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## DRAFT COMPREHENSIVE CONSERVATION PLAN

### ALAMEDA NATIONAL WILDLIFE REFUGE

#### Prepared by

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Implementation of this Comprehensive Conservation Plan and alternative management actions/programs has been assessed consistent with requirements of the National Environmental Policy Act (42 U.S.C. 4321 et seq.). A copy of the environmental assessment can be found in Appendix F (under separate cover).

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## **Chapter 1. INTRODUCTION/BACKGROUND**

The U.S. Fish and Wildlife Service is developing a Comprehensive Conservation Plan (CCP) to guide Refuge management and resource use at the proposed Alameda National Wildlife Refuge (NWR). This CCP provides a description of the desired future conditions and long-range guidance to accomplish Alameda NWR purposes. The plan and environmental assessment (EA) address U.S. Fish and Wildlife Service (Service) legal mandates, policies, goals, and appropriate National Environmental Policy Act (NEPA) compliance. A range of administrative, habitat management, and public use alternatives that consider Refuge issues and opportunities are presented in the accompanying environmental assessment. The Service's initial proposal for future management of Alameda NWR is presented herein. The final plan will be developed through modifications made during internal and public review processes.

Major issues to be addressed during the CCP process include: acquisition and completion of the Refuge; habitat protection and enhancement; endangered species management; predator management; wetland restoration; nonnative vegetation control; use of navigable waters within the Refuge; public use management including interpretation, environmental education, and recreation; public use facilities; law enforcement; and compatibility of public uses.

This CCP for the Alameda National Wildlife Refuge is a management tool to be used by the Refuge staff. It will guide management decisions over the next 15 years, and set forth strategies for achieving Refuge goals and objectives within that timeframe. The CCP is divided into five chapters: Chapter 1, an introduction; Chapter 2, planning process; Chapter 3, a description of the Refuge and resources; Chapter 4, Refuge management direction; and Chapter 5, plan implementation.

### **1.1 Refuge Overview**

#### **1.1.1 History of Refuge Establishment and Acquisition**

The closure of NAS Alameda was mandated by Congress in 1993, when the Navy began the process for base closure and disposal of the excess Navy property. As part of the disposal process, the property was first offered to other Federal agencies.

On May 4, 1994, the Service requested a total of 713 acres of land (595 in fee title and 118 protected by easement) and 375 acres of open water for inclusion in the National Wildlife Refuge System. In 1995, the Alameda Reuse and Redevelopment Authority (ARRA), which directed the community planning process for closure and reuse of NAS Alameda, developed a Draft NAS Alameda Community Reuse Plan. This plan recommended that a smaller amount of land be included in the Refuge than the Service request (the Service and the City of Alameda agreed on the water acreage). In September 1995, representatives from the Service and ARRA met and demarcated on a map a northern boundary between the Refuge and areas open for redevelopment that appeared to represent the minimum amount of land area needed to protect the California least tern. ARRA subsequently calculated that 525 land acres and 375 open water acres were within the proposed Refuge, basing this figure on the demarcated northern boundary rather than an actual survey.

In 1996, a *Draft Conceptual Management Plan for the California Least Tern for the Preferred Alternative Community Reuse Plan, NAS Alameda, Alameda, California* was prepared for ARRA (Zander 1996). The ARRA Plan described concepts for managing a Refuge encompassing 390

land acres. It recommended a smaller Refuge in order to make more lands available for redevelopment. After reviewing ARRA's Conceptual Management Plan and conferring with tern experts and predator management specialists with expertise in protecting endangered species, the Service determined that the management proposals and acreage advocated in the plan were inadequate to preserve the least tern colony, and that the area demarcated in September 1995 was the minimum needed. On November 21, 1996, the Service submitted a request to the Navy for a no-cost transfer of 900 acres of land and water. The Service's request was based on a map showing the demarcated boundary developed at the September 1995 meeting. In December 1997, the Service surveyed the lands within this boundary. The digitized estimate is 565 acres of land and 413 acres of open water, resulting in a total of 978 acres within the Refuge boundary.

NAS Alameda closed operations in April 1997. Since closure, the facility has been in a temporary caretaker status under custody of the Navy's Engineering Field Activity West, Naval Facilities Engineering Command in San Bruno. Navy activity is limited to security, maintenance, and environmental restoration. In addition to rehabilitation of contaminated sites, these activities have included preseason tern nesting site preparations, vegetation control, colony monitoring, and predator management.

Alameda NWR will be established when the Service accepts the transfer of open water and land at the former NAS Alameda from the U.S. Navy. The transfer is contingent upon completion of NEPA requirements, clean up of or an agreement to clean up contaminated areas within the Refuge, and other compliance requirements. An exact date for the transfer has not been established, but it is expected to take place during 1999.

### **1.1.2 History of Navy Management**

Until closure of NAS Alameda in April 1997, the Navy managed the land area of the Refuge as an active airfield, and the open water portion as a secured transit area for passage of ships and other watercraft to and from NAS Alameda Inner Harbor. All land and open water areas were closed to the public for military security purposes. The Navy also conducted an active California least tern management program, which, together with protection from human disturbance afforded by the access restrictions, contributed greatly to the breeding success of the tern colony. Least tern management consisted of the following activities: (1) regular monitoring of the nesting site since 1980, (2) protective fencing of the colony site, (3) site preparation,

(4) vegetation control on taxiways and runways, (5) predator control, and (6) tern foraging studies (U.S. Navy 1997a).

Under Navy management, the California least tern colony was monitored three to five days a week or more during the nesting season. Monitoring records included numbers of pairs, number and location of nests, hatching success, number of fledglings, and predation incidents/threats, which were summarized in annual reports. The intensive monitoring allowed rapid response to predation problems (U.S. Navy 1997a). The Navy also conducted tern foraging studies between 1984 and 1993 to determine where terns fed in waters around NAS Alameda.

An electric fence was constructed around the least tern colony in the early 1980s and replaced in 1990. The fence protected the colony from mammalian predators and prevented fledglings from wandering onto the airfield and being run over by aircraft or vehicles. The fence is a solar-powered, three-foot-high (height limited by Navy airfield safety restrictions), 13-strand aluminum wire electric fence. Wire mesh covers the bottom of fence and wraps around onto the ground surface outside the fence (Pomeroy 1994).

Annual site preparation consists of removing vegetation at the colony site by herbicide application (Roundup®) and hand-pulling, adding gravel, and repairing the fence prior to the nesting season. The Navy added oyster shells on several occasions and placed cinder blocks and drain tiles to create visual disruptions and provide shade for chicks (Pomeroy 1994).

Runway maintenance consists of applying herbicide to weedy vegetation that grows in the cracks of the tarmac. When the airfield was operational, vegetation was controlled over the entire airfield area, for the purpose of aircraft safety. While the airfield was active, blasts from the aircraft engines also diminished growth of weeds. During, and just prior to, the caretaker period, the area of vegetation control was reduced. Herbicide treatment of tarmac weeds only occurs within and immediately adjacent to the tern colony (Pomeroy, pers. com.).

Predator management is conducted by USDA Wildlife Services (formerly Animal Damage Control) prior to and during the tern nesting season. Feral cats are trapped and transported to an animal care facility or shot if trapping proves ineffective. Other target mammalian predators listed in the San Francisco Bay NWR Predator Management Plan (rats, raccoons, striped skunks, opossum) are occasionally taken. Red fox, a target species, has not yet been found in the immediate area but would be taken if found in the vicinity of the tern colony.

Avian predators are managed on a case-by-case basis, with live-trapping and relocation being

the preferred method. Avian predators are also removed by shooting when their activities threaten to destroy the entire fledgling production for the nesting season (Pomeroy 1994). Some avian species and/or individuals will avoid live traps, so shooting becomes the only viable option (Steuber, pers. com.).

Preventative methods are also used to reduce predation by northern harriers by managing nesting attempts. No more than one northern harrier pair in a given year is allowed to nest successfully in the grassland areas west of the north-south runway. If more than one nesting pair is found, the eggs of the additional nesting pair(s) are addled, or the young of the additional nesting pair(s) are relocated. Nesting attempts on the airfield area (between the east-west and north-south runways) are completely discouraged. In recent years, one or two northern harrier nesting attempts have been managed each year.

## **1.2 Purpose of and Need for a Plan**

The plan is being developed for the following purposes:

To provide a clear statement of the desired future conditions of the Refuge.

To provide visitors with a clear understanding of the reasons for management actions on the Refuge.

To ensure that management of the Refuge reflects the policies and goals of the National Wildlife Refuge System.

To ensure the compatibility of current and future uses of the Refuge.

To provide long-term continuity in Refuge management.

To provide a basis for operation, maintenance, and development budget requests.

To meet the requirement of the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, which requires the development of Comprehensive Conservation Plans for all refuges by the year 2012.

## **1.3 National Wildlife Refuge System Mission and Goals**

Established in 1903 by President Theodore Roosevelt, the National Wildlife Refuge System now includes 516 refuges and 38 wetland management districts in all 50 states and the U.S. territories. National wildlife refuges teem with a tremendous variety of plants and animals supported by many different kinds of habitats, from arctic tundra to tallgrass prairie to subtropical estuaries. Most national wildlife refuges are strategically located along the major bird migration corridors, ensuring that ducks, geese, and songbirds have rest stops on their long annual migrations. Many refuges were established to protect endangered or threatened species or key sensitive habitats, such as offshore nesting seabird colonies.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997).

The goals of the National Wildlife Refuge System, as described in the Fish and Wildlife Service Manual (602FW 1.4M), follow:

- To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.
- To perpetuate the migratory bird resource.
- To preserve a natural diversity and abundance of fauna and flora on refuge lands.
- To provide an understanding and appreciation of fish and wildlife ecology and the human's role in the environment; and to provide refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented

toward wildlife, to the extent these activities are compatible with the purposes for which the refuge was established.

## **1.4 Refuge Purpose**

The purpose of the proposed Refuge is to protect and enhance migratory birds and other wildlife, particularly threatened and endangered species; and to provide opportunities for environmental education.

The Refuge would also serve purposes encompassed by the following legislation: Migratory Bird Treaty Act of 1918; the Endangered Species Act of 1973, as amended; the Fish and Wildlife Act of 1956, as amended by the Fish and Wildlife Improvement Act of 1978; and the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997.

The authority for the establishment of the Alameda National Wildlife Refuge is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544, 87 Stat. 884).

## **1.5 Refuge Vision Statement**

The proposed Refuge will be managed for the conservation and management of native species of wildlife and fish and their habitats. Wildlife species identified as endangered or threatened will receive management priority, with a special emphasis on stewardship of the California least tern nesting colony. The Alameda least tern colony will continue to be one of the most successful breeding sites in California, and the colony will be expanded. Habitat management will emphasize keeping most of the currently unvegetated areas free of vegetation to deter predators, removing exotic species of plants, and restoring wetland habitat. Predators of least terns will be managed by an integrated program of preventative and selective humane control methods.

Alameda NWR will be a valued asset and a source of community pride to the people of Alameda Point, the City of Alameda, and the East Bay. The proposed public use program, with its emphasis on environmental education and interpretation of natural history, will benefit the endangered species, migratory birds, and other wildlife of the Refuge, and this benefit will extend beyond the boundaries, ultimately for the continuing benefit of the American people.

## **1.6 Step-down Management Plans**

Wildlife and habitat management and public use management are discussed in Chapter 4. As additional site-specific public use facilities are considered, NEPA compliance and public review may be required. A safety and health plan will be developed within one year of Refuge establishment.

## **1.7 Legal and Policy Guidance**

Refuges are guided by the mission and goals of the NWRS, purpose of the refuge, Service laws and policy, and international treaties. Key concepts included in laws, regulations, and policies that guide management of the National Wildlife Refuge System include primary versus multiple-use public lands, compatibility, and priority wildlife-dependent recreational activities. Examples of relevant guidance include the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The Refuge Recreation Act, as amended, authorized the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use when such uses did not interfere with the area's primary purpose. The National Wildlife Refuge System Administration Act of 1966, as amended, provided guidelines and directives for administration and management of all areas in the System, including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas. Use of any area within the System was permitted, provided that such uses were compatible with the major purposes for which such areas were established.

Executive Order 12996 (March 23, 1996) identified a new mission statement for the National Wildlife Refuge System; established six priority public uses (hunting, fishing, wildlife observation and photography, environmental education and interpretation); emphasized conservation and enhancement of the quality and diversity of fish and wildlife habitat; stressed the importance of partnerships with Federal and State agencies, Tribes,

organizations, industry, and the general public; mandated public involvement in decisions on the acquisition and management of refuges; and required identification, prior to acquisition of new refuge lands, of existing compatible wildlife-dependent uses that would be permitted to continue on an interim basis pending completion of comprehensive planning.

The National Wildlife Refuge System Improvement Act of 1997 clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses; establishes a formal process for determining compatibility; establishes the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

Unlike other Federal lands that are managed under a multiple-use mandate (e.g., national forests administered by the U.S. Forest Service and public lands administered by the U.S. Bureau of Land Management), the National Wildlife Refuge System is managed specifically for the benefit of fish, wildlife, and plant resources and their habitats. Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the Refuge System. Compatible wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation are priority public uses of the Refuge System. These uses must receive enhanced consideration over other public uses in refuge planning and management.

Before any uses, including wildlife-dependent recreational activities, are allowed on national wildlife refuges, Federal law requires that they be formally determined to be "compatible." A compatible use is defined as a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or purposes of the refuge. Sound professional judgement is defined as a finding, determination, or decision that is consistent with: the principles of sound fish and wildlife management and administration, available science and resources (funding, personnel, facilities, and other infrastructure), and applicable laws. If financial resources are not available to design, operate, and maintain an activity, the refuge manager will take reasonable steps to obtain outside assistance from the State and other conservation interests.

The Service has completed interim compatibility determinations for the proposed Alameda Refuge ([Appendix D](#), Comprehensive Conservation Plan). Four of the six priority wildlife-dependent recreational activities--wildlife observation, wildlife photography, environmental interpretation, and environmental education--were determined to be compatible. Hunting does not occur in the study area and would not be permitted. For human health reason, fishing would not be allowed on the Refuge. After the U.S. Navy completes all cleanup actions, fishing use on the Refuge would be reevaluated.

## **Chapter 2. PLANNING PROCESS**

### **2.1 Planning Process, Planning Time Frame, and Future Revision**

The first Planning Update for the proposed Alameda NWR was released in July 1997. This update announced a public workshop to be held on August 12, 1997 to identify issues and concerns, and described preliminary goals and key areas of management focus to be discussed in a management plan and environmental assessment (see Appendix G for a summary of public involvement). In a Federal Register Notice dated August 4, 1997, the Service announced that it was preparing a plan for the Refuge. The second Planning Update, released in November 1997, described the issues, concerns, and opportunities identified at the public workshop. The third Planning Update, released in June 1998, announced a delay in release of the planning documents and requested a mailing list update.

The draft CCP and EA and fourth Planning Update are scheduled for release in December 1998. The draft CCP and EA will be distributed to government agencies, local jurisdictions, community groups, and citizens (see Appendix H). A public workshop is scheduled for January 1999 to solicit comments and to provide answers to questions on the draft documents. The final CCP and EA and fifth Planning Update are scheduled for release in March 1999. The CCP will be implemented after the transfer of U.S. Navy property to the U.S. Fish and Wildlife Service.

This CCP will be informally reviewed by Refuge staff while preparing annual work plans and updating the refuge information management system database. It may also be reviewed during routine inspections or programmatic evaluations. Results of the reviews may indicate a need to modify the plan. The monitoring of objectives is an integral part of the plan, and management activities may be modified if desired results are not achieved. If minor changes are required, the level of public involvement and associated NEPA documentation will be determined by the project leader. The CCP will be formally revised at least every 15 years.

The development of this draft CCP was guided by the Refuge Planning Chapter of the Fish and Wildlife Service Manual (Part 602 FW2.1, November 1996). Key steps included: (1) preplanning; (2) identifying issues and developing a vision; (3) gathering information; (4)

analyzing resource relationships; (5) developing alternatives and assessing environmental effects (see Appendix F for environmental assessment); (6) identifying a preferred alternative; and (7) publishing the draft plan. The next steps in this process include soliciting public comments on the draft plan, preparation of the final plan, approval by the California/Nevada Operations Manager, and finally, implementation of the plan.

## 2.2 Planning Issues

Issues, concerns, and opportunities were identified through discussions with planning team members and key contacts and through the public scoping process, which began with a public meeting in August 1997. Comments were received orally at the meetings and in writing. The following issues, concerns, and opportunities are a compilation of information developed by the Service throughout the planning process.

**Habitat and wildlife management.** Many people were concerned about the loss of wildlife habitat and felt that protecting and enhancing wildlife, especially the California least tern, should be a priority. Some felt that other wildlife species, including butterflies and marine mammals, should be considered, and that enhancement of wildlife off the Refuge should be discussed. Concern was expressed about the design of the perimeter fence, vegetation management, and any additional structures and how they would affect the appearance of the area. A comment was made that current wildlife management practices should be evaluated before any changes are made.

Legislation (National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997) mandates wildlife conservation as the overarching mission of the National Wildlife Refuge System and, as such, it is the most important issue at the proposed Alameda NWR. Protection of wildlife habitat, especially for feeding, resting, and nesting birds and their young, would define the types of visitor activities and access allowed. A primary responsibility of the Refuge will be to preserve, restore, and enhance threatened and endangered species and migratory birds. To carry out this responsibility, the California least tern colony must be protected from human disturbance and mammalian/avian predation during the nesting season, and least tern foraging areas must remain free from pollution and disruptive activities. Public use of the open water areas must be managed to prevent flushing and other disturbance of roosting California brown pelicans, nesting birds, and harbor seals hauled out on Breakwater Island. Nonnative plants must be controlled and/or eradicated to restore native plant communities in upland and wetland areas, thereby enhancing habitat for migratory birds. How to provide wildlife-dependent recreation and opportunities for environmental education, while at the same time ensuring wildlife protection, is an issue to be resolved through the CCP process.

**Predator management.** Some people commented that they want the predator management program to continue. One individual opposed the lethal removal of nonnative target animals except as a last resort. Another encouraged a more proactive approach to reduce the need to euthanize or shoot predators. The planning team, California least tern experts, and others involved with managing the tern colony consider protection of the least terns from nonnative and native predators as essential in maintaining the existence of the colony. Without predator management, the colony would not survive. Threats from feral cats off-Refuge are expected to continue, and the potential for invasion of nonnative red foxes (which completed destroyed Oakland Airport colony and could do the same at Alameda) exists. Avian species also prey on least tern adults, eggs, and chicks.

**Public use opportunities.** Many people expressed concern about public access (where, when, restrictions) to the Refuge and its open water, facilities (viewing platforms, boardwalks, perimeter trail, interpretive center with closed circuit television), and types of public uses allowed (docent-led tours, self-guided wildlife observation, fishing, bicycling, jet skiing, etc.). They felt that educational and research opportunities should be considered. Suggestions included charging an entrance fee and offering transportation alternatives, such as ferry and shuttle service or electric vehicles. A couple of respondents stated that boat access through the Refuge to the proposed marina must be considered.

**Contaminant cleanup.** Some people commented that the U.S. Navy should clean up all the contaminated areas.

**Nonwildlife-related uses.** Many people commented that an airfield is not needed, would not be compatible with the preliminary goals of the Refuge, would not be economically feasible or safe, and would contribute to noise and air pollution. Other people commented that a limited-use airfield would be compatible with the Refuge, generate revenue for the city, promote tourism, and provide security for the Refuge.

Some people stated that the use of other facilities, such as the bunkers, should be considered.

**Adequate funding and staff to manage the Refuge.** Managing the Refuge requires funding and staff to effectively carry out habitat and population management activities. Some people expressed concern that the Fish and Wildlife Service would not receive sufficient funds to manage the new Refuge. Several people recommended that the management plan include

a budget for operations and capital improvements. Some respondents felt that building partnerships with public agencies, private organizations, and volunteers would increase the Refuge's management ability.

## Chapter 3. REFUGE AND RESOURCE DESCRIPTION

### 3.1 Geographic and Physical Setting

The Refuge is part of the former Naval Air Station (NAS) Alameda. It is located at the western end of Alameda Island along the eastern side of San Francisco Bay, adjacent to the City of Oakland ([Figure 1](#)). The majority of the site lies within the City of Alameda in Alameda County, except for the southwest corner of the land and water area, which lies in the City and County of San Francisco ([Figure 2](#)). The Refuge is bordered to the west and south by San Francisco Bay, and to the east by former NAS Alameda airfield hangars and other properties. To the north lies the "Northwest Territories," a portion of the former east-west runway, and relatively undeveloped grasslands. The U.S. Navy and the City of Alameda are currently preparing a joint Environmental Impact Statement/Environmental Impact Report regarding the Navy property disposal and subsequent community reuse of the former NAS Alameda property adjoining the proposed Refuge area. Although the U.S. Navy has not made a decision regarding the disposal of the property, the NAS Alameda Reuse Plan calls for development of a links-style golf course, soccer fields, and light-industrial/business park in the Northwest Territories (U.S. Navy 1997a).

The proposed Refuge consists of approximately 565 acres of land and 413 acres of open water. Of those acreages, approximately 534 acres of land and 405 acres of water are in Alameda County, and 31 acres of land and 8 acres of water are in San Francisco County. Land areas include two tidal wetlands, along with the former NAS Alameda airfield. The open water area includes an approach to the former seaplane lagoon and a breakwater. The topography is basically flat, reflecting its history as filled baylands, and the elevation is essentially at sea level.

Most of the proposed Refuge lies within the former airfield area. Within the Refuge boundary are buildings and other structures that were constructed for airfield operations and other military purposes. These include the following buildings: 7 bunkers, 2 guard/watch towers, 3 concrete buildings, and 1 quonset hut. Other structures or facilities within the proposed Refuge boundaries include: runway lighting, helicopter wash pad, electrical vaults (concrete holes 2 to 10 feet deep), storm sewers, blast fence ruins, fences, power poles, wheels up landing aid, and a tetrahedron structure.

### 3.2 Soil

The land portion of the Refuge is composed entirely of engineered fill that was placed over submerged land or tidal flats within San Francisco Bay between 1939 and 1940 (Nichols and Wright 1971). Most of the artificial fill consists of Merritt Sand mixed with Bay Mud that was dredged or pumped from offshore underwater borrow areas. In some places it consists of other materials, including Temescal Formation, broken rock, or miscellaneous refuse. Most of the fill has been covered with tarmac. Soils have developed on top of these fill materials in areas that were not paved. They are all disturbed, mixed soils with variable properties (Welch 1981).

**FIGURE 1**

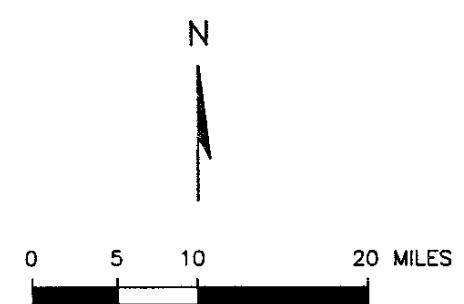
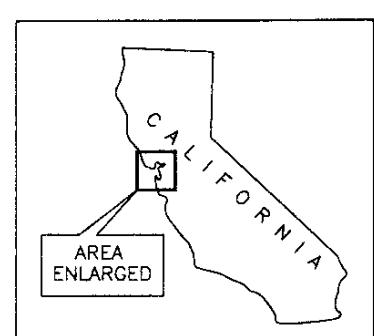
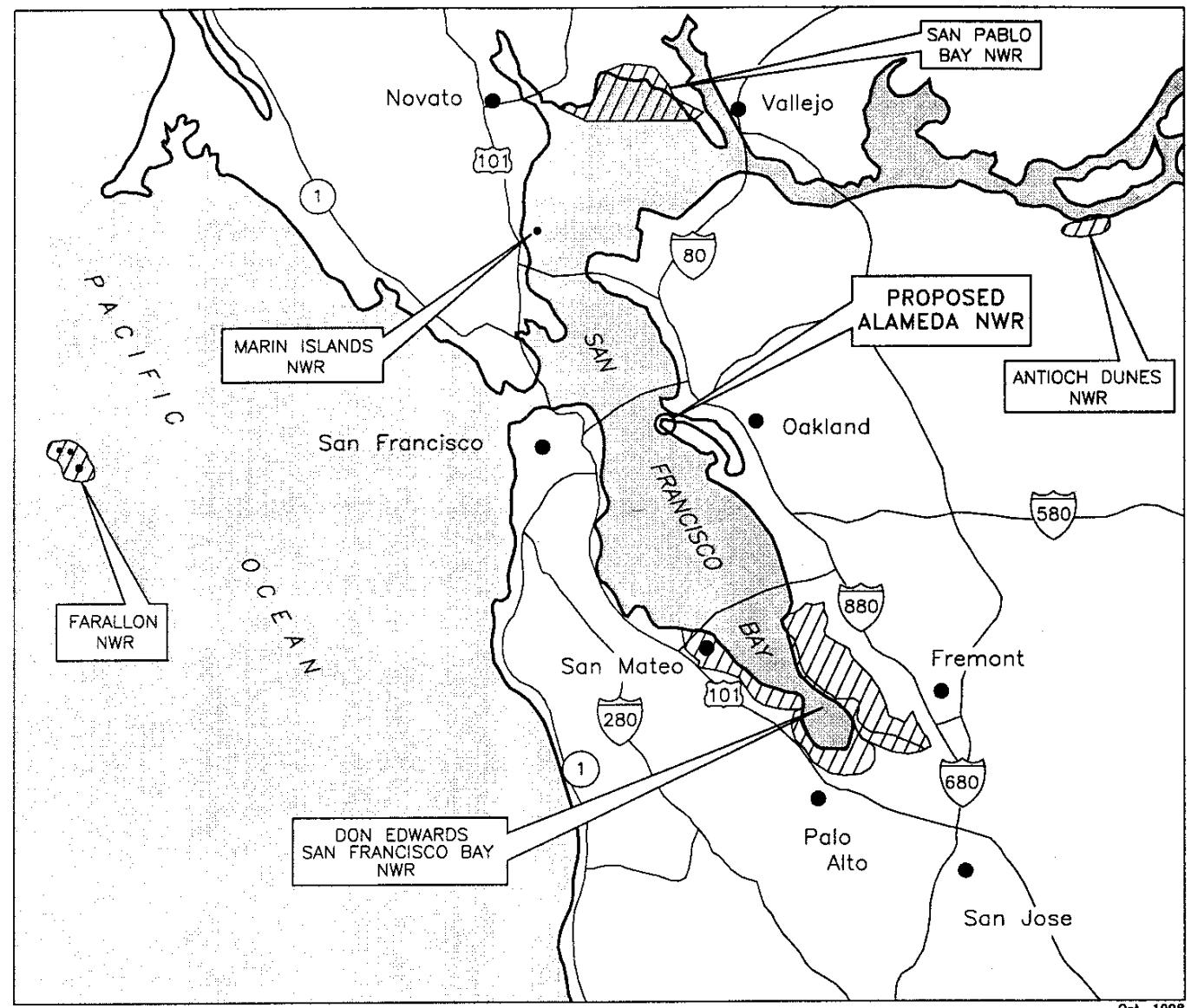


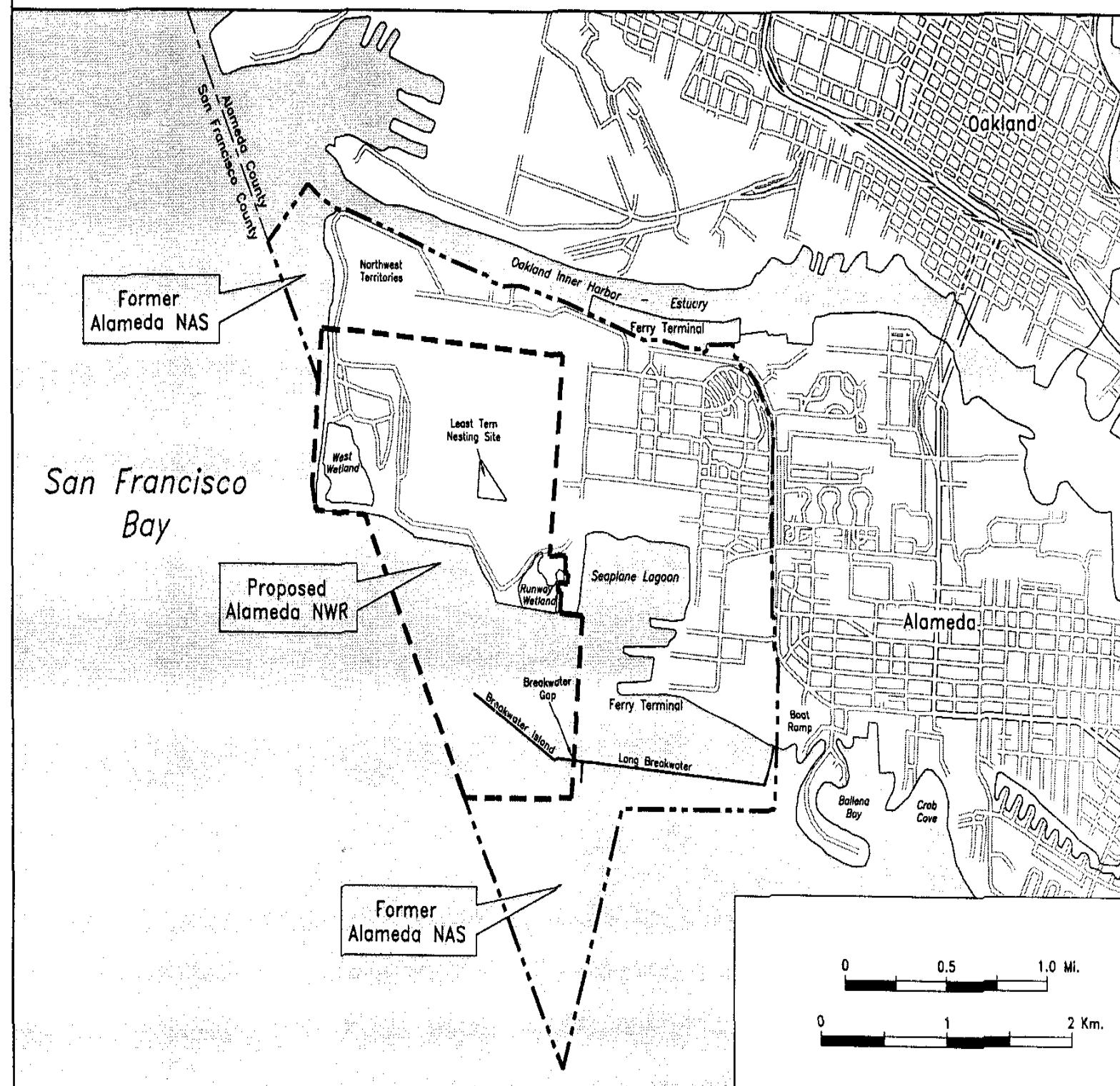
Figure 1. Location Map

FIGURE 2

## PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE

### SPECIFIC LOCALITY MAP

Figure 2.



### 3.3 Water

Groundwater occurs at shallow depths. In general, all subsurface materials are saturated at depths greater than 10 feet below the surface (San Francisco Bay Regional Water Quality Control Board 1995). In wetland areas of the Refuge, groundwater is at the surface. The shallow groundwater is hydrologically connected to the saline Bay waters, resulting in brackish groundwater quality and ponding on some of the land areas during high tides.

The west shoreline of the Refuge is protected from San Francisco Bay waters by rip-rap, consisting of rock boulders piled atop one another. Certain portions of the rip-rap have settled or eroded due to winter storms. Water overtops the rip-rap during certain high tides (Swienton, pers. com.). An earthen levee encircles the western portion of the proposed Refuge, and contains the West Wetland (Figure 3) and landfill site (Figure 7). Between the rip-rap and the earthen levee is a perimeter road. A 36-inch culvert passes under the northwest portion of the riprap and levee, providing tidal interchange with the West Wetland (Figure 3). The culvert is deteriorating, and water seeps out of the culvert's seams during high tide. The integrity of the perimeter road and levee is threatened by the eroding rip-rap and the deteriorating culvert.

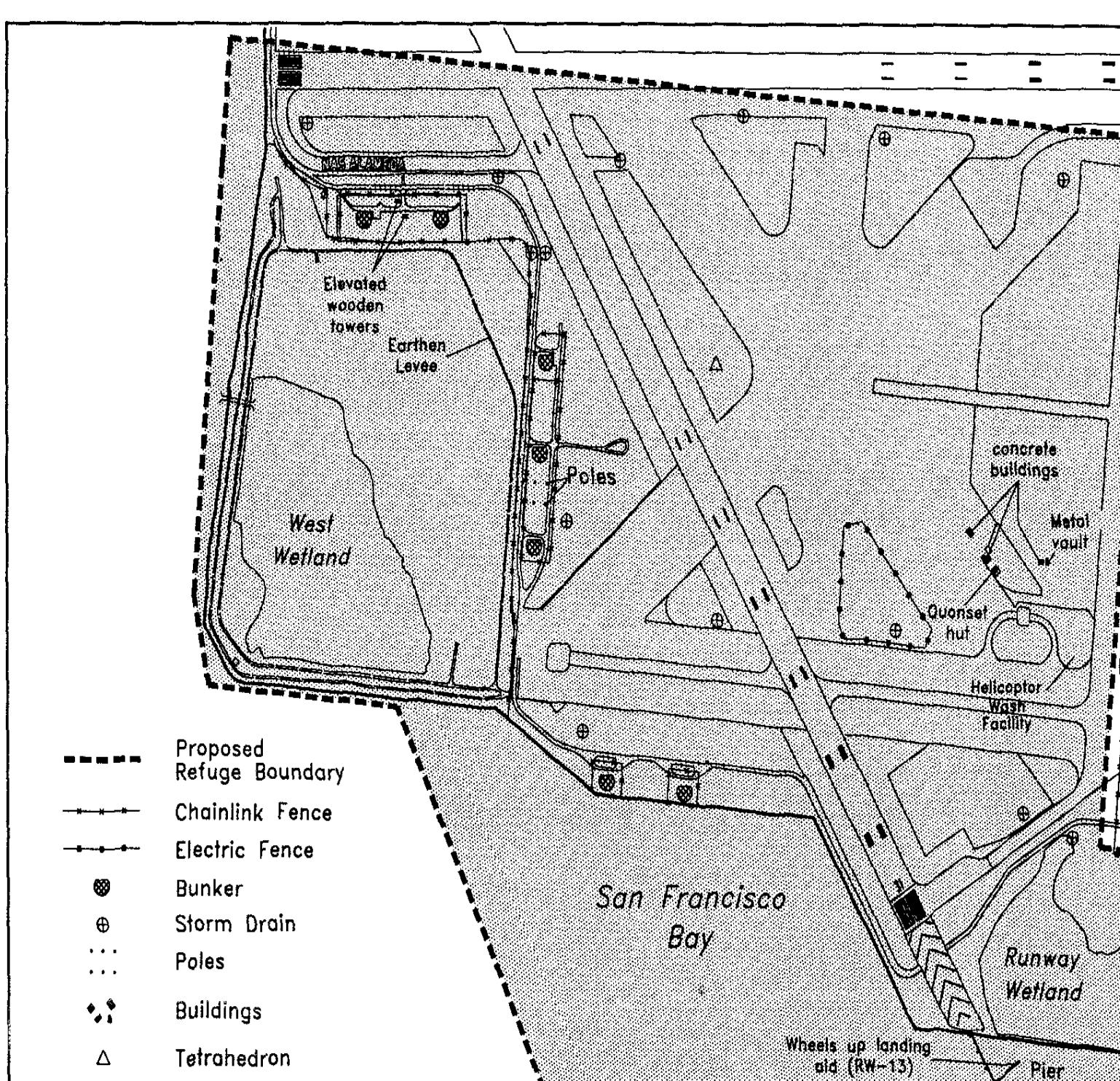
The south shoreline is protected by a rock seawall. A portion of the seawall adjacent to the Runway Wetland is permeable and may indicate a structural problem (Swienton, pers. com.). This allows tidal exchange between the Runway Wetland and the Bay. Ponding in the Runway Wetland and on an adjacent portion of the tarmac also appears to occur from subsurface sources and a high water table, particularly during high tides. An area of the tarmac immediately north of the Runway Wetland regularly ponds water during high winter tides (Swienton, pers. com.).

The paved surfaces of the former airfield drain via storm drains that capture overland flow

and direct it to a system of underground pipelines. Water from the lines is eventually discharged into the Bay (Swienton, pers. com.). Location of the storm drains is shown on [Figure 3](#). The storm sewer system on the former airfield is separate from the storm sewer system and the sanitary system on the industrial portion of NAS Alameda east of the proposed Refuge boundary.

The open water portion of the Refuge consists of approximately 413 acres of open water, including the 2,862-foot-long Breakwater Island near the southern boundary of the Refuge. This open water portion of the Refuge contains a deepwater navigation channel that runs roughly parallel to the southern shoreline between Breakwater Island and tern foraging areas 7 and 8 ([Figure 4](#)). This channel was designed for aircraft carriers which formerly docked at Piers 1, 2, and 3. Aside from the U.S.S. Hornet, which will be docked at Pier 3 as a permanent museum, no future use of the channel by aircraft carriers is anticipated. The channel was dredged in the past by NAS Alameda to 42 feet below mean lower low water. Dredging resulted in short-term increases to turbidity and possible dispersal of contaminated sediments. To minimize impacts to tern foraging activity, the Navy avoided dredging between May 1 and July 15. The Navy has no plans to undertake additional dredging (Pomeroy, pers.com.). However, it is anticipated that the Service will receive requests to dredge this channel every 5 to 10 years.

[FIGURE 3](#)



*Figure 3.*  
PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE  
FACILITIES

[FIGURE 4](#)

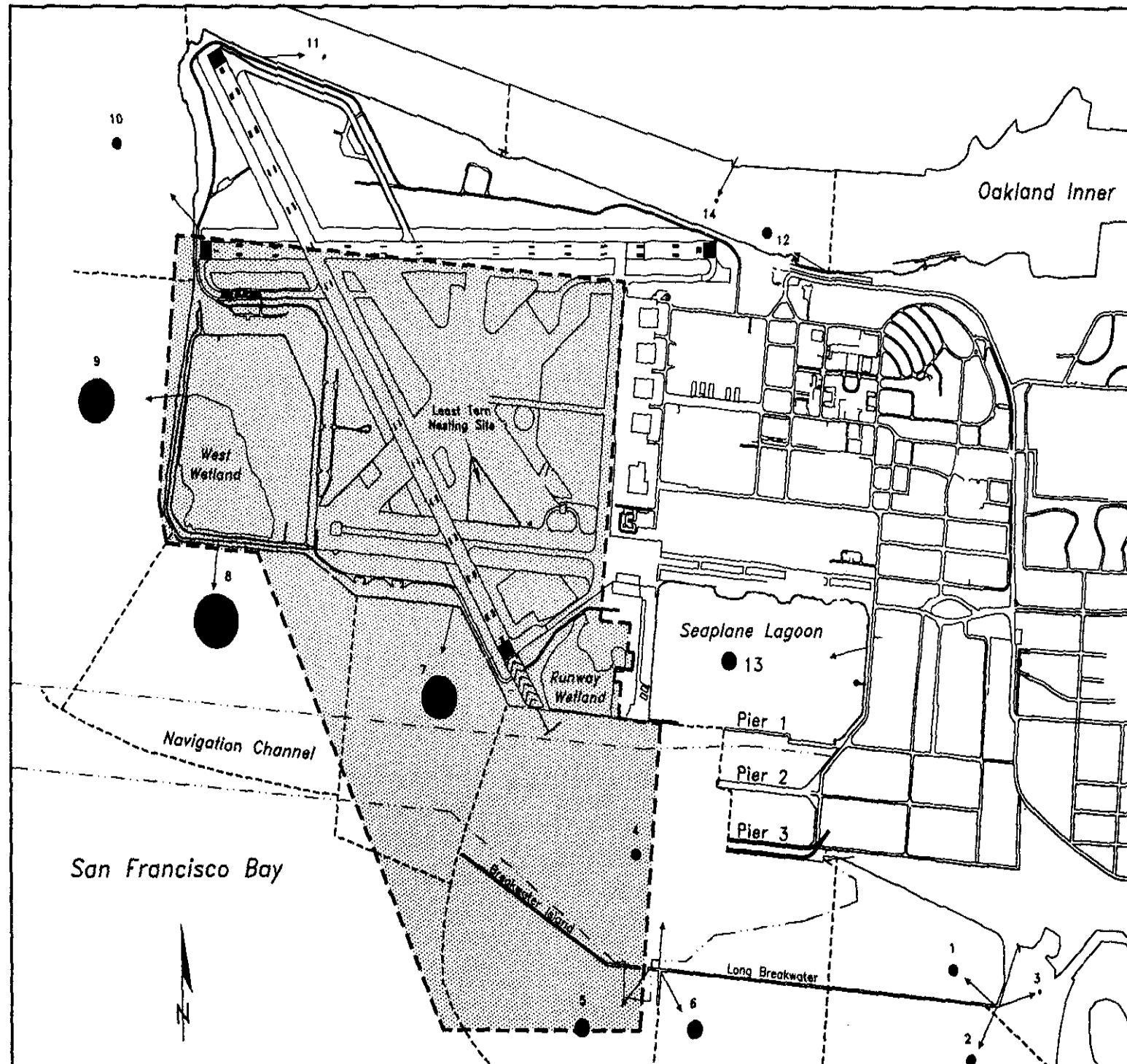


Figure 4.

PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE  
CALIFORNIA LEAST TERN FORAGING AREAS

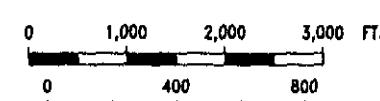
Each arrow (—  
point and a di-  
water body.

Percent of time terns spent foraging  
at locations during 1984-1993.  
Studies conducted by NAS Alameda.

----- Foraging Area Boundary

• =0-1%	● =10-20%
● =1-5%	
● =5-10%	● =>20%

Source: U.S. Navy 1997a



The Maritime Administration maintains a fleet of 11 cargo ships of varying design at Alameda Point. These ships require use of the navigation channel. This fleet is available within 96 hours to the Department of Defense in times of war or national emergency to meet the demands for delivery of needed cargo to any port in the world.

### 3.4 Vegetation

The land portion of the Refuge includes three different "habitat" types: wetland, upland, and paved. These main habitat types, as well as more detailed delineations and descriptions of vegetation types, are shown on [Figure 5](#).

#### 3.4.1 Wetland Areas

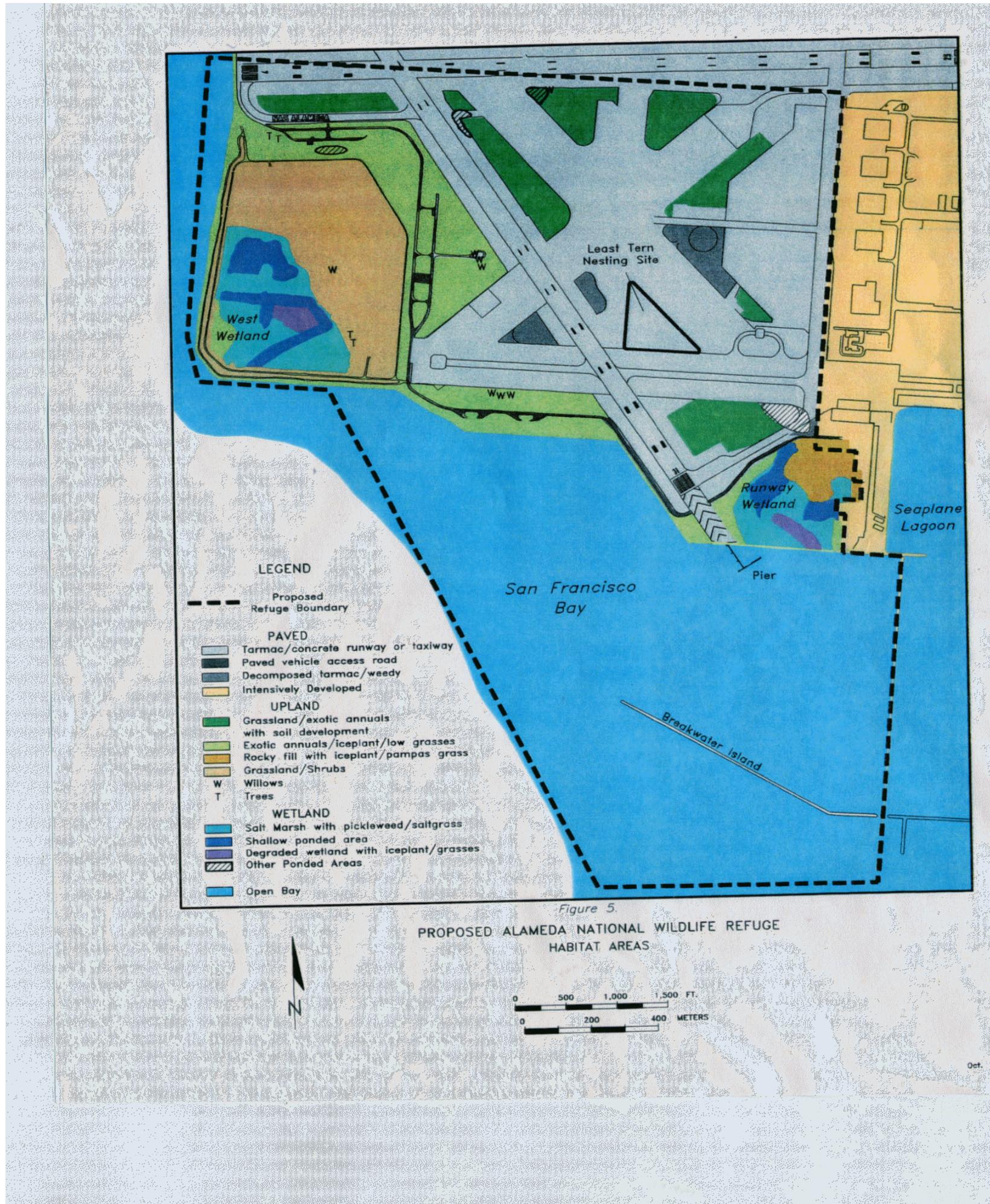
Two wetland areas, encompassing about 49 acres, have been classified as salt marsh and brackish tidal marsh (U.S. Navy 1997a). The 32.4-acre West Wetland is bounded on the west and south by the perimeter road and levee, and on the north and east by an area referred to as the "West Landfill" in Navy planning documents. The West Wetland consists of shallow ponded areas interspersed with vegetated salt marsh. Salt marsh vegetation is dominated by pickleweed (*Salicornia virginica*) and saltgrass (*Distichlis spicata*), with lesser amounts of brass buttons (*Cotula coronopifolia*), seaside trefoil (*Lotus formosissimus*), and Australian saltbush (*Atriplex semibaccata*) (U.S. Navy 1997a). Higher areas interspersed within the West Wetland are being invaded by nonnative grasses, iceplant (*Carpobrotus edulis* and *C. chilense*), cranesbill (*Geranium dissectum*), ox-tongue (*Picris echioides*), and coyote brush (*Baccharis pilularis*) and are therefore identified as "degraded wetland" in [Figure 5](#). Open water and shallow ponded areas, as well as some areas of exposed bare ground, lack

vegetative cover. Ponding results from San Francisco Bay tidal water entering through a 36-inch culvert under the perimeter road, as well as from groundwater and seasonal precipitation.

The 16.5-acre Runway Wetland, located at the southern edge of the 565 acres of land, is separated from San Francisco Bay by a seawall. Ponding results from San Francisco Bay water that seeps through the seawall and from precipitation and surface runoff. The wetland is dominated by pickleweed and saltgrass, but nonnative iceplant is encroaching on the degraded wetland vegetation. The Navy filled a portion of this wetland in the mid-1980s, and the rocky fill is being invaded by nonnative upland species such as pampas grass (*Cortaderia selloana*) and iceplant.

In addition to these two wetland areas, a few other low spots on the tarmac and grassland areas seasonally collect water due to precipitation or high tides. These areas are shown (cross-hatched) in [Figure 5](#), but since they have not yet developed full wetland characteristics, their extent should be considered approximate.

**FIGURE 5**



### 3.4.2 Upland Areas

Upland habitat (approximately 202 acres) is primarily located north and east of the West

Wetland, and in small patches and strips among the old taxiways of the former airfield where soil exists. Nonnative grass and other weedy species dominate the habitat type in varying species mixes. Species include ripgut brome (*Bromus diandrus*), European hairgrass (*Aira caryophyllea*), common velvetgrass (*Holcus lanatus*), California oatgrass (a native) (*Danthonia californica*), plantain (*Plantago* spp.), vetch (*Vicia* spp.), mustard (*Brassica nigra*), fennel (*Foeniculum vulgare*), pampas grass, iceplant, and cranesbill. A few shrubs and trees, such as coyote brush, willow (*Salix* spp.), and star acacia (*Acacia verticillata*), are found within the upland areas (U.S. Navy 1997a).

### 3.4.3 Paved Areas

The paved area (317 acres) comprises the former airfield and is composed of concrete (former runways), tarmac (former taxiways), and roads. Most of the habitat categorized as paved is devoid of vegetation except for nonnative grasses and forbs growing in cracks of the tarmac. There are several areas of decomposed tarmac (see [Figure 5](#)) that contain a sparse cover of nonnative weedy vegetation.

## 3.5 Wildlife

Nine wildlife species that are federally listed as endangered or threatened are either known to inhabit or could potentially occur on the Refuge based on their presence on similar areas in Alameda County. They are the winter-run chinook salmon, tidewater goby, California brown pelican, California clapper rail, western snowy plover, California least tern, American peregrine falcon, Steller sea lion, and salt marsh harvest mouse. Five of these species, discussed in detail below, have been observed on the site. The likelihood of the remaining species occurring within the Refuge is considered low.

### 3.5.1 California Least Tern

The federally endangered California least tern (*Sterna antillarum browni*) nests and roosts on the paved former airfield area, and forages in the open water portion of the Refuge ([Figure 4](#)). Wildlife agencies became aware of this colony in 1976, although there is some evidence that least terns have used the site since 1966 or 1967 (USFWS 1980). Although the terns have nested in several locations on the airfield in the past, the primary nesting area since 1980 has been a 4-acre fenced area ([Figure 6](#)).

Least terns are migratory, with individuals arriving at the Alameda colony site from mid-April to mid-June, nesting from early May to early July, and departing in mid-August. Generally, they nest in open areas near coastal wetlands, lagoons, and estuaries, which provide foraging habitat. Natural nesting habitat for this species consists of light-colored sandy substrate and little

### FIGURE 6



vegetation (USFWS 1980; U.S. Navy 1995b). Least terns traditionally nested on sandy ocean beaches without human disturbance, but as their natural habitat decreased, they colonized disturbed areas with features similar to their natural habitats (USFWS 1980). The tarmac areas at Alameda approximate the natural habitat. Gravel and oyster shell added by the U.S. Navy mimics natural nesting substrate, and the large area of surrounding unvegetated tarmac and mowed grassland provides a buffer zone from predators.

The California least tern colony in Alameda is the northernmost breeding colony along the California coast and the only substantial colony in San Francisco Bay. Each year, the colony experiences high reproductive success and contributes a large number of potential new breeders to the statewide population (Caffrey 1995). Between 1986 and 1997, the number of nests, pairs, and fledglings produced in the Alameda colony each year generally increased (Table 1). The only significant exception to this trend was in 1995, when the number of fledglings dropped 37 percent from the previous year, primarily due to predation from red-tailed hawks (U.S. Navy 1995a). The number of breeding pairs increased an average of 14 percent per year (range of 1 percent to 28 percent) for this 11-year period.

Between 1984 and 1993, the Navy conducted studies of least tern foraging activities around the Alameda NAS. Observers scanned the waters adjacent to Alameda NAS from established observation points on the shoreline (Figure 4), and also visited potential foraging areas away from Alameda NAS (southeast to Oakland Airport and north to the Emeryville Marina). Figure 4 shows areas where terns were observed foraging between 1984 and 1993. The dashed lines represent foraging area boundaries and the black circles indicate the relative percentage of time terns were observed at each foraging area; the larger the circle, the more time terns spent foraging in the area. Arrows show the direction of view from the observation point. Terns spent the majority of time (79 percent, combining all years of the study period, 1984-1993) foraging in the portion of the Bay within the Refuge boundaries (locations 4,5, and 7) or immediately offshore (locations 6, 8, and 9). Terns spent 30 percent of their time foraging

in the open water areas encompassed by the Refuge (foraging areas 4,5, and 7) during the study period (U.S. Navy 1997a).

An objective of this monitoring was to identify any changes in relative use of foraging areas around Alameda NAS prior to and after partial closure of the Breakwater Gap area in 1991. The Breakwater Gap area was found to be an important foraging area for least terns, both before and after the Gap's partial closure, although terns appear to have shifted their intensity of foraging away from the Breakwater Gap to portions of the Bay adjacent to the West Wetland (U.S. Navy 1997a).

California least terns forage primarily in shallow estuaries and lagoons and occasionally forage in the ocean (U.S. Navy 1997a). The Alameda NAS tern foraging study found that waters shallower than 10 feet were favored for foraging; however, foraging areas were not limited to shallow waters. Terns forage in the Breakwater Gap, where depths vary between 15 and 30 feet (Bailey 1985). Least terns at Alameda forage primarily on four groups of fish: silversides (topsmelt and jacksmelt), surfperches, northern anchovy, and Pacific herring. These fishes share features that make them suitable prey for least terns: they all school, they are ubiquitous in San Francisco Bay, and they have abundant small individuals during the least tern breeding seasons.

**Table 1.** California Least Tern Nests, Pairs, and Fledglings at Alameda, 1986-1997.

YEAR	NESTS	PAIR NUMBER *	% INCREASE	FLEDGLINGS
1986	55	43		75
1987	61	58	25	87
1988	79	63	8	84
1989	78	74	15	88
1990	115	99	25	105
1991	120	110	10	138
1992	138	126	13	218
1993	135	127	<1	207
1994	162	138	8	196
1995	216	150	8	73
1996	250	208	28	233
1997	258	244	15	316

\* Pair is minimum number between the estimated minimum and maximum number of pairs each year. Table adapted from U.S. Navy 1997a.

### 3.5.2 California Brown Pelican

A large colony of California brown pelican (*Pelecanus occidentalis californicus*), a federally and State-listed endangered species, roosts on Breakwater Island during late summer through fall. The colony is the largest roost and the only known night roost in the San Francisco Bay Area (U.S. Navy 1997a). Pelicans eat small surface-schooling fish, primarily anchovy, in the adjacent Bay.

California brown pelicans breed on the Channel Islands in Southern California, along the Baja peninsula, and in the Gulf of California, Mexico. During summer and fall, pelicans migrate north in a post-breeding dispersal up the Pacific Coast. Pelicans are seen in Northern California as early as April or May, but numbers swell to the thousands in July through September following the pelican breeding season. Pelicans usually retreat to the south by about December (Jaques-Strong 1994).

Brown pelicans roost to rest, preen and dry their feathers, maintain body temperature, and socialize. Roosting requires a dry location near food and a buffer from predators and humans. Breakwater Island provides quality habitat for roosting because of its isolation from land and because of the Navy's efforts to keep boats at a distance (Jaques-Strong 1994). The Navy restricted boats from landing on Breakwater Island while it was an active air station (U.S. Navy 1997a). Under caretaker status, this closure is not enforced, and boaters have been observed landing on or close to the breakwater (Feeney, pers. com.). A large dog was observed on Breakwater Island during April and May 1998, accessing the Island by swimming across Breakwater Gap. The dog was eventually trapped and removed from the Island (Buffa, pers. obs.).

### 3.5.3 Other Endangered Species

Western snowy plover (*Charadrius alexandrinus nivosus*), a federally threatened species and a State species of special concern, often shares habitat with least terns and has nested within the least tern nesting site during at least two years in the early 1980s (U.S. Navy 1997a). Snowy plovers have not been observed in recent years, however, and the Refuge does not contain any proposed or designated critical habitat.

American peregrine falcon (*Falco peregrinus*), a federally and State-listed endangered species, uses the Refuge to forage primarily for avian prey in the grasslands and areas between the runways. Falcons are documented predators of least terns (Caffrey 1995), are suspected to have caused abandonment of tern nests at Alameda in 1993 and 1990 (U.S. Navy 1990 and 1993a), and depredated terns at Alameda in 1997 (U.S. Navy 1998). Peregrine falcons nest on the Bay Bridge. The peregrine falcon was proposed for de-listing.

Winter-run chinook salmon (*Oncorhynchus tshawytscha*) spawn in the upper reaches of the Sacramento River. Adults enter San Francisco Bay from the ocean and head north to the Sacramento River, with peak numbers occurring in December and January. Juveniles migrate through the Bay and into the ocean January through April. Since both adults and juveniles migrate along the most direct route (mainly north of Alcatraz Island), they would only occur occasionally in the open water portions of the Refuge if they strayed from the migration route (U.S. Navy 1997a).

A single Steller sea lion (*Eumetopias jubatus*) was observed in the open water of San Francisco Bay near NAS Alameda during the 1980s.

Although the two wetland areas contain suitable habitat for salt marsh harvest mouse (*Reithrodontomys raviventris*), the species is not likely to be present because the wetlands are relatively small and isolated. No harvest mice were found during an eight-day trapping survey conducted in 1995 (U.S. Navy 1997a).

The tidal wetlands do not contain suitable habitat for California clapper rails (*Rallus longirostris obsoletus*) due to the restricted tidal flow and lack of tidal slough channels. Likewise, suitable habitat currently does not exist within the Refuge for the tidewater goby (*Eucyclogobius newberryi*) (U.S. Navy 1997a).

### **3.5.4 Migratory Waterfowl and Other Waterbirds**

Caspian terns nest each year on an area of elevated exposed soil within the West Wetland ([Figure 5](#)). They generally arrive in late April and depart in mid-September. Regular monitoring has not occurred and breeding population estimates have fluctuated, but there is indication of a declining trend in recent years. McChesney (pers. com.) counted 594 pairs in 1990, and Bailey (1994) estimated that 1,020 pairs of Caspian terns nested in the colony during the 1991 breeding season. A maximum of 285 pairs was counted during the 1997 breeding season (McCoy, pers. com.).

The open water area of the proposed Alameda Refuge is a wintering area for diving ducks. These waters provide resting and feeding habitat for between 2,000 to 10,000 ducks on any given day during the winter. Based on Christmas Bird Count surveys (conducted one day annually in December), surf scoters make up the majority of these numbers, with canvasback, lesser and greater scaup, goldeneye, bufflehead, red-breasted merganser, and ruddy ducks also present (Golden Gate Audubon Society, unpubl. data). Open water areas of the Refuge also provide important foraging habitat for other waterbirds, in addition to California least terns and brown pelicans. Common loons and grebes (eared, horned, Clark's, and western) also winter on open water areas in fewer numbers.

Wetlands are used by nesting Canada geese, mallards, gadwall, killdeer, black-necked stilts, American avocets, California gulls, Caspian terns, and Savannah sparrows. California gulls began nesting in the West Wetland in 1992, and Western gulls nest in the wetlands and riprap areas (Collins, pers. com.). Mudflats, tidal/seasonal ponds, and vegetated areas within the Runway and West Wetlands provide feeding, resting, and roosting areas for shorebirds and waterfowl in the winter and during migration. Raptors and swallows forage in the marshes, and other landbirds (see [Appendix C](#)) have also been observed using the wetland areas.

In a beach seine survey conducted by the California Department of Fish and Game between 1981 and 1986, central San Francisco Bay, which includes open water areas of the Refuge, consistently had the highest density of fish compared to other areas of the Bay (U.S. Navy 1997a). Fish species observed in this survey, from most to least abundant, were topsmelt, jacksmelt, Pacific herring, northern anchovy, arrow goby, striped bass, shiner surfperch, yellowfin goby, and Pacific staghorn sculpin ([Appendix C](#)).

Breakwater Island contains the second largest nesting colony of western gulls in central and northern California (Feeney 1994). In June 1990, 239 western gull nests were counted on Breakwater Island, and a breeding population of 502 western gulls was estimated for the entire Alameda NAS (McChesney, pers. com.). In May 1998, 215 Western gull nests were counted, although the majority of these had been destroyed by a dog (Buffa, pers. obs.).

Breakwater Island also is a roosting site for three cormorant species, at least six gull species, at least eight shorebird species, and at least two species of egrets and herons (Bailey 1994).

### **3.5.5 Marine Mammals**

Harbor seals use the tip of Breakwater Island as a haul-out site and forage extensively in the Breakwater Gap area (Kopec, pers. com.). Although it is not considered a primary haul-out site for San Francisco Bay (Kopec and Harvey 1995), Breakwater Island is the only haul-out site in the central Bay that is accessible to seals throughout the full tidal range (Kopec 1994). Aerial surveys of seal haul-outs conducted in 1995-97 and incidental counts made during summer tern foraging studies conducted in 1984-93 usually counted fewer than 10 seals present at any one time (Kopec, pers. com.). There is some evidence that more harbor seals have been using Breakwater Island in recent years, or that it is more important as a winter haul-out. Seventy-three seals were counted on Breakwater Island in January 1997, and 20 were observed hauled-out on April 4, 1998. A small pup was observed during May 1997 (Feeney, pers. com.); however, site characteristics are not ideal for the island to be a major pupping area (Kopec, pers. com.).

Haul-out sites are critical to the species' habitat needs and are used for resting, molting, and pupping. Seals exhibit strong site fidelity to haul-out sites. Seals were first noted using Breakwater Island as a haul-out area in the early 1900s. Harbor seals are one of the most wary pinniped species and are very easily disturbed by human activities.

### **3.5.6 Other Wildlife**

Uplands provide nesting and foraging habitat for a variety of landbirds and raptors, including northern harriers, white-tailed kites, red-tailed hawks, kestrels, and burrowing owls. Uplands and portions of the wetland areas are important in providing a source of prey (e.g., jack rabbits, ground squirrels, mice, voles, and other rodents) that focuses the foraging activity of predators away from the California least tern colony (Collins, pers. com.).

[Appendix C](#) lists plant and animal species observed or predicted to occur on the Refuge. These lists were adapted from various sources, including Navy documents, unpublished studies and surveys (e.g., least tern foraging and nesting studies, Breakwater Island and Gap Study), Christmas bird count data, and incidental observations during various wildlife studies on NAS Alameda (Feeney and Collins 1993).

## **3.6 Visual Resources**

### **3.6.1 Regional Landscape Character**

The regional landscape character surrounding the proposed Refuge is mixed. East of the Refuge, the area has an industrial character, dominated by warehouses and other large buildings. Immediately to the north is an extension of the tarmac and runway and beyond that, the industrial-looking Oakland Inner Harbor. San Francisco, about three miles to the west across the bay, provides a dense urban landscape character with its high-rise skyline in the background and, in the far background, San Bruno Mountain and Twin Peaks. The Oakland Bay Bridge (Bay Bridge) and Yerba Buena Island are also visible to the west. The view across the bay to San Francisco, the Bay Bridge, and the Peninsula Hills is impressive. To the south, the views are primarily of open water with Breakwater Island visible in the distance. The topography of the immediate area is essentially flat, the only topographic relief on the far horizon are the Berkeley and Peninsula Hills.

### **3.6.2 Landscape Character of Alameda NWR**

The proposed Refuge is a former airfield consisting primarily of tarmac and concrete. Natural habitat preferred by California least terns is mimicked by the tarmac and concrete. While it was an active military base most of the airfield was kept free of vegetation, except for strips of low growing grasses and herbaceous vegetation between taxiways and runways. Since base closure was announced in 1994, weeds have begun to grow in tarmac cracks. The Navy removes the weedy vegetation in the immediate vicinity of the tern colony with herbicide. The Refuge plans to keep most of the tarmac free of weedy vegetation. Other features of the Refuge include two wetland areas, one at the northwestern portion of the Refuge and one at the southeastern portion of the Refuge, a large (413 acres) open water area to the south and west of the terrestrial component of the site, and a perimeter levee along the west and south boundaries of the terrestrial component of the Refuge.

### **3.6.3 Views from and of Alameda NWR**

Looking west and south there are sweeping, panoramic views of the horizon, Bay Bridge, and San Francisco skyline from many areas within the proposed Refuge. Because the area is flat and has few structures, the views of the bay area are unobstructed. Looking east, views are mostly of large warehouses and buildings. Current views to the north are of the airfield and low-growing vegetation. Views to the north will change when the City of Alameda's plans to build a golf course and soccer field are realized.

Land use to the east of the proposed Refuge is light industrial and it is anticipated that it will remain primarily light industrial. An outdoor antique market has been proposed to be held one Sunday a month on the former taxiway just outside the Refuge's east boundary. It is possible other activities could also occur on this open area. Properties adjacent to the eastern Refuge boundary are slightly higher in elevation than the Refuge. The Refuge is visible in fore and middle ground views from the east side. The Refuge is most visible from the east side, hence views from this side are considered most sensitive.

Lands north of the proposed Refuge consist of former airfield and undeveloped areas. Public use is currently minimal, hence viewer sensitivity is low. In addition, the properties adjacent to the Refuge on the north are slightly lower in elevation than the proposed Refuge. From the north, the Refuge is only visible in the foreground view because vegetated areas along the northern boundary and site topography screen most of the tarmac and the bay from view. Views from the north are therefore considered less sensitive. A golf course and soccer field are currently being proposed in the northern area by the City of Alameda, thus viewer sensitivity is expected to increase in the future. If these facilities are constructed at the current grade or slightly higher, the golf course and soccer field would have some views of the proposed Refuge.

From the west, ferry boats and other public-bearing craft would primarily have views of the rip-rap shoreline and perimeter levee. This levee obscures views of the West Wetland and most of the airfield. From the west, the airfield area is only visible from one vantage point, where the east-west runway intersects the bay at the western boundary of the proposed Refuge. Although the Bay Bridge is visible from the Refuge, the Refuge is generally not visible from the bridge because it is obstructed by the infrastructure of the Oakland Inner Harbor. Views from the west are considered less sensitive than views from any other direction.

Viewers from the south are primarily engaged in recreational boating, including fishing. This use is recent and unquantified because prior to base closure the area was closed to public use. Maritime Administration Fleet vessels infrequently transit the area to gain access to the piers where the vessels are docked. Passengers on these craft have midground views of the land portion of the Refuge. Views are of the rocky rip-rapped shoreline, perimeter levee, vegetated upland areas, and tarmac. Visual sensitivity from the south could increase in the future. A recreational marina is proposed for the former Seaplane Lagoon, which could increase the number of boats traveling through the Refuge. The Aircraft Carrier Hornet Foundation has proposed tour boat service to one of the piers, which would also increase the number of people viewing the Refuge from the water.

### **3.7 Cultural Resources**

No prehistoric cultural resources are expected to be present within the Refuge boundary, since the area is composed of baylands that were filled between 1918 and 1940 (U.S. Navy 1997a). Navy records indicate that any historical buildings or other features that may have existed on site prior to Navy acquisition were removed prior to filling and construction of NAS Alameda, which began in 1939 (U.S. Navy 1997b). No properties of National Historic Property significance exist within the proposed Refuge.

### **3.8 Contaminants**

Military operations at NAS Alameda released a number of contaminants to the environment over the years. The Navy began remedial investigations of contaminated sites in 1982 under the auspices of the Navy Assessment and Control of Installation Pollutants (NACIP) Program, a Department of Defense initiative that was developed concurrently with the U.S. Environmental Protection Agency's (EPA) program to manage past waste disposal sites under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 1986, the Superfund Amendment and Reauthorization Act (SARA) established the Defense Environmental Restoration Account to fund DOD cleanups, and the DOD cleanup program was converted into the Installation Restoration Program (IRP). When NAS Alameda was listed for closure in 1993, funding for the cleanup program shifted to the Base Realignment and Closure Account, but the administration of the program remained the same. The Navy remained the lead Federal agency and the State Department of Toxic Substances Control remained the lead State agency. Because the station was not listed on the National Priorities List, EPA serves an advisory and review role.

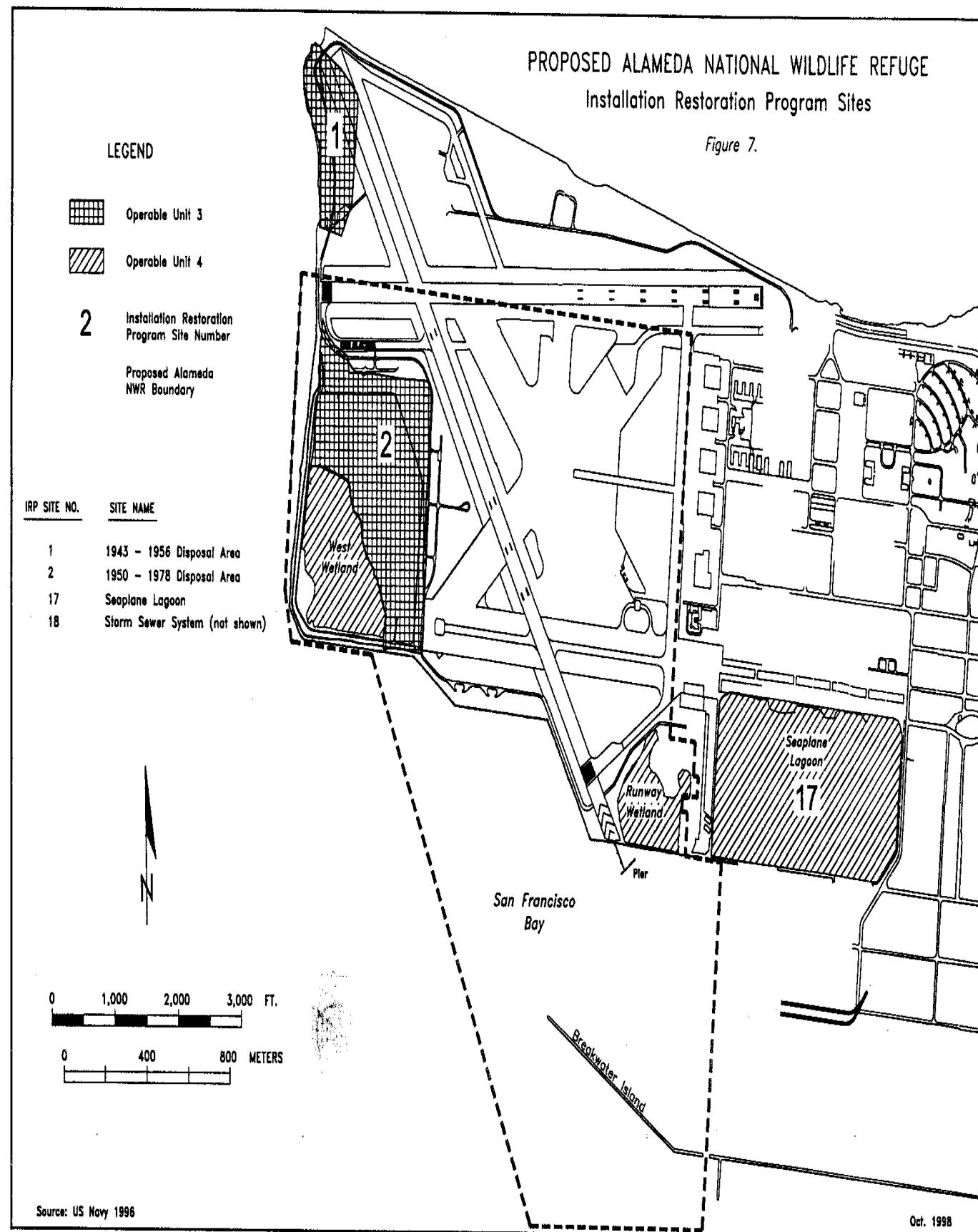
Although the majority of contaminated sites are located outside the boundaries of the Refuge, the IRP has identified approximately six contaminated or potentially contaminated sites in two operable units within or near the Refuge boundary (see [Figure 7](#)). An operable unit (OU) is a management unit that allows the grouping of sites with similar histories and contaminant

### 3.8.1 Operable Unit 3 Landfills

IRP Site 1 is a 12-acre landfill located on the northwest corner of the former Alameda Naval Air Station (outside of the proposed Refuge boundary). The landfill received all solid waste generated by the station from 1943 to 1956. From 1950 to 1954, open burning was conducted in the northwest corner of the site. Much of the site is now covered by concrete runways. Contaminants present in the landfill include polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), various petroleum products, and radium. Groundwater on the western edge of the landfill is contaminated with chlorinated solvents (trichloroethene, 1,2-dichloroethene, and vinyl chloride) and aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylene). A demonstration project for groundwater treatment is in place as a joint effort by Rice University and Waterloo University. The project is studying the efficacy of dechlorinating the solvents using iron filings and then bioremediating the dechlorinated solvents. Remedial alternatives under consideration for the site include no action or capping and groundwater monitoring. A decision on the selected cleanup method is due in April 2000.

IRP Site 2 is a 110-acre landfill located within the proposed Refuge boundary northeast of the West Wetland. The landfill received waste from the early 1950s until 1978. During the 1980s, the West Wetland was created by excavating soil for cover fill for the landfill. Contaminants present in the landfill include polycyclic aromatic hydrocarbons (PAHs), polychlorinated

FIGURE 7



pesticide, asbestos, mercury, and inert ordnance. Groundwater on the northwest corner of the landfill is contaminated with chlorinated solvents (trichloroethene, 1,2-dichloroethene, and vinyl chloride) and aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylene). In June 1985, the Navy installed a subsurface wall along a portion of the western perimeter of the landfill to prevent seepage of leachate from the landfill into the Bay. Remedial alternatives under consideration for the site include no action or capping and groundwater monitoring. The Service intends to pursue additional alternatives with the Navy. A decision on the selected cleanup method is due in April 2000 (U.S. Navy 1997c).

### **3.8.2 Operable Unit 4 Aquatic Sites**

The near-shore areas of San Francisco Bay potentially could be affected by contaminated groundwater from IRP Sites 1 and 2. Chlorinated solvents are the primary contaminants of concern. The area will be more fully characterized during the aquatic ecological risk assessment (ERA), for which the work plan is now being prepared. A decision on the selected cleanup method is due in June 2000.

The West Wetlands area encompasses the wetlands associated with IRP Site 2. Contaminants of concern include PAHs, PCBs, various petroleum products, radium, chlorinated solvents (trichloroethene, 1,2-dichloroethene, and vinyl chloride), and aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylene) that have entered the wetland from surface runoff and groundwater. The wetland was classified as an estuarine tidal emergent wetland using the U.S. Army Corps of Engineers' delineation criteria. The area will be more fully characterized during the aquatic ERA, for which the work plan is now being prepared.

The Runway Wetland receives surface water run-off from the runways, precipitation, and water from San Francisco Bay during high tides. PAHs, chlorinated pesticides, PCBs, and metals are the contaminants of concern that have probably entered the wetland through surface runoff. The wetland was classified as an estuarine intertidal emergent wetland using Corps of Engineer delineation criteria. The area will be more fully characterized during the aquatic ERA, for which the work plan is now being prepared.

IRP Site 17 is the Seaplane Lagoon, located on the south side of the former base and east of the proposed Refuge boundary. The seaplane lagoon is approximately 110 acres and ranges from 12- to 15-feet deep. It receives discharge from the station's storm sewer system, which also discharged industrial waste water until 1975. Contaminants present in the sediments of the lagoon include metals (such as lead, chromium, and copper), PAHs, PCBs, chlorinated pesticides, and petroleum products. Although the lagoon is located outside the proposed Refuge boundary, it is a potential foraging site for California least terns and other species present at the proposed Refuge. Because of the currently unassessed potential for ecological risk, remedial alternatives for the site have not been fully developed. Possibilities include no action, dredging of hot spots, and capping with clean sediments. The University of California at Berkeley is conducting a treatability study of the sediments, and a plan for the ERA is being prepared.

IRP Site 18 is the station storm sewer system consisting of about 40,000 linear feet of sewer lines ranging from 4 to 36 inches. The lines, located throughout the former base (including a number of sewer lines within the proposed Refuge boundary), empty into the Seaplane Lagoon, Oakland Inner Harbor, and San Francisco Bay. Contaminants present in the system included metals (such as lead, chromium, and copper), PAHs, PCBs, phenols, aromatic hydrocarbons, chlorinated solvents, chlorinated pesticides, and petroleum products. The system is being remediated as a time-critical removal action. Contaminated sediments have been removed, and the lines have been cleaned and inspected (IT Corporation 1997).

As discussed, ERAs are planned for both terrestrial and aquatic sites located within and adjacent to the proposed Refuge boundaries. The purpose of the ERA is to (1) identify the chemicals of potential concern at a site; (2) identify ecological receptors at a site; (3) identify the routes and frequencies of exposure of the ecological receptors to the chemicals of concern; and (4) evaluate the relationship between the doses of the chemicals of concern and the potential for adverse effects to ecological receptors resulting from the exposure. The Service is participating with the Navy, regulatory agencies, and other natural resource agencies, such as the California Department of Fish and Game, in developing and evaluating the ERAs. These agencies will also participate in characterizing and managing ecological risk through the development of appropriate remedial alternatives (U.S. Navy 1997c).

### **3.9 Public Use Programs**

Little public use now occurs. The general public has no access to the lands within the proposed Refuge boundary, and no educational, interpretive, or recreational activities are allowed. A portion of the former base is leased to the City of Alameda for a variety of economic and recreational uses. The Golden Gate Audubon Society, working in concert with the Biology Department at the College of Alameda, has held a one-day docent training program that involves training on-site, as well as classroom study at the College. Participants in this program could form a ready corps of volunteers for the Refuge's public use program.

Golden Gate Audubon Society has also conducted classroom environmental education activities in Alameda grade schools.

Public wildlife-dependent recreation is not allowed on the former naval base, although fishing and boating occur nearby, and boats have not been restricted from entering waters of the proposed Refuge. Outside the boundary of the proposed Refuge, anglers have had some access to the proximate end of the Long Breakwater near Encinal High School, and recreational boats are launched at a nearby public ramp ([Figure 2](#)).

Located within the city limits of both Alameda and San Francisco, most of the former naval base falls within the jurisdiction of the Alameda Police Department. Concurrent jurisdiction has been established to provide legal basis for law enforcement.

### **3.9.1 Public Use Facilities**

There are no public use facilities on the proposed Refuge at this time. However, the former air traffic control tower (located off-site but adjacent to the east boundary; see [Figure 3](#)) could be made suitable for use as a wildlife observation center from which to view the Refuge. The Runway Wetland fill area could serve as an alternate site for a visitor contact facility.

Another off-site facility could possibly be developed in partnership with the Golden Gate Audubon Society or the Alameda Reuse and Redevelopment Authority. Although not open to the public at this time, the perimeter levee, which isolates and protects the west end of the proposed Refuge from San Francisco Bay, could be used for a public access trail, with major renovation.

### **3.9.2 Refuge Visitation**

While no public use occurs on the proposed Refuge at this time, the Golden Gate Audubon Society contracted a study to determine the potential for visitation at the proposed Refuge. The following factors will determine the number of visitors to the Refuge (Hrubes 1995):

- The total number of tourists visiting the Bay Area.
- The percentage of Bay Area residents who engage in wildlife viewing and Bay shoreline recreation.
- The proximity of the Refuge/day-use area to large population and tourism areas.
- Ease of access.
- The extent to which the public is made aware of the Refuge.
- The uniqueness of the proposed facility (in terms of visitor features and amenities) relative to similar environmental and shoreline day-use areas around the Bay Area.

Hrubes (1995) predicted that 25,000 to 50,000 Bay Area residents will visit the Refuge each year. In addition, between 21,000 and 63,000 tourists from outside the Bay Area will visit the Refuge per year.

## **Chapter 4. MANAGEMENT DIRECTION: GOALS, OBJECTIVES, AND STRATEGIES**

The goals of Alameda NWR translate the stated Refuge purposes into management direction. These goals are being used to select the preferred alternative and to develop this Comprehensive Conservation Plan. Each goal is supported by measurable, achievable objectives with specific strategies needed to accomplish them. Objectives are intended to be accomplished in 10 to 15 years. Actual implementation may vary as a result of available funding.

### **4.1 Wildlife and Habitat Management**

**Goal 1:** Preserve, restore, and enhance endangered and threatened species, including the California least tern.

**Objective A:** Manage existing California least tern nesting site to maintain, at a minimum, the current population of 200 to 250 pairs. Maintain a minimum of 0.7 fledgling-to-pair ratio in any given year, and maintain an average fledgling-to-pair ratio of 1.1 during any consecutive 3-year timespan.

**Current Status:** Alameda is one of the most consistently successful breeding sites for California least tern in the State. A fledgling-to-pair ratio greater than 1.0 is considered highly successful. Between 1988 and 1997, six out of eight consecutive 3-year timespans had a fledgling-to-pair ratio of 1.1 or higher. The two remaining consecutive 3-year timespans had fledgling-to-pair ratios of 0.96 or higher, and were lower than the other six timespans because of very heavy predation by red-tailed hawks in 1995.

**Rationale:** The annual fledgling-to-pair ratio necessary to sustain population size is 0.7 (Fancher 1992). The high reproductive success at Alameda and a few other sites has offset poor nesting success in some southern California colonies, thus allowing statewide numbers to increase. The Alameda colony is considered an important "source population" that adds large numbers of potential new breeders to the statewide population, especially in years when southern colonies fail due to predation or limited food availability (Caffrey 1995).

**Strategies:**

- Monitor California least tern nesting pairs, reproductive success, and predation disturbance according to statewide protocols during the nesting season mid-April through mid-August. If fledgling-to-pair ratios drop below those specified as objectives or abandonment occurs, then management actions will be reevaluated and other possible causes will be assessed to determine appropriate corrective measures.
- Prepare existing 4-acre nesting site and any additional sites created prior to tern arrival each year: control vegetation with herbicide, add pea gravel (about 25 tons/year), augment oyster shell (about 3/4 ton/biannually), replace drain tile as needed.
- Evaluate the existing protective fencing design around colony site. Remove, repair, maintain, or modify fence if a more optimal design/configuration is appropriate in light of current and future management/uses. Consider installing anti-perching devices such as nixalite.
- Strategically place additional drain tiles, oyster shells, and other objects in high use tern roosting/fledgling areas ([Figure 6](#)) to provide protection from predators and weather.

**Objective B:** Create additional habitat to accommodate approximately 300 additional nesting pairs of California least terns, while maintaining a fledgling-to-pair ratio of a minimum of 0.7 and ideally, 1.1 (total management goal is 500 nesting pairs for the entire Refuge).

**Current Status:** The primary nesting area for the Alameda colony has been the 4-acre fenced area in the center of the airfield. In 1984, some least terns nested on the filled portion of the Runway Wetland, but due to predation, no young were fledged (U.S. Navy 1997a).

**Rationale:** While Alameda was operated as an active airfield, additional safe nesting areas were limited at the site. With aircraft no longer posing a hazard, the Service intends to expand the nesting colony to speed population recovery. A larger colony would also be more successful in mobbing predators, hence less vulnerable to predation.

**Strategies:**

- Enlarge the current 4-acre colony to 6 to 8 acres providing habitat for 150 additional nesting pairs by adding suitable nesting substrate (gravel, oyster

shell, cinder blocks, drain tile) along the side(s) of the existing site. Change the shape from the current triangle to a rectangle or oval to eliminate the existing confining triangle corners.

- Create another colony site, 3 to 4 acres in size, to provide habitat for 150 additional nesting pairs by depositing suitable substrate on the airfield and deploying tern decoys to attract birds to the new site. [Figure 8](#) identifies several potential locations for an additional colony site. However, other areas may be more suitable and the exact location will be determined after a site specific analysis considering the following factors: (1) situate as far away as practical from development areas; (2) locate away from predator use areas; and (3) avoid existing tern use areas as much as possible.
- Monitor colonization and use of newly created area(s).

**Objective C:** Minimize predation on California least tern eggs, chicks, fledglings, and adults by managing habitat so that it draws predators away from the tern colony and by managing known avian and mammalian predators.

**Current Status:** American kestrel, red-tailed hawk, northern harrier, peregrine falcon, burrowing owl, barn owl, common raven, cat, and gray fox have been documented as predators of California least terns at Alameda (U.S. Navy 1997a, U.S. Navy 1998). Great horned owl, Caspian tern, and western gull are additional known or suspected predators (U.S. Navy 1995a, 1996a). Other species of birds and mammals that are known to prey on terns at other colonies have also been noted around the Alameda Refuge and are considered potential predators. The Navy has conducted predator management in coordination with USDA Wildlife Services for at least ten years by removing mammal and avian predators. Navy maintenance of an unvegetated tarmac/runway around the nesting colony has minimized predators and maximized the terns' ability to detect any predators.

**Rationale:** Maintaining site conditions that discourage predators and conducting active predator management is essential to maintain high tern breeding success. Predation is the major cause of breeding failure at most sites in California. Due to the limited availability of suitable nesting habitat, breeding terns tend to concentrate in high numbers, making them especially vulnerable to predators. An individual predator can cause substantial breeding failure of an entire colony. Swift and effective response to a known or potential predatory event is critical.

### **Strategies:**

- Monitor predator activity on all land portions of the Refuge during and prior to the nesting season.
- Monitor tern use of tarmac areas that surround the colony site to determine important areas (and their site characteristics) used for roosting, courtship, fledgling feeding and dispersal, and other needs.
- Maintain most tarmac areas free of vegetation to discourage predators, provide tern roosting habitat, and maintain unobstructed views needed for predator detection. The herbicide Roundup® would be applied to vegetation growing in cracks and other areas of decomposing tarmac. Areas to be treated are indicated on [Figure 8](#). A core area, consisting of the least tern colony site and adjacent high use roosting/fledgling areas would be treated annually to maintain nesting/roosting habitat. Tarmac outside of the core area would be treated every 2 or 3 years, the exact frequency determined by the need to provide unobstructed views for terns and eliminate cover for predators. The exact configuration may be refined based on monitoring (previous strategy) and where additional tern nesting habitat is created.
- Mow the grassland/exotic annuals habitat areas ([Figure 8](#)) interspersed within the tarmac areas to maintain vegetation height below 6 inches during tern nesting season in order to discourage mammalian predators and attract avian predators away from the tern colony.
- Expand grassland by up to 14 acres in northwest corner of Refuge to attract avian predators away from the tern colony.

- Remove six power poles on west side of airfield ([Figure 3](#)).
- Identify any other structures (e.g. fences, buildings, poles) that provide predator perches or harbor mammalian predators that threaten the least tern colony. Remove or modify them to deter predators.
- Conduct an integrated predator management program that combines humane and sensitive, preventative, nonlethal, and lethal control methods. Nonlethal methods will be used as the preferred option, whenever possible, when problem animals are found in the area. Nonlethal methods include box-type traps, soft-catch padded leghold traps, hazing, egg addling, Bal-chatri traps, pole traps, Dho gazo nets, bow nets, and lures. Lethal methods include euthanasia, snares, body-grip traps, and shooting. Strategies described below could occur within the Refuge or on adjacent properties in cooperation with the appropriate landowner. See Chapter 4 in the environmental assessment for additional details on protocols.
- Continue control of known mammalian tern predators during and just prior to tern nesting season. Remove all nonnative mammalian predators, and remove native mammalian predators that pose a threat to the nesting colony.
- Continue to monitor avian predator use of Alameda Refuge during and immediately before the nesting season. Discourage avian predators from the area by preventative measures as a first option; survey buildings and other potential nesting habitat for nesting predators before least tern nesting season begins, remove nests that are too close to the colony, and restrict the use of outside lighting. Live-trap and remove kestrels that threaten the colony. Haze adults, addle eggs, or relocate young of nesting northern harriers where their proximity is

[FIGURE 8](#)

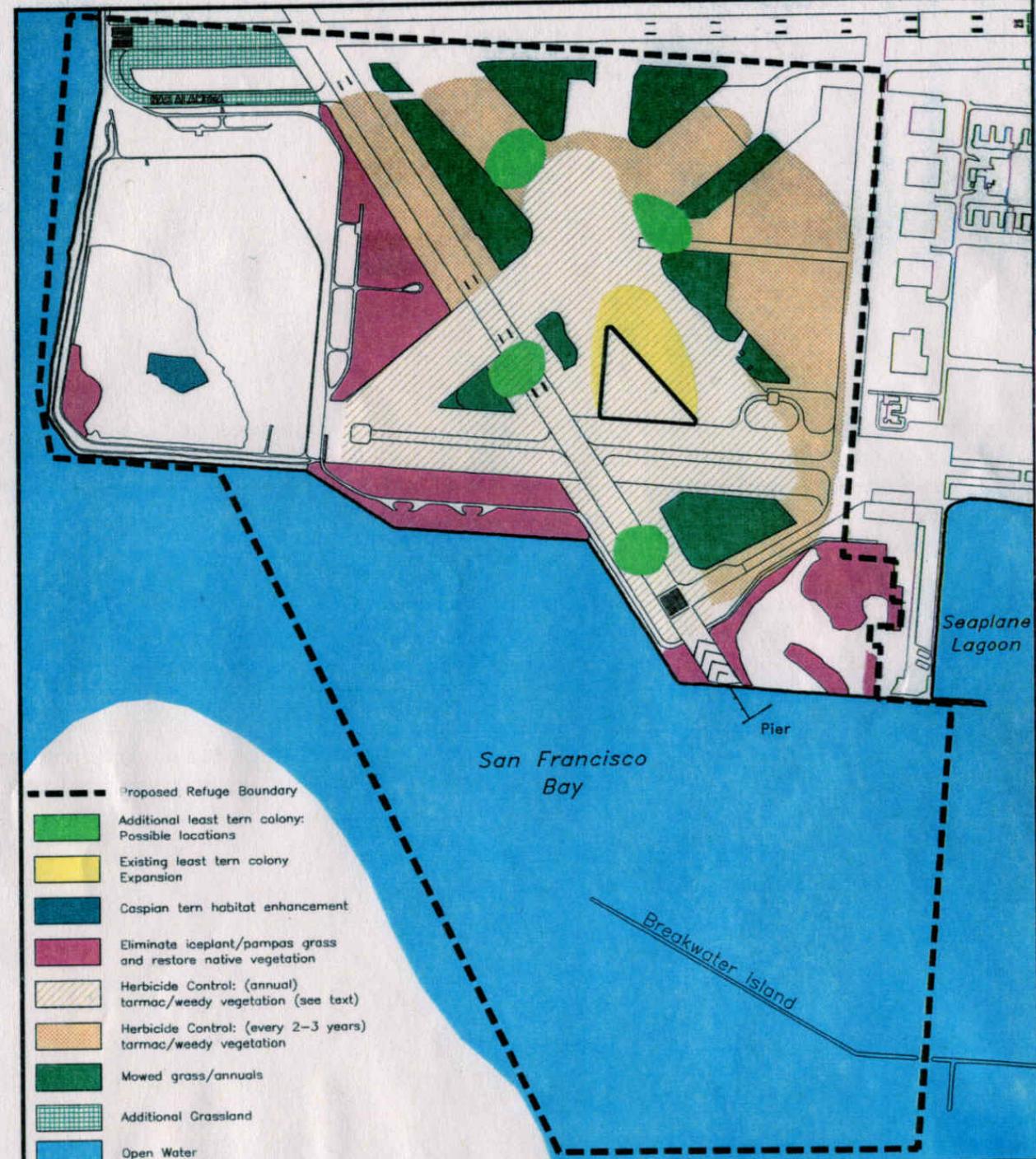
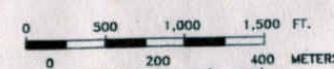


Figure 8.  
PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE  
HABITAT ENHANCEMENT AREAS



determined to threaten the colony. Monitor active burrowing owl burrows for signs of tern predation.

- Avian predators that pose an immediate threat to the tern colony and cannot be humanely live-trapped will be taken by humane lethal methods, which may involve shooting. Shooting would only be used when other methods are determined to be ineffective. It would be conducted by government personnel trained and certified in firearm safety and would be done only when people are not in the area. The decision to lethally remove an avian predator will be determined on a case-by-case basis, after taking into account the degree of threat, breeding phase of the terns, type of predator, resident versus migratory status of predator, and professional knowledge of the situation and species involved.
- Predator management activities will continue to be carried out by professional and humane USDA Wildlife Services personnel in close coordination with Refuge personnel, including the tern monitor.
- Peregrine falcons that depredate the tern colony or cause impacts to tern productivity will be removed according to the Protocols for Problem Peregrine Predation (Santa Cruz Predatory Bird Research Group).
- The Refuge will cooperate and coordinate with the City of Alameda in order to maximize the effectiveness of predator control programs on the Refuge and on lands adjacent to the Refuge.

- Prevent the establishment of gull nesting colonies on the airfield. Manage any nesting attempts of Western or California gulls on paved areas by oiling or addling eggs. Remove nests on colony site(s). Remove any individual gulls that become predators on terns or threaten the colony.

**Objective D:** Protect high-quality California least tern foraging areas and other habitat use areas from human disturbance.

**Current Status:** Prior to base closure, open water (foraging areas) and the airfield (nesting/roosting/fledgling habitat) were closed to public access for military security purposes. Under caretaker status, the open water closure is no longer enforced. The airfield's eastern perimeter is fenced, although the fencing does not follow the proposed Refuge boundary. Currently, there is no authorized public access to the land portion of the Refuge.

**Rationale:** Human disturbance is one of two significant factors (predation being the other) contributing to tern breeding failure (Caffrey 1995). Recreational boating and fishing in tern foraging areas could interfere with foraging activities and introduce pollutants into the water (Baird, pers. com.). Because access will no longer be restricted for military purposes, signing, buoys, and physical barriers will be needed to prevent human disturbance to land and water areas. Foraging terns generally favor waters shallower than the dredged channels (Bailey 1985).

#### **Strategies:**

- Construct an 8-foot-high chain-link fence along the northern boundary with the following design considerations: (1) features to discourage perching raptors; (2) top section consisting of several strands of barbed wire angled outward to discourage climbing mammals; and (3) slats to screen views and provide security.
- Construct the eastern boundary fence to a uniform 8 feet, and include design considerations mentioned above.
- Place signs on the Refuge boundary, including the land/water interface on the west and south sides. Coordinate with National Oceanic and Atmospheric Administration and Federal Aviation Administration to get "Refuge Boundary Closed to Public Access" indicated on nautical and air charts.
- Confine boat traffic to a 500-foot wide corridor, providing access to the proposed marina in the old seaplane berthing lagoon and Piers 1, 2 and 3. Maximum channel speed will be 5-mile per hour (no wake).
- Coordinate with the City of Alameda and future operator of the marina that will encompass the old Seaplane Lagoon to assure that marina users comply with boating restrictions within the Refuge. Compliance with boating restrictions on the Refuge should be a condition of the marina's lease with the City.
- Have the Refuge marked on aeronautical charts as a restricted fly-zone under 1,000 feet and the airfield marked as closed to all landings on these charts. Work with the FAA to have a Notice to Airmen (NOTAM) issued advising pilots of these flight restrictions.
- Initiate and/or support studies of open water foraging areas to determine which biological and physical characteristics are important to least terns. Determine factors influencing use of foraging areas both on and off-Refuge.
- Do not allow dredging of the deepwater navigational channel ([Figure 4](#)) between March 15 and September 30 in order to minimize open water turbidity just prior to and during the least tern breeding season and peak use periods for brown pelicans.

**Objective E:** Protect and enhance habitat for other species of threatened and endangered species at Alameda NWR.

**Current Status:** Breakwater Island is critical to brown pelican use of San Francisco Bay. It is used as both a day and night roost (Jaques-Strong 1994). Opportunistic surveys during the mid-1980s through mid-1990s counted as many as 400 pelicans (Bailey 1994). A record high of 1,400 brown pelicans were counted on the Island Breakwater in May 1998 (Luther, pers. com.). If regular surveys for brown pelicans were made in the fall, it is likely that greater numbers would be found (Jaques-Strong 1994). Western snowy plovers nested on the Alameda tern colony during at least two years in the early 1980s (U.S. Navy 1997a), and American peregrine falcons occasionally use the area for foraging.

**Rationale:** Brown pelicans flushed off the island by trespassing boaters often stayed away for at least a full day (Bailey 1994). Night roosts are particularly vulnerable to disturbance. Systematic censuses are needed to quantify brown pelican use of the Breakwater Island. Management actions to increase least terns could potentially create nesting habitat for snowy plovers, which is considered desirable. Peregrine falcon use will not be intentionally encouraged through management strategies because peregrines prey on least terns.

**Strategies:**

- Keep Breakwater Island closed to public access all year. Install appropriate signs on the breakwater.
- Allow boats only within the access corridor.
- Compile existing data on pelican use of Breakwater Island and initiate regular pelican counts during appropriate seasons.
- Enhance habitat and manage predators for least terns in such a way as to encourage and protect nesting snowy plovers.
- Monitor peregrine use in conjunction with predator surveys. Follow protocols developed by the Service and the Santa Cruz Predatory Bird Research Group in dealing with peregrine falcons that threaten the least tern colony.

**Goal 2:** Preserve, maintain, and enhance habitat for migratory birds, and protect important foraging, nesting, and roosting habitats from disturbance.

**Objective A:** Maintain and enhance wetland areas to provide high-quality nesting and wintering habitat for waterfowl and shorebirds.

**Current Status:** The Refuge contains two wetland areas composed of salt marsh or brackish tidal marsh: the 32.4-acre West Wetland in the southwestern corner, and the 16.5-acre Runway Wetland in the southeast corner. The West Wetland is part of a contaminated CERCLA site being investigated by the Navy for cleanup. The hydrology of these wetlands is not completely understood. Open water areas provide important resting and feeding areas for waterfowl and other waterbirds.

**Rationale:** Even though these wetlands were not built with wildlife objectives in mind, they provide nesting and migratory habitat for a considerable number of waterbirds. Opportunities for enhancement must be balanced with the need to discourage predators near the least tern colony. Service management of the West Wetland will be coordinated with the Navy's remediation of the contaminated area.

**Strategies:**

- Work with the Navy and its contractor to integrate enhancement of the West Wetland into cleanup of the contaminated site. Ensure that wildlife habitat values are, at minimum, maintained and, ideally, improved.
- Coordinate with the Navy to insure that integrity of the culvert (tidal connection

to West Wetland) is maintained prior to transfer. Evaluate the need to modify or replace the inlet structure to improve tidal flow.

- Compile existing information on waterfowl and shorebird use of the two wetlands and open water areas, and initiate regular bird censuses (weekly/monthly depending on season) to quantify seasonal use.
- Remove exotic plant species, primarily pampas grass and ice plant, adjacent to and within the Runway Wetland ([Figure 8](#)) to discourage predators and encourage nesting shorebirds.
- Evaluate site characteristics of the Runway Wetland to determine opportunities for further wetland enhancement.
- Limit public access to open water areas to protect important waterfowl and other waterbird feeding, roosting, and resting areas from human disturbance.

**Objective B:** Maintain habitat for at least 300 pairs of nesting Caspian Terns on the West Wetland, and restore habitat conditions to increase the colony size to early 1990 levels (population goal is 1,000 nesting pairs).

**Current Status:** Caspian terns have nested on an area of elevated, exposed soil within the West Wetland since the mid-1980s. The colony location moved eastward during the early 1990s in response to nesting California gulls and encroaching vegetation (Collins, pers. com.). The size of the colony has decreased in recent years for unknown reasons.

**Rationale:** Alameda's Caspian tern colony is of regional importance. Annual standardized monitoring has not occurred, but several investigators have periodically conducted censuses of the colony. Reasons for the decreased number of breeding pairs are unknown, but vegetation encroachment onto the breeding site, competition with California gulls, shifts to alternate site(s), and contaminants have been identified as possible factors.

#### **Strategies:**

- Compile existing information from past Caspian tern colony censuses/investigations. Initiate a regular program to monitor, at a minimum, the breeding population size and arrival/departure dates, and ideally, reproductive success.
- Conduct a habitat analysis of Caspian tern nesting habitat to determine what vegetation management actions are needed, and what opportunities exist to maintain and expand the nesting area. Manage vegetation by either manipulating water levels, using chemical treatments, or adding suitable substrates ([Figure 9](#)).
- Support and encourage studies that investigate other potential limiting factors for and dynamics of the Caspian tern nesting colony, such as food resources, disturbance to feeding areas, shifts to other nesting areas, etc.
- Work with the Navy so that its remediation plan includes provisions and funding to monitor migration of any contaminants from the adjacent CERCLA contaminated site. This should include monitoring the effects on Caspian tern reproduction.

**Goal 3:** Protect important haul-out, roosting, nesting, and foraging habitat on Breakwater Island and other shoreline habitats.

**Objective A:** Protect the harbor seal haul-out site on Breakwater Island and feeding sites around Breakwater Gap from human disturbance.

**Current Status:** Harbor seals use Breakwater Island as a haul-out site but it has not been regularly monitored, so its overall and seasonal importance is poorly understood. Harbor seals forage extensively in the Breakwater Gap area.

**Rationale:** The Navy restricted public access to breakwaters and open waters within the Refuge prior to base closure. Since access will no longer be restricted for military purposes, closures and/or physical barriers will be needed to minimize human disturbance. Seals do not haul out at sites with high disturbance, and they will abandon established haul-outs if disturbance develops and persists.

**Strategies:**

- Close Breakwater Island to public access throughout the year and post with National Marine Fisheries Service "Do Not Disturb: Marine Mammals in Area" signs.
- Initiate periodic monitoring of the haul-out site to determine numbers of seals present, whether it is used as a pupping site, and how this varies by season, tide, or other factors.
- Develop other management strategies based on results of monitoring.
- Conduct regular law enforcement patrols to enforce access restrictions.

**Objective B:** Protect bird nesting, roosting, and foraging habitat on Breakwater Island and in Breakwater Gap.

**Current Status:** Breakwater Island is an important roosting and nesting area for waterbirds. At least 25 species of waterbirds are known to forage around the gap between the Breakwater Island and Long Breakwater, particularly in the tidal eddies (Bailey 1994). Breakwater Island provides a relatively safe habitat for birds because it is protected from people, predators, and boats (Feeney 1994).

**Rationale:** Boaters landing on or approaching Breakwater Island too closely could flush roosting or nesting birds, causing site abandonment and/or damage to chicks or eggs. The Navy restricted boats from landing on Breakwater Island; however, trespass did occur. Human activity on the western end of Long Breakwater could also disrupt wildlife nesting, roosting, or foraging in Breakwater Gap or on Breakwater Island.

**Strategies:**

Do not allow boats to land on Breakwater Island.

- Do not allow commercial or recreational boat traffic within the Breakwater Gap area.
- Coordinate with the City of Alameda to develop signing and access restrictions for Long Breakwater needed to protect sensitive wildlife habitat in the Breakwater Gap and on Breakwater Island.

**Objective C:** Protect birds nesting and roosting on the wooden pier south of the runway from human disturbance.

**Current Status:** This structure was part of the runway landing system. It has been posted by the Navy as unsafe for human access. It is used by roosting double-crested cormorants and nesting western gulls and great blue herons (Feeney, pers. com.).

**Rationale:** The structure's significance to nesting/roosting birds is not well known.

**Strategies:**

- Conduct baseline surveys to determine wildlife use of the wooden pier.
- Do not allow access (from either land or water) to the wooden pier, and post it with refuge boundary/no trespassing signs.

**Goal 4:** Restore and preserve native biological communities in vegetated habitat areas of Alameda NWR.

**Objective A:** Control and/or eliminate nonnative plant and animal species and improve habitat quality for native songbirds, small prey mammals, and invertebrate species where this does not conflict with tern habitat management objectives.

**Current Status:** Most of the upland habitat areas are dominated by nonnative "weedy" species. Some of these areas (e.g. those dominated by iceplant and pampas grass) provide little habitat value for native wildlife; other areas (e.g. those dominated by non-native grasses) do provide cover and forage for small mammals and birds. Domestic rabbits were released on NAS Alameda, and a feral rabbit colony has established and proliferated on the Northwest Territories outside the Refuge boundary; a few have been seen within the proposed Refuge boundary (Collins, pers. com.). Storm drains ([Figure 3](#)) drain water from the airfield area into the Bay, preventing ponding.

**Rationale:** Prey populations in grassy and other vegetated habitats located some distance from the tern colony draw predators away from the terns. Opportunities exist to improve some of these areas for other native wildlife species. However, care should be taken to make sure that converting existing nonnative grasslands to native grasslands does not reduce prey populations currently in these areas. Information on wildlife use of other habitat areas on the Refuge is incomplete.

### **Strategies:**

- Remove iceplant, pampas grass, and other invasive, nonnative vegetation (pink areas on [Figure 8](#)) through a combination of chemical and mechanical treatments, and biological control methods if they become available. Re-establish low-growing native species by planting and reducing competition from nonnatives.
- Manage native vegetation to provide habitat for ground-nesting songbirds and small mammals while not creating perching opportunities for predators.
- Evaluate information gaps regarding the distribution and abundance of flora and fauna. Seek opportunities to form partnerships with universities, conservation groups, and other cooperators to conduct studies that meet high-priority research needs.
- Remove domestic rabbits if populations become or threaten to become established on Alameda NWR.
- Assess suitability for creating seasonal wetlands by directing and ponding water that would otherwise run off into storm drains.

## **4.2 Public Use Management**

The proposed Public Use Program will include most of the priority public uses included in the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, such as high-quality environmental education and interpretation and wildlife observation and photography ([Figure 9](#)). Some limited nonwildlife-dependent recreation will also be allowed. Due to the extremely limited size of appropriate habitat and the dense population of anticipated Refuge users and the high potential for accidents, hunting will not be allowed. Due to the potential health risks from contaminated shoreline sites, fishing will not be allowed. Recreational fishing will be re-evaluated after the Navy completes its required remediation. At that time, regional contaminant problems (Office of Environmental Health

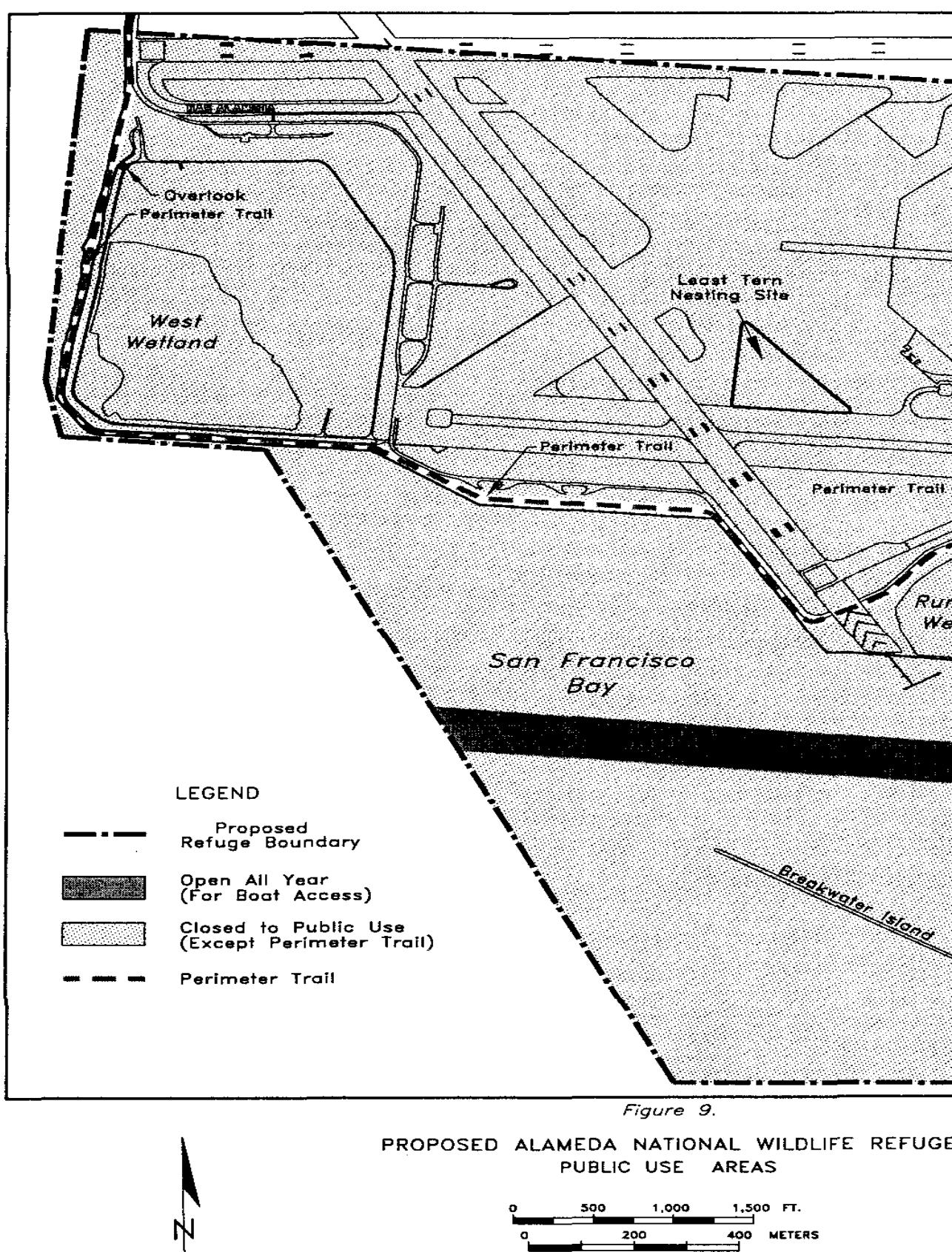
Hazard Assessment 1994) will be considered, as well as impacts to fish-eating birds.

Allowable public uses will be confined to the Perimeter Trail (seasonally), the 500-foot wide boat corridor, guided interpretive tours during tern nesting season, and organized environmental educational activities. The majority of the Refuge would be closed to public use.

Following are goals and objectives for the proposed program, and strategies for accomplishing those goals and objectives:

**Goal 5:** Provide opportunities for environmental education, wildlife-dependent recreation, and other compatible and safe public use.

FIGURE 9



**Objective A:** Develop and maintain facilities and programs to provide opportunities for safe, compatible, wildlife-dependent public uses, including wildlife observation,

environmental education, interpretation, and wildlife photography. Establish, or expand, partnerships with outside agencies and organizations to further the Refuge's public use programs.

**Current Status:** The proposed Alameda NWR includes grounds and buildings originally used by the U.S. Navy as part of Alameda Naval Air Station. The Air Traffic Control Tower has unobstructed views of the least tern nesting area, and

more distant views of the proposed Refuge's wetlands. The Air Traffic Control Tower does not lie within the Refuge, and its availability is uncertain. The Golden Gate Audubon Society has hired two public use specialists to develop an environmental education (EE) program, with office space provided by the College of Alameda. This EE program is occurring in public school classrooms throughout the City of Alameda.

The lower level of the levee along the western edge of the former Naval Air Station has potential for use as a hiking trail. The lower level is out of sight of the birds in the West Wetland, and therefore can be used without causing disturbance. The upper portion should remain closed to public use to eliminate the possibility of adversely affecting the terns, geese, and ducks. However, a screened observation deck on the upper level of the levee would allow views of the birds without disturbing them.

The portion of the proposed Perimeter Trail, passing near the Runway Wetland is not shielded from view by a levee, and use of that section of the Trail could therefore result in disturbance to the birds in that wetland. Birds will either flush from the site or move away from the trail. If this disturbance is fairly constant, some migratory waterfowl would simply avoid use of wetland areas within 100 to 300 feet of the Perimeter Trail (Klein, 1989). However, during nesting season the trail will be closed, eliminating most impacts to the nesting waterfowl and shorebirds. A temporary, removable fence along the runway portion of the Perimeter Trail, between the Trail and the Runway Wetland, would encourage hikers to stay on the trail and thereby minimize disturbance to wintering waterfowl in the Runway Wetland. During nesting season, when the fence would provide perching sites for raptors, the fence would be removed following seasonal closure of the Trail. Major improvements to the levee portion of the trail are needed.

**Rationale:** Potential for wildlife-dependent public uses, such as environmental education, interpretation, wildlife observation and wildlife photography, is clear. Off-site programs already occur, but programs on the Refuge cannot be provided until safe, accessible facilities are developed.

### **Strategies:**

- Further develop partnerships with the Golden Gate Audubon Society and the College of Alameda to improve and expand the existing environmental education program in the public schools. Develop links with Alameda Point Ferry Terminal, the Hornet Museum, Air Museum, and other public contact points to foster awareness of visitor programs and appreciation of the Refuge's important biological resources.
- Develop a Wildlife Observation/Interpretive Center off-Refuge in partnership with the Golden Gate Audubon Society, ARRA, the City of Alameda, or other appropriate organizations. The Air Traffic Control Tower would provide a particularly useful site. In the event that the Air Traffic Control Tower is not available, develop a small interpretive center at either another off-site building near the eastern boundary or within the Refuge. Construction of any new building on Refuge lands would incorporate design restrictions needed to protect endangered/threatened species.
- Develop the Refuge portion of the Perimeter Trail along the lower levee. Coordinate development of the Perimeter Trail with the East Bay Regional Park District. Although the perimeter levee is in place, some areas along the proposed Perimeter Trail alignment are inundated by high water, and much of the trail could be impassable during the rainy season because of mud. Seek funds to repair the rip-rap from a variety of sources, including the Navy who are responsible for containing the contaminated area. Due to spring and summer seasonal use of the Refuge by Caspian terns and California least terns, the Perimeter Trail will be closed during the nesting season of each year (April 1 to August 15).

To minimize disturbance to wildlife, the Perimeter Trail will follow the lower level of the perimeter levee, and public use would be monitored to ensure it would not conflict with wildlife objectives. If the level of public use causes unacceptable disruption of migratory birds or endangered species, access may be restricted to reduce the number of visitors or time of visitation.

- Construct one or more screened observation platforms on the upper levee of the Perimeter Trail to afford visitors the opportunity to view and photograph wildlife in the wetland.
- Install a closed-circuit television system to view California least tern and/or

harbor seal activity from the Wildlife Observation Center. When terns and other wildlife are absent, or activity is at a minimum, play tapes of previously recorded activity.

- Develop indoor and trailside exhibits for the Refuge.
- Develop a Refuge Volunteer Program, modeled after the successful program at Don Edwards San Francisco Bay NWR. Use trained volunteers to help patrol trails, work in the Wildlife Observation Center, conduct the environmental education program, and carry out staff projects of all kinds.
- Once the Refuge assumes management responsibility of property, all buildings and structures will be inspected and evaluated to determine their fate. This determination will be made on a case-by-case basis. Criteria used in this assessment will include potential use, historical status, physical condition, safety hazards, aesthetics, predator perching opportunities and other wildlife management considerations. Appropriate action will be taken as a result of this process and may include removal, restoration, or no action.

**Objective B:** Create educational and interpretative programs that will foster visitors' appreciation and understanding of the wildlife of San Francisco Bay and enhance their concept of national wildlife refuges. Accommodate 30 students for three hours per day for up to 90 days per year, and 104 two-hour weekend tours per year with an average of 10 people per tour.

**Current Status:** No public use programs currently exist on the proposed Refuge. The Friends of Alameda National Wildlife Refuge (FAWR) developed an off-site environmental education program using docents from the community. EE programs have been conducted by this group throughout the public school system in Alameda. No interpretive walks are being conducted at the present time.

**Rationale:** Organized, well-managed public use activities will greatly enhance the quality of environmental education and natural history interpretation on the Refuge. The National Wildlife Refuge System Improvement Act of 1997 lists interpretation and environmental education as priority public uses.

#### **Strategies:**

- Establish an environmental education (EE) program on the proposed Refuge for local schools. Once established, this program could be managed by an EE specialist and an intern. It will be modeled after the "Trekking The Refuge" program at Don Edwards San Francisco Bay NWR. Teachers use Refuge-provided equipment and materials to lead field trips along designated areas of the Refuge. Refuge employees conduct preparatory workshops for teachers and parents in advance of scheduled field trips. Education topics will include the ecology of San Francisco Bay and the natural history of the Bay's endangered species and migratory shorebirds. This program, and FAWR's EE program already underway off-site, would augment each other.
- Set up a series of weekend nature walks, led by trained volunteer docents, as the core of the Refuge Interpretive Program. Volunteers will receive ancillary training at the College of Alameda in a course that will cover the mission of the U.S. Fish and Wildlife Service; the history of the Refuge; the biology of Refuge wildlife, including the California least tern and other endangered species; and interpretive philosophy and techniques. Tours will be conducted on foot near the wetland areas, or in a bus or van near the perimeter of the tern colony. Passengers will be required to stay inside the vehicle, so as to avoid disturbance to the nesting birds.
- Work with FAWR to further develop the off-site interpretive program as staffing and volunteer help become available. Visit schools and other organizations to educate the public about the wildlife of the Refuge.

**Objective C:** Manage a wildlife-dependent recreation program that will enable visitors to experience and enjoy the wildlife of San Francisco Bay and the Refuge and thereby develop an appreciation for fish and wildlife.

**Current Status:** No sanctioned recreation programs exist on the proposed Refuge.

**Rationale:** The National Wildlife Refuge System Administration Act 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, recognizes wildlife-dependent recreational activities as priority uses of the National Wildlife Refuge System. Wildlife observation and photography are included in the priority public uses of national wildlife refuges.

### **Strategies:**

- Foster a wildlife observation program. Most birdwatching and nature observation will be done by visitors on the Perimeter Trail. Restricting public use to daylight hours should decrease vandalism and other crime. Volunteers will patrol the trail, interpreting natural history to hikers and giving aid as needed. Only screened viewing areas on the perimeter levee will be developed, thereby providing less disturbance to wildlife.
- Allow artistic pursuits on the Refuge, to the extent they are compatible. Wildlife photography may be possible at a former watchtower photo blind overlooking a small seasonal wetland north of the landfill. This site will be considered for use under a special use permit system in order to control access. The site can be reached from the north and access would not disturb wildlife in the three main wildlife concentration areas: least tern colony, West Wetland, and Runway Wetland.
- Advise the public of the danger of contaminants in the substrate, the water, and the fish of the proposed Refuge. Prohibit, via signs and active law enforcement, recreational fishing along the Perimeter Trail shoreline because of litter, possible ingestion of hooks and sinkers by fish-eating birds, and the potential for health hazards from eating fish caught close to contaminated remediation sites. Reconsider recreational fishing when remediation activities are completed.

**Objective D:** Manage nonwildlife-dependent uses compatible with the purposes of the proposed Refuge. Assure that nonwildlife-dependent uses do not conflict with wildlife-dependent uses. Jogging, aerobic walking, and bicycling will be carefully monitored to assure compatibility. Recreational boating (except that which is confined to an access corridor to and from the Seaplane Berthing Lagoon) and flying of kites and model airplanes will not be allowed. Restrict other nonpriority uses of Refuge lands and facilities not identified here to those that will result in limited public or permittee access to Refuge lands and waters, and that are nondisturbing to wildlife, are safe, and are otherwise compatible with the purposes for which the proposed Refuge is to be established.

**Current Status:** The Navy limits official activities on the former naval base to a minimum. Nonwildlife-dependent recreation programs currently do not exist within the proposed Refuge.

**Rationale:** A limited amount of bicycling and jogging on the Perimeter Trail would not conflict with wildlife-dependent public uses. Recreational boating has been shown to significantly disturb foraging and rafting waterbirds (Tuite et al. 1984). Disturbances can cause waterfowl to leave the area and deplete fat reserves needed for migration and winter survival.

### **Strategies:**

- Manage bicycling, jogging, and aerobic walking with signs, brochures, and contact between Refuge visitors and volunteers and/or staff members so that these activities are confined to the Perimeter Trail and conducted in a compatible and safe manner. Monitor to assure that they do not interfere with wildlife-dependent recreational activities. Prohibit activities along the Perimeter Trail near the West Wetland until Navy cleanup activities on the adjacent landfill have progressed to a stage that visitor safety can be assured. In addition, biking would not be allowed until the surface of the Perimeter Trail is upgraded sufficiently to support bicycle use.
- Allow only those nonpriority uses that meet the following criteria: (1) require limited access, (2) are nondisruptive to wildlife and management activities, (3) avoid important wildlife use areas ([Figure 6](#)) and areas planned for habitat improvement, (4) are flexible in accommodating access restrictions or closures to protect wildlife, (5) do not interfere with established/ongoing environmental education programs or biological studies, and (6) do not involve flammable, corrosive, or hazardous materials.
- Develop brochures interpreting the natural history of the breakwater area, the seaplane lagoon, the Refuge shoreline, and the tern nesting colony, that emphasize the sensitive nature of these habitats and the importance of minimizing disturbance.

- Mark with buoys a 500-foot wide corridor for boats to access the proposed marina in the old seaplane berthing lagoon. Institute a 5-mile per hour (no wake) speed limit within the boating corridor to decrease the level of disturbance to marine mammals and seabirds on the Breakwater Island and foraging areas in the nearby eelgrass beds. Close the areas outside of the corridor to recreational and commercial boats with the occasional exception of Maritime Administration ships and tugs traversing the Refuge with a special use permit. Develop signs informing boaters that other areas within the proposed Refuge are off limits.
- Establish a Refuge Law Enforcement (LE) Program at the proposed Alameda NWR. Assure that at least two staff members have LE authority. Arrange for supplemental LE support from San Francisco Bay NWR Complex police officers. Develop cooperative agreements with the Alameda Police Department, Alameda Fire Department, and East Bay Regional Park District to augment Service efforts.
- Conduct regular patrols of Refuge open water areas and Breakwater Island to prevent trespass and to enforce closed areas. Enlist assistance of harbor patrol, U.S. Coast Guard, and other cooperators to augment Service patrol efforts.

## Chapter 5. PLAN IMPLEMENTATION

Refuge objectives are intended to be accomplished over the next 15 years. Management activities will be phased in over time and implementation is contingent upon and subject to results of monitoring and evaluation, timing of contaminants clean up, funding through Congressional appropriations and other sources, and staffing.

### 5.1 Funding and Personnel

Funding needed for any wildlife refuge includes both initial capital costs for equipment, facilities, structures, and other one-time expenditures as well as annual, ongoing costs for staff, contracts, supplies, and other recurring expenditures.

Large initial expenditures for the proposed Alameda NWR would include boundary fencing (\$168,000); vehicles, such as trucks, tractor, boat, and trailers (\$145,000); buoys (\$50,000); gravel, shell, and other habitat development needs (\$190,000); observation deck and interpretive panels (\$65,000); and office and visitor center development and exhibits (\$100,000). Along with other smaller equipment, tools, and staff moving costs (\$93,000), the total initial, capital costs are estimated at \$848,000 (see [Table 2](#)). These capital costs will not all accrue during the first year of Refuge operation. For example, habitat development likely will occur over several years, and some vehicles and equipment may be borrowed from the Refuge Complex headquarters site in Fremont during the initial years. The Refuge will, however, incur these costs over the long term.

At full staffing, on-site Fish and Wildlife Service personnel would include a refuge manager, a maintenance worker, a wildlife biologist, and a public use specialist. In addition, several interns would be hired to help operate the environmental education program. Both the refuge manager and the maintenance worker would have collateral law enforcement authority. Annual contracts or cooperative agreements would be issued for predator management, buoy maintenance, and other activities. All of these recurring costs are expected to total \$299,400 per year (see [Table 2](#)).

### 5.2 Partnership Opportunities

Many biologists, scientific organizations, retired military personnel, environmental organizations, other agencies, and private citizens have expressed a great interest in the management of Alameda National Wildlife Refuge. The Friends of Alameda Wildlife Refuge (FAWR) was formed specifically to provide support for the Refuge. This group's continued and/or planned activities include organizing and training volunteers to help with interpretive activities and biological monitoring, encouraging public awareness and support, and recruiting volunteers. FAWR conducted a training class for potential Alameda Refuge docents in 1997 and another in 1998.

**Table 2. Anticipated Costs to Operate Alameda National Wildlife Refuge**

#### Initial Capital Costs:

Fence (North Boundary--6,000 feet @ \$16/foot) \$ 96,000

Fence (East Boundary--4,000 feet @ \$16/foot) 64,000

Gates (4 gates @ \$2,000 each) 8,000

Electric Fence (Expanded site--1,200 feet @ \$10/foot) 12,000

Electric Fence (New site--2,000 feet @ \$10/foot) 20,000

Habitat (Shell, pebbles--3,200 cubic yards @ \$46/cubic yard  
+ 29 percent contingency) 190,000

Truck/Jeep, includes LE equipment (2 @ \$30,000/vehicle) 60,000

Tractor (includes trailer, sidebar mower, safety cab) 60,000

Boat (includes trailer) 25,000

Buoys (initial cost plus installation @ \$1,000/buoy)

Marina corridor (4,000 feet; 2 buoys/200 feet=40 buoys) 40,000

South of breakwater (2,000 feet; 1 buoy/200 feet=10 buoys) 10,000

Observation Deck at perimeter trail 30,000

Interpretive panels (10 @ \$3,500/panel) 35,000

Signs (directional) 5,000

Office and Visitor Center Development, includes exhibits and  
closed circuit television 100,000

Office equipment 20,000

Computers (3), software, printer (1) 7,000

Binoculars, cameras, cell phones/radios 4,000

Maintenance tools 10,000

Environmental education equipment/tables 2,000

Staff move 50,000

Total \$848,000

**Annual Costs:**

Salaries & Benefits

Refuge Manager @ GS 12 \$ 65,000

Maintenance Worker/ Law Enforcement @ WG-8 50,000

Biologist @ GS-9 45,000

Public Use Specialist @ GS-9 45,000

Interns (Environmental Education, 3 [12 weeks] @ \$2,700 each) 8,000

Predator Management (20 hours per week for 6 months) 30,000

Buoy Maintenance 2,000

Herbicides (54 acres @ 2.5 gallons/acre=135 gallons and

142 acres @ 1.5 gallons/acre=213 gallons @ \$50/gallon) 17,400

Travel/Training (required law enforcement, safety, etc.) 7,000

Supplies, space costs, utilities 25,000

Printing 5,000

Total \$299,400

The Golden Gate Audubon Society (GGAS) organized a scientific symposium in 1994 to inform the agencies, scientists, and the public about the biological resources and management opportunities at Alameda. GGAS has also pledged \$25,000 to assist with management of Alameda Refuge.

Many San Francisco Bay National Wildlife Refuge Complex volunteers and other private citizens have indicated an interest in helping with wildlife monitoring and environmental education programs. Opportunities exist to form partnerships with other Bay Area land management agencies and organizations such as East Bay Regional Park District and California Department of Fish and Game, Golden Gate National Recreation Area, Point Reyes Bird Observatory, and San Francisco Bay Bird Observatory.

Partnerships require extensive time to coordinate, develop, and nurture. This must be accounted for in the development of budgets and annual work plans.

### **5.3 Monitoring and Evaluation**

Adaptive management is a flexible approach to longterm management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. Biological management techniques and specific objectives will be regularly evaluated in light of monitoring results and other new information. These periodic evaluations will be used over time to adapt both the management objectives and techniques to better achieve management goals.

Monitoring is an essential component of this plan, and specific monitoring strategies have been integrated into the goals and objectives outlined above. All habitat management activities will be monitored to assess whether the desired effect on wildlife and habitat components has been achieved. Monitoring the number of breeding pairs and the reproductive parameters of the California least tern colony will follow established statewide protocols, at a minimum. Baseline surveys will be established for other species of wildlife for which existing or historical numbers are not well known. It also will be important to begin studies to monitor the response of wildlife to increased public use in the form of observation and environmental education.

### **5.4 Compliance Requirements**

In implementing the Comprehensive Conservation Plan, the Service would comply with the following Federal laws, Executive orders, and legislative acts: Floodplain Management (Executive Order 11988); Intergovernmental Review of Federal Programs (Executive Order 12372); Protection of Historical, Archaeological, and Scientific Properties (Executive Order 11593); Protection of Wetlands (Executive Order 11990); Management and General Public Use of the National Wildlife Refuge System (Executive Order 12996); Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898); Hazardous Substances Determinations (Secretarial Order 3127); Endangered Species Act of 1973, as amended; Refuge Recreation Act, as amended; National Wildlife Refuge System Administration Act of 1966, as amended; National Environmental Policy Act of 1969, as amended; National Historic Preservation Act of 1966, as amended; Coastal Zone Management Act of 1972, as amended ([Appendix E](#)).

## **APPENDIX A**

### **GLOSSARY**

**Alternative.** Alternatives are different means of accomplishing the unit goals and objectives.

**Biological Diversity/Biodiversity.** The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

**Compatible Use.** A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.

**Comprehensive Conservation Plan (CCP).** A document that describes the desired future conditions of the refuge and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates.

**Ecosystem.** Dynamic and interrelated complex of plant and animal communities and their

associated nonliving environment.

**Ecosystem Approach.** Protecting or restoring the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.

**Goal.** Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units.

**Issue.** Any unsettled matter that requires a management decision; e.g., a Service initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition.

**National Wildlife Refuge (Refuge).** A designated area of land or water or an interest in land or water within the System, including national wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas (except coordination areas) under Service jurisdiction for the protection and conservation of fish and wildlife. A complete listing of all units of the Refuge System may be found in the current "Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service."

**National Wildlife Refuge System, Refuge System, or System.** Various categories of areas that are administered by the Secretary for the conservation of fish and wildlife, including species that are threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management or waterfowl production areas.

**National Wildlife Refuge System Mission.** To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

**No Action Alternative.** An alternative under which existing management would be continued.

**Non-Priority Public Uses.** Any use other than a compatible wildlife-dependent recreational use.

**Objective.** A concise statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies, monitoring refuge accomplishments, and evaluating the success of the strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively.

**Opportunities.** Potential solutions to issues.

**Preferred Alternative.** The Service's selected alternative at the draft CCP stage.

**Priority Public Uses.** Compatible wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) are the priority general public uses of the System and shall receive priority consideration in refuge planning and management.

**Proposed Action.** The Service's proposed action for Comprehensive Conservation Plans is to prepare and implement the CCP.

**Public Involvement.** The process by which interested and affected individuals, organizations, agencies, and governmental entities participate in the planning and decision making process.

**Purposes of the Refuge.** The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit.

**Strategy.** A specific action, tool, or technique or combination of actions, tools, and techniques used to meet refuge objectives.

**Wildlife-Dependent Recreation/Wildlife-Dependent Recreational Use.** A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. The Refuge Administration Act specifies that these are the six priority general public uses of the System.

## APPENDIX B

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**APPENDIX C****PLANT SPECIES OBSERVED OR PREDICTED TO  
OCCUR AT THE PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE****CLASS: DICOTYLEDONS (DICOTS)****Scientific Name Common Name**

AIZOACEAE (Carpetweed Family)

*Carpobrotus chilensis* ice plant

*Carpobrotus edulis* Hottentot fig

ANACARDIACEAE (Sumac Family)

*Toxicodendron diversilobum* poison oak

ARALIACEAE (Ginseng Family)

*Hedera helix* English ivy

ASTERACEAE (Sunflower Family)

*Baccharis pilularis* var. *consanguinea* coyote bush

*Carduus* sp. Italian thistle

*Centaurea solstitialis* yellow star thistle

*Cirsium vulgare* bull thistle

*Cotula coronopifolia* brass buttons

*Gazania* sp. Gazania perennial

*Grindelia* sp. gum plant

*Jaumea carnosa* Jaumea

*Lactuca virosa* prickly lettuce

*Picris echioides* bristly ox-tongue

BETULACEAE (Birch Family)

*Alnus rhombifolia* white alder

*Alnus rubra* red alder

BORAGINACEAE (Borage Family)

*Plagiobothrys* sp. popcorn flower

BRASSICACEAE (Mustard Family)

*Raphanus sativus* wild radish

CARYOPHYLLACEAE (Pink Family)

*Spergularia marina* saltmarsh sandspurry

**Scientific Name Common Name**

CHENOPODIACEAE (Goosefoot Family)

*Atriplex semibaccata* Australian saltbush

*Salicornia virginica* pickleweed

CISTACEAE (Rockrose Family)

*Cistus purpureus* rockrose orchid

ERICACEAE (Heath Family)

*Erica* sp. heather

FABACEAE (Pea Family)

*Acacia decurrens* green wattle

*Acacia longifolia* Sydney golden wattle

*Acacia melanoxylon* blackwood acacia

*Acacia verticillata* star acacia

*Lotus formosissimus* seaside trefoil

*Vicia villosa* hairy vetch

GERANIACEAE (Geranium Family)

*Geranium dissectum* cut-leaf geranium

LAMIACEAE (Mint Family)

*Rosmarinus officinalis* rosemary

MYOPORACEAE (Myoporum Family)

*Myoporum laetum* Myoporum

PLANTAGINACEAE (Plaintain Family)

*Plantago coronopus* cut-leaved plantain

POLYGONACEAE (Buckwheat Family)

*Rumex crispus* curly dock

ROSACEAE (Rose Family)

*Cotoneaster* sp. cotoneaster

*Fragaria chiloensis* beach strawberry

*Raphiolepis indica* India hawthorne

*Rubus* sp. blackberry

SALICACEAE (Willow Family)

*Salix* sp. willow

**Scientific Name** **Common Name**

SAXIFRAGACEAE (Saxifrage Family)

*Escallonia* sp. Escallonia

SCROPHULARIACEAE (Figwort Family)

*Hebe* sp. Hebe species

**CLASS: MONOCOTYLEDONS (MONOCOTS)**

CYPERACEAE (Sedge Family)

*Carex* sp. sedge

*Scirpus* sp. bulrush, sedge

JUNCACEAE (Rush Family)

*Juncus* sp. rush

POACEAE (Grass Family)

*Aira caryophyllea* European hairgrass

*Avena barbata* slender wild oat

*Bromus diandrus* ripgut grass

*Bromus hordeaceus* soft chess

*Danthonia californica* California oatgrass

*Distichlis spicata* saltgrass

*Holcus lanatus* common velvet grass

*Hordeum murinum* ssp. *leporinum* foxtail grass

*Koeleria macrantha* junegrass

*Lolium perenne* perennial ryegrass

*Phalaris aquatica* Harding grass

*Poa pratensis* Kentucky bluegrass

*Vulpia myuros* rattle fescue

ZOSTERACEAE (Eel-grass Family)

*Zostera* sp. eel-grass

Sources: Hickman 1993; U.S. Navy 1986, 1993b.

**APPENDIX C**

**VERTEBRATE SPECIES OBSERVED OR PREDICTED TO OCCUR  
WITHIN THE PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE**

<b>SPECIES</b>	<b>HABITATS</b>				
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
Sevengill shark ( <i>Notorynchus maculatus</i> )			O		
Brown smoothhound ( <i>Mustelus henlei</i> )			O		
Leopard shark ( <i>Triakis semifasciata</i> )			O		

Bat ray ( <i>Myliobatis californica</i> )			O	
Pacific herring ( <i>Clupea pallasii</i> )			O	
Northern anchovy ( <i>Engraulis mordax</i> )			O	
Silver (Coho) salmon ( <i>Oncorhynchus kisutch</i> )			O	
King (Chinook) salmon ( <i>Oncorhynchus tshawytscha</i> )			O	
Delta smelt ( <i>Hypomesus transpacificus</i> )			O	
Plainfin midshipman ( <i>Porichthys notatus</i> )			O	
Rainwater killifish ( <i>Lucania parva</i> )			O	
Jacksmelt ( <i>Atherinopsis californiensis</i> )			O	
Topsmelt ( <i>Atherinops affinis</i> )			O	
Threespine stickleback ( <i>Gasterosteus aculeatus</i> )			O	
Bay pipefish ( <i>Syngnathus leptorhynchus</i> )			O	
Pacific staghorn sculpin ( <i>Leptcottus armatus</i> )			O	
Striped bass ( <i>Morone saxatilis</i> )			O	
White croaker ( <i>Genyonemus lineatus</i> )			O	
Shiner surfperch ( <i>Cymatogaster aggregata</i> )			O	
Silver surfperch ( <i>Hyperprosopon ellipticum</i> )			O	
Walleye surfperch ( <i>Hyperprosopon argenteum</i> )			O	
Pile surfperch ( <i>Damalichthys vacca</i> )			O	
White surfperch ( <i>Phanerodon furcatus</i> )			O	
Yellowfin goby ( <i>Acanthgobius flavimanus</i> )			O	
Arrow goby ( <i>Clevelandia ios</i> )			O	
California halibut ( <i>Paralichthys californicus</i> )			O	
Starry flounder ( <i>Platichthys stellarus</i> )			O	
English sole ( <i>Parophrys vetulus</i> )			O	
California slender salamander ( <i>Batrachoseps attenuatus</i> )	E			
Pacific treefrog ( <i>Hyla regilla</i> )	E			
Western fence lizard ( <i>Sceloporus</i>	O	E		

<i>occidentalis)</i>	E				
Northern alligator lizard ( <i>Gerrhonotus coeruleus</i> )					
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
Gopher snake ( <i>Pituophis melanoleucus</i> )	E				
Common garter snake ( <i>Thamnophis sirtalis</i> )	E	E			
Western terrestrial garter snake ( <i>Thamnophis elegans</i> )					
Red-throated loons ( <i>Gavia stellata</i> )		O			
Common loon ( <i>Gavia immer</i> )		O			
Pied-billed grebe ( <i>Podilymbus podiceps</i> )		E	O		
Horned grebe ( <i>Podiceps auritus</i> )		E	O		
Eared grebe ( <i>Podiceps nigricollis</i> )		E	O		
Western grebe ( <i>Aechmophorus occidentalis</i> )		E	O		
Clark's grebe ( <i>Aechmophorus clarkii</i> )		E	O		
American white pelican ( <i>Pelecanus erythrorhynchos</i> )	O	O			
Brown pelican ( <i>Pelecanus occidentalis</i> )		O	O	O	
Double-crested cormorant ( <i>Phalacrocorax auritus</i> )		E	O		O
Brandt's cormorant ( <i>Phalacrocorax penicillatus</i> )			O	O	
Pelagic cormorant ( <i>Phalacrocorax pelagicus</i> )			O	O	
Great blue heron ( <i>Ardea herodias</i> )	O	O			
Great egret ( <i>Casmerodius albus</i> )	O	O			
Snowy egret ( <i>Egretta thula</i> )		O		O	
Black-crowned night-heron ( <i>Nycticorax nycticorax</i> )		O		O	
Cattle egret ( <i>Bubulus ibis</i> )	E				
Canada goose ( <i>Branta canadensis</i> )	O, n	O, n			O
Snow goose ( <i>Chen caerulescens</i> )		O			
Green-winged teal ( <i>Anas crecca</i> )		O			
Mallard ( <i>Anas platyrhynchos</i> )	O, n	O, n	O	O	
Northern pintail ( <i>Anas acuta</i> )		O			
Blue-winged teal ( <i>Anas discors</i> )		E			
Cinnamon teal ( <i>Anas cyanoptera</i> )		O			
Northern shoveler ( <i>Anas clypeata</i> )		O			

Gadwall ( <i>Anas strepera</i> )	O, n				
Eurasian wigeon ( <i>Anas penelope</i> )	O				
American wigeon ( <i>Anas americana</i> )	O				
Canvasback ( <i>Aythya valisineria</i> )	O	O			
Greater scaup ( <i>Aythya marila</i> )	E	O			
Lesser scaup ( <i>Aythya affinis</i> )	E	O			
Common goldeneye ( <i>Bucephala clangula</i> )	E	O			
Bufflehead ( <i>Bucephala albeola</i> )	O	O			
Oldsquaw ( <i>Clangula hyemalis</i> )		O			
Black scoter ( <i>Melanitta nigra</i> )		O			
Surf scoter ( <i>Melanitta perspicillata</i> )		O			
White-winged scoter ( <i>Melanitta fusca</i> )	E	O			
Red-breasted merganser ( <i>Mergus serrator</i> )	E	O			
Ruddy duck ( <i>Oxyura jamaicensis</i> )		O			
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
Turkey vulture ( <i>Cathartes aura</i> )	O	O			O
Black-shouldered kite ( <i>Elanus caeruleus</i> )	O	O			O
Northern harrier ( <i>Circus cyaneus</i> )	O, n	O, n			O
Sharp-shinned hawk ( <i>Accipiter striatus</i> )	E	E			
Cooper's hawk ( <i>Accipiter cooperii</i> )	E	E			
Red-tailed hawk ( <i>Buteo jamaicensis</i> )	O	O			O
Red-shouldered hawk ( <i>Buteo lineatus</i> )	O				
Osprey ( <i>Pandion haliaetus</i> )	O	E			O
Rough-legged hawk ( <i>Buteo lagopus</i> )	O	E			O
American kestrel ( <i>Falco sparverius</i> )	O	E			O
Merlin ( <i>Falco columbarius</i> )	O	E			O
Peregrine falcon ( <i>Falco peregrinus</i> )		O			
Ring-necked pheasant ( <i>Phasianus colchicus</i> )	E				
California quail ( <i>Callipepla californica</i> )	E				E
American coot ( <i>Fulica americana</i> )		O	O		
Black oystercatcher ( <i>Haematopus bachmani</i> )		E		E	
Black-bellied plover ( <i>Pluvialis squatarola</i> )		O			
Semipalmated plover ( <i>Charadrius semipalmatus</i> )		O			
Snowy plover ( <i>Charadrius</i>		E			O, n

	E	O, n	O		
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
<i>alexandrinus)</i>					
Lesser golden-plover ( <i>Pluvialis dominica</i> )	O, n	O, n			
Killdeer ( <i>Charadrius vociferus</i> )	O, n	E			
Black-necked stilt ( <i>Himantopus mexicanus</i> )		E			
American avocet ( <i>Recurvirostra americana</i> )		O	O		
Greater yellowlegs ( <i>Tringa melanoleuca</i> )		E	O		
Lesser yellowlegs ( <i>Traigia flavipes</i> )		O			
Willet ( <i>Catoptrophorus semipalmatus</i> )		O			
Spotted sandpiper ( <i>Actitis macularia</i> )		O	O		
Whimbrel ( <i>Numenius phaeopus</i> )		E			
Long-billed curlew ( <i>Numenius americanus</i> )		E			
Marbled godwit ( <i>Limosa fedoa</i> )		O	O		
Western sandpiper ( <i>Calidris mauri</i> )		O			
Least sandpiper ( <i>Calidris minutilla</i> )		E			
Baird's sandpiper ( <i>Calidris bairdii</i> )		E			
Pectoral sandpiper ( <i>Calidris melanotos</i> )		O			
Dunlin ( <i>Calidris alpina</i> )		E			
Short-billed dowitcher ( <i>Limnodromus griseus</i> )			O	O	
Long-billed dowitcher ( <i>Limnodromus scolopaceus</i> )			O	O	
Common snipe ( <i>Gallinago gallinago</i> )				O	
Wilson's phalarope ( <i>Phalaropus tricolor</i> )				O	
Red-necked phalarope ( <i>Phalaropus lobatus</i> )				O	
Red phalarope ( <i>Phalaropus fulicaria</i> )					
Wandering tattler ( <i>Heteroscelus incanus</i> )			O		
Ruddy turnstone ( <i>Arenaria interpres</i> )					
Black turnstone ( <i>Arenaria melanocephala</i> )					
Sanderling ( <i>Calidris alba</i> )					
Rock sandpiper ( <i>Calidris ptilocnemis</i> )					
Red knot ( <i>Calidris canutus</i> )					
Parasitic jaeger ( <i>Stercorarius parasiticus</i> )					

Pomarine jaeger ( <i>Stercorarius pomarinus</i> )			O		
Sabine's gull ( <i>Xema sabini</i> )	E	E	E	E	
Franklin's gull ( <i>Larus pipixcan</i> )	E	O	E	E	
Heerman's gull ( <i>Larus heermanni</i> )	E	O	O	O	
Bonaparte's gull ( <i>Larus philadelphia</i> )	E	O	O	O	
Mew gull ( <i>Larus canus</i> )	O	O	O	O	0
Ring-billed gull ( <i>Larus delawarensis</i> )	O, n	O	O	O	0
California gull ( <i>Larus californicus</i> )	O	O	O	O	0
Herring gull ( <i>Larus argentatus</i> )	O	O	O	O	0
Thayer's gull ( <i>Larus thayeri</i> )	O, n	O	O	O	0
Western gull ( <i>Larus occidentalis</i> )	O	O	O	O, n	0
Glaucous-winged gull ( <i>Larus glaucescens</i> )	O	O	O	O	
Caspian tern ( <i>Sterna caspia</i> )	E	O	O	O	
Elegant tern ( <i>Sterna elegans</i> )	O	O	O	O	
Forster's tern ( <i>Sterna forsteri</i> )	E	E	E	O, n	
California least tern ( <i>Sterna antillarum browni</i> )	E	E	O	O	
Black tern ( <i>Chlidonias niger</i> )	E	E	E	E	
Common murre ( <i>Uria aalge</i> )					
Pigeon guillemot ( <i>Cephus columba</i> )					
Rock dove ( <i>Columba livia</i> )	O	E	E	E	O
Mourning dove ( <i>Zenaida macroura</i> )	O				O
Burrowing owl ( <i>Athene cunicularia</i> )	O, n				O
Great-horned owl ( <i>Bubo virginianus</i> )	E				E
Barn owl ( <i>Tyto alba</i> )	O	E	E	E	O
Anna's hummingbird ( <i>Calypte anna</i> )	O				
Belted kingfisher ( <i>Ceryle alcyon</i> )		O	O	O	
Black phoebe ( <i>Sayornis nigricans</i> )	E	O	O	O	
Say's phoebe ( <i>Sayornis saya</i> )	O	E	E	E	
Western kingbird ( <i>Tyrannus verticalis</i> )	E				
Horned lark ( <i>Eremophila alpestris</i> )	O, n	O	O	O	O, n
Tree swallow ( <i>Tachycineta bicolor</i> )	O	E	E	E	
Violet-green swallow ( <i>Tachycineta thalassina</i> )	E	O	O	O	
Northern rough-winged swallow ( <i>Stelgidopteryx serripennis</i> )	O	E	E	E	
Cliff swallow ( <i>Hirundo pyrrhonota</i> )	E	O	O	O	
Barn swallow ( <i>Hirundo rustica</i> )	E	E	E	E	O

Scrub jay ( <i>Aphelocoma coerulescens</i> )	O	E			E
Common raven ( <i>Corvus corax</i> )	E	O			O
American crow ( <i>Corvus brachyrhynchos</i> )	O	E			E
American robin ( <i>Turdus migratorius</i> )	O	E			O
Northern mockingbird ( <i>Mimus polyglottos</i> )	E	E			
American pipit ( <i>Anthus rubescens</i> )	O				
Water pipit ( <i>Anthus spinoletta</i> )	O				
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	E				
European starling ( <i>Sturnus vulgaris</i> )					
Pine siskin ( <i>Carduelis pinus</i> )					
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
American goldfinch ( <i>Carduelis tristis</i> )	O	O			
Lesser goldfinch ( <i>Carduelis psaltria</i> )	O	E			
House finch ( <i>Carpodacus mexicanus</i> )	O, n E	E			E
Brown towhee ( <i>Pipilo fuscus</i> )	E				
Orange-crowned warbler ( <i>Vermivora celata</i> )	E	E			
Yellow warbler ( <i>Dendroica petechia</i> )	E	E			
Yellow-rumped warbler ( <i>Dendroica coronata</i> )	E				
Common yellowthroat ( <i>Geothlypis trichas</i> )	E				
Wilson's warbler ( <i>Wilsonia pusilla</i> )	O	O			E
Chipping sparrow ( <i>Spizella passerina</i> )	E	O			
House sparrow ( <i>Passer domesticus</i> )	E	E			
Savannah sparrow ( <i>Passerculus sandwichensis</i> )	O	O			
Song sparrow ( <i>Melospiza melodia</i> )	O	E			
Lincoln's sparrow ( <i>Melospiza lincolni</i> )	O	E			O
Golden-crowned sparrow ( <i>Zonotrichia atricapilla</i> )	O				O
White-crowned sparrow ( <i>Zonotrichia leucophrys</i> )	O				O
Red-winged blackbird ( <i>Agelaius phoeniceus</i> )					
Western meadowlark ( <i>Sturnella neglecta</i> )					
Brewer's blackbird ( <i>Euphagus cyanocephalus</i> )					
Virginia opossum ( <i>Didelphis virginiana</i> )	E	E			

Vagrant shrew ( <i>Vorex vagrans</i> )	E	E			
Broad-footed mole ( <i>Scapanus latimanus</i> )	E				
Little brown myotis ( <i>Myotis lucifugus</i> )	E	E			
Fringed myotis ( <i>Myotis thysanodes</i> )	E	E			
Long-legged myotis ( <i>Myotis volans</i> )	E	E			
Western pipistrelle ( <i>Pipistrellus hesperus</i> )	E	E			
Mexican freetail bat ( <i>Tadarida brasiliensis</i> )					O
Raccoon ( <i>Procyon lotor</i> )	E				E
Striped skunk ( <i>Mephitis mephitis</i> )	E		O	O	E
Long-tailed weasel ( <i>Mustela frenata</i> )	O	E	O		O
Feral cat ( <i>Felis catus</i> )	O	O	O		
California sea lion ( <i>Zalophus californianus</i> )					
Steller sea lion ( <i>Eumetopias jubatus</i> )					
Harbor seal ( <i>Phoca vitulina</i> )					
California ground squirrel ( <i>Citellus beecheyi</i> )	E	E			
Botta's pocket gopher ( <i>Thomomys bottae</i> )	E	E			
Western harvest mouse ( <i>Reithrodontomys megalotis</i> )	E				
Deer mouse ( <i>Peromyscus maniculatus</i> )	E	E			
California vole ( <i>Microtus californicus</i> )	E	O			
Norway rat ( <i>Rattus norvegicus</i> )	E	O			
Black rat ( <i>Rattus rattus</i> )	O	O			
House mouse ( <i>Mus musculus</i> )					
Black-tailed jackrabbit ( <i>Lepus californicus</i> )					
	Grassland	Salt Marsh	Open Water	Breakwaters & Riprap	Paved Areas
Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> )			O		
Harbor porpoise ( <i>Phocoena phocoena</i> )			O		

KEY:

Potential to Occur at NAS Alameda/Alameda

O - Wildlife species or their signs observed in the study area.

E - Wildlife species expected to occur in the study area.

n - Bird species known or suspected to nest in the study area.

**APPENDIX D**

**COMPATIBILITY DETERMINATIONS**

**APPENDIX E**

**COMPLIANCE REQUIREMENTS**

Many procedural and substantive requirements of Federal and applicable State and local laws and regulations affect refuge establishment, management, and development. This appendix identifies the key permits, approvals, and consultations needed to implement the strategies.

In undertaking the proposed action, the Service would comply with the following Federal laws, Executive orders, and legislative acts: Floodplain Management (Executive Order 11988); Intergovernmental Review of Federal Programs (Executive Order 12372); Protection of Historical, Archaeological, and Scientific Properties (Executive Order 11593); Protection of Wetlands (Executive Order 11990); Management and General Public Use of the National Wildlife Refuge System (Executive Order 12996); Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898); Hazardous Substances Determinations (Secretarial Order 3127); Endangered Species Act of 1973, as amended; Refuge Recreation Act, as amended; National Wildlife Refuge System Administration Act of 1966, as amended; National Historic Preservation Act of 1966, as amended; Coastal Zone Management Act of 1972, as amended.

**APPENDIX F**

**(Under Separate Cover)**

**DRAFT ENVIRONMENTAL ASSESSMENT**

**ESTABLISHMENT AND MANAGEMENT OF  
ALAMEDA NATIONAL WILDLIFE REFUGE**

**APPENDIX G**

**SUMMARY OF PUBLIC INVOLVEMENT/CONSULTATION/COORDINATION**

The first Planning Update for the proposed Alameda NWR was released in July 1997. This update announced a public workshop held on August 12, 1997 to identify issues and concerns, and described preliminary goals and key areas of management focus to be discussed in a management plan and environmental assessment. A news release was also issued by the Service that announced the public workshop. Approximately 90 people attended this meeting, and more than 350 cards, letters, and e-mail messages were received. The volume of comments precluded their inclusion in the CCP, however, the original comments are being maintained in Refuge files and are available for reading, upon request.

preparing a plan for the Refuge. The second Planning Update, released in November 1997, described the issues, concerns, and opportunities identified at the public workshop. The third Planning Update, released in June 1998, announced a delay in the release of the planning documents and requested a mailing list update.

The draft CCP and EA and fourth Planning Update are scheduled for release in December 1998, followed by a public review and comment period. This draft CCP and EA will be distributed to government agencies, local jurisdictions, community groups, and citizens (see Appendix H). A public workshop is scheduled for January 1999 to solicit comments and to provide answers to questions on the draft documents. The final CCP and EA and fifth Planning Update are scheduled for release in March 1999. The CCP will be implemented after the transfer of U.S. Navy property to the U.S. Fish and Wildlife Service.

Over the past year, the Service has briefed the U.S. Navy, the Alameda Reuse and Redevelopment Authority, the Base Reuse Advisory Group, and community and environmental groups.

## **APPENDIX H**

### **DISTRIBUTION LIST**

ELECTED OFFICIALS

FEDERAL AGENCIES

NATIVE AMERICAN TRIBES

STATE AGENCIES

CITY/COUNTY/LOCAL GOVERNMENTS

ORGANIZATIONS/BUSINESS/CIVIC GROUPS

MEDIA

UNIVERSITIES/COLLEGES

INDIVIDUALS

## **APPENDIX I**

### **LIST OF PLANNING TEAM MEMBERS**

Joy Albertson, Wildlife Biologist, San Francisco Bay National Wildlife Refuge Complex, Fremont, California (M.A. Conservation Biology, San Francisco State University). Responsible for biological information.

Jim Browning, Senior Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office, Sacramento, California (B.S. Wildlife Ecology, Oklahoma State University and M. S. Outdoor Recreation Management, University of Idaho). Responsible for endangered species information and CCP and EA review.

Joelle Buffa, Wildlife Biologist, San Francisco Bay National Wildlife Refuge Complex, Fremont, California (B.S. Fisheries and Wildlife Biology, Iowa State University). Planning team co-leader responsible for biological information and CCP and EA preparation and review.

Jim Haas, Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office, Sacramento, California (M.A. Ecology and Systematic Biology, San Francisco State University). Responsible for contaminants information.

Margaret Kolar, Project Leader, San Francisco Bay National Wildlife Refuge Complex, Fremont, California (M.S. Fisheries and Wildlife, Michigan State University). Responsible for CCP and EA review.

Leslie Lew, Landscape Architect, Division of Refuge Planning, Sacramento, California (B.S. Landscape Architecture, University of California, Davis). Responsible for visual resources information.

Cathy Osugi, Wildlife Biologist, Division of Refuge Planning, Portland, Oregon (B.A. Wildlife Conservation, San Jose State). Planning team co-leader responsible for CCP and EA preparation and review and NEPA compliance.

John Steiner, Outdoor Recreation Planner, San Francisco Bay National Wildlife Refuge Complex, Fremont, California (M.S. Biological Science, Cal State Hayward). Responsible for public use information, CCP and EA preparation and review, and public involvement.

John Steuber, Assistant State Director/Supervisory Wildlife Biologist, Department of Agriculture Wildlife Services, Sacramento, California (B.S. Biology and Wildlife Management, University of Wisconsin, Stevens Point). Responsible for CCP and EA review.

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