ELLICOTT SLOUGH NATIONAL WILDLIFE REFUGE

Santa Cruz County

ANNUAL NARRATIVE REPORT

Calendar Year 2001

U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

REVIEWS AND APPROVALS

ELLICOTT SLOUGH NATIONAL WILDLIFE REFUGE

Santa Cruz County, California

ANNUAL NARRATIVE REPORT

Calendar Year 2001

Refuge Manager	Date: 3/15/04
Refuge Complex Manager	Date: 3/16/04

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INTRODUCTION

Ellicott Slough National Wildlife Refuge (Refuge) was established in 1975 for the protection of the endangered Santa Cruz long-toed salamander. Of the eleven known locations where this species can still be found, the refuge may possibly support the largest remaining populations. Management objectives are to protect the site from human disturbance and to enhance upland habitat.

The Refuge consists of 170 acres of upland oak woodland and willow thickets, mostly acquired between 1975 and 1978. In 1994, an additional 6 acres of upland was purchased along with 8 acres of habitat easement by the U.S. Fish and Wildlife Service (Service). In 1999, an additional breeding pond on 31 acres, known as the Calabasas Unit was acquired. The Refuge is located in Santa Cruz County: the main Ellicott Unit is 0.5 mile inland from Monterey Bay and 4 miles west of Watsonville on San Andreas Road, while the Calabasas Unit is approximately 2 miles north of Ellicott, on the east side of Highway 1. The Refuge and adjacent 30 acres of California Department of Fish and Game (CDFG) land is managed cooperatively by the Service. The salamander breeds in Ellicott Pond on CDFG land as well as the Calabasas Pond on Service land. It breeds in the winter rainy season and spends the remainder of the year in the valley and hillside habitat surrounding the ponds.

Ellicott Slough National Wildlife Refuge is closed to the public in order to protect salamander habitat from disturbance.

The Santa Cruz long-toed salamander grows to about 5 inches in length and has relatively long, tapered toes. It is shiny black, with an irregular pattern of metallic orange to yellow gold blotches along the back. Adults spend most of their life under leaf litter or in animal burrows aestivating. During their active periods, which are triggered by rainfall and ground moisture, they feed on beetles, centipedes, earthworms, isopods and spiders.

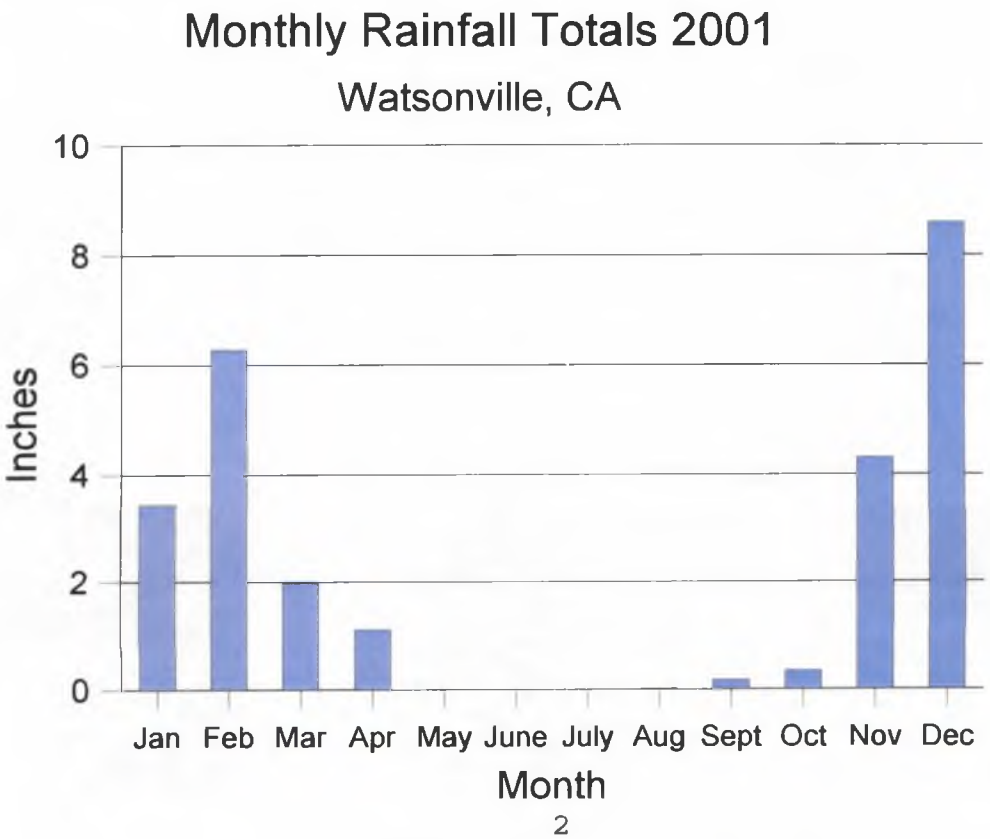
Adult salamanders leave their upland habitat at the onset of the rainy season in late November/December and begin their annual nocturnal migration to the breeding ponds. Males usually migrate to pond sites one to several weeks before the females. As females enter the pond, they pair with males, court, and breed. Eggs are deposited singly or in small clusters on submerged vegetation. Most adults leave the pond in March or April and return to the same general upland areas they came from. Eggs hatch in two to four weeks and develop into metamorphs in three to four months. Metamorphosis occurs after larvae reach approximately 1-1/4 inches in length. As the ponds dry, juvenile salamanders migrate back to nearby uplands.

A. HIGHLIGHTS

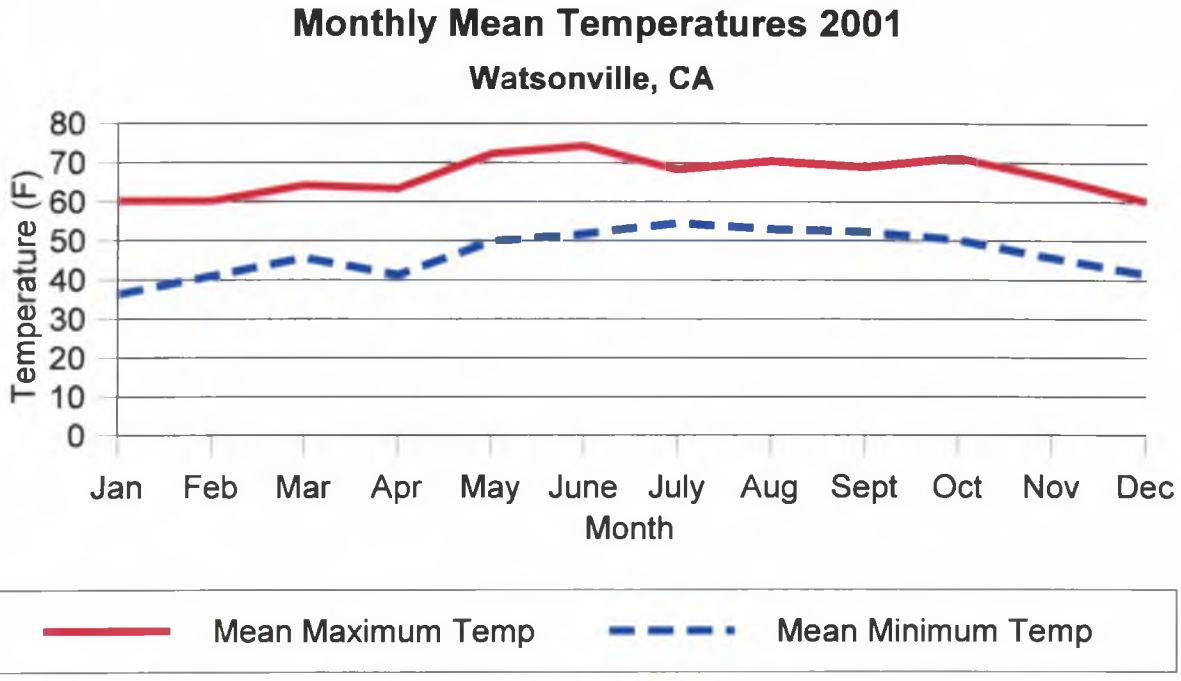
- Refuge received a National Fish and Wildlife Foundation grant for the redesign plan for Prospect Pond (see page 6).
- Large coast live oak trees were planted along access road where eucalyptus were removed last fall (see page 7).
- California Department of Forestry crews and Refuge staff concentrate on pampas grass removal (see page 7).
- Water levels in Ellicott Pond are augmented with well water due to dry conditions (see page 8).
- Trematode infection found in treefrogs and SCLTS at Ellicott Pond. Calabasas SCLTS appeared very healthy (see page 9 and 10).

B. CLIMATE CONDITIONS

Weather conditions on the Refuge are greatly impacted by the influence of Monterey Bay. Winters are generally cool and wet while summers are typically warm. This year was slightly above average in the amount of precipitation. Total precipitation in 2001 was 26.25"



(www.wrcc.dri.edu) Average rainfall for Watsonville is approximately 22".



The latter part of the 2000-2001 winter season (Jan-April 2001) experienced slightly below average rainfall, although rainfall was higher than average in February. This period followed a below average start to the winter (Oct-Dec. 2000), and made for a dry season overall. The beginning of the following season (Oct. - Dec. 2001), however, was wetter than average, with an especially wet December.

Other than a slightly colder than average April and September, the 2001 calendar year recorded fairly typical mean temperatures.

C. LAND ACQUISITION

1. Fee Title

The Refuge continued to work with the Trust for Public Land (TPL) on the acquisition of the 289-acre Buena Vista property. The site is relatively pristine, with few non-native plants. It contains a Santa Cruz long-toed salamander population and breeding pond, one of only five known populations of the endangered robust spineflower (*Chorizanthe robusta*), and a population of the rare Hooker's manzanita (*Arctostaphalus hookerii ssp. hookerii*). There is also a house (caretaker's quarters), trailer, and tool shed on the property. The previous owners prepared a Habitat Conservation Plan for a golf course and resort on this site. The Section 10

permit, as submitted, was not granted. There are currently three owners: two from Packard, Packard and Johnson Investment Corp. (including Ron Packard), and a 3rd owner from another investment company. TPL contracted an appraisal of the property in December 2000. It was appraised as four estate size lots.

In 2001, the Refuge continued working with TPL toward the acquisition of Buena Vista. TPL took the lead in preparing grant proposals, including a $1 million TEA-21 grant from Federal Highways Administration. They explored a variety of other funding sources including the Wildlife Conservation Board, Coastal Conservancy, and EEMP (State transportation money) to cover the rest. TPL continued negotiations with the landowners throughout the year, attempting to negotiate a two-year option. By the end of 2001, it was clear that the landowners were very willing to sell and were negotiating the details of the option.

The Service also worked closely with the California Department of Fish and Game (CDFG) on the protection of this property. CDFG recognized the importance of protecting Buena Vista and included the property in their overall land protection plan for the area. Inclusion in the plan facilitates funding by the Wildlife Conservation Board. However, CDFG acknowledged that they did not have the resources to manage the property. There were several discussions with TPL and CDFG regarding whether CDFG could take ownership of part or all of the property and FWS manage the entire property. This would allow us to apply for grants that were not available to federal agencies. All parties agreed that CDFG could take on ownership or partial ownership if FWS managed the property and had it all within the approved refuge boundary. For ease of management, FWS preference would be to own the two parcels that include the house and the pond, while CDFG hold the larger undisturbed parcel.

Buena Vista Property along Hwy 1

Buena Vista SCLTS Breeding Pond

Another potential acquisition that the Refuge continued to be involved with in 2001 was the Farm Services Agency (FSA) property on Harkins Slough. The property is 116 acres, approximately 40 acres are never dry and have remained unfarmed. The slough is reclaiming some land, but some of the higher ground is still farmed. The previous owners (Bencich) defaulted on a loan and FSA reclaimed the property in 1994. FSA does not consider the property to be economically viable as a farm. The Bencich's exhausted their buy back options, so FSA considered it as surplus property. There are contaminant issues on the property such as unidentified old containers and old equipment in an area where contaminants could runoff into the slough. There is also a lot of junk on the property such as old vehicles, farm equipment, five

trailers, and scrap metal. Santa Cruz County cited the landowner with violations and civil penalties for illegal mobile homes and other violations. FSA is required to clean up the property. FSA has allowed the Bencichs to remain on the property because of promises to clean up the property and haul out the trailers and junk. This clean up has been ongoing for several years. Although the initial FWS recommendation in 1995 was to acquire an easement on part of the property, by the end of 2000, the Refuge was interested in acquiring the property in fee-title and working with FSA to accomplish that. However, the Refuge is not willing to take the property until it is cleaned up.

In 2001, FSA showed interest in transferring the entire property to the FWS, but were still concerned about clean up costs. The Santa Cruz County Land Trust (SCCLT) was interested in helping ensure the property transfer in order to restore Harkins Slough. However, SCCLT felt it could not pay for clean up of a federal property. SCCLT remains as a supporter of Refuge ownership of the property, but will not likely be actively involved in the transfer. CDFG also supports the transfer of the property. They own the adjacent downstream parcel. In meetings with CDFG, they expressed interest in managing the Bencich property under an MOU.

In the summer of 2001, FSA sent a letter to the Bencichs notifying them that they had until September 30th to vacate the property. At the end of 2001, they were still there, and were asking FSA for more time.

In June, Refuge staff attended a meeting organized by Santa Cruz Open Space Alliance on protection of Harkins Slough / Watsonville Slough watershed. Many agencies were represented. Santa Cruz County and other agencies expressed support for public ownership and restoration of parcels within the Watsonville Slough watershed. This area includes the Buena Vista and Bencich properties.

In December 2001, the Ventura Fish and Wildlife Office informed the Refuge that a new SCLTS pond was discovered on the Tucker property, approximately 2 miles north of Calabasas. The Tuckers wanted to sell a portion of the property and had initiated monitoring, conducted by Dana Bland. She had already captured 300 adult male SCLTS by December, which indicated a sizable population. The property is 100 acres and the landowner was interested in selling. The Service notified Trust for Public Land about this property, although funding was scarce due to ongoing fund-raising for the Buena Vista property. In early 2002, the father of the Tucker family passed away. His family decided to sell the property to a private individual.

D. PLANNING

2. Management Plan

The Ellicott Slough Comprehensive Conservation Plan is scheduled to begin in 2005.

In 2001, the Refuge wrote up a new draft Memorandum of Understanding between the Refuge and CDFG for management of Ellicott Slough NWR. It was sent to CDFG for comments and

edits.

5. Research and Investigations

The Wildlife Health Lab in Madison, Wisconsin, was sent a sample of *Hyla* tadpoles and metamorphs from the Ellicott Pond. The larvae were analyzed for disease/parasites. They were found to be infected with trematode parasites. More information is provided under the Endangered and/or Threatened Species heading.

E. ADMINISTRATION

1. Personnel

Ellicott Slough is administered as a subunit of San Francisco Bay National Wildlife Refuge Complex. As such, no personnel are stationed full time at this site. However, two staff members at the San Francisco Bay NWR Complex have the primary responsibility for this Refuge (as well as for Salinas River NWR). Ivette Loredo is the Refuge Manager and Diane Kodama is the biologist.

3. Other Manpower Programs

The Refuge continued its partnership with the California Department of Forestry (CDF) and their Ben Lomond Youth Conservation Camp. CDF oversees the inmate crews on habitat projects and wildfire suppression. CDF has been working at Ellicott Slough NWR since 1997.

5. Funding

In addition to a portion of the Complex's base funds, Ellicott Slough NWR received a National Fish and Wildlife Foundation grant in 2001 for $15,000. This grant was for a redesign plan for Prospect Pond to provide breeding habitat for the long-toed salamander. The $15,000 was used to hire a hydrologic engineering firm to provide the design plans for the pond. The matching funds were contributed in-kind by our partner, California Department of Forestry (CDF). CDF provided $20,000 of in-kind labor for invasive species control around Prospect Pond.

6. Safety

No safety incidents occurred.

F. HABITAT MANAGEMENT

1. General

In February, 150 oaks of 5-gallon size were planted on the Refuge. These were planted on the top of the hillsides: 75 were planted on the north side of the access road on a south-facing slope and 75 were planted on the south side of the access road at the top of the hill. Because they were planted relatively late in the season, Refuge staff decided to water these oaks approximately once a month through their first summer with about 1.5 gallons each.

Large Coast Live Oak Planting

In March, Refuge staff planted 17 coast live oak trees along the entrance road, in the same area where 11 large eucalyptus trees were removed in the fall of 2000. The oak trees were fairly large, in 24" boxes, and the maintenance crew assisted with handling and planting of the trees and digging holes. Weeds in the area, including hemlock and thistle, were weed-wacked. The oak trees were each given 15 gallons of water approximately once a month through the summer of 2001.

CDF continued their ongoing habitat work in the spring and summer of 2001, approximately three days per week. They assisted with watering oaks, weed-whacking, mechanical removal of pampas grass, and cleaning up log debris along the entrance road.

Refuge staff continued non-native weed control efforts. Areas which had been highly disturbed due to extensive eucalyptus removal or slash pile burning had the worst weed infestations. In addition to mechanical removal, Refuge staff used herbicide to treat weeds. In June, Roundup was applied along the access road to control hemlock, milk thistle, and New Zealand spinach. In August and September, Refuge spray crews used Roundup on pampas grass using trucks and backpack sprayers. Some pampas grass that had been treated in August had a few green leaves remaining. These were retreated in September. Pampas that had been cut first by the CDF crews were more effectively controlled with one treatment.

Sprayed Pampas Grass

In October, Refuge staff and maintenance spent the day loading and hauling out cut pampas grass, which CDF had piled along the hillsides. Five dump truck loads and four pickup loads of pampas were removed. Much pampas grass remained; however, due to the approaching rainy season, the remainder was left for removal in early spring.

Monkey flower and coffee berry seeds and acorns were collected for propagation in the native

plant nursery and outplanting the winter of 2002-3.

2. Wetlands

In 2001, the Refuge was awarded a National Fish and Wildlife Foundation grant to redesign Prospect Pond to provide breeding habitat for the Santa Cruz long-toed salamander. In preparation for the Prospect Pond redesign project, Refuge Manager Loredo gathered information about pond design and contractors. Loredo and biologist Diane Kodama met with Seascape managers Mark Allaback and David Labbs to look at their breeding ponds and discuss needs for redesign.

The Refuge worked with Engineering and Contracting to award the architectural and engineering contract. An existing IDIQ contract existed with Jones and Stokes, so the Refuge asked them to bid on the project in October. Their bids came in November and was substantially over our budget. Loredo then began talking to various agencies such as Santa Cruz County, Elkhorn Slough Foundation, and Seascape to get recommendations for hydrologic engineering firms. Upon checking references and experience, Loredo asked Balance Hydrologic if they were interested in the project. Balance has done a lot of work in the Santa Cruz area and has worked on California tiger salamander ponds. They were interested and joined Loredo for a site visit in December. Loredo continued working with Engineering and Contracting to award the contract.

Due to low water levels at Ellicott Pond, in March biologist Kodama met with CDFG managers about augmenting the pond with well water. The pump on Refuge property was used to add water to Ellicott Pond to ensure it would hold enough water for metamorphosis of salamanders to occur. CDFG paid for the electricity costs of running the pump.

10. Pest Control

Santa Cruz Mosquito Abatement District continued to treat the KOA and railroad ditches at the Refuge for mosquitos. They have not treated Ellicott Pond due to the Refuge's and CDFG's concern about affects to salamanders. A new Section 7 still needs to be completed for mosquito abatement once the Memorandum of Understanding with CDFG is revised.

For background: In 2000 the Refuge began to examine mosquito control practices on Ellicott Pond because of recent studies on the potential effects of methoprene, a mosquito control chemical, on amphibians. It was resolved with Ventura Fish and Wildlife Office that in light of new studies a formal Section 7 consultation was necessary in order to evaluate the effects of mosquito abatement activities. However, the pond is on State land and the Refuge's Memorandum of Understanding (MOU) with the State is out of date. After much discussion with the Ventura Office, the resolution was made to rewrite the MOU and then initiate a Section 7 consultation. In the meantime, both Fish and Game and the Service asked the mosquito control district not to spray in Ellicott Pond. They were allowed to continue spraying in the ditches along the KOA and by the Railroad. Mosquito abatement in the area is primarily conducted for human nuisance; encephalitis mosquitos only breed at Ellicott when the pond holds water into

July, which is only during really wet years. Refuge staff completed a draft Section 7 request but did not submit it in 2000 because the MOU with the State still needs to be updated.

G. WILDLIFE

1. Wildlife Diversity

The Refuge provides habitat to various migratory birds, as well as resident birds, small mammals and deer. However, the Refuge is located in an area of intense farming in Santa Cruz County. Many of the surrounding valleys and hillsides are used for greenhouses, farmed for strawberries and raspberries, or grazed by cattle. As more areas are converted to agriculture in the future, the refuge will increase in importance by retaining natural habitat for many species.

2. Endangered and/or Threatened Species

Dip-netting for SCLTS larvae was conducted on May 21 at Ellicott Pond, Calabasas, Suess Pond, and Valencia Lagoon. Prospect Pond was dry. At Ellicott, only 2 SCLTS found - they had abnormal hind limbs, feet came right out from body with no true limb. There were also many treefrogs with extra limbs. A sample of treefrog tadpoles was collected to send to the Madison Health Lab for analysis. Larvae at Calabasas larvae looked very healthy and, unlike last year, no crawfish were found. One larvae was found at Valencia Lagoon for the first time since 1997. The 1997 survey similarly counted only one larvae. Despite this finding, virtually no reproduction has occurred at Valencia since 1978 and the population is expected to be extirpated in the next several years.

The first fall rain occurred on November 4th. Refuge staff was unable to conduct a survey to look for juveniles that night. However, Seascape biologists reported a lot of juvenile salamander movement from the Seascape ponds. In December Refuge staff conducted several night surveys to document breeding. Both male and female adult SCLTS were seen migrating toward both Ellicott Pond and Calabasas.

3. Waterfowl

Mallards and gadwall use the Refuge ponds occasionally.

6. Raptors

Raptors using Ellicott Slough NWR include northern harrier, cooper's hawk, sharp-shinned hawk, and red-tailed hawk.

7. Other Migratory Birds

Black phoebes, Bewick's wren, California towhees, white-crowned sparrow, western meadowlark, scrub jay, mockingbird, swallows, woodpeckers, and warblers are regularly seen on the Refuge.

8. Game Mammals

Ellicott Slough provides habitat for mule deer.

10. Other Resident Wildlife

Pacific treefrogs, California tiger salamanders, arboreal salamanders, Ensatina salamanders, California slender salamanders, fence lizards, alligator lizards, western aquatic garter snakes, gopher snakes. California quail. Racoons, rabbits, gray fox, striped skunk, coyote, Botta's pocket gopher, voles, deer mice, moles, western gray squirrel.

14. Scientific Collections

Hyla tadpoles and metamorphs from Ellicott Pond were sent to the Madison Wildlife Health Lab for analysis. They were determined to be infected with trematode parasites.

17. Disease Prevention and Control

As a result of the chytrid fungus that was discovered in Calabasas in 2000, Refuge staff has continued to take precautions to disinfect nets and waders between ponds with a bleach solution.

H. PUBLIC USE

1. General

The Refuge is closed to the public, although occasional tours or interpretive events do occur.

6. Interpretive Exhibits/ Demonstrations

Refuge staff assisted the Ventura Fish and Wildlife Service at the Santa Cruz County Fair in September 2001. The Service had a booth set up to provide information on local endangered species. Refuge staff also provided information on Ellicott Slough NWR.

17. Law Enforcement

On Sept. 26, the Lansdale residence, which is adjacent to the Refuge, was burglarized. Someone went into the unlocked house, entered the son's room and took $43 in cash, a $5 check, and a walkman. Upon investigation, it was determined that a member of the CDF crew was responsible. The CDF administrative captain visited with the Lansdales in order to return the

stolen items and resolve the issue to ensure that this kind of incident does not happen again. All parties, including the Refuge, agreed that in order for CDF to be able to continue work several additional security measures would need to be employed. These included having two supervisors with the crew at all times, moving the portable toilet to the work site so that crew members would not be out of site when using it, and not using the Lansdale parking area as a turn-around spot for their vehicles.

No other law enforcement incidents occurred in 2001.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

The levee for the Calabasas Pond was breached during the El Nino winter of 1997/1998. It was temporarily fixed by Fish and Game in 1999 with rip rap and by Refuge staff in 2000 with sand bags. Once again, in November of 2001, prior to pond filling, Refuge staff repaired the levee with additional sand bags and a tarp. This is another temporary fix until the Refuge can get maintenance funds to permanently fix it. Large holes have been scoured out on both sides of the levee.

3. Major maintenance

In October of 2000, the maintenance crew began a large project to clear up the corners of the Refuge entrance. Work was interrupted by the beginning of the rainy season, which coincides with the salamander breeding season. After the salamander breeding season, in the spring of 2001, this project was completed by maintenance and CDF crews. It involved removing several large remaining eucalyptus stumps and trunks, clearing the fence line area, building a berm at the southwest corner of the access road to prevent flooding of the railroad, installing a Refuge sign at that southwest corner, and constructing a more formal-looking entrance.

New Refuge Sign

In the spring of 2001, 1500' of split rail fence was installed along the access road and a portion of the San Andreas road boundary. Refuge maintenance staff and CDF installed the fence and a new gate. Work was often slowed as eucalyptus roots were encountered while digging post holes. Cost for 1500' of split rail fence material was $4400. The labor time included two maintenance staff for approximately 6 days each, as well as the CDF crew for approximately 3 weeks.

Split Rail Fence along Access Road

J. OTHER ITEMS

2. Items of Interest

On April 10th, Dave Paullin conducted a station review of Ellicott Slough and Salinas River.

3. Credits

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Joelle Buffa
Refuge Manager

December 23, 2002
Date

Margaret J. Kolar
Refuge Complex Manager

Dec 31, 2002
Date

INTRODUCTION

Farallon National Wildlife Refuge was established in 1909 and is located approximately 28 miles west of San Francisco. It is comprised of four groups of islands including the North Farallons, Middle Farallons, and Noonday Rock which are all designated as wilderness areas. The South Farallon Islands were given refuge status in 1969 and are the largest group consisting of 120 acres and reaching a height of 370 feet. West End, a portion of the South Farallon Islands, is also designated a wilderness area. The Refuge totals 211 acres.

The Refuge comprises the largest continental seabird breeding colony south of Alaska. It supports 13 nesting species including the world's largest breeding colonies of ashy storm-petrel, Brandt's cormorant, and western gull. Six pinniped species also breed or haul out on the Refuge. After absences of over 100 years, northern elephant seals and northern fur seals returned to breed on South Farallon Islands in 1972 and 1996, respectively.

The Farallon Islands are a granitic formation that is part of the Farallon Ridge. Shallow soils can be found scattered on some of the South Farallon Islands. Vegetation is dominated by Farallon weed, an important nest building material for cormorants and gulls. Floral diversity is limited and is made up of a high proportion and number of nonnative species due to the large amount of human activity on the Southeast Farallon Island (part of the South Farallon Islands) since the 1800's.

Wildlife populations were heavily exploited in the late 18th and early 19th centuries for meat, hides and eggs. Over-fishing of sardines reduced seabird food supplies. Some species were extirpated or declined drastically. Historical estimates indicate that thousands of northern fur seals and as many as 400,000 common murres once populated the islands. An active Coast Guard station further impacted island wildlife and habitat until the full automation of the light station in 1972. While some species have re-colonized the islands, other are slowly recovering. Wildlife remain vulnerable to the impacts of pollution, oil spills, gill net fisheries and global climate charges. The Service has cooperative agreements with Point Reyes Bird Observatory and the U.S. Coast Guard to facilitate protection and management of the Refuge

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A. HIGHLIGHTS

- Productivity of seabird species was higher than average for the third year in a row. Breeding population sizes were higher than the 2000 estimates for all species except pigeon guillemot and double-crested cormorant. (Section G.5).

- The Farallon Islands were designated a Globally Important Bird Area by the American Bird Conservancy (Section F.12).

- A monthly trapping survey of house mice was initiated to collect baseline data to plan a mouse eradication project (Section G. 15).

- Major repairs were completed on the Powerhouse and Derrick (Section I. 3)

B. CLIMATIC CONDITIONS

Temperatures are relatively constant throughout the year, seldom falling below 45°F or rising above 65°F. Most rainfall occurs in the winter. Summer moisture is usually limited to damp fog. Offshore fog banks frequently envelope the islands in dense fog.

With the exception of July, mean monthly sea surface temperatures (SSTs) in waters surrounding the Farallon Islands from March to August were approximately 1°F cooler than the 30-year average. No extreme weather conditions occurred. November and December were very wet, with 8.12 inches of rain falling in December.

Feeding flocks of seabirds were noted throughout the year, but particularly in the fall months (September - November), when large schools of bait fish were noted close to the islands.

D. PLANNING

5. Research and Investigation

Farallon NWR is managed by the Fish and Wildlife Service out of the Refuge complex Headquarters. We hold a cooperative agreement with the Point Reyes Bird Observatory (PRBO) for their biologists to be present on the island year-round. They monitor seabirds to determine breeding population size and productivity for 11 species of nesting seabirds, and census number of adult and pups of the 5 species of marine mammals that haul out on the Refuge. PRBO also provides day-to-day resource protection, preventative maintenance, and conducts research approved by the Refuge. The Service provides funding, direction, maintenance support and some assistance for studies.

PRBO studies were numerous, some of which are long term projects that have been on going since the 1970's. They included:

Population demography of the western gull: This study examines survival, breeding biology, and

breeding site fidelity in relation to life history traits, reproductive life span, and performance. Monitoring known-age gulls provides the core of this project. The oldest known-age western gull, hatched in 1971, did not return to the island in 2001. He was last seen in 2000, so he did make it to his 30th birthday and the new millennium.

Demography, population dynamics, and food habits of common murre: Three study plots (Shubrick, Upper Upper, and Cliff) are monitored daily during the breeding season to determine number/location of breeding sites, phenology, breeding success, incubation, and chick-rearing periods. A new study plot near Tower Point was monitored this year. Intensive observations are made of parental care, chick diet, feeding intervals, and foraging trip duration. Diurnal attendance is determined by conducting 3 all-day censuses. Diet studies track food items that adults feed to murre chicks. These studies have shown that northern anchovy greatly exceed all other food items over the long-term, but there is also substantial between year and between decade variability in food items. The consumption of juvenile rockfish dominated in the 1970s and 80s, while anchovy and Pacific sardine dominated in the 1990s. In 2001, juvenile rockfish were again predominant in the diet.

Demography, population dynamics, and food habits of Brandt's cormorants: The colony at the Farallons represents the largest single known Brandt's cormorant colony anywhere. Breeding/ productivity studies are conducted at Upper Shubrick and Corm Blind Hill. Reproductive success of known-age birds is being investigated to determine parameters such as age at maturity, fecundity, longevity, mate/site fidelity, survival to breeding age, and how these relate to breeding effort and success. A diet study, initiated in 1983, has shown that midshipman are the most important group in terms of mass, comprising over 50% of the identified diet, although rockfish are the most abundant species-group recorded.

Demography, population dynamics, foraging ecology and diet of pigeon guillemots: Survivorship and parental care is studied by observing color banded birds. Diet watches are conducted at known sites. Observers record site number, band markings, time, and the prey species being taken to breeding sites. Pigeon guillemots fed primarily on juvenile rockfish in 2001, and to a lesser extent on sculpins, flatfish, and gunnel. Guillemot diet has tracked a pattern similar to murres: During the 1970s and '80s, juvenile rockfish were the primary prey item fed to chicks, while in the 1990s sculpin and flatfish (both bottom fish) predominated.

Demography, population and diet of rhinoceros auklets: A mark/recapture study was begun in 1987. As of 2001, 685 birds had been banded and previously marked birds had been recaptured 806 times. The objectives of this study are to more accurately determine population size, although data has not yet been analyzed. Birds are mist-netted at the entrance to breeding burrows at four sites, and food items carried in by netted birds are collected and identified. Diet samples collected this year found them feeding primarily on juvenile rockfish; Pacific saury, lingcod, salmon, squid, and Myctophid (a deep-water "lantern fish" were other identified food items. Occupancy rates of natural burrows are investigated by using a burrow camera.

Demography, population dynamics, and food habits of Cassin's auklets: Age specific

reproductive performance and survival, lifetime reproductive success, and recruitment patterns of Cassin's auklets are studied by banding birds and monitoring known-age individuals nesting in artificial nest boxes. Regurgitations are collected to determine food items brought back to chicks. Analysis of diet items since 1994 show krill *(Thysanoessa spinifera* and *Euphausia pacifica)* to be the main food items. Occupancy rates of natural burrows are investigated by using a burrow camera.

Colony Formation in Cassin's auklet: This study was initiated in 1990. It was designed to investigate the impacts of western gull predation on Cassin's auklets. Specifically, it addresses the question of whether gulls prevent auklets from colonizing areas which have previously supported high densities of nest burrows. Ten 100 square meter plots are monitored during peak incubation. Occupancy rates of natural burrows in index plots are determined by using a burrow camera.

Population status and productivity of ashy storm-petrel: A mark-recapture study using mist netting was initiated in 1992 and continued for the tenth year. Petrels are mist netted and banded at two locations two nights per month, weather permitting, April through August. To date 3129 ashy storm-petrel have been newly banded (189 of these in 2001) and previously marked birds have been recaptured 642 times (16 recaptured in 2001). The goal is to determine population size and assess population trends by comparing results with data sets from1972 and 1992, however data have not yet been analyzed. Productivity of ashy storm-petrels is monitored at known natural crevice nesting sites.

Ashy storm-petrel social attraction: This experiment, initiated in 1996 to attract petrels to nesting boxes, was conducted at three sites: Domes area on the Marine Terrace, the Eggers House at North Landing, and an area north of the Russian House (just west of the main house). Each site contains 40 nest boxes, and taped calls of ashy storm-petrels are played continuously throughout the night. The playback equipment worked well this season, but the experiment has been unsuccessful thus far in attracting petrels to nest in boxes.

Tufted Puffin: Daily observations at historic nesting sites were conducted during two 1-week periods (May and July) to estimate number of pairs. Attempts to band chicks in 2001 were unsuccessful. A number of chicks were located in crevice nests with the burrow camera, but they could not be reached.

Black Oystercatcher: Historic nesting sites are monitored. Two diet watches in June revealed that marine worms, chitons, limpets, crabs, mussels, and insect larvae were fed to chicks.

Reproductive ecology and survival of the northern elephant seal: Multiple objectives focus on the effects of age on reproductive success and the effects of white shark predation on juvenile elephant seal survival. Methods included tagging, marking, and censusing elephant seals during the winter breeding season (Section G.9). Studies have been conducted annually since the Farallons were re-colonized by breeding seals in 1972.

Biology of the White Shark at Southeast Farallon Island (SEFI): This study is being conducted in the waters around the Farallon NWR using the Refuge as an observation point. During fall months (September 1 to November 30) observers conduct all day watches from Lighthouse Hill in order to detect and describe shark attacks on pinnipeds. Events are videotaped and photographed whenever possible and a boat is often launched to take researchers to the site of the attack. Individuals sharks are identified by distinctive markings. The occurrence and behavior of white sharks, and the behavioral tactics white sharks use to hunt and capture their have been published. Objectives are to determine population size, recruitment, return probability and trends; the relationship of shark predation to environmental factors; and trends in white shark predation. In 1999 a new component to track shark movement with pop-off satellite tags was added. Two white sharks were tagged in 1999, 6 were tagged in 2000, and 10 were tagged in 2001.

The Fish and Wildlife Service conducted the following studies:

Aerial census of murre colonies - The annual breeding season aerial photographic survey of Farallon colonies took place on May 30, 2001. Colonies are photographed using a 35mm camera, with 300mm lens, shooting out of the bottom of a twin-engine Partanavia airplane. Photographs are taken at an altitude of 800' - 1,000' above the colony.

The Refuge occasionally issues permits to other researchers to conduct studies. During 2001 these included:

Intertidal communities within GFNMS Monitoring:
In 1992 GFNMS biologists began monitoring the density and diversity of intertidal species (invertebrates and algae) at six locations on Southeast Farallon Island. Point and photo quadrants are visited three times annually. The purpose is to develop baseline species inventory to determine resource risk and damage assessment in the event of an oil spill or other human-induced of natural disaster. As of December 2000, 201 taxa of intertidal organisms have been recorded in the plots. A statistical analysis of the data from 1996-1998 showed no significant differences among the three years or seasons (spring, summer, and fall). During the February 2001 visit, *Aeolidia pappilesa,* a species of nudibranch never before seen on SEFI, was recorded.

Visual discrimination by shape of white sharks upon decoys:
A permit was issued in 2001 for this study, initiated in 1996 by Scot Anderson in cooperation with PRBO biologists. However, due to activity by a commercial "dive-with-the sharks" operation, the study could not be conducted.

Farallon Plant Community Monitoring:
Malcolm Coulter, an independent researcher from New Hampshire, has been monitoring species composition, and trends of invasive non-native plants and the endemic *Lasthenia maritima* since the early 1970s. He conducts monitoring approximately every three years in March. He visited the island March 24 to April 3rd this year. In November 2001 Malcolm met with Refuge and PRBO personnel to review his methods/objectives, and to discuss future direction for plant monitoring and non-native species control.

E. ADMINISTRATION

1. Personnel

Pete Warzybok took over the co-helm as Farallon Seabird Biologist from Chris Abraham. Kyra Mill, the senior Seabird Biologist, did a remarkable job of showing Pete the ropes.

This is the third year of the Farallon ROS position, which is funded by a combination of flood (storm relief) dollars, Apex, and FWS Coastal Program funds for special projects. Bart McDermott started his second year in the ROS position in September 2001.

Pete Warzybok (right) and Bart McDermott playing darts

4. Volunteer Program

During the Calendar year 2001, approximately 24 volunteers donated about 10,550 hours of service at the PRBO research station on Southeast Farallon Island. Volunteers assumed a variety of responsibilities including assisting with bird, mammal, and white shark monitoring; research; collecting meteorological and oceanographic data; and performing facility and equipment maintenance.

PRBO Volunteer Manuel Grosselet (twice awarded "Spinach Puller of the Month") monitoring Cassin's auklets. Photo by Pat Leeson

Refuge Volunteers donated approximately 118.5 hours during 2001. Volunteer Kunihiro Kitajima spent a total of 64.5 hours in April pulling New Zealand spinach, *Malva*, and grass (51 hours) and conducting biological surveys (13.5 hours). Meg Marriott donated 54 hours in May (prior to her appointment as a wildlife biologist student trainee) pulling exotic plants (31 hours), conducting mouse trapping (12 hours), and accomplishing other wildlife monitoring tasks (11 hours).

5. Funding

The cooperative agreement between the Refuge and PRBO provides PRBO with an amount

equivalent of one GS-7 and one GS-9 plus benefits (20%), and camp rate per diem for two persons. A total of $89,410 was paid to PRBO in Calendar Year 2001.

The USFWS Coastal Ecosystem Program/San Francisco Bay Program provided $2,500 to create a GIS base map of the island's outline, topography, contours, and major landmark features. USGS-Dixon Field Station prepared and digitize the base map. The map will allow the Refuge and PRBO to more effectively plan and evaluate restoration projects, map bird nesting locations, track changes in invasive vs. native plant species distribution, and implement other management activities.

The Farallon Islands Foundation (FIF) donated a total of $4,020 in 2001 to the Farallon Contributed Fund for completion of the Gray Water project. FIF also purchased the island a Trimble GPS unit, which will be used in various mapping, monitoring, and habitat restoration projects.

The Apex-Houston Trustee Council provided $12,600 of seabird restoration funds to be used over a 5-year period to monitor auklet colonization of the boardwalk (constructed Sept 2000).

FWS provided a total of $225,056 in MMS funds for the following projects: Powerhouse Repair ($125,656), East Landing Derrick Repair ($90,800), and Billy Pugh Replacement ($7,600). See Section I. for more details.

6. Safety

On March 6, 2001 Regional Safety Officer Alan Williams and Regional Environmental Coordinator Dan Forney conducted a joint Safety Review/Environmental Compliance Audit on the Refuge. Thirty- nine safety deficiencies were found Thirty-three of these were corrected by the end of the year (see Section I), and the remaining six are in the process of being corrected. The deficiencies of greatest concern involved East Landing and the living quarters not meeting Life Safety Code for fire protection. The Service provided MMS funds to repair the East Landing Derrick (Section I.), and contracted with URS Engineers to consider other landing options at East and North Landing. URS consultant David Harder visited the Refuge in December 2001. The Regional Office also contracted with Calvin Jordan Associates (Portland) to design a fire protection system in the residences. Architect Garry Moore and RO Engineer Monique King visited the island in November 2001 to collect information for designing the system and a Scope of Work was prepared in December.

The Environmental Audit documented 13 findings. Eight of these were corrected by the end of the year. The remaining five were included in a Refuge Cleanup Proposal, which was funded for FY 2002. The Cleanup Project will remove accumulated waste oil and other hazardous material stored in the powerhouse, clean-up abandoned diesel contaminated piping and contaminated soil around the powerhouse, and purchase flammable cabinets. A site visit was made by Geo Engineers and Dan Forney in June to develop the scope of work. Two Cassin's auklets, which had excavated burrows in the contaminated soil were re-located to artificial nesting boxes placed on top of the soil.

A USCG consultant from Tetratech company also made a visit in May to conduct a Level 1 Contaminant Survey.

Following the safety review, a conference call was held between PRBO and Refuge Staff to address these deficiencies. Safety improvements made to Refuge operating procedures included: 1) A schedule and log for fire extinguisher inspections, 2) Written confined space protocol; 3) Chemical inventory completed; 4) Changes in the way flammable materials and propane is stored; and 5) Installation of first aid kits, eye wash station, and exit signs. Other activities completed to improve station safety are described under the Equipment and Facilities (Section I).

7. Technical Assistance

USGS Dixon Field Station digitized a base map of South Farallon Island. A meeting was held between USGS, PRBO and Refuge staff in August to discuss how this new GIS capability would be used for research and management, and to strategize approaches for building additional GIS layers. The GPS map and Trimble Unit were used to map the boardwalk, auklet burrows and mouse transects.

F. HABITAT MANAGEMENT

1. General

The Refuge consists of 211 acres of mostly rocky habitats. SEFI, where all facilities and PRBO staff are located, supports a soil-covered marine terrace. Island flora includes 45-50 species. Rocky habitats provide nesting areas for many seabird species including common murres, pigeon guillemots, and Brandt's cormorants. Soils provide habitat for burrow-nesting species such as Cassin's and rhinoceros auklets. Rocky habitats are largely undisturbed. However, habitats which can support plant life on SEFI have been significantly impacted by a history of human occupation and disturbance. Many exotic plant species flourish on the island, and in some areas have displaced the native endemic Farallon weed (*Lasthenia maritima*).

Malcolm Coulter is a dedicated volunteer who has been monitoring vegetation composition and trends on SEFI since 1968. He visits the island for a week in the spring, roughly every 3 years, to conduct measurements on permanent transects he has established on the Marine Terrace. The reports he submits to the Refuge have been helpful in understanding the spread of invasive species, and directing our control efforts. Malcolm conducted plant survey work from March 24 - April 3 in 2001. On November 20 Refuge and PRBO Staff, and others interested Farallon flora met to review his methodology and outline direction for future monitoring and develop a linkage between plant survey work and habitat management efforts.

Results of a moss survey made by National Park Service botanist Jim Shevock in September 2000 were published this year, making this the first time Farallon mosses were documented in the literature (Shevock and Toren 2001). The four species: *Bryum canariense, Diranella heteromalla, Orthotrichum tenellum,* and *Scleropodium cespitans* were all collected along

Lighthouse trail and are permanently housed in California Academy of Sciences collection.

3. Forests

The "woodland habitat" on SEFI consists of three Monterey cypress and one low-growing Monterey pine, which are able to tolerate the strong prevailing winds. These small trees serve as veritable magnets to migrant land-birds. During the spring and fall large numbers of migrants can be found in and around these trees, thus facilitating censusing and banding of these birds.

6. Other Habitats

In September 2000, the Habitat Sculpture was constructed near North Landing by Meadowsweet Dairy. It is a stainless steel bird blind containing 32 artificial nesting boxes, and covered with rock rubble from the remains of an old building near North Landing to resemble natural nesting habitat. Nine auklet pairs nested in the habitat sculpture during 2001, its debut year. Pigeon guillemots were also observed roosting on the habitat sculpture during the breeding season, perhaps contemplating a change of address for next year.

In September 2000, 813 linear feet of boardwalk were constructed to protect habitat from trampling and create nesting habitat underneath the structure. In May 2001 the boardwalks were surveyed for Cassin's auklet burrows, and a total of 50 were counted.

Refuge volunteer Kuni Kitajima entirely removed two kinds of grasses (*Hordeum* and *Bromus)* and *Malva* from a plot on the western side of the FWS house. In May 2001, approximately 160 ounces of *Lasthenia maritima* seeds were collected and spread on the plot.

10. Pest Control

FWS personnel and PRBO and volunteers continued to control exotic vegetation, primarily New Zealand spinach (*Tetragonia tetragonioides*), to prevent its encroachment into new areas and reduce its spread in already-infested areas where it covers seabird nesting burrows. August 11-17 marked the 13th year in a row that Refuge staff chemically treated spinach and *Malva spp.* with a 4% Round-up herbicide solution after the seabird breeding season.

Infestation of New Zealand Spinach was considerably sparser this year compared to last year, but *Malva spp.* infestation was about the same. One hundred fewer gallons of herbicide (179 gallons

in 2001 compared to 277 gal. in 2000) and about 2/3 the person effort (52 person hours in 2001 compared to 82 in 2000) was spent on non-native plant control this year due to reduced invasives.

The success of this year's invasive Spinach control efforts are attributable to several factors: 1) A constant and sustained effort throughout the winter/spring 2000/01 season by the Farallon ROS to pull and/or spray plants as they arose; 2) Intense manual control efforts by Refuge volunteers in March and April (82 person hours total). 3) Diligent efforts by PRBO seabird intern Manual Cappoletta in pulling plants during the seabird breeding season, most notable in the Caves and Lighthouse Hill areas; and 4) Team Spinach conducted spraying earlier this year than usual.

The control of *Malva* continues to be a challenge. Infestation has been dense and widespread along the cart path, and around the water catchment pad for the past 4 years, despite fall spraying and spring hand-pulling efforts by volunteers. Some progress in reducing *Malva's* encroachment was noted in this year, indicating that treatment efforts may be having an effect. Most *Malva* plants were small and in the "rosette" pre-flowering phase when sprayed, in contrast to the rank, sprawling plants that we usually encounter during the summer spraying effort. Further investigations are needed, however, to refine control methods. Because its roots are stout and expansive, *Malva* is a concern for burrowing seabirds.

12. Wilderness and Special Areas

In 1973, Middle Farallon Island, North Farallon Islands, West End (part of the South Farallons), and Noonday Rock were designated a National Wilderness Area. The largest island, Southeast Farallon, was excluded from this designation because of the structures and people living on the island. The land area within the Wilderness Area encompasses 141 acres, which serve as marine bird and mammal breeding areas. Periodic monitoring from offshore by boat or by foot is the only management practiced on these islands, therefore the wilderness designation does not affect Refuge operations.

IBA Sign on Shark Shack (See Section I)

In March 2001, the Farallon Islands were designated a Globally Important Bird Area by the American Bird Conservancy because of their significance for breeding seabirds. Part of a national network, this recognition will help focus public attention and hopefully mobilize funding and other resources to further conservation efforts on the Refuge.

The waters surrounding the Refuge are part of the Gulf of the Farallones National Marine Sanctuary, managed by NOAA, and are a designated State Department of Fish and Game Ecological Reserve. The islands and waters are also part of the Golden Gate Biosphere Reserve.

G. WILDLIFE

13. Endangered and/or Threatened Species

a. California Brown Pelican

Brown pelican numbers peaked at 1350 in October (Table 1). The timing of this peak was characteristic of most years, as pelican use is usually concentrated in the fall and winter when birds commonly roost on the islands after dispersing from breeding sites in Southern and Baja California. Year to year fluctuations in numbers are related to water temperature (more pelicans during warm-water years), and the relative abundance of food resources in coastal and offshore zones.

Table 1. Peak monthly population estimates of California brown pelicans on S Farallon Island

Month	1993	1994	1995	1996	1997	1998	1999	2000	2001
January	375	208	52	320	475	1000	700*	200*	1050
February	143	78	0	N/A	38	525	500*	6	20*
March	247	26	81	14	0	213	0	65	83
April	N/A	N/A	73	7	1	180	0	26	34
May	N/A	N/A	14	10	40	455	26*	42	48
June	N/A	N/A	5*	10	386	1245	41	436	118
July	N/A	353	464	193	112	300*	300*	300*	238
August	861	409	1200	456	960	810	500*	300*	307
September	1070	940	1190	819	3380	2332	728*	1700	970
October	1049	2025	1629	1670	4350	2625	2700	2450	1350
November	3300	425	1117	721	3030	2360	1900	663	800
December	1500	N/A	392	460	1500	750*	1000*	650	500

*** =Average monthly population** **N/A= Data not available**

NOTE: These numbers are preliminary and may be revised based on future analysis. Do not cite.

c. Steller Sea Lion

The Steller sea lion was listed as federally threatened in 1990 due to a 50% worldwide decline between the 1960s and 1989. The South Farallon Island (SFI) rookery and waters around the Refuge are designated critical habitat. Most of the following is based on Hastings and Sydeman (2002).

Counts of Steller sea lions on the Farallon Islands have been conducted since 1927, however standardized annual counts on SFI have occurred only since 1973. The Steller sea lion population has declined on SFI between the 1920s and the present. However, the magnitude and pattern of the decline is complicated by differing census techniques and differing patterns in seasonal trends, age-classes and sexes. The total count of Steller sea lions on the Farallon Islands has declined approximately 80%, from an average of 790 animals from 1927-1947, to an average of 150 animals from 1974-1997. This may be biased because animals on North Farallon Islands were not included in surveys since 1950.

Between 1974 and 1996, numbers of adult females during the breeding season declined approximately 6% per year and maximum pup counts also declined significantly. During this same period, numbers of sub-adult males increased during the breeding season, and numbers of immatures present during the late fall/early winter increased by approximately 5% per year.

A shift in pupping areas on the SFI occurred from 1973 to 1988. From 1973 to 1975 all full-term pups were born on Saddle Rock. From 1976 to 1983 females pupped in Sea Lion Cove, but this site was abandoned in the late 1980's, possibly due to increased diving activity. Pupping was first observed on West End in 1985. Shell Beach and Indian Head on West End are currently the only active rookery sites on SFI.

Steller sea lion natality rates have also declined steadily between 1973 and 1994, exhibiting a low pregnancy rate and high incidence of premature pupping (stillbirths). The premature pupping rate on SFI (30-50%) is extremely high compared to others rookeries (e.g. 2% at Año Nuevo). Twenty to thirty pups were born annually in the late 1970s and early 1980s, compared with an average of five to ten per year in recent times (Table 3). Although pup production may be somewhat underestimated because rookeries are not easily observed from island vantage points, low pup production is evident- only 11% of females give birth on average. With such low reproduction, the status of the Steller sea lions at Farallon NWR remains precarious.

Possible reasons for the SFI Steller sea lion population decline include pollution, human disturbance, over-fishing, increased disease and/or predation on sea lions, and El Niño effects. PRBO's annual monitoring suggests that the 1982-83 El Niño may have affected the number of viable pups cows were able to produce. Studies of possible causes of premature births found that five to seven premature pups sampled died of the influenza virus, and a pollution study found elevated organochlorine and trace metal (Hg and Cu) levels in sea lion tissues. It has been suggested that there may be an interrelationship between increased levels of organochlorines and PCBs and diseases.

3. Waterfowl

Waterfowl are not common on SEFI, most records consisting of flocks of ducks or geese flying by the island after getting lost at sea. An emperor goose arrived Christmas day, and stayed through the winter. A ring-necked duck, killed by a peregrine falcon, was the first island record. In 1993 a black brant arrived on SEFI and has been resident ever since. She was named Molly and feeds among the western gulls on the Marine Terrace and Lighthouse Hill.

4. Marsh and Waterbirds

No marsh or waterbirds breed on the Refuge, however PRBO censuses wintering and migratory species daily. For the second year in a row, the August "Team Spinach" crew was treated to a surprise appearance by a rail, when a sora flew out from under the house while Refuge Manager Joelle Buffa was taking off her boots. In August 2000, a Virginia rail had been identified by the spinach spraying crew..

5. Shorebirds, Gulls, Terns and Allied Species

Farallon NWR is an extremely important breeding site for seabirds. It supports 29% of the breeding seabird population in California and is the single largest seabird breeding colony in the continuous United States. A statewide survey of seabird colonies conducted by the USFWS in 1989-1991 found that the North and South Farallon Island colonies contained the largest seabird population in California, totaling 155,550 breeding birds of 12 species (plus another possibly breeding species). Breeding birds have increased to an estimated 250,000 since then.

The Refuge supports a significant proportion of state's breeding population of 10 species: Leach's storm petrel (11%), ashy storm-petrel (55%), double crested cormorants (11%), Brandt's cormorant (20%), western gull (36%), common murre (19%), pigeon guillemot (12%), Cassin's auklet (68%), rhinoceros auklet (29%), and tufted puffin (25%). The Refuge hosts the world's largest colonies of ashy storm petrel, Brandt's cormorants and western gull, as well as the most southerly colonies of significant size for rhinoceros auklets and tufted puffins on the west coast of North America.

Seabird breeding activities on the Farallon Islands are correlated with the seasonal occurrence of oceanic upwelling off central California. Extended periods of strong northwesterly winds during late winter and early spring promote the upwelling of cold, nutrient-rich subsurface waters. Upwelling stimulates phytoplankton blooms and production of zooplankton and juvenile fish, including sardines, which are the prey-base for the seabirds of the Refuge. Juvenile sardines, an important part of the seabird diet, were over fished in the 1940s and disappeared from the Farallon food chain. Juvenile sardines returned to Farallon waters in the early 1990s.

Seabird populations and productivity of 11 species were monitored by PRBO by cooperative agreement and results are shown in Table 2 below.

Productivity of seabirds on SEFI during the 2001 breeding season was higher than the long-term average for all species except western gulls and ashy storm-petrels, a result of lower-than-average

Table 2. South Farallon Breeding Seabird Populations

	1995		1996		1997		1998		1999		2000		2001		1991-2000
SPECIES	**BP**	**YF**	**BP**	**YF**	**BP**	**YF**	**BP**	**YF**	**BP**	**YF**	**BP**	**YF**	**BP**	**YF[6]**	**Avg. Breeding Population**
Ashy storm-petrel [1,2]	2661[3]	0.60	2661[3]	0.53	2661[3]	0.78	2661[3]	0.52	2661[3]	0.74	2661[3]	0.67	2661[3]	0.56	N/A
Double-crested cormorant	462	N/A	444	N/A	188[5]	N/A	330	N/A	468	N/A	402	N/A	402	N/A	449
Brandt's cormorant[1]	10,630	9,940	8,074	8,437	7,490[5]	7,003	5,092[5]	1,069	6,345[5]	7,614	5,896[5]	6,692	6,570	6,504	7,310
Pelagic cormorant	374	318	374[5]	47	316[5]	144	164[5]	5	222[5]	141	260[5]	159	416	470	370
Black oystercatcher	6	N/A	12	9-27	22	14	18	10	30	26	26	N/A	30	6	19
Western gull[1]	24,630	11,450	20,815	5,412	23,807	7,142	19,707	5,124	19,767	3,063	15,544	4,818	18,235	2,918	20,334
Pigeon guillemot	1,650	685	728	164	1,273	433	294	7	468	267	568	335	502	331	838
Common murre	69,600	28,290	65,400	19,293	61,089[5]	24,130	52,670[5]	10,271	58,878[5]	24,082	53,301[5]	21,853	68,194[5]	27,619	58,115
Cassin's auklet[2]	25,325	8,610	23,668	9,586	26,892	7,395	10,458	4,131	15,239	6,324	15,239	6,324	16,690	8,762	21,379
Rhinoceros auklet[2]	±1000[4]	±325	±1000[4]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.66[6]	N/A	0.64[6]	N/A
Tufted puffin	100	N/A	92	N/A	130	N/A	50	N/A	118	N/A	74	N/A	102	N/A	100

*BP= Breeding population; YF= Number of young fledged; N/A= Data not available.

(1) Farallon National Wildlife Refuge contains the world's largest breeding colony for species.
(2) Estimates from Southeast Farallon Island only.
(3) 1992 Estimate (Sydeman et al 1998). More recent population estimate not available.
(4) Estimates are very rough.
(5) Population estimate from land based survey only. No boat survey conducted.
(6) Young fledged includes relays. For ashy storm-petrel and rhinoceros auklets, figure is young fledged/pair.
NOTE: These numbers are preliminary and may be revised based on future analysis. Do not cite

sea surface temperatures present throughout the breeding season. Other indicators of a productive breeding season were second broods for Cassin's auklets, and the return of juvenile rockfish in the diet of rhinoceros auklets, pigeon guillemots and murres. This is the third highly productive seabird year in a row.

Breeding population sizes were lower than the 2001 estimate for all species except double-crested cormorant and pigeon guillemot. The boat portion of the census for Brandt's cormorant, and common murre could not be conducted during 2001due to rough seas. The **ashy storm-petrel** was listed by the USFWS as a Category 2 species under the ESA in November 1994. However the USFWS discontinued all Category 2 designations in February 1996. The ashy storm-petrel is currently considered a "species of concern", with no status under the ESA. Prompted by the potential listing, PRBO undertook a population viability analysis of the species. This analysis concluded that the population is not in imminent danger of extinction, but should be considered threatened. Given current population parameters and predation rates, the population faces high probability (~45%) of being quasi-extinct within 50 years.

The SEFI **ashy storm-petrel** breeding population was estimated at 2661 for 1992 by PRBO from capture/recapture data (Sydeman et al. 1998). Comparing 1972 and 1992 population estimates shows an overall population decline of 35% and a 40% decline of breeding birds. The 2.87% per year decline roughly equals the observed annual predation by western gulls, as determined by ashy storm-petrel carcasses (approximately 40) found each year. This predation rate on adults of such long lived, slowly reproducing species is considered significant. Introduced house mice may also be partly responsible for petrel declines. In 1997 and 1998, petrel eggs were found in monitored nests with evidence of mouse predation. House mice may be having more serious indirect effects on petrels by enticing owls that predate seabirds to over-winter (Section G.6) A population estimate of ashy storm-petrels more recent then 1992 cannot be made until data from continuing mark/recapture study are analyzed.

There has been a substantial decline of breeding **Brandt's cormorants** on SEFI compared to population sizes in the early 1970s. In 1971-1977, breeding number exceeded 20,000 in four of seven years, but after 1978 they never reached this level. In 1983, the breeding numbers dropped markedly, and again recovered one to two years later, but not to the levels achieved before that drop. However, since 1985 the breeding population has maintained a fairly level trend, without displaying further drops. Observed declines may be partially due to colonies shifting closer to the mainland. However, shifting colonies cannot totally explain the over 50% decline, so oceanic changes are also suspected as being partially responsible.

Population size of Brandt's Cormorants in 2001 was 11% higher than the estimate for 2000, but still 10% below the 10-year average (Table 2). The population estimate is based on ground surveys conducted during 2001 plus a correction factor derived from 1994-96 censuses, when complete ground and boat censuses were last conducted. The Cormorant Blind colony produced 1.98 fledglings produced per pair, which is 40% higher than the 30-year average (Fig. 1). Mean clutch size was 3.31 eggs per nest and hatching success was 76%. Fledgling success was lower than last season, with 82% of the chicks that hatched surviving to fledge.

The **double crested cormorant colony** is located on Maintop on West End. On 31 May, a peak number of 201 well-built nests with birds in incubation posture were counted. Multiplying this count by 2 yields a breeding population of 402 birds. This is the same as 2000, and about 10% lower than the 10-year average (Table 2). No reproductive data is collected on this species due to poor visibility of double crested cormorant nests.

The **pelagic cormorant** breeding population was 12% higher than the 10-year average. The estimated 2001 breeding population of 416 birds was 60% higher than the 2000 count. Pelagic cormorants produced 2.26 fledglings per pair, which is 176% higher than the 30-year average (Fig. 1). The average clutch size was 3.50 eggs per nest. Hatching success was 71%, and 92% of the chicks that hatched survived to fledge. One pair was successful at raising a second brood.

The **western gull** breeding population size of 18,235 birds was 17% higher than in 2000, but is still 10% below the 10-year average (Table 2). Western gull productivity was low again this season, resuming its downward trend after a light increase in 2000 (Fig.1). Productivity estimates for 2001 indicated a 48% decrease compared to 2000 and a 71% decrease compared to the 30-year average. Causes for the decline are unknown, but changes in prey availability and intra-specific predations are contributing factors. The number of chicks fledged per pair was only 0.32. Out of the 68% of eggs that hatched, only 14% of the chicks survived to fledge. Mean clutch size was 2.78 eggs per nest.

Pigeon guillemot by Pat Leeson

The peak count of 502 **pigeon guillemots** on 23 April was lower than the 2000 count, and 40% lower than the 10-year average (Table 2). At Lighthouse Hill and Garbage Gulch, 127 sites were monitored, of which 68 were observed with at least one egg (54% of total monitored sites). Pigeon guillemots produced 1.32 fledglings per pair, which was 65% higher than the 30-year average (Fig. 1). The mean clutch size was 1.88 eggs per nest and 91% of the chicks hatched successfully. Fledging success was also high, with 82% of the chicks surviving to fledge.

The **common murre** population peaked at over 102,000 in 1982, followed by a decline in the mid to late 1980s. This decline was due mainly to the combined effects of gill-net caused mortality, the El Niño Southern Oscillation (ENSO) event, and oil spills. The near shore gill-net fishery was halted in late 1987 due to its significant impact on seabirds (primarily murres) and marine animals. Beginning in the early 1990s the murre population began to recover, but this was interrupted by the 1992 ENSO event. Moderate growth resumed thereafter but the population remains depleted.

A SFI breeding population of 68,194 common murres was estimated from PRBO land-based surveys. A correction factor based on data from 1992-93 and 1995-96 (when boat and land-based surveys were conducted) was applied to this number to account for areas not counted in 2001 in

the boat portion. This 2001 breeding population estimate was 21% higher than in 2000, and also greater than the 10-year average. Preliminary analysis of aerial surveys conducted by USFWS on 30 May came up with a breeding population estimate of 58,672 murres for North Farallon Islands. These numbers are preliminary and may change upon further analysis. Data from South Farallon Islands has not been counted yet.

During the 2001 seabird breeding season, 185 common murre sites were monitored daily in the Upper Shubrick Study Plot. The total number of breeding sites (where at least one egg was laid) was 149. Productivity in 2001 was high, with .081 chicks fledged per pair (see Table 2). This figure was higher than the 30-year average (Fig. 1). Hatching and fledging success were both high, with 87% of all the eggs hatching, and 92% of the hatched chicks surviving to fledge.

In the Upper Upper plot under the Cormorant Blind, the number of sites monitored daily was 59, with 38 of those sites attended by a breeding pair. Hatching success at Upper Upper was 89%, although only 74% of these chicks fledged. Productivity was 0.66 chicks fledged per pair.

The SEFI **Cassin's auklet** breeding population estimate is considered very rough, and is based on counts of burrows and crevice nesting sites. Population censuses are very difficult due to the bird's nocturnal behavior and burrowing nesting habits. The most recent complete survey of all burrows and crevices on South Farallon Islands conducted by USFWS in 1989 produced an estimate of 29,880 breeding birds on SEFI (38,274 for all South Farallon Islands). A burrow occupancy rate of 75% was used as a correction factor. Since 1991, PRBO has monitored Cassin's auklet burrows and crevices in twelve index plots on SEFI in order to detect population trends. The difference in index plot burrow density each year is applied to the 1989 USFWS population estimate to roughly estimate the current year's population. The SEFI 2001 breeding population was estimated at 16,690 birds,. This is 10% higher than 2000, but still lower than the 10-year average. (Table 2).

Over the past 20 years Cassin's auklets have been declining at concerning rates. The 1989 USFWS breeding population estimate of 29,880 was significantly lower than the estimate of 105,492 Cassin's auklets breeding on SEFI in Manuwal's 1971 study. This decline may be exaggerated due to differences in census methods and occupancy correction factors used in the two studies. Possible causes are increased predation by western gulls, owls and peregrine falcons; decline in suitable burrow sites; changes in prey availability; and oil spill mortality.

Occupancy of breeding Cassin's auklets in boxes was high this year, with 91% of the 44 boxes occupied. Productivity was exceptionally high, with 1.05 chicks fledged per pair (including second broods and relays- See Table 2), which is 52% higher than the 30-year average. 83% of the eggs hatched and 67% of these chicks were able to fledge successfully. Ten pairs out of 14 attempts were successful at raising second broods.

Rhinoceros auklet population size could not be estimated due to difficulties in censusing this crepuscular, burrow-nesting species. Rhinoceros auklet pairs bred in 57% of 109 monitored sites (boxes, crevices, and cave sites). Auklets produced 0.64 fledglings per pair, which was 16% higher than the 15-year average (Fig. 1). 82% of the chicks successfully hatched, and 88% successfully fledged.

Tufted puffin breeding population was estimated at 102 birds based on the number of occupied breeding year sites. This is approximately equal to the 10-year average. Criteria used for determining site occupancy is two or more sightings of a bird at a site, or one sighting of a bird entering with nesting material.

Black Oystercatcher breeding population is estimated by censusing all known breeding sites visible from Lighthouse Hill, the Marine Terrace, and by boat. The estimate does not reflect birds on parts of the islands not visible from the SEFI vantage points. Of the 31 sites that were monitored this year, 15 were attended by a breeding pair which had eggs and/or chicks. Compared to previous years, this is equals the highest number recorded since 1991 (Table 2) and is 58% higher than the 10-year average. Based on these 15 breeding sites, black oystercatchers produced 0.38 fledglings per pair. This is a dramatic decline compared to the productivity of 1.25 in 2000. Black oystercatcher nests are cryptic and difficult to observe, therefore clutch size and hatching success could not be estimated.

Oiled Birds: Few oiled wildlife were seen throughout most of the year until late November when 8 common murres were found. In December, an unusually large number of oiled birds were observed: 54 common murres, 2 herring gulls, 3 western gulls, 1 Brandt's cormorant, and 1 ancient murrelet. This coincided with large numbers of oiled wildlife also collected and observed on mainland beaches along the central California coast. The US Coast Guard invested much time and effort trying to locate the source of this oil, as they had during several recent winters when similar "mystery spills" had occurred. Finally, in early 2002 the oil was discovered to be leaking from the SS Jacob Lukenbach, a ship that sank in 1953 about 17 miles southwest of the Golden Gate. It is now thought that oiled seabirds, seen primarily in the winter around the Farallon Islands are probably the result of leakage from the Lukenbach and winter wind/sea patterns.

6. Raptors

One to three peregrine falcons were present throughout the fall, winter, and early spring months, September through April. Peregrine falcons feed primarily on Cassin's auklets and common murres at sea near SEFI, based on numerous carcasses found at island feeding sites. During March, the following peregrine falcon kills were noted: 5 rhinoceros auklet carcasses, 17 common murre carcasses, and 3 observed kills of murres.

The occurrence patterns of peregrine falcons on Southeast Farallon Island were recently summarized in a paper in Western Birds (Earnheart-Gold and Pyle 2001). A total of 201 peregrine falcons were observed during the fall and winter 1990-1999. Of the 87 birds sexed, 47 were females and 40 were males, and of 121 birds aged, 50 were adults and 71 were immatures. There was no linear trend in the number of arrivals during the 10-year period taken as a whole, suggesting that peregrine numbers are stable.

One to two burrowing owls were present September through March, which is typical. PRBO recently analyzed burrowing owl data and found that a total of 271 burrowing owls (an average of 8 per year) arrived on SEFI from 1968 to 2000. A total of 92 of these (average of 3 per year)

were recorded as winter residents. Capture, banding, and release studies have shown these to be young-of-the-year birds. They are most likely dispersing juveniles who arrive during fall migration and stay because of the abundant food supply (non-native house mice peak in the fall). After winter rains cause the house mouse population to crash (burrows are flooded), most of the owls either starve or are killed by gulls. A growing concern is that some of these owls remain on the island into the spring, and begin preying on ashy storm-petrels. For example, in 1997 two burrowing owls stayed through early May and 49 petrel wings and 16 owl pellets with petrel remains were found outside one owl's crevice. This situation is a concern for both the owl and the petrel, as both are declining species. The number of dead owls found on SEFI increased between 1968 and 2000, indicating that the declining petrel population is unable to support the over-wintering owls.

Other raptors on SEFI are usually limited to a few fall transients, such as the northern harrier recorded in November. A saw whet owl in September was a second island record.

7. Other Migratory Birds

Southeast Farallon Island is a place well known among ornithologists, ecologists, bird watchers and others for the number and diversity of landbirds that show up on the island. Many of these landbirds are common western birds migrating either north or south depending on the time of year. Increasingly, PRBO is concluding that occurrence of fall migrants at SEFI is affected more by summer productivity than by weather patterns. The birds that attract the most attention are the eastern vagrants (primarily juvenile birds), common elsewhere in the country but not normally found on the west coast or in California. On rare occasions, birds from other continents appear on the island. The vagrants may have defects which cause them to incorrectly migrate northeast to southwest rather than northwest to southeast. Over 400 species of birds have been recorded for the Farallon Islands.

There are no resident landbirds on the Refuge. Migratory birds have been censussed daily on SEFI since 1968. Analyses have shown that landbird populations show more declines than increases, reflecting Breeding Bird Survey data for the western US.

Noteworthy birds observed this year included rufus-crowned sparrow and acorn woodpecker in September; yellow bellied flycatcher, Connecticut warbler, mourning warbler, and blue-headed vireo in October; and a red-throated pipit and a flock of 70 cedar waxwings in November.

9. Marine Mammals

Weekly all-island pinniped censuses of haul-out areas on South Farallon Island (SFI) are conducted throughout the year. Maximum populations and breeding success for the five pinniped species using the South Farallon Island during the last nine years are shown in Table 3. Average monthly population of pinniped populations for the past three years are shown on Table 4.

Guadalupe fur seal sightings are not included on Table 3. One or several animals have been observed each year in early fall or winter since the first historic sighting of this species in September 1993. Also not included on Table 3 was the **California sea otter** spotted in Seal Lion Cove June 11 and 14. It was the first otter observed since 1986.

The National Marine Fisheries Service Southwest Fisheries Sciences Center analyzed pinniped population trends in the Gulf of the Farallons during the period 1973 to 1994. Some of the following discussions is based on the report prepared by Sydeman and Allen (1996).

Table 3.-(A) Maximum Population Numbers (Peak Monthly)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
California Sea Lion	4574 (May)	3883 (July)	3416 (May)	4594 (May)	4303 (Aug)	4990 (July)	7837 (Oct)	5270 (Jan)	2423 (Sept)	3301 (Aug)
Steller Sea Lion	138 (May)	118 (Dec)	187 (Oct)	138 (June)	213 (Nov)	148 (Nov)	253 (Dec)	133 (Oct)	174 (July)	261 (May)
Harbor Seal	128 (Aug)	170 (Sept)	122 (Feb)	151 (Mar)	144 (Sep/Oct)	141 (Sept/ Nov)	190 (Feb)	125 (Feb)	128 (Dec)	150 (Dec)
Northern Elephant Seal	911 (May)	790 (May)	838 (Apr)	532 (Apr)	590 (Jan)	571 (Nov)	406 (Jan)	623 (Nov)	1019 (Nov)	843 (Oct)
Northern Fur Seal	9 (Oct)	3 (O ct)	2 (Mar)	3 (Aug)	10 (Aug-Oct)	8-12 (Sept)	4 (Nov)	22 (Aug)	13 (Sept)	18 (Sept)

Table 3.-(B) Number of Pups or Pups/weaners Produced

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
California Sea Lion	0	1	2	3	16	0	31	17	33	12
Seller Sea Lion[1]	5	4	5	5	5	4	10	11	9	11
Harbor Seal	N/A	N/A	N/A	1	1	2	4	2	1	1
Elephant Seal[2]	366/281	329/216	287/183	299/188	308/232	274/211	250/192	198/158	174/127	156/139
N. Fur Seal[3]	0	0	0	0	1	4	1	3	4	5

N/A= Data not available

[1] Maximum numbers of pups observed during any one June/July census.

[2] Number of pups born/number pups weaned

[3] Number of pups observed during August visit to West End.

NOTE: These numbers are preliminary and may be revised based on future analysis. Do not cite.

Table 4. Average Monthly Pinniped Numbers - South Farallon Island

	CA Sea Lion			Steller's Sea Lion			Harbor Seal			Elephant Seal			N. Fur Seal		
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001
JAN	5000	800	1500	30	30	43	50	90	125	300	200	275	1	2	1
FEB	2750	600	750	30	20	20	63	100	100	200	200	225	0	0	0
MAR	625	222	570	20	16	31	60	75	108	170	95	157	0	0	0
APR	254	501	340	47	27	50	57	83	96	267	330	468	0	0	0
MAY	600	1039	1428	46	39	132	61	39	70	258	425	390	0	0	0
JUNE	5007	686	1452	87	101	108	53	55	85	258	72	73	0	2	5
JULY	2124	1658	2437	34	89	92	54	102	74	43	17	24	0	5	6
AUG	2000	1450	2985	25	39	63	90	97	79	75	114	53	30	0	0
SEPT	1446	1929	1220	62	50	76	74	47	66	213	322	500	5	11	11
OCT	1745	1815	1356	109	54	110	81	69	55	377	772	668	4	4	6
NOV	1419	1529	1850	91	91	134	89	63	57	542	763	543	2	1	0
DEC	1100	1250	2000	40	35	40	90	120	150	310	375	225	2	1	0
TOTAL	24070	13479	17888	621	591	899	822	940	1065	3013	3685	3601	44	26	29
Avg/Mo	2005	1123	1491	51	49	75	68	78	89	251	307	300	4	2	2

NOTE: These numbers are preliminary and may be revised based on future analysis. Do not cite.
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California sea lions, primarily immatures, haul-out on SFI year-round. They are the most abundant species of pinniped on the Refuge. This species' abundance at SFI increased significantly between 1973 and 1994, at an average rate of 6.4% per year. Peak California sea lion abundance was observed in the years of the 1983, 1992, and 1998 El Niño Southerly Oscillation (ENSO) events. The average number of California sea lions in 1998 was 4,172. Compare that with average numbers for the 3 years following the ENSO (Table 4) of 2,005 in 2000, 1,123 in 2000 and 1,491 in 2001. The decline reflects differences in migration rather than an increase in mortality.

Most California sea lion young in California are produced south of Point Conception, with the Farallons representing the northern breeding limit for the species. Usually not more than a few pups are born on the Refuge each year. Higher than usual pup numbers have been noted since the 1998 El Niño.

In contrast to the California sea lion, the Farallons are near the southern breeding limit of the **Steller sea lion**, which pups only as far south as Año Nuevo. In general, Steller sea lions breed in small numbers in spring and summer (May through August) on the South Farallon Islands, and haul-out in larger numbers throughout the year. Births occur from late May through mid-July and copulation occurs 1-1/2 to 2 weeks after postpartum. Females typically return to the same pupping site in successive years. It is possible that pupping and breeding occurs on North Farallon Island, as Steller sea lions have been observed there, but data is lacking.

The average number of Steller sea lions on SFI during 2001 was 75 (Table 4). The peak number of Steller sea lions counted during the breeding season was 261 in May (Table 3A). The high count of pups counted from mainland vantage points in July was 11. Their remote rookery location on West End makes it difficult to monitor reproductive success from land. On July 17 the National Marine Fisheries Service conducted an aerial pinniped survey.

Another influx of Steller sea lions occurs on SFI in the fall (September to December) when mother-pup pairs from Año Nuevo haul-out on SFI. Fall numbers peaked at 238 in November.

Pacific harbor seal populations on SFI grew at an annual rate of 10.4% between 1973 and 1994. This increasing trend is probably explained by poor food availability which has forced seals to leave their coastal foraging grounds and search for food in more pelagic waters. Marked peaks in abundance occur during ENSO such as 1998 when an all-time high of 190 harbor seals were counted (Table 3A). Harbor seals occasionally pup on SFI, and one pup was noted on May 15.

It is estimated that over 80,000 **northern fur seals** used the Farallons during the breeding season prior to the arrival of American and Russian sealers in the 1800s. This species was extirpated from the Farallons due to intensive hunting in the early 1800s, and until 1996 northern fur seal use consisted of immatures occasionally being seen around, or hauled out on, the island. In 1996 the first fur seal pup was recorded on West End. Until this historic Farallon birth, northern fur seals were only known to breed in Alaska and the Channel Islands in North America.

Five northern fur seal pups were observed on West End this year (Table 3B). The breeding site was located in the same area previous years: In Upper Mirounga Valley near Pastel Cave Highlands. The breeding site is not visible from Lighthouse Hill nor boat. Pups can only be monitored by accessing West End on foot in the early fall after seabirds have left their breeding sides.

Elephant seals were also extirpated from the Farallons, but returned in 1959 and began breeding on SFI again in 1972. Elephant seal births between 1973 and 1983 followed a pattern of exponential growth, increasing at a rate of 56.5% per year. The SFI population apparently reached carrying capacity in 1983, and between 1983 and 2000 the number of pups produced declined an average 3.5% annually. In 1983, a peak of 475 pups were born, compared with an estimated 156 births during the 2001 season. Associated with the decline in production, is also a decline in the number of adult bulls and cows (Table 5).

It is thought that the major reason for this decline is deterioration and erosion of beaches that are important pupping areas. In the 1980s, major elephant seal breeding activity shifted from the Sand Flat on SEFI to Shell Beach on West End after severe winter storms in 1983 eroded the Sand Flat Beach and access routes. Winter 1997-98 El Niño storms severely eroded sand on the Shell Beach access route, leaving a series of steep rocky cascades. After 1998, numbers of cows using Shell Beach declined dramatically declined, and the numbers of cows pupping on SEFI increased compared to the 90's. Breeding elephant seal breeding activity is now more evenly distributed between SEFI and West End.

Reproductive success of elephant seals was monitored daily at four Southeast Farallon Island sub-colonies and several times a month at the two West End sub-colonies. The first pregnant elephant seal cow of the 1999-2000 season arrived on December 15th , 2000. The first pup of the season was born on December 22, 2000.

In summary, breeding dynamics of elephant seals on SFI have changed, primarily due to beach erosion. Wave action and heavy use by pinnipeds have caused sand to wash away. Competition for space with California sea lions may also be a contributing factor in this decline. It is possible that the increase in elephant seal numbers reported from Pt. Reyes Headlands might reflect the displacement of Farallon island elephant seals.

Table 5. Elephant Seal Breeding Activity - South Farallon Island

YEAR	Cows	Pups	Weaners
1993	503	329	216
1994	415	287	183
1995	406	299	190
1996	348	82	231
1997	309	274	210
1998	289	250	192
1999	178	198	158
2000	199	174	127
2001	168	156	139

NOTE: These numbers are preliminary and may be revised based on future analysis. Do not cite.
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PRBO has been collecting information on **cetacean** numbers, as observed from SEFI, since 1973. Observations of most species have increased, probably due to population increases of some species (e.g., gray, blue, and humpback whale), increased effort, and observer bias (PRBO personnel have possibly become better at sighting whales). Gray whales are commonly observed

migrating during winter months, southbound in January and northbound in March. One gray whale "adopted" the island in June and was observed doing "feeding laps" around the island every day.

Other species observed during 2001 were blue, humpback, Minke and orca whales; Pacific white-sided, bottle-nosed, and common dolphins, and Dall's porpoise.

11. Fisheries Resources

White sharks were once considered very rare along the California coastline, however in the 1980s shark sightings, captures by commercial fisherman, and shark bites to humans all increased. The main reason for the apparent white shark population increase is probably the tremendous increase in their prey base: elephant seals and California sea lions. The White Shark Protection Bill, which took effect January 1994, prohibits commercial or sport fishing of white sharks within 200 miles of the coast of California.

PRBO conducted two main studies of white sharks in waters around SEFI during the fall. In the first study, observers recorded and photographed/video-taped shark attacks on pinnipeds noting sea conditions, prey taken and location. The study is unique in that shark behavior is observed under natural conditions without baiting or chumming. Individuals sharks can be identified by their appearance and scar pattern. During 2000, 52 white shark predation events were recorded, an occurrence slightly below average. The prey species was identified during 27 of the 52 events and included 6 California sea lions and 21 immature northern elephant seals. An estimated 25-30 different individual white sharks were identified during fall.

In a related study, ten sharks were tagged with pop-off satellite transmitters in 2001. A total of 15 sharks have been tagged with these pop-off transmitters during the first 3 years of the study, and 8 of these have been tracked long-term (4-6 months). After a "near-shore" phase, these sharks moved off-shore and were tracked to waters around Hawaii, and the subtropical eastern Pacific (Nature 2002).

Rockfish have declined in waters surrounding the Farallon Islands during the '90s. This has affected seabird diets as documented through PRBO diet studies. For example, during the '70s and '80s, murres ate primarily juvenile rockfish, but switched to anchovies and sardines in the 1990s. In 2001 the California Department of Fish and Game issued a Draft Nearshore Fishery Management Plan which covers 19 species of fish, including 13 species of rockfish. The Plan's goal is to promote sustainable use of this fishery. The Refuge sent a letter of comment on the Draft Plan (Oct 2001), requesting that more emphasis be placed on protecting seabird food resources.

Between 1986 and 1990, commercial abalone and urchin harvesting activity increased by more than ten-fold in waters surrounding the Refuge and disturbance to wildlife correspondingly increased. In order to reduce and minimize disturbance to nesting seabirds and mammals, the waters within one nautical mile of the Southeast and North Farallon Islands were established as a state of California Ecological Reserve, and boating restrictions prohibit boats within 300 feet of

most of the shoreline between March 15 and August 15 (Section 630 (b) (71), Title 14, California Code of Regulations). Since a moratorium on abalone harvesting was enacted in 1997, dive activity around the Refuge is now focused on urchin harvest.

12. Wildlife Propagation and Stocking

Occasionally the Marine Mammal Center (MMC) or the Oiled Wildlife Care Network releases rehabilitated animals in waters around the Refuge, particularly those animals who need to be removed from human activity. A California sea lion named Anastazi made a one-way trip to the Farallon waters on March 1st via the *Superfish,* which the Service had hired for a contractor show-me trip. Anastazi had been rescued from Dillon Beach in January, suffering from domoic acid poisoning, and was released on February 5 at Moss Beach. On February 10 he was recaptured at Monterey's Fisherman's Wharf and brought back to the MMC because his food panhandling shenanigans were deemed hazardous to sea lion and tourists. It is speculated that the Farallon sea lions or the white sharks have taught Anastazi some manners, since no further reports have been received.

15. Animal Control

The Refuge and PRBO continued planning and data collection for a project to eradicate non-native house mice from SEFI because of their adverse affects on the natural ecology (Section G.6). In February 2001, a monthly trapping survey was established to sample the house mouse (*Mus musculus*) on SEFI, and document their population cycle. Four transects, each consisting of seven trapping site, were set up to sample variable habitat types around the accessible portions of SEFI. The 28 baited dCon snap traps were set for three consecutive nights once a month Feb-Nov 2001, and twice/month beginning December 2001. A total of 462 mice were caught from 15 trapping surveys. As suspected, the survey confirmed that mouse numbers peak in the fall (highest number trapped = 72 in November). However, the crash occurred much later than previously thought (Figure 6). An additional year of data will be collected to confirm these findings. Carcasses are being preserved for future food habit analysis.

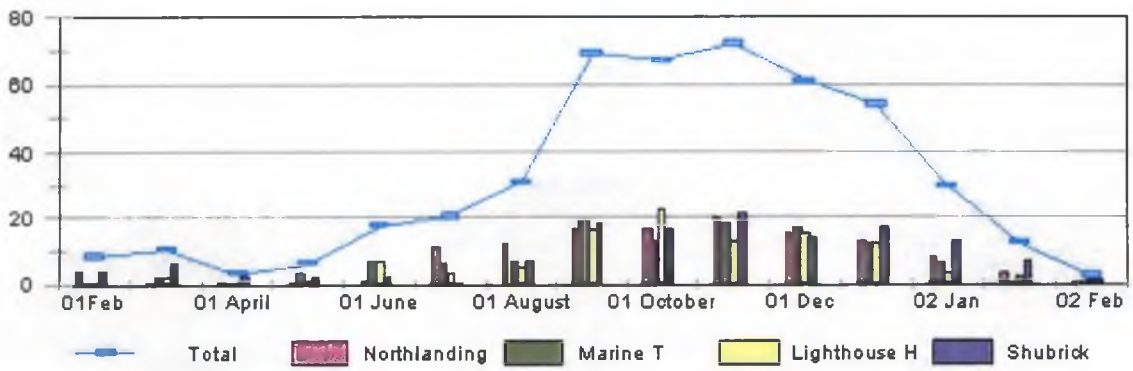


Figure 6 House Mouse Trapping Results - SEFI

A proposal to eradicate house mice from South Farallon Islands was submitted for funding to the Cape Mohican Trustee Council. It was included in the draft restoration plan.

The collection and analysis of regurgitated owl pellets was standardized. Preliminary analyses support our hypothesis that owls feed primarily on mice during the fall, then switch to ashy storm-petrels and Cassin's auklets in spring when mouse populations are low. In February 2001 a poster entitled *"Indirect Effects of House Mice on a Declining Population of a Small Seabird, the Ashy Storm-Petrel on Southeast Farallon Island, California"* was presented at the New Zealand conference, "Eradication of Island Invasives: Practical Actions and Results Achieved" by Kyra Mills and co-authors from PRBO and the Service (Joelle Buffa and Bart McDermott).

16. Marking and Banding

Banding and/or color marking of seabirds, landbirds, and elephant seals are conducted on a large scale by PRBO. 2,493 seabirds and landbirds were banded in 2001. Since 1971, western gulls and Brandt's cormorants in study plots have been banded with U.S. Banding Lab metal and colored bands. Common murre chicks in the Upper Upper colony are banded in July. Pigeon guillemot, tufted puffin, Cassin's auklet, and rhinoceros auklet chicks are banded in monitored nest box/natural burrow sites with metal and/or color bands. Rhinoceros auklet adults are banded when captured in mist nets during diet studies. Since 1992 a mark/recapture study has involved mist-netting and banding ashy storm-petrels and Leach's storm petrels with metal bands. Some individual birds have been followed as nestlings through more than 20 years of life by reading numbers on metal bands. Valuable information is being obtained in the breeding success of known age birds, and in relation to adverse environmental conditions and other factors.

Elephant seals are tagged with two numbered pink plastic tags on the hind flippers. These animals can then be identified on the Refuge and at other sites in California, and provide information about longevity and movements. A cow born and tagged on the Farallons in 1981 was observed for three days this year. Farallon-born elephant seals have been observed at haulouts on San Nicholas Island, San Miguel Island, Año Nuevo and Castle Rock NWR in California, and on Isla San Martin, Baja Mexico. In 2001 a cow tagged on San Miguel Island in 1978 weaned her pup successfully on SEFI.

17. Disease Prevention and Control

Botulism-killed western gulls are seen periodically throughout the year. It is assumed that they contract the disease while feeding in mainland dumps. There was an outbreak of botulism in July which affected some adults and chicks.

PRBO recently summarized entanglement records of pinnipeds on SEFI haul-out areas between 1976 and 1998 (Hanni & Pyle 2000). During this period, 914 pinnipeds were observed with materials such as packing straps, monofilament, and salmon lures constricting their necks or other body parts. Of the total, 820 (89%) were California sea lions, 68 (7%) were northern elephant seals, 27 (3%) were Steller's sea lions, and 3 (<1%) were harbor seals, and 1 (<1%) was a northern fur seal. There was a significant decrease in entangled elephant seals over the study

period, but no significant trend of entangled California sea lions. Typically, 45-60 "ringed" pinnipeds are observed per year, and in 2001 47 "ringed" pinnipeds were observed. When animals were accessible and it would not disturb other hauled-out animals, entangling material was removed from animals (24 total) with a custom-made Farallon de-entangling tool.

H. PUBLIC USE

1. General

The Farallon National Wildlife Refuge is closed to the public. However, sightseeing boats cruise the waters around SEFI to observe mammals and seabirds. Boats were recorded during most months, although peak numbers visited in late summer and the fall. A total of 74 sightseeing boats with 2534 people on board were recorded during the 2001. This is probably an underestimate since data from May and December are not available.

Media visits offer additional opportunities to educate the public about Refuge resources. In June, photographer Pat Leeson spent four days photographing wildlife for the Refuge Centennial book: *Wild America Takes Refuge: 100 Years of Success Stories from National Wildlife Refuges."* In October, Granada Media spent 7 days filming a 50-minute documentary: *Sharks: Beyond the Jaws* on Anderson and Pyle's white shark research. It was televised on Animal Planet (Discovery Channel) in March 2002).

Mains'l Haul, the Journal of the Pacific Maritime Museum of San Diego published article on "Lighthouses 50 years Later". It featured photographs of the Farallon lighthouse and other landscapes taken in 1951 and 2001 (by Bart McDermott). Of interest was that personnel pictured in 1951 were all male and in 2001 all female.

7. Other Interpretive Programs

During 2001 the Refuge Manager made three presentations on "Seasons and Seabirds of the Farallon Islands: San Pablo Bay Flyway Festival in January; Ohlone Audubon Society in May; and Point Reyes' Bird Observatory's annual Osher Symposium in October.

Meadowsweet Dairy produced a 6-minute video on constructing the Habitat Sculpture.

An article on the Farallons entitled, "Ashy Storm-Petrel: The Color of Darkness," appeared in the Summer 2001 issue of *"Tideline"* (authored by Joelle Buffa and Kyra Mills). The Refuge Manager and Outdoor Recreation Planner (Carmen Leong) continued to work on the Refuge Brochure with the Regional Office EPIC staff.

17. Law Enforcement

USFWS regulations prohibit wildlife disturbance. Low level flights (below 1000') frequently flush wildlife so aircraft flying under 1,000' over the island are considered violations. Several private planes flew below 1,000 feet over the Refuge, but none of these disturbed wildlife so no

violation reports were filed by PRBO staff. Three USCG helicopters flushed seabirds or pinnipeds while delivering personnel to the island, and the pilots were reminded of the correct flight pattern.

The amount of wildlife disturbance caused by low-flying aircraft was lower this year than in previous years, and could be attributed to increased outreach and coordination efforts. In December 2000 and March 2001, "Seabird/Marine Mammal Protection" meetings brought together law enforcement personnel from USFWS, NOAA, NPS, and biologists from PRBO, the Refuge, and the Common Murre Restoration Project to standardize and coordinate wildlife disturbance enforcement and reporting. Outreach efforts for private pilots and the military were also discussed. Refuge enforcement staff and the US Attorney continued to work on the case against the helicopter pilot cited with disturbing nesting seabirds on SEFI during 2000.

Ten boats were documented as violating the seasonal boat closure area, or causing wildlife to flush. California Dept. of Fish and Game enforces closure violations occurring between March 15 and August 15. Although disturbance to wildlife can be cited under Refuge regulations, sufficient documentation was not supplied for enforcement personnel to take action during 2001.

I. EQUIPMENT AND FACILITIES

1. Construction

A 6' x 4' x 4.5' shed was constructed by Bart McDermott on an existing foundation near East Landing (see F.12 for photo). Christened the "Shark Shak" (for unknown reasons), it is used to store life jackets and other landing gear. Removing this gear from the derrick control box, where it was previously stored, will reduce corrosion to the derrick's electrical components.

2. Rehabilitation

Water System: During the "2000/2001" rain year (November 2000 - April 2001) 51,500 gallons of water were "harvested" during the collection system's third year of operation. This compares with 29,830 in 2000, and 38,000 gallons in 1999. Water samples are taken 3 times during the year and tested by Alameda County for coliform and nitrates. Coliform continue to test negative. Nitrate levels were higher than acceptable levels until a nitrate water filter system was installed in June. The disposable nitrate filtering medium in the canister is changed monthly by PRBO personnel.

Glenn Reynolds, who designed our water collection/treatment system in 1998, performed a field review of the system on March 1 and made several recommendations for improvement, but pronounced the system healthy overall. Modifications were made to the ozonator units following failure of "Ozzie's" (ozonator in gravity tank) pump: The ozonator "Harriet" was moved from the cistern to the wooden gravity tank and placed in a wooden box mounted on the side of the tank. A new ozonator ("Ricky") was installed in the cistern.

Additional repairs to the water system included: 1) Replacing corroded valves and couplings on water distribution pipe, 2) Repairing leaking fire stantions, 3) Replacing bulb connection on UV filter; 4) Installed new digital GPI water meter; 5) Replaced line between settling tank and pump house; and 5) UV filter flow gauge removed and cleaned of sediments.

Joy Albertson & Joelle Buffa prepare to clean tank

The gray water system, installed to collect rainwater and washing machine discharge in late 2000, functioned well during its first "rainfall year." The 3,000 gallon holding tank filled by the end of March, and was used to flush the toilet, thereby conserving potable water supplies. Several improvements were made to the system.

In response to the Safety Review, new confined space procedures were followed during the annual cleaning of the sediment tank by Team Spinach in August.

Residences: Bird-B-Gone spikes were installed on the CG House roof peaks in January (spikes were installed on FWS House December 2000) to prevent gulls from roosting on the houses and picking at the shingles. High (30-40 knot) winds in December 2001 blew shingles from small sections of both roofs. The exposed tar paper was covered with tarps, the damage assessed and documented for the RO engineer and contracting officer. The problem was the same as found last year - the roofing contractor in 1999 failed to secure shingles with mastic as specified in the contract.

Both houses were "mouse-proofed" in August by Team Spinach by covering gaps and other entry points on the exterior. Four sonic mouse zappers were installed in the houses (2 per house) for the purpose of repelling mice. Their effectiveness was suspect after a mouse was discovered asleep on top of one.

Numerous safety deficiencies were corrected by Bart McDermott and Jim Griffin in March, May and June including: installing smoke detectors and exit signs, re-charging fire extinguishers, removing flammables from living areas, and installing GFCI protectors.

Webasto heating system: The "Webastard" continued to live up to its nickname, requiring the following repairs: 1) Replaced battery and battery charger; 2) Replaced leaking temperature and pressure release valve; 3) Cleaned carbon build-up from combustion chamber; and 4) Added more antifreeze/water solution to pressurize the system.

Electric: In June (20-23) Scott DeLapp of Industrial Electric conducted an inspection of Farallon facilities including the powerhouse, CG House, pumphouse, and derrick. His report included recommendations for repairs, and a schematic of the station's power system. Between Aug 25 -

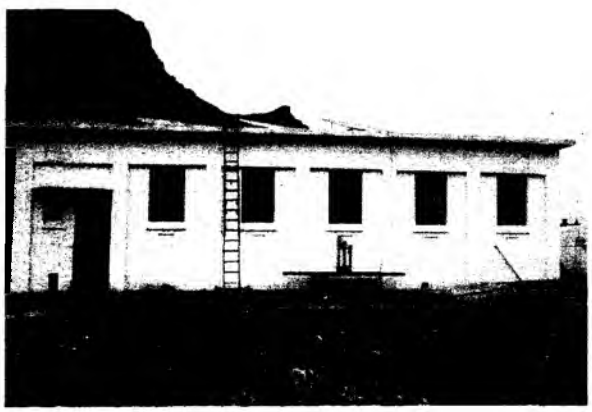
Sept 1 he completed repairs to correct all electrical problems noted during his June visit and the March Safety Review, including: 1) In the CG House installed new circuit breaker panel, replaced wall switches and duplex receptacles, corrected all shorts and other wiring problems, and installed new fixtures; 2) Replaced circuit breaker panel in derrick control box; 3) Installed circuit breaker for Jacuzzi pump; 4) Installed GFCI receptacles in Lighthouse; and 5) Tested duplex receptacles in FWS house.

Corroded couplings in the 3-phase powerhouse-derrick conduit were replaced with stainless steel couplings by the Farallon ROS.

Other: An emergency shower/eyewash station was installed in the Powerhouse, and eyewash bottles mounted in the Carp Shop.

3. Major Maintenance

Powerhouse: An MMS project to rehabilitate the Powerhouse was completed in September 2001.



Rusting, exposed sections of rebar were removed and new ones spliced in. The exterior concrete walls were patched and sealed with an elastomeric coating and painted. Cracks in the interior ceiling beams were injected with epoxy resin, and leaks in the roof were patched. The contractor (Western Waterproofing) accomplished the project under the most trying circumstances. Besides the usual challenges presented by the island's remoteness and harsh weather, the September 11th incident canceled a planned aerial re-supply, and heavy concrete had to be brought in by boat.

East Landing Derrick: Major maintenance was completed on the boom October 2001 by AC3 contractors with MMS funds. The entire structure was de-rusted and painted, a new fairlead roller assembly was fabricated to prevent cable wear, the shock absorber was removed and replaced with a safer assembly, and other mechanical inspections/repairs were completed.

4. Equipment Utilization and Replacement

Generators/Fuel: Repairs and modifications to the two Lister generators included: 1) Three decompression arms adjusted and arm valve cover replaced; 2) Replaced voltage regulator in Lister #1;

A replacement radiator for Kohler generator was sent out by the manufacturer after the radiator was noticed to be dry by PRBO during the April maintenance check. The cause of this leak remained a mystery, and since the fluid level remained normal for the rest of the year, the replacement radiator was stored as a spare.

Outboard Motors/Boats: A new Honda 4-stroke 15 horsepower motor replaced the Johnson 25-hp Whaler motor in May. The Johnson, dubbed "*Sebastes*" (genus name for Rockfish) because of its tendency to jump off the boat into the ocean, finally failed beyond repair. PRBO staff replaced the starter and fuel pump on the 15hp Evinrude, and rebuilt the carburetor. A new boat cradle was constructed for PRBO's VIP Zodiac. The Billy Pugh and cover were replaced after fraying and corrosion were noted on the old Pugh. A new plastic boat box for gear was procured.

Improvements to landing equipment and procedures made in response to the safety review included: New rated hoisting bridle for Whaler, training for personnel using boom and Billy Pugh, and a crane inspection/certification completed in October 2001. The Regional Office contracted with the URS Corporation to develop concepts for safety improvements at East and North Landing. The contractor, David Harder, visited the island in December.

Houses: A new commercial grade Wolf Stove was airlifted to the island by the Air National Guard 129th Rescue Squad (Moffett Air Field) in March, replacing the failing kitchen stove. Problems with the pilot light dampened the Farallon ROS' enthusiasm for this new appliance.

Jerry Nusbaum replaced the rusting, 50's-vintage, ugly metal kitchen cabinets with natural wood cabinets with classy porcelain knobs in March. The dilapidated kitchen counter top was also replaced with an attractive blue Formica one, and a new sink installed. Henry Corning donated funds for this project, Jerry donated the labor, and the Kyra/Joelle shopping team donated their interior decorating skills. Farallon dinners are reported to taste even better than ever in the new kitchen digs.

5. Communication System

UC Berkeley Seismograph Lab was issued a Special Use Permit in March to replace their seismometer. During their visit the e-mail cable was also replaced, restoring e-mail service to the house. The new cable was threaded through PVC conduit and follows the existing "utility corridor" along the cart path.

6. Energy Conservation

March marked the 3-year anniversary of operating the field station on solar power. Performance continues to exceed expectations. Solar power supplied over 90% of the Refuge's power needs, and saved at least 5,000 gallons of diesel fuel during its 3rd year of operation. Fuel consumption during the 3rd year of solar operation was 546 gallons (compared to 600 and 980 gallons used the first and second years, respectively).

Applied Power made minor adjustments to the P-V system by during their annual service visit in February including: 1) Replaced 4 rusting combiner box exclosures; 2) Cleaned fuse assemblies that are failing due to gull guano and corrosion; 3) Added stronger electrolyte solution and re-balanced cells; and 4) Re-routed PV cables to hide them from the gulls, which like to peck on them.

J. OTHER ITEMS

1. Cooperative Programs

Since solarizing their lighthouse in the early '90s, the US Coast Guard has gradually been reducing its activities on Southeast Farallon Island. They stopped delivering fuel and water in 1997. The USCG still provides helicopter support for Refuge and other government employees during the non-seabird nesting season (August 15-March 15) when landings are allowed. In March, Refuge personnel met with CG Environmental Protection Specialist Roy Clark to begin planning for safety and petroleum contaminated debris to be removed from the island

The Farallon Patrol is a volunteer group of about 20-30 sailboat and motorboat owners who take turns making twice monthly runs out to the Refuge. Since 1969 they have donated their time, boats, and fuel to transport personnel and supplies. The Patrol runs are organized by a commandant and PRBO. Dick Spight, patrol skipper and Director of the Farallon Islands Foundation (FIF), was presented with the second annual "Farallon Outstanding Service Award" by Refuge Manager Joelle Buffa at the annual Patrol dinner. The award recognized Dick's leadership and funding support on 3 recent projects that improved facilities and habitat on the island: 1) Scrap metal removal, 2) Gray water system installation; 3) Boardwalk construction. The FIF oversees an endowment fund that assists with projects on the Farallons and other islands.

3. Credits

This narrative was written by Joelle Buffa.

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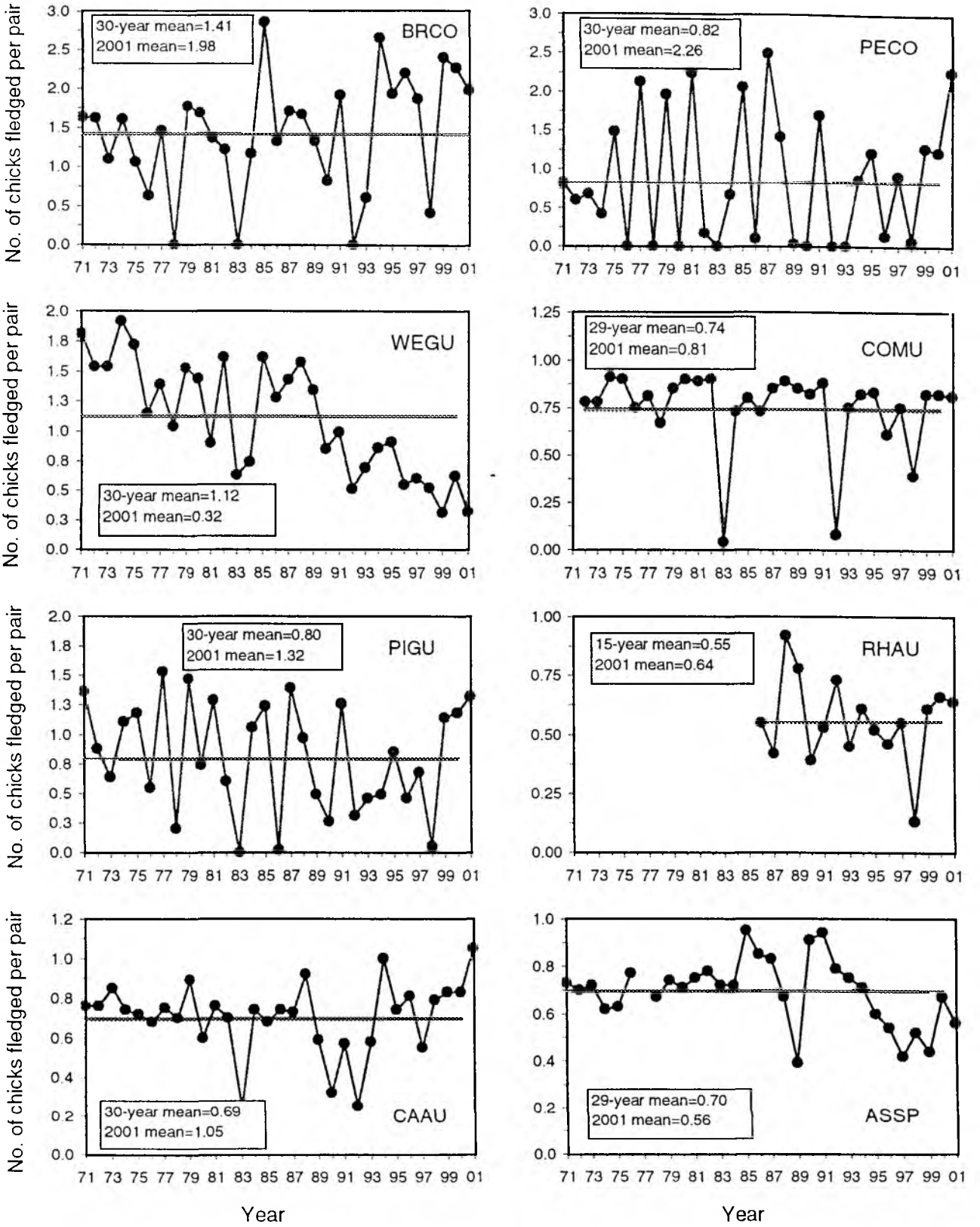

Fig. 1[illegible]. Productivity of 8 species of seabirds on Southeast Farallon Island, 1971-2001. Productivity is measured as number of chicks fledged per breeding pair (includes first attempts, relays and second broods). The bold horizontal line indicates mean productivity from all attempts between 1971 and 2000. Please note the different scales on the y-axis.

SALINAS RIVER NATIONAL WILDLIFE REFUGE

Monterey County

ANNUAL NARRATIVE REPORT

Calendar Year 2001

U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

REVIEWS AND APPROVALS

SALINAS RIVER NATIONAL WILDLIFE REFUGE

Monterey County, California

ANNUAL NARRATIVE REPORT

Calendar Year 2001

Refuge Manager	3/15/04 Date
Refuge Complex Manager	3/16/04 Date

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INTRODUCTION

Salinas River National Wildlife Refuge (Refuge) encompasses 367 acres located 11 miles north of Monterey, California at the point where the Salinas River empties into Monterey Bay (Fig. 1). The Refuge is part of the San Francisco Bay National Wildlife Refuge Complex, headquartered in Fremont, California.

Refuge lands include a range of terrestrial and aquatic habitats, including coastal dunes and beach, grasslands, wetlands, and riparian scrub. Because of its location within the Pacific Flyway, the Refuge is used by a variety of migratory birds during breeding, wintering, and migration periods. It also provides habitat for several threatened and endangered species, including the endangered California brown pelican, Smith's blue butterfly, and Monterey gilia, and the threatened western snowy plover and Monterey spineflower.

The Refuge is open to the public and current uses include wildlife observation and photography, and waterfowl hunting. The Refuge is also used to access the beach for surf fishing. Those willing to walk from the parking lot to the beach are rewarded with beautiful scenery and an excellent display of native dune vegetation.

The Refuge was acquired in 1973 through a transfer of surplus military land from the U. S. Army and the Coast Guard. From 1974 through 1991, what is now the Refuge was operated as a Wildlife Management Area under a cooperative agreement with the California Department of Fish and Game. By the mid-1980s, growing awareness of the Refuge's importance as habitat for sensitive species prompted a shift toward more active management and protection of its resources. In 1991, the Service began managing the area as a National Wildlife Refuge.

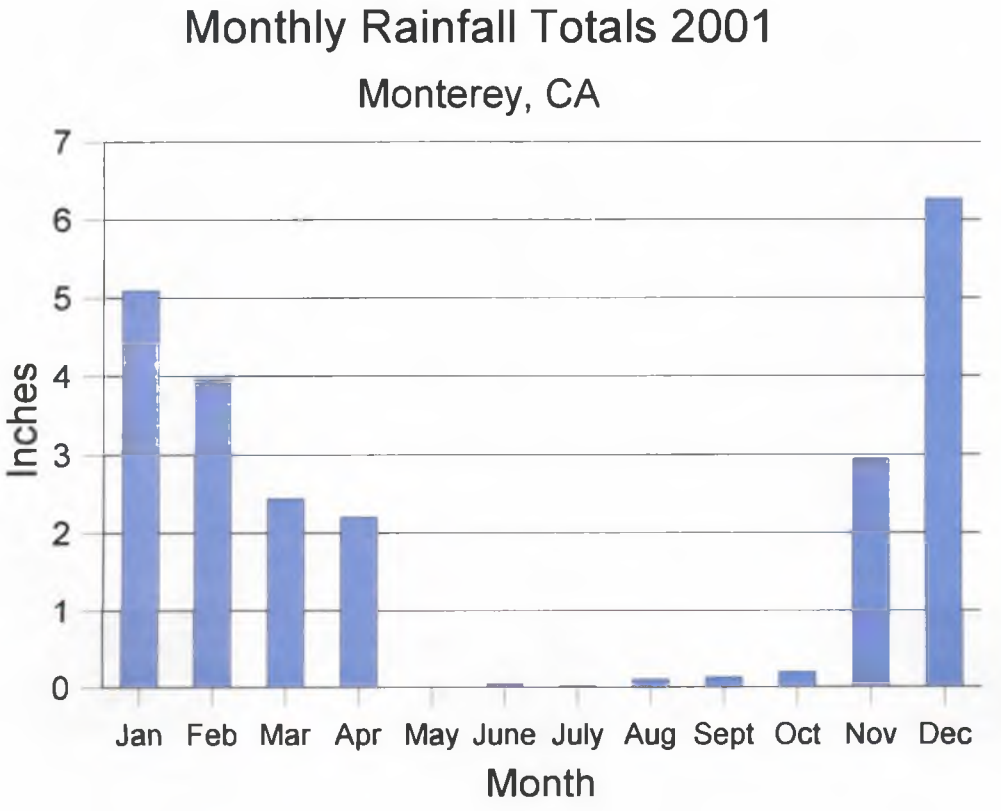
Since 1991, Refuge management efforts have focused on sensitive species protection, habitat restoration and enhancement, and public use management.

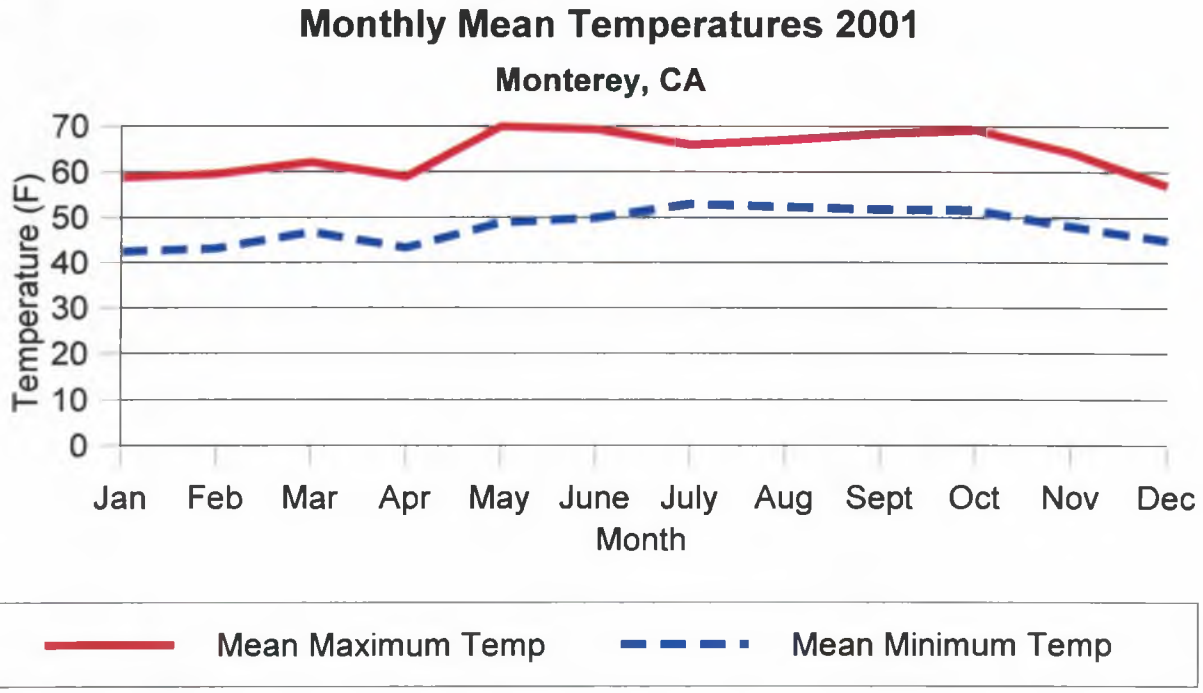
A. HIGHLIGHTS

- The Draft Salinas River National Wildlife Refuge Comprehensive Conservation Plan (CCP) was released for public review (see page 3).
- Refuge records its highest snowy plover fledge rate due to success of avian predator management (see page 10).
- Sunken tanker ship off the coast caused tar balls to be washed ashore (see page 16).

B. CLIMATIC CONDITIONS

Weather conditions on the Refuge are greatly impacted by the influence of Monterey Bay. Winters are generally cool and wet while summers are typically warm. This year was slightly above average in the amount of precipitation. Total precipitation in 2001 was 23.41" (www.wrcc.dri.edu) Average rainfall for Monterey is approximately 20".





The latter part of the 2000-2001 winter season (Jan-April 2001) experienced about average rainfall. The beginning of the following season (Oct. - Dec. 2001), however, was wetter than average, with an especially wet December.

Seasonal temperature variation is low as is typical of the central California coast. In 2001, temperatures were slightly colder than average in April and December and warmer than average in May and June.

D. PLANNING

2. Management Plan

The Comprehensive Conservation Plan (CCP) process was started for Salinas River NWR in December of 1999. In 2001, Refuge staff continued working on development of the CCP with Mark Pelz from the Sacramento Planning Office and Jones and Stokes, a contractor hired to write and coordinate the CCP. In 2001, Refuge staff completed drafts for the revised Hunt Plan, the Compatibility Determinations, and the Avian Predator Management Plan and sent them to Jones and Stokes to incorporate into the Draft CCP. In August, the Section 7 consultation request for the entire CCP was sent to the Ventura Fish and Wildlife Office. The Public Draft CCP was completed in September. However, the Federal Register Notice of Availability was not published until November. Public comments were received until Dec. 14th. The remainder of the year was spent incorporating comments and changes into what would become the final CCP.

On June 13th, there was a Regional Office CCP review in Sacramento. Refuge staff presented a

slide show overview of the refuge and its public uses. Mark Pelz, from the Sacramento Refuge Planning Office, summarized the proposed actions and issues of the CCP. Regional Office staff provided feedback.

In May, the Refuge Complex hired a temporary biologist, Rachel Hurt, to assist with editing of ongoing CCPs for Salinas River and Antioch Dunes and to conduct some background data gathering for Marin Islands, scheduled to begin its CCP in 2002. Rachel, a former biology intern, was in this position until September 30, 2001.

3. Public Participation

The draft CCP/EA was sent to over 200 members of the public, organizations, and local, State, and Federal agencies and elected officials in the fall of 2001. In addition, members of the public could specifically request a copy, and several copies were sent based on these requests. The Service received a total of eight comment letters and e-mails containing 39 individual comments during the 45-day review period for the draft CCP/EA. Several of the comments resulted in changes in the final CCP. Comments were received from Northern Salinas Valley Mosquito Abatement District, California Waterfowl Association, Point Reyes Bird Observatory, Safari Club International, California Coastal Commission, and private individuals.

5. Research and Investigations

Point Reyes Bird Observatory (PRBO) continued their long-term study of snowy plover breeding success in Central Coastal California. PRBO worked closely with Refuge staff on coordinating the snowy plover predator management program.

During the CCP development process, Refuge staff received conflicting information on the location of the actual Refuge boundary. First, Regional Office Realty confirmed that the Salinas River NWR boundary extends into the ocean, as shown on Refuge maps drawn by the Service's Cartography Office. Regional Office staff stated that when the military owned the land they asserted exclusive federal jurisdiction for law enforcement activities, requiring a boundary out to the water. When the land was transferred, that was changed to concurrent jurisdiction but no land was relinquished to the state. Refuge staff also began to look through the Salinas NWR realty files. The files seemed to show that the Service did own out into the water. However, in conversations with the State Lands Commission, they claimed that lands below mean high water reverted back to them by default once the area was converted from military ownership. They said that when the Army condemned land at the Refuge site, it only condemned up to mean high water. But under an 1897 statute in CA, they were given control of lands 300 yards offshore for military purposes. The statute, however, states that this control is only for military purposes. So when they turned over the land to the DOI, they should not have turned over those lands. The tidelands would have defaulted back to the state. Realty said we would need a Solicitor's Opinion to finally settle it. The issue was settled in early 2001 when the Solicitor's Office issued their opinion that the Service only owned lands to the mean high-water mark (see Fig. 1). Documentation is in the Refuge's files ("Boundary Issue") at Refuge Headquarters.

Figure 1. Map of Salinas River National Wildlife Refuge

E. ADMINISTRATION

1. Personnel

Salinas River National Wildlife Refuge is administered as a satellite station of San Francisco Bay NWRC. As such, no personnel are stationed full-time at the site. However, two staff members at the San Francisco Bay NWR Complex have the primary responsibility for this Refuge (as well as for Ellicott Slough NWR). Ivette Loredo is the Refuge Manager and Diane Kodama is the biologist.

4. Volunteer Programs

The Snowy Plover surveys conducted by PRBO were contributed as a volunteer activity throughout the year. PRBO contributed approximately 500 hours in 2001.

5. Funding

In addition to a portion of the Complex's base funds, the Ventura Fish and Wildlife Office provided funds in 2001 for refuge endangered species projects. They funded three projects for the Salinas River Refuge: GIS software to better track endangered species as well as invasive plants, symbolic fence materials for snowy plover protection, and new "Closed Area" signs, in both English and Spanish, that provided some information on snowy plover protection.

New Snowy Plover Closed Area signs

6. Safety

Three Army Corp of Engineer staff conducted a site visit to Salinas River NWR on June 6, 2001 to investigate further the potential for unexploded ordnance and/or hazardous materials on the Refuge. This investigation was part of a larger scale investigation of many former military bases. They searched the former bombing range, looking for any signs of hazards, but did not find

anything. They noted that sand dune migration may have deeply buried anything that may have been on the refuge. They were to complete an Archival Search Report (ASR) and send to their headquarters in Huntsville for review and discussion. The finalized version would come out of the Huntsville Office, probably in early 2002. They would probably recommend no further action due to minimal danger. Alternatively, they may decide that they will eventually want to conduct another survey in coordination with Refuge staff. This would be a preliminary assessment where 100 ft^2 grids would be searched with a magnatometer. If any anomalies are found, they would hand dig. However, they may decide not to conduct this assessment since risk is considered low. Also, the Refuge may decide it would be too disruptive to allow.

F. HABITAT MANAGEMENT

1. General

Salinas River NWR is comprised of several unique habitat types including saline pond, central dune scrub, central foredunes, coyote brush scrub/grassland, northern coastal salt marsh, and central coast riparian scrub. Quality of the habitat found on the dunes and beach is very good. Salt marsh areas have been altered by changes in the water regime in the Salinas River over the past several decades. Irrigation draws off a major portion of freshwater inflow and flood control practices (i.e., breaching the front beach and channelization) have changed the hydrology. Much of the grassland habitat is gradually being restored after years of cultivation prior to refuge establishment.

2. Wetlands

The 15-acre saline pond on the Refuge is a permanent saline wetland bordered by pickleweed salt marsh. Water sources for the pond include a high water table, rainfall, surface drainage from adjacent agricultural fields, surf overwash of the low dunes and occasional flooding of the Salinas River. The area is extremely attractive to shorebirds, waterfowl, and other water-associated birds.

The Salinas River was manually breached by the Monterey County Water Resource Agency on January 12, 2001. Dave Dixon, of State Parks, supervised the breaching to ensure that sensitive resources were not harmed. Access to the breaching site is through the Salinas River State Beach, just north of the Refuge. Breaching is conducted in the winter to prevent flooding of agricultural lands adjacent to the river.

Extreme high tides in January were evident during a site visit on January 24th. A freezer had been washed up all the way to the interior road from the beach. Seawater washed into the saline pond through several dune wash-out areas and the pond was holding a lot of water. At some point the tides had even reached the beach trail by the interior parking lot, as evidenced by debris on the trail. The trail along the saline pond that runs parallel to the beach trail was under water. During the CCP process earlier, there had been some discussion of putting a boardwalk on this

trail in order to avoid using the adjacent trail through the dunes which had been getting wider. However, staff determined that this would not be feasible, given the extent to which tides and water levels in the saline pond could flood this trail. It was decided that the trail along the saline pond should be abandoned and the adjacent trail through the dunes could be best contained using cable fencing. In addition, maintaining the trail through the dunes would allow for a truck or ATV to get to the beach when needed.

On December 4, 2001 Monterey County Water Resources Agency again planned to breach the Salinas River. However, the sandbar breached itself without intervention from the agency due to high waves on December 2nd, 3rd, and 4th.

The Watershed Institute (WI), out of California State University Monterey, has partnered with the Service and has been conducting riparian restoration on the Refuge since 1996. During the first half of 2001, the WI was funded with a Packard Foundation grant and continued their riparian restoration efforts along the Salinas River. However, for the remainder of the year, funding was minimal so WI concentrated on maintenance of previously restored areas.

Watershed Institute riparian restoration efforts.

5. Grasslands

Grassland areas on the Refuge are interspersed with scrub habitat. The Watershed Institute (WI) has also been involved with grassland restoration efforts on the Refuge. WI drill-seeded native grasses on 25 acres in 1996. WI currently maintains the area by regular mechanical mowing three to four times each year and intensive weed-whacking to control non-natives such as wild radish, mustard, and hemlock. The grassland restoration goal is to have approximately 40 acres planted with *Elymus glaucus*, *Hordeum brachyantherum*, *Deschampsia caespitosa*, and *Bromus carinatus*. Additional seeding will be necessary in the future. Funding in 2001 allowed for continued mowings in the grasslands to maintain native species, but no additional seedings.

6. Other Habitats

For its size, the Refuge has a very diverse mosaic of habitat types. The beach and low dunes provide feeding and resting areas for many shorebirds such as sanderlings, sandpipers, willets, marbled godwits, and other waterbirds. Snowy plovers nest here and, historically, California least terns, an endangered species, nested on the beach. The high dunes contain many

herbaceous and woody shrubs that come alive with colors during the spring. The high dunes provide habitat for many small mammals and resident birds such as California quail. Raptors commonly forage for prey in the dunes and grassland areas.

10. Pest Control

The Refuge has had a cooperative agreement with California State Parks to conduct herbicide treatments for control of iceplant and European beach grass since 1998. In 2001, State Parks crews were only able to do limited European beach grass control in early March. There was some confusion at their field office as to how and where payment was received from the Refuge. It took many months to resolve so the crew was only able to spray two days before the snowy plover breeding season. The following fall, the optimal time for herbicide treatment, the State Parks staff were again requesting the same information about payment. No further spraying was done. Iceplant was not treated in 2001 and began to spread.

In general, the control program has produced excellent results. Those benefitting include the endangered Smith's Blue butterfly, the threatened snowy plover, the black legless lizard, and a variety of endangered and native plants.

Mosquito control is conducted on the Refuge by the Northern Salinas Valley Mosquito Abatement District. In 2001, two treatments of Bti were applied to the Saline Pond, on January 26th and March 10th. In 2001, Refuge staff asked NSVMAD for extensive information on their control program and techniques, in order to write the draft Compatibility Determination for mosquito control for the CCP.

G. WILDLIFE

1. Wildlife Diversity

Salinas River NWR has a diverse array of wildlife species using the various plant communities. The upper dunes support a diversity of plant types that host many species of insects including the endangered Smith's blue butterfly. The black legless lizard (*Aniella pulchra nigra*), a State species of special concern also occurs here. Several raptor species use the refuge, especially during the winter months, and many passerine species use the refuge during migration. Shorebirds and waterfowl are seen on the refuge year round.

Black legless lizard *(Aniella pulchra nigra)*

Smith's blue butterfly *(Euphilotes enoptes)*

2. Endangered and/or Threatened Species

Endangered California brown pelicans commonly roost on the sandbar at the mouth of the

Salinas River. These birds are present from April through December, arriving from the south after breeding in southern California and Mexico.

The Federally endangered Smith's blue butterfly (*Euphilotes enoptes*) occurs on the dune habitats of the refuge where there is an abundance of their host plants, coastal buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*Eriogonum parvifolium*).

The Point Reyes Bird Observatory (PRBO) continued their long term study of the threatened western snowy plover (*Charadrius alexandrinus nivosus)* throughout Monterey Bay. John and Ricki Warriner, PRBO volunteers, have been studying western snowy plovers since 1977 and have been documenting plover breeding success at SRNWR since 1983. They attempt to color band all breeding adults and chicks at the Refuge in order to monitor the birds annually.

Banded Western snowy plover

On Feb. 8th, 2001 the Monterey Working Group snowy plover coordination preseason meeting was held. This meeting includes all the partners in snowy plover management in the Monterey Bay including State Parks, CA Dept. of Fish and Game, PRBO, USDA Wildlife Services, Santa Cruz Predatory Bird Research Group (SCPBRG), FWS Refuge Staff, and FWS Endangered Species Division. Coordination of monitoring, avian predator management, and mammalian predator management was discussed as well as funding for these programs. It was noted that predator management was more effective than exclosures in protecting snowy plovers. Upon analyzing the data, the use of exclosures led to an increase in adult plover mortality, likely because avian predators began to cue in on exclosures. Funding for mammalian predator management was discussed in detail. Wildlife Services had been undercharging for their work in the area. The cost to have a person work from March through August is approximately $30,000. The Service encouraged State Parks and Department of Fish and Game to contribute to predator management efforts. The condition of the Moss Landing Wildlife Area (Salt Ponds) was also discussed. The Salt Ponds have been taken over by *Salicornia*, and the levees are being destroyed. Unfortunately, there is not enough time and monetary resources to do all that needs to be done in this area, although progress is being made. The group decided to present a proposal to the Wildlife Conservation Board and Ducks Unlimited to redesign the water distribution system of the ponds.

In May, due to frequent trespassing into closed areas, Refuge staff worked with State Parks staff to put up cable fencing along the beach trail and more signs along the closed area.

In the 2001 breeding season, there were a total of 26 nests at the Refuge. Symbolic fencing was placed around 3 of these nests that were in danger of being trampled by Refuge visitors due to their location. Only one exclosure was erected around a nest, to protect it from trampling by gulls. In the past few years, PRBO has observed that avian predators seem to be cuing in on

exclosures and taking chicks. Also, nest abandonment of exclosed nests is higher than unexclosed nests. In contrast, loss of nests by mammalian predators has been low due to the success of the mammalian predator management program. Therefore, the Monterey Working Group is moving away from exclosure use. The hatch rate at the Refuge was a solid 77%. Four nests were lost to gull trampling, one to canid predation, and one nest contained nonviable eggs. The fledge rate was 57%, the highest recorded on the Refuge, far above our goal of 40%. This was due to the success of the avian predator management. One problem male harrier was removed from the Refuge early in the breeding season, and although there were subsequent harrier sightings, none of these birds remained on the Refuge.

The post-season Monterey Working Group snowy plover coordination meeting was held on November 1st. An overview of the breeding season was discussed. The 2001 season was characterized by an increase in the number of nesting plovers in the area. The 115 males and 114 females nesting in 2001 represented a 24% increase over last year's numbers. This population is 72% of the recovery plan target of 318 breeders in the Monterey Bay area. Overall, it was the best season on record with an overall hatch rate of 78%, a very high overall fledge rate of 56%, and an average of 2.4 fledges/male (above goal of 1 fledge/male). Only one nest was destroyed by a canid this year. An increased knowledge of and efforts against raptor predation is believed to have contributed to this year's success. Ravens were documented taking chicks out of their nest at Laguna Creek Beach; this is the first documentation of raven predation in our area. PRBO also stressed that they would need additional monitoring help from their partners due to the increase in the number of plovers. Other discussion items included the need for restoration at the Moss Landing Wildlife Area, getting tougher on horseback riders and dog walkers at the Refuge and State Parks; and not using exclosures as a long-term strategy due to loss of adults and chicks.

At the end of the year, manager Ivette Loredo spoke to Dave Dixon at State Parks. He mentioned that State Parks had $10K for predator management and $15K for personnel earmarked for snowy plover work, but that the state had a hiring freeze and would not be able to hire a seasonal worker. The possibility of the Service hiring the plover monitor and State Parks putting the $15K toward avian predator management was discussed. The monitor would work out of the State Parks Marina office. No vehicle or housing would be available. This person would be the extra monitor that PRBO has been looking for and would work the entire snowy plover breeding area in Monterey, not just State Parks lands.

3. Waterfowl

Waterfowl, including mallards, gadwall, ruddy ducks, and geese can be found in the Salinas River and lagoon.

4. Marsh and Water Birds

Brown pelicans, California gulls, western gulls, American coot, great blue heron, green-backed heron, great egret, snowy egret, and pied-billed grebes are found on the Refuge.

5. Shorebirds, Gulls, Terns, and Allied Species

Thousands of shorebirds use the beach, lagoon, river and marsh habitat during migration and winter. Black-necked stilts and American avocets nest near the Saline Pond. Caspian and elegant terns roost near the lagoon. Killdeer and western snowy plovers nest in the low dunes and on islands near the mouth of the Salinas River. Other shorebirds, associated either with the Saline Pond, the lagoon, or the ocean shore, include western sandpipers, sanderling, least sandpiper, marbled godwit, willet, long-billed curlew, and red-necked phalarope. Black skimmers attempted to nest at the Refuge for the first time this year. Their nest was located by the Saline Pond but was unsuccessful.

6. Raptors

Raptors on the Refuge include northern harriers, Peregrine falcons, American kestrels, white-tailed kites, loggerhead shrikes, red-tailed hawks, and barn owls.

7. Other Migratory Birds

Song sparrow, savannah sparrow, white-crowned sparrow, golden-crowned sparrow, common bushtit, warbling vireo, yellow warbler, Wilson's warbler, common yellowthroat, marsh wren, Bewick's wren, cliff swallow, barn swallow, Northern rough-winged swallow, Pacific slope flycatcher, ash-throated flycatcher, black phoebe, Downy woodpecker, Allen's hummingbird, American goldfinch, and western meadowlark have all been documented on the Refuge.

8. Game Mammals

Mule deer are common in the upland habitats of the Refuge.

9. Marine Mammals

Marine mammals of coastal waters offshore include the Southern sea otter, California sea lion, California harbor seal, Pacific white-sided dolphins, bottle-nose dolphins, Dall's porpoise, and harbor porpoise. Whales species migrating through the area include gray whale, humpback whale, blue whale, and killer whale.

10. Other Resident Wildlife

Other resident wildlife include reptiles such as the gopher snake, common garter snake, western fence lizard, western skink, southern alligator lizard, and common king snake; and mammals such as the muskrat, beaver, gray fox, red fox, coyote, bobcat, striped skunk, Virginia oppossum, raccoon, long-tailed weasel, black-tailed jackrabbit, California ground squirrel, California vole, broad-footed mole, Botta's pocket gopher, western harvest mouse, and deer mouse.

11. Fisheries Resources

The composition of fish in the Salinas River Lagoon is typical of that found in lagoon/rivermouth habitats elsewhere on the central California coast. Native fish species in the lagoon include Sacramento blackfish, Sacramento sucker, Sacramento squawfish, California roach, threespine stickleback, and the federally threatened steelhead trout. Nonnative species include carp, white bass, bluegill, green sunfish, mosquitofish, and threadfin shad.

Saltwater fish found in ocean waters by the Refuge and occasionally in the lagoon include starry flounders, staghorn sculpin, Pacific herring, topsmelt, shiner surfperch, walleye surfperch, silver surfperch, spotfin surfperch, white surfperch, surf smelt, northern anchovy, jacksmelt, English sole, and striped bass.

15. Animal Control

The Monterey Integrated Predator Management Program was initiated in 1993 by the Service, CDPR, and CDFG, in response to low snowy plover reproductive success rates. It integrates a variety of techniques, including: removal of mammalian predators, primarily non-native red foxes, feral cats, and skunks; installation of nest exclosures and symbolic fencing; and posting of informational signs. The Department of Agriculture's Wildlife Services Branch (Wildlife Services) conducts removal activities.

The program has been very successful in increasing snowy plover hatch rates. Snowy plover hatch rates have been high for the past five years; the 2001 overall hatch rate of 78% in the Monterey Bay was one of the highest recorded since monitoring began in 1984. In addition, it has been possible to use fewer exclosures around snowy plover nests in the Monterey Bay area in the last few years because of the success of the mammalian predator management program. It is desirable to minimize the use of nest exclosures because avian predators learn to recognize them and use them as perches from which to prey on snowy plover chicks and adults; fledge rates decrease and adult loss increases when nests are exclosed.

In 2001, Wildlife Services determined that the Service and its partners have not been providing enough funding to cover predator management for the complex and Monterey Bay. Due to long-standing accounting problems, it took Wildlife Services several months to accurately figure out the budget. In past years, the State had been contributing $50K per year through Section 6 money and much of the Service's $80K funding came from Endangered Species funds as well. However, in 1997 the Refuge received a $50K RONS project and had been putting that in each year since; at the same time, endangered species money to both the Refuge and the State was essentially eliminated. This resulted in a $30K shortfall in 2001. Several Refuge Complex staff spent considerable amounts of time trying to raise funds from California Department of Fish and Game (CDFG), California State Parks, and Endangered Species Offices. CDFG ended up putting in $15K. Initially, State Parks started paperwork to contribute $10K per year for the next three years. However, the State budget crisis caused large budget cuts and State Parks were only able to contribute $5K. Remaining money came from leftover funds in prior Service agreements

with Wildlife Services; in the past, Wildlife Services had neglected to clean out old agreements before charging to new agreements. Funding problems for predator management will be an ongoing problem unless secured funding sources are found.

In 2000 the Refuge contracted PRBO to conduct a study of the predator management data and write a summary report detailing the effectiveness of the program. Data from 1993-1999 was used. The analysis report was completed in August 2001. The analysis showed that snowy plover hatching success on the Refuge was significantly higher during predator removal, a mean of 61%, versus the pre-management level of 30%. Fledgling success during predator removal, however, did not exceed pre-management levels, indicating that mammalian predators were not the only factor limiting fledging success.

Because of decreased snowy plover fledge rates and continued adult loss believed to be primarily the result of avian predation, the Service and the Santa Cruz Predatory Bird Research Group, in cooperation with CDFG, CDPR, and PRBO, implemented a small-scale 3-year experimental avian predator relocation study at the Refuge and the Moss Landing Wildlife Area in 1999. The purpose of the study was to document the effects of avian predators on snowy plovers and to assess the efficacy of translocating avian predators.

In 2001, the third year of selected avian predator removal was undertaken to examine the effect of avian predators on chick fledging success at specific sites in Monterey Bay. The Santa Cruz Predatory Bird Research Group (SCPBRG) had responsibility for trapping, transporting, and releasing raptors from the Refuge, the Salt Ponds, and Zmudowski State Beach. The third year of the study saw improved protocols and increased funding, contributing to quicker and more efficient predator translocation and an overall increase in effectiveness. Fledge rates were very high at all three Monterey Bay area study sites in 2001. At the Refuge, one male harrier was translocated in May and females that were spotted throughout the season did not remain on the Refuge. The Refuge fledge rate increased from a 1997–1999 average of 14% to a value of 57% in 2001. For the season, we trapped and relocated 2 targeted harriers (1 male trapped on Refuge, one female at Moss Landing Wildlife Area). It was a relatively good year in that shrikes were not seen at Zmudowski and several potentially damaging harriers, sighted on both the Refuge and the Salt Ponds, did not stay in the area.

16. Marking and Banding

All snowy plovers on the Refuge are banded by PRBO. Unique color leg band combinations are used to be able to distinguish each individual.

H. PUBLIC USE

1. General

Most of the Refuge is closed to public use in an effort to protect rare and endangered species. The Refuge is used primarily for surf fishing, waterfowl hunting and nonconsumptive use, such

as wildlife viewing, hiking and photography.

8. Hunting

Waterfowl hunting is allowed on the Refuge during the waterfowl hunting season, usually October through January. On November 26th, the Refuge submitted changes to the Federal Register for the 2002/2003 hunt regulations. These included limiting the amount of shot in possession to no more than 25 shells, specifying that access to the hunt area was by foot-traffic only and prohibiting bicycles or other conveyances, and keeping firearms unloaded until within the hunt area.

9. Fishing

Surf fishing is allowed year-round on the lands adjacent to the Refuge. No fishing is allowed in the Salinas River.

Fisherperson with surf perch.

16. Other Non-wildlife Oriented Recreation

Horseback riding and dog walking are prohibited on the Refuge although they do occur.

Dogwalkers on Refuge

17. Law Enforcement

In March, a boat washed ashore on the Refuge. Sheriffs combed the beaches on ATVs looking for the body of the boater. On April 3rd, Capt. Mark Wagner of Vessel Assist coordinated with Refuge Manager Loredo and PRBO on the boat debris removal. Because of the potential for disturbance to nesting snowy plovers, some options were discussed. It was decided that the

removal could occur by land only if it were to occur on April 4th or 5th, before chicks were due to hatch. Kriss Neumann, a PRBO snowy plover monitor, would be present during the removal in order to direct the truck away from nests. They would drive along the tidal area and retrieve the debris. On April 4th, Vessel Assist successfully removed the boat wreck debris. There was no gas or oil spillage - everything was contained.

I. EQUIPMENT AND FACILITIES

5. Communications Systems

The Refuge has no telephone available for public use.

J. OTHER ITEMS

2. Items of Interest

On March 2nd, Refuge manager Ivette Loredo attended a Central Coast Regional Conservation Partnership meeting at CSU Monterey. This is a group looking to form a sort of "joint venture" for the central coast to build partnerships, share information and GIS, build political power, and receive funding.

On April 10th, Refuge Supervisor Dave Paullin conducted a station review of Salinas River NWR. We also visited the adjacent Martin and Lonestar properties along the beach, at his request.

Beginning in the early fall of 2001, oiled birds were found along the coast, primarily along the San Mateo coast but also further north and south. There was Federal notification and the Coast Guard and Oil Spill Prevention Response (OSPR) were on the scene in Monterey county in September. Some beaches were closed temporarily in September due to the cleanup efforts and unknown risks to visitors. Coast clean-up volunteers were redirected from the Refuge and other local beaches to other areas.

On September 14th, Refuge Manager Loredo went to the Refuge to assess the damage from the spill. Only a few small pieces of dry tar could be found on shore along the rack line. OSPR finished cleaning the beaches on Saturday evening (Sept. 15th), and beaches were reopened on Sunday. OSPR reported that tarballs had washed up on beaches from Point Sur to Moss Landing, 125 garbage bags of oily debris and tarballs were removed from beaches, and three oiled birds were collected including one dead murre, one dead gull, and one live gull. Guidance on protecting snowy plovers was provided to the OSPR team by the Department of Fish and Game and it appeared to have been followed. The oil appeared "old" and OSPR was considering

Size of tar balls found on Refuge in September.

the possibility that it came from a spill along the Oregon coast that occurred several weeks earlier. Samples were collected and were analyzed to compare the fingerprints.

On October 3rd, Refuge Manager Loredo and Steve Henry of the Ventura FWS contaminants division conducted a follow up visit to the Refuge to assess the cleanup effort. They walked the entire beach and found only a few small dry pieces of tar. Steve concluded that there was no wildlife concern with the remaining tar.

In November and December OSPR was again responding to reports of oiled birds washing up on shore. John Henderson from FWS Contaminants in Sacramento was working with OSPR on the response and clean up effort. The response effort continued for about four weeks. Along the beaches in the vicinity of the Refuge, there were a few dead birds, but they did not appear to be oiled. John did not see any oil on the beach, but talked to a surfer who said he did see oil about a week ago. However, many oiled birds had been found from Half Moon Bay to Monterey. Approximately 600 birds, a little over half of which were dead, were collected including some from the Moss Landing area. In the initial response, the search radius only went as far south as Santa Cruz County; it was expanded three weeks later to include Monterey County. The source of the oil was unidentified for months and the event was referred to as the "San Mateo mystery spill." The oil had been "fingerprinted" and it was all from the same source. It was determined that the oil was not from a natural seep.

In early 2002, the oil was identified as originating from the S.S. Jacob Luckenbach. This vessel, loaded with 457,000 gallons of bunker fuel, sank in 180 feet of water in 1953. It is located approximately 17 miles west-southwest of San Francisco. It had been leaking sporadically through the years and was determined to be the source of several "mystery" spills including the San Mateo Mystery Spill of 2001-2002.

In the tragedy of September 11, 2001, a U.S. Fish and Wildlife Service employee, Rich Guadagno from Humboldt Bay NWR, died in the Pennsylvania plane crash. A memorial was spontaneously erected at the Salinas River NWR by an unknown visitor(s).

September 11th Memorial; note flowers on and below signs. Photo taken on September 14th.

3. Credits

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