

**The Distribution and Reproductive Success of the Western Snowy Plover
Along the Oregon Coast - 2000**

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Abstract

From 6 April – 15 September 2000, we completed our 11th year of monitoring the distribution, abundance and productivity of Federally Threatened Western Snowy Plovers (*Charadrius alexandrinus nivosus*) along the Oregon coast during the breeding season. From north to south, we surveyed and monitored plover activity at Sutton Beach, Siltcoos River mouth, the Dunes Overlook, Tahkenitch Creek, Tenmile Creek, Coos Bay North Spit, Bandon Beach, and south from the mouth of New River to Floras Lake. We also visited Bayocean Spit early in the season and the Necanicum Spit site after being alerted to the presence of an adult plover with unfledged young. Our objectives this year for the Oregon coast were to: 1) estimate the size of the adult Snowy Plover population, 2) locate plover nests, 3) erect predator exclosures around nests, 4) determine nest success, 5) determine fledgling success, and 6) monitor and record brood movements.

We observed an estimated 109 adult Snowy Plovers, including 53 banded females, six unbanded females, 49 banded males and one unbanded male. Eighty-nine of these adults were known to have made a nesting attempt. We located 100 nests and two broods from undiscovered nests during the 2000 nesting season. This is the highest number of nests found during the course of this project. However, the high number of nests is partially a result of low nesting success, leading to high levels of renesting. The Mayfield nest success was 32%, with exclosed nests (n=79) experiencing a 46% success rate and unexclosed nests (n=21) a complete failure at 2%. These rates are substantially lower than the 10 year means of 67% for exclosed nests and 19% for unexclosed nests. Nest failures were attributed to unknown predation (19%), unknown cause (19%), corvid predation (15%), abandonment (13%), depredation of adult by an avian predator (13%), wind (10%), overwash (6%), skunk predation (2%), infertile eggs (2%) and red fox (*Vulpes vulpes*) predation (2%). We monitored 40 broods in 2000, which produced 40 confirmed fledglings. Fledgling success was 38%, equivalent to the overall success rate since 1990. We recorded at least four locations for 24 of the successful broods at eight nesting areas. The mean maximum distance moved from the nest site was 931 m (SD=875 m). The mean area of the minimum convex polygon formed by the observations was 8.5 ha (SD=8.2).

The Western Snowy Plover population will improve only through increased efforts in habitat, predator, and recreation management to increase both nesting success and fledgling success, and we recommend continued breeding season monitoring until recovery goals have been reached.

TABLE OF CONTENTS

ABSTRACT	i
INTRODUCTION	1
STUDY AREA	1
METHODS	1
RESULTS	4
Abundance and Distribution	4
Nest Activity	6
Nest Success	8
Nest Exclosures	8
Nest Failure	8
Fledgling Success	10
Brood Movements	10
1999 Hatch-Year Returns	10
Sightings of Snowy Plovers Banded Elsewhere	10
DISCUSSION	11
Abundance	11
Nesting Activity	11
Nest Success and Failure	13
Fledgling Success	15
Brood Movements	16
Habitat Restoration and Development Projects	16
RECOMMENDATIONS	18
Signing of Restricted Areas	18
General Recommendations	18
ACKNOWLEDGMENTS	20
LITERATURE CITED	21
TABLES 1-12	23
FIGURES 1-11	35
APPENDIX A. Study Area	46
APPENDIX B. Site Specific Recommendations	48

Introduction

The Western Snowy Plover (*Charadrius alexandrinus nivosus*) breeds along the coast of the Pacific Ocean in California, Oregon, and Washington and at alkaline lakes in the interior of the western United States (Page et al. 1991). Loss of habitat, disturbance and predation pressures have caused the decline of the coastal population of Snowy Plovers and led to the listing of the Pacific Coast Population of Western Snowy Plovers as Threatened in 1992 (Federal Register 1993).

We are now in our 11th year of monitoring the distribution, abundance, and productivity of Snowy Plovers found along the Oregon coast during the breeding season. We have focused our efforts on placing predator proof exclosures around nests as a means of reducing egg predation, with the expectation that increased annual productivity will lead to increases in the overall breeding population in Oregon. Based on observations and data gathered since the inception of the project, we continually evaluated and when necessary modified our methods. Previous work and results have been summarized in annual reports (Stern et al. 1990, 1991, 2000, Craig et al. 1992, Casler et al. 1993, Hallett et al. 1994, 1995, Estelle et al. 1997, and Castelein et al. 1997, 1998, 2000). We continued with these efforts in 2000; our objectives for the Oregon coastal population this year were to: 1) estimate the size of the adult Snowy Plover population, 2) locate plover nests, 3) erect predator exclosures around nests, 4) determine nest success, 5) determine fledgling success, and 6) monitor and record brood movements. These results are presented in this report.

Study Area

We surveyed Snowy Plover breeding habitat along the Oregon coast, including ocean beaches, sandy spits, ocean-overwashed areas within sand dunes dominated by European beachgrass (*Ammophila arenaria*), open estuarine areas with sand flats, dredge spoil sites, and several habitat restoration sites. From north to south, we surveyed and monitored plover activity at Sutton Beach, Siltcoos River mouth, the Dunes Overlook, Tahkenitch Creek, Tenmile Creek, Coos Bay North Spit, Bandon Beach, and south from the mouth of New River to Floras Lake (Fig. 1). A description of each site occurs in Appendix A. We also visited Bayocean Spit early in the season and the Necanicum Spit site after being alerted to the presence of an adult plover with unfledged young.

Methods

Fieldwork was completed between 6 April - 15 September 2000. Surveys were completed on foot or from an all-terrain vehicle (ATV). For each survey we recorded the number of plovers observed, the sex of each bird if known, and the color band combination of any banded individual. The amount of time to complete the survey and weather conditions during the survey was also noted. We surveyed each site weekly, and additional visits were made to check nests, band chicks, or monitor broods.

We located nests using methods described by Page et al. (1985) and Stern et al. (1990). We defined a nest as a nest bowl or scrape with eggs or tangible evidence of eggs in the bowl, i.e. egg shells. The incubation period of nests has been determined to be 29 days as documented at Mono Lake, California (pers. comm. Gary Page). In 1998 and 1999 we analyzed the incubation period (Castelein et al. 1998, 2000) and determined that the average incubation period based on the laying of the third egg on the Oregon coast is 28 days. We predicted hatching dates by floating eggs (Westerkov 1950) using a floatation schedule developed by staff at Point Reyes Bird Observatory (pers. comm. Gary Page). We defined a successful nest as one that hatched at least one egg. A failed nest was one where we found buried or abandoned eggs, infertile eggs, signs of depredation (e.g. mammalian or avian tracks, eggshell remains not typical of hatched eggs, or nest cup disturbance) or where eggs had disappeared prior to the expected hatch date. In a few instances we found nests with only one egg; often there was no indication of incubation or nest defense, and it was uncertain to what extent the nest was abandoned, or simply a “dropped” egg. Because it was difficult to make this determination, we considered all one egg clutches as nest attempts, and classified them as abandoned when there was no indication of incubation or nest defense.

Since the inception of the project we have employed exclosures to protect nests from egg predators. The design of the exclosure has been refined over time by modifications intended to either make the construction of the exclosure more efficient, or to make it more difficult for predators to enter. In previous years we have witnessed episodic events of egg predation where as many as eight exclosed nests at a site have been lost to egg predators within a short period of time. We suspect that in these instances of episodic predation, there have been one or two individual resident or migratory predators who have learned what is inside the exclosure and how to get in. In response to these problems we have made adjustments to our exclosure methods, using extra string or blueberry netting on the top of the exclosure. In 2000, we experienced episodic loss of eggs to corvids, and in addition to extra string and blueberry netting, experimented with putting either chicken wire or an electrified “hot wire” along the top perimeter of each exclosure. In some instances, multiple methods were used. Our use of these modifications is explained below.

- The extra string method was also applied to exclosures during the 1999 nesting season (Castelein et al. 2000). This method calls for additional rows of twine spaced at two-inch intervals (instead of four-inch) on the outer 12-16 inches of all four sides of the exclosure. The idea was to make it more difficult for corvids to drop down into the exclosures from a perched position on the edge of the exclosure. Extra string was used in conjunction with three other methods: blueberry netting, chicken wire and “hot wire”. For two nests we employed a slight variation of the extra stringing described above. In one situation we ran the string parallel with the regular string only, no extra string was added perpendicularly. In the second case the extra string was added perpendicularly to the regular string only.
- In previous years blueberry netting was stretched over the entire top of several exclosures. Due to instances of abandonment and possible adult plover mortality in

previous years, we modified the concept this year attaching 12-16" strips of blueberry netting to the perimeter of the exclosure over the string. This was to make it more difficult for an avian predator to perch on the exclosure and drop into the exclosure.

- The chicken wire method involved adding cut strips of chicken wire to two sides and all four corners of the exclosure. The chicken wire was cut to form wire "spikes" pointing up to deter anything from landing on the exclosure. Extra string was also added following the first procedure.
- The "hot wire" method entailed placement of an electrified hot wire around the top perimeter of the exclosure. This method was implemented to discourage or prevent corvids from perching on the top of the exclosure and forcing their way between the rows of twine. This hot wire method required placement of two sets of wires, one positive and one negative, around the top of the exclosure. The positive wire was charged by a battery-operated field charger and the negative wire was attached to a ground pole buried in the sand.

We also placed three American Crow (*Corvus brachyrhynchos*) decoys (Outlaw Decoy, Spokane, WA) on the north end of the north spit of the Siltcoos River to attempt to scare the crows away by using "dead" crows as a deterrent. The crows were attached upside down on wooden posts with holes and/or feathers on the decoys.

At Coos Bay North Spit during 5-13 May 10-11 nesting adult plovers were apparently depredated and their associated exclosed nests failed. We determined that the depredation events occurred at or near the exclosures, and we were unable to determine the exact predator involved, although we suspected from evidence an avian predator was responsible. We decided at the time that we would not exclose any newly found nests even though it may have lead to higher nest failures. We made this decision on the basis that we did not want exclosures to potentially cause further adult plover depredations and we did not know if the predator continued to pose a significant threat. We continued to monitor and search for nests and documented the outcomes following the depredation event. We also made efforts to observe the area for long periods to determine if an avian predator was actively hunting. We did not observe any further adult depredation activity, and after unexclosed nests repeatedly failed, we decided to try exclosing nests again on 14 June. We cautiously exclosed nests and did not experience any more adult depredation events for the remainder of the season.

Male Snowy Plovers typically rear their broods until fledging. In order to track the broods we banded the nesting adult male and each hatch-year bird with both a USFWS aluminum band and a combination of colored plastic bands. We used an oblong walk-in funnel-trap placed over the nest or chicks to catch adult birds for banding. Chicks were considered fledged when they were observed 28 days after hatching, with one exception of a chick observed at 27 days old but not recorded again for the season.

We estimated the number of Snowy Plovers on the Oregon Coast during the 2000 summer by determining the number of individually color-banded adult Snowy Plovers recorded during the breeding season, and adding to that number our estimate of the

number of unbanded Snowy Plovers that were also present. We estimated the number of unbanded Snowy Plovers by determining the number of unbanded plovers observed at each site within ten-day intervals during May, June and the first week of July. These time periods, as determined in past years, represent the periods of maximum nesting effort, maximum breeding population, and are also when there are relatively few movements of plovers between nesting sites. For each 10-day interval we then subtracted the number of adults that were subsequently banded during the breeding season and then selected the 10-day interval that had the highest remaining count of unbanded plovers. This provided us with a minimum estimate of the number of unbanded plovers found at these sites during the breeding season. This method may underestimate the number of unbanded plovers because not all plovers are recorded on every survey. To check our estimate we also analyzed our daily observations of all unbanded plovers at each site. We tracked all the dates of unbanded plovers during the breeding season which permitted us to observe where each unbanded plover was over time, if they had a nest, when they potentially moved from a particular site, and if and when they were subsequently banded. We determined a minimum number of unbanded plovers using this method and compared it to the previous method.

We calculated nest success using apparent nest success (number of successful nests divided by the total number of nests) and the Mayfield method of nest success (Mayfield 1961, Mayfield 1975). The Mayfield method is used because it describes the probability of nest success on a per day basis, thus creating a relative scale upon which nests found at different times during the nesting cycle can be compared; e.g. a nest found on day two of incubation has a different likelihood of hatching than one found on day 27. The strength of the Mayfield method is that the probability of nest success is calculated on a per day basis, and when mortality is assumed to be constant during the incubation period, nest success can be calculated for the entire period.

We monitored broods and recorded brood activity or males exhibiting broody behavior at each site. We estimated the location of individual broods by noting the location of the chicks or that of the tending male as it exhibited brood defense behavior. We used GPS instrumentation to record all sightings of each brood that fledged at least one chick. We attempted to note brood locations approximately two times per week at each site. For broods with at least four GPS locations up to the fledging age of 28 days we calculated minimum convex polygons (MCPs) for the area used by each brood, as well as the perimeter of each polygon, and the maximum distance moved from the nest.

Results

Abundance and Distribution

We observed an estimated 109 adult Snowy Plovers at breeding sites along the Oregon coast in 2000 (Table 1). Of 109 plovers, 102 were banded. We initially estimated there were four unbanded adult plovers based on the number of unbanded plovers accounted for during the 10-day interval. However, the alternative evaluation of

estimating unbanded plovers determined a minimum of seven unbanded plovers were present. Using the latter method of estimating unbanded plovers, we observed 53 banded females, six unbanded females, 49 banded males and one unbanded male. Included in the population estimate is one male recorded at Necanicum River Spit, in Clatsop Co. The Necanicum site has not been used by Snowy Plovers in at least a decade and has not been regularly surveyed. A birdwatcher, Todd Thornton, reported observing a male Snowy Plover and two chicks on 29 July 2000. The observation was confirmed by others, and the male and two chicks were caught and banded by David Bailey on 1 August 2000.

Our population estimate of 109 adult Snowy Plovers includes 13-15 banded adult plovers that were initially present and nesting but were apparently killed by predators during the first part of the breeding season. At the Coos Bay North Spit (CBNS) we estimated 10 banded adults were depredated between 5-13 May, with most of the birds lost between 8-10 May. At Overlook two nests failed simultaneously during this same time period and one of the banded adults was not recorded thereafter. At New River three nests failed between 24-29 April; two banded females associated with these nests were not recorded after the nest failures. Two other banded adult plovers with previous nesting history at New River were not recorded after 29 April and 11 May. We believe these adult plovers may have been depredated, and it is possible an additional two to three unbanded adult plovers may also have been depredated during this time period.

The mean number of plovers recorded at each site this nesting season ranged from zero at Bay Beach-CBNS to 9.57 at North Siltcoos (Table 2). Other sites with high mean number of plovers included New River (8.32), South Siltcoos (7.82), and Sutton Beach (6.95). Low numbers of plovers were at Floras Lake (1.13), Bandon (2.33) and Tahkenitch (2.57). Compared to the 1999 nesting season, noteworthy increases were observed at Sutton Beach, Overlook, North Tahkenitch and North Tenmile. Sutton Beach had 2.75 plovers per survey in 1999 compared to 6.95 in 2000; Overlook had 2.33 plovers per survey in 1999 compared to 4.00 in 2000; North Tahkenitch had zero plovers per survey in 1999 compared to 2.57; and North Tenmile had 0.19 plovers per survey compared 1.81 in 2000. Two sites had slight increases: North Siltcoos in 1999 had a mean of 8.41 plovers per survey compared to 9.57 in 2000 and Floras Lake had a mean of 0.27 plovers per survey in 1999 compared to 1.13 in 2000. Several of the study sites had decreases including South Siltcoos and South Tahkenitch. South Siltcoos had a mean of 9.03 plovers per survey in 1999 compared to 7.82 in 2000. South Tahkenitch continues to decline: 8.44 in 1997, 4.47 in 1998, 1.58 in 1999 and 0.33 in 2000. Coos Bay North Spit had an overall decrease in individual birds per site except for the South Spoil which stayed the same (2.12 in 1999 and 2.13 in 2000). South Beach in 1999 had a mean of 6.07 individuals compared to 4.42 in 2000, and the 1994 HRA had a mean of 5.52 in 1999 compared to 3.84 in 2000. New River continues to see an annual decrease in the population and use of the site; the 2000 mean was 8.32 compared to 11.28 in 1999, 17.22 in 1998 and 18.64 in 1997.

Sixes River, Elk River, Euchre Creek, and Pistol River in Curry Co. were surveyed once each on 30 April, but no plovers were observed. Bayocean Spit,

Tillamook Co., was surveyed twice by Geoff Dorsey in April, but no plovers were observed.

Nest Activity

We located 100 nests during the 2000 nesting season (Table 3 and Figs. 3-11). Sutton had more than twice the number of nests found this year compared to the 1999 nesting season; seven nests in 2000 compared to three nests in 1999. A brood from an undiscovered nest was also found at Sutton raising the total number of nests at Sutton to eight this year. Five of the nests were found north of Berry Creek, including all three nests which hatched. The other two nests were located between Berry Creek and the Holman Vista trail. No nests were found south of the Holman Vista trail, where all three nests were in 1999.

The 22 nests found at North and South Siltcoos in the 2000 nesting season were similar to 1999 when 21 were found. Plovers continued to use all available open habitat on the sand spits near the mouth of the Siltcoos River and the adjacent areas near the foredune. Early in the season, nests were primarily located on the North Spit. However, after the middle of May, we only found nests on the South Spit, although we found nest scrapes on the North Spit through early July. Two nests were located on the South Spit near the Waxmyrtle Trail beach access point; one of these nests was successful.

The number of nests at the Overlook clearing increased to eight in the 2000 nesting season compared to two in 1999. All the nests were located on the northern clearing, although we found nest scrapes on the south clearing.

Tahkenitch showed a slight increase with five nests found during the 2000 nesting season, the first increase in nest attempts since a declining trend began in 1996. This season the north spit was large enough to have suitable plover nesting habitat and four nests were found here. This is the first documentation of a nest on the north spit since the project began in 1990.

One nest was found on the spit at North Tenmile at the end of the 2000 nesting season, for the first time since 1996. This nest was exclosed, but the spit was not roped off as recreation pressure is light at this site. South Tenmile had five nests in 2000, which is the same as in 1999. This is a decrease from 1998 when 11 nests were found.

We found 28 nests at the Coos Bay North Spit this year compared to 14 nests found in 1999. The increase in the number of nests found is in part due to the depredation event that took place in May, when eight active nests failed and a ninth nest hatched but subsequently failed because no male attended the brood. The remaining adults at that time paired and renested, but exclosures were not set up around nests immediately following the predation event due to the possibility of additional adults being killed. Several unexclosed nests were depredated, causing the birds to again renest. Because of this sequence of events the birds repeatedly made nesting attempts until they were successful. Initially, as was seen in 1999, a majority of the nesting was on the

94HRA. After these nests failed the birds made a second attempt, with the majority of the nests again initiated on the 94HRA. When a few of those nests failed the birds attempted to nest in other areas. Several nests were found on the south end of the 95HRA and then two nests were found on the 98HRA. The last nest of the season for CBNS was found on South Beach, but was infertile.

There were two nests at Bandon Beach this year, the same as in 1999. In the past several years nest sites were in or near the overwash at China Creek, south of the parking area. This year no nests were found in or around the China Creek overwash. One nest was near the entrance point for the Christian Camp Trail. The other nest was at the south end of the beach in an overwash near the Twomile/New River estuary on the north side of the spit.

The only site on the coast where there was a decrease in the number of nests as compared to 1999 was New River. Seventeen nests were found in the 2000 nesting season compared to 28 nests in 1999. Most of the nests were found in overwashes in the 2000 nesting season, with three nests on the open spit at the north end of the site. The plovers used the enhanced habitat restoration area (HRA) midway through the nesting season when four nests were found, including one at the very south end of the HRA.

Five nests were found at Floras Lake in the 2000 nesting season. The banded plovers that nested at Floras Lake this season have nested at Bandon Beach and/or New River in the past two years. Four of the five nests were located at the north end of the beach on the two overwash areas near Floras Creek/New River. One nest was found early in the nesting season at the very north end of the north overwash, and one other nest was found later in the season at the south end of the north overwash. Two nests were found late in the season on the south overwash area. The fifth nest was actually along the open beach adjacent to New River considerably north of the overwash areas. We included this nest in the Floras Lake totals because the nest was in Curry Co., and although it was adjacent to New River it was closer to the Floras Lake nesting area than the traditional New River nesting area. The nest was in an area that has not had nesting plovers to our knowledge in past years. Since all the nesting activity occurred at the north end of the beach, once a second nest was found on the southern overwash we decided to rope and sign the area. The area at the south end of the beach this year was again steep and narrow, compared to the north end of the beach. More activity was seen at Floras Lake this year compared to the past two years when no nests were laid or hatched.

Nest initiation in the 2000 nesting began eight days earlier than 1999 (ca. 29 March) and ended two days earlier (17 July). The last successful nest of the 2000 season hatched on 14 August. The maximum number of active nests during 10-day intervals was 28 during 21-30 April and 10-19 June (Fig. 2). There was a significantly (2 SD) earlier peak in the number of nests active during 10 day intervals in 2000 compared to 1993-1999. The 9, 19, and 28 nests active in the first three ten day periods starting 1 April were much more than the average 4, 5, and 11 nests usually active during those periods. Nesting activity flattened out and then declined at a normal rate during the

middle and end of the 2000 season, but earlier than in 1999 when the breeding season had a late start. The last successful brood in 2000 fledged on 30 August, approximately two and a half weeks earlier than last year when the last brood fledged on 17 September.

Approximately 82% of the adults (n=89/109) were known to have made a nesting attempt during the 2000 breeding season. This is slightly higher than most previous years: 1999-81%, 1998-77 %, 1997-72%, 1996-78 %, 1995-66 %, and 1994-69 %. Of the nesting adults in 2000, 47 were female (41 banded, 6 unbanded), and 42 were male (41 banded, 1 unbanded).

Nest Success

In 2000, overall Mayfield nest success was 32%. This was almost a 20% decrease compared to the last two years when 50% and 51% of both exclosed and unexclosed nests hatched in 1998 and 1999, respectively. The estimated Mayfield nest success in 2000 for exclosed nests was 46%, substantially lower than the 10 year mean of 67% for exclosed nests (Table 4). Unexclosed nests followed the same pattern: in 2000 the Mayfield nest success for unexclosed nests was two percent, while the 10 year mean is 19%.

Nest Exclosures

We placed exclosures around 79 of the 100 nests found in 2000 (Table 5). Thirty-eight of the 79 exclosed nests had extra string placed on top, but corvids still managed to enter some of these exclosures early in the season. We then tried the other techniques to prevent corvids from entering exclosures. In addition to extra string seven nests had blueberry netting around the perimeter, four nests had chicken wire and nine nests were "hot-wired". Of the nests with blueberry netting, five hatched and two failed, one to unknown predation and one to unknown cause. All four nests with chicken wire failed, all due to unknown cause. We "hot-wired" exclosures at three different sites (Siltcoos, CBNS, and New River). Eight of the nests hatched and one failed. The battery for the nest that failed was no longer charged when checked and depredation may have occurred after the battery had failed.

Nest Failure

Both exclosed and unexclosed nests experienced relatively high rates of nest failure compared to previous years. Exclosed nests in 2000 had a 52% (41 of 79) failure rate, compared to 36% (25 of 69) in 1999 and 30% (18 of 61) in 1998. Unexclosed nests in the 2000 nesting season were a complete loss (21 of 21), similar to 1999 (9 of 9) and 1998 (16 of 17). Nest failures were attributed to unknown predation of the eggs (19%), unknown cause (19%), corvid predation (15%), abandonment (13%), depredation of adult by an avian predator (13%), wind (10%), overwash (6%), skunk predation (2%), infertile eggs (2%) and red fox (*Vulpes vulpes*) predation (2%) (Tables 6 and 7).

Unknown predation and unknown cause were the most frequent causes of nest failure in 2000, with 12 failing in each case. Following the depredation of adult plovers at CBNS in early May we did not exclose any additional nests until 14 June because we were concerned about additional depredation of nesting adults. During this time six nesting attempts were made on the 94HRA; all failed, including four due to unknown predation. This contributed to the high number of failures due to unknown predators.

Corvid predation was the third most frequent cause of nest failure in 2000. Abandonment accounted for 13% of the nest failures this season. Eight nests were abandoned at six different sites this year, including five which were one-egg nests that the adults never completed clutches or attended the nest.

Depredation of an adult plover by an avian predator also accounted for 13% of the nest failures this season. At CBNS we concluded that probably 10-11 adults were depredated from nine active exclosed nests on the South Spoil and the 94HRA. Beginning on 5 May, one adult (possibly both in one case) from each of the nine active nests was probably depredated by an avian predator. The first nest to experience problems is not included in this category because it actually hatched, probably due to incubation by the female and perhaps aided by moderate ambient air temperature. The male did not attend to the hatched chicks nor did the female. It appeared the male may have been depredated a day or two before the nest was due to hatch. We found some evidence of ravens just outside the exclosure and believe the chicks wandered out of the exclosure and were probably depredated. The remaining eight nests failed between 5-13 May. The eggs of these nests were not depredated, and we found evidence of depredated plovers in or near four of the eight nests. The adult plovers associated with these nests were all banded except for one female. Ten of the banded adults were not recorded again for the remainder of the nesting season.

Ten percent (6 nests) of the nests failed this year due to burial by wind blown sand, all occurring between Sutton Beach and Tahkenitch. Four nests failed due to overwashing, accounting for six percent of the nest failures. All four of these nests failed the first week of May when high tides were over seven feet.

Skunk predation, red fox predation, and infertility caused the failure of one nest each, or two percent of the total number of nests that failed. The nest that was predated by a skunk was exclosed and was within approximately two days of hatching. We also noted predation of a Semipalmated Plover (*Charadrius semipalmatus*) nest on the 94HRA at CBNS. A skunk depredated the nest within 24 hours of the expected hatching when the eggs were all cracked and the chicks were heard chirping in the eggs on the last nest check. The chirping sounds of the soon to hatch chicks may have attracted the skunk. At that time skunks were digging under the fence erected around the 94HRA, but as the holes were repeatedly filled in the skunks repeatedly dug more holes.

Fledgling Success

We monitored 40 broods in 2000, including two broods from undiscovered nests, compared to 45 broods in 1999 and 44 broods in 1998. We confirmed 40 fledglings for the 2000 nesting season compared to 53 in 1999 and 32 in 1998 (Table 8). Fledgling success was 38% in 2000 compared to 43% in 1999 and 28% in 1998 (Table 9). There was a one to one ratio of number of broods monitored compared to number of chicks fledged. Three sites had fledgling success over 50%: Tahkenitch (83%), Overlook (63%) and South Spoil (50%); however the number of broods at each of these sites was three or less. The remaining sites had fledgling success rates ranging from 18-37% (Table 10).

Sutton produced three fledglings this year. North Siltcoos did not produce any fledglings this year but South Siltcoos produced seven. Overlook produced five fledglings, as did Tahkenitch. Although collectively the sites at Coos Bay North Spit produced eight fledglings, the highest number of fledglings for any beach in 2000, this was the lowest number of fledglings since 1990. New River declined again with just five fledglings confirmed from 17 known nests. Floras Lake produced two fledglings this year.

Brood Movements

We recorded at least four locations (including the nest site) for 24 successful broods at eight different nesting areas on the Oregon coast in 2000 (Table 11). The mean maximum distance moved from the nest site was 931 m, with a SD of 875 m. The mean area and perimeter of the minimum convex polygon (MCP) formed by the GPS'd observations was 8.5 ha (SD=8.2) and 2428 m (SD=2195). The mean results from 1999 were reported slightly incorrectly in the 1999 annual report (Castelein et al. 2000). The correct means for 1999 are 1196 m for maximum distance from the nest, and 10.0 ha and 2691 m for the area and perimeter of the MCPs. The data for each brood was listed correctly.

1999 Hatch-Year Returns

Thirty-one of the 53 hatch-year 1999 plovers returned to Oregon this year. This 58% return rate this year is similar to the return rate in 1999 (56%), but the actual number of plovers returning this year was higher because more fledglings were produced in 1999 than 1998 (31 of 53 plovers compared to 18 of 32). Return rates for the past two seasons are higher than previous years, including 1998, when only 14 of 42 (33%) 1997 hatch-year (HY) birds returned. Of the returning '99HY birds, 17 were female and 14 were male (Table 12). Eighty-one percent of the returning '99HY birds nested, and they accounted for 25% (25 of 102) of the banded adults.

Sightings of Snowy Plovers Banded Elsewhere

Six females banded in California were observed in Oregon in 2000. Four of the females were present throughout the nesting season and successfully nested and fledged

young. One female was a '99HY bird from Humboldt Co., CA. She was first noted at Tahkenitch on 11 April, and soon moved to Siltcoos where she was rebanded on 25 May on a nest. She remained at Siltcoos throughout the summer, nesting twice, and was last recorded on 25 July at Siltcoos. Another female was banded while nesting on 19 May at Eel River, Humboldt Co., CA. She was first observed in Oregon on 6 June at Tahkenitch where she nested twice. A third female arrived at New River on 29 May, had one nest, and was last recorded at New River on 8 July. The fourth female arrived at New River on 16 May, then moved south and nested north of Floras Lake along the beach adjacent to New River. She was last recorded at Floras Lake on 30 June. The fifth individual was a '98 HY bird from South Tenmile and was rebanded in California in 1999. She wintered at Sutton, apparently leaving sometime in spring and returning to Oregon on 11 Aug at Tenmile. She then moved north to Siltcoos and was last recorded on 10 Sept. The sixth female was banded at Eel River, Humboldt Co. on 3 July and was recorded only once at Bandon Beach on 28 July.

Discussion

The 1999-2000 winter was relatively mild along the Oregon coast. Most wintering plovers were observed at the same location throughout the monthly winter surveys (Lauten et al. 2001) and dispersed to breeding sites in March and April. Due to mild weather, nest initiation was earlier this year, although the success of these early nests was extremely low.

Abundance

The estimated population of adult plovers in 2000 was higher than in 1999, reflecting the high 1999 hatch year return rate. The increasing number of plovers at some of the northern nesting sites is the partially the result of hatch year return plovers utilizing these areas. However, the 109 plovers present on the Oregon coast this year were still well below the peak of 141 documented in 1997. Unfortunately the apparent depredation of adult plovers further reduced the number of adult plovers during the summer, which was most noticeable in the mean number of plovers recorded at CBNS.

Nesting Activity

The 100 nests found during the 2000 nesting season were the most found in one year since our study began in 1990 (Table 3). The high number of nests is explained largely by the high rates of nest failure which led plovers to make multiple nesting attempts.

A combination of sand accretion on the north spits and meandering of river mouths at Berry Creek (Sutton), Siltcoos, Tahkenitch, and Tenmile, created more expansive and improved nesting habitat on the north spits. Plovers continue to increase their nesting attempts at Sutton Beach, partially due to the increased use of Sutton by hatch year returns. The habitat north of Berry Creek improved substantially after the

winter season, resulting in increased nesting attempts in this area, including all three of the successful nests. Due to its location and the area being roped off, it provided a nesting area with little human and dog traffic. It is unclear which side of Berry Creek the brood from the undiscovered nest came from, although we suspect it was towards Holman Vista. The three fledglings produced were the highest total documented for Sutton, which had previously only produced up to one fledgling each year.

Siltcoos continues to present some of the most difficult management issues. Plover numbers and use of Siltcoos remains high, and they continue to nest in all available areas including further south along the beach than in previous years. The two nests that were located on the South Spit near the Waxmyrtle Trail beach access point were in close proximity to high recreational use, and the potential disturbance problems presented an especially difficult management challenge. One of these nests was successful, in part due to a closure of the trail during hatching.

The number of nests at the Overlook increased as the plovers continued to colonize newly created nesting habitat. Additional habitat restoration is scheduled to continue over the next few years for this site, and we believe plovers will continue to use this area, and begin to nest in the southern clearing.

The increase in plovers nesting at Tahkenitch is encouraging considering the sharp decline this site experienced since 1996. However, most of the plover use was on the enlarged north spit where nesting has not been previously documented, and the one brood from the south spit crossed to the north spit after hatching. The habitat on the south side of the creek still appears capable of supporting an increase in use by the plovers, providing existing conditions are maintained.

The overall decrease in both nesting and fledging at Tenmile could in part be due to degradation of existing habitat on the South Tenmile Spit. Over the past few years European beachgrass and other vegetation has been filling the mouths of overwashes permitting sand to accrete and closing off the overwashes to winter storm activity. The habitat needs to be aggressively maintained at Tenmile which has proven to be a productive site. The low levels of disturbance at this site makes it especially valuable as a nesting and brood-rearing area.

Plovers nesting in close proximity to each other increases activity levels near nests and potentially attracts the attention of predators. The loss of eight to nine nests during a short time interval at CBNS was probably due to one predator focusing their hunting around the exclosures that were protecting the nests at the time. After failing several times, the plovers gradually moved into other available habitat to renest, indicating the importance of having large areas available for the plovers to use. Without the available habitat adjacent to their preferred nesting area, the plovers would not have had the opportunity to attempt to renest in areas where predation pressure was potentially lower. The predation problems at CBNS also indicate the importance of having nesting plovers more widely distributed, helping reduce the level of plover activity around each nest.

Bandon Beach is one of the main wintering areas for plovers, especially at the south end of their range on the Oregon coast (Lauten et al. 2001). However, plover nesting continues to be minimal at Bandon and each spring the plovers disperse to New River and other nesting sites. Nevertheless, plovers do continue to attempt to nest near the China Creek area and south along the foredune. Human use of the area by attendees of the Christian Camp and the general public continues to be high. Further cooperation with the Christian Camp will help minimize disturbance in this area.

At New River, the decrease in the number of nests found compared to other sites is partially due to the continuing decrease in the number of individual plovers at this site over the past four years. The mean number of plovers has declined from 1997 to 2000 (18.64, 17.22, 11.28, and 8.32 respectively) despite ongoing habitat restoration. We believe the decrease in the numbers of plovers nesting here may be due to high predation rates of plovers and poor fledgling success, possibly caused by the red fox population at New River. The continuing enhancement of habitat adjacent to Storm Ranch has restored overwashes and cleared vegetation on large dunes creating plover nesting habitat. The plovers responded to the newly created habitat, particularly midway through the nesting season when four nests were found, including one at the very south end of the HRA. While the increased habitat permits the plovers to nest in more widely distributed areas, removal of the fox will be needed to increase nesting and fledgling success and possibly increase adult survival.

The habitat along the north portion of Floras Lake was excellent this past year and it was encouraging to have an increase in the number of nesting plovers and the first successful fledglings since 1997. The plovers utilized the two large overwashes at Floras Lake adjacent to the confluence of Floras Creek/New River. One nest was found north of the overwashes at Floras Lake on one of a series of beach shelves adjacent to New River in an area not known to have nesting plovers in previous years. Floras Lake remains an important nesting site and we believe it is beneficial to the plovers to distribute their nesting attempts to potentially increase overall success by decreasing the density of nests and activity in one area. Ropes and signs should also be posted early in the season prior to nesting along the state regulated northern overwash areas to help reduce disturbance and protect the nesting areas.

Nest Success and Failure

Mayfield nest success of exclosed nests continues to be greater than that of unexclosed nests. However, we experienced higher rates of nest failure for exclosed nests this year compared to the 10 year mean. Exclosures have been used for 11 years and the low Mayfield nest estimate for exclosed nests is partly a reflection of predators becoming more familiar with exclosures and learning how to get inside. Lower nest success was also due to the depredation of nesting adult plovers. Again, it is probable that some predators are learning that plovers are associated with exclosures and are targeting the adults that are tending to the exclosed nests. Unexclosed nests also did very poorly this year, as all 21 failed, including 15 due to predation of the eggs.

Avian depredation of either the eggs or an adult plover accounted for 27% (17 of 62) of the known causes of nest failures in the 2000 nesting season (Table 6). Beginning in 1995 corvids “episodically” depredated multiple nests at a given site. In 1995, 10 nests were depredated at Bandon and New River in a five-day period of time; eight of them were exclosed. Since then, Tahkenitch, Siltcoos, Bandon and New River have all experienced similar events. Usually multiple nests are destroyed in a short window of time. Due to these predation events we have attempted to reduce the opportunity for corvids to enter an exclosure. Depredation of an incubating adult Snowy Plover has been documented in previous years, but typically only one or possibly two incidents in a given year. In past years we have recorded depredations of adult plovers with some evidence suggesting avian predators. This year we believe avian predators at CBNS depredated 10-11 adult plovers and we suspect another 2-4 adult plovers were depredated elsewhere. Although we cannot confirm the specific avian predator, we suspect a falcon, perhaps a migrant Merlin (*Falco columbarius*) was the most likely culprit.

When exclosed and unexclosed nests began experiencing high rates of depredation, we evaluated some options and contacted Wildlife Services of the Animal and Plant Health Inspection Service (APHIS) personnel to request assistance setting up “hot wires” on the exclosures. We believe this may be a useful tool to deter predation of exclosed nests but we began using it once a problem was already identified. When we had documented corvid predation events in past nesting seasons, they appeared to occur sporadically and often happened once per season at a given site. This made it difficult to evaluate whether the hot wire system worked or whether the corvids were just not visiting the exclosures. Nevertheless, eight of nine nests with hot wire systems were successful, and the one nest that failed had a dead battery. This suggests that the hot wire system may be useful in keeping corvids out of exclosures. A negative aspect of this system is the time it takes to set up which is additional time spent around the nest. The mean time to set up an exclosure and hot-wire this year was two hours and one minute with times ranging from 77 minutes to three hours and twenty minutes. For nests where the exclosure set up time was longer than normal, the hot wires were added later in the day to minimize the period of time the adults were away from the nest at one time.

Of seven nests with blueberry netting, two failed, one by an unknown predator and one by unknown cause. Again it is difficult to assess whether the blueberry netting was actually helping to keep the corvids out of the exclosures. All four of the chicken wire nests failed due to unknown cause. Unfortunately we cannot determine whether the chicken wire was failing to prevent corvids from entering the exclosures or whether some other cause was responsible for the failures. Placement of three fake dead crow decoys at North Siltcoos appeared to have little effect on the movements and presence of crows in the area, although it was difficult to assess the effects, as no more plover nests were found in the area where the crow decoys were placed. The sample sizes for all modified exclosure types and the crow decoys were neither large enough nor systematic enough to fully evaluate each method.

Red fox also appear to be having an impact on the plover's reproductive success, in particular from Bandon Beach south to Floras Lake. Three red fox dens were found this year in the dunes parallel to New River. Two of the dens were found on BLM property in Coos Co. (Fig. 10), and the third den was on private land in Curry Co. between the New River and Floras Lake nesting areas (Fig. 11). One of the dens on BLM land was in the dunes between two overwashes, and at that time one nest was located in both the overwash to the north and to the south of the den. The other den on BLM land was located approximately 50 meters from an active nest, under a large driftwood log in the habitat restoration area across from the Storm Ranch boat launch. The third den was found by following two red fox pups into the dunes after stopping to investigate the large number of fox tracks along the edge of the foredune. The den was at the top of a large dune. The pups were seen the following day also. All three dens were photographed and slides were given to BLM personnel for documentation. In the past three years we have documented evidence of red fox circling around plover nest exclosures and being harassed by adult plovers. During the 1999 nesting season APHIS personnel removed 17 red fox from the New River area. We have also documented the decline in nesting activity and the overall abundance of plovers at New River and the adjacent sites. We believe red fox are having a negative impact on the plovers and to increase the plover population the red fox population must be removed from any plover nesting beach.

Twelve nests failed due to unknown causes in 2000. These nests were put in this category when eggs disappeared prior to the hatching date without any evidence of what happened. The most probable reasons for the eggs disappearing are predation and burial by wind-blown sand. Often we are able to find eggs after they have been buried by blowing sand and uncover them, but sometimes they get buried too deep, or are moved by the incubating plovers and the wind far enough that we do not find them until the winds shift and they are uncovered weeks later. However, it is important to note that we do not know the actual cause of failure for some of the nests. For instance, the six nests which were classified as failing due to wind, or burial by blowing sand, may have actually failed because something caused the incubating adult to leave the nest for a short period of time while it was windy, and the nest was then buried. If we found the buried eggs, we listed that as the apparent cause, although the nest may have survived if the adult had not left due to a human or predator being near the nest. Similarly, it is often unclear what causes adults to abandon a nest, which happened to five one-egg nests and three full clutch nests in 2000.

Fledgling Success

This year more fledglings were produced on the northern half of the study sites compared to the southern sites for the first time since this project started in 1990 (Table 8). The number of plovers at the northern sites has increased per site correlating to an increase of nesting attempts and therefore an increase in the potential number of fledglings. Reasons for the low number of fledglings at CBNS can be attributed primarily to poor nest success and loss of adult plovers to predators. Importantly, not only did these nests fail at CBNS, but the loss of the adults meant fewer renesting efforts

at this site. At New River declining numbers of adult plovers has translated into fewer nesting attempts, and in conjunction with poor fledgling success probably due to high predation rates, has resulted in few fledglings produced.

One brood in the 2000 nesting season at Sutton appears to have been “adopted” which has happened in previous nesting seasons but is a rare occurrence. The original male of the brood was observed on the beach but was not tending to the chicks post hatching. At the same time another male was broody and he was later observed with a chick from this brood. This chick fledged but never associated with the original male who did not behave broody during the entire time period. Another brood during the 2000 nesting season was reared by the female of the nest. The male was seen a few times after the nest hatched but he never exhibited any brood like behavior. The female was broody throughout the rearing time period and one chick fledged.

Brood Movements

The distances and areas for brood movements in 2000 were similar, although smaller, than those observed in 1999. However, in 1999 the two broods from the Overlook Clearing both traveled to different nesting areas soon after hatching, and thus had the furthest movements and largest MCPs. In 2000 the 3 broods tracked at Overlook stayed at this nesting site, and this partially explains the lower numbers in 2000. For instance, without the Overlook broods in 1999, the mean maximum distance broods were observed from the nest was 903 m, very close to the 933 m observed in 2000.

The large SDs for all three measurements show both how each brood differs from another, as well as the fact that we only observed a fraction of each brood’s locations during the 28 days before they fledged. An example of how much the broods can differ in their movements is seen at New River in 2000, where brood 678 moved the furthest from their nest (3142 m), and brood 279 stayed closest to the nest (64 m). Brood 678 moved south at least 1000 m seven days after hatching, and was found over 4 km north of that point 13 days later. Conversely, Brood 679, which was tended by the female only, stayed near it’s nest site, with only one of the seven observations being more than 40 meters from the nest.

Habitat Restoration and Development Projects

The habitat restoration on the USFS Dunes NRA was minimal in 2000. Due to the National Guard being called upon to help fight forest fires, no further bulldozing was completed on the Overlook project which began in 1998. However, prison crews were brought in after the 2000 breeding season to hand pull the beachgrass growing up in the northern clearing. Currently, approximately 0.75 miles of beach grass has been removed by burning and bulldozers. The ultimate goal of the project is to clear 516 acres to open dunes two miles south towards Tahkenitch Creek, allowing the natural movement of sand and to create plover habitat. The results from the 1999 and 2000 nesting seasons show that if the habitat becomes available, the plovers can and will respond.

At Tahkenitch, the contractor hired by the USFS to spray herbicide on the European beachgrass completed his 1999 contract by spraying one application on the South Spit after all nesting and brood activity had ceased in the fall of 2000. Plans for additional spraying by the Forest Service at Tahkenitch and Tenmile were cancelled due to budget and/or personnel constraints. No restoration activities occurred at Sutton, Siltcoos, or Tenmile.

Starting in the late 1980's the BLM actively began managing habitat for Snowy Plovers on Coos Bay North Spit in conjunction with the Army Corp of Engineers and ODFW. In the early 1990's the BLM began to experiment with removal of beachgrass in some areas adjacent to the South Spoil. These areas were extensively expanded starting in 1994 when approximately 50 acres of land was cleared adjacent to the South Spoil on the west and north sides. At that time the two areas combined equaled ca. 70 acres. The following year 35 acres of land was cleared and managed for Snowy Plovers. Since that time annual work has been completed to further improve nesting and brood rearing habitat. Disking, bull dozing, hand pulling and herbiciding are methods the BLM has used in conjunction with Army Corps and ODFW to control European beachgrass. In winter 1998-99, the BLM obtained funding to create an 60 additional acres to be managed for Snowy Plovers: 30 acres adjacent to the 1995 HRA on the west side of the foredune road and 30 acres on the east side of the foredune road north of the 1994 HRA. After the New Carissa wreck, the Responsible Party help contribute to the completion of the clearing of the additional acreage. In total, 165 acres of land are co-managed on CBNS for Snowy Plovers by the BLM, ODFW and the Army Corps of Engineers.

During the winter and early spring of 1999/2000 disking was completed twice on the '94HRA and '95/'98HRA. On the east portion of the '98HRA large piles of vegetation were burned and approximately 40% of the area was disked. Herbicide was applied to the South Spoil in the fall of 1999. There was no application of oyster shells in 1999 for the 2000 nesting season but the oyster shells from the past two years remained on the surface even after two diskings. The BLM has, as of January 2001, completed all the additional work on the 98HRA. In addition, more oyster shells were obtained and spread on the HRAs during the fall of 2000. Oyster shells may only have to be applied every two or three years to maintain an adequate exposed amount to attract nesting plovers.

Habitat restoration was started at New River in 1998 in the area due west of the BLM Storm Ranch boat launch. A bulldozer widened some of the existing overwashes that were beginning to fill in due to European beachgrass, directly creating nesting habitat and lowering the opening of the overwashes. Ocean water from winter storms and high tides enters the overwashes, maintaining the open areas for nesting. In the fall of 1999 the area was expanded to cover approximately 20 acres of land.

Recommendations

Signing of Restricted Areas

Signing and roping for the 2001 nesting season should again be implemented as needed to inform the public of sensitive areas. Annually, improvements are made in an attempt to make the wet and dry sand restrictions less confusing to the public. Signing and roping methods are important tools to restrict public use in and around the plover nesting areas. Each year there is some level of confusion by the public pertaining to where they can recreate. Continued refinement may help alleviate some of the problems. Annually, at the onset of the nesting season each site should be evaluated to determine how much signing and roping is necessary depending on the structure of the beach that season. To maximize the effectiveness of the signing and restricted areas and minimize disturbance to nesting birds, signs and ropes should be put into place by 15 March at most sites and should be replaced as quickly as possible when necessary. Regular periodical checks and maintenance of signs would indicate to the public that the area is being closely monitored and may deter them from violating restrictions.

Human activity near nesting areas continues to raise concerns as to the success of Snowy Plover nests and their young. High and/or increased human use at certain sites continues to challenge management recommendations for habitat restrictions. Many people obey the restricted area, but use the area adjacent to the signs. The Forest Service continues to use the 200 foot buffer zones at Siltcoos, but it still leads to confusion on the part of the public. Many people walk up to the sign to read it and are at that point within the buffered zone. Carsonite signs should continue to be used as a management tool to inform people of the restrictions. During high tides water came up to the signs making it difficult for the public to follow the restrictions. Signs and ropes must be moved multiple times during the breeding season to account for changes in tides and enlargements of the areas used by the plovers. This both costs time and money for the USFS and ONHP biologists, as well as causing the plovers to be off active nests when disturbed. Current management techniques are expensive and enforcement has been very difficult. We recommend for the 2001 nesting season that both spits at Siltcoos be entirely closed to prevent recreationalists from walking around and through plover nesting areas. At other nesting areas, we continue to recommend partial closures where people should not enter, taking high tide lines into account.

General Recommendations

Below are general recommendations. We also provide additional site specific comments and management recommendations in Appendix B.

- Maintain and expand habitat restoration areas
- Continue the use of predator exclosures around nests but consider alternative exclosures and the extent of their use
- Pursue ideas related to both avian and mammalian predator control
- Continue predator control of red fox at New River

- Continue to coordinate with federal agency employees regarding any restoration work to be completed to minimize disturbance to nesting activity and broods.
- Coordinate any agency activities in closed areas with plover biologists
- Continue and explore ideas to document and monitor human disturbance by various recreational users in plover nesting areas.
- Continue and expand volunteer site monitoring program.
- Expand outreach programs to enhance community awareness and involvement.
- Continue intensive breeding season monitoring, at least until plover numbers have reached the goals to be established in the USFWS Recovery Plan for Snowy Plovers.

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Table 1. Population estimates of the Western Snowy Plover on the Oregon Coast, 1990-2000.

YEAR	WINDOW SURVEY	# SNPL BREEDING	# SNPL PRESENT
1990	59	-	-
1991	35	-	-
1992	30	-	-
1993	45	55-61	72
1994	51	67	83
1995	72	94	120
1996	86	110-113	134-137
1997	85	106-110	141
1998	63	75	97
1999	52	77	95-96
2000	no survey	89 ^a	109 ^a

^a - includes 13-15 adult plovers that were depredated during the breeding season

Table 2. Distribution and abundance of adult Snowy Plovers along the Oregon coast during the 2000 breeding season.

Site Name	Mean (x)	SD	Range	# Surveys (n) ^a	Date(s) of Peak Count	Dates of Surveys
Sutton Beach	6.95	3.54	2-14	19(36)	22 Aug	6 April-30 Aug
Siltcoos:						
North Spit	9.57	5.46	2-20	21(32)	29 Aug	7 April-10 Sept
South Spit	7.82	4.80	1-18	22(54)	10 June	7 April-9 Sept
Overlook	4.00	1.76	1-8	25(43)	7 June	8 April-9 Sept
Tahk. Creek to Umpqua R.:						
N. Tahk. Spit	2.57	1.94	0-7	21(30)	13 July	11 April-5 Sept
S. Tahk. Spit	0.33	0.84	0-3	18(21)	13 July	11 April-17 Aug
Tenmile:						
North Spit to Umpqua R.	1.81	2.84	0-9	21(29)	9 Sept	12 April-9 Sept
South Spit	5.82	5.41	0-19	28(34)	26 Aug	5 April-15 Sept
Coos Bay N.S.:						
South Beach	4.50	3.35	0-15	32(34)	26 April	15 April-29 Aug
South Spoil	2.13	2.46	0-9	31(42)	1 May	12 April-29 Aug
HRA '94	3.84	2.90	0-11	31(50)	15 May	12 April-29 Aug
HRA '95	0.33	0.58	0-1	3(23)	23 May	15 April-11 Aug
Bay Beach	0.00	0.00	0	7(7)	-	15 April-11 Aug
Bandon	2.33	1.96	0-6	21(39)	22 Aug	10 April-30 Aug
New River	8.32	3.56	0-13	25(55)	16,21,24 May 3 June	11 April-23 Aug
Floras Lake/New River Breach	1.13	1.55	0-5	15(39)	11 July	10 April-25 Aug

^a – first number is total number of complete surveys, number in parenthesis is total number of visits to the site

Table 3. Total number of nests for all sites on the Oregon Coast 1990 – 2000; cells tally nests only and not broods from undiscovered nests. The number of broods from undiscovered nests is totaled for each year and site only.

Site Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total # nests	Total # broods ^a
Necanicum													1
Sutton Beach				2	1	2	6	14	8	3	7	43	1
Siltcoos:													
North Spit				0	2	4	2	0	1	4	8	21	0
South Spit				1	2	2	1	3	3	17	14	43	0
Overlook										2	8	10	0
Tahkenitch:													
North Spit				0	0	0	0	0	0	0	4	4	0
South Spit				0	3	9	18	14	6	3	1	54	1
Threemile Creek/Umpqua River				0	0	0	1	0	0	0	0	1	0
Tenmile:													
North Spit					2	2	1	0	0	0	1	6	0
South Spit	2	0	9	8	5	4	3	2	11	5	5	54	2
Coos Bay North Spit:													
South Beach	0	4	6	3	4	3	3	6	6	0	1	36	9
South Spoil	20	9	4	6	9	12	22	14	5	2	5	108	13
North Spoil	5	1	1	0	0	0						7	0
Habitat Rest. Areas					4	3	2	3	7	12	22	53	8
Anad. Spoil	0											0	1
Menasha, N.Bend	1	0										1	0
Bandon	0	14	8	10	5	9	3	4	1	2	2	58	2
New River Spit	6	6	2	0	6	20	18	25	26	28	17	154	6
Floras Lake/ New River Overwash	2	2	6	11	8	6	9	8	4	0	5	61	3
Total nests	36	36	36	41	51	76	89	93	78	78	100	714	
Total broods^a	2	1	5	7	4	6	11	5	3	1	2		47

^a – broods from undiscovered nests only; these broods are not tallied in the total number of nests

Table 4. Nest Success (Mayfield Method) of Snowy Plovers on the Oregon coast, 1990-2000.

Year	Overall ¹	% Nest Success		(N) ¹	(N) ²
		Exclosed ²	Unexclosed ²		
1990	12	- ³	13	(36)	(29)
1991	23	77	5	(36)	(33)
1992	54	80	9	(36)	(34)
1993	55	77	16	(41)	(39)
1994	74	76	68	(51)	(48)
1995	43	62	5	(76)	(71)
1996	48	66	7	(89)	(87)
1997	43	52	24	(93)	(88)
1998	50	70	15	(78)	(70)
1999	51	62	40	(78)	(72)
2000	32	46	2	(100)	(91)
mean	44.1 ± 16.8	66.8 ± 11.4	18.5 ± 19.6	(714)	(662)

¹Overall includes exclosed nests, unexclosed nests, infertile nests, and nests with one egg that were subsequently abandoned.

²Does not include infertile nests or nests with one egg that were subsequently abandoned because the outcome of these nests was not affected by the presence or absence of an exclosure.

³Exclosed nests not included as multiple experimental designs were employed.

Table 5. Nest Success of Snowy Plovers on the Oregon Coast, 2000.

		NESTS EXCLOSED		NESTS NOT EXCLOSED	
SITE NAME	Total #	Hatch	Fail	Hatch	Fail
Sutton	7	3	3	0	1
Siltcoos:					
North Spit	8	0	5	0	3
South Spit	14	7	6	0	3
Overlook '98 Clearing	8	3	4	0	1
Tahkenitch:					
North Spit	4	1	3	0	0
South Spit	1	1	0	0	0
3mi. Ck. - Umpqua R.	0	0	0	0	0
Tenmile:					
North	1	1	0	0	0
South	5	4	0	0	1
Coos Bay North Spit:					
South Beach	1	0	1	0	0
South Spoil	5	2	2	0	0
Habitat Restoration Areas	22	6	7	0	10
Bandon	2	0	2	0	0
New River	17	6	8	0	3
Floras Lake	5	4	0	0	1
TOTALS	100	38	41	0	21
% Success of known fate nests:		Nests Exclosed		Nests Not Exclosed	
Apparent		48		0	

Table 6. Causes of Snowy Plover nest failure at survey sites along the Oregon coast, 2000.

Site Name	Total Nests	# Fail	Depredation					Other				
			Egg Depredation				Adult Depredation	Wind	Over wash	Infertile	Abandon ^a	Unk cause
			Corvid	Unk	Skunk	Red Fox	Avian					
Sutton	7	4						2			2	
Siltcoos:												
North	8	8	2	1				1	3		1	
South	14	7	1									6
Overlook	8	5						1			2	2
Tahkenitch:												
North	4	3		1				2				
South	1	0										
Tenmile:												
North	1	0										
South	5	1	1									
Coos Bay North Spit:												
South Beach	1	1								1		
South Spoil	5	3					3					
HRAs	22	16	3	6	1		5				1	
Bandon	2	2	1									1
New River	17	11	1	4		1			1		1	3
Floras Lake	5	1									1	
TOTALS	100	62	9	12	1	1	8	6	4	1	8	12

^a includes 5 one-egg nests (clutches never completed)

Table 7. Cause of failure for Snowy Plover nests protected by predator exclosures and nests unprotected by predator exclosures along the Oregon coast, 2000.

Cause of Failure		Exclosed	Unexclosed	Totals
Egg Depredation	Corvid Predation	2	7	9
	Unknown Predation	5	7	12
	Skunk Predation	1	0	1
	Red Fox Predation	0	1	1
Adult Depredation	Avian Predation	8	0	8
Other	Wind	6	0	6
	Overwash	4	0	4
	Infertility	1	0	1
	Abandoned ^a	2	6	8
	Unknown Cause	12	0	12
Totals		41	21	62

a – includes 5 one-egg nests (clutches never completed)

Table 8. Total number of young fledged for all sites on the Oregon Coast 1990-2000; includes fledglings from broods from undiscovered nests.

Site Name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTALS
Necanicum											1	1
Sutton							0	1	1	0	3	5
Siltcoos:												
North Spit					0		0	0	2	4	0	6
South Spit					1	2	0	0	4	2	7	16
Overlook '98 clearing										3	5	8
Tahkenitch												
North Spit											2	2
South Spit					1	12	8	7	1	1	3	33
Tenmile:												
North Spit					0	1	0	0	0	0	0	1
South Spit			14	7	3	3	4	4	3	7	4	49
Coos Bay North Spit:												
South Spoil	3	2	4	13	17	17	22	9	6	5	3	101
South Beach		11	9	2	6	2	2	7	2	0	0	41
Habitat Rest. Areas					7	2	1	1	1	22	5	39
Bandon		1	1	3	5	0	1	0	1	1	0	13
New River Spit			4	0	7	12	8	9	11	8	5	64
Floras Lake/ New River Overwash	0	2	1	11	9	6	1	3	0	0	2	35
TOTALS	3	16	33	36	56	57	47	41	32	53	40	414

Table 9. Overall Mayfield nest success, fledgling success and total number of fledglings on the Oregon Coast, 1990 – 2000.

Year	% Nest Success ^a	% Fledgling Success ^b	# Fledglings ^c
1990	12	11	3
1991	23	45	16
1992	54	41	33
1993	55	42	36
1994	74	50	56
1995	43	50	57
1996	48	32	47
1997	43	31	41
1998	50	26	32
1999	51	43	53
2000	32	38	40
	Mean = 44.1±16.8	Overall = 38	Total = 414

^a – Overall Mayfield Success from Table 4

^b – does not include fledglings from broods from undiscovered nests

^c – total number of fledglings including from broods from undiscovered nests

Table 10. Fledging and Brood Success of Snowy Plovers on the Oregon Coast, 2000.

Site Name	Total # Broods*	% Brood Success*	Total # Eggs Hatched	Min. # Fledged		% Fledging Success**
				From Known Nests	From Undiscovered Nests	
Necanicum	1	100	?	0	1	-
Sutton	4	50	8	3	0	37
Siltcoos:						
North Siltcoos	0	-	-	-	-	-
South Siltcoos	7	71	19	7	0	37
Overlook '98 Clearing	3	100	8	5	0	63
Tahkenitch:						
North Spit	1	100	3	2	0	67
South Spit	1	100	3	3	0	100
Tenmile:						
North Spit	1	0	3	0	0	0
South Spit	4	50	11	4	0	36
Coos Bay N. Spit						
South Spoil	2	100	6	3	0	50
South Beach	0	-	-	-	-	-
HRA	6	50	17	5	0	29
Bandon	0	-	-	-	-	-
New River Spit	6	50	14	5	0	36
Floras Lake/New River Overwash	4	50	11	2	0	18
TOTALS	40	63	103	39	1	38
TOTAL FLEDGED				40		

% Brood success = # broods with at least 1 chick fledged / total # of broods

% Fledging Success = # of young fledged / # of eggs hatched

* Includes broods from undiscovered nests:

** Does not include fledglings from undiscovered nests because we do not know how many eggs hatched from those nests.

Table 11. Observations of Snowy Plover brood locations along the Oregon coast in 2000.

Site	Brood Number	Number of Locations	MCP Area (ha)	MCP Perimeter (m)	Max. Distance From Nest (m)
Sutton	617	5	2.9	911	373
Sutton	688	7	10.1	3004	1177
Sutton	701	7	11.1	2689	1293
South Siltcoos	670	6	2.2	877	279
South Siltcoos	689	9	6.0	1306	612
South Siltcoos	704	10	18.8	2426	657
South Siltcoos	706	8	4.6	908	267
Overlook	668	9	4.4	1318	389
Overlook	708	8	4.1	1457	503
Overlook	713	9	3.6	1546	600
Tahkenitch	703	5	1.2	552	247
North Tenmile	714	4	8.9	1994	564
South Tenmile	651	5	15.0	2110	999
South Tenmile	705	6	2.4	655	240
CBNS - South Spoil	684	7	0.7	839	418
CBNS -South Spoil	694	8	6.3	1033	379
CBNS -South Spoil	699	7	4.6	1101	274
CBNS -HRAs	696	9	37.6	5705	1608
CBNS -HRAs	698	7	9.8	1641	734
New River	677	8	20.4	5048	2492
New River	678	8	14.7	8309	3142
New River	679	8	0.1	185	64
Floras Lake	690	8	7.4	6385	2791
Floras Lake	695	5	7.0	6282	2236
	Mean	7.2	8.5	2428	931

Table 12. 1999 hatch year Snowy Plovers that returned to the Oregon coast in 2000.

Chick Combos	New Combo	Sex	1999 Banding Location	2000 Location(s) ^a	2000 Nest
A/B:B		F	South Spoil	SB/4,HRA/5	Yes
A/W:B		F	HRA	HRA/4,SB/4,SS/5	Yes
A/W:B		F	HRA	HRA/4,SB/4	Yes
A/Y:B	LR:YB	F	Tenmile	SU/4	Yes
A/Y:G		F	South Spoil	NR/4	Yes
A/Y:G		M	South Spoil	SB/4,HRA/4,SS/5	No
B/A/B:B	LB:WB	M	Siltcoos	SI/4	Yes
B/A/B:B	LB:YB	M	Siltcoos	TM/4	Yes
B/A/B:G		F	New River	SU/4	No
B:B		F	Unknown	SB/4,HRA/4,SS/5	Yes
BR:B		M	HRA	SI/4,OV/6,TA/9	Yes
BR:B		M	HRA	SB/4,HRA/5,SS/5, BB/6,NR/6	Yes
BW:B		F?	Siltcoos	SB/7,SS/7,TM/7	No
GL:B		F	HRA	SB/4,HRA/4,SS/5, NR/6	Yes
GL:B		F	HRA	HRA/5,SS/5	Yes
GR:B		M	Tenmile	SI/4	No
L/G/L:B		F	New River	SI/7,TM/6,BB/6, NR/4	No
L/Y/L:B	BR:AW	F	HRA	SU/4,SI/5	Yes
L:B		F	Unknown	OV/4,TA/4	Yes
R/A:B	LB:BR	M	New River	TA/4,OV/4	Yes
R/A/R:B	BR:AY	M	New River	BB/8,NR/4	Yes
R/A/R:G		F	Takhenitch	SU/7	No
RB:B	LB:LB	M	Overlook	SU/4,SI/9	Yes
RB:B	LR:RY	F	Overlook	SI/8,OV/8,TA/9, TM/7	Yes
S:B		F	Unknown	SU/4,SI/4,OV/5, TA/7,TM/4,NR/7	Yes
W/A/W:B	LR:BW	M	HRA	NR/4,BB/4,FL/6, OV/8,SI/8	Yes
W/B/W:B		M	HRA	SB/5,HRA/5,SS/5	Yes
W/R/W:B		M	HRA	SI/4,OV/4	Yes
W/Y/W:B		F	South Spoil	SI/4,OV/5	Yes
YR:B	LR:RB	M	Siltcoos	SI/6,OV/9	Yes
YW:B	BR:AB	M	HRA	SU/4,SI/6	Yes

^a - abbreviations represent site names with first month observed at each site.

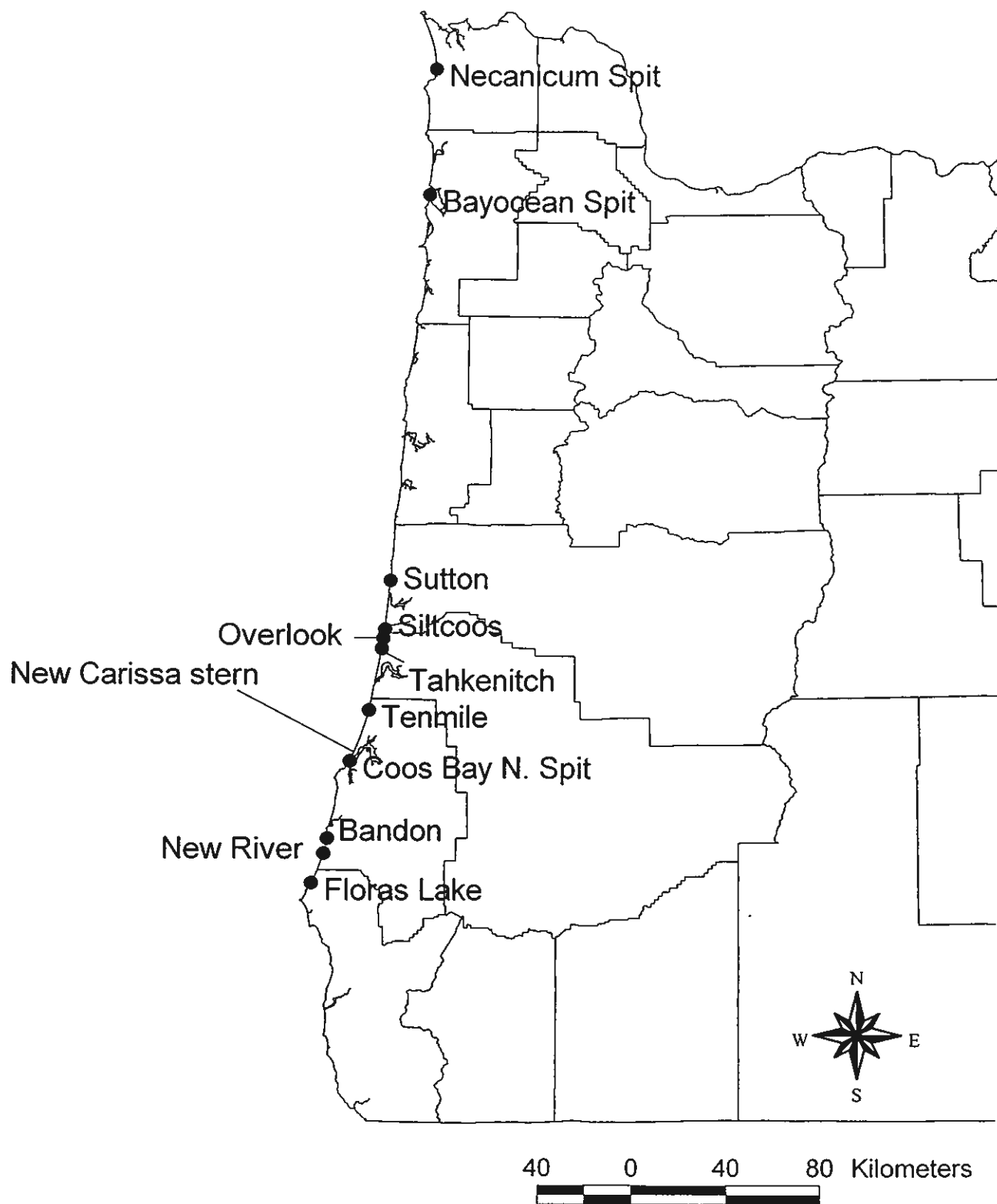


Figure 1. New Carissa location and Snowy Plover nesting areas surveyed on the Oregon Coast in 2000.

Figure 2. Number of active Snowy Plover nests within 10 day intervals on the Oregon coast, 2000. Dashed lines represent ± 2 standard deviations.

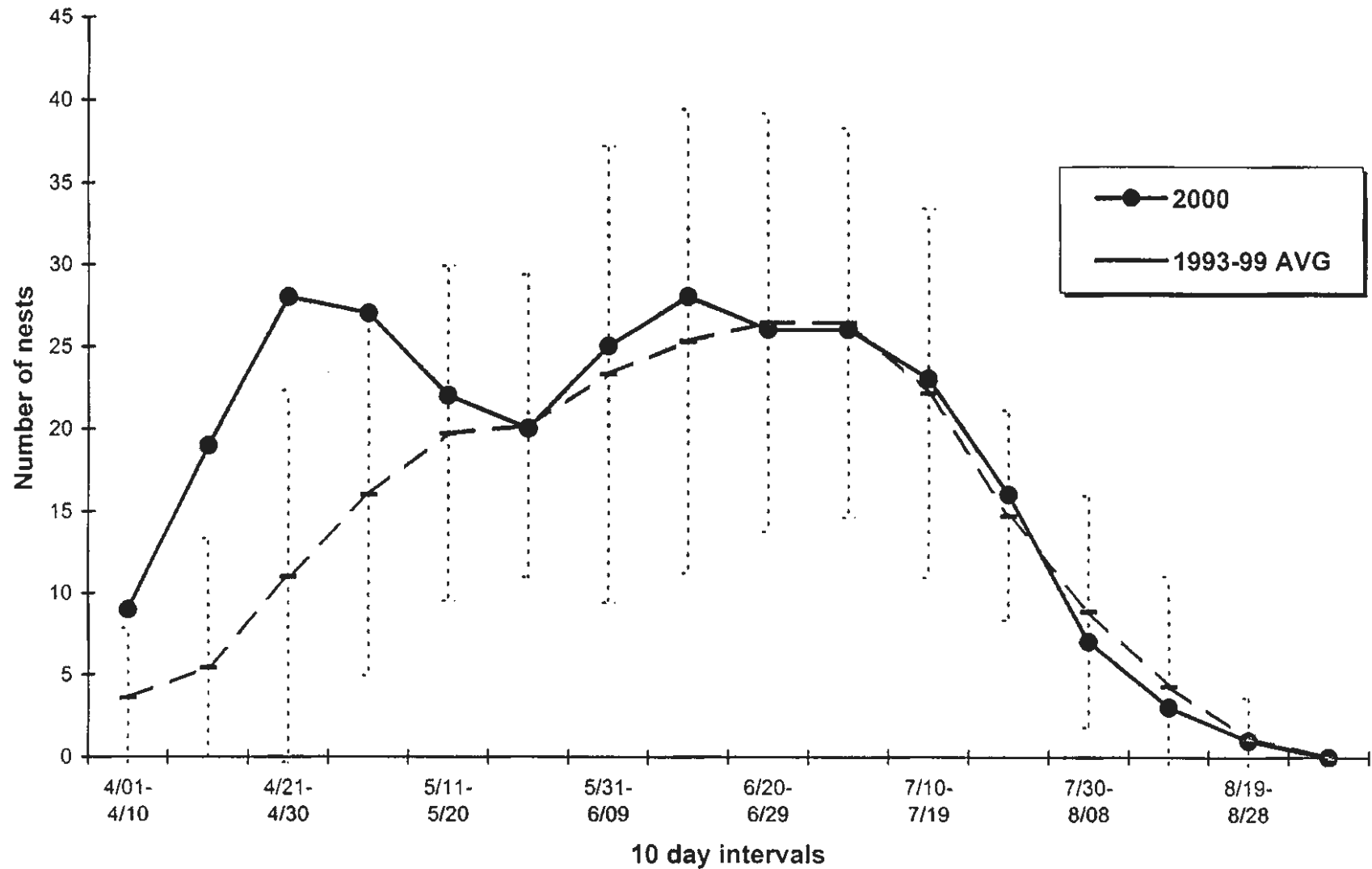


Figure 3. Snowy Plover nest and brood locations at Sutton and Baker Beaches, Oregon, 2000.

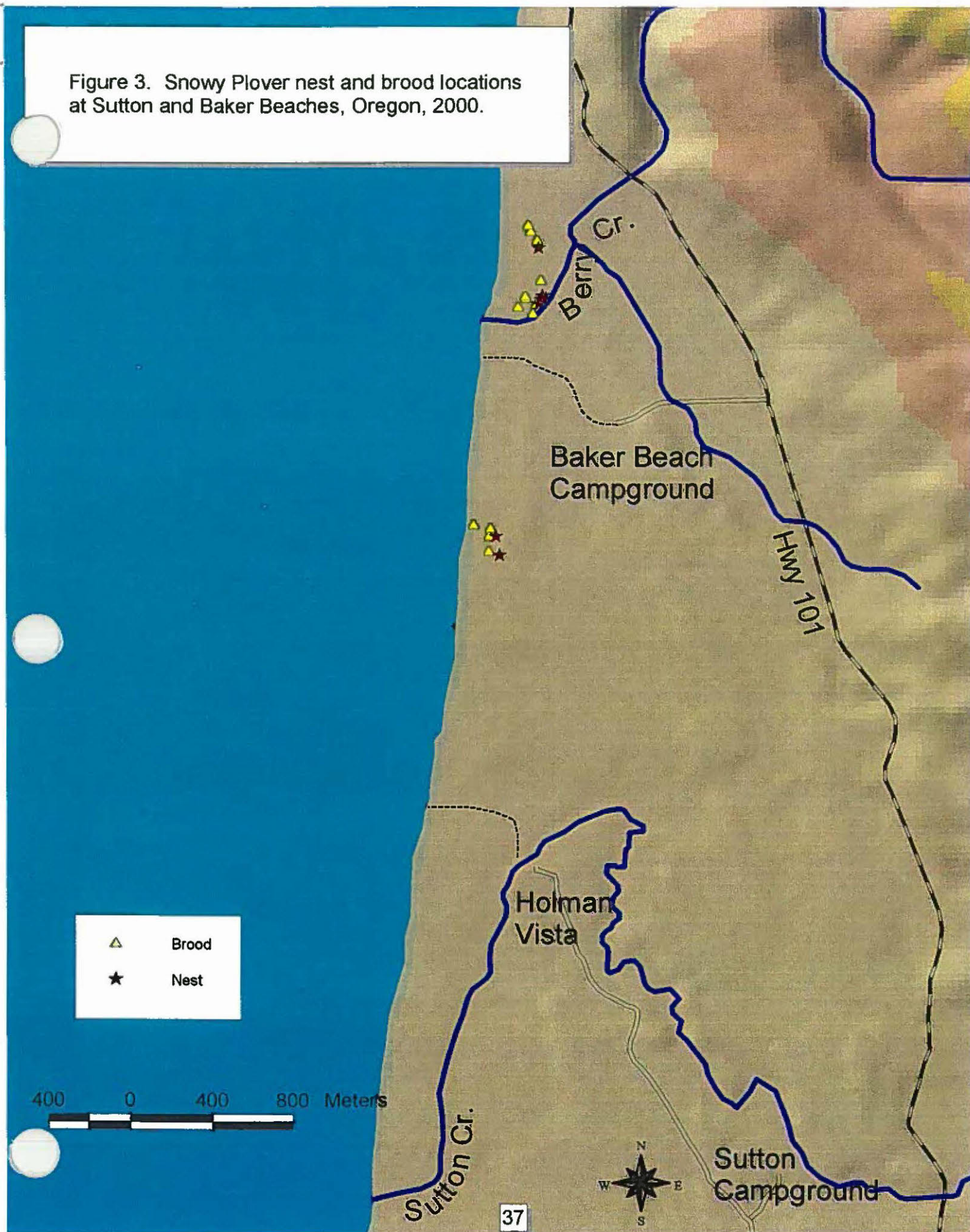


Figure 4. Snowy Plover nest and brood locations at Siltcoos River, Oregon, 2000.

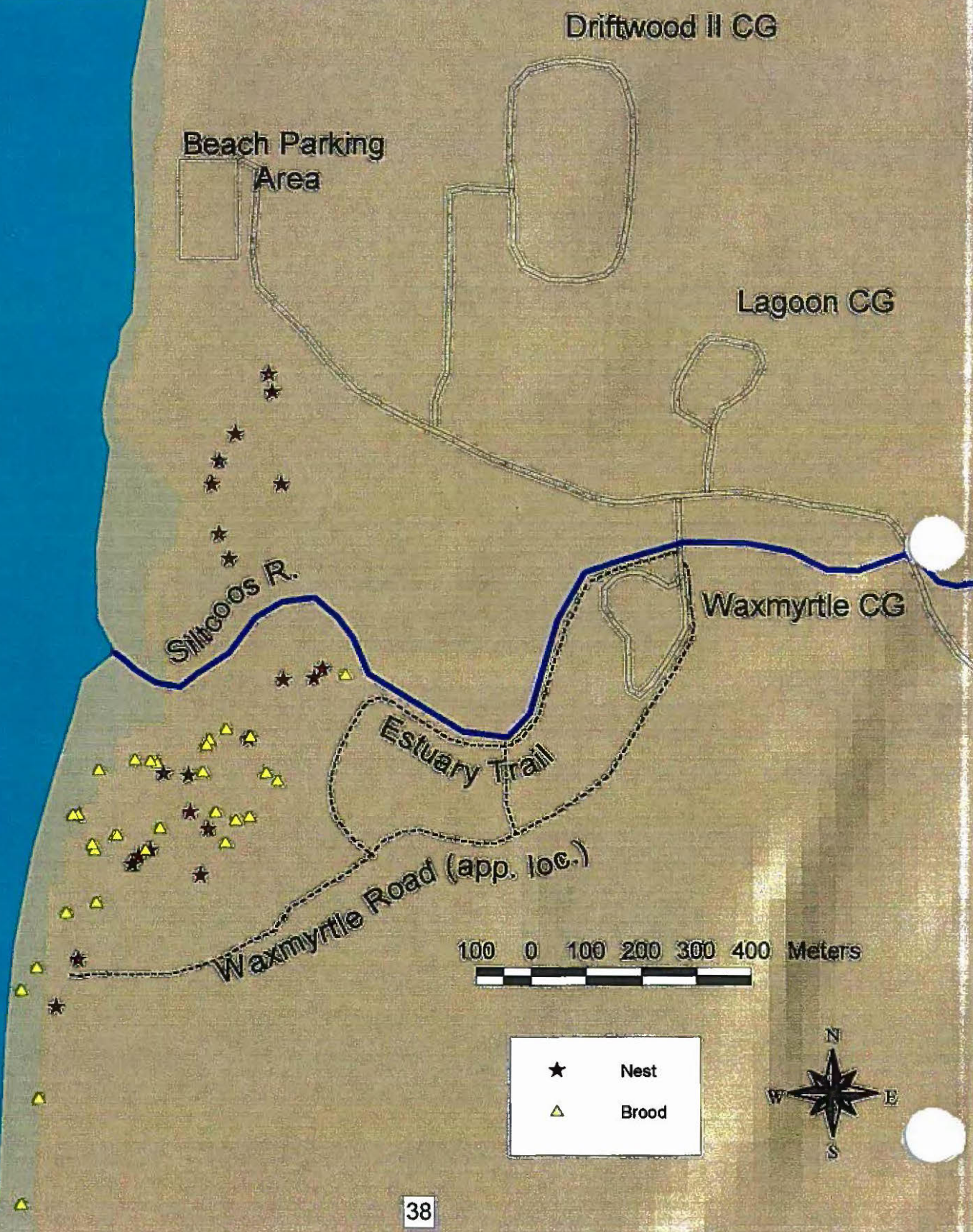


Figure 5. Snowy Plover nest and brood locations at the Overlook Clearing, 2000.

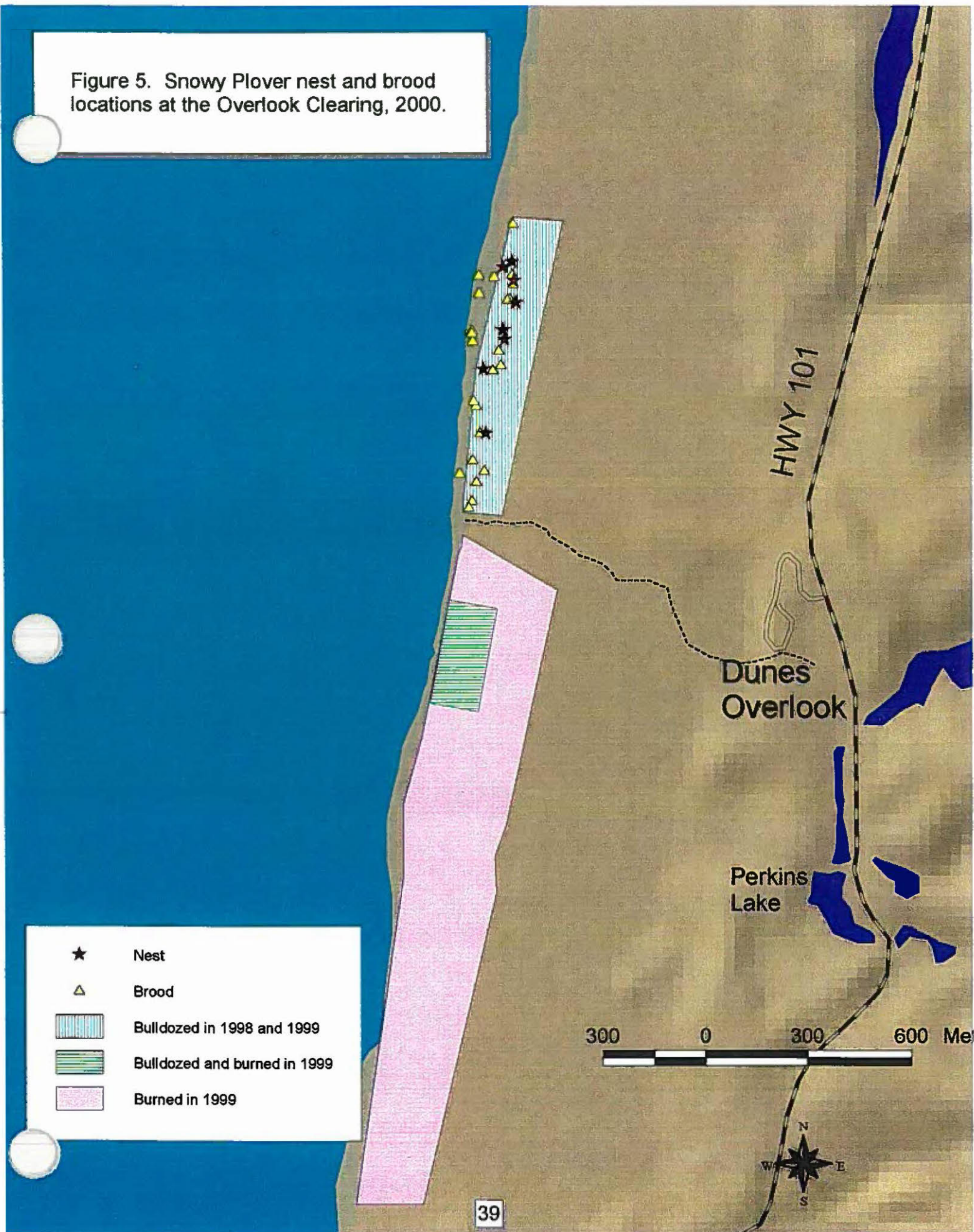


Figure 6. Snowy Plover nest and brood locations at Tahkenitch Cr., Oregon, 2000.

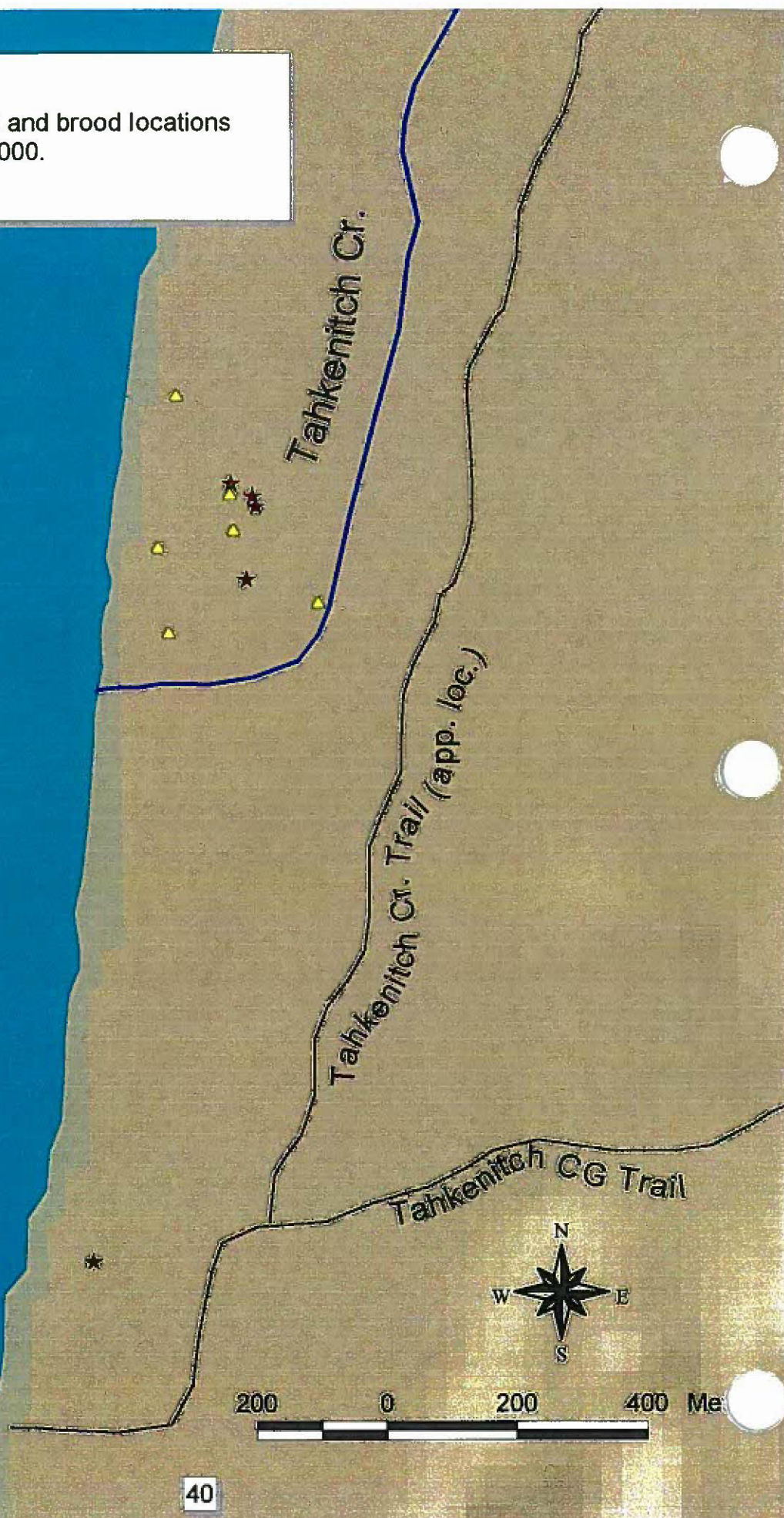
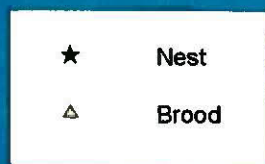


Figure 7. Snowy Plover nest and brood locations at Tenmile Cr., Oregon, 2000.



Figure 8. Snowy Plover nest and brood locations at Coos Bay North Spit, 2000.



Figure 9. Snowy Plover nest locations near Bandon Beach, Oregon, 2000.

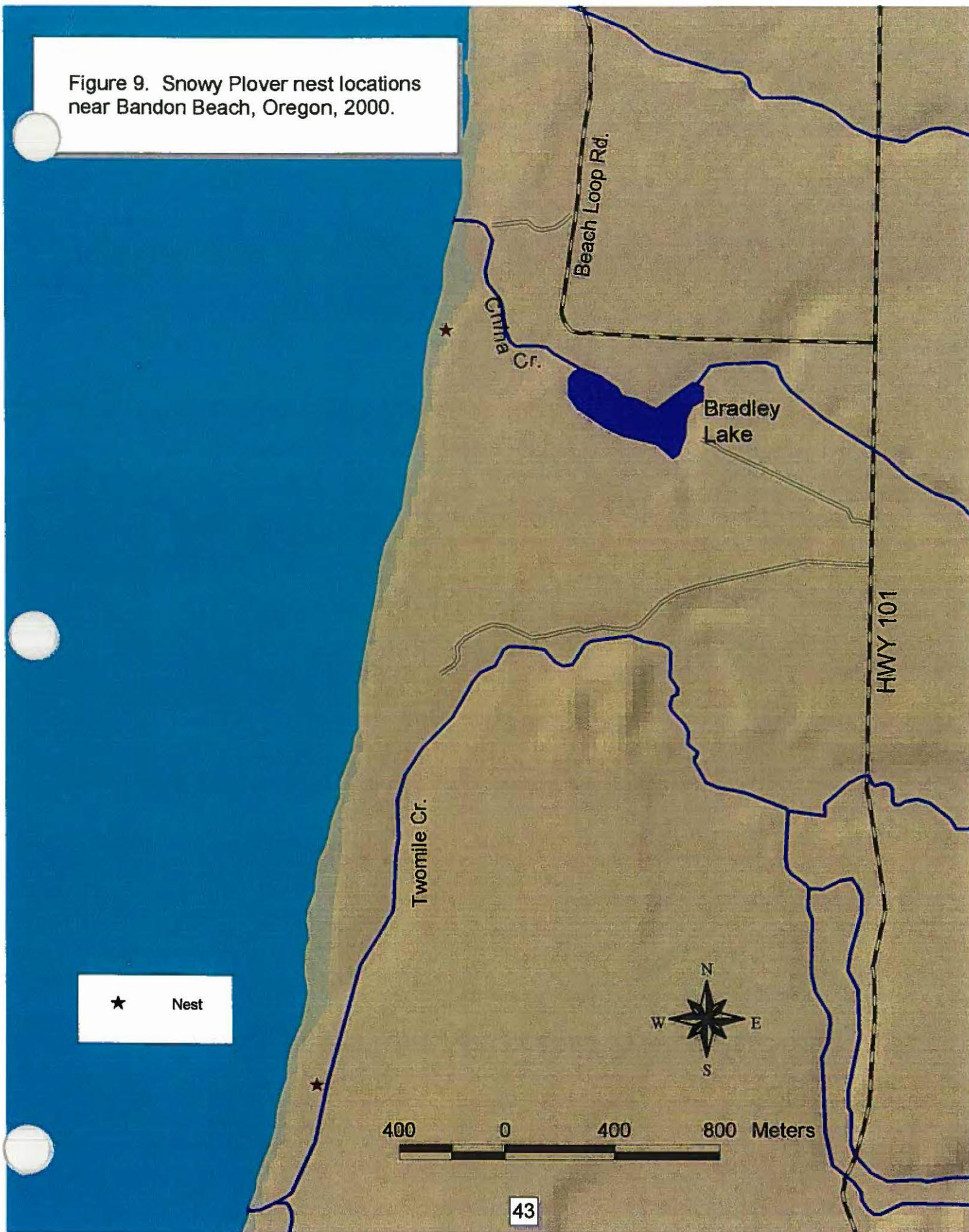


Figure 10. Snowy Plover nest and brood locations at New River, Oregon, 2000.

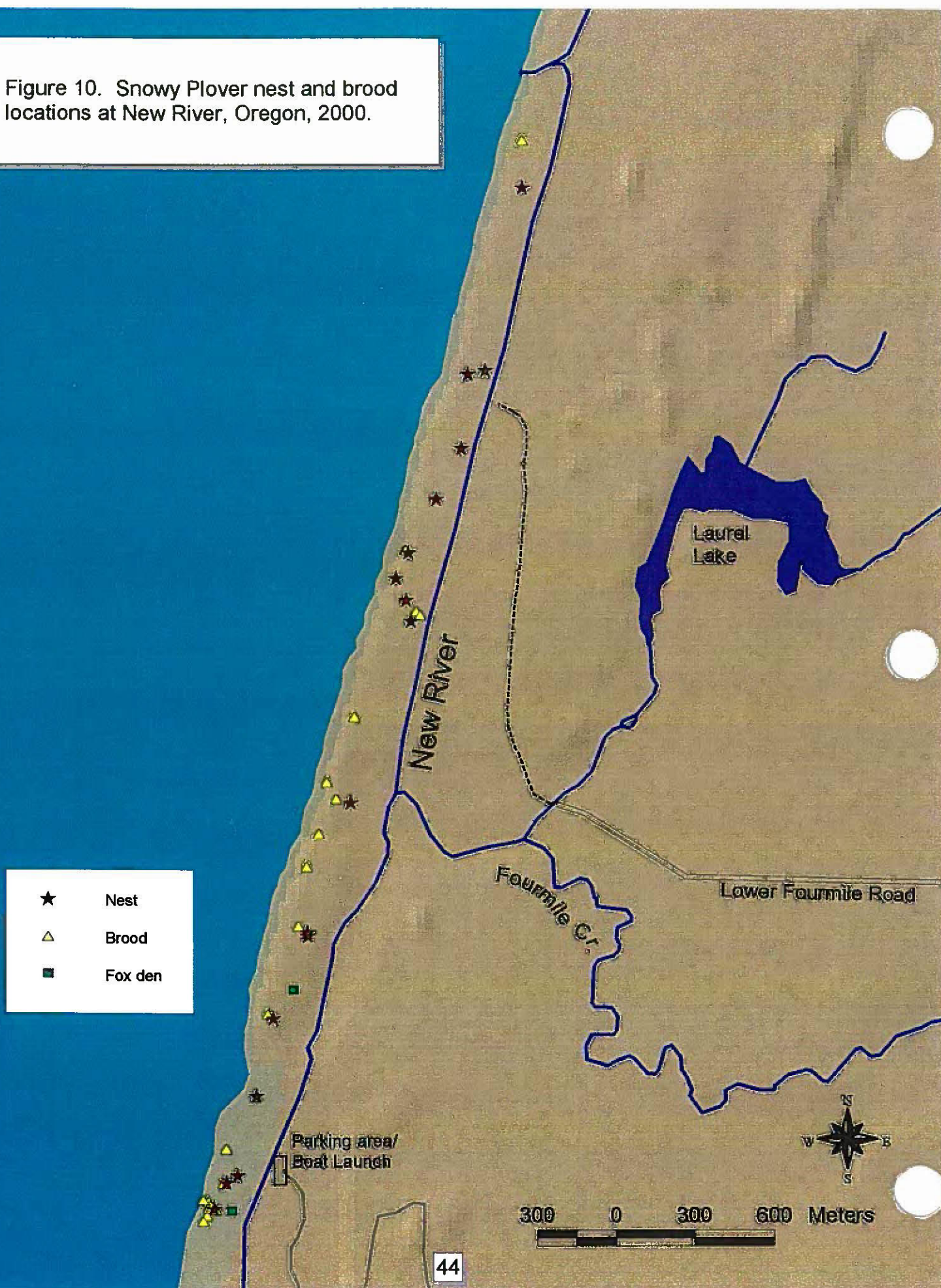


Figure 11. Snowy Plover nest and brood locations at Floras Lake, 2000.





APPENDIX A. Study Area

The study area encompassed known nesting areas along the Oregon coast including Necanicum Spit, Clatsop Co., Bayocean Spit, Tillamook Co., and nine primary sites between Berry Creek, Lane Co., and Floras Lake, Curry Co. (Fig. 1). Survey effort was concentrated at the following sites, listed from north to south:

Necanicum Spit, Clatsop Co.: the spit north of the mouth of the Necanicum River.

Bayocean Spit, Tillamook Co.: the beach from the south jetty of Tillamook Bay, south approximately three miles to the south end of the woods.

Sutton Beach, Lane Co.: the beach north of Berry Creek south to the mouth of Sutton Creek.

Siltcoos: North Siltcoos, Lane Co. - the north spit, beach, and open sand areas between Siltcoos River mouth and the parking lot entrance at the end of the paved road on the north side of the Siltcoos River; and South Siltcoos, Lane Co. - the south spit, beach, and open sand areas between Siltcoos River mouth and the Waxmyrtle trail beach entrance.

Dunes Overlook Clearing, Douglas Co. : the area cleared of beachgrass, beginning in 1998, directly west of the Oregon Dunes Overlook off of Hwy 101.

Tahkenitch Creek to the Umpqua River, Douglas Co. : Tahkenitch North Spit - the small spit and beach on the north side of Tahkenitch Creek; Tahkenitch South Spit - the spit, beach and sand openings between Tahkenitch Creek and the south end of the of the vehicle closure; North of Threemile Creek. - the beach from the south end of the vehicle closure to Threemile Creek; and South of Threemile Creek. - the beach between Threemile Creek and the Umpqua River.

Tenmile: North Tenmile, Coos and Douglas Cos. - the spit and ocean beach north of Tenmile Creek, north to the Umpqua River jetty; and South Tenmile, Coos Co. - the south spit, beach, and estuary areas within the Tenmile Estuary vehicle closure, and continuing south of the closure for approximately 1/2 mile.

Coos Bay North Spit (CBNS), Coos Co: South Beach - the beach between the north jetty and the first set of F.A.A. towers; South Spoil/HRA - the south dredge spoil and adjacent habitat restoration areas (HRA) that were recently cleared of vegetation; and Bayside - the bay south of the South Spoil.

Bandon Beach, Coos Co: the beach between China Creek and New River mouth, the sand spits and overwash areas near the mouth of Twomile Creek.

New River Spit, Coos and Curry Cos.: the beach and sand spit on the south side of the mouth of New River, and the oceanside beach, overwashes and riverside deltas extending to approximately one mile south of Fourmile Creek.

Floras Lake/New River Overwash, Curry Co.: the beach west of Floras Lake north to the two overwash areas near the confluence of Floras Creek and Floras Lake outflow.

In addition, the beach between the overwash areas of Floras Lake/New River Overwash and New River Spit, the beach between the FAA towers and the Tenmile Estuary closure (North Beach) were surveyed periodically. Suitable plover habitat at Sixes River, Elk River, Euchre Creek, and Pistol River in Curry Co. was also surveyed at least once this season.

APPENDIX B. Recommendations for Management of Recreational Activities and Habitat Restoration for sites with Snowy Plovers along the Oregon Coast - 2000.

Sutton: Continue roping and signing of dry sand from Sutton Creek to north of Berry Creek. We recommend having the necessary materials in place at the initiation of the nesting season to reduce confusion to the public and achieve greater compliance. Continue to sign the back side of the foredune in order to minimize pedestrian crossing of dry sand. Place signs on the south side of Sutton Creek notifying people that if they cross the creek dogs must be on leash at all times.

Siltcoos North and South Spits: Both the north and south sides of Siltcoos again appeared confusing and unmanageable during the 2000 nesting season. Closure of the entire estuary would benefit nesting Snowy Plovers on both spits. Noncompliance with the closed areas continues to be a problem every year due to high recreational use at this site. Most people did not know the riverbank was closed. This includes both people on foot and people boating in the river. We recommend posting the area with updated maps of the estuary and beach at several locations. These areas include the Stagecoach Trailhead, the north parking lot, and both ends of the Waxmyrtle Road. If the closed area during the 2001 nesting season is similar to the closed area during the 1999 and 2000 nesting season, we recommend the ropes and signs be set up early in the nesting season to be as effective as possible. Continue to prohibit dogs on the spits and near the estuary during nesting season. The north spit appears too confusing for people to understand the "dogs allowed/no dogs allowed" sections and trails, and it is difficult to put signs up everywhere a dog walker can access the beach from the north parking lot. A dog walker can access the estuary from the main road without encountering a "no dogs" sign. If the north spit is not closed we recommend a fence be placed around the parking lot of North Siltcoos to ensure everyone accesses the beach from the same access point. This will make signing and enforcement more effective. Continue the use of site monitors to educate people and keep them out of closed areas. Use monitors, especially during peak periods on weekends, and stagger their hours to cover evenings. Have monitors in contact with Law Enforcement Officers to improve enforcement of the closures, and have them engage people on the beach before violations occur. To address the number of crows using the area estuary at Siltcoos, we recommend exploration of various management methods. Changes should be made with the establishment of the Canoe Trail down the Siltcoos River which will drop people off directly between the two plover nesting areas. Possible solutions to potential problems include development of a viewing platform on the Estuary Trail which would allow people to get out of their boats, learn about the area and the plovers, and go back upstream before entering the nesting areas. This may also alleviate problems posed by people hiking the Estuary Trail and crossing to the South Spit.

Overlook Clearing: We recommend roping and signing of all suitable Snowy Plover nesting habitat in early April at the onset of the nesting season. Restoration work should be scheduled after the Snowy Plover nesting season is completed to allow adequate time for the nests to hatch and broods to be reared, allowing that broods may remain in the

area as late as early September. Do not allow people to camp adjacent to plover nesting habitat.

Tahkenitch: Continue to rope and sign all suitable habitat on the north and south spits. Block off the old trail that people use to access the south spit from the Tahkenitch Creek Trail, and put up new trail signs. Do not allow people to camp on the north spit adjacent to plover nesting habitat.

Tenmile North and South Spits: Continue to rope and sign plover nesting habitat on the south spit, and enforce vehicle closure to prevent violators from driving in the habitat restoration area.

Coos Bay North Spit: Yellow rope was erected for the 2000 nesting season on South Beach similar to the work completed in 1998 in the key areas plovers use to further delineate the upper dry sand portion of the beach. During the 1999 nesting season the roping was not necessary due to the closure implemented because of the New Carissa. Since the wet sand portion of the beach will most likely be open to the public in 2001 we recommend using the yellow rope to define and hopefully restrict human activity in the dry sand portion of the South Beach. We recommend setting up the rope again early in the nesting season when the carsonite signs are put in place. Clearly sign the entrance road that the beach is street legal vehicles only, and inform all law enforcement agencies of the regulations on the beach. We strongly recommend a permanent reroute of the foredune road be created around the '94HRA to reduce disturbance to the plovers, especially during the nesting season. The seasonal reroute of the road in 2000 once again allowed a minimum amount of disturbance to occur. The plovers appeared to respond by continuing to nest near the edge of the fence and spreading further out and along the edge of the 95HRA and the 98HRA compared to what has been observed in previous years.

Bandon: Signs and ropes were set up around the China Creek overwash and the entrance point to the Christian Camp early in the season. Even though we continue to have some problems with people entering the beach from the Christian Camp, overall violations were lower this season. We recommend State Parks continue to work with the administration of the camp and hire a recreational monitor to help explain the wet and dry sand restrictions to the public. All law enforcement agencies should again be informed as to the status of the vehicle regulations on the beach. We again recommend signing the beach from China Creek to the mouth of Twomile Creek/New River before the nesting season, especially near China Creek early in the season, before nesting begins. We recommend roping the area from the camp's legal access point north to China Creek overwash and south 100-200 meters to more clearly define the closed section of beach. This should be completed as early as possible to avoid any confusion at a later date. Maintain enforcement of restricted areas and leash laws for dogs.

New River: Compliance at this site this year was substantially improved compared to last year. We believe part of the problem we had in the 1999 nesting season regarding compliance of the no motorized vehicles regulation on the beach came from a small handful of individuals. In conjunction with State Parks a large closed to motorized

vehicle sign was put in place at the beach access point from the county land. We also worked closely with State Parks to know who the legal permit riders were on the beach. We believe the combination of these two factors reduced ATV riding on the open spit from the county land. People were not accessing from the south side of Floras Lake, which had been a traditional point of entry, nor was there much evidence of ATV riders accessing via private land south of the BLM boat launch. We recommend placing interpretive signs on the east side of the river at the BLM boat launch and the county land at the end of Lower Fourmile Road to inform the public of plover activity. The spit is currently south of the mouth of Two Mile Creek and is considered part of the New River nesting complex, however much of it is state land. We strongly recommend roping and signing the area to notify people of nesting plovers. People with dogs off leash, including horseback riders, continue to be a problem at New River. Much of the access is from the county land, where there are no signs of any type to inform the public about the plovers. Coordination between county, state and federal agencies may be an option for adequate posting of the area. We continue to recommend closure of the gate at the Storm Ranch for 15 April- 15 September. Better coordination with the county sheriff and state police may help clarify concerns and issues regarding access and use of the New River area. Continue to keep the local landowners involved in the project and informed of all project plans and results.

Floras Lake: The seasonal closure and use of the cyclone fence, additional roping and signing, an on site interpretive specialist, and strict law enforcement continued to greatly improve compliance by the public at Floras Lake. The closed section of the beach was similar to the 1999 nesting season: steep, short and lacking high, dry shelves. The north end of the beach has two large overwashes where the main nesting activity was this nesting season. This area is where plovers nested in the early 1990's. Signs and ropes were erected when a second nest was found on the southern overwash. It is important for the BLM to maintain a high profile at Floras Lake to notify the public the site is being monitored, especially since a new bridge is being constructed which will once again allow easy access to the nesting areas. Habitat may be available in both the closed and open section of the beach, therefore it is important to have all the ropes, signs and fences in place early in the nesting season. Continue to use environmental educators and law enforcement to contact the public, monitor the beach, and present slide shows. Prompt replacement of signs, rope and posts should continue to notify people that the area is being monitored. Signs need to clearly state that dogs must be on leashes at all times on the beach regardless of whether or not they are outside of the restricted zone. }

Habitat Restoration

Sutton: Control beachgrass to maintain and restore nesting areas on Sutton spit and elsewhere.

Siltcoos: Maintain open nesting areas on North and South Spits by removing European beachgrass.

Overlook: Continue the restoration project as in 1999, but begin activities after the end

of the nesting season. Continue the handpulling of beachgrass in previously cleared areas.

Tahkenitch: Maintain open areas with attention to overwash areas.

Tenmile: Maintain open nesting areas on both spits by spraying and handpulling. Break open foredune to encourage overwashes.

Coos Bay North Spit: Maintain the annual disking to retard beachgrass growth.

New River Spit: Continue mechanical scraping of overwash areas with the goal of creating physical characteristics that will facilitate scouring and overwash of sites by winter storms.