

**NESTING SUCCESS OF SNOWY PLOVERS
AT POINT REYES NATIONAL SEASHORE IN 1995**

By:

**Catherine M. Hickey
Gary W. Page
Katherine S. Wilson**

**A report of
Point Reyes Bird Observatory
4990 Shoreline Highway
Stinson Beach, CA 94970**

October 1995

SUMMARY

This report documents breeding success and causes of clutch loss of the Snowy Plover (*Charadrius alexandrinus*) on Point Reyes Beach during the 1995 season and provides a perspective on the current status of this federally threatened species at Point Reyes National Seashore. The number of Snowy Plover nests on Point Reyes Beach decreased from 74 in 1987 to just 20 in 1995. In 1995 only 2 of the 20 clutches hatched but 4 of the 5 chicks which hatched fledged. Common Ravens (*Corvus corax*) and high tides were responsible for the majority of clutch losses. The rate of clutches hatching (mean = 9.5%, range = 1.6% to 19%) and of chicks fledged per egg (mean = .035, range = .007 to .030) both have consistently been very low on Point Reyes Beach in 1987, 1988, 1989, and 1995 and fall below averages for other central California sites. Chick fledging rates, averaging 43.0%, 45.5%, 33.3%, and 80.0% in 1987, 1988, 1989 and 1995, respectively, are not particularly low compared to other sites. This suggests that the low reproductive success rate on Point Reyes Beach is due mainly to high clutch loss and not to low survival of chicks. Management efforts to improve Snowy Plover breeding success on Point Reyes Beach should aim to reduce predation on nests and thus increase clutch hatching rate. We recommend the use of exclosures to increase Snowy Plover reproductive success on Point Reyes Beach.

INTRODUCTION

The U.S. Fish and Wildlife Service has asked the Point Reyes National Seashore to implement a plan that will monitor and protect the federally threatened Snowy Plover (*Charadrius alexandrinus*) within park boundaries. The Point Reyes Bird Observatory (PRBO) is assisting the Point Reyes National Seashore by monitoring the current status of the Snowy Plover on Point Reyes Beach. PRBO's past Snowy Plover research on the Point Reyes National Seashore includes breeding and wintering season surveys since 1977 and intensive nest monitoring in 1977 and between 1986 to 1989. This report documents breeding success of Snowy Plovers on Point Reyes Beach during the 1995 season. It also compares breeding success and causes of clutch loss in 1995 to those of previous years to provide a perspective on the current status of the Snowy Plover at Point Reyes National Seashore. This should aid the Seashore and PRBO in developing a strategy for future habitat management that will help ensure the continued survival and reproduction of this threatened species.

METHODS

We conducted 10 full-length surveys of Point Reyes Beach, once every other week from 15 March through 1 August 1995, to determine the current abundance and distribution of breeding Snowy Plovers at Point Reyes National Seashore, Marin County, California. The methods used are described in Hickey (1995). These surveys required approximately 110 hrs of effort. We separated Point Reyes Beach into four subareas: K = Kehoe Beach entrance to Abbott's Lagoon; NP = Abbott's Lagoon to North Beach parking lot; NB = North Beach parking lot to South Beach parking lot; and SB = South Beach parking lot to Lighthouse Beach. We searched for

nests two to three days a week in those areas, identified by full-length surveys, that were most likely to hold breeding birds. Nest searching and monitoring required approximately 400 hrs of effort.

We used three methods to locate nests: (1) systematically searching microhabitats in which plovers are known to likely place a nest; (2) watching females that behaved furtively from a concealed position approximately 100 m away; and (3) following plover footprints in fine sand. Upon locating a nest, the observer viewed it with binoculars from a distance and recorded the contents. It is known that Snowy Plover eggs are laid at intervals ranging from 46.5 to 118 h and that the date of hatching is approximately 27 days after the clutch is completed (Page 1995). All nests were located prior to completion of a full clutch except for one nest that was destroyed by a high tide. Thus, it was possible to estimate initiation and potential hatching dates without using alternative methods that would require closely approaching the nests. Date, time, location of nest (by subarea and obvious landmarks), and identity of owners also were recorded. Nest checks were made on each visit to the area to determine whether the nest was still active. For nests from which eggs disappeared prior to the projected hatching date, the empty nest and vicinity were examined for predator or human tracks to determine probable cause of clutch loss. On a nest's projected hatching date, checks were made frequently to determine if chicks were present. To obtain conclusive fledging rates, the adult and chicks were searched for regularly on subsequent visits, and, once found, the number of chicks and location were recorded. Based on prior research (Page 1995), 28 days after hatching was defined as the date of fledging.

All data collected in the field were transferred onto survey and nest data forms. Survey and nest data from the 1995 season were then compared with unpublished PRBO data from previous

breeding seasons. Previous intensive nest finding on Point Reyes Beach was conducted in 1977, 1986 (efforts concentrated between Kehoe Beach and North parking lot), 1987, 1988, and 1989. Breeding success was evaluated in terms of number of nests, total eggs laid, percent of clutches hatching, percent of eggs hatching, percent of chicks fledged, and chicks fledged per egg.

RESULTS AND DISCUSSION

For those years in which thorough season-long searches were made for Snowy Plover nests on the full length of Point Reyes Beach, the total number of nests and total number of eggs laid have steadily decreased (Table 1). A total of 74, 65, 61, and 20 nests were found in 1987, 1988, 1989, and 1995, respectively.

The current number of plovers breeding on Point Reyes Beach has decreased to just half that of the late 1980s and early 1990s (Hickey 1995). We believe this is mainly due to low reproductive success. The observed clutch hatching rate of 10% in 1995 is consistent with the low hatching rates from 1987 to 1989 (mean = 9.4%, range = 1.6% to 19.0%) and is well below the average for the California coast (mean = 54%, range = 18.7% to 86.8%) (Page 1995). Clutch hatching rate for the two northern sections of Point Reyes Beach has consistently been lower than that for the two southern ones (Table 1). This may be due to the number of Common Ravens using each section, but needs further investigation.

Chick fledging rates at Point Reyes Beach have ranged from 33.3% in 1989 to 80% in 1995 (mean = 50.5%) (Table 1) and are not particularly low compared to mean fledging rates from other coastal sites which typically range from 30.0% to 45.0% (PRBO unpub. data). Although the 1995 sample size of 2 out of 20 nests hatched was very small, fledging rates suggest that the

low reproductive success of Snowy Plovers on Point Reyes Beach is due mainly to high clutch loss and not to low survival of chicks.

The number of chicks fledged per egg also is a valuable measure of breeding success. The rates of .03, .01, and .07, chicks fledged per egg at Point Reyes Beach in 1988, 1989, and 1995, respectively, fall below the averages of .18, .23, and .10 for central California sites in 1988, 1989, and 1991, respectively (Page 1988, 1990, 1991).

As in all other years of research on the Snowy Plover on Point Reyes Beach, Common Ravens (*Corvus corax*) were responsible for the majority of clutches lost (Table 2). In 1995 39% of the 18 failed nests were taken by ravens. Percentages of clutches lost to ravens were 58%, 63%, and 67%, in 1987, 1988, and 1989, respectively. An unusually high proportion, 28%, of nests in 1995 were destroyed by high tides. We believe this was attributable to erosion of long stretches of beach by the intense winter storms of 1994-95 and heavy storm activity causing high swells in the spring of 1995. Small mammalian predators claimed 10% of failed clutches, and only one nest loss was attributable directly to humans. The effect of disturbance to breeding plovers caused by humans and dogs (i.e. the flushing of plovers off their nests) and its potential relationship to nest predation by ravens deserves further investigation. The distribution of nests and their fates are depicted in Figure 1.

Efforts to increase clutch hatching rate by reducing predation of eggs most likely will be the most effective means to increase the reproductive success of Snowy Plovers on Point Reyes Beach. Of 34 birds that fledged from Point Reyes National Seashore from 1986 to 1989, at least 62% are known to have reached breeding age. 35% of the 34 birds are known to have bred in the Point Reyes region and 6% are known to have been present at Point Reyes in the summer and

may have bred. Only 7 of the 34 birds are known to have reached breeding age and not bred at Point Reyes; 13 fledged birds disappeared before the first breeding season. If future Point Reyes fledglings demonstrate the same patterns as in the 1980s, approximately 2.6 fledglings must be produced for every one that is likely to breed at Point Reyes.

Breeding plovers are less likely to retain their territory after losing a clutch to predation than to other causes (Warriner et al. 1986). The effects of reducing clutch predation could both increase the number of potential locally-produced breeders and increase the likelihood that established breeders retain their Point Reyes territories and thus increase the population size of the Snowy Plover at Point Reyes National Seashore.

RECOMMENDATIONS

We recommend the use of exclosures to increase Snowy Plover reproductive success on Point Reyes Beach. Fencing of individual nests has proven to increase clutch hatching success by reducing losses to predators and people (Page 1995) and, in one year to double the rate of chicks fledged per egg at five central California sites (Page 1991). Depending on further evaluation of the potential usefulness of conditioned taste aversion as a management tool, we may also recommend the use of CTA to deter predators from depredating nests.

ACKNOWLEDGEMENTS

Jack Dineen and Helen Pratt volunteered time and energy on surveys of Point Reyes Beach, Drake's spit and Limantour spit. Grant Ballard helped produce Figure 1 and David Shuford provided comments on this report's text. This project was funded by the National Park Service

and by members of the Point Reyes Bird Observatory.

Table 1. Measures of breeding success of Snowy Plovers on Point Reyes Beach, 1986 to 1989 and 1995.

Year	area	# nests	total eggs laid	% clutches hatching	% eggs hatching	# eggs hatched	% chicks fledged	chicks fledged per egg
1986	PR north	34	96	29.0	29.0	28	18.0	.05
1987	PR north	57	151	14.0	13.2	20	50.0	.06
	PR south	17	47	35.3	32.0	15	33.3	.10
	PR total	74	198	19.0	18.0	35	43.0	.07
1988	PR north	46	114	4.3	4.4	5	60.0	.03
	PR south	19	47	15.8	12.7	6	33.3	.04
	PR total	65	161	7.7	6.8	11	45.5	.03
1989	PR north	48	112	0.0	0.0	0	-	.00
	PR south	13	34	7.7	8.8	3	33.3	.03
	PR total	61	146	1.6	2.0	3	33.3	.01
1995	PR north	15	42	6.7	7.1	3	100	.07
	PR south	5	13	20.0	15.4	2	50.0	.08
	PR total	20	55	10.0	9.1	5	80.0	.07

PR north = Kehoe Beach entrance to North Beach parking lot

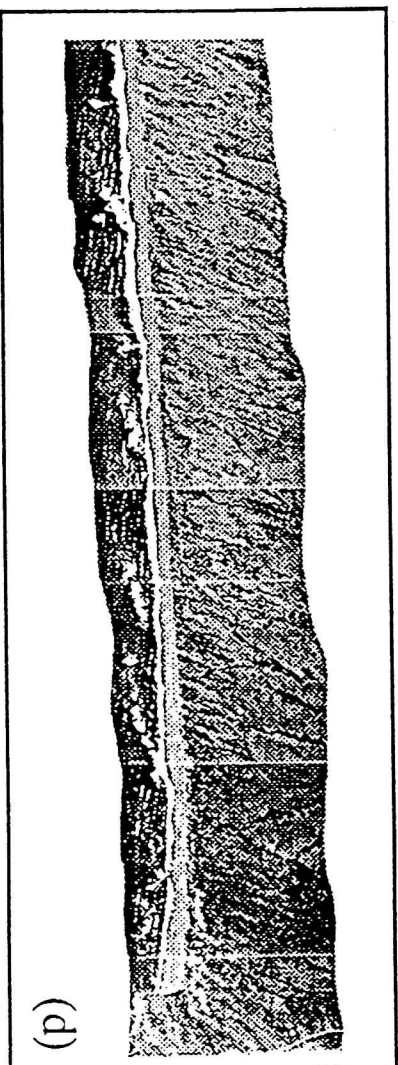
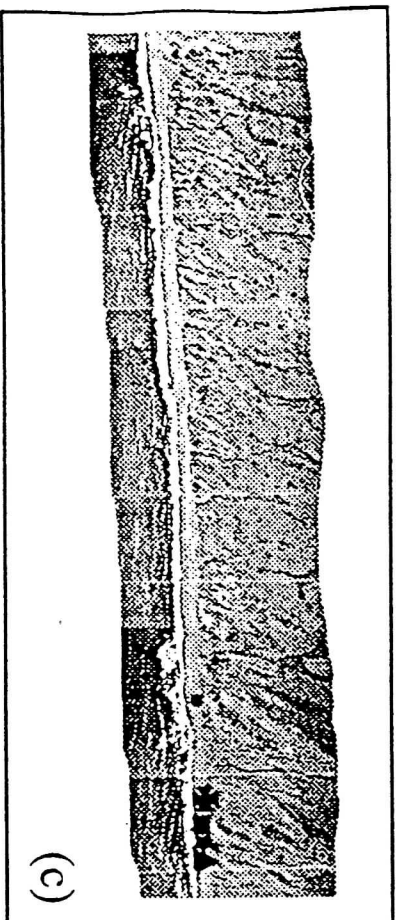
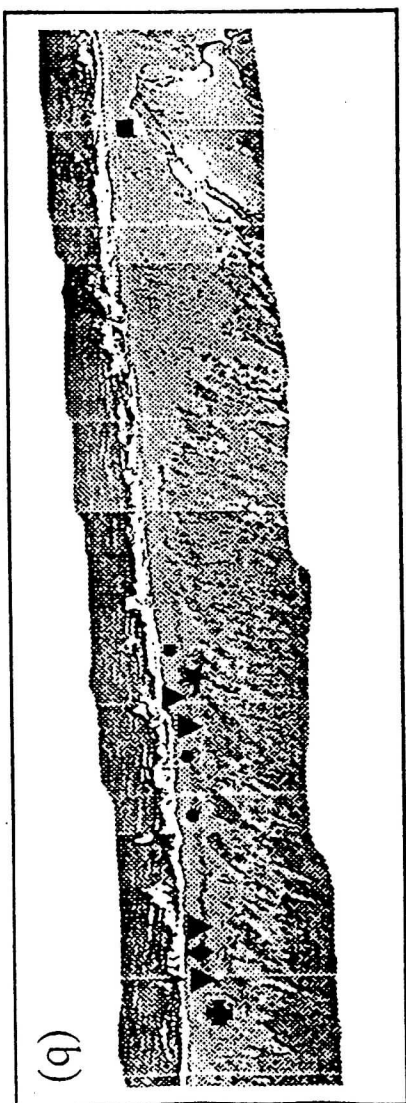
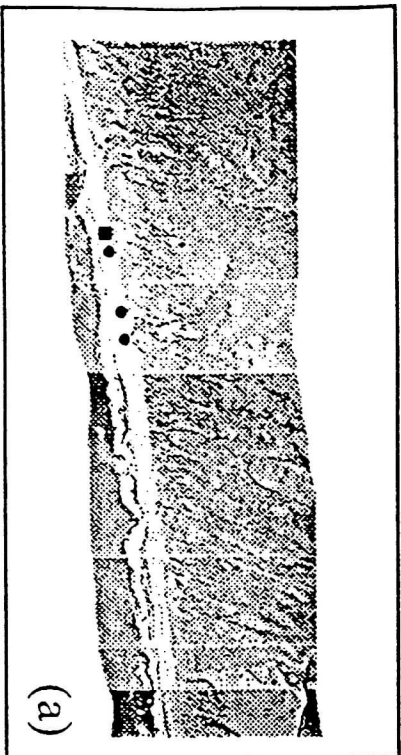
PR south = North Beach parking lot to Lighthouse Beach

PR total = entire length of Point Reyes Beach

Table 2. Numbers of Snowy Plover clutches lost to various causes, 1986 to 1989 and 1995.

Year	Unk	Rav	Sku	Fox	Rac	Mam	Gull	Hors	Peo	Wnd	Tide	Des	Pred	Tot
1986	5	9	0	1	2	1	0	0	1	1	1	2	1	24
1987	13	34	2	1	0	0	0	2	3	0	5	0	0	60
1988	9	38	2	0	0	1	1	0	3	3	0	1	2	60
1989	11	39	4	0	0	0	0	0	0	1	2	1	2	60
1995	1	7	0	0	0	2	0	0	1	0	5	0	2	18

Unk = unknown; Rav = raven; Sku = skunk; Fox = fox; Rac = raccoon; Mam = unid. mammal; Gull = gull;
Hors = horse; Peo = people; Wnd = wind; Des = deserted; Pred = unknown predator; Tot = total



N ---> S

Figure 1. Fates of Snowy Plover nests along four sections of Point Reyes Beach: (a) = Kehoe Beach entrance to Abbott's Lagoon mouth; (b) = Abbott's Lagoon mouth to North Beach parking lot; (c) = North Beach parking lot to South Beach parking lot; (d) = South Beach parking lot to Lighthouse Beach. Symbols for fates: ● = raven; ■ = unknown cause of clutch loss; ★ = mammal; ◆ = people; ▲ = tide; ✱ = hatched. Image created by scanned aerial photographs taken 14 August 1963 (provided by National Park Service).

REFERENCES

- Hickey, C.M. 1995. Distribution of Snowy Plovers and their nests at Point Reyes National Seashore in 1995. Point Reyes Bird Observatory, Stinson Beach, CA.
- Page, G.W. 1988. Nesting success of Snowy Plovers in central California in 1988. Point Reyes Bird Observatory, Stinson Beach, CA.
- Page, G.W. 1990. Nesting success of Snowy Plovers in central coastal California in 1989 and 1990. Point Reyes Bird Observatory, Stinson Beach, CA.
- Page, G.W. 1991. Nesting success of Snowy Plovers in central coastal California in 1991. Point Reyes Bird Observatory, Stinson Beach, CA.
- Page, G.W. 1995. Birds of North America: Life histories for the 21st century. No. 154. The American Ornithologists' Union and The Academy of Natural Sciences, Philadelphia, PA.
- Warriner, J.S., J.C. Warriner, G.W. Page, and L.E. Stenzel. 1986. Mating system and reproductive success of a small population of polygamous Snowy Plovers. *Wilson Bull.* 98:15-37.