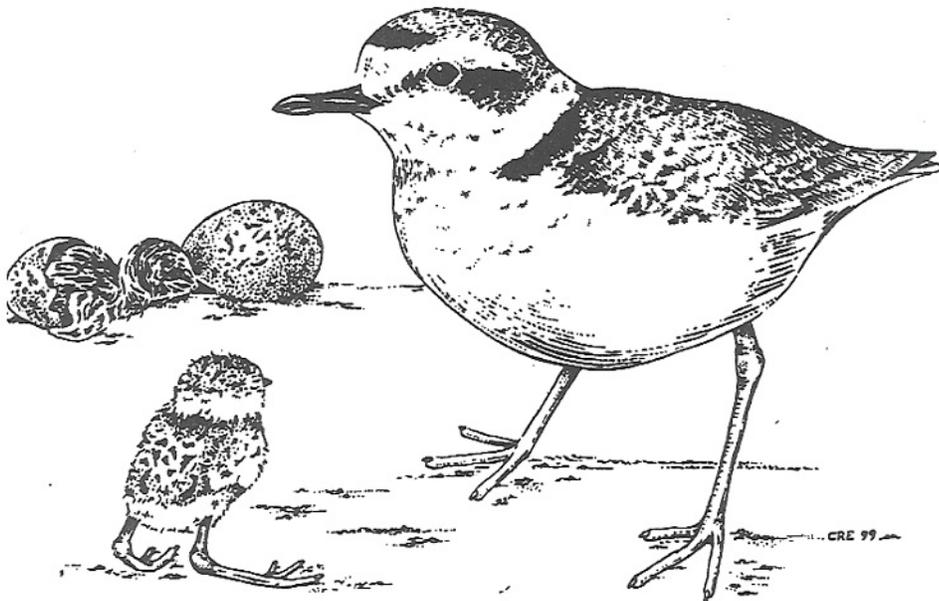


California State Parks
North Coast Redwoods District
And Redwood National Park



Western Snowy Plover
Annual Report
2009-2010

January 30, 2011

INTRODUCTION

The Department of Parks and Recreation (DPR) manages nearly 25 percent of the state's coastline. Many of these coastal lands provide important habitat for the western snowy plover (*Charadrius alexandrinus nivosus*), a shorebird listed as "threatened" by the federal government and a "species of special concern" by the State of California. As these coastal lands are also popular recreation areas for millions of people, strategic management of DPR lands is essential to meeting state and federal goals to stop the decline of this species and restore sustainable populations (CDPR 2002). Consequently, in March of 2002, DPR released the *Western Snowy Plover Systemwide Management Guidelines* to facilitate stewardship efforts to protect the western snowy plover (WSP or plover) and manage coastal habitat. The guidelines present an integrated approach to assessing WSP use of State Park System (SPS) lands, planning for the species' conservation, implementing management actions, and monitoring progress toward recovery (CDPR 2002). A major component of the Department's approach to WSP stewardship relies on thorough documentation of management efforts and adaptive responses at the unit or district level (CDPR 2002).

Regular evaluation of habitat management, visitor management, law enforcement, public education and interpretative efforts is needed to continuously improve stewardship results. As such, this report assesses the effectiveness of efforts taken by DPR, North Coast Redwoods District (NCRD) to protect and restore WSP populations in light of management activities and monitoring results from 2010. This report will contribute to a systemwide annual report produced by DPR, Natural Resources Division to assess WSP management throughout SPS lands. In addition, as many activities associated with research, monitoring, or management of WSP require an endangered species permit under Section 10(a)(1)(A) of the Endangered Species Act, this report will meet the requirements of the NCRD's 10(a)(1)(A) permit (TE004234-1).

BACKGROUND

The coastal population of the western snowy plover was listed as threatened under the Endangered Species Act in 1993 (USFWS 1993) as a distinct population segment. The listing included populations nesting along the coast in Washington, Oregon and California. A significant population decline and a reduction in the number of active breeding areas prompted the federal listing. Expanding predator populations, human disturbance, and urban development/introduced beachgrass (*Ammophila arenaria*) have been attributed to the decline (USFWS 2007). The United States Fish and Wildlife Service designated critical habitat for the WSP in 1999. This designation was amended in 2004 following a lawsuit over the failure to analyze the economic impacts of the critical habitat. In 2007, the USFWS released the final recovery plan (USFWS 2007). The goal of the plan was to ensure the long-term viability of the U.S. Pacific coast western snowy plover population with specific objectives to; (1) Increase population numbers distributed across the western snowy plover's Pacific coast range; (2) Conduct intensive ongoing management for the species and its habitat and develop mechanisms to ensure management in perpetuity; and (3) Monitor western snowy plover populations and threats to determine success of recovery actions and refine management actions (USFWS 2007). According to the recovery plan, the population will be considered for delisting when a number of recovery criteria related to productivity and habitat protection are met within the six designated recovery units throughout the range (USFWS 2007). In 2006 the USFWS denied a proposal to de-list the plover, but did propose a special 4(d) rule that would exempt counties from certain prohibitions on take as long as populations remain above recovery goals as identified in the recovery plan (USFWS 2006).

The NCRD is located within Recovery Unit 2, which includes Del Norte, Humboldt, and Mendocino counties. Recovery criteria for Unit 2 include: (1) maintain 150 adults for 10 years; (2) maintain a 5-year average productivity of at least one fledged chick per male; and (3) have in place participation plans among cooperators to insure protection and management of breeding, wintering and migration areas to maintain the subpopulation sizes and average productivity listed above. Recent surveys indicate that most plovers in Recovery Unit 2 breed and winter in Humboldt County along ocean beaches and gravel bars of the Eel River (Colwell et al. 2006).

Since 1998, Recovery Unit 2 Working Group has been active in monitoring suitable WSP habitat with a coordinated effort between federal, state, and local agencies as well as parties

who have an interest in WSP conservation. Much of the WSP recovery effort is expected to be organized and facilitated by the working group, as members include conservation experts (e.g. Humboldt State University and Mad River Biologists) as well as resource managers (e.g. DPR, Bureau of Land Management, California Department of Fish and Game) with responsibility for on-the-ground actions (CDPR 2002). In 2001 biologists of Humboldt State University (HSU) and Mad River Biologists (MRB) began collaborating in what has become a multi-year effort to answer questions critical to effective management and recovery of the WSP in Recovery Unit 2. Consequently, the HSU/MRB WSP annual report has served as the Recovery Unit 2 annual report since 2001. Much of this report is based on those results.

The NCRD - WSP program objectives for 2009/2010 were to:

- 1) Increase coordination between groups collecting WSP data in the NCRD.
- 2) Improve and modify electronic WSP data gathering using PDA's with GPS units.
- 3) Continue monitoring efforts throughout the NCRD and participation in the Recovery Unit 2 demographic study
- 4) Continue to work and coordinate with the Recovery Unit 2 working group and subcommittees, and the Humboldt Coastal Dunes Cooperative.
- 5) Continue habitat restoration within suitable habitat.
- 6) Continue to use symbolic fencing to protect nests when appropriate.
- 7) Develop a database for the rangers to document beach and dune patrols, violations, citations, and contacts.
- 8) Continue to increase law enforcement presence at occupied State Park beaches during the WSP breeding season, especially during holiday weekends.
- 9) Continue to use nests exclosures where appropriate.
- 10) Increase public outreach with signage and working within the Recovery Unit 2 Outreach Subcommittee.

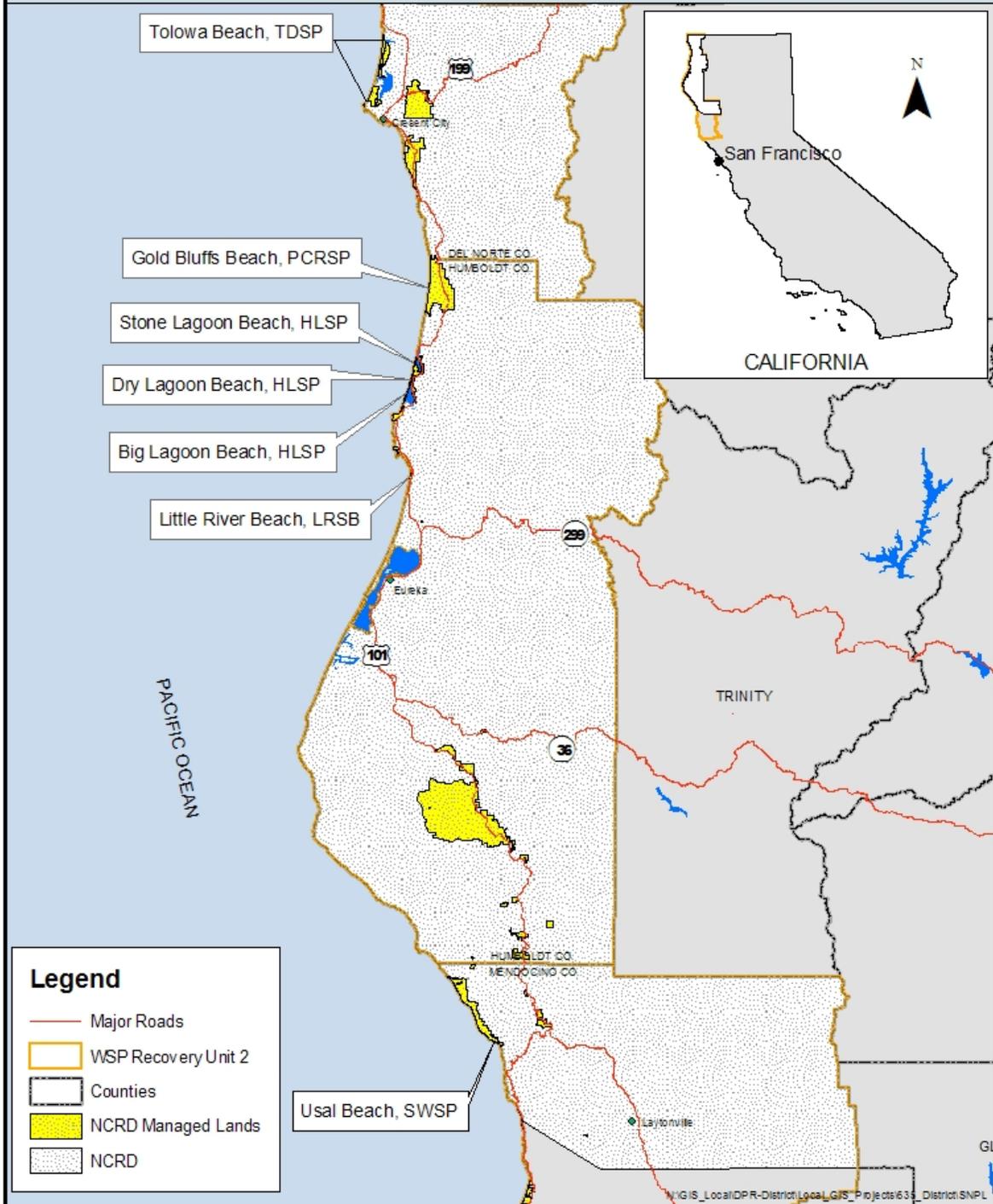
STUDY AREA

Department of Parks and Recreation, Redwood National and State Parks (RNSP), U.S. Fish and Wildlife Service (USFWS), MRB, and HSU biologists surveyed 7 State Park beaches within the NCRD that have been identified as suitable WSP habitat (Fig. 1). These beaches are (1) Tolowa Beach, Tolowa Dunes State Park (TDSP); (2) Gold Bluffs Beach, Prairie Creek Redwoods State Park (PCRSP); (3) Stone Lagoon Beach, Humboldt Lagoons State Park (HLSP); (4) Dry Lagoon Beach, HLSP; (5) Big Lagoon Beach, HLSP; (6) Little River State Beach (LRSB) and (7) Usal Beach, Sinkyone Wilderness State Park (SWSP).



California State Parks

North Coast Redwood District



North Coast Redwoods District
Western Snowy Plover Annual Report

FIGURE 1
General Location Map

METHODS

We conducted management activities under USFWS permit TE-004234-1 and USFWS banding permit #22971. Suitable habitat within the NCRD was surveyed monthly (mid-month) during the 2009/2010 season (Sep 15, 2009 – Sep 1, 2010) with the exception of Usal Beach, which was only surveyed during winter and breeding window surveys. Additional surveys were conducted at the end of each month during the breeding season (March-August). Intensive monitoring (to search for nests and young) occurred every 3 days at sites where breeding plovers were observed.

Abundance and Distribution

Annual abundance and distribution of WSP was estimated based on mid-month (± 4 days) surveys, by covering identified stretches of beach (by walking or by ATV) and stopping at 50-100 meter intervals to scan with binoculars and/or spotting scopes. Western snowy plover numbers, sex, age, and color band combinations were recorded whenever possible.

Reproductive Monitoring

We searched for nests and/or breeding activity (at least twice monthly) beginning 15 March and continuing until 31 August. Intensive monitoring (every 3-4 days) occurred at sites where plovers were recorded during the breeding season. Nests searching included: observing suggestive behavior of adult plovers and watching them return to the nest to incubate, following tracks, and/or spotting incubating adults on the nest.

Predator Activity and Management

We collected data on potential plover predators to assess the threat of predation between sites and different temporal scales. It is anticipated that this data will help evaluate relationships between relative abundance of potential predators and WSP reproductive success. To assess the threat of avian predators, area-constrained (500 m radius) point counts at 20 minute intervals (walking) or 10 minute intervals (ATV) were conducted and the number of corvids and raptors recorded. We also noted the total number of potential predators (American crow, common raven, or other potential avian predator) observed during the entire survey. Point count data was summarized by averaging values for multiple observations conducted during each visit to a site, and then averaging all observations for each study site.

Human Activity and Management

Data on human use were collected during regular WSP abundance and distribution surveys. Area-constrained point counts at 20 minute intervals (walking) or 10 minute intervals (ATV) were conducted and the number of humans, dogs (in compliance/not in compliance), and vehicles (in compliance/not in compliance) within 500 m were recorded. Total numbers of humans, dogs and vehicles observed during the entire survey were tallied and identified as in compliance or out of compliance depending on local regulations.

Habitat Condition and Plover Use

During abundance and distribution surveys, general habitat conditions were recorded. Nesting and brooding activity occurring in restoration areas was noted to determine if habitat characteristics influence nesting/fledging success.

Data Summary and Analysis

Data were collected separately for the seven State Park beaches being monitored using a personal digital assistant (PDA), global positioning system (GPS), ESRI Mobile GIS software (ArcPad), and WSP monitoring forms (Appendix A) . Survey results were distributed to the RU2 working group via email and included in the RU2 final report (Colwell et al. 2010). Abundance and distribution data, predator activity data, and human activity data are presented as means (± 1 SD) and figures are presented as means (± 1 SE).

RESULTS and DISCUSSION

Abundance and Distribution Surveys

For the 2009-2010 plover season, six sites were surveyed at least monthly totaling 270 survey hours and ~436 person hours. Surveys revealed that the non-breeding population (29 ± 5.6) continues to be significantly greater than the breeding population (13 ± 10.4) (Fig. 2). The number of wintering plovers was similar to that observed in 2008-09, but still lower than the numbers observed in 2005-06. During the breeding season the average number of plovers observed increased 63% compared to 2009. Similarly, the breeding population for the entire Recovery Unit 2 increased 63% to 31 (16 males and 15 females) breeding adults (Colwell et al. 2010).

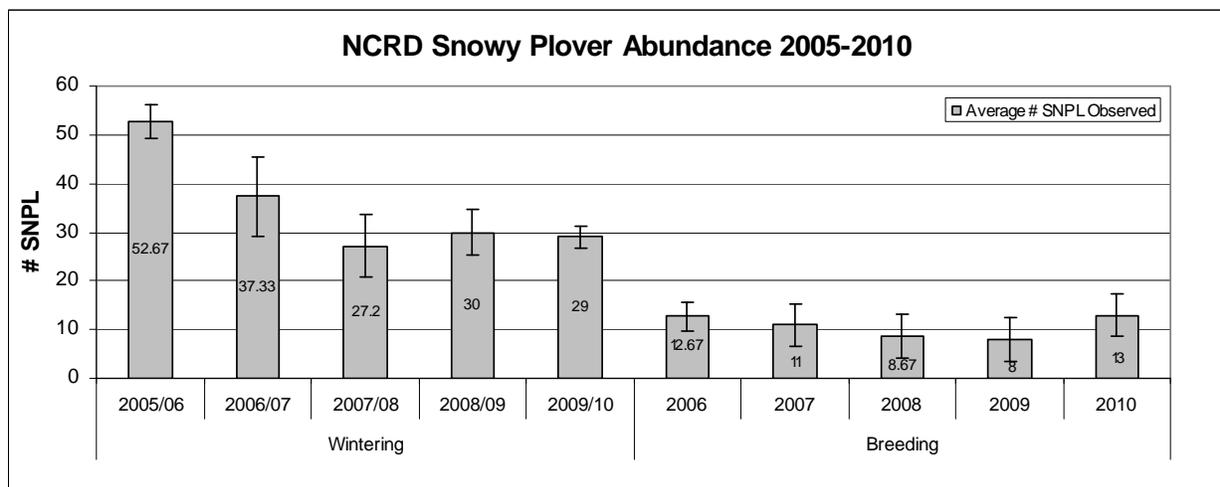


Figure 2. North Coast Redwoods District Western Snowy Plover Abundance 2005-2010.

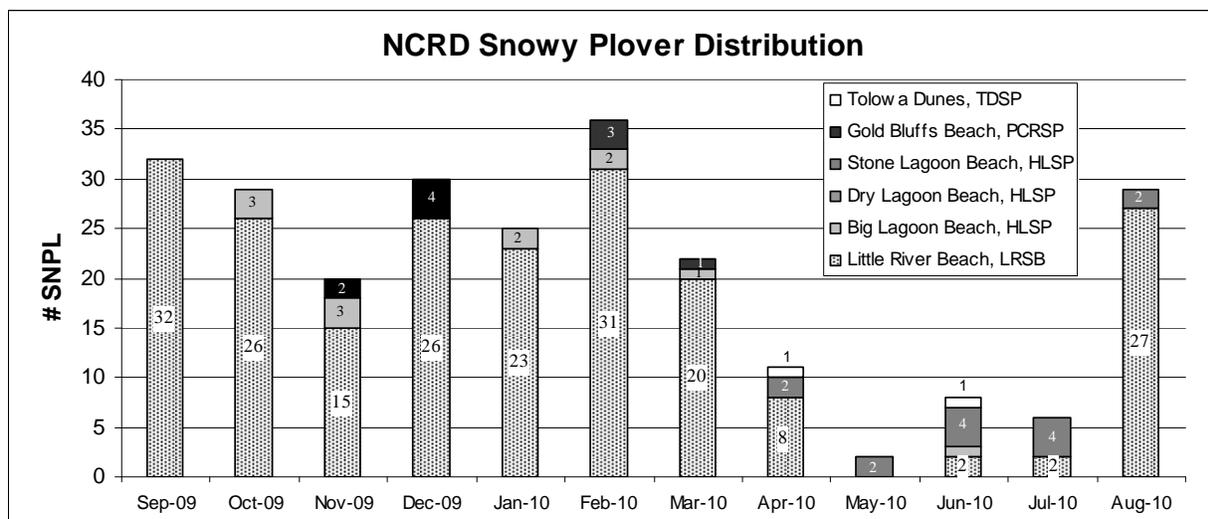


Figure 3. Western Snowy Plover Distribution within the North Coast Redwoods District.

We detected wintering WSP at three of six beaches (Gold Bluffs Beach, Big Lagoon Beach and Little River State Beach) (Fig. 3). During the breeding season, birds were

detected at five of six sites (Tolowa Dunes, Gold Bluffs Beach, Stone Lagoon Beach, Big Lagoon Beach and Little River State Beach), however only two sites (Stone Lagoon and Little River State Beach) hosted birds throughout the breeding season.

Reproductive Success

In the NCRD, 5 breeding plovers initiated 8 nests, produced 4 chicks and fledged 3 chicks (Table 1). Of the entire RU2 breeding population, NCRD hosted 16% (5 of 31) of the breeding adults and 23% (3 of 13) of the chicks fledged. Over the past 10 years, 50% of 40 nests hatched at least one chick compared with 35.6% for the entire recovery unit (Colwell et al. 2010).

Table 1. NCRD WSP Breeding Season Summary 2010 with comparison to previous years

<i>Unit</i>	<i>Females^a</i>	<i>Males^a</i>	<i># of Nests</i>	<i># Exclosed</i>	<i>% Hatched</i>	<i># Chicks Hatched</i>	<i># Chicks Fledged</i>	<i>Fledged per male</i>
Tolowa Lake, TDSP	0	0	0	0	0.00%	0	0	0
Gold Bluffs Beach, PCRSP	0	0	0	0	0.00%	0	0	0
Stone Lagoon, HLSP	1	2	3	0	66.6%	4	3(75%)	1.5±.71
Dry Lagoon, HLSP	0	0	0	0	0.00%	0	0	0
Big Lagoon, HLSP	0	0	0	0	0.00%	0	0	0
Little River State Beach	2	2	5	0	0.00%	0	0	0
All Sites 2010	2	3	8	0	25%	4	3(75%)	1±1
2009	1	1	1	0	100%	3	3(100%)	3±0
2008	0	0	0	0	0%	0	0(0%)	0
2007	0	0	0	0	0%	0	0(0%)	0
2006	2	2	2	2 _b	50%	3	0(0%)	0
2005	6	5	6	3	83%	14	3(21%)	.6±.89
2004	2	2	2	1	100%	4	3(75%)	1.5±.71
2003	3	4	4	3	50%	5	1(20%)	.25±.50
2002	3	3	9	2	22%	6	0(0%)	0
2001	3	4	8	5	63%	14	5(36%)	1.25

a Based on histories of marked birds known to nest in the NCRD. OR:RRf and OR:YRm were assigned to Little River and Stone Lagoon, as they initiated nests at both sites.

b The exclosure of one nest was removed late in the incubation phase, due to potential adult predation. This nest subsequently failed.

For the second consecutive year, young fledged from Stone Lagoon making this beach the most productive beach (based on per capita reproductive success, average fledged young per male) within RU2. Overall, per capita reproductive success for the NCRD was 1±1.00 compared to 0.81±1.22 for the entire recovery unit (Colwell et al. 2010).

Predator Activity and Management

Predation continues to be the leading cause of nest failure in RU2 (Colwell et al. 2010) and anecdotal observations suggest that corvids, principally common ravens, are the primary predator of WSP eggs and chicks, video evidence collected on Clam Beach support this notion (Colwell et al. 2009). Corvid activity for the 2009/10 plover season varied among sites (Fig. 4), with Little River Beach having higher levels compared to other sites within the NCRD. NCRD staff also monitor the use of symbolic fence posts for potential corvid perch sites. No corvids were observed using symbolic fence posts for perch sites during the 2009-10 season.

Colwell et al. (2010) compared estimated daily predation rates (DPR) to evaluate the relative impact of predation on nest survival among sites and between years. They found DPR of nests over the past 10 years were particularly high at Clam Beach/LRSB (0.065-0.390) especially compared to sites such as, Big Lagoon (0.00) and Stone Lagoon (0.00).

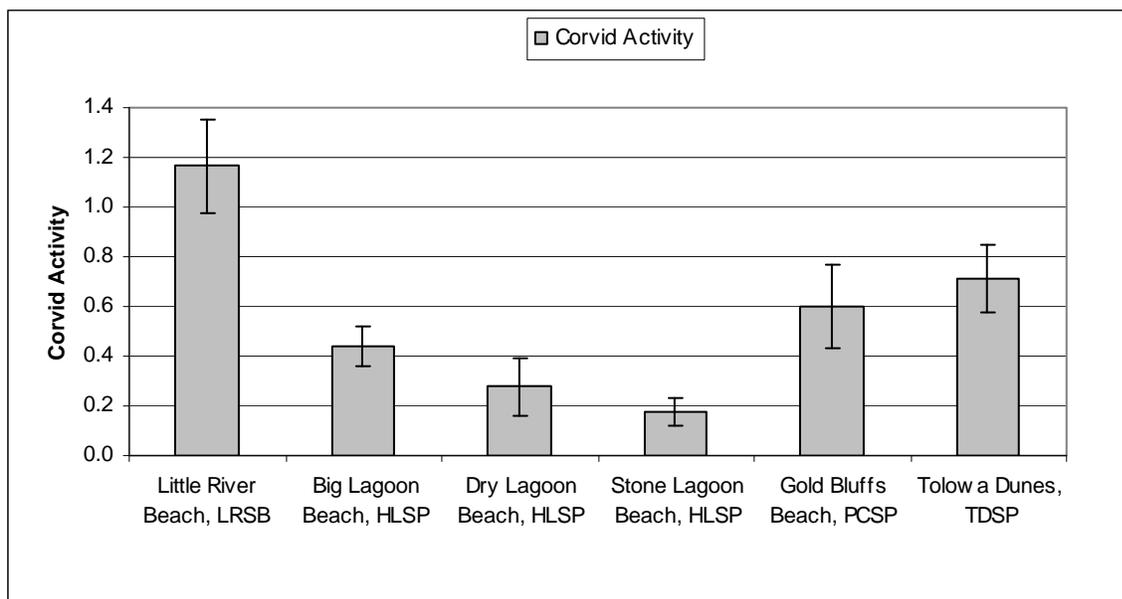


Figure 4. Corvid abundance based on average number of corvids detected during 500-m radius point counts.

Activities associated with predator management (i.e. installation of anti-predator perching devices and installation/maintenance of predator proof trash receptacles) were similar across sites with the exception of Tolowa Dunes, where public use developments are lacking entirely. The development of the RNSP Corvid Management Strategy (RNSP 2008) addresses corvid management at a landscape level. The goal of

the strategy is to decrease the density of corvids surrounding visitor use developments in Jedediah Smith Redwoods State Park, Del Norte Coast Redwoods State Park, Prairie Creek Redwoods State Park and Redwood National Park (collectively referred to as Redwood National and State Parks or RNSP). RNSP is comprised of 132,000 acres in and adjacent to suitable plover habitat of the NCRD.

Human Activity and Management

Human activity was highest at Little River Beach followed by Dry Lagoon (Fig. 5).

Predictably, dog activity was highest at Little River Beach where human activity was the highest second to Dry Lagoon.

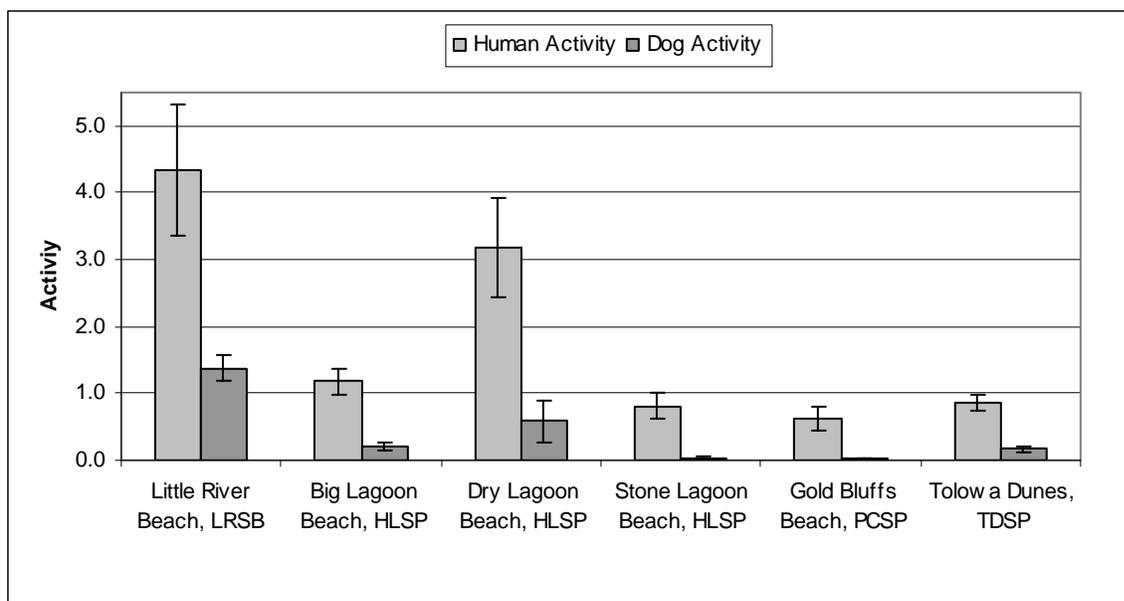


Figure 5. Human and Dog abundance based on average number of humans detected during 500-m radius point counts.

Management efforts associated with minimizing human impact to snowy plovers included dog restrictions, vehicle restrictions and the use of breeding and non-breeding plover protection areas (PPAs). See Appendix C for site specific beach and dune rules and regulations. C DPR rangers patrolled beaches by vehicle and foot for a total of ~150 hours. Approximately 80 warnings, 3 vehicle citations and 1 dog citation was issued this year.

In an effort to minimize visitor impacts to WSP, the NCRD continued to participate in the “Share the Beach” docent program organized by the Recovery Unit 2 outreach subcommittee. The 2010 Share the Beach efforts began in April with one educational workshop, consisting of a 2 hour classroom session, followed by a 2 hour field trip to

LRSB. As a result, a small group of volunteer docents were able to roam the beach and provide information about plover breeding biology to beachgoers for a few hours 2-3 times a week, mostly on weekends for the entire breeding season. In addition, 6 beach and dune naturalist walks were given at LRSB between May and December of 2010. Finally, during the local annual bird watching festival “Godwit Days”, NCRD staff participated with the outreach subcommittee to present a WSP educational display and also led a snowy plover/dune restoration field trip.

Habitat Condition and Management

Plovers initiated 8 nests in 2010, all in restored habitats of varying seral stages. Three nests were initiated at Stone Lagoon where per capita reproductive success was $1.5 \pm .71$ (Table 2), making this beach the most productive beach (based on per capita fledging success of breeding males) within RU2. Little River State Beach hosted 5 nests in the newly treated habitat restoration area (HRA), however no eggs made it to hatching. Prior to 2010, the last nesting at LRSB was in 2006 when the use of predator exclosures was discontinued due to potential loss of adult plovers. The last chick to fledge from LRSB did so in 2005, the breeding season following the implementation of the pilot habitat restoration. Colwell et al. (2010) note that corvid predation may overwhelm the otherwise beneficial effects of high-quality nesting habitat, LRSB may in time connote this very idea. See Appendix C for site specific habitat condition.

	LRSB	BL	SL	DL	GBB	TDSP
2001	(8) $1.25 \pm .96$	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0
2002	(9) 0	(0) 0*	(0) 0*	(0) 0*	(0) 0	(0) 0
2003	(4) $.25 \pm .50$	(0) 0*	(0) 0*	(0) 0*	(0) 0	(0) 0
2004	(1) $2 \pm 0^*$	(0) 0*	(0) 0*	(0) 0*	(1) $1 \pm 0^*$	(0) 0
2005	(3) 1 ± 1	(2) 0	(0) 0	(0) 0	(1) 0*	(0) 0
2006	(2) 0	(0) 0	(0) 0	(0) 0	(0) 0*	(0) 0
2007	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0*	(0) 0
2008	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0*	(0) 0
2009	(0) 0*	(0) 0	(1) 3 ± 0	(0) 0	(0) 0	(0) 0*
2010	(5) 0	(0) 0	(3) $1.5 \pm .71$	(0) 0	(0) 0	(0) 0*

(# Nests) per capita reproductive success ± 1 SD
 *Invasive Exotic Removal Year

In an effort to provide quality habitat for the western snowy plover and to protect the beach and dune ecosystem, the NCRD initiated the following restoration activities:

TOLOWA DUNES STATE PARK

The Lake Tolowa restoration project initiated in 2009 proposes restoration of 103 acres of coastal dune habitat in the southern portion of Tolowa Dunes State Park. The primary goal of this project is to restore areas damaged by European beachgrass infestation. The project proposes to restore natural dune processes by removing European beachgrass, re-establishing pre-invasion dune topography and sand movement, and promoting re-vegetation by native dune vegetation.

PRAIRIE CREEK REDWOODS STATE PARK

Dune restoration efforts continued at Carruther's Cove (north end of Gold Bluffs Beach) within PCRSP. Between 2005 and 2009, approximately 26 acres of *Ammophila arenaria* was removed from the Ossagon and Carruther's Cove area via heavy equipment. In the late summer of 2010, the Ossagon area was retreated by hand. The ~26 acres at Ossagon are now at a maintenance level.

HUMBOLDT LAGOONS STATE PARK

The restoration efforts at HLSP began in the spring of 2002 and initial treatment of the entire dune system was completed in March of 2005. The control of exotic invasive vegetation at HLSP beaches is currently at maintenance level.

LITTLE RIVER STATE BEACH

Using mitigation funds from the Stuyvesant oil spill; the North Coast Redwoods District initially treated 34 acres of European beachgrass at Little River SB. This effort, in combination with the original pilot project from 2005, resulted in 42 acres of removed beachgrass from Little River State Beach. As with the pilot project, the recent initial treatment was conducted with heavy equipment, primarily bulldozers. Retreatment, utilizing a combination of volunteers, CCC crews, CDC crews, and Park staff is currently being conducted several times a year.

CONCLUSION

To facilitate management of plovers within the NCRD we draw upon results presented as it relates to predation, human disturbance and habitat degradation. These three inter-related factors have been reported to compromise reproductive success (USFWS 2007) and hence, limit plover populations along the Pacific coast. In order to continually improve our stewardship, results presented are interpreted in light of current management efforts.

In 2010, the NCRD Resource Management Program continued monitoring WSP within the District with the help of HSU (LRSB) and RNP (PCRSP). After several years of low breeding numbers, there was an increase in birds observed during the breeding season and an increase in nesting plovers. In the NCRD, 5 breeding plovers initiated 8 nests, produced 4 chicks and fledged 3 juvenile. For the greater RU2, Colwell et al. (2010) reports a 63% increase in the breeding population, which they attribute to high adult breeding site fidelity and plover immigration from elsewhere along the Pacific coast.

Predator Activity and Management

Colwell et al. (2009) report that predation of eggs and chicks is the most significant problem limiting productivity of plovers in RU2. In 2010, nest loss varied significantly between the two nesting sites, Little River Beach and Stone Lagoon Beach. At LRSB 100% (5) of nests failed, presumably to predation (80%) and tidal overwash (20%). In contrast, at SL 33% (3) of nests failed, presumably due to tidal overwash. Colwell et al. (2010) suggest two alternative (but not mutually exclusive) strategies to aid recovery in light of the observed DPR patterns: 1) encourage plovers to settle at sites with lower DPR, by allowing high nest predation rates to gradually “push” breeding plovers into higher-quality sites and/or modifying those sites to make them more attractive; and 2) reducing DPR at sites with aggregations of breeding plovers through enhanced predator management. It appears that the plover response to the high DPR may already be in motion (as evidenced by the fledging of birds from SL after first attempting at LRSB/CN and failing). In an effort to make these sites more attractive, CSP erected a temporary PPA and increased enforcement at SL. As in years past, we continued using anti-predator perching devices and predator proof trash cans to manage predator concentrations in plover breeding areas. At a landscape level, CSP (in partnership with NPS) implemented the Corvid Management Strategy (RNSP 2008) to decrease the density of corvids surrounding visitor use developments. The Corvid Management

Strategy includes effectiveness monitoring and an adaptive management approach to facilitate the selection of appropriate corvid management tools for California State Park lands. Finally, CSP staff continue to participate in the RU2 working group and the RU2 Predator Sub-Committee to identify means of enhanced predator management.

Human Activity and Management

In 2010, no nests were known to fail directly from human activity. In years past humans have driven over nests, vandalized exclosures and removed eggs, stepped on eggs, disturbed incubating adults causing nest abandonment, and caused the death of newly hatched chicks owing to hypothermia (Colwell et al. 2008). To address these risks, NCRD staff have erected PPA (breeding and non-breeding) to protect WSP and their eggs, increased enforcement of existing regulations and invested in plover-centric education and outreach programs.

To encourage protection of the beach and dune ecosystem and educate the public about sharing the beach with all species, the NCRD has been active in the WSP Recovery Unit 2 Outreach subcommittee and the “Share the Beach” docent program at LRSB and adjoining Clam Beach County Park (CBCP). At a landscape level, CSP staff have initiated a district wide outreach campaign to inform visitors about the potential effect they have on corvid populations, the impact this may have on sensitive species, and ways that visitors can minimize the effect they have on corvid populations.

Habitat Condition and Management

Of the three limiting factors identified by the USFWS, habitat quality is perhaps the most difficult to assess. Within the NCRD, plovers have selected open and restored habitats during the breeding and non-breeding season and settled disproportionately in newly restored habitats. The direct influence of habitat condition on plover productivity remains vague; however the positive implications of European beachgrass removal and restoration of native dune vegetations for WSP recovery are vast. For example, 1) the native dune vegetation known as “dune mat” offers a heterogeneous substrate, in which WSP eggs and chicks may be more cryptic and therefore less susceptible to predation; 2) the removal of beachgrass and its rhizomes facilitates the restoration of dune topography from artificially high, densely vegetated dunes to the sparsely vegetated low hummocks and open ground preferred by nesting plovers; and 3) European beachgrass is associated with a lower invertebrate abundance and diversity (Slobodchikoff and

Doyen 1977, Webb et al. 2000). Plovers primarily forage on surface invertebrates of the beach and dunes, a lower abundance of invertebrates may have serious implications to plover survival.

Habitat restoration, specifically the removal of exotic invasive vegetation such as European beachgrass, continues to be a major component of CSP's Natural Resource Program. We anticipate that the relationship between exotic invasive vegetation and plover productivity will become apparent in time as we continue monitoring plover use in treated and non-treated areas and are able to observe the potential implications that patch size, crypsis, topography, foraging opportunities, proximity to foot traffic, proximity to conspecifics, and corvid abundance have on plover productivity.

In 2009/10 the North Coast Redwoods District plans to:

- Continue monitoring efforts throughout the NCRD and participation in the Recovery Unit 2 demographic study.
- Continue to work and coordinate with the Recovery Unit 2 working group and subcommittees, and the Humboldt Coastal Dunes Cooperative.
- Continue habitat restoration within WSP suitable habitat.
- Continue to use symbolic fencing to protect nests and wintering areas when appropriate.
- Explore avenues to attract plovers to sites with lower DPR.
- Complete beach patrol logs developed in 2010 for the rangers to document beach and dune patrols, violations, citations, and contacts.
- Continue to increase law enforcement presence at occupied State Park beaches during the WSP breeding season, especially during holiday weekends.
- Increase public outreach via Recovery Unit 2 Outreach Subcommittee and improved signage.

LITERATURE CITED

- Alberico, J.A.R. 1995. Floating eggs to estimate incubation stage does not affect hatchability. *Wildlife Bulletin* 23:212-216.
- Barry, W.J. & Schlinger, E.I. 1977. Inglenook Fen. California Department of Parks and Recreation, Sacramento, CA
- Boyd, R.S. 1992. Influence of *Ammophila arenaria* on foredune plant microdistributions at Point Reyes National Seashore, California. *Madrono: a west American journal of botany*, 39, no. 1 (Jan/Mar 1992), p67-76.
- Buell, A. C. 1992. History of the introduction and spread of *Ammophila arenaria* on the North Spit of Humboldt Bay, California. M.A. Thesis, Humboldt State University, Arcata, California, USA. California Department of Parks and Recreation. 2002. Western Snowy Plover Systemwide Management Guidelines. Sacramento, California.
- Colwell, M.A., Zach Nelson, Steve. Mullin, Carol Wilson, Sean E. McAllister, Kerry G. Ross, and Ron R. LeValley. 2005. Final report: 2005 Western Snowy Plover Breeding in Coastal Northern California, Recovery Unit 2. Submitted to MRB Research, Inc.
- Colwell, M.A., S.M. Mullin, Z.J. Nelson, C. A. Wilson, J.M. Muir; W.P. Goldenberg, S.E. McAllister, and K.G. Ross. 2006. Final report: 2006 Western Snowy Plover Breeding in Coastal Northern California, Recovery Unit 2. Submitted to MRB Research, Inc.
- Colwell, M.A., N.S. Burrell, M.A. Hardy, J.J. Muir, C.A. Wilson, S.E. McAllister, and R. R. LeValley. 2007. Final Report: 2007 Snowy Plover breeding in coastal northern California, Recovery Unit 2. Submitted to MRB Research, Inc.
- Colwell, M.A., K. M. Brindock, N.S. Burrell, M.A. Hardy, J.J. Muir, S.A. Peterson, S.E. McAllister, K. G. Ross, and R. R. LeValley. 2008. Final Report: 2008 Snowy Plover breeding in coastal northern California, Recovery Unit 2. Submitted to MRB Research, Inc.
- Colwell, M.A., N.S. Burrell, M.A. Hardy, K. Kayano, J.J. Muir, W.J. Pearson, S. A. Peterson, K.A. Sesser, and R.R Thiem. 2009. Final report: 2009 Snowy Plover breeding in coastal northern California, Recovery Unit 2. Submitted to MRB Research, Inc., and California Department of Fish and Game.
- Colwell, M.A., N.S. Burrell, M.A. Hardy, S.E. McAllister, W.J. Pearson, S. A. Peterson, K.G. Ross, and K.A. Sesser. 2010. Final report: 2010 Snowy Plover breeding in coastal northern California, Recovery Unit 2. Submitted to MRB Research, Inc. and California Department of Fish and Game.
- Danin, A., S. Rae. 1998. Early primary succession on dunes at Bodega Head, California. *Madrono*. April June 45(2): 101-109. {a} *Evolution, Ecology, and Systematics*, Hebrew University of Jerusalem, Jerusalem, 91904, Israel
- Pickart, A.J. and J.O. Sawyer. 1998. Ecology and restoration of northern California coastal dunes. California Native Plant Society. Sacramento, CA.

- Pickart, A.J., and M.G. Barbour. 2007. Beach and dune. Pages 155–179 in M.G. Barbour, T. Keeler-Wolf, and A.A. Schoenherr, eds., *Terrestrial vegetation of California*, 3d edn. University of California Press, Berkeley.
- Pitts, W. D. & M. G. Barbour. 1979. The microdistribution and feeding preferences of *Peromyscus maniculatus* in the strand at Point Reyes National Seashore, California. *Amer. Midi. Nat.* 101:38-48.
- RNSP. 2008a. Corvid Management Strategy – Redwood National and State Parks. Unpub. report on file at South Operations Center, Redwood National and State Parks, Orick, CA. 45 pp United State Fish and Wildlife Service. 1993. Threatened status for the Pacific Coast Population of the Western Snowy Plover. *Federal Register* Vol. 58 (42) 12864-12874.
- Slobodchikov, C.N.; Doyen, J.T. (1977). Effects of *Ammophila arenaria* on sand dune arthropod communities. *Ecology*, 58, no. 8, p1171-1175.
- Wiedemann, A. M. 1984. The ecology of the Pacific Northwest coastal sand dunes: A community profile. U.S. Fish and Wildlife Services FWS/OBS-84/04.
- Wiedemann, A. M. 1988. Evergreen State College, Olympia, Washington. Letter to Andrea Pickart, Preserve Manager, Lanphere-Christensen Dunes Preserve. May 14, 1988.
- United States Fish and Wildlife Service. 2006. Endangered and threatened wildlife and plants; Proposed special rule pursuant to section 4(d) of the Endangered species Act for the Pacific coast distinct population segment of the western snowy plover. *Federal Register* 71:20625-20636. April 21, 2006.
- United States Fish and Wildlife Service. 2007. Recovery Plan for the Pacific coast population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). Sacramento, CA. XIV + 751 pp.
- Webb, C.E.; Oliver, I.; Pik, A.J. (2000). Does Coastal Foredune Stabilization with *Ammophila arenaria* restore plant and arthropod communities in southeastern Australia? *Restoration Ecology*, 8, no. 3 (Sept 01,2000), p283-288.
- Westerkov, K. 1950. Methods for determining the age of game-bird eggs. *J. Wildl. Manage.* 14:56-67.

Appendix A - WSP Survey Forms

SNPL Monitoring

SNPL Survey

Survey Info Results

SurveySite Freshwater

Date 1/14/2009

StartTime 0821 Visit Type CS

Observer 1 Jay Harris

Observer 2

Total # Observers 1

Temp F 51-5 Wind mph 1-4

% Cloud 1-25 Precip D

ok x

SNPL Survey

Survey Info Results

End Time 1321 Human 8

cora 3 amcr 2 other 0

Dog IC 0 Dog NIC 2

Veh. IC 0 Veh. NIC 0

Adult M 3

Adult F 2

Adult U 0

Juv 0

Chicks 0

Total SNPL 5

Nests 0

ok x

SNPL Survey

Results Notes

Low detection likely due to off-leash dog running present in survey area.

ok x

SNPL Monitoring

Point Count

Page 1 Page 2

1/14/2009 Obsvr JEH

Time 920 Visual to 500m Nc

CORA 1 Other Avi Pred 0

AMCR 0

Human 2 Horse 0

Dog IC 0 Dog NIC 1

Veh. IC 0 Veh. NIC 0

ok x

Bird_ID

ID Notes Pictu

Date 1/14/2009

Observer JEH

Color Band GV:YG

Sex M

Age A

chic in brood 2

Behavior Brood

Habitat WR

GroupSize 3

ok x

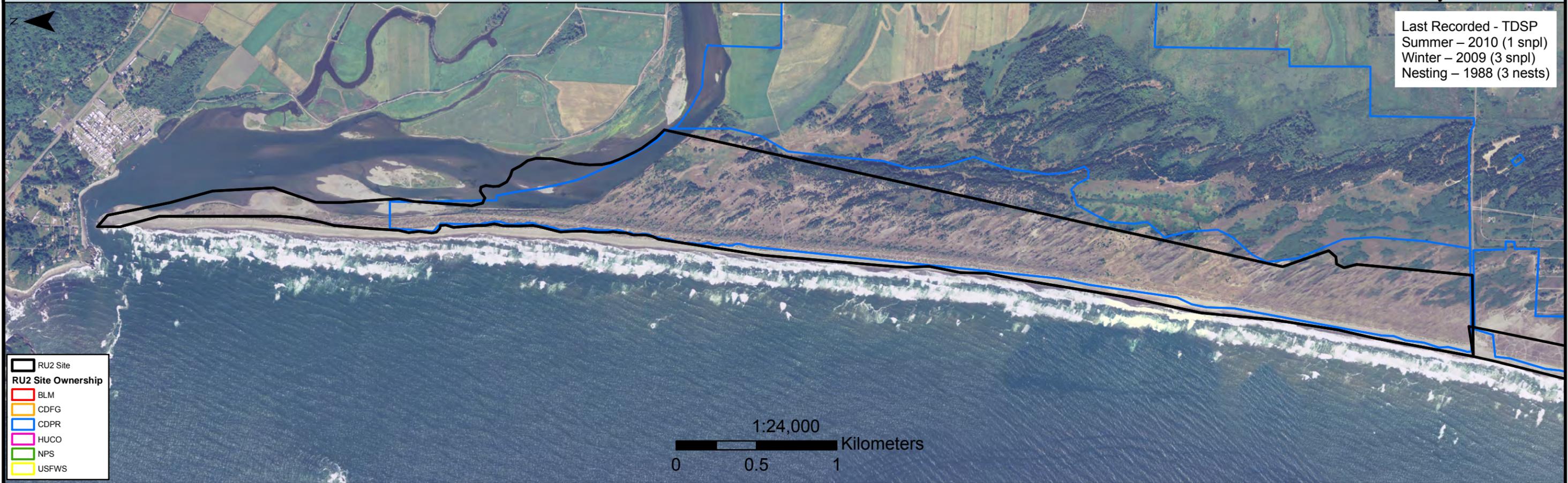
Appendix B. NCRD Western Snowy Plover Breeding Summary 2010									
Location	Nest Number	Northing	Easting	Date Nest Exclosed	Female	Male	Number Hatched	Fate	Date
Stone Lagoon Beach, HLSP	10SL01	407724	4567458	NA	OR:RR	OR:YR	0	Failed Tidal	04/09/10
Stone Lagoon Beach, HLSP	10SL02	407775	4567592	NA	OR:RR	OR:YR	1/1	Fledged 1	07/07/10
Stone Lagoon Beach, HLSP	10SL03	407709	4567445	NA	OR:RR	NW:RG	3/3	Fledged 2	08/06/10
Little River State Beach	10CN02	406402	4541197	NA	OR:RR	OR:YR	0	Failed Tidal	03/31/10
Little River State Beach	10CN03	406430	4541059	NA			0	Failed Unk.	04/09/10
Little River State Beach	10CN06	406432	4540893	NA	BP:OG	WW:YB	0	Failed Unk.	04/23/10
Little River State Beach	10CN08	406591	4541208	NA	BP:OG	WW:YB	0	Failed Unk.	06/10/10
Little River State Beach	10CN09	406340	4541131	NA	BP:OG	WW:YB	0	Failed CORA	06/24/10

* UTM - North American Datum 1983

Appendix C - WSP Survey Site

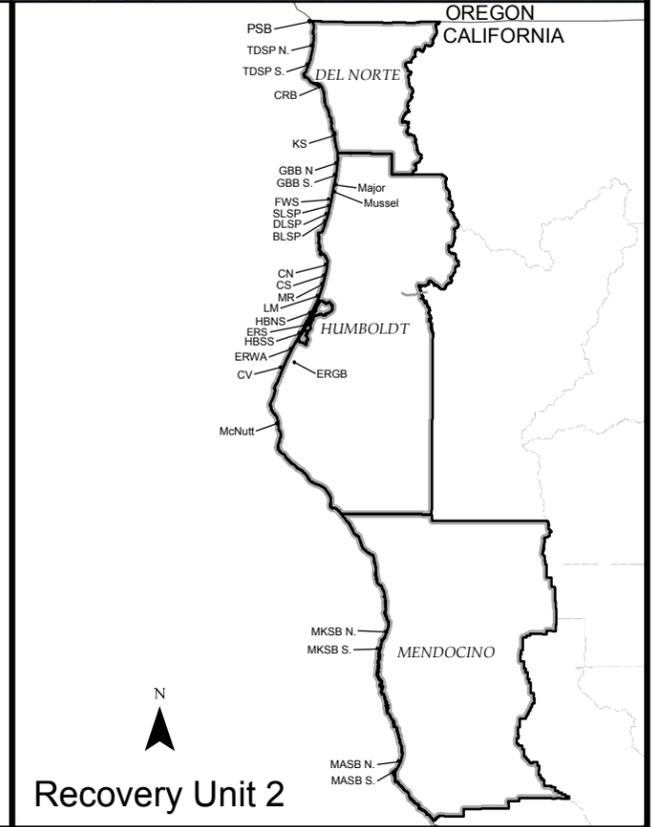
TDSP N. (Smith River to Kellogg Rd.)

Last Recorded - TDSP
Summer – 2010 (1 snpl)
Winter – 2009 (3 snpl)
Nesting – 1988 (3 nests)



RU2 Site
RU2 Site Ownership
 BLM
 CDFG
 CDPR
 HUCO
 NPS
 USFWS

<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i> Population Surveys (1x Month) -ATV survey (70 min.) 10 min. PC -Foot survey (210 min.) 20 min.PC</p> <p>Demographic Survey (1x Week if breeding determined)</p>	<p><i>Existing</i> *Symbolic Fencing (if breeding determined)</p>	<p><i>Existing</i></p>	<p><i>Existing</i> Beach Patrolled (1x Week) Vehicle NIC if -South of Kellogg without special permit on CSP lands -Non-street legal -Off waveslope -Speed > 15 mph -Vehicle play observed Dog NIC if -Beyond 500 meter of Kellogg Rd. -Off leash -Off waveslope</p>	<p><i>Existing</i> North Coast Redwood Interpretive Association and Tolowa Dunes Stewards offer field trips and talks.</p>
<p><i>Needed</i></p>	<p><i>Needed</i> * E. beachgrass removal, few remaining areas with open sand and or native vegetation.</p>	<p><i>Needed</i> *PP trash receptacles *Address illegal dumping of carcasses and adjacent agricultural land use correlated with high # Corvids</p>	<p><i>Needed</i> *Regulatory signage</p>	<p><i>Needed</i> *Interpretative displays</p>

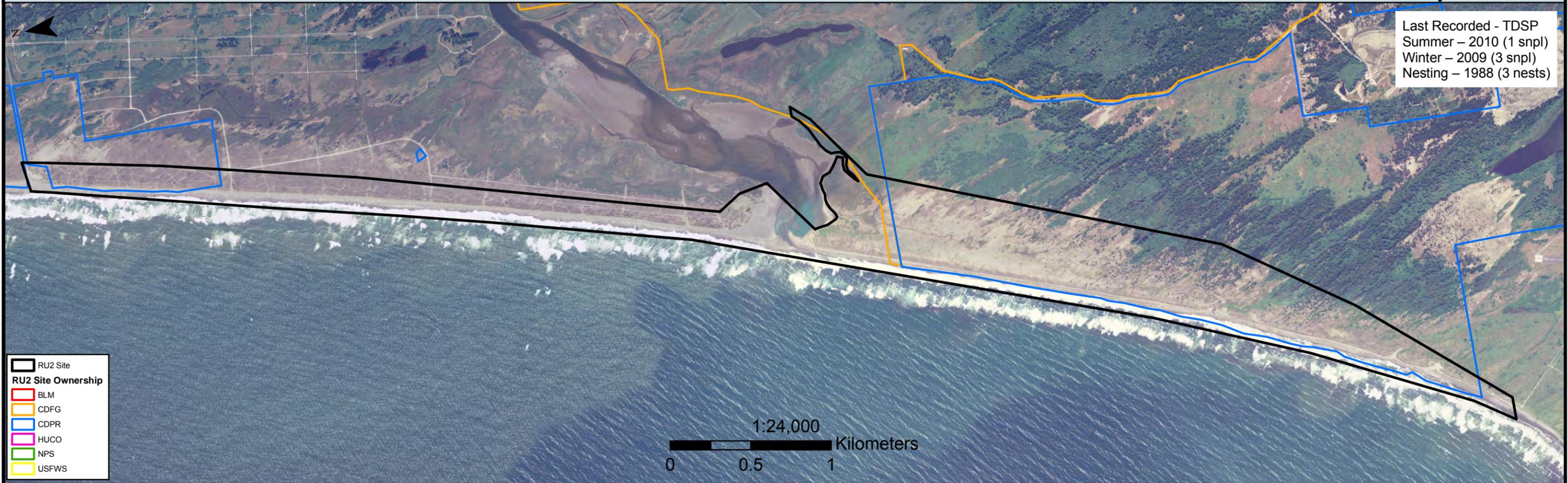


Recovery Unit 2

TDSP S. (Kellogg Rd. to Pt. St. George)



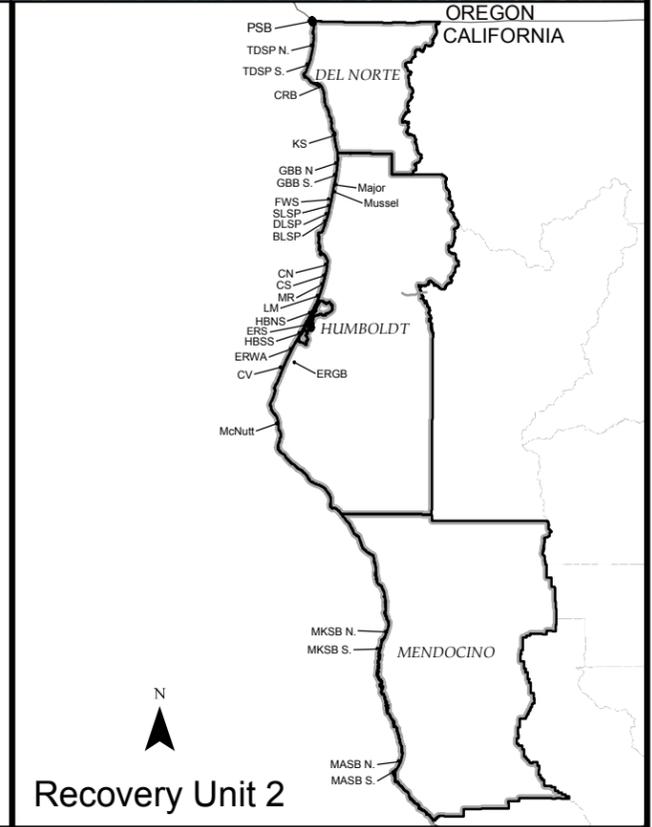
Last Recorded - TDSP
Summer – 2010 (1 snpl)
Winter – 2009 (3 snpl)
Nesting – 1988 (3 nests)



RU2 Site
RU2 Site Ownership
 BLM
 CDFG
 CDPR
 HUCO
 NPS
 USFWS

1:24,000
 0 0.5 1 Kilometers

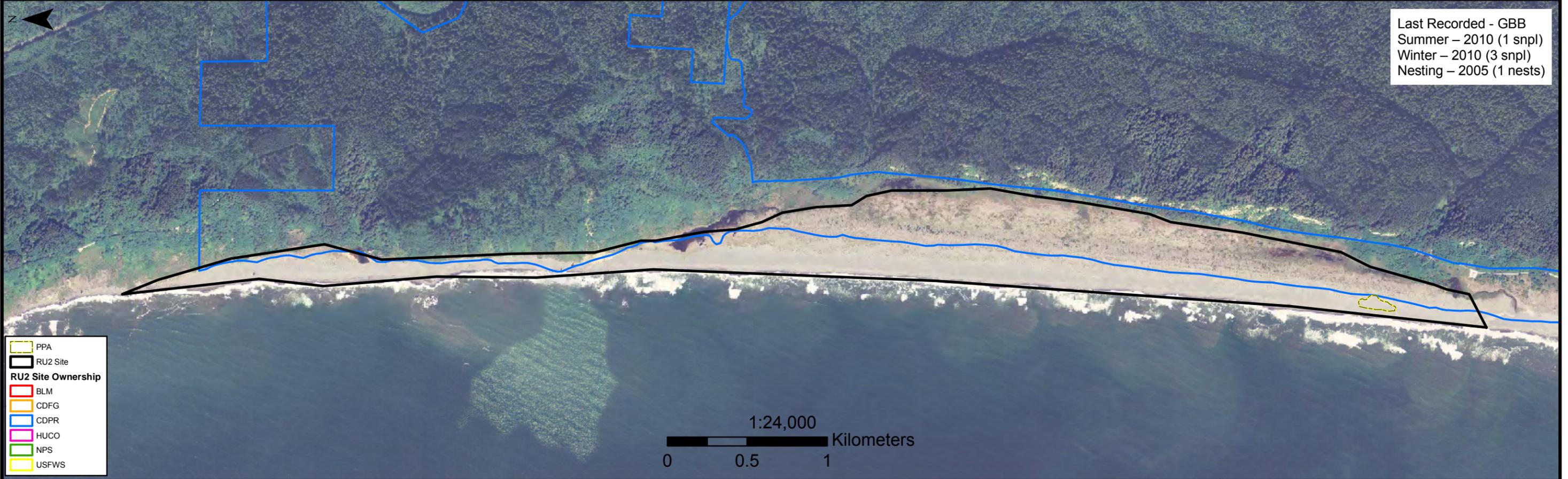
<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i> Population Surveys (1x Month) -ATV survey (70 min.) 10 min. PC -Foot survey (210 min.) 20 min. PC</p> <p>Demographic Survey (1x Week if breeding determined)</p>	<p><i>Existing</i> *Symbolic Fencing (if breeding determined) *400 acre nearshore dune restoration planned for area just south of the Tolowa breach on CSP lands.</p>	<p><i>Existing</i></p>	<p><i>Existing (CSP lands only)</i> Beach Patrolled (1x Week) Vehicle NIC if -South of Kellogg without special permit -Non-street legal -off waveslope -speed > 15 mph -vehicle play observed Dog NIC if -Beyond 500 meter of Kellogg Rd. -Off leash -Off waveslope</p>	<p><i>Existing</i> North Coast Redwood Interpretive Association and Tolowa Dunes Stewards offer field trips and talks.</p>
<p><i>Needed</i></p>	<p><i>Needed</i></p>	<p><i>Needed</i> *PP trash receptacles *Address illegal dumping of carcasses and adjacent agricultural land use correlated with high # Corvids</p>	<p><i>Needed</i> *Regulatory signage</p>	<p><i>Needed</i> *Interpretative displays</p>



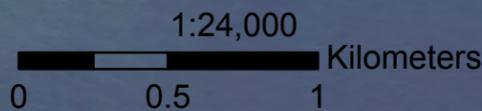
GBB N. (Carruthers Cove to Fern Canyon)



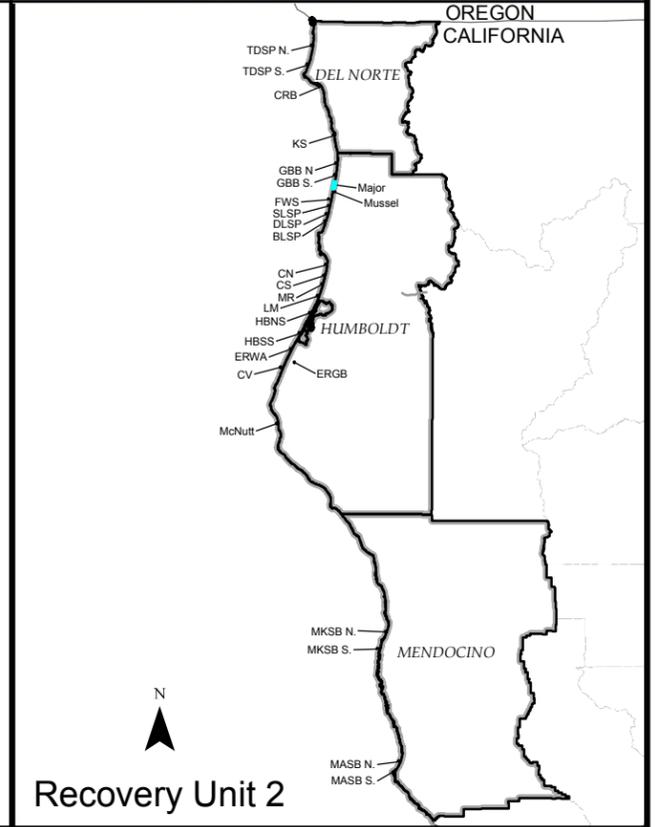
Last Recorded - GBB
Summer – 2010 (1 snpl)
Winter – 2010 (3 snpl)
Nesting – 2005 (1 nests)



PPA
 RU2 Site
RU2 Site Ownership
 BLM
 CDFG
 CDFR
 HUCO
 NPS
 USFWS



<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i></p> <p>Population Surveys-min. 2 surveyors Breeding (2x Month) Winter (1x Month) Breeding survey - by foot only -ATV (40 min.) 10 min. PC -Foot (230 min.) 20 min. PC</p> <p>Demographic Survey (1x Week if breeding determined)</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Symbolic Fencing (if breeding determined) *E. beachgrass removal and maintenance (approximately 20 acres) ongoing from Carruthers's Cove to Ossagon.</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Corvid Management Plan</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>Beach Patrolled (x Week) Vehicle use limited to permit Vehicle NIC if -Non-street legal -off waveslope -speed > 15 mph -vehicle play observed Dog NIC if -Off leash -Beyond area defined as waveslope to high tide line</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>North Coast Redwood Interpretive Association</p> <p><i>Needed</i></p> <p>*Interpretative displays</p>

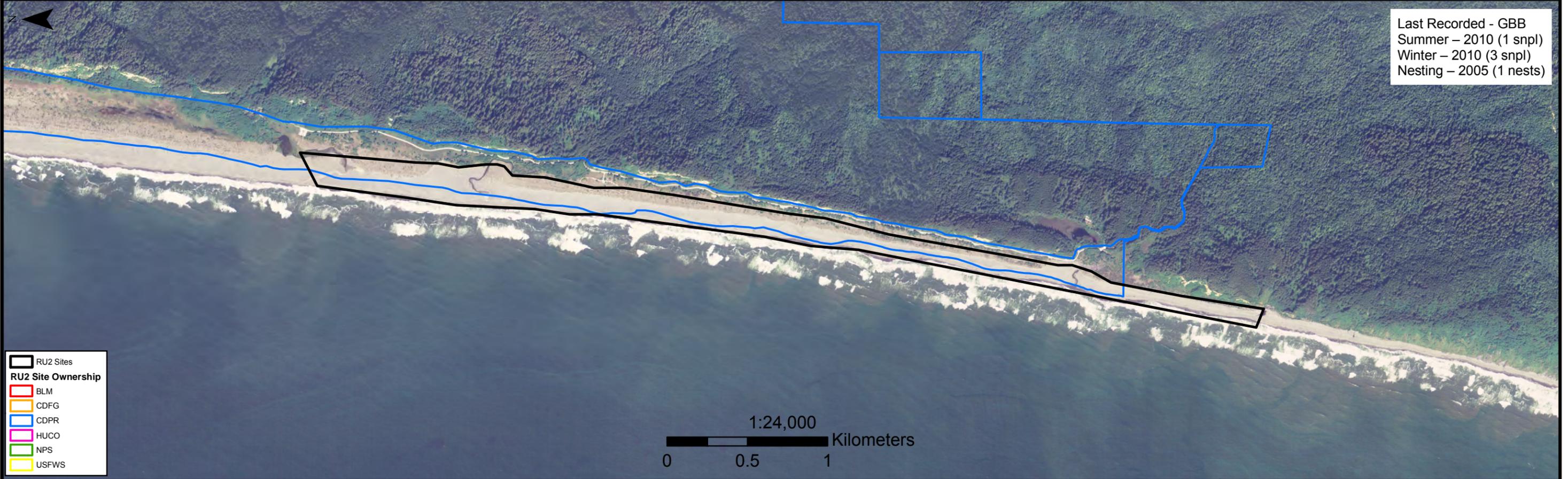


Recovery Unit 2

GBB S. (Fern Canyon to Major Creek)



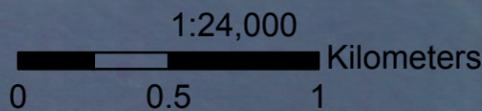
Last Recorded - GBB
Summer – 2010 (1 snpl)
Winter – 2010 (3 snpl)
Nesting – 2005 (1 nests)



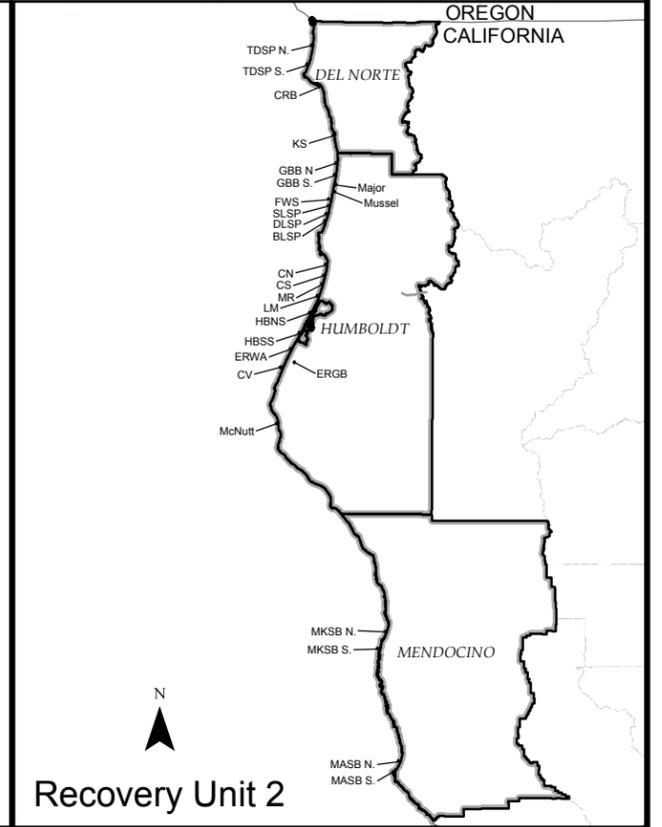
RU2 Sites

RU2 Site Ownership

- BLM
- CDFG
- CDPR
- HUCO
- NPS
- USFWS



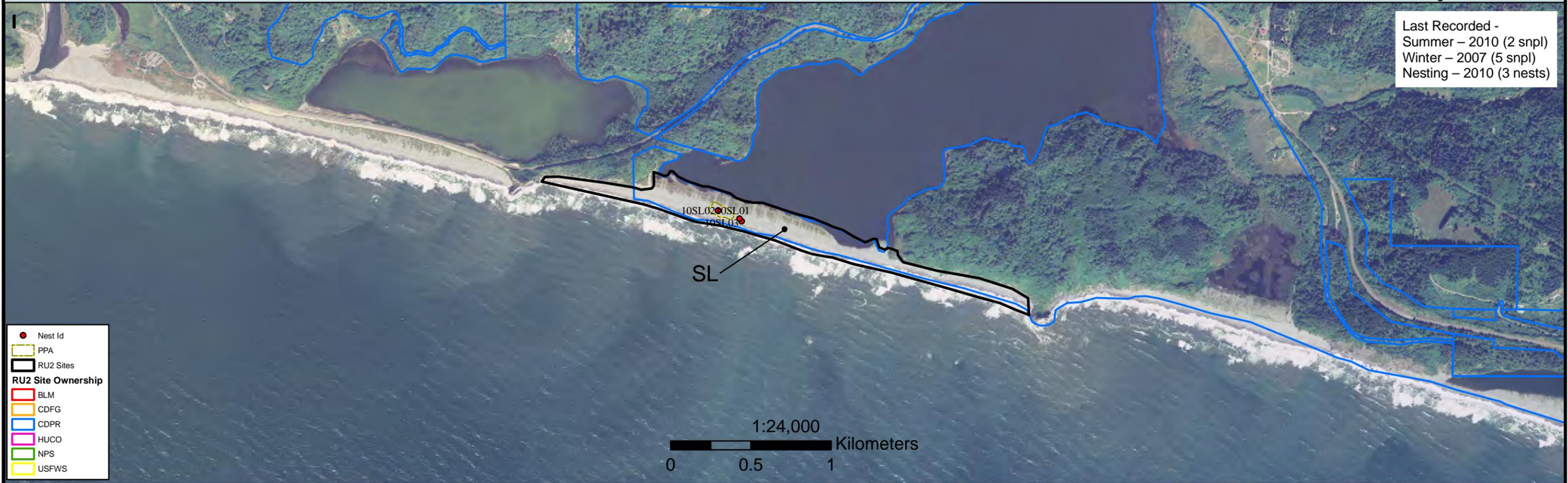
<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i></p> <p>Population Surveys-min. 2 surveyors Breeding (2x Month) Winter (1x Month) Breeding survey - by foot only -ATV (30 min.) 10 min. PC -Foot (120 min.) 20 min. PC</p> <p>Demographic Survey (1x Week if breeding determined)</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Symbolic Fencing (if breeding determined) *E. beachgrass removal by hand near Espa lagoon and GBB Campground.</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Corvid Management Plan</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>Beach Patrolled (x Week) Vehicle use limited to permit Vehicle NIC if -Non-street legal -off waveslope -speed > 15 mph -vehicle play observed Dog NIC if -Off leash -Off waveslope</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>North Coast Redwood Interpretive Association</p> <p><i>Needed</i></p> <p>*Interpretative displays</p>



SL (Freshwater Rocks to Sharp Pt.)



Last Recorded -
Summer - 2010 (2 snpl)
Winter - 2007 (5 snpl)
Nesting - 2010 (3 nests)



● Nest Id
 □ PPA
 □ RU2 Sites
RU2 Site Ownership
 ■ BLM
 ■ CDFG
 ■ C DPR
 ■ HUCO
 ■ NPS
 ■ USFWS

Research & Monitoring

Existing
Population Surveys
 Breeding (2x Month)
 Winter (1x Month)
 Survey - by foot only
 -Foot (55 min.) 20 min. PC

Demographic Survey (1x Week if breeding determined)

Needed

Habitat Management

Existing
 *Symbolic Fencing (if breeding determined)
 *nearshore dune exotics at maintenance level.

Needed

Predator Management

Existing
 *Predator proof receptacles

Needed

Law Enforcement

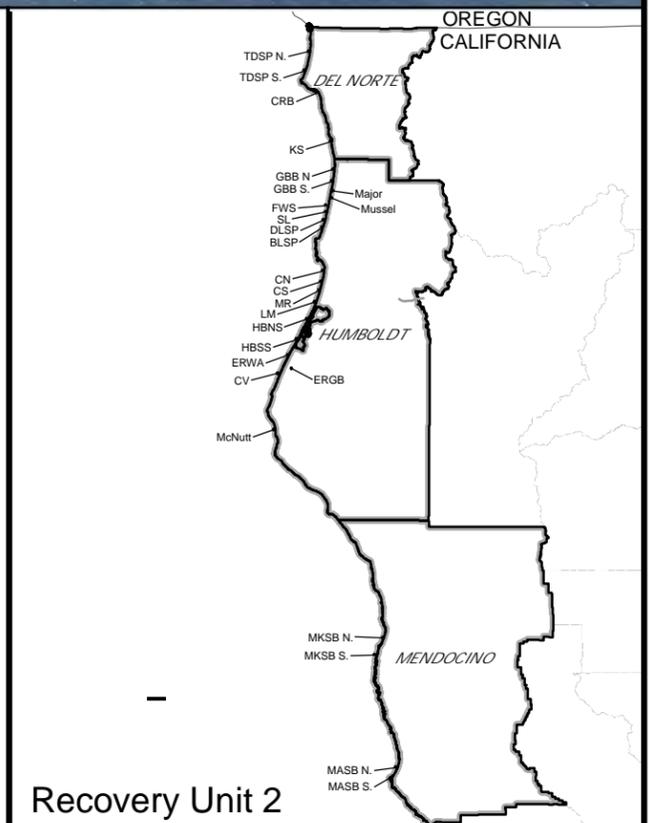
Existing
 Beach Patrolled (1x/Week)
Vehicle use limited to permit
Vehicle NIC if
 -Non-street legal
 -off waveslope
 -speed > 15 mph
 -vehicle play observed
Dog NIC if
 - Present outside of parking area or off leash anywhere

Needed

Education & Outreach

Existing

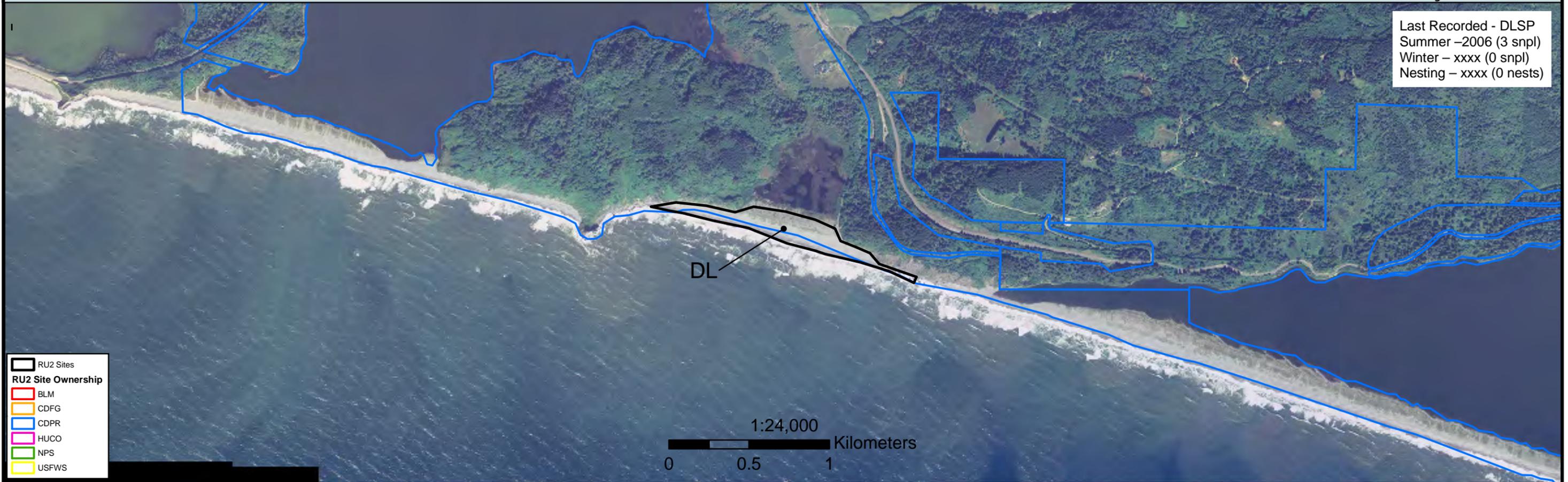
Needed
 *Interpretative displays



DL (Sharp Pt. to Big Lagoon Rocks)



Last Recorded - DLSP
Summer -2006 (3 snpl)
Winter - xxxx (0 snpl)
Nesting - xxxx (0 nests)

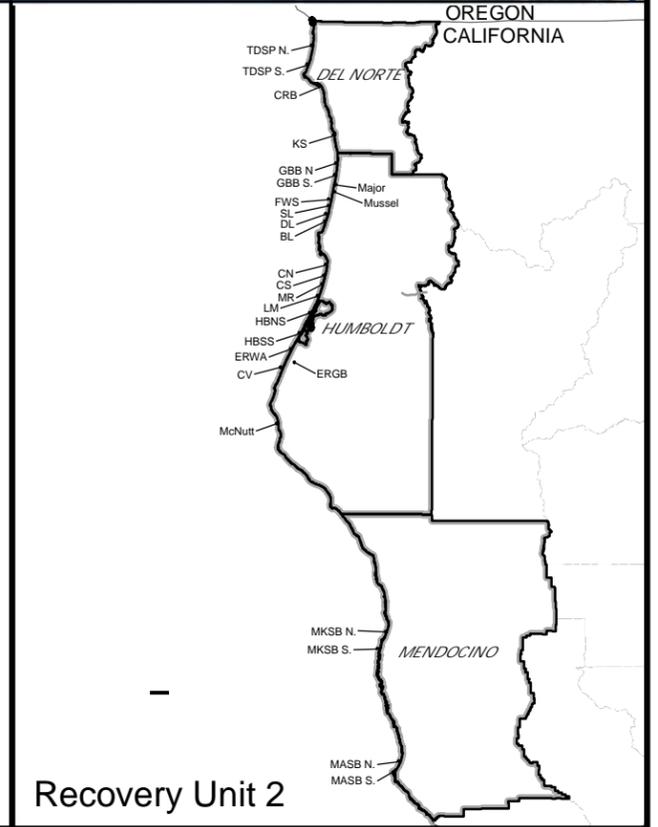


RU2 Sites

RU2 Site Ownership

- BLM
- CDFG
- C DPR
- HUCO
- NPS
- USFWS

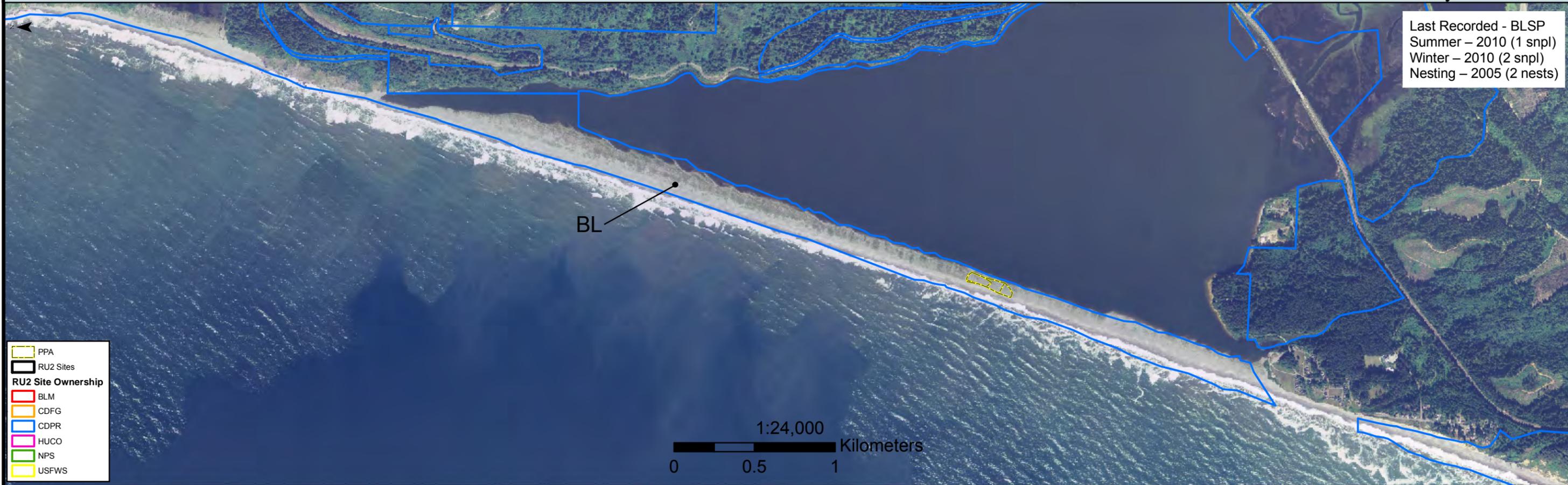
<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i></p> <p>Population Surveys Breeding (2x Month) Winter (1x Month) Breeding survey - by foot only -ATV (10 min.) 10 min PC -Foot (40 min.) 20 min. PC</p> <p>Demographic Survey (1x Week if breeding determined)</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Symbolic Fencing (if breeding determined) *nearshore dune exotics at maintenance level</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>*Predator proof receptacles</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p>Beach Patrolled (1x Week) No vehicle use Dog use permitted on a leash of no more than six (6) feet in length from Sharp Pt. south to rocks separating Dry from Big Lagoon Dog NIC if - Off leash - Off waveslope</p> <p><i>Needed</i></p>	<p><i>Existing</i></p> <p><i>Needed</i> *Interpretative displays</p>



Recovery Unit 2

BL (Big Lagoon Spit)

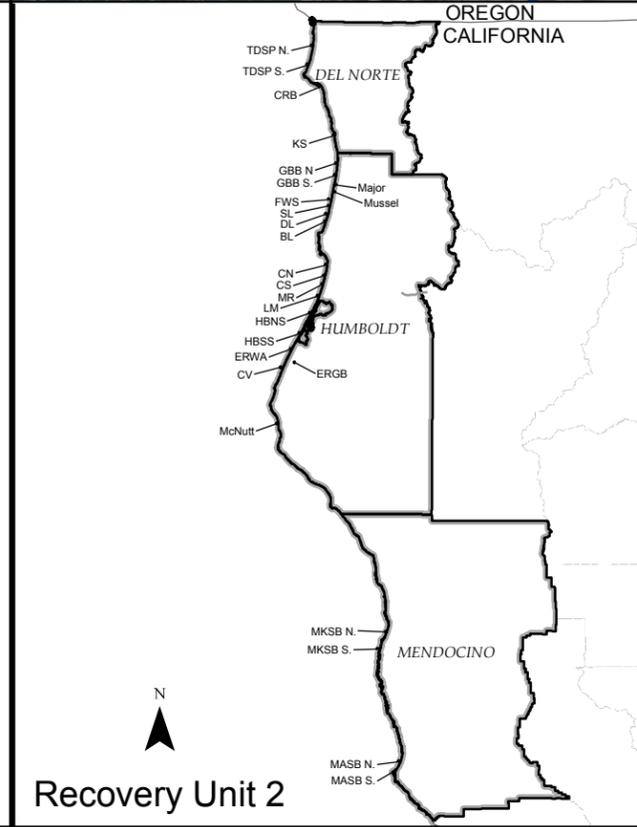
Last Recorded - BLSP
Summer - 2010 (1 snpl)
Winter - 2010 (2 snpl)
Nesting - 2005 (2 nests)



PPA
 RU2 Sites
RU2 Site Ownership
 BLM
 CDFG
 C DPR
 HUCO
 NPS
 USFWS

1:24,000
0 0.5 1 Kilometers

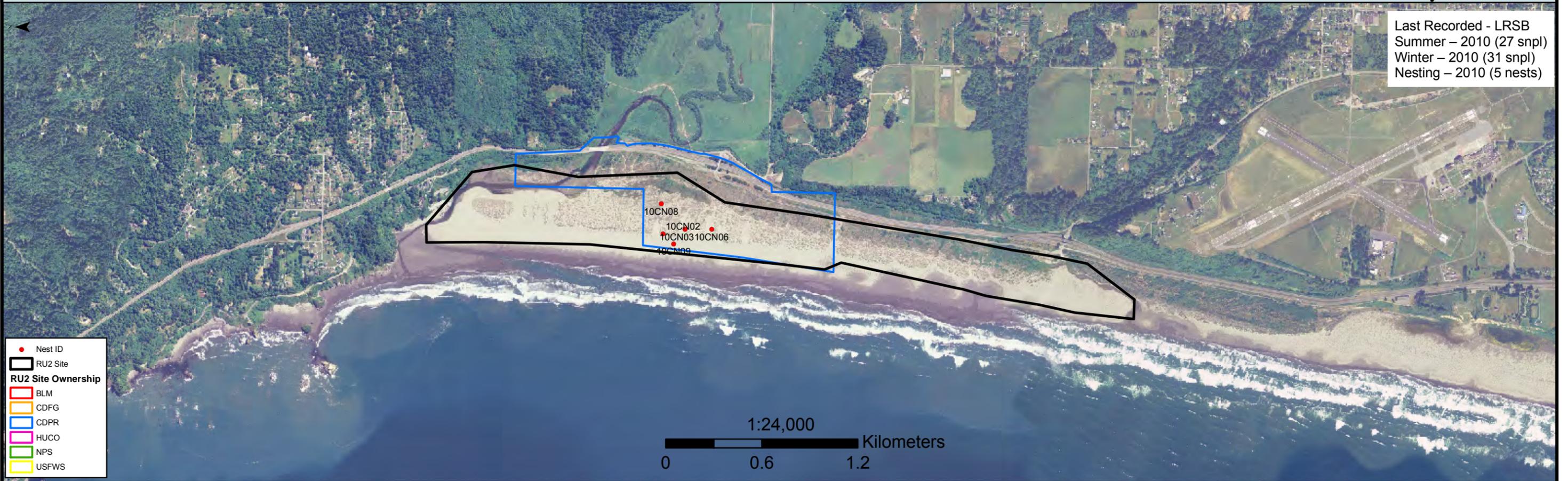
<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><i>Existing</i></p> <p>Population Survey min. 2 surveyors Breeding (2x Month) Winter (1x Month) Breeding survey - by foot only -ATV (60 min.) 10 min PC -Foot (120 min.) 20 min. PC</p> <p>Demographic Survey (1x Week if breeding determined)</p>	<p><i>Existing</i></p> <p>*Symbolic Fencing (if breeding determined) *Nearshore dune exotics at maintenance level.</p>	<p><i>Existing</i></p> <p>*Predator proof receptacles</p>	<p><i>Existing</i></p> <p>Beach Patrolled (1x Week) No vehicle use No dogs permitted on BLSP. Dogs are permitted on a leash at BLCP, within approximately 100 meters of BLCP parking area</p>	<p><i>Existing</i></p>
<p><i>Needed</i></p>	<p><i>Needed</i></p>	<p><i>Needed</i></p>	<p><i>Needed</i></p>	<p><i>Needed</i></p> <p>*Interpretative displays</p>



N
Recovery Unit 2

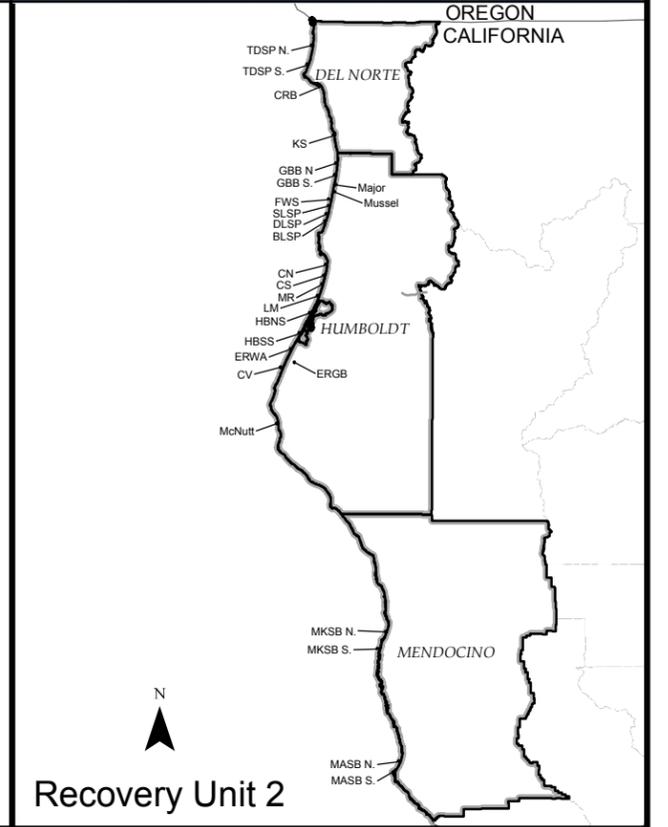


Last Recorded - LRSB
Summer – 2010 (27 snpl)
Winter – 2010 (31 snpl)
Nesting – 2010 (5 nests)



● Nest ID
 □ RU2 Site
RU2 Site Ownership
 ■ BLM
 ■ CDFG
 ■ CDFR
 ■ HUCO
 ■ NPS
 ■ USFWS

<u>Research & Monitoring</u>	<u>Habitat Management</u>	<u>Predator Management</u>	<u>Law Enforcement</u>	<u>Education & Outreach</u>
<p><u>LRSB ONLY</u> <u>From N. parking lot to LR</u> <i>Existing</i> Population Survey Breeding (2x Month) Winter (1x Month) -Foot (60 min.) 20 min. PC</p> <p>Demographic Survey (1x/Week if breeding determined)</p> <p><i>Needed</i></p>	<p><u>LRSB ONLY</u> <i>Existing</i> *Symbolic Fencing (if breeding determined) *Nearshore dune (28 ha.) restoration proposed for 2009.</p> <p><i>Needed</i></p>	<p><u>LRSB ONLY</u> <i>Existing</i> *Nixalite on perches</p> <p><i>Needed</i> *Predator proof receptacles</p>	<p><u>LRSB ONLY</u> <i>Existing</i> Beach Patrolled (3x/Week) Vehicle NIC if -Non-street legal -off waveslope -speed > 15 mph -vehicle play observed Dog NIC if -off leash -off waveslope</p> <p><i>Needed</i> *Additional regulatory signage (planned for in the LRSB Restoration and Enhancement Plan)</p>	<p><u>LRSB ONLY</u> <i>Existing</i> *FOD/Docents</p> <p><i>Needed</i> *Additional interpretive materials (planned for in the LRSB Restoration and Enhancement Plan)</p>



Appendix D

Redwood National Park

Western Snowy Plover and Vehicle Beach Access Permit System

Annual Report 2009 – 2010



March, 2011

Photo: Crescent Beach - Redwood National Park, one of four National Park Service western snowy plover monitoring reaches within Redwood National and State Parks.

INTRODUCTION

The western snowy plover monitoring program at Redwood National Park has always been conducted in cooperation with the California State Parks as part of the Redwood National and State Parks (RNSP) partnership. All of the information relevant to the history, background and reason for the monitoring program within Redwood National Park is the same as that given for the California State Parks and described in the previous report. This appendix will only cover the National Park Service owned survey reaches within RNSP. Please refer to the previous report for the results of western snowy plover monitoring on Gold Bluffs Beach in Prairie Creek Redwoods State Park.

This appendix and the Prairie Creek Redwoods State Park portions of the previous report satisfy the reporting requirements stipulated in the terms and conditions of the USFWS Vehicle Beach Access in Redwood National and State Parks biological opinion (USFWS ref. # 8-14-2001-F-0953 and 81331-2010-F-0021). Mandatory reporting on the beach access permittees fishing logs and ranger patrol levels for all of Redwood National and State Parks is contained within this appendix.

Regular western snowy plover wintering and breeding season surveys were started in Redwood National Park in 1996. No snowy plovers have ever been detected on any Redwood National Park beach during the past 14 years.

METHODS

All of the methods used within the state parks of RNSP were used for the monitoring surveys in Redwood National Park except for human and dog presence monitoring and subsequently will not be described here. Human and dog presence was recorded as the total number of individuals present on each survey reach in Redwood National Park. This contrasts with the method used for Prairie Creek Redwoods State Park where human and dog presence was measured using a 500m radius instantaneous scan sample every 20 minutes of survey time. Four survey reaches were monitored from October 2009 to September 2010 in Redwood National Park. Freshwater Spit was monitored once monthly from October 2009 to February 2010 and twice monthly from March to September 2010. Mussel Beach, the southernmost portion of Gold Bluffs Beach (Major Creek south), and Crescent Beach were monitored once monthly from March to September 2010.

RESULTS

Abundance and Distribution Surveys

No western snowy plovers were recorded on any of the four Redwood National Park survey reaches during the past survey year. Fifty-six hours (98 person hours) were spent searching for snowy plovers between October 2009 and September 2010.

Predator Activity and Management

Corvids were most common on Freshwater Spit and were not recorded at all on Mussel Beach (Figure 1).

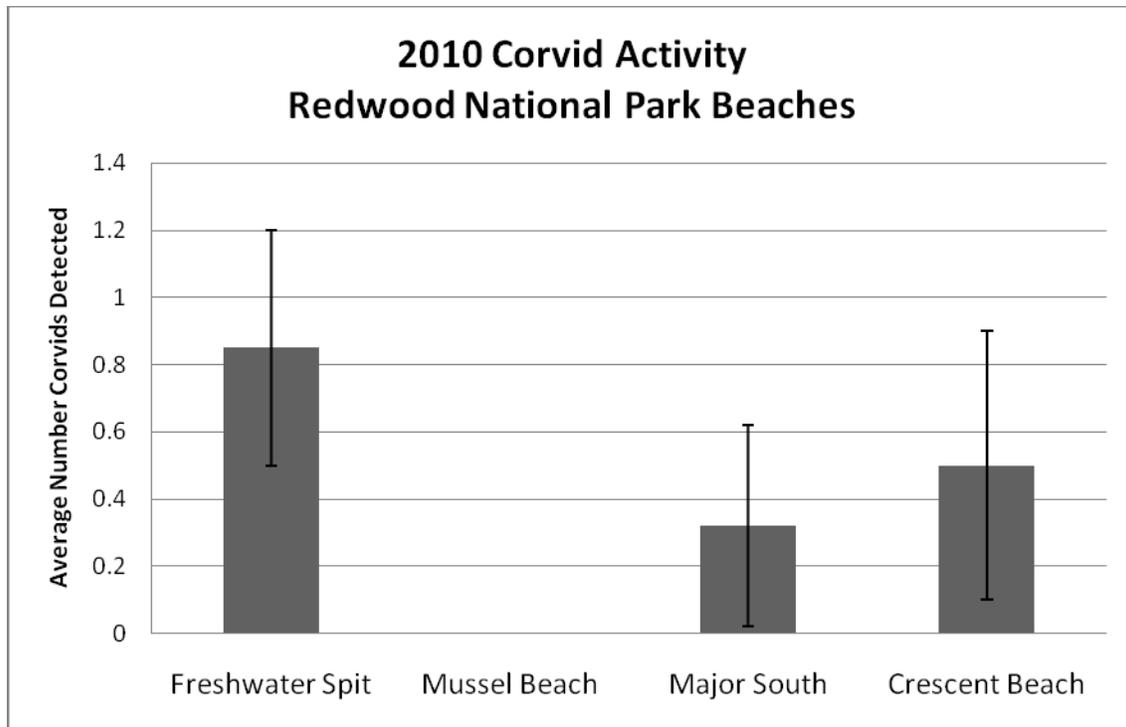


Figure 1. Corvid abundance based on average number of corvids detected during 500-m radius instantaneous point counts. Error bars represent 95% CI.

As stated in the previous report, the main corvid management tool is the Redwood National and State Parks Corvid Management Strategy. The development of the RNSP Corvid Management Strategy (RNSP 2008) addresses corvid management at a landscape level. The goal of the strategy is to decrease the density of corvids surrounding visitor use developments in Jedediah Smith Redwoods State Park, Del Norte Coast Redwoods State Park, Prairie Creek Redwoods State Park and Redwood National Park. Please see the 2010 RNSP Corvid Monitoring and Management report (RNSP 2010) for details.

Human Activity and Management

Freshwater Spit received the highest average human use while Crescent Beach received the highest average dog use (Figure 2). Every survey that recorded dogs on Crescent Beach had at least one dog recorded off leash while 91% of the surveys on Freshwater Spit with recorded dog presence recorded at least one dog off leash. No dogs were off leash when seen on Major South while no dogs were recorded at all on Mussel Beach.

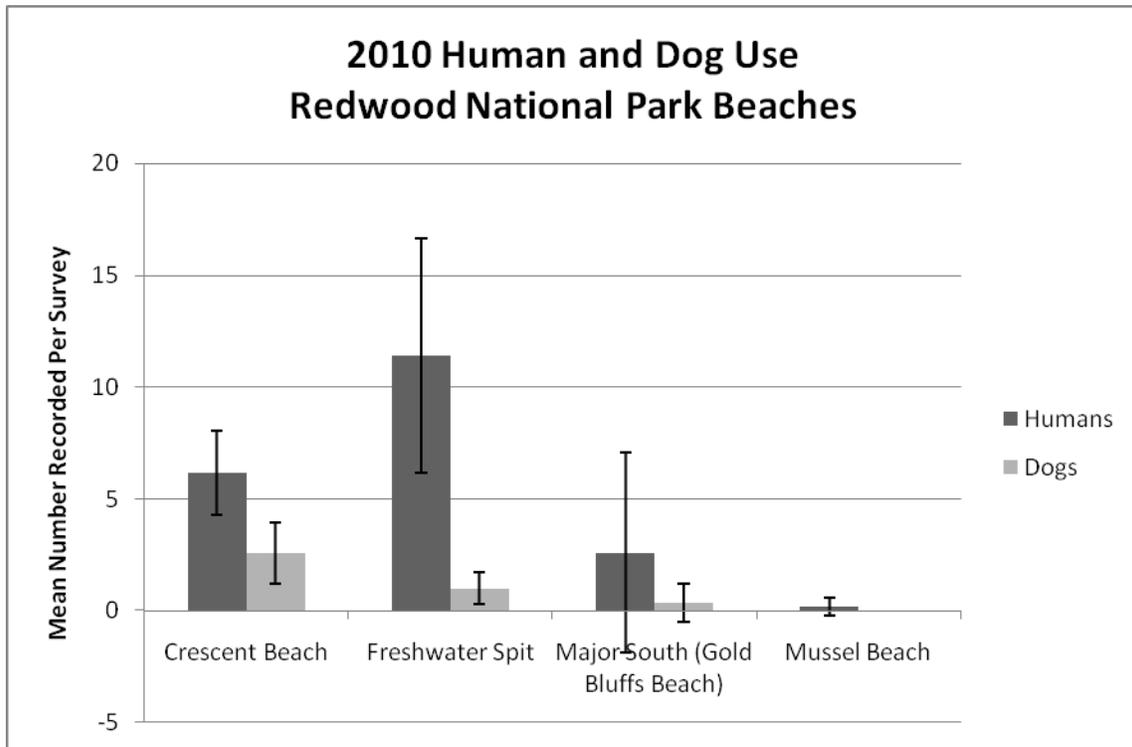


Figure 2. Human and dog use based on total number recorded per survey. Error bars represent 95% CI.

Table 1 below (next page) summarizes the vehicle track observations made during snowy plover surveys. Vehicle use appears to have remained relatively consistent over the four survey reaches over the past three years.

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Table 1. Summary by beach of number of surveys and numbers of vehicle track set observations, 2008-2010.

Beach	No. Surveys			Track Sets* Observed												No. of surveys with tracks above wave slope		
				0			1-2			3-5			>5					
Year	08	09	10	08	09	10	08	09	10	08	09	10	08	09	10	08	09	10
Crescent	9	7	7	5	5	3	0	2	3	2	0	0	0	0	1	0	1	0
Fresh-water	20	17	22	13	7	10	3	8	6	3	0	2	1	2	3	0	2	2
Mussel	8	7	6	4	2	3	3	3	2	0	2	1	1	0	0	0	3	1
Major South (GBB)	4	7	6	3	1	3	0	5	1	0	1	1	1	0	1	0	0	0

* A "track set" is defined as two parallel tracks made by one vehicle. A vehicle driving out and back in the same tracks would result in one set, out and back in different locations would result in two sets.

Commercial beach fishing occurred throughout RNSP, not just Redwood National Park. Commercial beach fishing for Prairie Creek Redwoods State Park was not reported in the previous report, but is reported here. Eleven commercial beach fishing vehicle access permits were issued in 2010 for all of RNSP. According to fishing logs submitted, commercial fishermen averaged 50 fishing days for the year (range = 2 – 165, SD = 56.4). Fishing was roughly divided between day and night fishing. In addition to the 11 commercial permits, 3 disabled permits, 1 "general management plan" permit, and no traditional gathering permits were issued in 2010. These latter, non-commercial permits do not require access logs to be submitted.

No human management actions (i.e. exclusion zones) were used on any Redwood National Park beaches to protect snowy plovers specifically because no plovers were ever recorded on any Redwood National Park beaches. Crescent Beach and Freshwater Spit were patrolled or observed on a daily basis by National Park Service law enforcement rangers throughout the survey year. No patrols were made on either Mussel Beach or Major South due to their isolation and very low visitor use. There was evidence of two illegal instances of illegal beach driving with no citations issued and two citations for illegal beach driving on

Freshwater Spit and Gold Bluffs Beach. One citation was given for illegal beach driving on Crescent Beach. No specific snowy plover educational programs were conducted.

Habitat Condition and Management

Only Freshwater Spit has had beach habitat restoration work completed within Redwood National Park. Exotic European beach grass removal was completed in 2000. The entire spit is now at a maintenance level.

CONCLUSION

The beaches of Redwood National Park continue to appear to not be quality western snowy plover habitat. No snowy plover has ever been recorded on a National Park Service managed beach within Redwood National and State Parks during the past 14 years of regular monitoring. However, as shown in the previous report, Gold Bluffs Beach within Prairie Creek Redwoods State Park (part of RNSP) has consistently had wintering snowy plovers as well as a few years of nesting. Additionally, successful nesting occurred this year again at Stone Lagoon Spit (Humboldt Lagoons State Park) which is located immediately south of Freshwater Spit. As plovers continue to suffer high nest failure rates on Clam Beach County Park and Little River State Beach and the Western Snowy Plover Recovery Unit Two recommended strategy of “attracting” plovers to other regional beaches (Colwell et al. 2010) takes hold, there may be a time when plovers will overwinter or nest within Redwood National Park.

Compliance by permittees with the permit stipulations of the Redwood National and State Park vehicle beach access permit program continues to appear to occur. Fishing logs were all consistently submitted. No gross or repeated violations were recorded. Of the few instances where above the wave slope driving was recorded, permittees were most likely forced above the wave slope due to heavy surf conditions or were the result of sporadic beach wood poaching. The most common human issue continues to appear to be off-leash dog walking on Freshwater Spit and Crescent Beach. If snowy plovers ever do start utilizing those beaches, then enforcement of leash rules will have to significantly increase.

LITERATURE CITED

- Colwell, M.A., N.S. Burrell, M.A. Hardy, S.E. McAllister, W.J. Pearson, S.A. Peterson, K.G. Ross, and K.A. Sesser. 2010. Final Report: 2010 Snowy Plover Breeding in Coastal Northern California, Recovery Unit 2. Unpub. report to the USFWS. Department of Wildlife, Humboldt State University, Mad River Biologists. 15 pp.
- RNSP. 2008a. Corvid Management Strategy – Redwood National and State Parks. Unpub. report on file at South Operations Center, Redwood National and State Parks, Orick, CA. 45 pp.
- RNSP. 2010. Forest and Beach Corvid Monitoring and Management, Trail and Backcountry Management Plan Implementation – 2010 Annual Progress Report. Unpub. report on file at South Operations Center, Redwood National and State Parks, Orick, CA. 21 pp.