sampling at one site on each of the refuges mentioned above in the summer of 2006. We use passive traps constructed of PVC and plastic mesh netting, and visit the sites every other week. We hope to continue this partnership so we can monitor and better manage these infamous invaders.

Jonathan received his Bachelors of Science degree in fisheries biology from Humboldt State University in 2001. He has worked on various fisheries related issues since graduation, including 15 months with the U.S. Fish and Wildlife Service Fisheries Resource Offices in Red Bluff and Reno. For the past five months, Jonathan has been working as a biological science technician for the

CALFED Non-native Invasive Species Program in Stockton, CA.

Jeff has been working with various aquatic species for over 15 years. He has over nine years of experience working for the Federal government in aquatic biology and ecology. Currently, he is the Program Coordinator for the U.S. Fish and Wildlife Service California-Nevada Operations Office Aquatic Nuisance Species Program and the CALFED Non-native Invasive Species Program. He coordinates and implements two National Management Plans (Chinese Mitten Crab and Caulerpa). He is the co-chair of the Non-native Invasive Species Advisory Council for CALFED Ecological Restoration Program and co-chair of the California Interagency Noxious and Invasive Plant Committee.



Chinese Mitten Crab seizure by USFWS law enforcement.

Conservation Heroes

Aldo Leopold, Rachel Carson, John Muir. These names evoke sentiments of environmental passion and dedication. I have become acquainted with these icons over my career in the conservation field and through some of their writings. In the case of Leopold and Carson, works like A Sand County Almanac and Silent Spring influenced my outlook on the world. Because these individuals lived before my time, I never had the opportunity to meet them personally.

I discovered one does not have to go far to meet true conservation heroes. While stationed at San Diego National Wildlife Refuge Complex, I learned Tijuana Slough was saved from being filled in for residential and commercial development through citizen actions in the late 1960s. Were it not for Dr. Mike McCoy, his wife Patricia, and other concerned citizens, 1000 acres of coastal marsh in the southwest U.S. corner near the Mexican border would have been converted into housing and a marina. Through impassioned pleas, years of struggle and even getting shot at one evening after attending a community meeting, they were able to convince the U.S. Fish and Wildlife Service to create Tijuana Slough National Wildlife Refuge in 1980. I felt honored working with such conservation heroes.

It was not long after I moved to the San Francisco Bay Area that I met more heroes. Don Edwards San Francisco Bay National Wildlife

Refuge would probably not exist were it not for a handful of individuals who petitioned for the establishment of a National Wildlife Refuge. Led by Phil and Florence LaRiviere, these individuals successfully lobbied Congress to establish the first “urban” National Wildlife Refuge in the country in 1974.

Across the bay in Redwood City, Ralph Nobles and local residents fought against development plans that spelled doom for wetland habitats on Bair Island. In the early 1980s, Nobles and his group petitioned to place the issue on the ballot. It went up for a vote and the development plans were defeated, ending the debate. Bair Island was eventually purchased by the Peninsula Open Space Trust, which donated it to the Don Edwards SF Bay Refuge.

Many of the same people that helped establish Don Edwards SF Bay National Wildlife Refuge continue to meet regularly to discuss and fight for habitat conservation around San Francisco Bay. These individuals are forever bonded by their shared passion for conservation. I attended the most recent meeting where the group celebrated the first “on the ground” actions to restore Bair Island. I often attend these meetings and it makes me recall the actions of Leopold, Carson and Muir. I may not have had the chance to meet them but I feel extremely fortunate and proud to know Nobles, the LaRivieres and the McCoy's – our generation's conservation heroes.

Refuge Reflections

By Mendel Stewart



For more information about the current actions to restore Bair Island, log on to our web site at www.fws.gov/desfbay/Bair_Intro.htm

Bay benefits from strong partnership between refuge and Save the Bay

Save The Bay's upcoming volunteer programs at Don Edwards San Francisco Bay National Wildlife Refuge

Bair Island Restoration Paddle: December 2, January 20, February 17

Marin Islands Kayak and Restoration Paddle: December 9, January 20 and February 3 (Note: December 9 is for trip alumni only)

San Pablo Nursery Volunteer Projects: December 13 and other weekday dates throughout winter

Tolay Creek Planting: February 10

Photos courtesy of Save the Bay

Community volunteers have many opportunities to help restore vital wetland habitat

By Jessica Castelli

Save The Bay communications manager

Do you want to observe the Bay's wildlife from a kayak or canoe? Would you enjoy peacefully sowing seeds in a nursery and planting native wetland plants along the Bay shoreline? Or does using some muscle to weed invasive plant species appeal to you?

If you join one of Save The Bay's programs at one of the National Wildlife Refuges (NWR) in the San Francisco Bay National Wildlife Refuge Complex (Refuge Complex), your choices are numerous. For the past five years Save The Bay, a nonprofit organization that works to protect, restore and celebrate San Francisco Bay, and the Refuge Complex have forged a strong partnership to improve the health of the Bay, enhance habitat for endangered species like the California clapper rail and connect the community to the Bay and NWRs in the San Francisco Bay Area.

Save The Bay partners with the Refuge Complex at four sites: San Pablo Bay NWR's Tolay Creek, the new San Pablo Bay NWR Nursery, Marin Islands NWR and Don Edwards SF Bay NWR's Bair Island in Redwood City. Since 2001, more than 10,000 volunteers have

logged 40,000 hours planting 12,000 plants and removing 40,000 pounds of trash and nonnative plants at these sites.

"It's critical that people understand the impor-

tance of the refuges' work and one of the best ways to do that is through volunteerism. We really appreciate Save The Bay's hard working volunteers," said Mendel Stewart, Project Leader of the Refuge Complex who started his career as a volunteer.

At the **San Pablo Bay NWR Nursery** in Sonoma County, Save The Bay, the refuge, and other partners host a monthly program where volunteers help grow native plants. This nursery

supports many refuge restoration projects, including **Tolay Creek**, where Save The Bay volunteers have successfully planted natives to improve wetland habitat over the past five years.

On Save The Bay's monthly **Marin Islands Restoration paddle** off the shores of San Rafael, volunteers kayak to the islands, which are home to thousands of nesting herons and egrets and are normally off limits to the public, to remove invasive French broom. A recent trip participant said, "I loved understanding the importance of the Marin Islands as a natural habitat

for snowy egrets... and the kayaking was fun!"

And at **Bair Island** in Redwood City, volunteers canoe to Middle Bair Island to remove invasive ice plant and pilot new innovative planting techniques in former salt ponds. More volunteers are needed this winter to help get 2,000 natives in the ground to improve habitat for many species.

"We are thrilled to be involving local residents to help restore habitat at Bair and Marin Islands and Tolay Creek. Volunteers provide the extra muscle needed to help us protect these amazing resources," said Marilyn Latta, Save The Bay restoration director.

To sign up for one of Save The Bay's volunteer opportunities on a San Francisco Bay National Wildlife Refuge, visit their Web site at www.saveSFbay.org or contact Jocelyn Gretz at 510.452.9261 x109.

In the words of Save The Bay volunteer, Maria, who recently spent a sunny Saturday morning planting native plants along the Bay shoreline, "Come out save the Bay, you will be glad you did!"



Refuge Dispatches

By Matt Griffis, Visitor Services Intern

The Year 2006 has been a busy one for the San Francisco Bay National Wildlife Refuge Complex. Here are just a few highlights of each refuge's accomplishments.

Don Edwards San Francisco Bay

The South Bay Salt Pond Restoration Project has been a management focus in the past year, with tidal restoration in full swing. This March, levees were breached in three ponds (A19, A20, A21) totaling 500 acres, allowing tidal flows to enter and a natural restoration to occur. A large increase in bird and fish species using those ponds has been observed, and further monitoring will occur.

Also, a full scale control of Atlantic cordgrass (*Spartina alterniflora*) on the refuge has been completed. This year in addition to traditional application methods such as broadcast spraying, biologists applied herbicide using a spray ball suspended from a helicopter – new technology that allowed them to target small, remote patches of the non-native cordgrass. The effectiveness of this treatment is being monitored and it looks promising.

Farallon

At Farallon NWR, the northern fur seal population is doing exceptionally well. They were completely extirpated from the island in the 1800s due to harvest for pelts and meat from hunters. The fur seals returned to the islands to breed in 1996, marking the first pup born there in over 100 years. The population took off this year with 188 seals, including 97 pups, up from 24 pups in 2005.

A trip in September marked the first time educators had been taken to the islands. The event occurred as part of the new curriculum for Webs Under Waves, an environmental education program focusing on the common murre restoration on Devil's Slide Rock and the Farallons. The program was delivered for the first time this spring to 650 students and 26 teachers and is being implemented by the SF Bay NWR Complex, PRBO Conservation Science, and Gulf of the Farallones National Marine Sanctuary.

Ellicott Slough

This year the levee repair at Calabasas Pond was finished. The levee broke in 1999, and, until now, only temporary fixes had occurred. Design of the levee repair began last year, with construction completed this fall with biological monitoring occurring throughout. This repair was crucial to the survival of the endangered Santa Cruz long-toed salamander, which relies on the pond.

Salinas River

Salinas River NWR, one of the protected areas for the federally threatened snowy plovers, recorded a successful breeding season. According to PRBO Conservation Science, there were 282 total fledges in the Monterey Bay area, 29 of which were on the refuge. This constitutes the 3rd all time highest fledge numbers in 15 years of monitoring this species. The recovery unit goal of one chick fledge per male was achieved, marking the 4th consecutive year of this accomplishment.

San Pablo Bay

The headquarters of San Pablo Bay NWR was moved from Mare Island to Sears Point. The new office was renovated and a greenhouse was built. Additionally, the refuge has formed



wonderful new partnerships with Sonoma Land Trust, US Geological Survey, the Bay Institute, Save the Bay, California Department of Fish and Game, and Friends of San Pablo Bay. The refuge is becoming friends with new neighbors at the new office location.

Antioch Dunes

Antioch Dunes NWR is under new management – Christy Smith, who also manages Marin Islands and San Pablo Bay NWRs, is now managing Antioch Dunes. Antioch Dunes welcomed biologist Louis Terrazas to its staff, and formed partnerships with PG&E and local fire and law enforcement.

Marin Islands

The final draft of the Comprehensive Conservation Plan (CCP) was completed and signed for Marin Islands NWR. Implementation of some CCP actions have already commenced, notably vegetation restoration.

Young Northern Fur Seal Pup at Farallon National Wildlife Refuge

Contributors: Clyde Morris, Joy Albertson, Joelle Buffa, Diane Kodama, Christy Smith

Trails of the Don Edwards San Francisco Bay NWR

Did you know that the Don Edwards San Francisco Bay National Wildlife Refuge spans nine cities and three counties, and contains over 30 miles of hiking trails? In the next few issues of *Tideline*, Refuge Manager and birding enthusiast Clyde Morris will highlight trails found on America's first urban National Wildlife Refuge.

Name: Coyote Creek Lagoon Trail

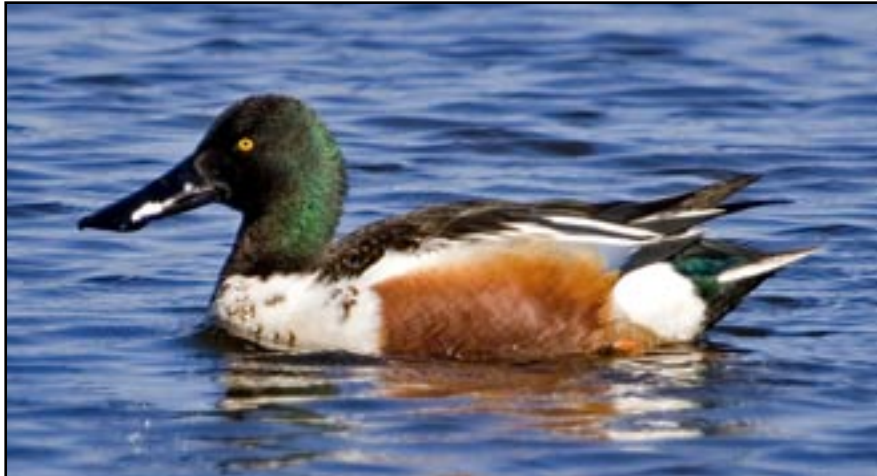
Miles One Way: 2.5 miles one way from north parking area to south parking area.

Degree of Difficulty: Easy

Uses Permitted: Walking & bicycling only; dogs not permitted

Trail Surface: Compacted gravel levee. ADA compatible from South Parking Lot/Trailhead only.

Highlights: This trail is one of the best trails on the refuge in Alameda County for viewing,



photographing, and studying water birds in the spring, winter and fall. At least 35 species can be seen on an hour-long walk. More species can be seen using binoculars and a spotting scope on longer walks. Hidden behind a business park, it is the perfect place to get away from urban congestion.

Directions to Trailhead: The north and south trailheads can be reached by taking the South Fremont Blvd/Cushing Pkwy exit from I-880 in Fremont. Drive south on Fremont Blvd.

North Fremont Blvd Parking Lot/Trailhead: Directly across 46600 Fremont Blvd and 0.1 mile before you reach the intersection with West Warren, turn right onto a poorly signed dirt road. This poorly maintained road leads 0.2 miles to a city park with parking. The trail begins at the brown metal gate.

South Fremont Blvd. Parking Lot/Trailhead: Drive south on Fremont Blvd. until it dead ends. There is a parking lot on the right next to 48481 Fremont Blvd. Go up the ramp to the trail that follows along a flood control channel. The refuge boundary begins at the sign.

Introduction: Coyote Creek Lagoon was created in 1986 as a 220-acre mitigation project for the business park next to the south parking lot on Fremont Blvd. The lagoon was excavated to provide fill for the business park and then connected to Coyote Creek and Mud Slough to provide wetland habitat for wildlife. It has been monitored yearly since 1986, forming one of the longest continuous monitoring data sets of a San Francisco Bay wetland mitigation project. The lagoon is tidal and is surrounded by brackish marsh. The trail is on an elevated flood control levee separating Coyote Creek Lagoon from a business park flood control basin. Plans call for connecting this trail to the Bay Trail within a few years.

Trail Details from the South Trailhead: The first 0.1 miles takes you along a flood control channel toward the refuge boundary. View tidal wetlands being constructed across the channel along Coyote Creek. These would-be wetlands are part of a mitigation project and are proposed to become part of the refuge.

For the next 0.3 miles, the trail is sandwiched between Coyote Creek and a pickleweed marsh dubbed the Mouse Pasture. This section of the creek is used by endangered steelhead and Coho salmon in their migration to the Bay and the ocean. Across Coyote Creek is a favorite of the South Bay gull population, the Newby Island Landfill. The Mouse Pasture provides habitat for the endangered salt marsh harvest mouse. It also houses nesting black-necked stilts and American avocets in the summer.

Venturing forward, you will come across a fork in the trail. Going straight brings you to a fishing spot popular with those dreaming of catching striped bass and sturgeon. Veering right will bring you between Coyote Creek Lagoon and the business park storm water retention basin. Both offer great water bird viewing. Depending on the tide and the time of year, there are excellent views of ducks, shorebirds, coots, gulls, egrets, herons, pelicans, cormorants, grebes, raptors, song sparrows, common yellowthroats, and many others.

After 2.1 miles you reach another junction. The left trail takes you over a railroad railcar bridge over Mud Slough with views of the back side of the lagoon. The right trail leads you to the north trailhead parking lot and another 0.4 mile toward the Fremont Blvd entrance. This section of trail has upland bird species such as ring-necked pheasant, house finch and mockingbirds. Rest at the picnic tables in the small city park before your return hike along the lagoon. Or, you can head out onto Fremont Blvd and walk the 1.5 miles back to your car at the south parking lot. For more information, contact the Don Edwards SF Bay NWR's Fremont Visitor Center Tuesday through Sunday 10:00 a.m. – 5:00 p.m. or call 510-792-0222 ext. 43.



San Pablo Bay National Wildlife Refuge
 Hwy 37 after Lakeville Hwy (707) 649-9464

11th Annual

San Francisco Bay Flyway Festival

Friday, February 2 5pm - 9pm

Saturday, February 3 9am - 4pm ~ Sunday, February 4 9am - 3pm

Visit the San Pablo Bay National Wildlife Refuge booth at Festival Headquarters in Building 897 on Mare Island.

Meet the National Wildlife Refuge System's famous Blue Goose!

Saturday and Sunday 12 noon

Enjoy Mucky Marsh Music

Saturday 1:30 p.m.

Visit the Office of the San Pablo Bay National Wildlife Refuge in Petaluma.

Refuge Manager Christy Smith and Project Director of Sonoma Land Trust John Brosnan will discuss restoration of the North Point property.

Saturday, 1 p.m. to 2 p.m.

Directions to refuge office: going west on 37, pass 121 light, make a U-turn at the next light, Lakeville Hwy. Office is 1/2 mile on right. Going east on 37, office is 1/2 mile on right after Lakeville Hwy light.



Guided Refuge Walks

Saturday:

Sonoma Baylands Tidal Wetland Walk

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

Off of Hwy 37 at Port Sonoma Marina. Follow the signs.

Guadacanal Village Wetland Restoration Marsh

9 a.m., 9:30 a.m., 10 a.m., 10:30 a.m., 11:00 a.m.

View shorebirds with a refuge volunteer.

Meet in front of Building 897 to be shuttled

Sunday:

Cullinan Ranch, San Pablo Bay National Wildlife Refuge

1 p.m. - 2 p.m.

Bird viewing and discussion on wetland restoration. Get directions to the site at the refuge booth in building 897 or from the Festival brochure.

For a Flyway Festival brochure, call (707) 649-9464 or www.SFBayFlywayFestival.com
 For events and activities at SF Bay National Wildlife Refuge Complex visit <http://www.fws.gov/desfbay>

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 April 8, 2006 and July 14, 2006. These gifts will be used for capital, environmental education, habitat restoration, and interpretive programs at the Don Edwards San Francisco Bay National Wildlife Refuge.

Sponsor

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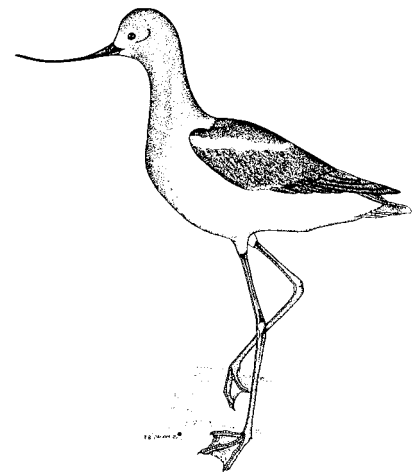
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Senior/Student

Jack Alex, Harriette Atkins, Ruth Bailey, Lyle P Bickley, Doris M Brown, Rosalie R Cape, Robert B Chessman, Ema B Coker, Walter R Ems, Betty Foster, Anne H Hootman, George J Kern, Phil Lindsat, Mary McDevitt-Brown, Alberto Martinez, Clark Nakamura, Jean L Salmon, Todd C Smith, Don J Thompson, Phyllis J Vickers, Bernice Walton, Craig Williams, and Norma Zimmer



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 510-792-0222 ext. 40.

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 \$250 Sponsor \$1,000 Leader
- \$35 Individual \$75 Supporter \$200 Corporation \$500 Sustainer

Check Visa or MasterCard # _____ Exp. Date _____

Signature _____

Name _____

Address _____ City _____ State _____ Zip _____

Phone _____ *Thank you for your support!*

I'm Glad You Asked!

The San Francisco Bay Wildlife Society (Wildlife Society) has had a very busy and successful year. Funding received from memberships, donations, bookstore sales and grants allowed the Wildlife Society to help the San Francisco Bay National Wildlife Refuge Complex accomplish several significant projects in wildlife habitat conservation and preservation, and promoting public awareness and appreciation of San Francisco Bay habitat Environmental Education and Interpretive Programs. Through a grant from the City of San Jose (Slow the Flow Program), an environmental education specialist provides free in-classroom presentations and field trips to the refuge for South Bay students; while family-oriented interpretive activities and events are provided by an interpretive specialist through a grant from the Santa Clara Valley Urban Runoff Pollution Prevention Program. Both programs are based at the Environmental Education Center in Alviso.

Relocation of salt marsh harvest mice. Using equipment purchased with funds donated to the Wildlife Society, U.S. Fish and Wildlife Service biologists successfully relocated the mice, who were desperately seeking a new home, onto wetland habitat within the boundary of the Don Edwards SF Bay NWR.

Completion of the Restoration and Management Plan for Bair Island. Thanks to the completion of the Bair Island Restoration and Management Plan, which was financed through grants to the Wildlife Society, this long-awaited restoration project in Redwood City is now underway.

Upland restoration and interpretive trail. A native plant restoration plan has been developed and restoration activities will soon begin on a 10-acre tract adjacent to the Environmental Education Center thanks to a grant to the Wildlife Society.

Printing of new map for Fremont trails. Visitor services were greatly enhanced when

NUMMI (New United Motor Manufacturing, Inc.) donated funds to the Wildlife Society to print new color trail maps for the Don Edwards San Francisco Bay NWR. The maps depict the area around the refuge's headquarters and visitor center in Fremont.

Visitor Center upgrades. You may have noticed the Fremont visitor center auditorium undergoing a transformation during the last few months. Look for more changes to come as Wildlife Society continues to help fund these improvements.

Binoculars to loan. What is a wildlife refuge without being able to enjoy the birds? Using funds provided by the Wildlife Society, the staff at the Environmental Education Center in Alviso was able to purchase much needed binoculars to enhance their activities.

T-shirts for Volunteer staff. Volunteers play a vital role in refuge operations, especially when staffing special events. Volunteers should be easily identified as a knowledgeable extension of refuge staff. Wildlife Society answered this need by purchasing special t-shirts for the volunteer staff of our refuge complex.

As we move into 2007, the Wildlife Society will continue to support upland restoration activities and visitor center upgrades for the Don Edwards San Francisco Bay NWR, as well as continuing to fund other visitor service needs such as the quarterly *Tideline* publications, summer camps, and education manuals for field trip programs.

We would love to hear from you if you have suggestions on how we can assist the refuge. Please send your comments to San Francisco Bay Wildlife Society, P.O. Box 234, Newark, CA 94560. We would also like to welcome you as a member of the Wildlife Society. Complete the coupon in *Tideline*, or use the envelope to send your donation. Together we can make a positive difference in the environment – benefiting man and nature.



Fast Facts:

Our mailing address has changed! The new mailing address for the U.S. Fish and Wildlife Service at the San Francisco Bay National Wildlife Refuge Complex is 9500 Thornton Avenue, Newark, CA 94560. Phone and FAX numbers remain the same.

Bair Island Restoration Begins! Over the next few years, land within the levees of Bair Island will be filled and raised to help marsh plants establish, create habitat for endangered species and other wildlife, and improve public access. To do this safely, Bair Island will close intermittently Monday-Friday but will remain open on most weekends. For more information, log on to <http://www.fws.gov/desfbay> or call 510-792-0222.

Winter Activity Schedule

December

Saturday, December 2

Family Bird Walk

Visitor Center, Fremont
10:00 a.m. - 12:00 p.m.

Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal birdwatching 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.

Sunday, December 3

Life-sized Puzzling Pipes

Environmental Education Center, Alviso
2:00 p.m. - 4:00 p.m.

Care to climb down your drain pipes? Well, maybe not! Instead, come out to the refuge and jump into our fun maze of puzzling pipes. Bring your creativity and design your own drain pipe system that maps where our water goes. Next, design and decorate your own, unique household water-saver pail with recycled materials. While waiting for your newly crafted pail to dry, test your agility and luck in our water pipes obstacle course. Recommended for ages 6 and up. Reservations required. Call Tina at 408-262-5513 ext 104.

Saturday, December 9

Exploring the Dunes

Antioch Dunes NWR, Antioch
10:00 a.m. - 11:00 a.m.

Did you know there's a National Wildlife Refuge in Antioch? 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.

Salt Pond Tour

Meet at Bayfront Park, Menlo Park
10:00 a.m. - 12:00 p.m.

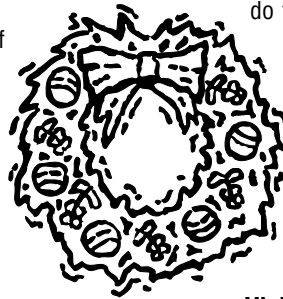
Did you know that the largest tidal wetland res-

toration project on the West Coast is happening right here in San Francisco Bay? Hear more about this project and view some of the salt ponds acquired by the Don Edwards San Francisco Bay National Wildlife Refuge. Geared toward adults. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 43 for reservations and directions.

Holiday Arts & Crafts

Environmental Education Center, Alviso
2:00 p.m. - 4:00 p.m.

Turn used paper into all kinds of nifty stuff. Create gifts, cards, and holiday decorations using recycled paper and other materials. Crafts suitable for ages 5 and up. RESERVATIONS REQUIRED. Call Laurie McEwen 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. Meet at the observation deck. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222. Led by Mary and Gene Bobik.

Sunday, December 10

Introduction to Ducks

Visitor Center, Fremont
10:00 a.m. - 11:30 a.m.

Thousands of ducks winter in the San Francisco Bay every year. View a short slide show 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. Led by Carmen Minch.

Saturday, December 16

Quackers and Honkers

Environmental Education Center, Alviso
1:00 p.m. - 2:30 p.m.

Enjoy a brief slide show about our migratory ducks and geese. Then join us in a leisurely walk to see which migrants made it to the refuge. Open to all ages. Led by Ed Kantack. RESERVA-

TIONS REQUIRED. Call Laurie McEwen at 408-262-5513 ext. 102.

Holiday for the Birds!

Environmental Education Center, Alviso
2:30 p.m. - 4:00 p.m.

Make new feathered friends at our holiday season live bird program. Sulphur Creek Nature Center will bring a diverse assortment of live birds for us to get familiar with. Find out what you can do to help wild birds and other wildlife in your watershed. Make a peanut butter bird treat to take home. Suitable for all ages. RESERVATIONS REQUIRED. Space is limited. Call Laurie at 408-262-5513 ext. 102.

South Bay Salt Pond Restoration Presentation

Visitor Center Auditorium, Fremont
3:00 p.m. - 4:00 p.m.

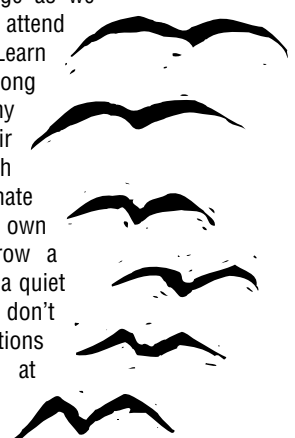
The South Bay Restoration Project will transform South San Francisco Bay in the next few decades. How will this affect habitat, wildlife, and wildlife-oriented recreation? In this slide presentation, learn about the project, the role of the Don Edwards San Francisco Bay National Wildlife Refuge, and how you can become involved with the largest tidal wetland restoration project on the West Coast. Geared for ages 12 and older. Call 510-792-0222 ext. 43 for reservations.

Sunday, December 17

Avian Antics

Environmental Education Center, Alviso
1:30 p.m. - 3:00 p.m.

Join us at the refuge as we explore the trails and attend a low-tide feast. Learn some bird trivia along the way, like why some birds eat their own feathers or which refuge bird finds a mate for life? Bring your own binoculars, or borrow a pair of ours! This is a quiet walk so the birds don't fly away. Reservations required. Call Tina at 408-262-5513 x104.



Don Edwards San Francisco Bay National Wildlife Refuge

1 Marshlands Road, Fremont - (510) 792-0222 • 1751 Grand Blvd, Alviso - (408) 262-5513 • <http://www.fws.gov/desfbay>

Winter Activity Schedule

Sunday, December 17

Salt Pond Tour

Meet at Bayfront Park, Menlo Park

2:00 p.m. – 4:00 p.m.

Did you know that the largest tidal wetland restoration project on the West Coast is happening right here in San Francisco Bay? Hear more about this project and view some of the salt ponds acquired by the Don Edwards San Francisco Bay National Wildlife Refuge. Geared toward adults. RESERVATIONS REQUIRED. Call 510-792-0222 ext. 43 for reservations and directions

Thursday, December 21

Twilight Solstice Walk

Environmental Education Center, Alviso

4:00 p.m. – 5:30 p.m.

Come celebrate the longest night of the year and enjoy sunset over the marsh. Learn about the Winter Solstice and how it is celebrated around the world. Suitable for all ages. Dress warmly. It can be cold and windy by the bay. RESERVATIONS REQUIRED. Call Laurie at 408-262-5513 ext. 102.

January

Saturday, January 6

Webelos Naturalist Program

Environmental Education Center, Alviso

1:00 p.m. – 3:00 p.m.

Calling all Webelos! Anyone out there need to earn a naturalist badge? We've got a program just for you. Learn about birds, migration, flyways, food chains, human impacts, and the importance of wetlands. Then take a walk with our binoculars to spot birds in the wild. Led by Webelos Den Leader June Smith. Program will take place rain or shine. RESERVATIONS REQUIRED. Please call Laurie at 408-262-5513 ext. 102.



Family Bird Walk

Visitor Center, Fremont

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

Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal birdwatching 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.

Sunday, January 7

Critter Café

Environmental Education Center, Alviso

2:00 p.m. – 3:30 p.m.

Water is pretty boring stuff, right? No way! Come take a closer look at some of the tiny, wiggly, squiggly creatures found in slough water samples. Learn about macroinvertebrates and plankton - the tasty treats that shorebirds are eating at our five-star marsh "cafes" at the refuge. Recommended for ages 6 and up. Reservations required. Call Tina at 408-262-5513 ext 104.

Saturday, January 13

Exploring the Dunes

Antioch Dunes NWR, Antioch

10:00 a.m. – 11:00 a.m.

Did you know there's a National Wildlife Refuge in Antioch? 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.

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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. Meet at the observation deck. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222. Led by Mary and Gene Bobik.

Saturday, January 20

All About Owls

Environmental Education Center, Alviso

1:00 p.m. – 2:30 p.m.

Why did Native Americans call them "hush wing?" How do they see and hear? What do they eat? Learn the answers to these and more. Recommended for ages 7 and up. Led by Ed Kantack. RESERVATIONS REQUIRED. Call Laurie at 408-262-5513 ext. 102.

Adult Beginning Birdwatching

Environmental Education Center, Alviso

3:00 p.m. – 4:30 p.m.

Can you tell a mallard from a northern shoveler? If not, join birding enthusiast Ceal Craig for a beginning birdwatching program and get to know the most common refuge visitors. Start with a slide show to learn how to recognize the regulars, then take a walk with our binoculars to try your new skills. Program intended for adults. RESERVATIONS REQUIRED. Call Laurie McEwen at 408-262-5513 ext. 102.

South Bay Salt Pond Restoration Presentation

Visitor Center Auditorium, Fremont

3:00 p.m. – 4:00 p.m.

The South Bay Restoration Project will transform South San Francisco Bay in the next few decades. How will this affect habitat, wildlife, and wildlife-oriented recreation? In this slide presentation, learn about the project, the role of the Don Edwards San Francisco Bay National Wildlife Refuge, and how you can become involved with the largest tidal wetland restoration project on the West Coast. Geared for ages 12 and older. Call 510-792-0222 ext. 43 for reservations.

Don Edwards San Francisco Bay National Wildlife Refuge

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Winter Activity Schedule

Sunday, January 21

Salt Pond Tour

Meet at Bayfront Park, Menlo Park
2:00 p.m. – 4:00 p.m.

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Salinity Sleuths

Environmental Education Center, Alviso
2:30 p.m. – 4:00 p.m.

Step into the shoes of a scientist and strap on our field detective packs for a hands-on investigation where we will collect water samples, use plant clues, and do some sleuthing around to uncover how salty the water is. You will need to bring along keen senses of taste, smell and sight to determine which plants and animals live in the refuge's salty habitats! Reservations required. Call Tina at 408-262-5513 x104.

Sunday, January 28

Introduction to Ducks

Visitor Center, Fremont
10:00 a.m. – 11:30 a.m.

Thousands of ducks winter in the San Francisco Bay every year. View a short slide show 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. Led by Carmen Minch.



February

Saturday, February 3

11th Annual San Francisco Bay Flyway Festival

Mare Island, building 897
9:00 a.m. to 4:00 p.m.

This annual event has it all! Come join the bird migration frenzy through games, activities for young and old, wetland and bird walks, presentations, videos, music and much, much more. See the Festival advertisement in this newsletter for refuge-related events and go to <http://www.SFBaFlywayFestival.com> for details on the 50 exhibits and off-site events.

Family Bird Walk

~~Visitor Center, Fremont
10:00 a.m. – 12:00 p.m.~~

~~Let family walks become a shared time of nature learning. We'll begin by helping kids create their personal birdwatching 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.~~

Sunday, February 4

Habitat Hike

Environmental Education Center, Alviso
2:00 p.m. – 3:30 p.m.

Ever wonder how many habitats are here at the refuge? Come take a walk and see them all! See the salt marsh, sloughs, salt ponds and more on our short and easy trek. We will identify plants, birds, and whatever animals that cross our path, and how people have affected their habitat. Recommended for ages 6 and up. Reservations required. Call Tina at 408-262-5513 ext 104.

Saturday, February 10

Exploring the Dunes

Antioch Dunes NWR, Antioch
10:00 a.m. – 11:00 a.m.

Did you know there's a National Wildlife Refuge in Antioch? 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.

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

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Salt Pond Tour

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10:00 a.m. – 12:00 p.m.

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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. Meet at the observation deck. Not suitable for young children. RESERVATIONS REQUIRED. Call 510-792-0222. Led by Mary and Gene Bobik.

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Winter Activity Schedule

Sunday, February 11

Where Does All the Water Go?

Environmental Education Center, Alviso
2:00 pm. – 3:30 p.m.

Are you curious about where wastewater goes after we flush, rinse, wash, and shower? Come enjoy a presentation on how the San Jose/Santa Clara Water Pollution Control Plant cleans wastewater. A short tour will follow the presentation, familiarizing participants with wastewater and the refuge habitats involved. Appropriate for ages 10 and up. Reservations required. Call Tina at 408-262-5513 ext 104.

Saturday, February 17

Water, Water Everywhere

Environmental Education Center, Alviso
1:00 p.m. – 2:30 p.m.

Where does all the water come from, and where does it go? Learn about the water cycle and watersheds. Build a model of a watershed and see if you can predict where the water will go. Recommended for ages 8 and up. Led by Ed Kantack. RESERVATIONS REQUIRED. Call Laurie at 408-262-5513 ext 102.

South Bay Salt Pond Restoration Presentation

Visitor Center Auditorium, Fremont
3:00 p.m. – 4:00 p.m.

The South Bay Restoration Project will transform South San Francisco Bay in the next few decades. How will this affect habitat, wildlife, and wildlife-oriented recreation? In this slide presentation, learn about the project, the role of the Don Edwards San Francisco Bay National Wildlife Refuge, and how you can become involved with the largest tidal wetland restoration project on the West Coast. Geared for ages 12 and older. Call 510-792-0222 ext. 43 for reservations.

Community Service Day

Visitor Center, Fremont
10:00 a.m. – 12:00 p.m.

Do you need to fulfill community service requirements? Come help remove invasive non-native plants. Bring your own gloves or borrow a pair of ours. Tools and drinking water provided. Dress in layers, long pants and long sleeved shirts over t-shirts recommended. Be prepared to get dirty and wet. All ages welcome. Young children must be accompanied by an adult. Reservations required, please call Tia Glagolev at 510-792-0222 ext. 36.

Sunday, February 18

Salt Pond Tour

Meet at Bayfront Park, Menlo Park
2:00 p.m. – 4:00 p.m.

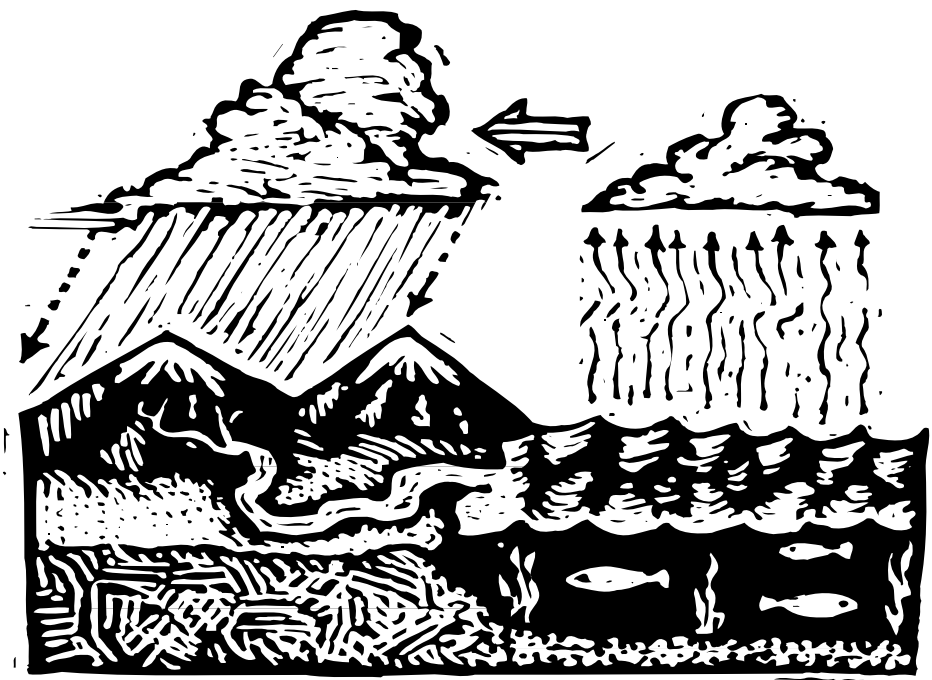
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Sunday, February 25

Adult Beginning Birdwatching

Environmental Education Center, Alviso
9:30 a.m. – 11:00 a.m.

Can you tell a mallard from a northern shoveler? If not, join birding enthusiast Ceal Craig for a beginning birdwatching program and get to know the most common refuge visitors. Start with a slide show to learn how to recognize the regulars, then take a walk with our binoculars to try your new skills. Program intended for adults. RESERVATIONS REQUIRED. Please call Laurie McEwen at 408-262-5513 ext. 102.



Don Edwards San Francisco Bay National Wildlife Refuge

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Field Trips to the Refuge

General Field Trip Program Information

FREE field trip programs are offered at two sites at the Don Edwards San Francisco Bay National Wildlife Refuge. Wetland Round-Up and Trekking the Refuge field trip programs are offered at the Visitor Center in Fremont, and Wetland Round-Up and Slow the Flow 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 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 going to the Fremont site must attend every two years.

Field Trips at the Visitor Center in Fremont

Wetland Roundup - Investigate creatures of the mud flats, plankton and other creatures in the slough, and the pickleweed in the salt marsh. This field trip is designed for grades K-6, for up to 65 students. Wetland Roundup is offered Tuesday-Friday from February through May, 2007.

Trekking the Refuge - Trek the 1-mile Tidelands Trail, and learn about the natural history of the refuge! Then explore the pickleweed in the salt marsh, the brine shrimp in the salt pond, and the plankton in the slough! Available only at the Visitor Center in Fremont, Trekking the Refuge Field Trip is designed for grades 3-6, for up to 36 students. Trekking the Refuge is offered Tuesday through Friday from February through May, 2007.

****Reservations for Spring 2007 field trips will begin on TUESDAY, December 5th from 4:00 p.m. - 5:00 p.m. Call 510-792-0222 ext 0 on this date to reserve a spring field trip. ** For more information or to schedule a field trip after the initial call- in date, call the Environmental Education Intern at 510-792-0222 ext 42.**

Field Trip Orientation Dates at the Visitor Center in Fremont

Call the Environmental Education Intern at 510-792-0222 ext. 42 to attend an orientation.

Wetland Round-Up Field Trip Orientations

Visitor Center in Fremont

4:00 p.m. - 7:30 p.m.

Wednesday, January 31

Thursday, February 22

Tuesday, March 6

Wednesday, April 11

Trekking the Refuge Field Trip Orientations

Visitor Center in Fremont

3:30 p.m. - 7:00 p.m.

Tuesday, February 27

Field Trips at the Environmental Education Center in Alviso

Wetland Round-Up Field Trips

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

****Reservations for Spring 2007 field trips will begin on TUESDAY, December 5th from 4:00 p.m. - 5:00 p.m. Call 408-262-5513 on this date to reserve a spring field trip.** For more information or to schedule a field trip after the initial call-in date, call the Environmental Education Intern at 408-262-5513 ext 103.**

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

****NEW**** A Wetland Round-Up Field Trip Orientation Refresher is now available at the Environmental Education Center in Alviso. This is for teachers who have attended two or more regular orientations. Teachers who have not attended two or more orientations and all adult volunteers must attend the regular orientations.

Call Genie Moore at 408-262-5513 to attend an orientation.

Wetland Round-Up Field Trip Orientation

4:00 p.m. - 7:30 p.m.

Tuesday, January 30

Wednesday, February 28

Thursday, March 15

Tuesday, April 3

Thursday, April 9

Wetland Round-Up Field Trip Orientation Refresher

4:00 p.m. - 5:30 p.m.

Thursday, January 25

Field Trips to the Refuge

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.

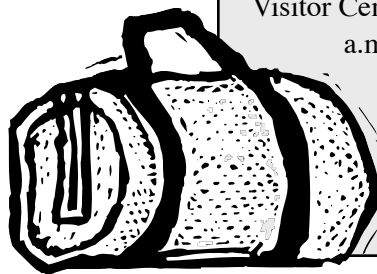
5th and 6th Grades: We offer a combined classroom presentation and an all day hands-on field trip at the refuge.

7th - 12th Grades: We offer classroom presentations and/or a field trip at the refuge.

Slow the Flow Programs are available throughout the year in Alviso. Reservations for the **Slow the Flow** program are on a first come basis. Call Tina Simmons at 408-262-5513 ext. 104 for more information, or to schedule a field trip or presentation.

Free Discovery Packs available at the Visitor Center and Environmental Education Center!

Explore the salt marshes, salt ponds, and the birds of the refuge with your family or small youth group! The Discovery Pack includes an activity booklet, and all the equipment you will need to take a closer look at the salt marsh plants, the brine shrimp, and the birds! The backpack is suitable for up to six people, ages kindergarten - adults. There are also group packs available for 12 - 24 at the Visitor Center in Fremont. Please call in advance if you would like a group pack. You can check out the Discovery Packs free of charge at the Visitor Center in Fremont and at the Environmental Education Center in Alviso. The Visitor Center is open Tuesday - Sunday from 10 a.m. - 5:00 p.m. For questions or to reserve a group pack please call 510-792-0222. The Environmental Education Center is open Saturday and Sunday from 10 a.m. - 5 p.m. For questions call 408-262-5513.



TIDELINE

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

Volume 26, Number 4

Editor: Carmen Minch

To receive **Tideline**, email carmen_leong-minch@fws.gov, or write to: Tideline, Don Edwards San Francisco Bay National Wildlife Refuge, 9500 Thornton Ave, Newark, CA 94560.

San Francisco Bay National Wildlife Refuge Complex

Founded in 1974 and administered by the U.S. Fish and Wildlife Service, Don Edwards San Francisco Bay National Wildlife Refuge exists to preserve wildlife habitat, protect threatened and endangered species, protect migratory birds, and provide opportunities for nature study. Six additional refuges are managed from the headquarters located in Fremont: San Pablo Bay NWR, Antioch Dunes NWR, Salinas River NWR, Ellicott Slough NWR, Marin Islands NWR, and Farallon NWR.

Project Leader: Mendel Stewart
Deputy Project Leader: John Bradley

Don Edwards San Francisco Bay
Refuge Manager: Clyde Morris
Don Edwards Warm Springs
Unit Manager: Ivette Loreda
Don Edwards Refuge
Operations Specialist: Eric Mruz
Farallon Refuge Manager: Joelle Buffa
Farallon Refuge
Operations Specialist: Jesse Irwin
North Bay Refuges Manager: Christy Smith
South Bay Refuges Manager: Diane Kodama
Refuge Planner: Winnie Chan
Chief of Visitor Services: Karla Tanner
Outdoor Recreation Planner: Carmen Minch
Environmental Education
Specialists: Fran McTamany,
Genie Moore, Tia Glagolev

Volunteer Coordinator: vacant
Law Enforcement Officers: Sean Reier,
Walter Duran

Biologists: Joelle Buffa, Joy Albertson,
Giselle Downard, Rachel Hurt, Gerry McChesney,
Danielle LeFer, Susan Euing, Louis Terrazas
Administrative Staff: Lucinda Ballard,
Ellen Tong
Maintenance Staff: Larry Wade,
Juan Flores, Michael Springman, James Griffin,
Robert Stump

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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Varon Smith, Robert Ahrenkiel, and Bill Fu

Staff

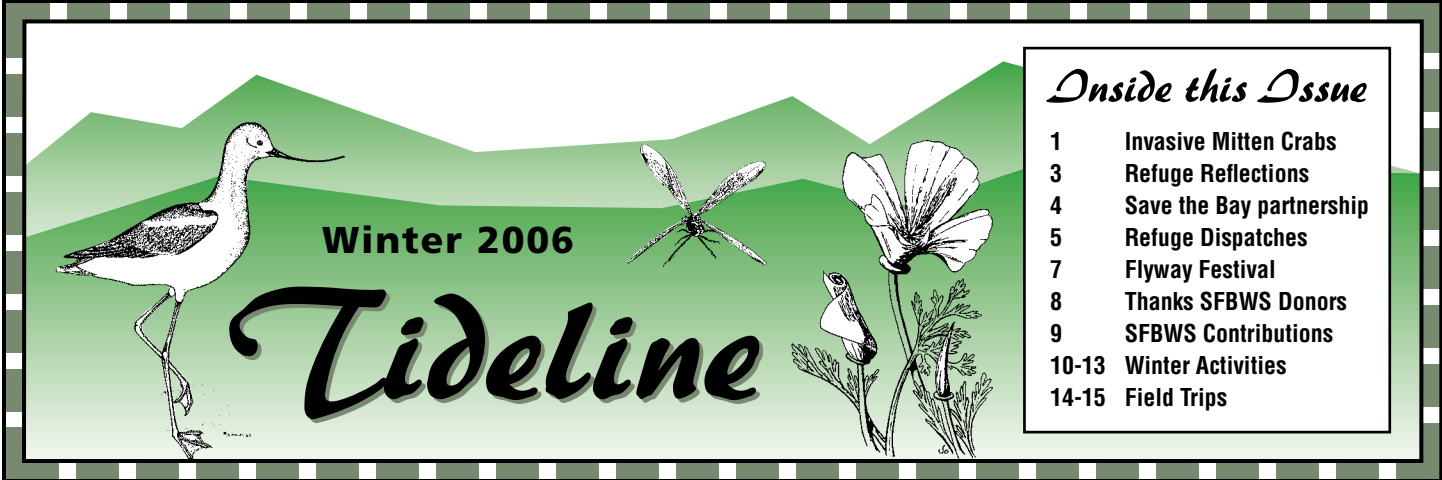
Interpretive Specialist: Laurie McEwen
Education Specialist: Tina Simmons
Program Administrator: Sue Ten Eyck

Tideline is On-Line

Visit our web site, which features
past issues of **Tideline**, at [http://
www.fws.gov/destfbay](http://www.fws.gov/destfbay)

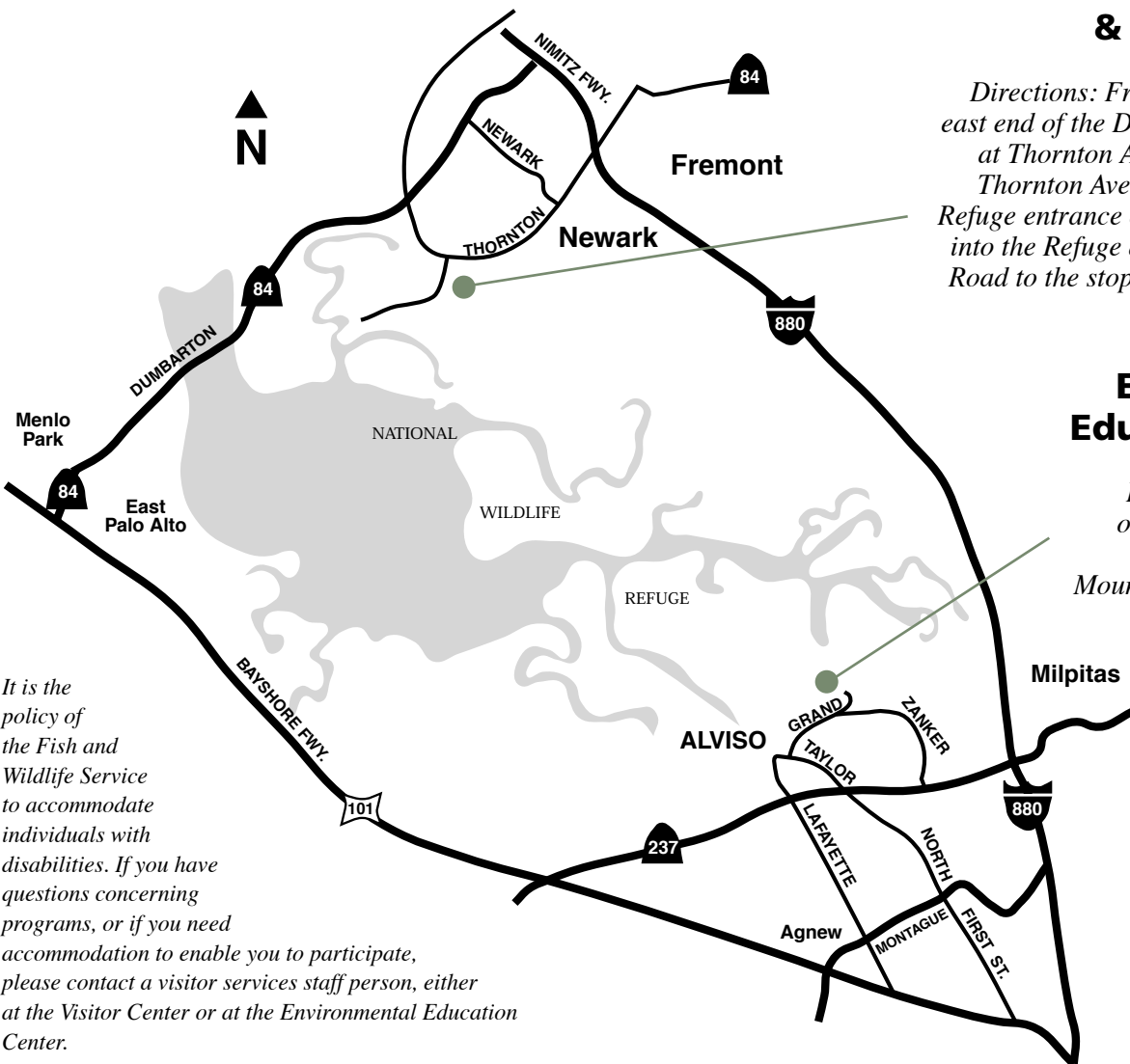
UNITED STATES
 DEPARTMENT OF THE INTERIOR
 FISH AND WILDLIFE SERVICE
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 NATIONAL WILDLIFE REFUGE
 1 MARSHLANDS ROAD
 FREMONT, CA 94555
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 PENALTY FOR PRIVATE USE, \$300

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Inside this Issue

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3	Refuge Reflections
4	Save the Bay partnership
5	Refuge Dispatches
7	Flyway Festival
8	Thanks SFBWS Donors
9	SFBWS Contributions
10-13	Winter Activities
14-15	Field Trips



**Headquarters
 & Visitor Center**

(510) 792-0222
 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.