

**HABITAT CONSERVATION PLAN
FOR THE
SNOWY PLOVER
AT SCOTT CREEK BEACH**

**LOCATED IN NORTHERN
SANTA CRUZ COUNTY, CALIFORNIA**



**Prepared by the County of Santa Cruz Parks,
Open Space & Cultural Services Department
9000 Soquel Avenue, Suite 101
Santa Cruz, California 95062**

**Submitted to the Regional Director,
United States Department of the Interior
Fish & Wildlife Service Region 1
Eastside Federal Complex
911 N.E. 11th Avenue
Portland, Oregon 97232-4181**

**July, 1995
Draft**

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INTRODUCTION

The purpose of this Habitat Conservation Plan (HCP) is to obtain permission to alter 1 acre of existing snowy plover (*Charadrys alexandrinus nivosus*) breeding habitat at Scott Creek Beach.

The HCP is formatted into four chapters: the first chapter discusses the existing conditions of Santa Cruz County's north coast, and more specifically Scott Creek Beach; the second chapter addresses the biology of the snowy plover; the third chapter presents the proposed improvements at Scott Creek Beach and the potential impact to snowy plover; and the fourth chapter explains the mitigation measures proposed to protect the snowy plover, the alternatives previously reviewed, and the results if no improvements are implemented.

Between the San Mateo County line to the north and the Santa Cruz City line to the south lies Santa Cruz County's north coast. There are four beaches along the north coast where snowy plover are currently known to nest: Waddell Creek State Beach, Scott Creek County Beach, Laguna Creek Beach, which is privately owned by the Coast Dairies and Land Company of Switzerland, and Wilder Beach State Preserve. Data regarding snowy plovers' activities on these four beaches has been collected over the past 2 - 7 years by the Point Reyes Bird Observatory. This data, as well as additional information, is being provided to aid in the evaluation of the Scott Creek Beach Project. Refer to the Appendix of this document for maps of the County's north coast and for the reports prepared by Point Reyes Bird Observatory on the nesting success of various north coast beaches.

With the help of the State Coastal Conservancy, the Point Reyes Bird Observatory, California State Parks, the U.S. Fish and Wildlife Service, and over 90 trained volunteers, the County of Santa Cruz has administered a program that has markedly improved the snowy plover breeding success at the two north coast beaches the County manages snowy plover protection efforts: Scott Creek Beach and Laguna Creek Beach.

This document was prepared by the County of Santa Cruz Parks, Open Space and Cultural Services Department in cooperation with the U.S. Fish and Wildlife Service. Historical data of the snowy plover activities on the aforementioned beaches was collected and provided by the Point Reyes Bird Observatory. A special "thank you" is given to Doug George, of the Point Reyes Bird Observatory, for his unwavering dedication and guidance to the preservation of the snowy plover on Santa Cruz County's north coast.

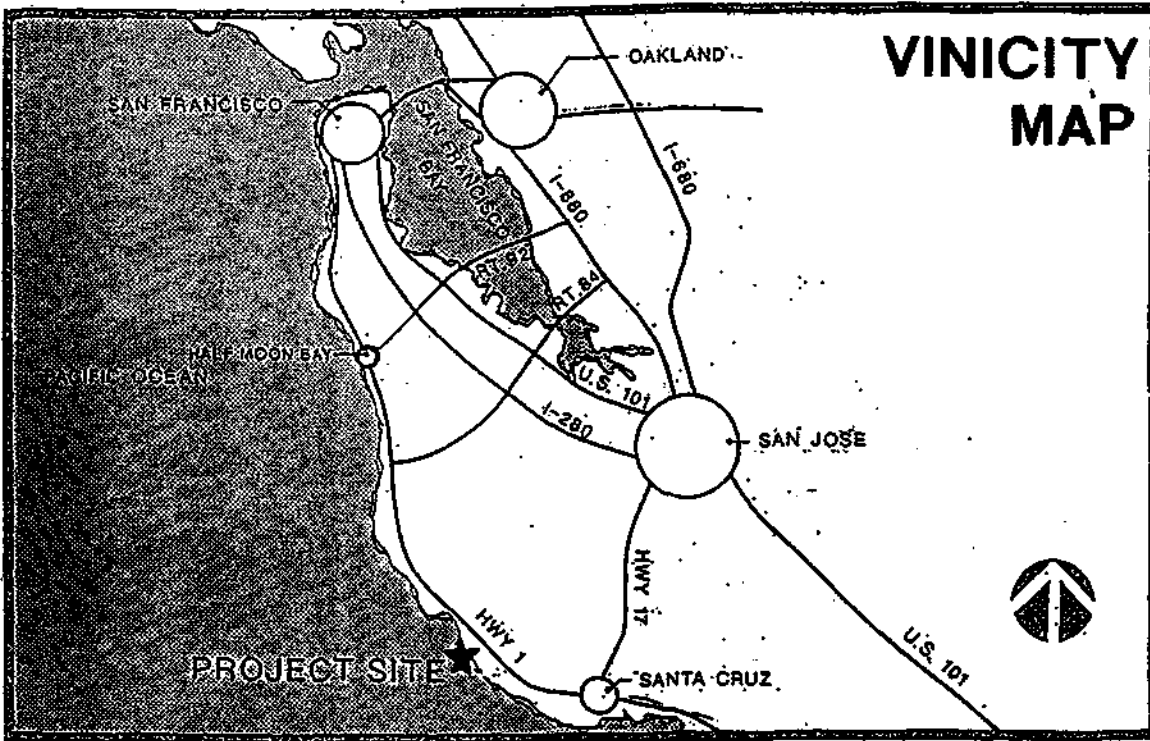


Photo: Staff
Scott Creek Beach

CHAPTER ONE - EXISTING CONDITIONS

Existing Character of Santa Cruz County's North Coast

The north coast of Santa Cruz County is rural and rugged. The coastline is typically bordered by high coastal bluffs with small coves and beaches where ephemeral and perennial creeks meet the ocean. The bluff-tops are predominately agriculture fields. Approximately nine (9) of the twenty (20) miles of coastline are in public ownership (Waddell State Beach, Greyhound Rock County Beach, Scott Creek County Beach, Wilder State Beach Preserve and Four Mile State Beach); however, the remaining eleven (11) miles of privately-owned coastline constitute the last stretch of unmanaged coastline south of San Francisco and north of Santa Cruz City. The evidence of unmanaged coastline is all too often the scars of erosion, the clutter or refuse, the invasion of weeds and noxious predators, and illegal and illicit human behavior. Refer to the north coast maps in Appendix C of this document which identify all existing and proposed public beach access points.

Existing Character of Scott Creek Beach

Scott Creek Beach is unique to the north coast of Santa Cruz County because it is the only undeveloped beach immediately adjacent to Highway One. Although the beach is undeveloped, it is in public ownership and a public liability. The main beach is approximately ½ mile long (approximately 10.5 acres), bounded on the north by coastal cliffs and on the south by a large sand dune. The boundaries of this beach delineate one of the most striking viewsheds along Highway One in Santa Cruz County. Thousands of people travel Highway One daily. On weekends, holidays, and during the summer, hundreds are drawn by this majestic vista to stop and visit. In addition to coastal tourists, Scott Creek Beach is a particularly popular beach for active recreation enthusiasts, such as sail-boarders, surfers, hang gliders, and drivers of off-road recreational vehicles (such off-road recreational vehicle use is illegal). Despite turbulent water and windy conditions, Scott Creek Beach is heavily used on weekends and holidays with cars parking in all available shoulder areas. As a result of this heavy public use, traffic congestion and environmental degradation have become significant issues.

County General Plan Consistency

Efforts to address natural resource protection and public access at Scott Creek Beach and other beaches on the County's north coast were first outlined in the County's Local Coastal Plan (LCP) adopted by the State Coastal Commission in 1983. Due to the intense recreational use of Scott Creek Beach, the LCP identified Scott Creek Beach as a primary public beach access point. The LCP also defined sensitive habitats and limited the permissible uses/activities that can occur within or adjacent to those habitat areas. The sensitive habitat policies of the LCP are implemented by Chapter 16.32 (Sensitive Habitat Ordinance) of the County Code. The proposed Scott Creek Beach Access

Enhancement Plan was developed with the objectives of restoring and protecting the natural resources identified at Scott Creek Beach and maintaining limited public access. For these reasons, the concept of the proposed plan is consistent with the intent of the LCP/General Plan.

The proposed Scott Creek Beach Access Enhancement Plan is the first phase of the "North Coast Beaches Master Plan" and the result of over a decade of planning and environmental review. In 1983, the Santa Cruz County Transportation Commission prepared a report entitled "North Coast Beaches Parking Study". This report identified Scott Creek Beach as having the highest traffic accident rate of all the north coast beach areas. The County took the findings of this traffic and parking impact study and established a public advisory group, made up of north coast constituents, who developed "The North Coast Today and Tomorrow Report". This report addressed the restoration, access enhancement, and management of several north coast beaches, including Scott Creek Beach. This report was refined by EDAW, Inc., into the "General Plan for the North Coast Beaches." The General Plan underwent extensive review by an inter-agency advisory group whose membership included State Parks, Caltrans, State Fish and Game, the Rural Bonny Doon Association, the California Coastal Commission, State Assembly Member Sam Farr's office, State Senator Henry Mello's office, the Sierra Club, Save Our Shores, and the State Coastal Conservancy. That group endorsed the plan and recommended its implementation to the County Board of Supervisors. In 1989 the County authorized the preparation of an Environmental Impact Report (EIR) and conducted public hearings on the General Plan. Based on the findings of the EIR, the North Coast Beaches General Plan was revised to include mitigation measures suggested to reduce significant environmental impact. With regard to the Scott Creek Beach project, the EIR states that "proposed dune restoration would generally result in positive impacts and habitat improvements." The resulting "North Coast Beaches Master Plan" attempts to balance, as well as manage, often conflicting special interests including, but not limited to, public access, public safety and law enforcement, natural resource restoration and preservation, and coastal recreation.

Existing Recreational Activities

The predominant recreational activities at Scott Creek Beach are water and wind sports: surfing, surf fishing, sail boarding, hang gliding and kiting. Other recreational activities include beach-combing, beach picnics/parties, and exercising pet dogs. Illegal recreational activities at Scott Creek Beach include driving of off-road recreational vehicles. The following is a matrix intended to provide information regarding the extent of these activities and their existing impact to snowy plovers. This information was provided by the County's North Coast Beaches Advisory Committee, comprised of a diverse group of north coast constituents and special interest representatives.

ACTIVITY MATRIX

ACTIVITY	AVERAGE # OF INDIVIDUALS PER MONTH	MONTHS / YEAR	EX. IMPACT TO PLOVER/HABITAT
SURFING	±300	ALL YEAR	LOW
SAIL BOARDING	±300	MARCH - SEPT.	LOW
*HANG GLIDING	±80	SEPT. - MARCH	NONE DURING SEASON
*KITES	±15	MARCH - OCT.	HIGH
*SURF FISHING	±10	ALL YEAR	MODERATE
*BEACH COMBING	±600	ALL YEAR	HIGH
*PICNIC/PARTIES	±100	MARCH - NOV.	HIGH
*OFF-ROAD	±20	ALL YEAR	HIGH

* It is speculated that by limiting areas for human activities, and providing an area of refuge for plover activities, existing impacts to plover breeding habitat can be reduced.

Over the past two decades, the County of Santa Cruz has worked closely with the residents and various user groups of the north coast beaches, including Scott Creek Beach. In 1990, the County established the second North Coast Beaches Advisory Committee to advise the County Board of Supervisors on matters related to development and management of the north coast beaches. Membership on this Committee represents: the Santa Cruz Board Sailing Association, Monterey Bay Hang Gliding Association, South Bay Naturists, Save Our Shores, North Coast Residents, Rancho Del Oso Nature Center, North Coast Improvement Association, Davenport Volunteer Fire Department, North Coast Farmers, Rural Bonny Doon Association, and the Santa Cruz Surfing Association. The County has made active efforts to communicate concerns regarding the snowy plover to these special interest groups and organizations that use the north coast area; snowy plover interpretive information has been published in newsletters of these organizations, resulting in several trained plover protection volunteers and hundreds of conscientious users. At Scott Creek Beach, a favorite site for hang gliders to learn to fly, hang gliding has been cooperatively ceased during the snowy plover breeding season, aiding a marked increase of the reproductive success at this beach. Continued use by the hang gliders of the Scott Creek Beach dune area will be considered and addressed in the supplemental EIR prepared for this project.

Property Ownership and Plover Protection Management

The four north coast beaches at which the snowy plover nest represent approximately 23 acres of potential habitat. The County manages the snowy plover protection programs at two beaches

(Laguna and Scott Creek), or approximately 14.5 acres of potential habitat. The remaining habitat (Waddell Creek and Wilder) is managed by the California Department of State Parks. In an effort to protect dwindling plover habitat, Wilder Beach has been designated as a state preserve with no public access. The snowy plover protection measures at Waddell State Beach are limited at this time to the posting of snowy plover interpretive information. Laguna Creek Beach is privately owned; however, the County obtained an easement agreement specifically to manage the protection of snowy plovers at this beach from 1992 - 1997. Scott Creek Beach is owned and managed by the County.

The snowy plover protection program administered by the County on the north coast, with the cooperation of the Point Reyes Bird Observatory and the State Coastal Conservancy, has been very successful. The reproductive success (chick per egg) at Laguna Creek Beach prior to instituting this program averaged 12.5% between 1988 - 1991. The average reproductive success at Laguna Creek Beach since the commencement of this program in 1992 is 43% (1992-1994). The average reproductive success at Scott Creek Beach is 21% (1993-1994). Reproductive success prior to 1992 is unknown.

The snowy plover protection program administered by the County has been in existence since 1992. In 1992, the program consisted of purchasing tools and materials, and installing triangular exclosures around nests at Laguna Creek Beach determined to be viable and vulnerable by PRBO biologists. Volunteers and County staff were trained by the California Department of Parks. It was during this first year that interpretive signage was developed and posted at several north coast beaches. During 1993, the County expanded the program to include its own volunteer training workshops using the same format as State Parks. Exclosures were modified by PRBO to include twine tops, and they were installed around snowy plover nests located at both Scott Creek and Laguna Creek Beaches which were determined to be viable and vulnerable by PRBO biologists. During 1994, the County expanded its snowy plover protection program to include a symbolic fence in addition to the above. The symbolic fence consisted of a post every ten to fifteen feet on center with a single strand of cable running between the posts and signs periodically attached to the posts. The symbolic fence was installed around areas plovers nested or attempted to nest the previous season at both Scott Creek and Laguna Creek Beaches. At Scott Creek Beach, the symbolic fence encircled approximately 2/3 of an acre, or the north face of the dune area. At Laguna Creek Beach, the symbolic fence encircled approximately two acres in the center of the beach.

In recent years prior to 1992, snowy plovers were not thought to breed at Scott Creek Beach. Due to the intensive recreational use of the beach, Scott Creek Beach was not monitored for breeding activity. However, Scott Creek Beach historically supported snowy plover breeding activities. "Museum collections of snowy plover egg sets were obtained from Scott Creek Beach during the years 1878 - 1946" (verbal reference, Doug George). In 1992, two birds were reported to fledge at Scott Creek Beach. The nest locations were unknown, but at least one nesting attempt did occur in the dune area. In 1993, there were multiple nesting attempts on the face of the Scott Creek Beach dune. None were successful, including one nesting attempt that was exclosed; however, two birds fledged Scott Creek Beach from an exclosed nest on the beach in an area proposed as an area of limited disturbance. In 1994, multiple nests were attempted on the Scott Creek Beach dune, and

three birds fledged from two separate nests located in the dune area. One nest was exclosed; both nests were protected with a post and cable demarcation identifying an area of limited disturbance. A point of contingency: the sides of the exclosure protecting the one nest were dismantled and used as traction by an off-road vehicle enthusiast who managed to get the vehicle stuck in the sand. Surprisingly, the nest hatched.

The following tables show the snowy plover reproductive success at the various beaches on Santa Cruz County's north coast. More detailed reports have been provided by the Point Reyes Bird Observatory and are attached as an appendix to this document.

Table 1. Breeding Success of Snowy Plovers at Scott Creek Beach in 1993 and 1994
 Rows of numbers without asterisks were unprotected nests.
 Rows of numbers marked with an asterisk were nests protected with exclosures.
 Rows with 2 asterisks were nests protected with exclosures and unprotected nests, combined.

Year	Number of Nests	Total Eggs Laid	Percent Nests hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged Per Egg
1992	3	?	?	?	?	?	?	2	?
1993	3	8	0.0	0	0.0	0	-	0	0.00
1993*	2	6	50.0	1	50.0	3	66.7	2	0.33
1993**	5	14	20.0	1	21.4	3	66.7	2	0.14
1994	2	6	50.0	1	33.3	2	50.0	1	0.17
1994*	1	3	100.0	1	66.7	2	100.0	2	0.67
1994**	3	9	66.7	2	44.4	4	75.0	3	0.33

Table 2: Causes of Snowy Plover Nest Loss at Scott Creek Beach in 1993 and 1994
 Rows of numbers without asterisks were unprotected nests.
 Rows of numbers marked with an asterisk were nests protected with exclosures.

Year	Deserted*
1993	3
1993*	1
1994	1

*Nests lost to desertion are nests that were abandoned by the parent birds, and the various reasons for abandonment are only assumption.

Table 3: Breeding Success of Snowy Plovers at Laguna Creek Beach 1988-1994
 Rows of numbers marked with an asterisk were nests protected with an enclosure.
 Those without an asterisk were unprotected nests.

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged Per Egg
1988	5	10	20.0	1	30.0	3	100.0	3	0.30
1989	11	20	18.2	2	20.0	6	50.0	3	0.10
1990	5	15	20.0	1	13.3	2	100.0	2	0.13
1991	4	9	25.0	1	22.2	2	100.0	2	0.13
1992	3	6	0.0	0	0.0	0	-	0	0.00
1992*	5	15	80.0	4	80.0	12	83.3	10	0.67
1993	3	6	0.0	0	0.0	0	-	0	0.00
1993*	7	21	71.4	5	61.9	13	53.8	7	0.33
1994	3	4	0.0	0	0.0	0	-	0	0.00
1994*	5	15	100.0	5	80.0	12	100.0	12	0.80

Table 4: Causes of Snowy Plover Nest Loss at Laguna Creek Beach 1988-1994
 Rows of numbers marked with an asterisk were nests protected with an enclosure.
 Those without an asterisk were unprotected nests.

Year	Unknown	People	Canine	Skunk	Raven	Predator	Rising Water of Lagoon	Deserted
1988	4							
1989	5	3		1				
1990	1	2	1					
1991	1				1			
1992				1			2	
1992*				1				
1993							1	2
1993*							1	1
1994	1	1				1		
1994**								

**No protected nests were lost in 1994.

Table 5: Breeding Success of Snowy Plovers at Waddell Beach in 1994

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged Per Egg
1994	11	32	36.4%	4	25.0%	8	25.0%	2	0.06

Table 6: Causes of Snowy Plover Nest Loss at Waddell Beach in 1994

Year	Unknown	Deserted
1994	6	1

Table 7: Breeding Success of Snowy Plovers at Wilder Beach 1988-1994

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged Per Egg
1988	10	27	40.0	4	40.7	11	45.5	5	0.19
1989	14	38	71.4	10	71.1	27	66.7	18	0.47
1990	17	46	47.1	8	39.1	18	27.8	5	0.11
1991	9	26	55.6	5	38.5	10	40.0	4	0.15
1992	17	47	70.6	12	70.2	33	12.2	4	0.09
1993	8	22	75.0	6	77.3	17	0.0	0	0.00
1994	13	33	53.8	7	54.5	18	66.7	12	0.36

Table 8: Causes of Snowy Plover Nest Loss at Wilder Beach 1988-1994

Year	Unkn.	People	Raven	Crow	Canine	Skunk	Gull	Predator	Wind	Tide	Desertion	Infertile
1988	2									3	1	
1989			2	1								1
1990	3	2	2			1				1		
1991	1	1			1						1	
1992	2				1		1		1			
1993								1			1	
1994	3							1	1	1		



CHAPTER TWO - BIOLOGICAL DATA

All biological data cited in Chapter Two of the "Habitat Conservation Plan for Snowy Plover at Scott Creek Beach" was obtained from the Federal Register/Vol. 58, No. 42/March 5, 1993.

The snowy plover is a small, pale-colored shore bird, with dark patches on either side of the upper breast and over the eyes. These dark patches are typically more prominent on the male than the female. Twelve subspecies of the snowy plover occur worldwide. Two subspecies of snowy plover are recognized in North America (Rittinghaus 1961 in Jacobs 1986); those are the western snowy plover (*Charadrys alexandrinus nivosus*) and the Cuban snowy plover (*C. a. tenuirostris*). According to the American Ornithologists' Union (1957), the western snowy plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and interior areas of Oregon, California, Nevada, New Mexico, Colorado, Kansas, Oklahoma, Texas and Arizona. The Pacific coast population of the western snowy plover is defined as those birds that nest adjacent to or near tidal waters, and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays and estuaries. The Pacific coast population of the western snowy plover is genetically isolated from western snowy plovers breeding in the interior (Gary Page, Point Reyes Bird Observatory, pers comm., 1990). Intensive banding and monitoring studies have documented only two instances of intermixing between coastal and interior populations. Additionally, snowy plover tend to be site faithful, with the majority of birds returning to the same nesting location in subsequent years (Warriner et al. 1986).

It is the coastal population of western snowy plover that is listed as Federally threatened under the Endangered Species Act, and that nest along the Santa Cruz County north coast.

Life History

The Pacific coast population of western snowy plover breed on coastal beaches from southern Washington to southern Baja California, Mexico. Sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal habitats for nesting (Stenzel et al. 1981, Wilson 1980). Nesting habitat is unstable and ephemeral as a result of unconsolidated soil characteristics influenced by high winds, storms, wave action and colonization by plants. Nest sites typically occur in flat, open areas and open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent (Wildrig 1980, Wilson 1980, Stenzel et al. 1981). Based on the most recent surveys, a total of 28 snowy plover breeding sites occur on the Pacific coast of the United States. 20 of the 28 breeding areas occur along coastal California (Page et al. 1981). Eight areas support 78% of the California breeding populations: San Francisco Bay, Monterey Bay, Morro Bay, the Callendar-Mussel Rock Dunes area, the area of Point Sal to Point Conception, the Oxnard lowland, Santa Rosa Island and San Nicholas Island (Page et al. 1991).

A majority of snowy plovers are site faithful, returning to the same breeding site in subsequent breeding seasons. Birds often nest in exactly the same location as previous years (Warriner et al. 1986). This is the case with the face of the Scott Creek Beach dune.

The breeding season of the coastal population of the western snowy plover extends from mid-March through mid-September. Nest initiation and egg laying occurs from mid-March through mid-July (Wilson 1980, Warriner et al. 1986). The usual clutch size is three eggs. Incubation averages 27 days (Warriner et al. 1986). Both sexes incubate the eggs.

Plover chicks are precocial, leaving the nest within hours after hatching to search for food. Fledging (reaching flying age) requires an average of 31 days (Warriner et al. 1986). Broods rarely remain in the nesting territory until fledging (Warriner et al. 1986, Stern et al. 1990b). Snowy plovers will renest after loss of a clutch or brood (Wilson 1980, Warriner et al. 1986). Double brooding and polygamy (i.e. the female successfully hatches more than one brood in a nesting season with different mates) have been observed in coastal California (Warriner et al. 1986). After loss of a clutch or brood or successful hatching of a nest, plovers may renest in the same colony site or move, sometimes up to several hundred miles, to other colony sites to nest (Gary Page, pers. comm., 1991; Warriner et al. 1986).

Widely varying nest success (percentage of nests hatching at least one egg) and reproduction success (number of young fledged per female or nest) are reported in the literature. Nest success ranges from 0-80% for coastal snowy plovers (Widrig 1980, Wilson 1980, Saul 1982, Wilson-Jacobs and Dorsey 1985, Wickham unpubl. data in Jacobs 1986, Warriner et al. 1986). Instances of low nest success have been attributed to predation, human disturbance and inclement weather conditions. Reproductive success ranges from 0.05 to 2.40 young per female, pair or nest (Page et al. 1977, Warriner 1980, Wilson 1980, Saul 1982, Warriner et al. 1986, Page 1988). Gary Page et al. (1977) estimated that snowy plover must fledge 0.8 young per female to maintain a stable population. Poor reproductive success, combined with permanent or long-term loss of nesting habitat to encroachment of introduced European beach grass (*Ammophila arenaria*) and urban development has led to a decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States.

CHAPTER THREE - PROPOSED PROJECT

Project Description

The Scott Creek Beach Access Enhancement Plan proposes to facilitate public access with a boardwalk, signs, fencing, waste management and bus stop improvements. Similarly, the plan proposes to restore and protect over three acres of coastal strand and dune habitat. Where use necessitates, pedestrians will cross sensitive dune areas on a boardwalk and designated paths. Pedestrian improvements such as informational signage, waste receptacles, bike racks and fencing will be placed to aid management of current and future public visitation. A vault toilet is proposed, thereby eliminating the need for visitors to hike across sensitive areas looking for privacy. Furthermore, in an effort to stabilize the sand dune and reduce blowing sand on the highway, approximately 1½ acres of native dune vegetation restoration is proposed in clearly delineated areas marked by interpretive signage and post and cable barriers. Other areas of the beach, approximately 2 acres above the mean high tide line, will be set aside as areas of limited disturbance for the snowy plover. (Mean high tide is approximately between elevations 4 and 6.) One area proposed for limited disturbance starts about elevation 13 - 14 and includes an area up to elevation 20 at the base of the sand dune. This area will encompass approximately one acre and the fence delineation will be designed to be flexible, thereby allowing staff to adjust the layout of the fence with the seasonal variation of the beach. A second area of limited disturbance is located on a level plateau at the crest of the sand dune. This second area is approximately one acre in size and is buffered on all sides by dune vegetation. Several open corridors will be established and maintained to aid plovers in their transition to and from the water's edge. Construction documents have been attached as an appendix to this document. A three-year dune monitoring and management program will be initiated with construction completion, as well as the continuation of the existing Snowy Plover Predator Management Program, whereby exclosures are employed to protect plover nests consistent with the exclosure protocol. Refer to the Site Specific Management Plan for proposed monitoring measures.

In an effort to recreate a self-sustaining dune system, native plant seeds collected from within a 20-mile radius of the site will be used to restore dune vegetation at Scott Creek Beach. A mosaic of vegetative island will be created. Each island will contain a variety of species specific to the micro-ecology of the dune area. For example, pioneering species such as *Elymus mollis* and *Camissonia cheiranthifolia* will be planted in the fore dune areas and where dune sand is unstable, such as adjacent to Highway One. Species such as *Eschscholzia californica var. maritims* and *Ericameria ericoides*, which require more stable soil, will be planted in a vegetative island located at the rear of the dune. In an effort to maximize areas for snowy plover nesting, a large level plateau will be left void of vegetation. Prostrate pioneering dune plants such as *Abronia latifolia* will be planted in vegetative islands adjacent to the areas left bare for plover nesting. It is anticipated that prostrate dune vegetation will allow nesting plover the necessary site visibility while providing some sand stabilization. All the vegetative islands will be carefully laid out to maximize plover nesting habitat and minimize the potential for sand "blow-outs", areas where wind-carried sand buries the vegetation. Finally, in dune areas that have a strong potential for human disturbance such as at the edges of delineated access paths, *Amboisia chamissonis* will be planted to deter human foot traffic.

Potential Impacts

The short-term potential impacts of the Scott Creek Beach Enhancement Plan will not affect snowy plover breeding activities. Construction of the project is scheduled for late fall and early winter, thereby avoiding impact during the snowy plover nesting season (March - September). Construction may affect the Scott Creek Beach wintering snowy plover population by forcing the wintering birds to other areas of the beach. As many as one hundred birds have been known to winter at Scott Creek Beach (November - March).

The long-term potential impacts of the Scott Creek Beach Access Enhancement Plan to the snowy plover are generally positive. Key areas of limited disturbance will be set aside and managed for snowy plover activities. Furthermore, the biological diversity of the area will be enhanced by the preservation and restoration of over three acres of native dune and coastal strand habitat. Finally, public awareness will be enhanced by the posting of seasonal interpretive information regarding snowy plover activities as well as other ecological significant points of interest at this coastal environment.

The adverse impact of this project is that 1 acre of existing snowy plover nesting habitat will be altered; 2/3 of this existing habitat is immediately adjacent to Highway One, and although there have been multiple nesting attempts adjacent to the highway, none of the nesting attempts have been successful. It is also possible that access improvements may encourage visitation; however, it should be noted that visitation annually increases at this beach without access improvements. **It should also be noted that with these improvements, access to the beach can be managed and controlled. Without these access improvements, it is impossible to manage or control how this beach is used and too often abused.**

The access improvements proposed are intended to mitigate increased visitation by clearly delineating areas of sensitivity and by limiting human disturbance within these areas, pursuant to County Code Chapter 16.32. In addition, the proposed access improvements provide facilities for waste disposal and sanitation, thereby reducing the possibility of predators being attracted to the litter and refuse on the beach. The most significant positive impact of the proposed plan is the elimination of off-road recreational vehicles from the beach with the placement of a post and cable barrier.

The one acre of existing snowy plover nesting habitat this project proposes to alter is located immediately adjacent to Highway One and on the north face of the dune flanking the southern boundary of the beach. The entire acre is highly disturbed and void of native vegetation; restoration of this area is critical to the success of this project. In an effort to mitigate the alteration of plover habitat, the County proposes to set aside two acres of enhanced plover nesting and foraging habitat. One acre of nesting habitat will be established on the plateau at the crest of the dune. This area encompasses some existing plover nesting habitat; however, the area will be enhanced by removing exotic weeds and remnants of old buildings. A second acre of nesting/foraging habitat will be set aside at the base of the fore dune. It is anticipated that this fore dune habitat will provide lateral

access to the kelp rack, an important foraging area for plover. This fore dune habitat also encompasses some existing plover nesting habitat.

Management and Monitoring Plan

As a condition of approval for this project by the State Department of Fish and Game and the North Coast Beaches Advisory Committee, the County was required to develop a site-specific management and monitoring plan. This plan specifically addresses public safety and law enforcement, general maintenance, and natural resource protection. This plan proposes to monitor and manage the dune vegetation for a minimum of three years. With regard to monitoring snowy plover, the plan proposes the County implement a plover monitoring system only in the event that PRBO is unable to continue its current monitoring status. In addition to the above, however, the County will provide to the U.S. Fish and Wildlife Service an annual status report which describes all efforts to monitor and maintain successful plover nesting habitat. This report would include photo documentation and the reproductive results of the HCP. The Scott Creek Beach Site Specific Management Plan is attached as Appendix A.

Project Funding

The Scott Creek Beach Access Enhancement Plan is being funded by grants from four different government agencies and one private donation: the United States Federal Highway Administration, the California State Department of Natural Resources, the State Coastal Conservancy, the County of Santa Cruz, and Steven Sutherland Associates Landscape Architecture and Planning. Following is the financial summary and project cost estimate for the Scott Creek Beach Access Enhancement Plan.

SCOTT CREEK BEACH
ACCESS ENHANCEMENT PROJECT
PROJECT COST ESTIMATE

ITEM	QUANTITY	TOTAL
Clearing	178,943 SF	\$ 8,912.25
Grading	124,410 SF	34,750.00
AC Paving	4,660 SF	14,000.00
Gravel Shoulder	7,400 SF	7,050.00
Bus Stop	1 EA	6,000.00
Post & Cable	952 LF	10,710.00
Boardwalk	6,880 SF	8,150.00
Native Landscaping	106,043 SF	159,065.00
Temporary Fencing	LUMP SUM	5,000.00
Comfort Station	1 EA	40,000.00
Signage	5 EA	2,500.00
Recycle Containers	1 UNIT	700.00
Construction Contingency	15%	44,525.00
Design & Permit Cost		70,710.00
TOTAL PROJECT COST		\$412,072.00

SCOTT CREEK ACCESS ENHANCEMENT PROJECT
FINANCIAL SUMMARY

FUNDING SOURCE	AMOUNT
Federal Highway Administration	\$290,000
State Department of Natural Resources	75,500
State Coastal Conservancy	37,072
Private Donation	9,500
TOTAL PROJECT FUNDING	412,072
County of Santa Cruz - Project/Administration Estimated Cost	73,476
TOTAL PROJECT COST	\$459,048

CHAPTER FOUR - MITIGATION MEASURES

The County proposes to mitigate the potential impacts of the Scott Creek Beach Access Enhancement Plan through the following actions:

- The County will set aside two acres of coastal strand and dune habitat at Scott Creek Beach as an area of limited disturbance intended and managed as a snowy plover refuge. Snowy plovers would be able to nest and/or retreat to this area during times of intensive public use of the beach.
- The County will post and maintain snowy plover interpretive information/signage at County-managed beaches.
- The County will continue its snowy plover predator exclosure program under Permit Number PRT-702631, effective through January 31, 1998, at both Scott Creek Beach and Laguna Creek Beach. This program costs the County approximately \$5,000 per year to administer, and will be an on-going program on County-managed beaches.
- The County will continue to educate special interest/user groups to the concerns of the snowy plover.

Project Alternatives

The Scott Creek Beach Access Enhancement Plan is the County's fourth attempt to address the unmanaged access issue at Scott Creek Beach. In 1983 the County obtained a State Coastal Conservancy grant to control off-road vehicular access at Scott Creek Beach. A vehicle barrier was constructed adjacent to the road. Two years later, Caltrans removed the barrier because the barrier was buried in drifts of unstable sand, and caused road maintenance and operational problems.

In 1989, two different beach access scenarios were considered and reviewed. One scenario proposed beach access from a bluff-top parking area north of the beach. The second scenario proposed beach access from a parking area south of the beach in an old railroad cut. In the 1989 EIR, both scenarios were considered unmitigatable significant adverse impacts. The first scenario created an adverse visual impact from the "scenic highway" Highway One. The second scenario would significantly impact a diverse and mature stand of coastal scrub and rare plant habitat for purple-flowered piperia. As a result of these unavoidable adverse impacts, neither plan was adopted.

Due to the proximity of the Highway One to Scott Creek Beach, human access must be addressed. The Scott Creek Beach Access Enhancement Plan is the synthesis of these previous proposals whereby all unmitigatable aspects have been eliminated from the plan. In 1992, prior to the discovery and return of snowy plover, the Scott Creek Beach Access Enhancement Plan was adopted by the County Board of Supervisors. Currently this plan, in its entirety, is undergoing a second environmental review in which impacts to snowy plover will be assessed.

No Project Option

Seventy percent (70%) of the funding for the Scott Creek Beach Access Enhancement Project is provided by the Federal Transportation Enhancement Act (TEA). Funding for this project was approved on a competitive basis specifically for highway landscaping and beautification. Dune restoration is the key criteria for this funding source, and the key element to the project's success. Should the U. S. Fish and Wildlife Service deny the County permission to restore the Scott Creek Beach dune system, and thereby modify one acre of existing plover nesting habitat, as proposed with mitigation measures, the County will lose the funding for this project. If the County loses the \$290,000 federal (TEA) funding for this project, the project will be abandoned unless other funding sources are obtained, which is highly unlikely given the fiscal constraints of today's economy and the precedence set should the U. S. Fish and Wildlife Service deny the permit for this project. In the meantime, the County will be unable to manage or control beach access. All-terrain vehicles will continue to access the beach illegally, continuing the degradation of dune and plover nesting habitat.

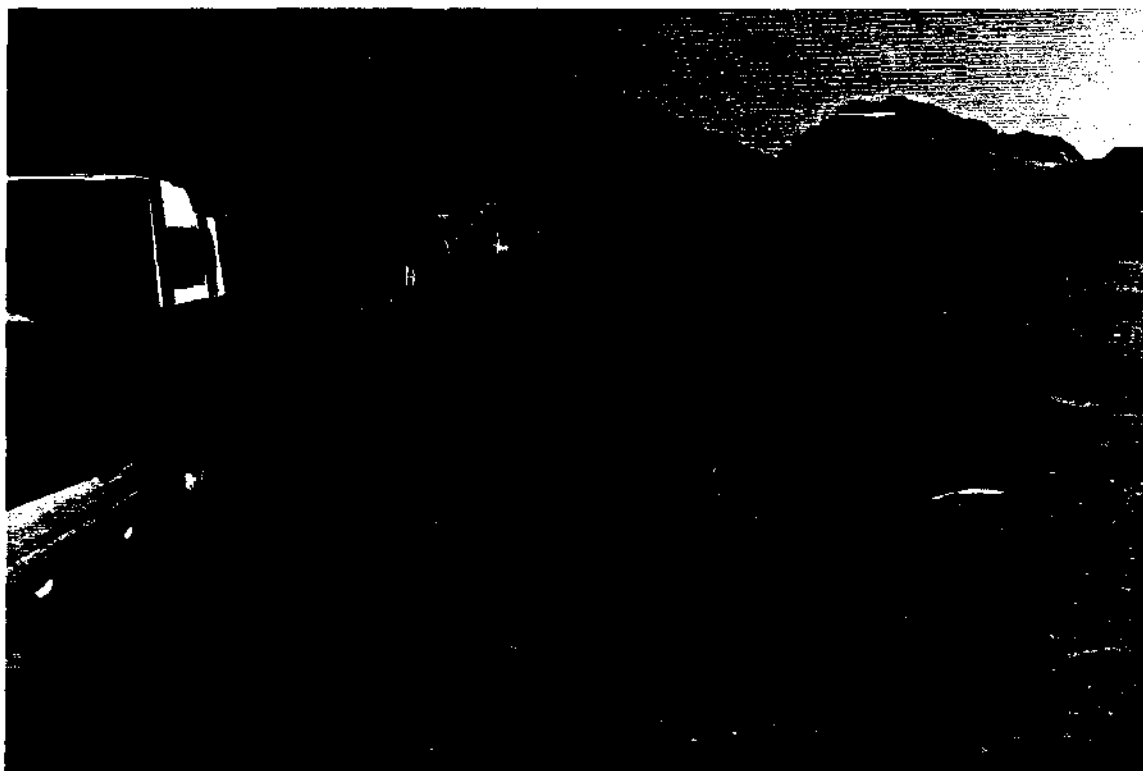


Photo: Staff

Scott Creek Beach Impacts

**NORTH COAST BEACHES
PHASE ONE**

APPENDIX A

SCOTT CREEK BEACH

DRAFT

SITE SPECIFIC

MANAGEMENT PLAN



PREPARED BY:

**THE COUNTY OF SANTA CRUZ
PARKS, OPEN SPACE & CULTURAL SERVICES DEPARTMENT
IN CONJUNCTION WITH
STEVEN SUTHERLAND AND ASSOCIATES,
SUNSET COAST NURSERY, AND THE
NORTH COAST BEACHES ADVISORY COMMITTEE**

JULY, 1995

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APPENDIX A) FEDERAL FISH AND WILDLIFE SERVICE PERMIT

SCOTT CREEK BEACH SITE SPECIFIC MANAGEMENT PLAN

INTRODUCTION

On March 12, 1993, the County of Santa Cruz Board of Supervisors adopted a System-wide Management Plan for the north coast beaches. The goal of the System-wide Management Plan was to coordinate a comprehensive management approach to the eight north coast beaches proposed for access or other improvements in the North Coast Beaches Master Plan. Since each beach is uniquely different, the System-wide Management Plan ensures that site specific plans will be compatible and complementary to the management operations overseen by the County Parks, Open Spaces and Cultural Services Department.

It is the intent of this Site Specific Management Plan to guide the management presence of Scott Creek Beach in compliance with the broad objectives of the North Coast Beaches Master Plan:

- ✓ Promote public safety by minimizing traffic related hazards, and reducing undesirable/criminal behavior.
- ✓ Maintaining the existing scenic character and perpetuate the environmental quality of the natural and cultural resources, particularly wildlife habitat and coastal vegetation.
- ✓ Provide the facilities needed to help meet current and future recreation demands without exceeding the existing low intensity use levels.
- ✓ Promote a clean, enjoyable and well-managed recreational environment by providing sanitary/garbage collection services and facilities.
- ✓ Provide appropriate interpretive facilities for safety, educational and recreational purposes.

The North Coast Beaches Master Plan is the response to the absence of management and lack of fundamental facilities for beach visitors. The northern coast of Santa Cruz County is the last stretch of shoreline between the cities of Santa Cruz and San Francisco where beach access is unmanaged. Unfortunately, the recreation experience along this stretch is often spoiled by hazardous, inadequate and unsightly conditions.

The management concerns for all the north coast beaches addressed in the North Coast Beaches Master Plan can be grouped into three categories: Public Safety and Enforcement, Maintenance Operations, Natural Resource Management (Protection, Preservation and Restoration). To implement the intent of the System-wide North Coast Beaches Management Plan, Site Management Plans would address all three elements.

a) Public Safety and Enforcement

This element would address enforcement of applicable laws, rules, regulations and ordinances, citation issuance for violations, routine patrol of sites (including actual beaches), emergency response, seasonal parking fee collection, site opening/closing and regular site safety inspections.

b) Maintenance Operations

This element would address equipment maintenance and repair (signage, trash/recycle containers, parking fee collection boxes, etc.), routine trash, litter and recycled material pickup, restroom cleanup, septic tank pumping, maintenance and repair, routine maintenance of grounds (shrubs, plants, weed control, etc.), responsibility for major maintenance program of equipment replacement, facility renovation, etc.

c) Natural Resources Management (Protection, Preservation and Restoration)

This element would address ensuring continued public access through management of landowner agreements and contract/lease easement renewals, coordination of public information program (i.e., vista and trail interpretive signage and displays, brochures, interpretive activities/events, etc.), regular inspection of trails, beach, wetlands, dunes, etc. for signs of environmental degradation and coordination of corrective actions seasonally or as necessary, and coordination of Adopt-A-Beach and other similar volunteer efforts.



Photo: Harry Bedford

County Staff and Volunteer Protecting a Snowy Plover Nest

EXISTING CHARACTER

Scott Creek Beach is unique to Santa Cruz's north coast in that it is one of only two beaches immediately adjacent to Highway One. The main beach is approximately ½ mile long and can be easily surveyed from the road. The close proximity to the highway makes Scott Creek Beach a particularly desirable destination for all types of beach user groups. However, due to the beach's orientation and exposure to the natural elements, such as wind and surf, Scott Creek Beach is a particularly popular beach for the more active recreational activities; it is for these reasons that the primary user groups of this beach tend to be sail-boarders, surfers, kite flyers and hang gliders. On a rare sunny day with little wind, beach activities will also include sunbathing, picnicking and parties. Despite turbulent water and windy conditions, on weekends and holidays Scott Creek Beach is used to the extent that shoulder parking allows. Several parking configurations have been considered for this beach; however, none resolved all the issues. To that end, improvements proposed for Scott Creek Beach encourage the use of alternative transportation.

PROPOSED IMPROVEMENTS

The improvements proposed for Scott Creek Beach will be a boardwalk across the dune with a small vista point and appropriate interpretive information. Parking will be addressed by providing alternative transportation improvements, such as institutionalizing a bus stop and providing bike parking; additionally, the shoulder which is currently too narrow for safe parking will be widened and stabilized. A major component to the improvements at Scott Creek Beach is the restoration of the existing sand dune. Approximately 1½ acres of dune will be stabilized and restored by removing exotic plantings and the remains of the oil pump station, and reestablishing native plantings. In addition, approximately two acres of snowy plover breeding and foraging habitat will be set aside and managed as a small plover refuge. Finally, a post and cable barrier will be placed parallel to the highway, prohibiting access of off-road vehicles; foot traffic through sensitive areas will be discouraged by clearly delineating those areas with barriers and signage.

PUBLIC SAFETY AND LAW ENFORCEMENT

The primary public safety and law enforcement issues at Scott Creek Beach are generally associated with the lack of fundamental facilities coupled with the relatively intense seasonal visitation. Other than off-road vehicle use and traffic violations, the criminal behavior tends to result from ignorance and lack of facilities. The primary undesirable behaviors at Scott Creek Beach include, but are not limited to, the following: parking and traffic violations; late night parties; camping; vandalism; beach fires; human excrement; off-road vehicles; creating erosion; glass; disturbing sensitive areas; pets; litter; and cliff diving. The solutions identified to reduce and possibly eliminate this human behavior are:

- ✓ Enforcing traffic violations along Highway One adjacent to Scott Creek Beach. Scott Creek Beach has the highest traffic accident rate of all the north coast beaches because of congested traffic and limited parking. In addition to the road and shoulder improvement proposed in the Scott Creek Beach Enhancement Plan, traffic controls and warning signals, such as double yellow lines and reduced speed limits, have been suggested to Caltrans for their consideration.
- ✓ The elimination of off-road vehicle use of the beach. Off-road vehicles have destroyed much of the vegetation on the beach, creating erosion and sensitive habitat destruction. Off-road vehicles are prohibited on all Santa Cruz County beaches.
- ✓ Protecting endangered species and sensitive habitat. Scott Creek Beach is a nesting and roosting habitat to at least one shore bird species which is federally-listed as threatened. On the dunes there is habitat for several plant species of special concern.
- ✓ Enforcement of the County Public Health and Safety Ordinances. No open fires; no camping; no glass bottles; no littering; and, no pets. Because Scott Creek Beach is a year-round home to the snowy plover, which is federally-listed as threatened, pets must be prohibited at this beach.
- ✓ Response to emergency calls. The rugged coast of all of Northern California poses threats to unsuspecting visitors.

The responsibility of the above Safety and Law Enforcement issues will be carried out by one or more of the five following agencies. It should also be noted that public safety and law enforcement response to problems at Scott Creek Beach can often be delayed and difficult to facilitate due to the large service area and over-committed resources.

- ✓ The California Highway Patrol (CHP) will be responsible for citing the traffic and parking violations within the State right-of-way, which includes the paved roadway of Highway One and approximately 25 feet on either side of the existing paved roadway.

- ✓ The County Sheriff's Office will augment the CHP patrol. Additionally, the Sheriff's Office will be responsible for enforcing all posted County Ordinances at the beach, including Ordinances posted within the State right-of-way. The Sheriff's Office will also augment the responses to reported emergency calls.
- ✓ The California Division of Forestry and Fire Protection (CDF) units of the Davenport and Bonny Doon Fire Teams will respond to emergency response calls to the best of their abilities and capabilities.
- ✓ The County Parks, Open Space and Cultural Services Department (POSCS) will ensure the posting of appropriate County Ordinances, as well as warnings of the hazardous marine conditions. POSCS will provide and maintain an emergency response telephone linked to the County's 911 dispatcher. POSCS will be responsible for thorough annual safety inspections, as well as routine maintenance safeguards. POSCS will be responsible for posting and delineating sensitive areas. During peak season use, POSCS will also use its authority to enforce parking regulations at Scott Creek Beach and other specified "beach parking areas" along Highway One. Finally, when funding is available, POSCS will contract with a security company or the Sheriff's Office to augment the law enforcement patrols and the emergency response efforts during peak season use, until such time that a POSCS Ranger program can assume these responsibilities.

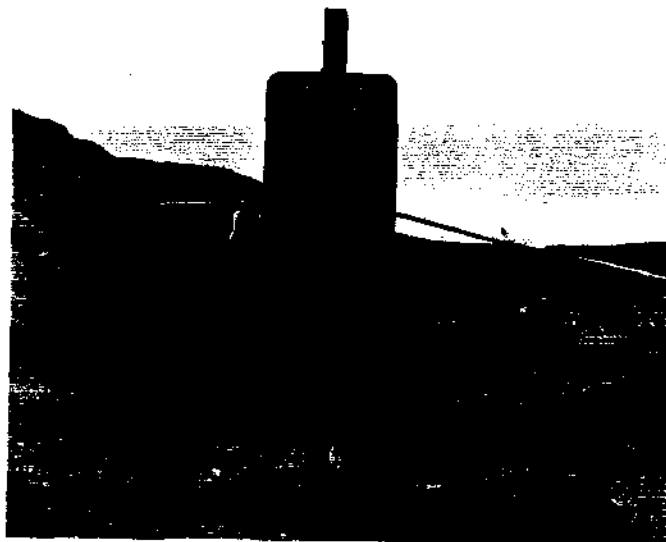


Photo: Harry Bedford
Sensitive Habitat Delineation

MAINTENANCE OPERATIONS

The Scott Creek Beach Access Enhancement Plan is designed to be as low-maintenance as possible. However, California State Parks staff have indicated that it is their experience Coastal Access Improvement Projects such as this, generally, receive an increase in vandalism immediately after implementation. With a commitment to maintaining the new improvements, the vandalism soon subsides and more desirable visitors become the norm. POSCS intends to combat this initial vandalism with a tightened maintenance presence for the first three months of the project's life. It is the intent of the Department to visit the site daily on weekends and holidays and every two days during the week during this initial three-month period. As the vandalism subsides, POSCS staff will begin a routine maintenance schedule of twice per week. Should vandalism for some reason increase at a later date, the maintenance presence must correspondingly increase.

The dune restoration, a key element to this project, will be maintained by a contracted restoration maintenance service. Because of the significance of this contract, performance criteria and references will be required of this specialized maintenance service company. Only a reputable company with experience in restoration work will be contracted.

The maintenance contract begins immediately after construction of the Scott Creek Beach Enhancement Plan is complete. This contract then extends for three years. However, during the snowy plover breeding season (March - September), dune restoration maintenance will be limited to maintaining the perimeter fencing. In general, the maintenance contract will consist of the following: irrigation, weed control, plant replacement and facility protection. The monitoring of the dune restoration is covered in detail in the Natural Resource Management section of this document and pertains to the on-going sustainability of this project.

Irrigation:

Plant material will require irrigation during the first year only. The maintenance contractor shall expect to provide trucked water a maximum of once every two weeks from September through March, when winter rainfall is insufficient. The dune monitor or County representative will determine when irrigation is required. Under no condition should plant material be irrigated between the months of April and August. Apply water with a sprinkling system designed to avoid erosion. The amount of water applied shall be sufficient to penetrate the soil a depth of 8 inches one hour after application.

Weed Control:

The area within the limit of work will require weed control over the course of the three-year maintenance contract; however, weed control shall not take place during the snowy plover breeding season (March - September). The contractor must be able to identify and eliminate the following plant species considered weeds: ice plant (all species: *Carpobrotus/Delospermum*), rip gutt grass (*Bromus diandrus*), pampas

grass (*Cortaderia seloana*), fountain grass (*Pennisetum* species), broom (all species: *Cytissus* species), veldt grass (*Ehrharta calcyna*), mustard (*Brassica* species) and Holland dune grass (*Ammophila arenaria*). As the native coastal strand community becomes established and the dune is stabilized, other non-native species may appear; these species must also be identified and eradicated per the request of the dune monitor or County representative.

The contractor shall eradicate non-native plant species with "Rodeo" herbicide applied with a wick-type applicator, a spreader sticker and a magenta marker dye. Herbicide concentration shall be per manufacturer's recommendation. Herbicide shall only be applied after September and before March when the 24-hour weather forecast predicts dry and windless weather. It is acceptable to apply herbicides on foggy days. Under no circumstances should herbicides be applied to native dune vegetation.

Areas to remain void of vegetation within the program area shall be maintained as such by manually removing native dune vegetation and chemically eradicating non-native weeds. However, prior to removing native planting anywhere in the program area, contractor shall consult with dune monitor or County representative. In an effort to stabilize shifting sand, the dune monitor or County representative will determine where or if it is necessary to remove native dune vegetation. All vegetative management must take place between September and March.

Plant Replacement:

Plant cells which did not survive the initial planting must be replaced during the first and second year of the three-year establishment period. The replacement of plant material shall only take place between the months of November and January. Irrigation of replacement plants shall be as stated for initial plantings. If plant failure exceeds 20 percent, the maintenance period shall be extended by one year for newly planted species.

The quantities and species ratios of plant replacement are subject to change during the plant replacement. The dune monitor shall determine these changes based on the success and failures of the initial plantings. In other words, the project may be more successful if larger quantities of pioneering species are planted in particularly problematic areas.

Before planting, plants in containers shall be placed as indicated on planting plan. The dune monitor or County representative shall check the location of all replacement plants in the field and will indicate exact position before actual planting operations proceed. Fill excavated hole for plants with water and allow to percolate out before planting plants. Planting hole shall be twice the width of the container and as deep. Place asmacote 14-14-14 controlled release fertilizer in bottom of planting hole per manufacturer's recommendation. Set plant in hole and backfill. Crown of plant shall be flush with finished grade. Flush the plant with water.

Facility Protection:

Critical to the success of this dune stabilization project are the devices installed to protect the plantings during the establishment period. It is therefore imperative that the contractor repair immediately any damages to such protective devices during the entire three-year maintenance contract.

The protective devices proposed in the plans and specifications are as follows: flexible barrier fencing shall be maintained around all plantings. These barriers are required to minimize human impact in sensitive areas. Signage will be required to help enforce sensitive conditions.

Straw plugs shall be replaced in spacing ratios necessary to eliminate wind erosion. Straw plugs are the only erosion control device allowed on the dune unless a particularly problematic area develops, at which time a snow fence may be used temporarily until the reasons for the problem are determined by the dune monitor or County representative. It should be noted that if a snow fence is required temporarily, it must be maintained on a monthly basis. All erosion control devices implemented during the snowy plover breeding season (March - September) must be coordinated with the County representative or dune monitor in an effort to minimize disturbance of breeding birds.

Minor grading may be required along the gravel shoulder to ensure proper storm runoff. If water erosion occurs on the dune, straw bales should be placed in spacing necessary to eliminate water erosion. After the reasons for such erosion are determined, corrective grading should take place immediately.

A County representative will administer this contract. Throughout the three-year term of this contract, selected maintenance staff shall familiarize themselves with the maintenance operation of this restoration maintenance contract. A County representative will be responsible for coordinating efforts between the dune and snowy plover breeding habitat monitors, the maintenance contract, and all the various enforcement agencies operating on the north coast.

Upon expiration of the three-year maintenance contract, maintenance staff will assume the responsibility of restoration maintenance. At the end of the establishment period, it is assumed that the dune maintenance will consist primarily of repairing and replacing fences, signs, or parking barriers; additionally, a County representative will provide ongoing staff for dune restoration and snowy plover breeding habitat monitoring.

A second contract starting immediately and going on indefinitely will be a contract with a vault toilet pumping service. The 1,000-gallon holding tank proposed for Scott Creek Beach shall be pumped on an as-needed basis or a minimum of three times per year.

For the life of the project, maintenance staff will be responsible for cleaning and maintaining toilet facilities and picking up trash twice per week. The bi-weekly schedule may change as more facilities

are encumbered on the north coast. The County's ultimate goal is to provide a daily presence on the north coast of Santa Cruz County during peak user months in the form of maintenance staff, park rangers, interpretive programs, or docents.

Finally, a maintenance agreement must be negotiated with Caltrans for all improvements within the State right-of-way. The County will be responsible for negotiating this agreement, as well as for maintaining our portions of the agreement. (To be attached as an Appendix when negotiated.)

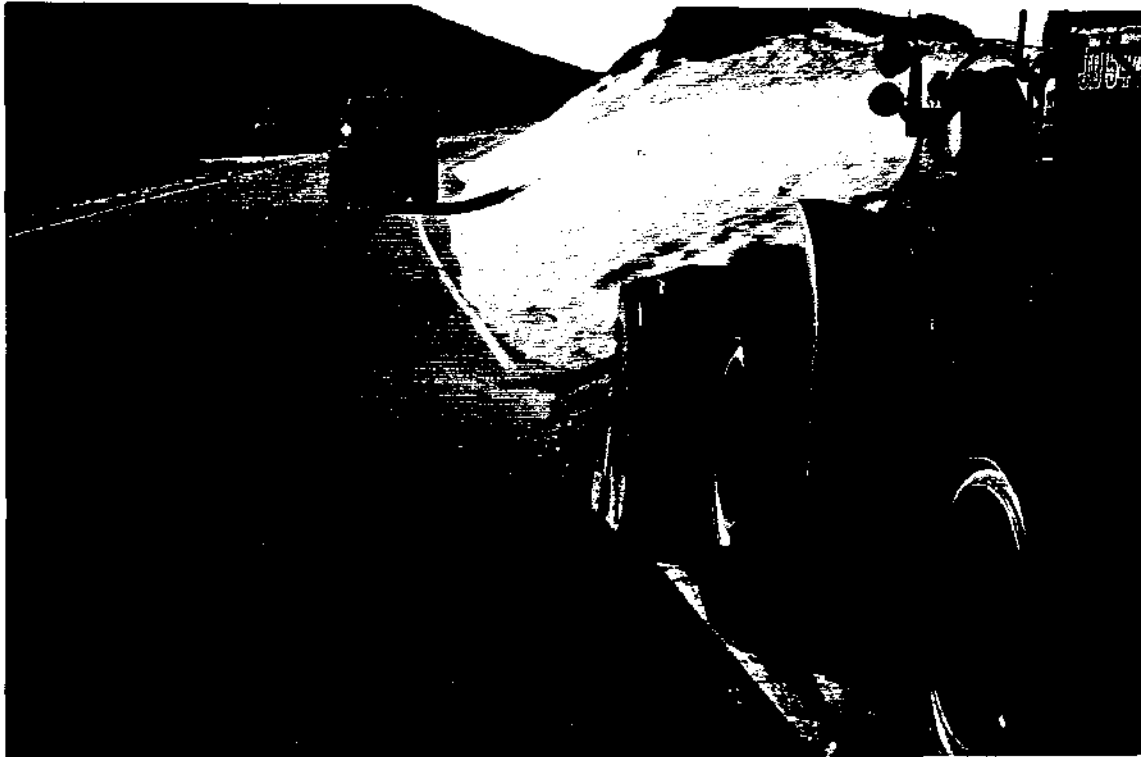


Photo: Tony Goddard

Caltrans Removing Sand

NATURAL RESOURCE MANAGEMENT

In an effort to ensure resource protection and public access at Scott Creek Beach, the County proposes to coordinate a system of public information, dune restoration, threatened species protection, and access improvements. The current condition of Scott Creek Beach is the result of decades of misused natural resources and unmanaged human access. The off-road vehicles and heavy foot traffic pose significant threats to the sensitive habitat and species in the area. A boardwalk is proposed to provide access across the dune and fenced exclosures will be placed around vulnerable snowy plover nests during the breeding season. Clearly delineated public access boundaries coupled with interpretive information will help reinforce the stated objectives of the North Coast Beaches Master Plan.

Access Improvements:

Improvements have been proposed at Scott Creek Beach to minimize traffic congestion and safety problems associated with parking on narrow or non-existing shoulders. Indirectly, shoulder improvements protect the natural resources of the area by reducing erosion caused by highway runoff. Access improvements which more directly protect the natural resources of the area are a boardwalk across the dune, a small observation deck and a restroom. The natural resources protection depends greatly on implementing all access improvements; otherwise, visitors will continue to trample the dune looking for privacy, a view or merely access across the dune to the shore. One of the key solutions to many of the problems at Scott Creek Beach is educating the public about the resource and then clearly defining the boundaries of that resource. This will be accomplished by fencing the sensitive areas and providing appropriate information regarding these areas.

Recreational Access:

Management of existing and future recreational use of Scott Creek Beach's natural resources shall be consistent with County Codes and local policy. Should recreational use of natural resources be allowable with mitigation, such recreational activities must bear the cost of that mitigation (to the extent that the impact on the natural resource of such recreational activity can be determined, directly or indirectly). An environmental evaluation of all recreational activities proposed within sensitive habitats will be necessary to determine the extent of environmental impacts and mitigation of such impact.

Public Information:

The public information programs proposed for Scott Creek Beach will be presented in several different formats. Interpretive signs regarding the snowy plover and dune restoration will be posted. These initial signs may be augmented and updated as needed. Informational displays showing seasonal information, rules regarding resource protection within the Monterey Bay National Marine Sanctuary, and/or current information will be posted in plexiglas enclosures installed onto the exterior wall of the restroom. The display enclosures have been designed to be flexible, so information can be changed or posted readily. All information posted in these enclosures must be presented to the County Department of Parks, Open Space and Cultural Services Facilities Supervisor for approval

and posting. Other public information programs will include educational workshops, such as dune restoration workshops and snowy plover protection workshops. These workshops will be designed to educate people to the subject matter being discussed as well as generate trained volunteer docents.

Endangered Species Protection:

All management methods for protecting Federal and/or State-listed threatened species are the purview of these two governments. In most cases, a Recovery Plan will be developed by one or the other of these governing bodies. The County will be responsible as a landholder to help make available the integration and implementation of the recovery plan as applicable and within staffing capabilities. The following list¹ includes species of special concern with the potential to occur in the program area; those species indicated with an asterisk are species of special concern currently found within the boundary of the Scott Creek Beach Enhancement Plan (see Key, page 12):

<u>SPECIES - COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>FEDERAL</u>	<u>STATE</u>
<u>Reptiles and Amphibians</u>			
Southwestern Pond Turtle	<i>Clemmys marmorata pallida</i>	FC2	CSC
California Horned Lizard	<i>Phrynosoma coronatum frontale</i>		CSC,W
Foothill Yellow-legged Frog	<i>Rana boylei</i>		CSC
<u>Fish</u>			
Tidewater Goby	<i>Eucyclogobius newberri</i>	FC2	CSC
Steelhead Trout	<i>Salmo gairdneri gairdneri</i>	FSS	SA
<u>Insects</u>			
San Francisco Tree Lupine Moth	<i>Grapholita edwardsiana</i>	FC2	SA
<u>Birds</u>			
Peregrine Falcon	<i>Falco peregrinus anatum</i>	FE	CE
California Brown Pelican	<i>Pelicanus occidentalis californicus</i>	FE	CE
*Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	FT	CSC
Common Loon	<i>Gavia immer</i>		CSC
Western Grebe	<i>Aechmophorus occidentalis</i>		W
Double-crested Cormorant	<i>Phalacrocorax auritus</i>		CSC
Great Blue Heron	<i>Ardea herodias</i>		SA
Great Egret	<i>Egretta thula</i>		SA
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>		SA
Harlequin Duck	<i>Histrionicus histrionicus</i>		CSC
Cooper's Hawk	<i>Accipiter cooperii</i>		CSC
Sharp-shinned Hawk	<i>Accipiter striatus</i>		CSC,W
Golden Eagle	<i>Aquila chrysaetos</i>		CSC
Osprey	<i>Pandion haliaetus</i>		CSC

¹General Plan for the North Coast Beaches Environmental Impact Report, Nichols•Berman, 1989

<u>SPECIES - COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>FEDERAL</u>	<u>STATE</u>
<i>Birds (cont.)</i>			
Northern Harrier	<i>Circus cyaneus</i>		CSC
Black-shouldered Kite	<i>Elanus caeruleus</i>		SA
California Gull	<i>Larus californicus</i>		CSC
Caspian Tern	<i>Sterna caspia</i>		W
Elegant Tern	<i>Sterna elegans</i>		CSC
Marbled Murrelet	<i>Brachyramphus marmoratus</i>		CSC
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>		CSC
Short-eared Owl	<i>Asio flammeus</i>		CSC
Long-eared Owl	<i>Asio otus</i>		CSC
Burrowing Owl	<i>Athene cunicularia</i>		CSC
Black Swift	<i>Cypseloides niger</i>		CSC
Purple Martin	<i>Progne subis</i>		CSC, W
Bank Swallow	<i>Riparia riparia</i>		CCE
Yellow Warbler	<i>Dendroica petechia brewsteri</i>		CSC
Yellow-breasted Chat	<i>Icteria virens</i>		CSC

Plants

		<u>USFWS</u>	<u>State</u>
		<u>Listing²</u>	<u>Status³</u>
Awned Bent Grass	<i>Agrostis aristiglumis</i>	Cat. 2	None
Blasdale's Bent Grass	<i>Agrostis blasdalei</i>	Cat. 2	None
*Monterey Indian Paint Brush	<i>Castilleja latifolia</i>	None	None
San Francisco Collinsia	<i>Collinsia franciscana</i>	None	None
Branching Beach Aster	<i>Corethrogyne leucophylla</i>	None	None
San Francisco Wallflower	<i>Erysimum franciscanum</i>	Cat. 2	None
Santa Cruz Microseris	<i>Microseris decipiens</i>	Cat. 2	None
Gairdner's Yampah	<i>Perideridia giardneri</i> ssp. <i>Gairdneri</i>	Cat. 2	None
Purple-flowered Piperia	<i>Piperia elongata</i> ssp. <i>michaelii</i>	None	None
Choris's Popcornflower	<i>Plagiobothrys chorisianus</i>	None	None
San Francisco Champion	<i>Silene Verecunda</i> ssp. <i>verecunda</i>	Cat. 2	None
Mt. Diablo Cottonweed	<i>Stylocline amphibola</i>	None	None

KEY:

FE	Listed as Endangered by the Federal Government
FT	Listed as Threatened by the Federal Government
FSS	Federal (BLM and USFS) Sensitive Species
FC2	Category 2 Candidate for Federal Listing
CE	Listed as Endangered in the State of California
CSC	California Department of Fish and Game Species of special Concern
W	Watch list. Location information for these taxa is not computerized, The NDDB is currently collecting distribution information fur maintains manual files only.
SA	On Special Animals List of California Department of Fish and Game Natural Diversity Data Base
CCE	California Candidate for listing as Endangered

²Cat. 2: Under review, insufficient information

³Section 1904, California Fish and Game Code (January 1987 listing) (CDFG 1987)

The snowy plover is the only one of the above species that occurs within the boundaries of the Scott Creek Beach Access Enhancement Plan (at the time of developing this plan) and the only species that the Santa Cruz County Parks, Open Space and Cultural Services Department (POSCS) actively manages the protection of. POSCS staff shall continue to be trained and permitted to protect the snowy plover in accordance with Permit #PRT-70263 issued by the U. S. Fish and Wildlife Services Regional Director, Region 1, 911 N.E. 11th Avenue, Portland, Oregon, 97232 (see Appendix). This permit applies to all Santa Cruz County beaches. Specific to the Scott Creek Beach plover population, a Habitat Conservation Plan (HCP) will be developed and submitted to the U.S. Fish and Wildlife Service (U.S.F.W.S.) Upon approval, the snowy plover HCP will be attached to this document as an Appendix. Also attached are the snowy plover exclosure protocol and permit.

Monitoring of the snowy plover population is currently provided by the Point Reyes Bird Observatory (PRBO) and their volunteer staff. Since PRBO is currently monitoring the plover population at Scott Creek Beach and has continued to monitor Scott Creek Beach since 1992, it is not necessary for additional monitoring support at this time.

In the event that PRBO staff and/or PRBO volunteers are unable to continue to monitor the nesting success of the Scott Creek Beach plover population, and it is determined by the U.S.F.W.S. that additional monitoring is necessary to evaluate the success of the natural resource protection efforts of the Scott Creek Beach Access Enhancement Plan, the County in cooperation with the U.S.F.W.S. will develop a limited snowy plover monitoring plan, specifically to evaluate the implementation and success of the Scott Creek Beach snowy plover Habitat Conservation Plan (HCP). The County recognizes that to determine the success and implementation of the aforementioned HCP, the reproductive success and the known causes of failures must be evaluated by the U.S.F.W.S. over a period of years determined by the U.S.F.W.S.

In addition to the above, the County will provide the U.S.F.W.S. an annual status report which will include photo documentation of the snowy plover breeding habitat. This status report will be prepared in early April of every year and will briefly describe the management efforts employed the previous breeding season, as well as the extent and condition of the breeding habitat for the forthcoming breeding season.

Dune Restoration:

The two primary goals of the Scott Creek Beach Dune Restoration are: first, to stabilize the sand dune; and second, to establish a self-sustaining native plant community. The unmanaged human-related use of Scott Creek Beach has adversely affected the dune ecology over the last century, resulting in a bare, unstable dune which is migrating at an alarming rate onto the highway, creating safety and operational concerns. Furthermore, sand is being blown across the highway, infiltrating a brackish water lagoon, home to several species of special status including, but not limited to, the following:

<u>SPECIES - COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>FEDERAL</u>	<u>STATE</u>
<u>Reptiles and Amphibians</u>			
Southwestern Pond Turtle	<i>Clemmys marmorata pallida</i>	FC2	CSC
<u>Fish</u>			
Tidewater Goby	<i>Eucyclogobius newberri</i>	FC2	CSC
Steelhead Trout	<i>Salmo gairdneri gairdneri</i>	FSS	SA

The second goal, and the key to accomplishing the first, is the reintroduction of a self-sustaining native coastal plant community. The management efforts proposed throughout this document were developed to insure the greatest degree of success for this objective.

The dune restoration should be effectively accomplished by following the Dune Monitoring Guidelines outlined herein. The Guidelines were specifically designed for flexibility. Different situations will require different responses, and it will be important to adapt these responses based upon information presented in this Guideline and obtained through observation. The County will be responsible for monitoring the dune restoration at Scott Creek Beach for the life of the project.

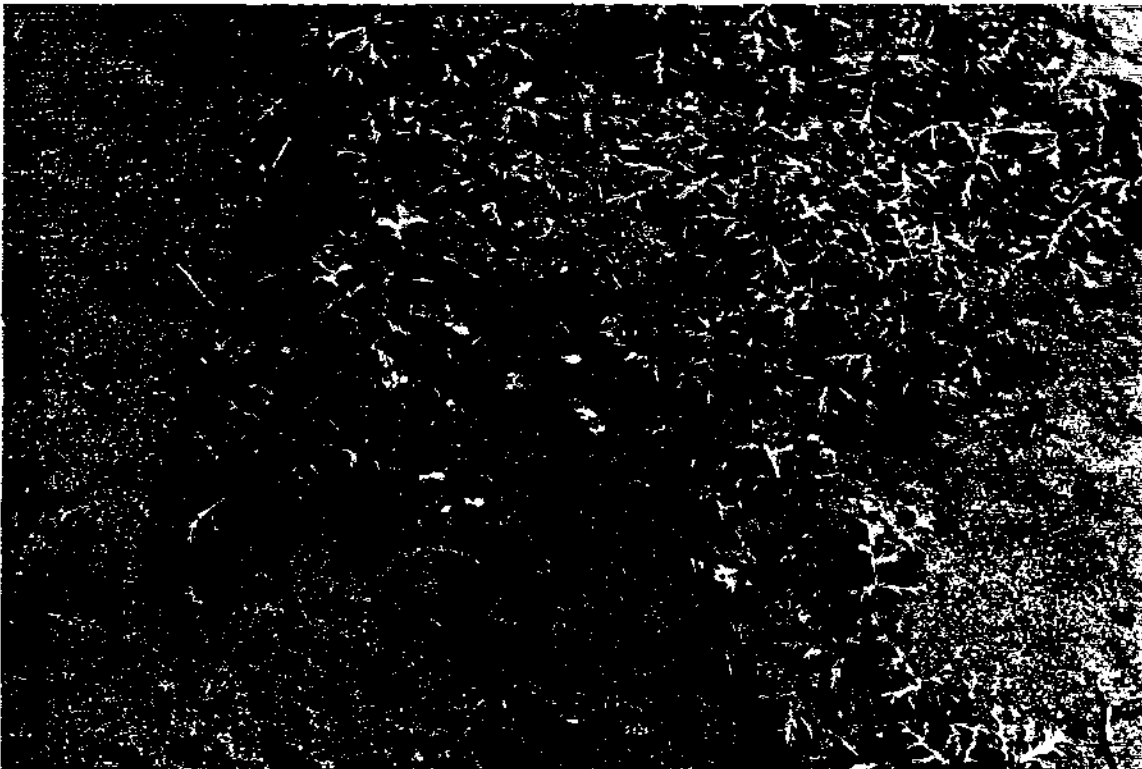


Photo: Staff

Snowy Plover Nest Among Dune Vegetation

DUNE RESTORATION MONITORING GUIDELINES

For reasons described in the Introduction, one of the key goals of the Scott Creek Beach Enhancement Project is to reintroduce a self-sustaining native coastal plant community. This should be effectively accomplished by planting appropriate material at the proper time, maintaining when necessary and limiting human use to maximize plant establishment. With these objectives, management will be most effective if it is designed to be responsive to observed needs.

Monitoring is the only way to evaluate whether the project is meeting our stated goals. Without meaningfully monitoring, management may be haphazard at best. With thorough observation, management can be site- and species-specific. Our objectives are to reestablish a functioning, natural plant community and allow human use of the area. This will not be a simple task. It will require a commitment, dedication, education and a means to evaluate progress.

The Monitoring Guidelines outlined in this document allow for expedient responses to situations in the first years of plant establishment and should lead to a self-sustaining plant community within five years. Management of human-related impacts should continue over the long term to avoid degradation of the area for the expected life of the project, approximately 50 years. Humans are not a natural element in a stable dune ecology, and management of their influence is described throughout this document.

It is important while we implement the Scott Creek Beach Dune Restoration Project not to create a native plant garden which will require constant, high-input maintenance and care. Irrigation must be restricted to the initial plant establishment period (first year). In addition to irrigation, maintenance will consist of the removal of exotic weeds which are invasive and competitive, the replacement of failed plantings and the repair of damaged protective devices. Maintenance above all must be flexible, adapting to observed needs and linked to the Monitoring Program. Refer to the Maintenance Operation section of this document.

Monitoring Program Goals:

- ✓ The Monitor must recognize plant health, plant needs and environmental impacts. A reporting mechanism which yields the immediate management response is necessary, and a consistent schedule is advised.
- ✓ Above all, the Monitoring Program should be designed to be: accurate and precise; repeatable; long term (2 - 5 years); and efficient.
- ✓ Monitoring should be for establishment of plants (flowering, seed production, seedling germination, and survivability).
- ✓ Monitoring should reflect general health and overall condition of restored plant community: population dynamics (distribution, diversity, and succession).
- ✓ Monitoring should report and aid in the request for maintenance (irrigation, weed elimination, and repair of protective devices).
- ✓ Monitoring should be sensitive to human impacts: vandalism, littering and over-use of planted areas.

Monitoring Schedule:

Once weekly for the first month after plant installation. (Plant installation must take place between November 1 and January 30.)

During and immediately after each storm in the first year after planting.

Once monthly for the first year following planting.

Quarterly from the second to the fifth year (August, November, February, May). Monitoring is desirable during and after major storm events throughout the five year establishment period.

Success will be linked to monitoring and responsive management over the initial 1 to 5-year establishment period. By the end of the first five years, there should be well-established vegetative areas which allow human use. Heavy human use, however, will result in a noticeable impact. In this regard, positive management should be stressed over punitive management in order to increase public awareness and cooperation.

Monitoring Program:

The monitoring program outlined here is only a suggested framework. A detailed monitoring program can (should) be designed to address specific questions of the person(s) who want to evaluate the results. (In this case, the Santa Cruz County Department of Parks, Open Space and Cultural Services, and any other interested parties, may want to formulate questions which could be answered by monitoring.)

In the section on Monitoring Program Goals, the following statement appears:

"A monitoring program should be designed to be:

- 1) accurate and precise,
- 2) repeatable,
- 3) long term (20 yrs.), and
- 4) efficient."

In order to make these requirements clear, some explanation is necessary.

Data to be collected should be relevant to some desired result; for example, if an increase in growth is desired, the measurement of growth should accurately reflect the true growth of the plant. (Determined species by species relative to growth characteristics.) Sampling design, placement of sample plots and sample size will contribute to accuracy of measurements. The measurements should be precise so that data values gathered will relate to previously (and future) gathered data. This accuracy and precision will give understandable results which will relate to each other over several monitoring periods.

Repeatable monitoring techniques are a necessity. If personnel changes from season to season or year to year, monitoring techniques must be straightforward and well-explained in order to be of real value. This means sampling sites must be able to be relocated, the same data can be recollected, and the same interpretive techniques can be utilized.

Long-term monitoring needs to be employed (5 - 20 years) in order to capture a true picture of what is happening in the restored community. Recruitment, survivorship, succession, response of the system to disturbances and other cumulative processes need to be observed in a continuing time frame (in order to relate to "success"). Some performance criteria should be selected to evaluate relative degrees of success (failure) over time.

Finally, monitoring must be efficient to be useful. If monitoring is too expensive or too complex, it will not be continued. (Likewise, if monitoring is linked to one individual's graduate program, it is likely to be short-lived.) Monitoring must answer questions of direct value and it must be low-cost (or inexpensive enough) to be continued.

Monitoring Stages:

There are generally three stages to a monitoring program:

- 1) Monitoring reintroduction of plants or seeds (at the time of and following installation)
- 2) Monitor recruitment ("new" plants, seedlings)
- 3) Monitoring the condition of the developing community

Each stage has different attributes to monitor (measure).

Monitoring the reintroduction of plants or seeds is the easiest of the three stages. Measurement of individual plants, their growth and reproduction is desirable. Over time, these measurements move into the second stage of recruitment, but initially, the measurements give an indication of vegetative vigor (demographic status) and reproductive vigor (fecundity). The first stage measures more than presence or absence. (We will begin with a known species composition, percent of each species, number of individuals, known densities and a percent cover estimate. We should expect to see some changes over several years. Tracking changes will let us know how the structure of the "community" is changing, and whether it is stabilizing.)

Measurements should have the following attributes: use a sensitive measure of performance (which may be species-specific, e.g. girth, height); use an easy to collect measurement (e.g. height versus number of leaves). Generally, it will be a good idea to collect more measurements at the beginning of the monitoring, until it is determined which measurements are the most efficient. Measurements collected can then be adjusted over time. (It is better to begin asking more questions and collecting more data, than to try to guess exactly which questions will give the "best" answers. Questions can be dropped as relevant data is collected and evaluated. It is difficult to try to reconstruct data to answer questions which have not been asked.)

Recruitment is generally defined as seedling establishment with survival compared over time. Recruitment measurements will vary with the type of plant and its characteristics of growth and seed dispersal. To measure "successful" recruitment, a notion of "safe sites" will be needed, i.e. an area which will remain the least disturbed by outside factors. Recruitment "success" will be determined by percent establishment of new seedlings and percent reaching maturity, using appropriate measurements of growth for each species (determined by Stage 1 monitoring techniques).

Recruitment may also refer to the appearance of "new" species as relates to the concept of community succession. This type of recruitment may depend on human efforts to provide additional "new" (not in original planting, but appropriate and local) species to allow diverse community development.

The third stage of monitoring involves the recognition of a functioning community (or in this case, how will the community function given the parameters of human use?). Natural processes (climatic or geological events - wind, storm, creek changes, earthquake, flood, tsunami) which may occur must be taken into account. In this stage, monitoring is key to giving information which will allow for flexible, responsive management.

The design of this stage of monitoring is necessarily more complex, as different sampling techniques are needed to monitor different community characteristics. Most notably, different

size sample plots may need to be used in determining characteristics (such as species composition, density and recruitment) based on the sizes of the species being measured. Small plants may be best measured in one square meter quadrants (Camissonia cheiranthifolia, beach primrose). Larger or more "mobile" rhizomatous species (Eymus mollis, Pacific dune grass) may require larger quadrants (five meters by five meters) to obtain reasonable measurements.

There will be a need to "test" which sample unit yields the most useful information the most effectively. In determining the best size of sample unit to be used, different size and shape plots should be tested against one another. (Since we are starting with imposed quantities in the monitoring area, we might want to try sample size determinations in a natural community as a reference index. [It's similar to determining which size sieve to use to separate soil particles: too large and everything flows through; too small, and everything stays in the sieve. In both cases, you have gained little information of value except that of inappropriate sieve size.]

To begin determining what plot size and shape provide the best information, use a 50 meter by 50 meter area and accurately count numbers of individuals of species. Then, use different size plots to determine which size (smaller) plots give the most accurate measurements. Suggested size plots to test are: 1m x 1m, 2m x 2m, 3m x 3m, 5m x 5m, 1m x 50m, 2m x 10m, 3m x 10m, etc. Persons experienced in monitoring techniques indicate that long and narrow or large and square plots seem to be most accurate. Typically, the 5m x 5m plot seems the most accurate; however, for different species the 3m x 3m plot is the most suitable. Overall, the 1m x 1m plot seems to be the least accurate.

Researchers feel it is best to use fixed transects rather than fixed quadrants for monitoring. Because of the well-defined limits and other management constraints of the project, we may not have the luxury of random quadrants along fixed transects. Suggestions for sample sites for monitoring follow.

Permanent photo points should be established. Photos taken from these points at each monitoring trip will give meaningful information easily. Height (1.5 m) and direction of the camera (compass degrees) should be specified and duplicated as closely as possible. Suggested sites have been identified on the Plan (refer to pages 10 and 11). (Film and processing is inexpensive compared to monitoring time; photo points can be dropped if determined to be unnecessary. Photos yield very valuable information.)

Sample plots (of the size determined by testing) should be established in each area. ([Areas 1 - 5, different species composition.] We will know the initial species composition, number of individuals, density and can estimate percent cover.) There should be at least two sites in each area:

- 1) at the initial perimeter of the initial planting to monitor the (a) expansion or contraction of original extent of planting, and (b) sand accumulation or depletion (spot elevations may be desirable);
- 2) at the "interior" of planted area to monitor/compare undisturbed or less disturbed areas with perimeter areas (which are more likely to suffer from disturbance).

In the larger areas, more than two sample sites may be desired. Two or three perimeter sites on windward and/or leeward sides of the planted area, as well as two or three interior sites, might be selected.

Measuring the success of the reintroduction of native vegetation to Scott Creek Beach will be linked to monitoring its establishment as a self-sustaining native plant community. As monitoring continues, it plays a critical role in evaluating the reintroduced plants, evaluating recruitment of new individuals and community development. Monitoring provides an important mechanism for evaluating performance criteria and determining management response and decisions.

(Many thanks go to Robert Sutter of The Nature Conservancy for his thoughts and inspiration in the development of this portion of the presentation.)

MAINTENANCE WORKSHEET

DATE: _____ TIME: _____ TECHNICIAN: _____

WEATHER	RAIN	WIND	CONDITION OF PLANTS	CONDITION OF AREA
Overcast	Light	None		
Fog	Moderate	Light		
Rain	Heavy	Moderate		
Clear		Strong		
Weeds: _____ Condition of Barriers: _____ Signs: _____				

ACTION TAKEN:

COMMENTS:

MONITORING DATA SHEET

DATE: _____ TIME: _____ TECHNICIAN: _____

WEATHER	RAIN	WIND	CONDITION OF PLANTS	CONDITION OF AREA	SNOWY PLOVER	
					APPROX. #	APPROX. LOCATION
Overcast	Light	None			/	Tideline No. / So.
Fog	Moderate	Light			/	Fore Dune No. / So.
Rain	Heavy	Moderate			/	Dune Back No. / So.
Clear		Strong			/	Beach Back No. / So.

PHOTO POINTS: Describe condition/photo - see map of area (to be determined)	
1	2
3	4
5	6
7	8
9	10
EVIDENCE OF DISTURBANCE:	
TYPE AND EXTENT:	
ACTION TAKEN:	

COMMENTS: (Specific Species Status)

Transects: See attached monitoring plans of area (to be determined)

FOR EACH QUADRANT ALONG EACH TRANSECT RECORD:

QUADRANT SIZE:

% COVER ESTIMATE:

OF MATURE / ESTABLISHED PLANTS (BY SPECIES):

OF SEEDLINGS (BY SPECIES):

MEASURE OF GROWTH CHARACTERISTICS (BY SPECIES):

(A FEW EXAMPLES FOLLOW)

Eymus mollis Pacific dune grass

HEIGHT:

CALIPER OF MAIN STEMS:

EVIDENCE OF "RUNNERS" / NEW SHOOTS

Species which are low-growing / ground cover type:

Camissonia cheiranthifolia beach primrose

Abronia latifolia yellow sand verbena

Fragaria chiloensis beach strawberry

Ambrosia chamissonis beach bur

DIAMETER (SPREAD) OF PLANT:

OF FLOWERS (<10, >20, >50, >100, etc.):

OF FRUIT:

(OR %) SEED PRODUCED:



DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

California Gnatcatcher
Western Snowy Plover
AMENDMENT # 10

J-201
(10 86)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

U.S. FISH & WILDLIFE SERVICE
REG, DIR., REGION 1
911 N.E. 11TH AVENUE
PORTLAND OR 97232

2. AUTHORITY-STATUTES

16 USC 1539 (a)
16 USC 1533 (d)
REGULATIONS (Attached)

50 CFR 17.22
50 CFR 17.32

3. NUMBER

PRT-702631

4. RENEWABLE

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

4/ 1/93

7. EXPIRES

1/31/98

8. NAME AND TITLE OF PRINCIPAL OFFICER (If # 1 is a business)

REGIONAL DIRECTOR
MARVIN I. PIENERT

9. TYPE OF PERMIT

ENDANGERED/THREATENED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

REGION ONE

11. CONDITIONS AND AUTHORIZATIONS:

- A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.
- B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.
- C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the "Special Conditions for Marine Mammals and Native Endangered and Threatened Species" (copy attached).

E. Authorized to take listed species identified on the attached sheets for scientific purposes or the enhancement of propagation or survival for approved recovery activities and as conditioned below.

F. Prior to conducting any activities not excluded under the Service's NEPA categorical exclusions (516 DM 6, Appendix I) the permittee must ensure that all NEPA requirements have been satisfied.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY ...Continued...

12. REPORTING REQUIREMENTS

FIRST ANNUAL REPORT DUE 1/31/94
SUBMIT COMPLETE REPORT TO: OMA, 4401 N. FAIRFAX DR., ROOM 432
ARLINGTON, VA 22203, BY 1/31 FOLLOWING EA YR PERMIT IS IN EFFECT

ISSUED BY

Diana Stuber
ORIGINAL

TITLE

CHIEF, BRANCH OF PERMITS, OMA

DATE

4/ 1/93

- G. Permittee must monitor each action taken under this permit to assure that the limits specified in each subpermit are not exceeded and that research efforts and handling of individual species is not duplicated by overlapping research.
- H. This permit is conditioned upon all applicable policy and guidance.
- I. Subpermittee's must be designated in writing.
- J. Subpermittee's must be required to hold and transport living specimens captured in the wild according to the provisions and procedures outlined in professionally established protocols for the handling and transport of the affected species.
- K. Procedures will be instituted to ensure that disease transmission does not occur during tissue sampling or other invasive procedures and that such activities are only performed by persons skilled in the techniques of handling the affected species.
- L. The permittee must ensure that all appropriate Section 7 consultation requirements have been completed prior to initiating any otherwise permitted activities and that no action taken under this permit will violate subsection 7(a)(2) of the U.S. Endangered Species Act.

Terms and Conditions for
PRBOCA

1. The conditions set forth in this permit supersede any previous permits issued by the U.S. Fish and Wildlife Service (Service).
2. The location of the permitted activities is coastal beaches of Santa Cruz, Monterey, and Santa Barbara Counties (including Santa Rosa Island).
3. Individuals designated to capture and handle western snowy plovers and erect exclosures pursuant to this permit are:

Carleton Eyster, Douglas George, Gary Page, Bernadette Ramer, Lynne Stenzel, Jane Warriner, John Warriner, and Katherine Wilson.

No other individuals are authorized to independently capture or handle western snowy plovers under this permit.

The individual designated to erect exclosures only pursuant to this permit is:

Lacy Holtzworth with Santa Cruz County.

Individuals assisting the permittees in deployment of exclosures must receive training by Service authorized instructors in the design, construction, and set up of exclosures prior to deployment in the field (see attached list). The permittees must supervise assistants at all times during exclosure set up.

4. The number of western snowy plovers allowed to be accidentally injured or killed during trapping, handling, banding, and erection of exclosures is three birds per year. The number of eggs allowed to be damaged or destroyed is three per year. All mortalities must be reported within 3 days of occurrence.

In the event that more animals are killed or injured, or eggs damaged or destroyed, than specified above, the permittee shall follow the steps outlined in general permit condition No. 6. Verbal and written notification shall be made to the Ventura Field Office (805-644-1766) as well as the Portland Regional Office (503-231-6241).

The depository designated to receive preserved specimens is the California Academy of Sciences or the University of California, Berkeley, Museum of Vertebrate Zoology. The permittee shall supply the depository with a copy of this permit to validate that the specimens supplied to the museum were taken pursuant to a permit.

5. This permit authorizes the capture/recapture of all individual adult, pre-flight juvenile, and fledgling western snowy plovers within the geographic boundaries and time limitation specified above. The erection of exclosures around western snowy plover nests and the handling and floating of eggs are also authorized.

Individuals captured may be measured in hand, banded with Service aluminum bands and color bands, and shall be released at the capture site within 15 minutes of capture provided that safety of the individual bird is not compromised, if the following conditions are followed:

- a. Capture is by use of drop traps, walk-in traps, monofilament snare mats, or by hand, around the nest and in feeding and roosting areas away from nesting areas.
 - b. Not more than 20 minutes shall be spent in any 1-day attempting to capture an individual bird.
 - c. No more than two attempts shall be made to capture an individual during the nesting season.
 - d. Pre-flight juveniles shall not be disturbed if the ambient temperature exceeds 90 degrees Fahrenheit.
 - e. Pre-flight juveniles shall not be pursued for more than 2 minutes.
6. Handling of western snowy plovers is permitted only when required for biological surveys and other research. No other handling is permitted. No handling of western snowy plovers shall occur prior to the Services approval of the research design for which the handling is required.
 7. If exclosures are deployed as part of this permit, the permittee must use Service-approved exclosure protocols, or receive written permission from the Service to vary from these protocols. Service-approved protocols are attached.
 8. All color-marking shall be coordinated with and approved by the U.S. Fish and Wildlife Service, Division of Ecological Services, 2800 Cottage Way, Room E-1803, Sacramento, California 95825-1846 (916-978-4866), and the National Biological Survey, Bird Banding Laboratory, Patuxent Wildlife Research Center, Gabrielson Lab, 12100 Beech Forest Road, Laurel, MD 20708-0422 (301-497-5942).
 9. Where capture and handling of snowy plovers occurs within a nesting colony of the endangered California least tern, the permittee shall first obtain permission from the Services, Carlsbad Field Office at (619) 431-9440 (Los Angeles to San Diego County), Ventura Field Office at (805) 644-1766 (Ventura to Santa Cruz County), or Sacramento Field Office at (916) 978-4866 (San Mateo to Del Norte County) to coordinate activities with the individual(s) monitoring the least tern colony, so as to reduce disturbance of the nesting colony to a minimum.
 10. The authorization of this permit is dependent upon compliance with all State regulations and Permit No. 09316, the Federal Bird Marking and Salvaging Permit, issued by the National Biological Survey, Bird Banding Laboratory.
 11. At the discretion of the Service, a Service employee may inspect the facilities or accompany the permittee during any activity conducted pursuant to this permit. The permittee shall allow Service personnel

complete and immediate access to any materials and information generated as a result of this permit. Any refusal, obstruction, or hindrance of Service participation in such work shall be grounds for suspension or revocation of this permit in accordance with 50 CFR 13.27 or 50 CFR 13.28, respectively.

12. Annual reports shall be submitted to the U.S. Fish and Wildlife Service, Portland Regional Office, Ecological Services, 911 NE 11th Avenue, Portland, Oregon 97232-4181, and to the U.S. Fish and Wildlife Service, Ecological Services, Ventura Field Office, 2140 Eastman Avenue, Suite 100, Ventura, California 93003, and the Sacramento Field Office, 2800 Cottage Way, Room E-1803, Sacramento, California 95825.

Reports shall follow the format specified in general permit condition No. 8. Reports shall include, if applicable, techniques used and effectiveness of trapping, the location, number, sex, age, and breeding status, if determinable, of each banded bird. If exclosures are employed as part of this permit, the report shall include a description of the exclosure design; the number and location of exclosures and date(s) deployed and removed; the hatching and fledgling success of enclosed nests; the fate of adults within exclosures; an account of any plover mortalities associated with exclosures, and the probable cause of these mortalities. The report shall also include the number of staff hours spent and funding expended for this study.

U.S. FISH AND WILDLIFE SERVICE
EXCLOSURE PROTOCOLS FOR SNOWY PLOVER NESTS
JANUARY, 1994

The purpose of these protocols is to provide standard guidelines for permittees who have been approved to use exclosures to protect nests of the coastal population of the western snowy plover (Charadrius alexandrinus nivosus). Information presented here is based on work conducted in California and Oregon, scientific literature describing use of exclosures to protect Atlantic coast piping plovers, and personal communications with biologists protecting plovers with exclosures.

I. Determine Whether Exclosures Are Appropriate

Exclosures should be used only if nest success of plovers is low because of predation or human impacts (i.e., ORV's, horses, high public use areas). Exclosures should be used only when other less intrusive alternatives to protect nests are not appropriate, effective, or practical.

Alternatives include closing breeding areas to public use during the breeding season (March 1 through September 15) or portions thereof, if human disturbance is a limiting factor in nest success. Barriers (e.g., fences) may be used in some breeding areas (i.e., peninsulas, levees, etc.) to prevent people and/or predators from disturbing or destroying nests. These alternatives can effectively protect nests (and possibly chicks) without disclosing individual nest locations or causing disturbance to the adults.

II. Goals of Exclosure Use

Rimmer and Deblinger (1990) described their goals in designing an exclosure to protect Atlantic coast piping plovers. These goals shall be met when designing and implementing any predator exclosure program for the western snowy plover:

- A. predators should be unable to penetrate an exclosure;
- B. exclosures should allow unimpeded movements of plover adults and chicks between the nest, foraging, and roosting areas, etc.;
- C. plover breeding behavior should not be significantly disrupted.

Exclosures shall not be erected:

- A. when a nest is close to high tideline and will be flooded;
- B. if there is a potential conflict with other endangered species.

III. Exclosure Design and Construction

Presented in this section are protocols for two exclosure designs which the Service has determined to effectively deter ground and aerial predation on snowy plover nests. The design and construction of the triangular and circular exclosures are as follows:

A. The Triangular Exclosure

In central coastal California 254 triangular exclosures have been erected during the last three years (1991-1993) (Parker et al. 1992; USFWS unpubl. data; Point Reyes Bird Observatory (PRBO), unpubl. data). A total of 3 protected nests have been preyed upon by mammals (1 non-native red fox, 2 skunks) (PRBO, unpubl. data). Although Deblinger et al. (1992) made no recommendation for the style of exclosures to use, it

should be noted that triangular exclosures experienced no predation during their study. Tops should only be used on the triangular exclosure when avian predation has been documented and is a potential problem. Figure 1 shows the design of a triangular exclosure.

Exclosures shall be:

1. triangular in shape with a minimum perimeter of 22.8 m;
2. made of metal mesh fence (5x5 or 5x10 cm), 3 pre-cut sides each 7.6 m in length (5x10 cm is the minimum in red fox areas);
3. supported by at least 6 sturdy metal 154-cm fence posts;
4. have a fence height of at least 122 cm above the sand and buried 20 cm in soft earth or sand;
5. erected in under 30 minutes without tops, 45 minutes with tops;
6. erected around complete clutches (usually 3 eggs) unless accelerated predation rates warrant construction prior to the clutch completion;
7. erected by a minimum of 2 persons, 1 person must have been trained by an experienced exclosure builder;
8. colored nylon webbing along the top edge may be used to alert birds to presence of the structure and therefore avoid "bird strikes".

Methods for construction of triangular exclosures:

1. prior to construction, assign tasks to individuals to avoid confusion during set-up;
2. upon arrival at the nest site, cover the nest with a bright object (hat, rag, etc.) to shade the eggs from the sun and prevent the nest from accidentally being stepped on;
3. use a rope as a guide to simulate the perimeter of the exclosure with the nest centered within the rope outline;
4. pound six 1 cm x 244 cm steel reinforcement bars (rebar), three corners and three supports, approximately 122 cm into the ground;
5. dig a trench, at least 20 cm deep, around the perimeter (follow the guide rope);
6. carefully place the three 7.60 m long walls, made of mesh wire, into the trenches;
7. fasten the wire to the rebar posts using standard, brass hog rings, removing all slack from the wire and insuring the wire will be buried at least 20 cm;
8. bend the top 10-15 cm of wire outward at a 45 degree angle to discourage mammalian predators from climbing over the exclosure
9. refill the trenches, insuring that the wire lies flush with the sand surface, allowing plovers to move freely through the exclosure;
10. rake the area to remove footprints and level the sand;
11. upon completion, leave the area immediately.

If a top is included, tops should be:

1. made of black seiners twine (or comparable material), avoid using clear monofilament line or fish netting;
2. twine should be set in parallel rows 15 cm apart.

Methods for construction of tops:

1. prior to exclosure set-up, ready enough wood strapping (2.5 x 5 cm) to be attached to two sides of the exclosure;
2. on the wood strapping, place small hooks, used to hold the

- twine, at 15 cm intervals;
3. after completion of enclosure perimeter, attach wood strapping (2.5 cm x 5 cm) along 2 sides of the enclosure with bailing wire;
4. attach twine to hooks creating parallel rows as you move along the enclosure, ensuring the twine is taut;
5. if twine loosens, tighten it by wrapping it around the hooks.

B. The Circular Enclosure

In Oregon, a circular enclosure design with a top has proven an effective means of deterring ground and aerial predation on snowy plover nests. In one study at sites along the Oregon Coast in 1990 to 1993, 85 percent (n=66) of plover nest with enclosures hatched compared to only 15 percent (n=67) of unprotected nests (Stern 1994). The circular enclosure maximizes the distance between the edge of the enclosure and the nest. Figure 2 shows the design of a circular enclosure.

Enclosures shall be:

1. generally circular in shape with a 20.3 m perimeter;
2. made of 122 cm tall mesh fence with 5 x 5 cm mesh size;
3. supported by 8 - 154 cm tall steel posts;
4. achieve a fence height of 106.7 cm above ground with 15.2 cm buried;
5. erected in under 60 minutes, including top;
6. erected by a minimum of 2 persons, with one person previously trained by an experienced enclosure builder;
7. erected around complete clutches unless accelerated predation rates warrant construction prior to the clutch completion;
8. colored nylon webbing along the top edge may be used to alert birds to presence of the structure and therefore avoid "bird strikes".

Methods for construction of enclosures:

1. prior to arrival at the nest site wipe oil off of the 20.3 m length of metal mesh fence, connect ends to each other, making sure that no sharp points protrude at the place of joining, then roll up the fence;
2. prior to arrival at the nest site, assign tasks to individuals, and provide training and explanation to new enclosure builders;
3. upon arrival at the nest site, float the eggs to determine incubation stage, then place a cap over the eggs to protect the eggs from the sun, and to mark the location of the nest;
4. unroll fencing material so that the middle of the fence is about 10 m from the nest, and the fence ends are equidistant from the nests;
5. have each person take a fence post in hand or place it nearby;
6. have one person pick up the top half of fence, and at once lift and pull the fence to extend over and beyond the nest, then gently stand up the enclosure;
7. place the two fence posts inside the enclosure and have both persons stretch the fence slightly;

8. have one person pound in the first fence post, then assist the second person pound in the second fence post;
9. pound in remaining fence posts at equidistances, gently stretching fencing to attain desired configuration;
10. dig a 15.2 cm trench with hands or a trowel underneath the bottom of the fence, pull the fence down into the trench, then refill with sand;
11. level the sand around the enclosure with horizontal stretches of mesh;
12. pound all fence posts in further so that the tops are about 5 cm below the top of the wire;
13. upon completion, leave the area immediately.

If a top is included, it should be:

1. made of black seiners twine (or comparable material), avoid using clear monofilament line or fish netting;
2. twine should be set in parallel rows 15 cm apart.

Methods for construction of tops:

1. extend the twine across the enclosure, tying ends off on each parallel row;
2. each row should have the same degree of tightness;
3. Run one row of twine in perpendicular direction, bisecting each row at midpoint, thus providing support to the rows of twine.

III. Timing of Exclosure Set-up

Exclosures may not be erected under the following conditions:

- A. on windy (> 20 mph) or rainy days
- B. 2 hours or less before sunset
- C. less than 1.5 hours after sunrise
- D. when the air temperature exceeds 80° F
- E. during constant or steady rain.

SMLSAR 0, 'Journal{Run WPT}°D

IV. Monitoring Exclosures

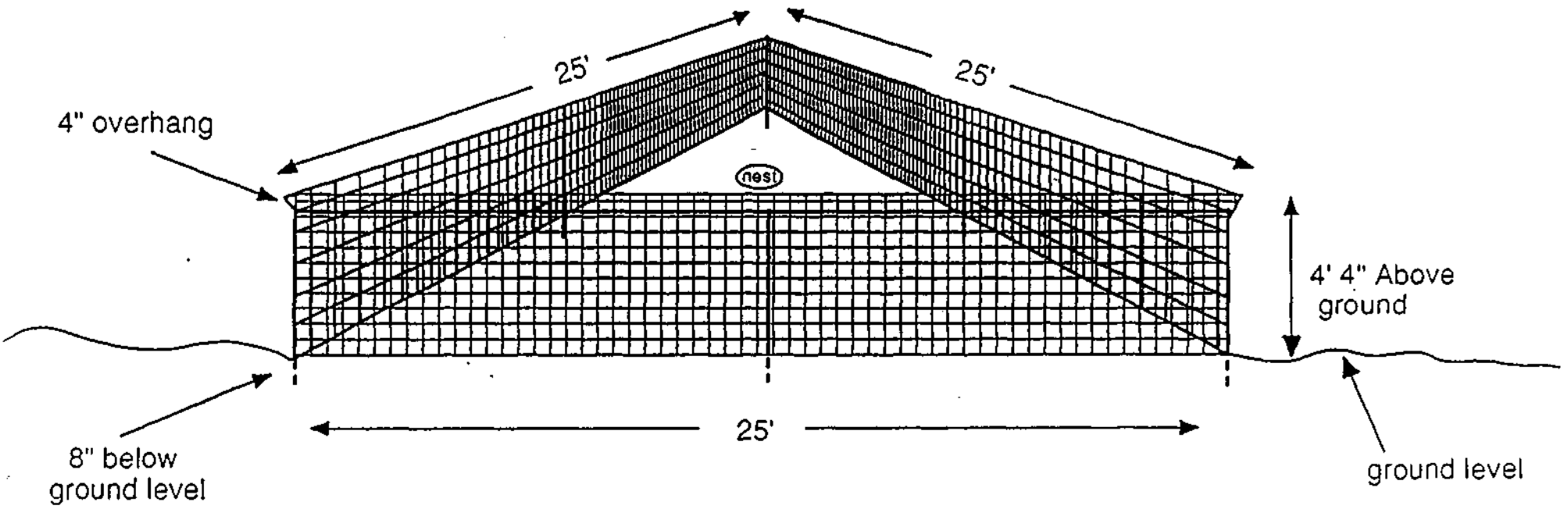
Exclosures must be monitored at least twice per week. Information gathered should include:

1. fate of the eggs
2. presence or absence of incubating bird and mate
3. status of enclosure
4. presence of predators
5. other disturbances.

LITERATURE CITED

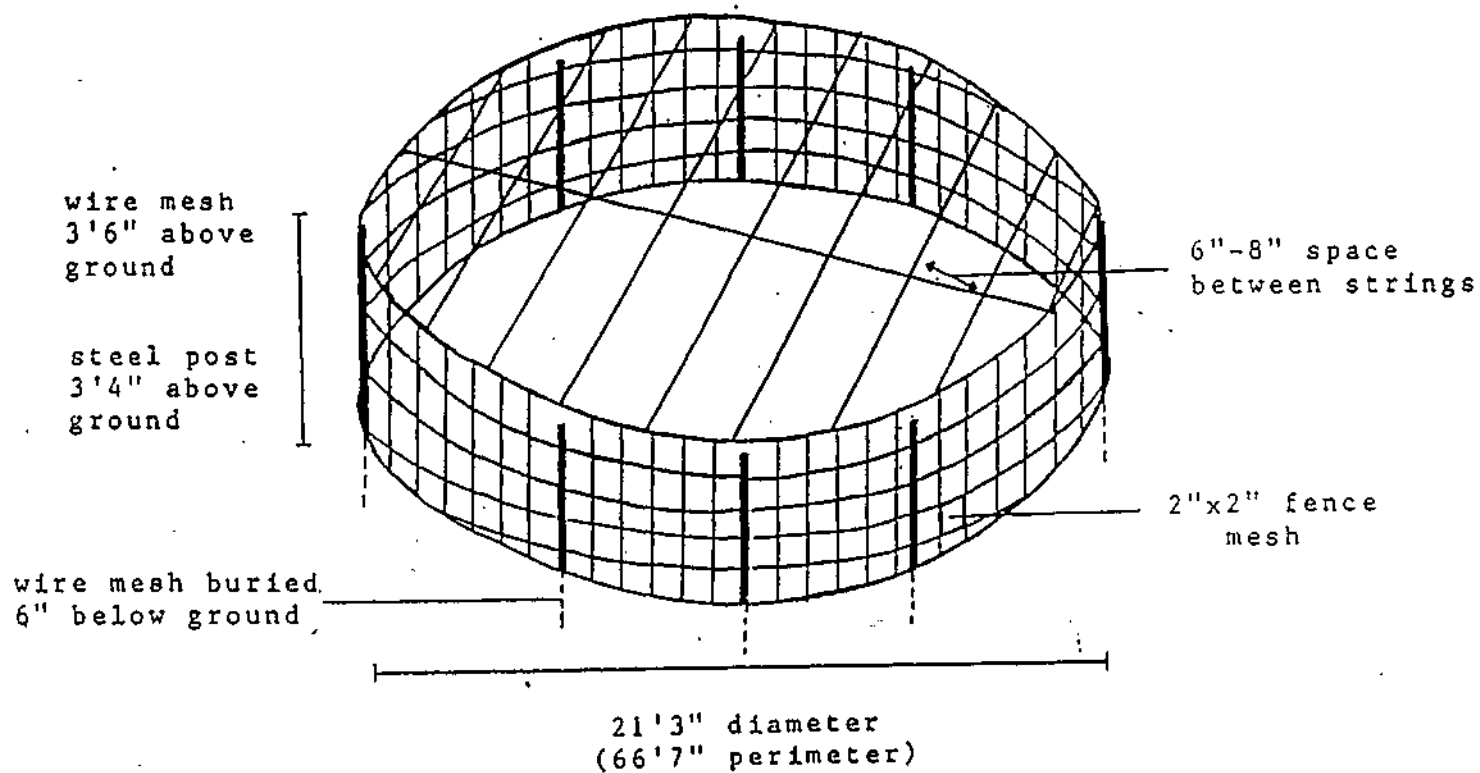
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- Stern, M. 1994. Reproductive ecology and management of snowy plovers on the Oregon coast. Paper presented at the annual meeting of the Oregon Chapter of The Wildlife Society. Sunriver, Oregon.

FIGURE 1. TRIANGULAR ENCLOSURE DESIGN



SOURCE: M. PARKER, SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE

FIGURE 2. CIRCULAR ENCLOSURE DESIGN



SOURCE: M. STERN, THE NATURE CONSERVANCY

INDIVIDUALS AUTHORIZED BY THE FISH AND WILDLIFE SERVICE AS INSTRUCTORS IN THE
CONSTRUCTION AND SET-UP OF ENCLOSURES FOR NESTING WESTERN SNOWY PLOVERS
JANUARY, 1994

California:

1. Michael Parker
San Francisco Bay National Wildlife Refuge
510-792-0222
2. Elaine Harding-Smith
San Francisco Bay National Wildlife Refuge
510-792-0222
3. Dave Dixon
California Department of Parks and Recreation
408-384-7695
4. Lacy Holtzworth
County of Santa Cruz
408-462-8321
5. Douglas George
Point Reyes Bird Observatory
415-868-1221
6. Bernadette Ramer
Point Reyes Bird Observatory
415-868-1221
7. Carleton Eyster
Point Reyes Bird Observatory
415-868-1221

Oregon:

1. Mark Stern
The Nature Conservancy
503-228-9561
2. Ginny Rosenberg
TNC Volunteer
503-621-3538
3. Bruce Casler
TNC Volunteer
503-229-5078 (w)
503-628-0780 (h)
4. Carole Hallette
TNC Volunteer
503-628-0780
5. Melissa Platt
Oregon Department of Fish and Wildlife
503-757-4186

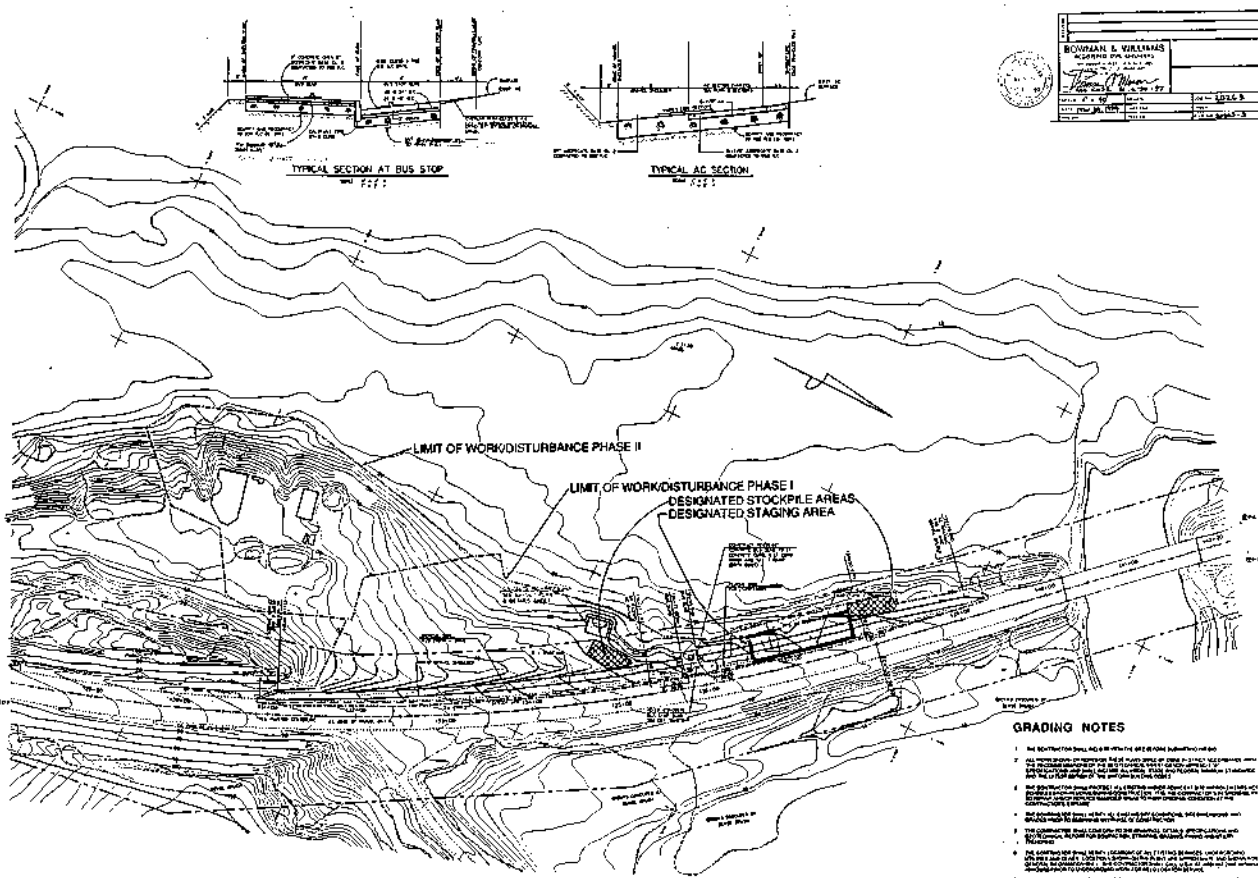
6. Dave Craig
TNC Volunteer
303-786-8742

Washington:

None

BOWMAN & WILKINS
 LANDSCAPE ARCHITECTS
 1000 S. GARDEN ST.
 ANAHEIM, CALIF. 92805
 TEL. (714) 771-1111
 FAX (714) 771-1112

SSA
 Steven Sutherland & Associates
 Landscape Architects
 1000 S. GARDEN ST.
 ANAHEIM, CALIF. 92805
 TEL. (714) 771-1111
 FAX (714) 771-1112



TYPICAL SECTION AT BUS STOP

TYPICAL AC SECTION

PLAN

SIGN NOTES

1. SIGN NOTATION SHALL BE AS SHOWN ON SHEET SIGN-1.
2. SIGN NOTATION SHALL BE AS SHOWN ON SHEET SIGN-2.
3. SIGN NOTATION SHALL BE AS SHOWN ON SHEET SIGN-3.

GRADING NOTES

1. ALL EXISTING GRADES SHALL BE AS SHOWN ON THIS PLAN UNLESS OTHERWISE NOTED.
2. ALL PROPOSED GRADES SHALL BE AS SHOWN ON THIS PLAN UNLESS OTHERWISE NOTED.
3. ALL PROPOSED GRADES SHALL BE AS SHOWN ON THIS PLAN UNLESS OTHERWISE NOTED.
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15. ALL PROPOSED GRADES SHALL BE AS SHOWN ON THIS PLAN UNLESS OTHERWISE NOTED.

NORTH COAST BEACHES PHASE ONE
North Coast Beaches
 Scott Creek

County of Santa Cruz Dept. of Parks, Open Spaces & Cultural Services

APPENDIX B

DRAWING ISSUED

DATE PLOTTED BY

SCALE

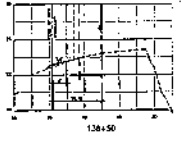
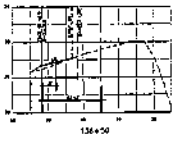
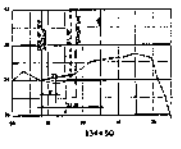
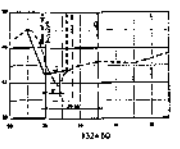
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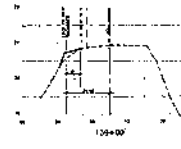
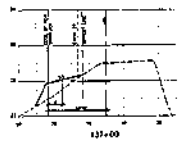
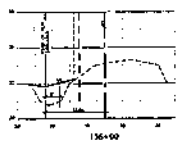
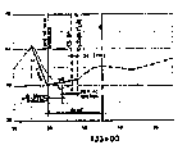
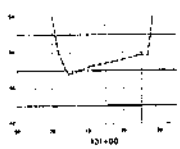
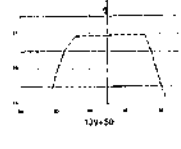
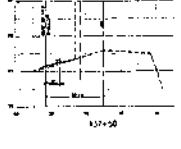
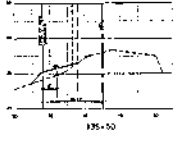
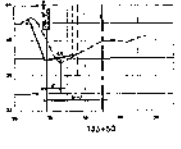
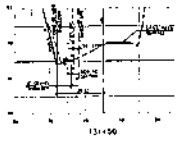
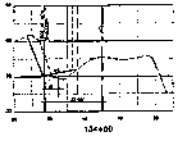
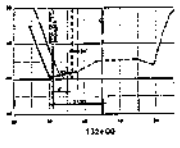
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C-1

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BOYMAN & WILLIAMS
 ARCHITECTS
 1000 S. G. ST.
 SAN ANTONIO, TEXAS 78205
 TEL. 548-1111
 FAX 548-1112



SCALE 1" = 20'

SSA
 STATE
 SUTHERLAND
 & ASSOCIATES
 LANDSCAPE
 ARCHITECTS

100 West H. Donnell
 San Antonio, TX 78205
 Tel. 548-1111
 Fax 548-1112

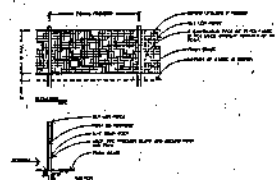
NORTH COAST BEACHES PHASE ONE
 Scott Creek Beaches
 County of Santa Cruz Dept. of Parks, Open Spaces & Cultural Services

DATE ISSUED: _____
 DATE PURPOSE BY: _____

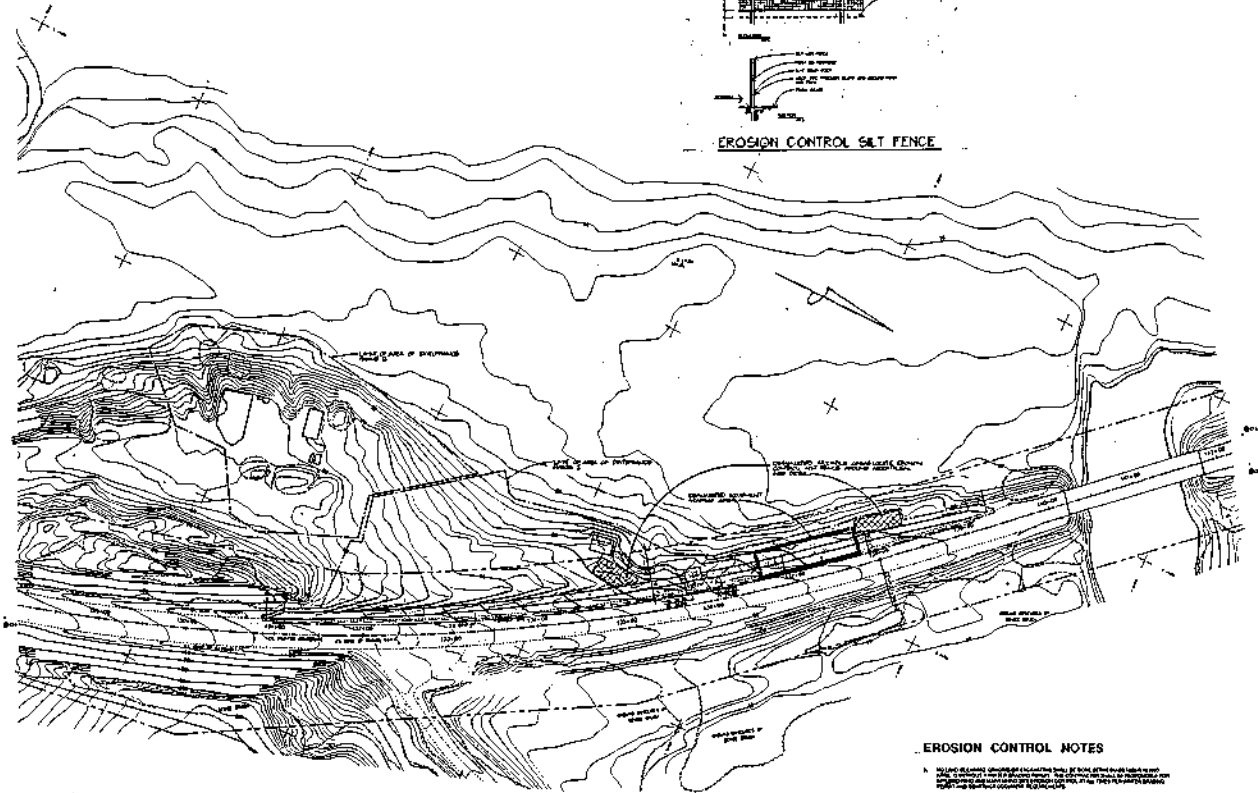
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SHEET TITLE:
 HWY 1
 Cross Sections

SHEET NUMBER:
 C-2



EROSION CONTROL SALT FENCE



PLAN
Scale: 1" = 40'

EROSION CONTROL NOTES

1. ALL EROSION CONTROL STRUCTURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING NOTES AND THE EROSION CONTROL MANUAL, 1987, PUBLISHED BY THE U.S. ARMY CORPS OF ENGINEERS, WASHINGTON, D.C.
2. ALL EROSION CONTROL STRUCTURES SHALL BE CONSTRUCTED WITH A MINIMUM OF 10% OVERLAP AND SHALL BE MAINTAINED AT ALL TIMES.
3. ALL EROSION CONTROL STRUCTURES SHALL BE CONSTRUCTED WITH A MINIMUM OF 10% OVERLAP AND SHALL BE MAINTAINED AT ALL TIMES.
4. ALL EROSION CONTROL STRUCTURES SHALL BE CONSTRUCTED WITH A MINIMUM OF 10% OVERLAP AND SHALL BE MAINTAINED AT ALL TIMES.
5. ALL EROSION CONTROL STRUCTURES SHALL BE CONSTRUCTED WITH A MINIMUM OF 10% OVERLAP AND SHALL BE MAINTAINED AT ALL TIMES.

SSA
Sutton
Sutherland
& Associates
Landscape
Architects

3600 S. 1st Ave. #2
Scottsdale, AZ 85260
(602) 948-1000

Co. License No. 10000
Lic. 10000

NORTH COAST BEACHES PHASE ONE
Scott Creek Beaches
County of Santa Cruz Dept. of Parks, Open Spaces & Cultural Services

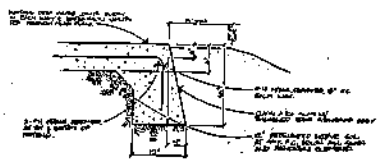
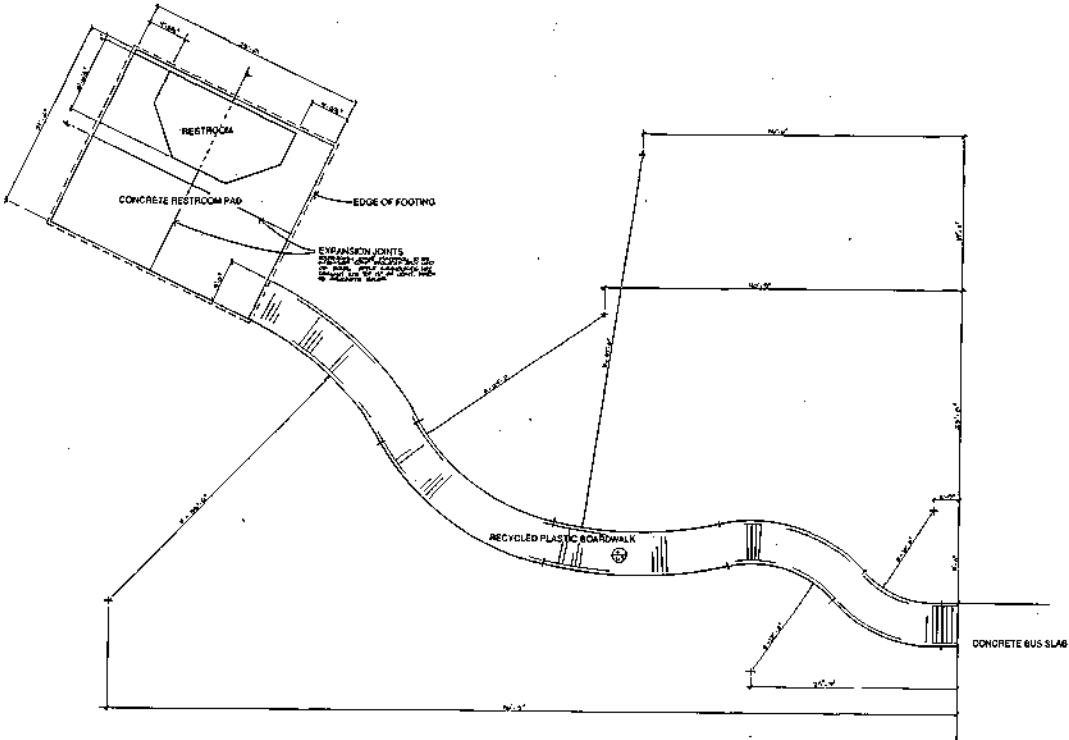
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10/1/88	FOR PERMITTING
10/1/88	FOR PERMITTING
10/1/88	FOR PERMITTING

FIELD
Scale: 1" = 40'

SHEET TITLE
Erosion
Control Plan

SHEET NUMBER
L-4

1
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Concrete Restroom Pad Detail N.T.S.

Boardwalk Layout Plan

SSA
Steven
Sutherland
& Associates
Landscape
Architects

100 South Third Street
San Diego, CA 92101
619-594-8800
California Architect
No. 49888

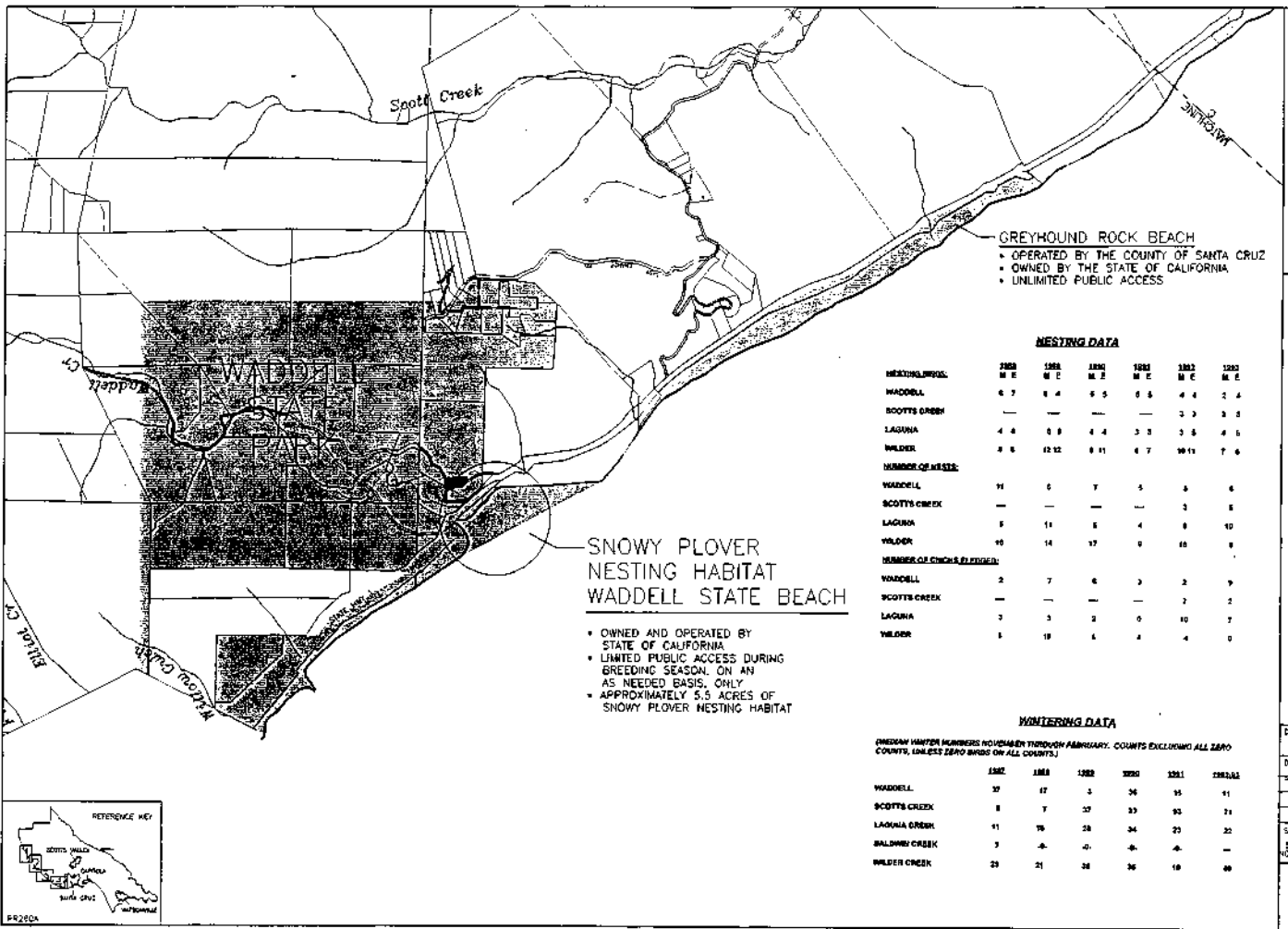
NORTH COAST BEACHES PHASE ONE
Scott Creek Beach
County of Santa Cruz Dept. of Parks, Open Space & Cultural Services

DATE	ISSUED	BY	PURPOSE
11/10/11			

SCALE:
Scale: 1/4" = 1' 0"

SHEET TITLE:
BOARDWALK
LAYOUT PLAN

SHEET NUMBER:
L-5



GREYHOUND ROCK BEACH
 • OPERATED BY THE COUNTY OF SANTA CRUZ
 • OWNED BY THE STATE OF CALIFORNIA
 • UNLIMITED PUBLIC ACCESS

**SNOWY PLOVER
NESTING HABITAT
WADDELL STATE BEACH**

- OWNED AND OPERATED BY STATE OF CALIFORNIA
- LIMITED PUBLIC ACCESS DURING BREEDING SEASON, ON AN AS NEEDED BASIS, ONLY
- APPROXIMATELY 5.5 ACRES OF SNOWY PLOVER NESTING HABITAT

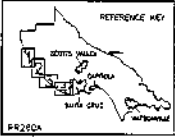
NESTING DATA

NESTING AREA	1988 M E	1989 M E	1990 M E	1991 M E	1992 M E	1993 M E
WADDELL	6.7	8.4	6.5	0.5	4.4	2.4
SCOTT'S CREEK	—	—	—	—	3.3	3.3
LAGUNA	4.4	0.9	4.4	3.3	3.5	4.5
WILDER	8.8	13.12	9.11	4.7	10.11	7.6
NUMBER OF NESTS:						
WADDELL	11	0	7	5	3	6
SCOTT'S CREEK	—	—	—	—	3	6
LAGUNA	5	11	5	4	8	10
WILDER	10	14	17	9	18	8
NUMBER OF CHICKS BY STAGE:						
WADDELL	2	7	6	3	2	9
SCOTT'S CREEK	—	—	—	—	2	2
LAGUNA	3	3	2	0	10	7
WILDER	1	18	6	4	4	0

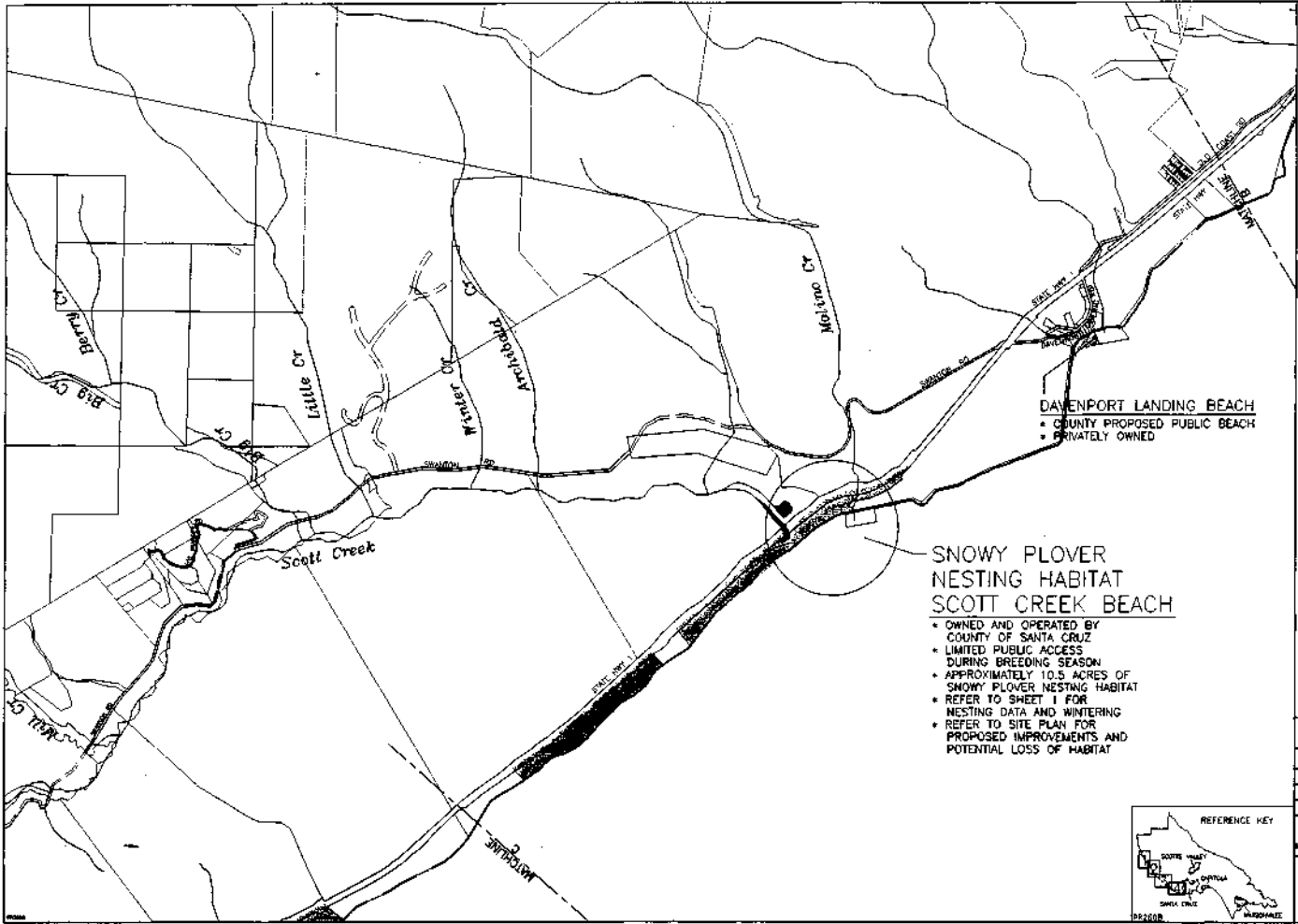
WINTERING DATA

(MEDIAN WINTER NUMBERS NOVEMBER THROUGH FEBRUARY. COUNTS EXCLUDING ALL ZERO COUNTS, UNLESS ZERO BIRDS ON ALL COUNTS.)

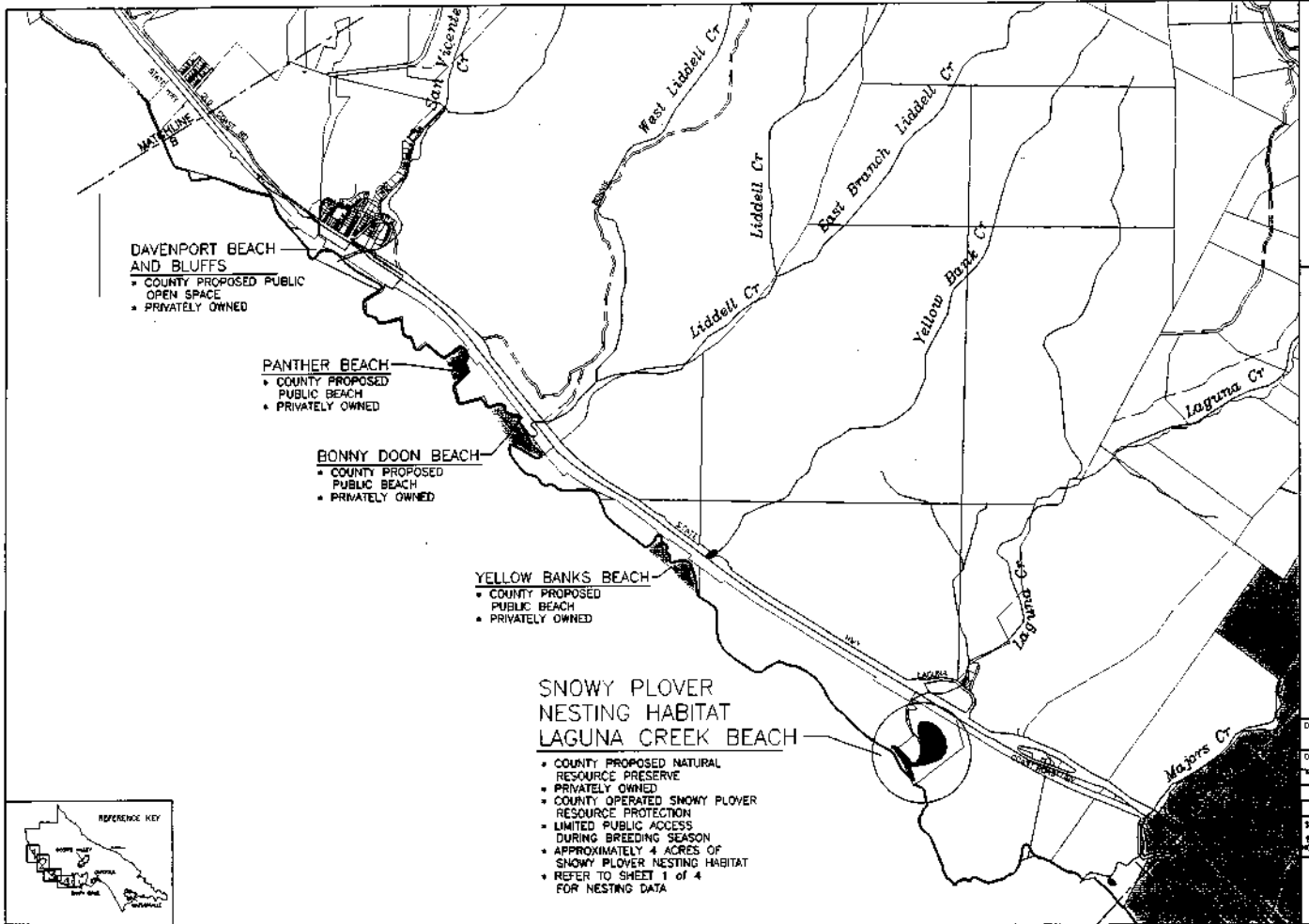
	1982	1983	1989	1990	1991	1992,93
WADDELL	37	47	5	36	55	11
SCOTT'S CREEK	8	7	37	33	93	71
LAGUNA CREEK	11	19	28	24	23	22
BALDWIN CREEK	7	4	4	4	4	—
WILDER CREEK	23	21	28	26	18	49

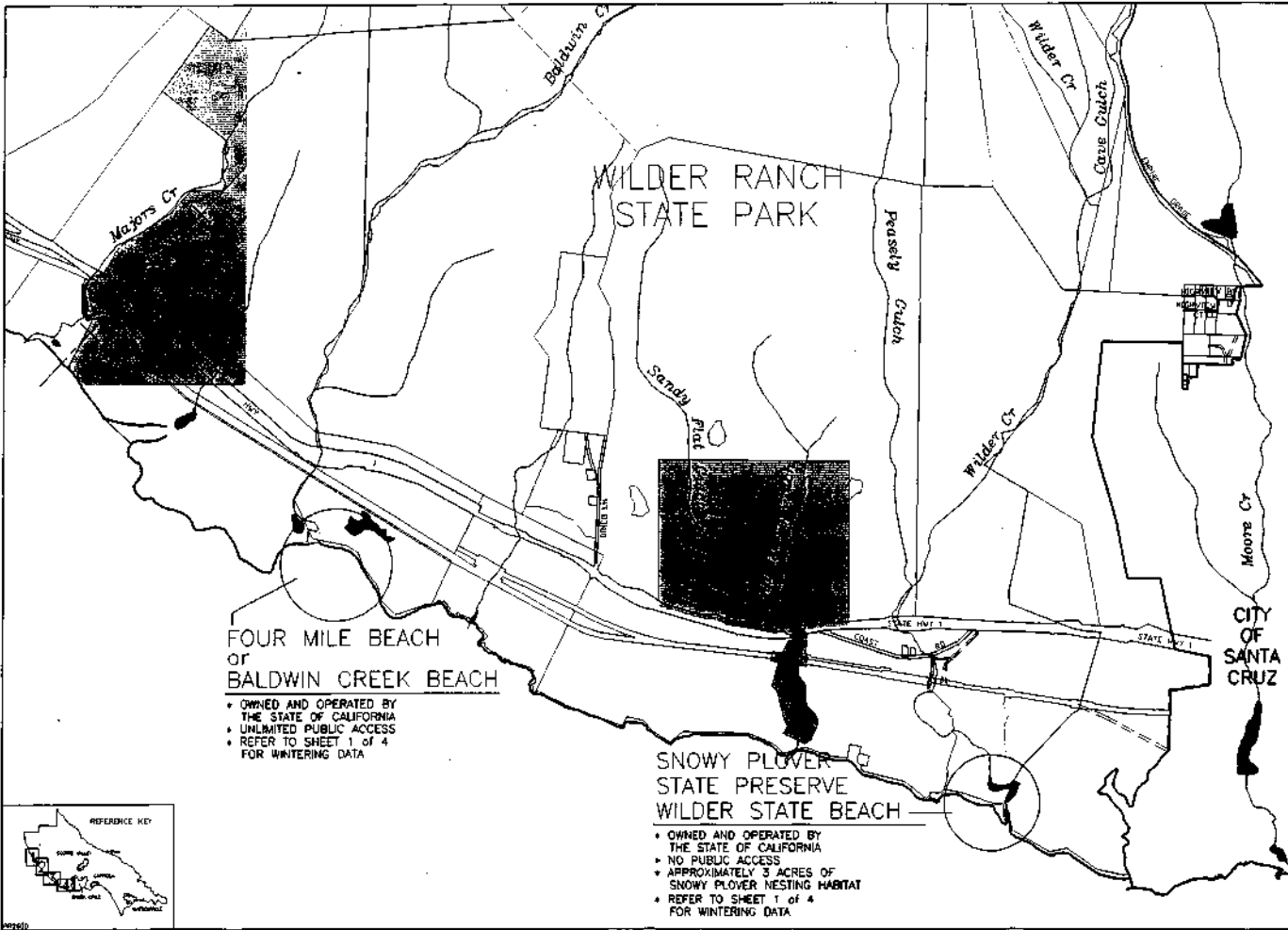


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 DRAWING NUMBER BY
 DATE
 SCALE
 NOT TO SCALE



GRAPHIC PREPARED BY	
GRAPHIC REVIEWED BY	
DATE	
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2 of 4	



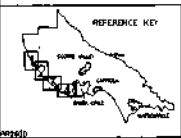


FOUR MILE BEACH
OR
BALDWIN CREEK BEACH

- OWNED AND OPERATED BY THE STATE OF CALIFORNIA
- UNLIMITED PUBLIC ACCESS
- REFER TO SHEET 1 of 4 FOR WINTERING DATA

SNOWY PLOVER
STATE PRESERVE
WILDER STATE BEACH

- OWNED AND OPERATED BY THE STATE OF CALIFORNIA
- NO PUBLIC ACCESS
- APPROXIMATELY 3 ACRES OF SNOWY PLOVER NESTING HABITAT
- REFER TO SHEET 1 of 4 FOR WINTERING DATA



DRAWING PREPARED BY	
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DATE	
SCALE	
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APPENDIX D

NESTING OF SNOWY PLOVERS
AT SCOTT CREEK BEACH, SANTA CRUZ COUNTY, CALIFORNIA IN 1994

Douglas E. George

Report of:

PRBO
4990 Shoreline Highway
Stinson Beach, CA 94970

September 1994

Introduction

Scott Creek Beach, in northern Santa Cruz Co., receives heavy recreational use by the public which poses significant threats to the breeding success of Snowy Plovers nesting on this beach. During 1993, an initial effort was made by the Santa Cruz County Office of Parks, Open Space and Cultural Services (POSCS) to protect some nests with exclosures. Of the total number of 5 nests at Scott Creek Beach in 1993, 3 were unprotected and all failed due to desertion. Of the 2 exclosure-protected nests 1 hatched and 1 failed due to desertion (Table 2). All nesting sites and incubating birds were subject to substantial levels of human disturbance which was likely an important factor in the very high rate of 4 of 5 nests (80%) being deserted. Some nests appeared to have been abandoned when disturbed birds were unable to incubate and the exposed eggs were scattered by wind or buried by blowing sand.

During 1994, in addition to the use of exclosures where suitable, symbolic fencing was placed by POSCS around a portion of breeding habitat where 3 of 5 nests were located in 1993. This symbolic fence was composed of a single strand of cable strung between metal stakes. Purpose of the symbolic fence was to provide an area of reduced human disturbance on the beach for potential nesting and as a possible area for adults with precocial chicks to find temporary refuge during periods of high public use.

Monitoring of Snowy Plover breeding success at Scott Creek Beach in 1994 was carried out by Doug George and Ed Jameyson.

Clutch Hatching Success

In 1994, there was a total of 3 nests, all located within the area protected by the symbolic fence. 1 nest was protected with an exclosure with top, and 2 nests did not have exclosures due to unsuitability of terrain. The exclosure-protected nest hatched. Of the 2 nests without exclosures, 1 hatched and 1 was deserted (Tables 1 and 2). The overall hatch rate for 1994 was 66.7% (2 of 3 nests hatching). This compares with an overall hatch rate of 20.0% (1 of 5) in 1993 when 1 of 2 exclosure-protected nests hatched and none of the 3 unprotected nests hatched.

Chick Fledging Rate

In 1994 both chicks from the enclosure-protected nest fledged, and 1 of 2 chicks from an unenclosed nest fledged, for an overall fledge rate of 75.0% (Table 1). In 1993, 2 of 3 chicks (66.7%) fledged from the single hatching enclosure-protected nest (Table 1).

Chicks Fledged per Egg

The number of chicks fledged per egg is a good measure of overall breeding success. In 1994 chicks fledged at a rate of 0.33 per egg (Table 1). This compares with a rate of only 0.14 in 1993 (Table 1), a result of a depressed clutch hatch rate of 20.0%.

Success of Protective Measures

In 1993 there was a total of 5 nests. 3 nests were unprotected: all were deserted. 2 nests were protected by enclosures: 1 hatched and 1 was deserted. The overall clutch hatch rate was only 20.0%. All of the nesting sites and incubating adults were subject to repeated human disturbance which was an apparent factor in the very high nest desertion rate (80.0%) and depressed breeding success.

In 1994 there was a total of 3 nests, all located within an area protected by a symbolic fence. 1 enclosure-protected nest hatched and 1 of 2 nests without enclosures hatched. The overall hatch rate in 1994 (66.7%) was 3.3 times the rate in 1993 (20.0%). Chick fledge rate for 1994 was 75.0% as compared with 66.7% in 1993. The number of chicks fledged per egg in 1994 (0.33) was 2.4 times the rate for 1993 (0.14) (Table 1).

Providing areas of significantly reduced human disturbance in appropriate breeding habitat and around nesting birds, as well as protecting eggs with enclosures (where suitable), are important protective measures for enhancing Snowy Plover reproductive success at Scott Creek Beach.

It is notable that in 1993 and 1994, 7 of 8 nests (87.5%) were located in a dune area near the back of the beach and adjacent to Highway 1. This dune area is scheduled for an extensive dune stabilization and revegetation project that may eliminate the area as breeding habitat for the Snowy Plover.

Table 1. Breeding Success of Snowy Plovers at Scott Creek Beach in 1993 and 1994

Rows of numbers without asterisks were unprotected nests.

Rows of numbers marked with an asterisk were nests protected with exclosures.

Rows with 2 asterisks were nests protected with exclosures and unprotected nests combined.

	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
1993	3	8	0.0	0	0.0	0	—	0	0.00
1993*	2	6	50.0	1	50.0	3	66.7	2	0.33
1993**	5	14	20.0	1	21.4	3	66.7	2	0.14
1994	2	6	50.0	1	33.3	2	50.0	1	0.17
1994*	1	3	100.0	1	66.7	2	100.0	2	0.67
1994**	3	9	66.7	2	44.4	4	75.0	3	0.33

Table 2. Causes of Snowy Plover Nest Loss at Scott Creek Beach in 1993 and 1994

Rows of numbers without asterisks were unprotected nests.

Rows of numbers marked with an asterisk were nests protected with exclosures.

Year	Deserted
1993	3
1993*	1
1994	1

APPENDIX D

NESTING OF SNOWY PLOVERS

AT LAGUNA CREEK BEACH, SANTA CRUZ COUNTY, CALIFORNIA IN 1994

Douglas E. George

Report of:

PRBO
4990 Shoreline Highway
Stinson Beach, California 94970

September 1994

Introduction

Laguna Creek Beach, in northern Santa Cruz Co., receives substantial use by the public. Over a four-year period 1988-1991 overall reproductive success of Snowy Plovers was low primarily because of low clutch hatching rates. Nests inadvertently destroyed by people were a significant cause of nest loss. Initial efforts to protect plover nests at Laguna Creek Beach began in 1992 and continued in 1993, when individual fenced exclosures with tops were placed around a number of the nests to provide protection from predators as well as from people stepping on eggs. During the pre-protection period, from 1988-1991, 5 of 25 nests hatched (20.0%). In 1992, 4 of 5 (80%) exclosure-protected nests hatched and in 1993, 5 of 7 (71.4%) exclosure-protected nests hatched (Table 3). Exclosures provided significant protection for eggs from predators and prevented eggs from being stepped on by people. However, people approaching nesting sites too closely resulted in incubating adults being repeatedly disturbed and flushed from nests, leaving exposed eggs vulnerable (e.g., overheating by sun, eggs scattered by wind, or buried by wind-blown sand). Within hours of hatch chicks are permanently led away from the nest by the parent birds. Thus, exclosures provide no protection for chicks during the month-long period until fledging (first capable of flight). The chick fledging rate for 1993 slipped to 53.8% as compared to 83.3% in 1992 and 61.5% for the period 1988-1991 (Table 5).

In 1994, in addition to protecting nests with exclosures, a symbolic fence composed of a single strand of cable strung between metal stakes was positioned around a portion of the nesting habitat. Purpose of the symbolic fence was to reduce human disturbance around some of the nests (4 of 5 hatching nests) and to provide an area of the beach where adults with chicks could find temporary refuge during periods of high public use.

Providing protective measures for the Snowy Plover nesting population at Laguna Creek Beach during 1992-1994 was a natural resource protection project of the Santa Cruz County Office of Parks, Open Space and Cultural Services and made possible through a grant from the California State Coastal Conservancy.

Clutch Hatching Success

In 1994 there was a total of 8 nests. 3 nests were unprotected and none of these hatched (all were destroyed before exclosures could be erected). 5 nests were protected with exclosures and all 5 hatched for a clutch hatching rate of 100% for protected nests (Table 1). This compares with clutch hatching rates for protected nests of 80% (4 of 5) in 1992 and 71.4% (5 of 7) in 1993. During the four-year pre-protection period 1988-1991 clutch hatching success ranged from 18.2% to 25.0% and averaged 20.8% (Table 3).

Chick Fledging Rate

The fledging rate of chicks from protected nests in 1994 was 100% (12 of 12 chicks) (Table 1). This compares with rates for protected nests of 83.3% (10 of 12 chicks) in 1992 and 53.8% (7 of 13 chicks) in 1993. During the period 1988-1991 chick fledging rate was 61.5% (8 of 13 chicks) (Table 5).

Chicks Fledged per Egg

The number of chicks fledged per egg is a good measure of overall breeding success. In 1994 there were 0.80 fledglings per egg in protected nests (Table 1). This compares with rates from protected nests of 0.67 and 0.33, in 1992 and 1993, respectively. Rates for the pre-protection years, 1988-1991, ranged from 0.00 to 0.30 and averaged 0.13 chicks fledged per egg (Table 3).

Success of Protective Measures

During 1994 protective measures included exclosures around individual nests to protect eggs and symbolic fencing to provide an area of reduced human disturbance for nesting birds and broods.

In 1994, 5 nests were protected and all 5 hatched for a hatching rate of 100% (Table 1). This compares with rates of 80.0% and 71.4% for protected nests in 1992 and 1993, respectively. During the pre-protection period 1988-1991 the clutch hatching rate for unprotected nests was 20% (5 of 25) (Tables 3 and 5).

The fledge rate for chicks from protected nests was 100% in 1994. This compares with rates of 83.3% in 1992 and 53.8% in 1993. For the pre-protection period 1988-1991 the fledge rate was 61.5% (Table 5).

The number of chicks fledged per egg in protected nests in 1994 (0.80) was 1.2 times the rate for protected nests in 1992 (0.67), 2.4 times the rate for protected nests in 1993 (0.33) and 6.2 times the rate for unprotected nests from 1988-1991 (0.13) (Table 5).

With protected and unprotected nests combined, the clutch hatch rate in 1994 was 62.5% and compares with rates of 50.0% for 1992 and 1993. The rate of chicks fledged per egg from protected and unprotected nests combined in 1994 was 0.63. This compares with rates of 0.48 and 0.26 in 1992 and 1993, respectively. For the pre-protection period 1988-1991 clutch hatch rate was 20.0% and the rate of chicks fledged per egg was 0.13 (Table 5).

In 1994 there were 12 chicks fledged from 5 protected nests. This compares with 10 chicks fledged from 5 protected nests in 1992 and 7 chicks fledged from 7 protected nests in 1993. During the three-year period 1992-1994, a total of 29 chicks fledged, all from protected nests. Numbers of chicks fledged from 25 nests during the pre-protection years 1988-1991 ranged from 0 to 3 and totaled 8 over the four-year period (Table 3).

Protective measures for Snowy Plover nesting at Laguna Creek Beach have significantly enhanced their reproductive success.

General Comments

At Laguna Creek Beach there are no areas of the beach where nests are not vulnerable to trampling by pedestrians or where precocial chicks are not subject to substantial human disturbance. Exclosure use in 1992 and 1993 was quite effective in protecting nests from predators as well as from people stepping on eggs. However, disturbance was caused by people approaching too near nest sites and repeatedly flushing incubating birds from nests, leaving the eggs exposed. In 1993 the chick fledging rate slipped to 53.8% as compared with 83.3% in 1992 and 61.5% for the period 1988-1991. During 1994, a symbolic fence was positioned to protect a portion of breeding habitat and provide further protection from high levels of human disturbance for 4 of 5 exclosure-protected nests. The symbolic fencing also provided an area of reduced human disturbance for adults and chicks to seek temporary refuge during periods of high public

use. In 1994 both clutch hatch rate for protected nests (100%) and fledge rate (100%) were high. Clutch hatch rates for protected nests were 80.0% and 71.4% while fledge rates were 83.3% and 53.8% , in 1992 and 1993 respectively. For the pre-protection years 1988-1991 clutch hatch rate was 20.0% and fledge rate was 61.5% (Table 5).

Providing adequate areas of significantly reduced human disturbance, for both nesting and raising chicks, is an important protective measure for enhancing Snowy Plover reproductive success at Laguna Creek Beach. Early protection of nests with exclosures also benefits clutch survival. During the period 1992-1994 there was a total of 26 nests. 14 of 17 (82.4%) protected nests hatched, while none of the 9 unprotected nests hatched (Table 3).

Table 1. Breeding Success of Snowy Plovers at Laguna Creek Beach in 1994

Protected nests are nests with a fenced enclosure.

	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
Unprotected Nests	3	4	0.0	0	0.0	0	—	0	0.00
Protected Nests	5	15	100.0	5	80.0	12	100.0	12	0.80

Table 2. Causes of Snowy Plover Nest Loss at Laguna Creek Beach in 1994

	Unknown	People	Predator
Unprotected Nests	1	1	1

Table 3. Breeding Success of Snowy Plovers at Laguna Creek Beach 1988-1994

Rows of numbers marked with an asterisk were nests protected with an exclosure. Those without an asterisk were unprotected nests.

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
1988	5	10	20.0	1	30.0	3	100.0	3	0.30
1989	11	30	18.2	2	20.0	6	50.0	3	0.10
1990	5	15	20.0	1	13.3	2	100.0	2	0.13
1991	4	9	25.0	1	22.2	2	0.0	0	0.00
1992	3	6	0.0	0	0.0	0	—	0	0.00
1992 *	5	15	80.0	4	80.0	12	83.3	10	0.67
1993	3	6	0.0	0	0.0	0	—	0	0.00
1993 *	7	21	71.4	5	61.9	13	53.8	7	0.33
1994	3	4	0.0	0	0.0	0	—	0	0.00
1994 *	5	15	100.0	5	80.0	12	100.0	12	0.80

Table 4. Causes of Snowy Plover Nest Loss at Laguna Creek Beach 1988-1994

Rows of numbers marked with an asterisk were nests protected with an enclosure.

Those without an asterisk were unprotected nests.

Year	Unknown	People	Canine	Skunk	Raven	Predator	Rising water of lagoon	Deserted
1988	4							
1989	5	3		1				
1990	1	2	1					
1991	1				1	1		
1992				1			2	
1992 *				1				
1993							1	2
1993 *							1	1
1994	1	1				1		
1994 * ¹								

1. No protected nests were lost in 1994.

Table 5. Measures of Snowy Plover Breeding Success at Laguna Creek Beach 1988-1994

Rows of numbers marked with an asterisk were nests protected with an exclosure.

Those without an asterisk were unprotected nests.

Year	Clutch Hatching Rate	Chick Fledging Rate	Chicks Fledged per Egg
1988-1991	20.0%	61.5%	0.13
1992	0.0%	—	0.00
1992 *	80.0%	83.3%	0.67
1993	0.0%	—	0.00
1993 *	71.4%	53.8%	0.33
1994	0.0%	—	0.00
1994*	100.0%	100.0%	0.80

Nests protected with exclosures and unprotected nests combined

Year	Clutch Hatching Rate	Chick Fledging Rate	Chicks Fledged per Egg
1988-1991 ¹	20.0%	61.5%	0.13
1992	50.0%	83.3%	0.48
1993	50.0%	53.8%	0.26
1994	62.5%	100.0%	0.63

1. No nests were protected 1988-1991.

APPENDIX D

NESTING SUCCESS OF SNOWY PLOVERS
AT WADDELL BEACH, SANTA CRUZ COUNTY, CALIFORNIA IN 1994

Douglas E. George

Report of:

PRBO
4990 Shoreline Highway
Stinson Beach, CA 94970

October 1994

Introduction

Waddell Beach is located in northern Santa Cruz County. During 1994 nesting of Snowy Plovers occurred on both the portion of beach owned and managed by the California Dept. of Parks and Recreation and the portion of beach in private ownership.

Monitoring of Snowy Plover breeding success at Waddell Beach in 1994 was carried out by Lisa Carp, Doug George, Bambi Hopkins and Bill Hopkins.

Clutch Hatching Success

There was a total of 11 nests. 4 of the 11 nests hatched for a clutch hatching rate of 36.4% (Table 1). Only one quarter of the plover eggs laid hatched.

Fledging Success of Chicks

2 of 8 chicks fledged (reached age when capable of flight) for a chick fledge rate of 25.0% (Table 1).

Chicks Fledged per Egg

The number of chicks fledged per egg is a good measure of overall productivity. In 1994 chicks fledged at a rate of only 0.06 fledglings per egg (Table 1).

General Comments

Snowy Plovers fared poorly at Waddell Beach in 1994 with only 2 chicks fledged from a total of 11 nests. The number of chicks fledged in 1994 (2) is only one quarter the number of fledglings produced in 1993 (8-9). During 1994 both the clutch hatch rate (36.4%) and chick fledge rate (25.0%) were depressed, resulting in a very low level of overall productivity of only 0.06 chicks fledged per egg (Table 1).

Predation by Common Ravens is speculated as a contributing factor in the low level of clutch success. Common Ravens were frequently seen throughout the breeding season both over and on the beach (with up to 5 present on the beach at the same time). Raven tracks were often noted at areas of the beach where Snowy Plovers located their nests. Common Ravens may also have played a role in the depressed chick fledge rate. A Common Raven was observed to fly onto Waddell Beach, seize, and fly off with a live Killdeer chick. In addition, several of the nests were also subject to disturbance by people.

Also of concern is the presence of the invasive non-native European beachgrass (*Ammophila arenaria*) at Waddell Beach. If unchecked, continued encroachment could seriously degrade plover nesting habitat in addition to having a severe impact on the native coastal dune plant community.

Table 1. Breeding Success of Snowy Plovers at Waddell Beach in 1994

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
1994	11	32	36.4%	4	25.0%	8	25.0%	2	0.06

Table 2. Causes of Snowy Plover Nest Loss at Waddell Beach in 1994

Year	Unknown	Deserted
1994	6	1

Table 3. Number of Adult Breeding Snowy Plovers at Waddell Beach in 1994

Year	Males	Females	Total
1994	4	5	9

APPENDIX D

NESTING SUCCESS OF SNOWY PLOVERS
AT WILDER BEACH, WILDER RANCH STATE PARK, CALIFORNIA IN 1994

Douglas E. George

Report of:

PRBO
4990 Shoreline Highway
Stinson Beach, CA 94970

September 1994

Introduction

Wilder is a small (0.5 km in length) pocket beach known as a Snowy Plover nesting site since 1922 (Page and Stenzel 1981). While recognized as a sensitive wildlife habitat and within a designated natural preserve closed to public use, the beach continued to receive levels of public disturbance that posed serious threats to the Snowy Plover.

During the 5-year period 1989-1993 the number of chicks fledged from Wilder steadily declined from 18 in 1989 to none in 1993 (Table 3). In 1994 State Parks increased efforts to provide protection for the preserve. This included fencing, improved signing, ranger patrols, and volunteer docents to inform park visitors of the closed and protected status of the preserve. These efforts successfully resulted in a very substantial reduction in the level of human disturbance at the natural preserve, including the beach.

This report documents the reproductive success of Snowy Plovers at Wilder Beach in 1994 and compares it with breeding success for the preceding 6-year period 1988-1993.

Clutch Hatching Success

In 1994 there was a total of 13 nests. 7 hatched for a clutch hatching rate of 54% (Table 1). This compares with a mean clutch hatching rate of 60% for the 6-year period 1988-1993 (range = 40%-75%) (Table 5).

Fledging Success of Chicks

12 chicks fledged (reached age when able to fly) at Wilder Beach in 1994 (Table 1). The total number of chicks fledged in 1994 (12) is double the average for the preceding 6 years, 1988-1993 (range=0-18, mean=6) (Table 3).

The fledge rate of chicks in 1994 was 67% (12 of 18 chicks fledging) (Table 1). This compares with rates ranging from 0.0% - 67% and averaging 32% during 1988-1993 (Table 5).

A good measure of overall productivity is the number of chicks fledged per egg. In 1994 there were 0.36 fledglings per egg, 2.1 times the average rate for 1988-1993 (0.17) (Table 5).

General Comments

1994 was a successful breeding season for Snowy Plovers at Wilder and overall productivity was high. A total of 12 chicks fledged in 1994, reversing a steadily declining trend for the preceding 5 years that saw numbers fall from 18 (1989) to none (1993).

The chick fledge rate (67%), number of chicks fledged per egg (0.36), and total number of chicks fledged (12), all doubled in 1994 as compared with the average numbers for the preceding 6 years, 1988-1993 (32%, 0.17, 6) (Tables 3 and 5).

An increase in effort by State Parks, begun in 1994, to protect the natural preserve has been successful in significantly reducing levels of human disturbance on the beach. It is important that Wilder Beach continue to be protected in order to preserve Snowy Plover breeding habitat and enhance reproductive success.

In addition to providing critical breeding habitat, Wilder Beach is also an important wintering site for plovers. During the past two winters the numbers of plovers on monthly surveys from November to February ranged from 38-45 (winter of 1992-1993) and 50-82 (winter of 1993-1994).

Literature Cited

- Page, G. W., and Stenzel, L. E., eds. 1981. The breeding status of the Snowy Plover in California. *Western Birds* 12:1-40.

Table 1. Breeding Success of Snowy Plovers at Wilder Beach in 1994

	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
1994	13	33	53.8	7	54.5	18	66.7	12	0.36

Table 2. Causes of Snowy Plover Nest Loss at Wilder Beach in 1994

Year	Unknown	Predator	Wind	Tide
1994	3	1	1	1

Table 3. Breeding Success of Snowy Plovers at Wilder Beach 1988-1994

Year	Number of Nests	Total Eggs Laid	Percent Nests Hatching	Number Nests Hatching	Percent Eggs Hatching	Number Chicks Hatching	Percent Chicks Fledged	Number Chicks Fledged	Chicks Fledged per Egg
1988	10	27	40.0	4	40.7	11	45.5	5	0.19
1989	14	38	71.4	10	71.1	27	66.7	18	0.47
1990	17	46	47.1	8	39.1	18	27.8	5	0.11
1991	9	26	55.6	5	38.5	10	40.0	4	0.15
1992	17	47	70.6	12	70.2	33	12.1	4	0.09
1993	8	22	75.0	6	77.3	17	0.0	0	0.00
1994	13	33	53.8	7	54.5	18	66.7	12	0.36

Table 4. Causes of Snowy Plover Nest Loss at Wilder Beach 1988-1994

Year	Unknown	People	Raven	Crow	Canine	Skunk	Gull	Predator	Wind	Tide	Desertion	Infertile
1988	2									3	1	
1989			2	1								1
1990	3	2	2			1				1		
1991	1	1			1							1
1992	2				1		1		1			
1993								1				1
1994	3							1	1	1		

Table 5. Measures of Snowy Plover Breeding Success at Wilder Beach 1988-1994

Year	Clutch Hatching Rate	Chick Fledging Rate	Chicks Fledged per Egg
1988	40.0%	45.5%	0.19
1989	71.4%	66.7%	0.47
1990	47.1%	27.8%	0.11
1991	55.6%	40.0%	0.15
1992	70.6%	12.1%	0.09
1993	75.0%	0.0%	0.00
1994	53.8%	66.7%	0.36

Table 6. Number of Breeding Snowy Plovers at Wilder Beach 1988-1994

Year	Males	Females	Total
1988	6-8	6-8	12-16
1989	8-9	8-9	16-18
1990	8-9	8-9	16-18
1991	6-7	7	13-14
1992	10	10	20
1993	7	6	13
1994	5	7	12