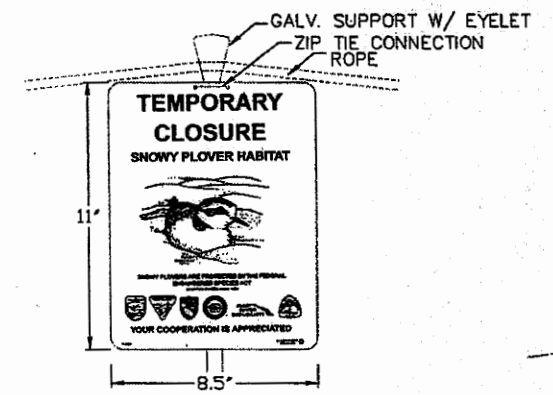
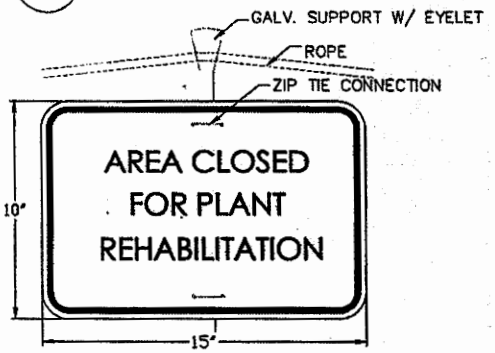
Symbolic Fencing Design (Note: the Snowy Plover Sign is not being proposed for use in this project. A Hazard sign of similar proportions may be used instead.)



1 PLOVER SIGN DETAIL
NO SCALE



2 REHABILITATION DETAIL
NO SCALE

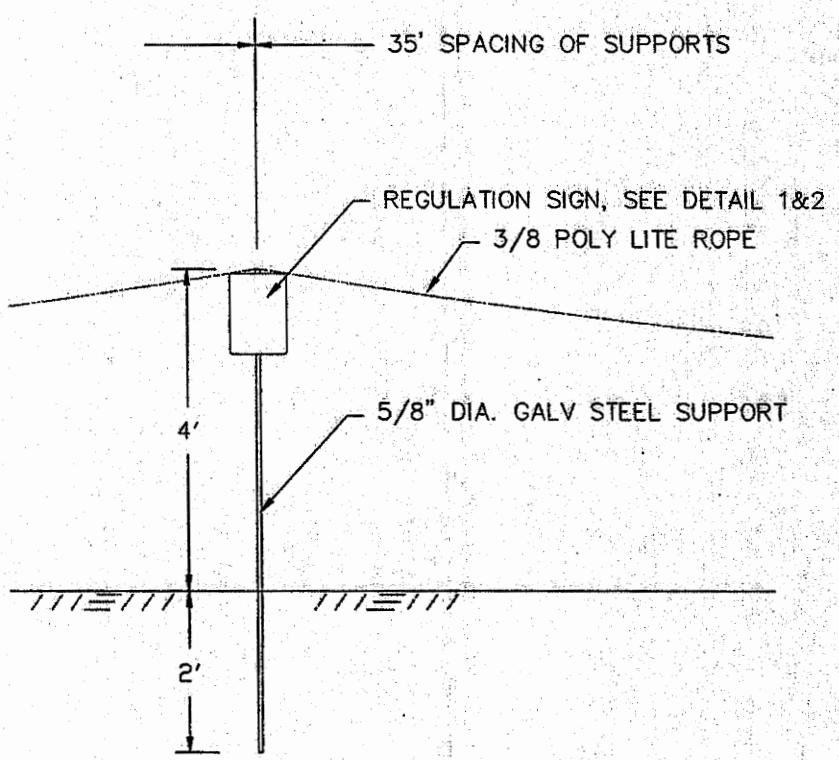


EXHIBIT NO. 5
APPLICATION NO.
CALIF. DEPT. OF PARKS & RECREATION
PROPOSED TEMPORARY SIGNAGE & FENCING

NORTH COAST REDWOODS DISTRICT 3431 Fort Ave. Eureka, CA 95503.	CALIFORNIA STATE PARKS SINCE 1864	LITTLE RIVER STATE BEACH RESTORATION AND ENHANCEMENT PLAN	SYMBOLIC FENCING AND SIGN DETAIL SHEET	7/22/08 DRAWING D1 1 OF 1

CHAPTER 3 – ENVIRONMENTAL CHECKLIST

PROJECT INFORMATION		
1.	Project Title:	North Gold Bluffs Beach Coastal Dune Restoration
2.	Lead Agency Name & Address:	California Department of Parks & Recreation
3.	Contact Person & Phone Number	John E. Harris (707) 445-6547 x19
4.	Project Location:	Prairie Creek Redwoods State Park
5.	Project Sponsor & Address:	California Department of Parks & Recreation North Coast Redwoods District 3431 Fort Ave. Eureka, CA 95503
6.	General Plan Designation:	State Park
7.	Description of Project:	California State Parks proposes to restore 222 ha (550 ac) of coastal dune habitat along the northwest edge of Prairie Creek Redwoods State Park (PCRSP). The primary goal of the project is to restore areas damaged by European beachgrass (*Ammophila arenaria*) infestation. The project proposes to restore natural dune processes by removing European beachgrass and other invasive exotic plants, thus promoting re-vegetation by native dune vegetation and restoration of sand movement. These efforts will increase the amount of suitable habitat for the federally threatened western snowy plover (*Charadrius nivosus nivosus*) as well as other native dune-adapted plants and animals. The project will involve an integrated approach to beachgrass control with treatment methods that include mechanical removal, manual removal, and flaming.
8.	Surrounding Land Use & Setting:	Refer to Chapter 3 of this Document (Section IX, Land Use Planning)
9.	Approval Required from Other Public Agencies	Refer to Chapter 2 of this document (Section 2.9 Discretionary Approvals)

EXHIBIT NO. 6

APPLICATION NO.
CALIF. DEPT. OF PARKS & RECREATION

EXCERPT FROM CEQA DOCUMENT (1 of 5)

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

If implemented as written, this project could result in a "Potentially Significant Impact" involving at least one area of the environmental factors checked below, as indicated in the Initial Study on the following pages.

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology/Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities & Service Systems	☐ Mandatory Findings of Significance	☒ None

DETERMINATION

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment and a NEGATIVE DECLARATION will be prepared. ☐

I find that although the original scope of the proposed project COULD have had a significant effect on the environment, there WILL NOT be a significant effect because revisions/mitigations to the project have been made by or agreed to by the applicant. A MITIGATED NEGATIVE DECLARATION will be prepared. ☒

I find that the proposed project MAY have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT or its functional equivalent will be prepared. ☐

I find that the proposed project may have a "potentially significant impact" or "potentially significant unless mitigated impact" on the environment. However, at least one impact has been adequately analyzed in an earlier document, pursuant to applicable legal standards, and has been addressed by mitigation measures based on the earlier analysis as described in the report's attachments. An ENVIRONMENTAL IMPACT REPORT is required, but it will analyze only the impacts not sufficiently addressed in previous documents. ☐

I find that although the proposed project could have had a significant effect on the environment, all potentially significant effects have been adequately analyzed in an earlier EIR or Negative Declaration, pursuant to applicable standards, and have been avoided or mitigated, pursuant to an earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project. Therefore, all impacts have been avoided or mitigated to a less-than-significant level and no further action is required. ☐

John E. Harris
District Environmental Coordinator

Date

CHAPTER 5 – SUMMARY OF MITIGATION MEASURES

The following mitigation measures would be implemented by CSP as part of the North Gold Bluffs Beach Coastal Dune Restoration Project.

MITIGATION MEASURE BIOLOGICAL 1 – SENSITIVE PLANTS

1. Sensitive plant surveys conducted in conformance with DFG guidelines will be completed prior to the initiation of project activities. Sensitive plant locations will be identified with pin flagging. Pin flags will be removed upon completion of work in an area.
2. Avoidance is the primary means of mitigation for plants listed as Rare, Threatened, and Endangered, or which occur on the CNPS Lists 1A, 1B or 2 as described under "Environmental Setting". A 3 m (9.8 ft) heavy equipment exclusion zone (EEZ) will be maintained around sensitive plants. Beachgrass will be pulled by hand within the EEZ, and sensitive plants will be avoided.
3. Where impacts to sensitive plants are not feasibly avoided, removal activities will be timed after the blooming period (Appendix C) to enable dispersal into the seed bank and/or individual plants will be transplanted to "safe sites" in the project area to prevent harm from heavy equipment.
4. Heavy equipment will enter the project area from the waveslope, which will be accessed via the established vehicle access corridor off Davison road.

MITIGATION MEASURE CULTURAL 1

1. If requested by the Yurok Tribe, a paid tribal cultural monitor will be on site during ground disturbing activities. Records of consultation with Native Americans are on file at the North Coast Redwoods District office in Eureka, California.
2. In the event that previously unknown cultural resources (including but not limited to dark soil containing shell, bone, flaked stone, groundstone, or deposits of historic trash) are encountered during project construction by anyone, the project manager will put work on hold at that specific location and workers will redirect to other tasks. A DPR-qualified archaeologist will record evaluate the find and work with the project manager to implement avoidance, preservation, or recovery measures as appropriate prior to any work resuming at that specific location.
3. In the event that human remains are discovered, work will cease immediately in the area of the find and the project manager will notify the DPR North Coast Redwoods District Archaeologist. Any human remains and/or funerary objects will be left in place or returned to the point of discovery and covered with soil. The DPR Sector Superintendent or District Archaeologist will notify the County Coroner, in accordance with section 7050.5 of the California Health and Safety Code.

MITIGATION MEASURE GEOLOGICAL 1

1. Heavy equipment operators accustomed to working in liquefiable earth materials shall be employed to implement the project and shall be informed of potential collapse and liquefaction hazards.
2. Symbolic fence will be deployed around ephemeral wet areas that are treated by heavy equipment. This fencing will be maintained until the water table has lowered to average mid-summer levels as determined by biologists/geologists familiar with the site. These fenced areas will be closed to public access and posted with warning regarding the potential for liquefaction. A superintendents order will be required to close these areas to the public.

CHAPTER 6 – SUMMARY OF MONITORING PLAN

Compliance and effectiveness monitoring will be implemented in conjunction with the activities proposed under the North Gold Bluffs Beach Coastal Dune Restoration Plan. See Appendix A, Section 3.2 for the detailed monitoring plan.

Reports will be filed annually with DPR North Coast Redwoods District headquarters and will summarize the quality and quantity of work accomplished. Annual reports will summarize lessons learned and may provide recommendations to improve future efforts.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California, 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:
8-14-1999-77

EXHIBIT NO. 7
APPLICATION NO.
CALIF. DEPT. OF PARKS & RECREATION
FISH & WILDLIFE SERVICE CONCURRENCE LETTER
(1 of 10)

Memorandum

To: Park Superintendents, Redwood National and State Parks
Orick, California

From: Field Supervisor, Arcata Fish and Wildlife Office
Arcata, California

Subject: Informal Consultation on Exotic Plant Management in Redwood National and State Parks, Humboldt and Del Norte Counties, California

This memorandum responds to your February 20, 2007, letter requesting Fish and Wildlife Service's (Service) concurrence with your determination of effects for the proposed Exotic Plant Management in Redwood National and State Parks (Parks), Humboldt and Del Norte Counties, California. You determined the project may affect but is not likely to adversely affect the following federally listed species: endangered tidewater goby (*Eucyclogobius newberryi*), endangered California brown pelican (*Pelecanus occidentalis californicus*), threatened western snowy plover (*Charadrius alexandrinus nivosus*), and threatened northern spotted owl (*Strix occidentalis caurina*). You also determined that all effects of the proposed project on the endangered beach layia (*Layia carnosa*) and the threatened Oregon silverspot butterfly (*Speyeria zerene hippolyta*) will be beneficial. This response is prepared in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act) and its implementing regulations (50 CFR § 402).

This consultation is based on information provided in your February16, 2007, biological assessment and other sources of information. The biological assessment contains a complete description of the proposed action and its effects on the above species and is hereby incorporated by reference. The proposed project is implementation of an exotic plant control program in the Parks. Control activities may include the following methods: mechanical with heavy equipment and power tools, manual including burning, biological, and chemical. The only type of biological control proposed is the use of

Klamath beetles (*Chrysolina quadrigemina*) to control Klamathweed (*Hypericum perforatum*) at Gan's Prairie. The only chemical control proposed is hand application of the following three herbicides: glyphosate in the form of Aquamaster, aminopyralid in the form of Milestone, and triclopyr in the form of Garlon 4. A complete administrative record for this consultation is on file in this office.

This concurrence letter is valid from the date of issuance through December 31, 2011.

Concurrence

Tidewater Goby

Presence/absence surveys were conducted annually in the Redwood Creek estuary from 1996 through 2002, and in 1998 in Espa Lagoon near Gold Bluffs Beach with no detections. In 2004, surveys were conducted in Johnson Creek/Lagoon and Ossagon Creek with no detections.

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the tidewater goby based on the following factors:

1. The likelihood that tidewater gobies are present in the Parks is low and habitat quality is low.

2. Heavy equipment will not be allowed to enter creeks and wet areas; therefore, no suitable tidewater goby habitat will be removed.

3. Digging will be allowed next to creeks or standing water; however, digging will cease if surface water enters the excavated area. Trenches for burying European beachgrass (*Ammophila arenaria*) will not be allowed within 30 feet of a creek or standing water.

4. No herbicides will be used within 33 feet of standing water. Herbicides will not be used within 0.25 mile of the Redwood Creek estuary.

California Brown Pelican

All of the Parks' beaches contain suitable brown pelican resting habitat. Pelicans are known to loaf on the berm and vicinity of the Redwood Creek estuary and along sections of Gold Bluffs Beach. In 2006, an average of 60 pelicans were observed per group at the Redwood Creek estuary and 80 per group on Gold Bluffs Beach. In 2006, maximum group size was 90 at the Redwood Creek estuary and 300 to 400 on Gold Bluffs Beach.

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the California brown pelican, based on the following factors:

1. No suitable brown pelican habitat will be removed or degraded.

2. Disturbance to brown pelicans is expected to be minimal because vehicles will be traveling at slow speeds when driving along the wave slope and will allow pelicans ample time to move out of the way and crews on foot will avoid flushing pelicans. Potential disturbance is expected to be of relatively low frequency and duration because vehicles and crews accessing work sites will only make two trips per day.

3. Injury or harm of brown pelicans is not anticipated because pelicans will be allowed to move away from vehicles to avoid injury.

Western Snowy Plover
On May 24, 2004, an adult plover with two chicks was sighted on Gold Bluffs Beach. One of the chicks fledged on June 23. The fate of the other chick was unknown. In 2005, a pair of plovers nested on Gold Bluffs Beach in early May but the nest failed within a few days of the estimated hatch date. There was no documented nesting in the Parks in 2006.

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the western snowy plover, based on the following factors:

1. Snowy plover surveys are conducted twice per month (March through August) and once per month (September through February) on the beaches with the highest quality habitat in the Parks. Additionally, daily pre-project surveys of the work area and out to 325 feet from the work area will be conducted throughout the year whenever work is occurring.

2. No suitable habitat will be removed or degraded. The proposed restrictions on the size of the burn piles on the beach should ensure that fires do not escape into surrounding driftwood. The removal of European beachgrass is expected to have a beneficial impact on snowy plover habitat by allowing native vegetation to return and reducing dune stabilization.

3. Disturbance to snowy plovers is expected to be minimal because of the following project design standards:

    a. If snowy plover adults, juveniles, chicks, nests, or scrapes are detected within the work area or out to 325 feet during the breeding season, no work will be conducted.

    b. If wintering plovers are located within the project area from October 1 through February 14, no heavy equipment or burning will be allowed within a 325 feet buffer around the plover's location, if necessary. A wildlife biologist will evaluate the circumstances (e.g., number of

    plovers, location relative to the work site) on a case-by-case basis and

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determine if the maximum area of protection buffer is necessary.

4. Injury or harm to snowy plovers is not anticipated because of the above project design standards and the following additional standards:

    a. From February 15 through August 21, no heavy equipment will be used on the beach. Only hand crews may be used for exotic plant management during this period.

    b. From August 22 through September 30, heavy equipment will only be used if no plover nests have been located in the project area or adjacent to the access route. If nests or chicks are present in late August, heavy equipment will not be used until after September 30.

    c. Heavy equipment will be walked to the work site along the wave slope and remain on-site until the project is completed.

    d. Vehicles accessing the beach will enter at the designated access point, drive as low on the wave slope as possible until reaching the work site, avoid the wrack line, access the beach only during daylight hours, and be limited to 5 miles per hour (mph) or the minimal speed required to prevent becoming stuck in the sand, but never to exceed a speed of 20 mph. A trained observer will be present in vehicles or walking in front of the vehicles to ensure that plovers are protected. One to three trucks may be used to transport crews, equipment, and fuel to the work site. Under normal circumstances, there will only be one round trip per day. Vehicles will remain on the wave slope, except during burning when a pickup with a water tank will need to be close to the burn site.

    e. Beachgrass burning will occur in late summer/early fall outside of the breeding season (February 15 through September 30). If no nests are present in late August, burning may start August 22, but if any nest are present burning will not occur until after September 30. If plovers are present in or within 325 feet of an area being burned, work will stop until the birds move to a new area.

    f. Herbicide application on the beach may occur at any time of the year. Herbicides will only be applied on the beach using a backpack sprayer. If plovers nest in or within 325 feet of an area being treated with herbicides, work will stop until fledging occurs. If plovers are present but not nesting in or within 325 feet of an herbicide-treatment area, work will stop if determined to be necessary by a wildlife biologist

    taking into consideration the time of year and location of the birds relative to the work site.

g. Workers involved in exotic plant management on the beaches will receive educational information about snowy plovers including most recent sighting information, habitat use, and identification.

5. Trash and food will be contained in predator-proof containers and transported off of the site each day.

Northern Spotted Owl

The Service concurs with your determination that the proposed project may affect but is not likely to adversely affect the northern spotted owl, based on the following factors:

1. No northern spotted owl nesting, roosting, or foraging habitat will be removed or degraded.

2. Disturbance to nesting spotted owls is expected to be minimal because activities that generate noise above ambient levels in or within 500 feet of unsurveyed or occupied suitable northern spotted owl habitat will not occur from February 1 through July 9. Noise generating activities may occur during the late breeding season (July 10 through July 31); however, this is after the period when the majority of young owls have fledged from the nest. The Service anticipates some change in the owl's behavior, but does not expect this to result in abandonment of the breeding effort.

3. Burning within 0.25 mile of suitable spotted owl nesting habitat during the breeding season (February 1 through July 31) will be restricted to a few small piles, no more that 6 feet by 6 feet by 6 feet, at any one time and location.

4. Injury or harm to northern spotted owls is not anticipated because of the following:

   a. No burning will occur in suitable spotted owl habitat.

   b. Herbicide use is not expected to significantly impact owls because the two chemicals (glypohosate and aminopyralid) proposed for use in suitable habitat have been classified as "practically non-toxic" to birds and other animals and a maximum of only 50 acres of suitable owl habitat can be treated park-wide per year.

Beach Layia

Beach layia occurs on Freshwater Spit. The population appears to be stable, or slightly increasing, and currently consists of four or five main plant clusters with individual

plants scattered between the clusters.

The Service concurs with your determination that all effects of the proposed project on the beach layia will be beneficial, based on the following factors:

1. Pre-project surveys will be conducted. At Freshwater Spit, beach layia plants will be identified and flagged. A minimum buffer of 50 feet will be clearly marked around plants.

2. No suitable beach layia habitat will be removed or degraded. European beachgrass removal is anticipated to improve habitat conditions for beach layia; therefore, the proposed action is expected to have a beneficial impact.

3. Injury or harm to individual beach layia plants is not anticipated because of the following project design standards:

    a. No exotic plant control, including crew access, will occur in the buffer area until beach layia has set seed, generally around mid-July. No chemicals, heavy equipment, or burning will be used in the 50 feet buffer area during any time of the year.

    b. At Freshwater Spit, the only method proposed to control exotic plants is manual removal by crews using either hand-pulling or digging with hand tools.

Oregon Silverspot Butterfly
In the Parks, potentially suitable Oregon silverspot butterfly habitat occurs in the Crescent Beach/Endert's Beach area south of Crescent City. There are 240 acres of coastal prairie and wetland at this site. The Oregon silverspot butterfly's larval host plant, *Viola adunca*, and adult nectar sources are present at the site. To date, this subspecies has not been detected in the Parks.

The Service concurs with your determination that the effects of the proposed project on the Oregon silverspot butterfly will be beneficial, based on the following factors:

1. In potentially suitable habitat in the Crescent Beach/Endert's Beach area south of Crescent City, pre-project surveys will be conducted to identify patches of *Viola adunca*.

2. Suitable Oregon silverspot butterfly habitat will not be removed.

3. Suitable Oregon silverspot butterfly habitat is expected to be beneficially affected by the proposed project because of the following:

a. If patches of *Viola adunca* occur in areas proposed for herbicide treatment, direct application will be the method used within 25 feet of violets to ensure that no herbicide contacts a *Viola adunca* plant.

b. Adult nectar sources may be impacted by the proposed removal of tansy ragwort (*Senecio jacobaea*) and other exotic species that are known nectar sources, e.g., thistles (*Cirsium* spp.). Tansy ragwort will be removed manually at Endert's Beach. This species is pervasive just outside the Parks; therefore, removal within the Parks is not expected to have a significant impact on the availability of potential nectar sources. The proposed fall removal of exotic species will be followed by the planting of native nectar species, such as goldenrod (*Solidago* sp.) and pearly everlasting (*Anaphalis margaritacea*). It is anticipated that by the following spring many native nectar plants will be present. The proposed removal of Himalayan blackberry (*Rubus discolor*) and Scotch broom (*Cytisus scoparius*) from potential habitat is expected to have a beneficial impact by restoring the coastal prairies.

4. Injury or harm to Oregon silverspot butterflies is not anticipated because no Oregon silverspot butterflies are known to occur in the area. If Oregon silverspot butterflies are detected, *Viola adunca* plants will be clearly marked to prevent trampling of eggs, larvae, or pupae.

Conclusion

This concludes informal consultation on the proposed Exotic Plant Management in the Parks. Unless new information reveals that the proposed action: (1) may affect listed species in a manner, or to an extent, not considered in your correspondence; (2) the action is modified in a manner that causes an effect on the listed species or critical habitat not considered in your correspondence; or (3) a new species is listed or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Act is necessary.

Please contact staff biologist Robin Hamlin at (707) 822-7201 should you have further questions regarding this consultation.

cc:
RNSP, Orick, CA (Attn: K. Schmidt)

Kraemer, Melissa@Coastal

From: McIver, Bill <bill_mciver@fws.gov>
Sent: Tuesday, December 18, 2012 11:20 AM
To: Transou, Amber@Parks
Cc: Harris, Jay@Parks; Kraemer, Melissa@Coastal
Subject: Re: FW: Exotics Consultation Extension

Amber,

Yes, I can confirm this, based on previous email correspondences and telephone conversations between Kristen Schmidt, you and myself this past summer.

Bill

==========

Bill McIver, Biologist
U.S. Fish and Wildlife Service
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California 95521

phone: 707.822.7201
fax: 707.822.8411
email: bill_mciver@fws.gov
==========

On Mon, Dec 17, 2012 at 12:02 PM, Transou, Amber@Parks <Amber.Transou@parks.ca.gov> wrote:

Hi Bill,

Can you please confirm that the USFWS concurrence letter #8-14-1999-77 has been extended through December 31, 2013? For clarity and ease, would you also confirm that the proposed mechanical removal between 15 Sep - Mar 01 (following the WSP avoidance measures below) may affect but is not likely to adversely affect the western snowy plover as outlined in the concurrence letter?

WESTERN SNOWY PLOVER AVOIDANCE MEASURES

1. Mechanical removal will be conducted between 15 September and March 01,

outside of the WSP breeding season.

2. Prior to commencing operations each day, access routes and work areas will be

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surveyed for the presence of WSP by a USFWS permitted WSP surveyors. A NCRD Natural Resource staff member will remain on site during implementation of treatments to monitor for WSP. Restoration work may only be conducted in areas monitored for WSP. Monitoring guidelines are described in Appendix C.

3. A spatial buffer zone will be maintained between WSP and restoration activities; 100 m (330 ft) during mechanical removal efforts and 50 m (164 ft) during manual removal efforts. If the monitor determines that operations are resulting in a behavioral disturbance to WSP then operations will be moved far enough away to eliminate the disturbance.

4. Trash at the work site will be contained in predator-proof containers and transported off site at the end of each workday. Lunch and breaks will be taken at the work site to prevent workers from disturbing WSP. No dogs or other pets will accompany workers to the work site.

5. Vehicles accessing the project area will be limited to 10 mph, or the minimal speed required to prevent getting stuck in sand. Vehicles will remain on the wet sand or upon approved access routes until reaching the treatment area. There will be no night driving or driving during periods of diminished visibility.

Thanks for your continued assistance,

Amber

Amber Transou

Staff Environmental Scientist

California State Parks, North Coast Redwoods

o: 707/445-6547 x14 c: 707/834-7675 f: 707/441-5737

From: Bill_McIver@fws.gov [mailto:Bill_McIver@fws.gov]
Sent: Thursday, September 06, 2012 4:22 PM
To: Transou, Amber
Cc: Kristin_Schmidt@nps.gov; Jim_H_Watkins@fws.gov
Subject: Gold Bluffs Beach beach grass removal_timing

Amber,

I spoke with Jim Watkins about the timing (within year) of mechanized removal of beach grass at Gold Bluffs Beach. It was his opinion that mechanized removal of beach grass could occur during the 16 Feb. - 28 Feb. time period, if daily morning surveys for western snowy plovers were conducted at the project area during the 16 Feb. - 28 Feb. time period, and (a) no plovers were found and (b) the biological monitor had the authority to halt project if snowy plovers were found closer than 100m from operating equipment. Jim, hopefully I captured your advice correctly, and Amber, hopefully this helps with the project at Gold Bluffs Beach.

Sincerely,

Bill

Hi Bill,

Please consider this a formal request to extend the life of the Exotic Plant Management programmatic consultation for an additional 2 years, until
the end of 2013 (it's scheduled to expire at the end of 2011). Nothing in
the project description will change during this time. The USFWS file number is 8-14-1999-77.

Also- I did locate the Mainstem email you sent extending that project through this year.

thanks!

Kristin Schmidt
Wildlife Biologist
Redwood National and State Parks
P.O. Box 7
Orick, CA 95555
(707) 465-7741 FAX: (707) 488-6485

Wetland Delineation Report:
North Gold Bluffs Beach Coastal Dune Restoration Project

Prairie Creek Redwoods State Park
Humboldt County, California

Submitted: September 28, 2012

J. B. Lovelace & Associates
HC 69, Box 38
Covelo, CA 95428
www.jblovelace.com

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Summary

The California State Department of Parks & Recreation (DPR) proposes to remove the invasive, exotic *Ammophila arenaria* ("European beachgrass") from the northwestern portion of Gold Bluffs Beach, Prairie Creek Redwoods State Park, in northern Humboldt County, California as part of their North Gold Bluffs Beach Coastal Dune Restoration Plan. A wetland delineation was performed in early February of 2012 by J. Brett Lovelace (J.B. Lovelace & Associates) to identify and delineate existing wetlands and Waters of the U.S. that may be affected by the proposed action, and to assist DPR in their coordination with the various state and federal agencies that have jurisdiction over the wetland resources at Gold Bluffs Beach. Marine and palustrine wetlands were identified within the wetland study area, where they variously intergrade and transition into stabilized and semi-stabilized coastal upland habitats.

The extensive colonization and subsequent stabilization of Gold Bluffs Beach by *Ammophila arenaria* has altered the geomorphological processes, hydrology, and vegetation in this area, resulting in a complex system that, in some instances, appears to be in the early stages of transitioning from coastal uplands to coastal dune hollow wetlands. Some wetland habitats identified during the course of this fieldwork exhibit characteristics of 3-parameter wetlands, which are regulated by the U.S. Army Corps of Engineers and the California Coastal Commission. Additional 1- and 2-parameter coastal wetlands, which fall under the jurisdiction of the California Coastal Commission alone, were also identified.

1.0. Introduction

Ammophila arenaria ("European beachgrass") is widely recognized as an invasive exotic species that has a profound impact on coastal ecosystems where it is not native. The establishment of this species has been implicated in the displacement of pre-existing native vegetation and in having far-reaching effects on the structure and function of associated coastal ecosystems.

Natural resource protection is one of the core programs of the mission of California State Department of Parks and Recreation (DPR) as described in their *Strategic Vision of California State Parks* (2001). Consistent with the goals of this program, DPR proposes to implement mechanical and manual removal of the invasive, exotic *A. arenaria* along the northwestern portion of Gold Bluffs Beach in an attempt to restore "normal" dune processes that benefit native vegetation and wildlife species.

In February of 2012, J. Brett Lovelace (J.B. Lovelace & Associates) conducted a formal delineation of wetlands and Waters of the U.S. in the study area to identify, characterize, and delineate any coastal wetland resources that might be affected by the proposed North Gold Bluffs Beach Coastal Dune Restoration Project. This report documents that effort.

2.0. Methods

A routine wetland delineation was conducted between February 15-27, 2012 by J. Brett Lovelace (J.B. Lovelace & Associates). The wetland delineation was carried out in accordance with the methodologies described in the *U. S. Army Corps of Engineer's Wetland Delineation Manual* (USACE 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Valleys, Mountains, and Coastal Regions* (Version 2.0) (USACE 2010) (hereafter, "Regional Supplement").

These protocols require the collection of a combination of vegetation, soil, and hydrological data, which are then used to assess for the presence or absence of wetland parameters, or so called "wetland indicators." The California Coastal Commission also utilizes such indicators to identify wetland habitats as described in their *Guidance for the Review of Wetland Projects in California's Coastal Zone* (CCC 1994), though their wetland qualification criteria differs from that of the USACE. Based on the distribution of such indicators throughout a site, a wetland perimeter, or boundary, can then be delineated.

The vegetation within the wetland study area was initially characterized and mapped in order to locate the best placement of suitable transects and associated sampling points to most accurately assess conditions at the site. Plant communities observed within the study area are described in Section 3.4 (below), and are consistent with those recognized in *A Manual of California Vegetation: Second Edition* (Sawyer et al. 2009), unless otherwise mentioned.

A longitudinal baseline, approximately 3 miles in length, was established parallel to the coastline and perpendicular to the perceived dominant hydrological gradient at the site. Seven transects were then oriented perpendicular to this baseline, parallel to the dominant local hydrological gradients, and in such a way as to intersect all existing vegetation communities in order to render the most complete characterization of the site conditions. Along these transects, soil, hydrology, and vegetation data were collected at sampling points located in each distinct vegetation community (or lack thereof) and/or within a perceived transition between two or more plant assemblages.

At each sampling point, soil pits were dug to a depth of at least 18 inches to assess the soil profile for indicators of wetland hydrology and hydric soils. Moist soil coloration was compared with *Munsell Soil Color* chips (Gretag-Macbeth 2009), and recorded. Other soil attributes (e.g., horizonation, soil texture, soil moisture, presence/absence of redoximorphic features and organic material, etc.) were also documented. Surficial indications of wetland hydrology (e.g., inundation, algal mats, water marks, drift/sediment deposits, etc.) were noted if present, and additional subsurface investigations were also made using a one-inch diameter soil probe to "fine-tune" the upland/wetland boundaries.

Vegetation sampling plot size for each sampling point extended radially from the center of each soil pit as follows: 5-feet for the herbaceous stratum, and 30-feet for shrub and/or tree strata. A list of plant species observed during the fieldwork, and the wetland indicator status rating for each, is provided in Appendix B. Wetland plant indicator status ratings are consistent with the *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988), as fieldwork was conducted, and all data forms were submitted to DPR, prior to the most recent publication of updated wetland vegetation indicator status ratings (Federal Register 77:90 [May 9, 2012]). These indicator status ratings are described in Table 1 (below). Nomenclature for all plant species mentioned in this report is consistent with *The Jepson Manual, Second Edition* (Baily et al. 2012).

Table 1. Wetland Vegetation Indicator Status Ratings. Obtained from the *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988).

Rating Code	Rating	Description
OBL	Obligate Wetland Species	Under natural conditions, almost always (estimated probability 99%) occurs in wetlands.
FACW	Facultative Wetland Species	Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
FAC	Facultative Species	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
FACU	Facultative Upland Species	Usually occurs in non-wetlands (estimated probability 67%-99%) but occasionally found in wetlands (estimated probability 1%-33%).
UPL	Obligate Upland Species	Under natural conditions, almost always (estimated probability 99%) occurs in non-wetlands in the region specified, though may occur in wetlands in another region. If a species does not occur in wetlands in any region, it is not included in the National List.
NI	Not Indicated	No indicator status rating based on limited information; generally considered to occur predominantly in uplands.
NL	Not Listed	Not included in the National List; generally considered to occur predominantly in uplands.

Field data forms documenting vegetation, soil, and hydrological characteristics for each sampling point along each transect are provided in Appendix D, and include a preliminary determination for each point as either "wetland" or "upland," pending final approval by the U.S. Army Corps of Engineers.

All wetland delineation sampling points and wetland boundaries were recorded using a Trimble Juno geographical positioning system (GPS) unit with ArcPad 9.0 software (ESRI 2005), and the GPS data were subsequently corrected and fit to a 2012 National Agriculture Imagery Program (NAIP) true-color aerial photograph. Using this imagery and ArcGIS 9.0 software (ESRI 2004), DPR staff produced the attached wetland delineation maps (Appendix A), depicting the location of wetland sampling points, and the distribution of the wetlands identified at Gold Bluffs Beach.

Wetlands identified within the wetland study area were classified according to the U.S. Fish and Wildlife Service's *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), which provides a standardized method for characterizing wetland habitats. This hierarchical classification includes the following levels: System, Subsystem, Class, and Subclass. Each of these can be further modified based on water regime, water chemistry, soil, and other attributes of interest. For purposes of simplification and communication, this classification system has been codified such that each wetland habitat can be assigned a code to provide basic information about that habitat, succinctly. Descriptions of the wetland habitats identified within the study area, and associated wetland classification codes are provided in Section 4.0 (Results).

3.0. Environmental Setting

3.1. Project Location

Part of Prairie Creek Redwoods State Park, Gold Bluffs Beach is situated along the Pacific coast in northern Humboldt County, California, just south of the Humboldt-Del Norte County line (Figure 1). The wetland study area is located within Sections 9, 16, 21, and 28 of the Fern Canyon, and Sections 4 and 9 of the Orick U.S. Geological Survey (USGS) quadrangles, in Townships 11N & 12N, Range 1E (Humboldt Base Meridian). The study area extends from its northern boundary, near the mouth of Ossagon Creek, south to the mouth of Home Creek near Fern Canyon. The eastern edge of the study area lies along the base of the Gold Bluffs and the western edge of the study area is bounded by the Pacific Ocean.

3.2. Regional & Local Climate Information

Regional climate data for the Gold Bluffs Beach area (i.e., Orick, California *in* NRCS 2012a) are typical of locations on the immediate coast of northern California: generally mild, with limited temperature extremes and a protracted wet season. The growing season (as defined in USACE 2010) extends throughout the year. Average daily temperatures range from 36.8° – 71.1°F (2.7° – 21.7°C), with an annual average temperature of 51.9°F (11.1°C), and average annual precipitation is 65.68 inches (1,168 mm), the bulk of which typically falls between October and May.

Cumulative precipitation for the three-month period preceding the fieldwork was below normal (Table 2). Measured rainfall for each of these months independently was also below normal, with the exception of January, 2011. The National Resource Conservation Service's (NRCS) National Water and Climate Center "Wetland Evaluation Table Station" (WETS) data provide "normal" precipitation ranges that are based on long-term (i.e., 30-year) weather records gathered at National Weather Service (NWS) meteorological stations. "Normal" precipitation is defined as the range within which there exists a 30% chance that measured precipitation is less than, or greater than, the stated range.

Table 2. Recent Precipitation Data for the Wetland Study Area Vicinity. Precipitation data are provided for February, 2012 (when wetland fieldwork was conducted), and the three preceding months. All values are in inches.

Month	Precipitation[1]	Mean "Normal" Precipitation[2] (Range)	Deviation from Mean "Normal" Precipitation
November, 2011	4.32	9.90 (6.2-11.9)	- 5.58
December, 2011	3.60	11.00 (6.6-13.4)	- 7.40
January, 2012	9.64	9.41 (6.4-11.2)	+ 0.23
February, 2012	4.54	9.50 (7.2-11.1)	- 4.96
Total	19.66	40.00 (26.4-47.6)	-20.34

[1] CDWR & USGS (2011, 2012) Daily Observations for Redwood Creek at Orick, CA.

[2] NRCS' WETS Data (2011, 2012a) for Orick, Prairie Creek R.S.P., CA.

3.3. Ecological Context

The coastal dune habitats within the wetland study area at Gold Bluffs Beach have been substantially altered as a result of colonization by *Ammophila arenaria*. This invasive exotic species appears to have initiated substantial changes to the vegetation, topography, and hydrology within this coastal system, as well as to the historic disturbance regimes within the area. In addition to the direct exclusion of native dune mat plant communities as a result of the aggressive colonization, *A. arenaria* has also initiated successional shifts in the vegetation at Gold Bluffs Beach as a result of the stabilizing effects of the colonization by this species.

Where it occurs *Ammophila arenaria* increases the accretion and accumulation of beach sands and sediments, which functions to stabilize what have historically been semi-stable dune features in a system where the distribution of these dune ridges and hollows is typically in a state of constant change. Historically, wave incursion commonly reached the base of the nearby Gold Bluffs (Transou pers. com.), and large drift material (e.g., logs, stumps, etc.) now supporting established lignicolous plant species such as *Gaultheria shallon* ("salal") and *Vaccinium ovatum* ("evergreen huckleberry") is distributed throughout the study area near the toe of the adjacent slopes.

Sand-accretion and dune-stabilization associated with the spread of *A. arenaria* appears to have resulted in the elevation of this coastal dune system, coinciding with a progressively westward movement of the primary foredune. What was once the historic foredune system now forms a reardune ridge. This latter feature supports *A. arenaria*, as well as a plant community in the early stages of succession, dominated by perennial woody species such as *Baccharis pilularis* ("coyote bush"), *Picea sitchensis* ("Sitka spruce"), *Alnus rubra* ("red alder"), and *Morella californica* ("wax myrtle") that are now well established in the absence of periodic ocean wave-related disturbance.

The more recently developed primary foredune slope ranges from near vertical in places where *Ammophila arenaria* occurs, to more gradual in other areas with little to no *A. arenaria*. The presumed increased elevation of this dune system influences the local hydrology by further impeding the direct discharge of streams into the Pacific Ocean, and altering these stream courses such that they periodically contribute to wetlands associated with this area.

In the central region between the current and historic foredune systems, a sparsely vegetated, shallow, narrow deflation basin has developed, which receives re-directed runoff during winter months from various streams draining the adjacent hill slope. Additional aeolian scouring in this region has also displaced sediments and further excavated this concave feature, exposing the water table more extensively than may have occurred previously.

Over time, pedogenic transformations become manifest as soils in such mesic areas begin to accumulate organic material contributed from senescent plant material. The resulting effect further alters the hydrological regime by increasing the moisture-holding capacity of such soils, reducing percolation and drainage, and therefore further increasing the extent of inundation and saturation in these areas. Although such transformations typically occur over relatively large timescales, effects associated with these processes can begin to influence site characteristics in the near term.

The cumulative effects of the establishment and spread of *Ammophila arenaria* at Gold Bluffs Beach have dramatically altered this system, and the associated habitats are still in the process of conversion. This transitional state has contributed to the complexity of the system, and in turn to the delineation of wetlands at the site.

3.4. Vegetation

Due to the season in which the fieldwork was conducted, it was not possible for a comprehensive assessment of the flora within the wetland study area, as many plant species are either in a period of senescence or dormancy during the winter months. However, the condition of the vegetation was suitable for the purposes of conducting the wetland delineation, and allowed for a general characterization of the plant communities in the study area. Where vegetation does occur within the wetland study area, herbaceous plant communities dominate. Although more extensive shrub-dominated and forested plant communities exist at the base of, and along, the adjacent slopes outside of the eastern project boundary, no such habitat occurs within the wetland study area, with the exception of the *Morella californica* ("California wax myrtle") Shrubland Alliance, which is discussed below.

A brief description of the plant communities identified within the study area follows. Vegetation is described here at two hierarchical levels: that of the *alliance*, and occasionally if necessary or applicable, the *association* within a

given alliance. *Alliances* are defined by diagnostic dominant taxa, and have moderately consistent species compositions reflecting regional or sub-regional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes (Sawyer et al. 2009). *Associations*, while also designated by diagnostic taxa, include more narrowly recognized species compositions and reflect more localized, topo-edaphic climate, substrates, hydrology, and disturbance regimes (Sawyer et al. 2009).

***Ammophila arenaria* Semi-Natural Herbaceous Stands ("European Beach Grass Swards")**

Ammophila arenaria Semi-Natural Herbaceous Stands constitute the majority of the vegetated upland habitat within the wetland study area. This plant community is dominated by the exotic *Ammophila arenaria* ("European beachgrass"), historically planted along coastal dune systems to facilitate stabilization in these dynamic areas. Subsequent spread of this species has occurred throughout coastal habitats of western North America.

In this alliance, *A. arenaria* exceeds 80% relative cover in the herbaceous stratum and often is associated with other non-native species such as *Lupinus arboreus* ("yellow bush lupine"), and the native shrub, *Baccharis pilularis* ("coyote bush") (Keeler-Wolf 2003 *in* Sawyer et al. 2009).

Other species in this alliance observed in the herbaceous layer within the wetland study area include residual members of native upland dune mat communities such as *Abronia latifolia* ("yellow sand verbena"), *Calystegia soldanella* ("beach morning glory"), *Camissoniopsis cheiranthifolia* ("beach evening-primrose"), *Cardionema ramosissimum* ("sandmat"), etc., as well as exotic species such as *Cakile maritima* ("sea rocket"), *Festuca myuros* ("rattail six-weeks grass"), *Aira praecox* ("early hair grass"), and *Hypochaeris radicata* ("hairy cat's-ear").

***Abronia latifolia* - *Ambrosia chamissonis* Herbaceous Alliance ("Dune Mat")**

"Dune mat" is a colloquial term for a suite of plants that inhabit the semi-stable inner dunes of the coastal dunes complex. This alliance only requires the "characteristic presence" of *Abronia latifolia* ("yellow sand verbena"), *Ambrosia chamissonis* ("beach bur-sage"), and/or other non-woody dune plants (Sawyer et al. 2009). Along the local north coast of California, this alliance provides habitat for special-status plant species including *Layia carnosa* ("beach Layia"), *Erysimum menziesii* spp. *eurekense* ("Menzies' wallflower"), *Gilia millefoliata* ("dark-eyed Gilia"), *Abronia umbellata* var. *breviflora* ("pink sand verbena"), and *Oenothera wolfii* ("Wolf's evening-primrose"), some of which are known to occur within the wetland study area (Transou pers. com.). A variety of diverse plant associations are recognized within this alliance; the most appropriate association observed within the wetland study area at Gold Bluffs Beach being the *Abronia latifolia-Elymus mollis* ssp. *mollis* (=*Leymus mollis*) association.

This plant community is distributed discontinuously throughout portions of the wetland study area, and occurs in smaller, relictual and degraded patches where *A. arenaria* has not yet dominated. Associated species include *Abronia latifolia* ("yellow sand verbena"), *Abronia umbellata* var. *breviflora* ("pink sand verbena"), *Fragaria chiloensis* ("beach strawberry"), *Camissoniopsis cheiranthifolia* ("beach evening-primrose"), *Elymus mollis* ssp. *mollis* ("American dunegrass"), *Cakile maritima* ("sea rocket"), and *Ammophila arenaria* ("European beachgrass").

***Elymus mollis* ssp. *mollis* (=*Leymus mollis*) Herbaceous Alliance ("Sea Lyme Grass Patches")**

Limited, discontinuous portions along the primary foredune of Gold Bluffs Beach are dominated by the native *Elymus mollis* ssp. *mollis* ("American dunegrass" or Sea lyme grass"). These occurrences appear to be relictual populations not yet excluded by *Ammophila arenaria*. This alliance is characterized by a dominance of *E. mollis* ssp. *mollis* (>50% relative cover) (Sawyer et al. 2009), and is associated with other native dune mat and exotic plant species. Such associates encountered in the wetland study area include *Abronia latifolia* ("yellow sand verbena"), *Fragaria chiloensis* ("beach strawberry"), *Camissoniopsis cheiranthifolia* ("beach evening-primrose"), *Cakile maritima* ("sea rocket"), and *Ammophila arenaria* ("European beachgrass").

***Carex obnupta* Herbaceous Alliance ("Slough Sedge Swards")**

This alliance is commonly found in seasonally flooded swales and dune hollows associated with freshwater and brackish coastal wetland habitats. *Carex obnupta* ("slough sedge") is an obligate wetland plant (Reed 1988), and is the dominant (≥ 50% relative cover) species in this alliance (Sawyer et al. 2009).

The *Carex obnupta* Herbaceous Alliance occurs throughout most of the wetland habitats within the study area at Gold Bluffs Beach, and is typically found in the more mesic habitats and dune hollows. In some instances, *C. obnupta* is the only plant species found at the lowest points in sparsely vegetated areas, whereas in other instances it is also associated with *Juncus breweri* ("Brewer's rush"), *Rumex crassus* ("willow dock"), *Cyperus eragrostis* ("nutsedge"), *Plantago lanceolata* ("English plantain"), *Aira praecox* ("early hair grass "), *Rumex acetosella* ("sheep sorrel"), *Hypochaeris radicata* ("hairy cat's-ear"), *Cardionema ramosissimum* ("sandmat"), and *Leontodon saxatilis* ssp. *longirostris* ("hairy hawkbit").

***Juncus lescurii* Herbaceous Alliance ("Salt Rush Swales")**

This alliance is dominated (> 50% relative cover) by *Juncus lescurii* ("San Francisco rush") (Sawyer et al. 2009), and typically occurs in seasonally wet brackish marshes. This plant community is also found at the upper edges or transitional areas between adjacent salt marshes and upland habitats, and often in diked former tidelands (Sawyer et al. 2009). Observations of this alliance in drier wetland sites in the Humboldt Bay area (and elsewhere) are actually thought to be dominated by *Juncus breweri* ("Brewer's rush") instead of *J. lescurii*

(Pickart 2008 *in* Sawyer et al. 2009). However, no such alliance for *Juncus breweri* is described in Sawyer et al. (2009).

Although this alliance is described here, *Juncus lescurii* was *not* identified within the current wetland study area at Gold Bluffs Beach. Instead, *Juncus breweri* (also a FACW taxon [Reed 1988]) was the dominant species (> 50% estimated relative cover within the herbaceous stratum) comprising this distinct plant community, which was indicative of the "transition zone" between more mesic wetland dune swales and adjacent upland dunes at the site. Given Pickart's observations of this alliance in the region (2008 *in* Sawyer et al. 2009), the *Juncus lescurii* Herbaceous Alliance is included here as a surrogate for the non-existent description of any such alliance for *Juncus breweri*.

Where it occurs in the wetland study area, this vegetation consistently occurs along the toe of the dune slopes between more mesic habitats in the deflation basins and upland habitats, or in drier portions of the adjacent dune hollows. In some instances, *J. breweri* is the only plant species occurring in sparsely vegetated areas, whereas in other instances it is also associated with *Carex obnupta* ("slough sedge"), *Rumex crassus* ("willow dock"), *Cyperus eragrostis* ("nutsedge"), *Plantago lanceolata* ("English plantain"), *Aira praecox* ("early hair grass "), *Rumex acetosella* ("sheep sorrel"), *Hypochaeris radicata* ("hairy cat's-ear"), *Cardionema ramosissimum* ("sandmat"), and *Leontodon saxatilis* ssp. *longirostris* ("hairy hawkbit").

***Morella californica* Shrubland Alliance ("Wax Myrtle Scrub")**
The *Morella californica* Shrubland Alliance is the only plant community occurring within the wetland study area that is not composed of predominantly herbaceous vegetation. *Morella californica* ("California wax myrtle") is a native evergreen shrub or small tree (<10 meters) that occurs in mesic sandy soils. This species creates a dense or intermittent canopy, and typically is associated with a sparse herbaceous layer.

This alliance was characteristic of the early successional vegetation observed along the transitioning historic foredune ridge, which was composed of saplings and young individuals of the following woody species in addition to *M. californica*: *Picea sitchensis* ("Sitka spruce"), *Baccharis pilularis* ("coyote bush"), *Garrya elliptica* ("silk tassel"), and occasionally in old decaying drift wood: *Gaultheria shallon* ("salal"), and *Vaccinium ovatum* ("evergreen huckleberry").

3.5. Soils

Soils throughout Gold Bluffs Beach are generally derived from aeolian and wave-transported sands with lesser amounts of alluvial silts and clays deposited by Ossagon, Butler, Boat, Home, Squashan, and Espa creeks. NRCS Web Soil Survey (NRCS 2012b) identifies the following two soil map units (complexes) in the immediate study area: Beaches-Samoa-dune land complex and Samoa-Clam Beach-dune land complex. Soil "complexes" represent regions of varying soil

components that are distributed in a more or less repeatable pattern, but that are not easily mapped separately at a relatively fine scale (1:24,000) (NRCS 2012c). Dominant components are listed first. Both of these complexes, as observed at Gold Bluffs Beach are described briefly below.

Beaches-Samoa-Dune Land Complex
The Beaches-Samoa-Dune Land Complex consists of very deep, excessively drained soils formed of aeolian and marine sands derived from mixed sources. Slopes range from 0-50%. Land use in areas with these soils is typically limited to recreation and/or habitat conservation. Though much of the landscape with this soil complex lacks substantial vegetative cover and consists of open beach sands, the vegetation that does occur is representative of either *Ammophila arenaria* Semi-natural Herbaceous Stands, or by relictual native dune mat plant communities such as *Elymus mollis* ssp. *mollis* (=*Leymus mollis*) and *Abronia latifolia-Ambrosia chamissonis* Herbaceous Alliances. This soil complex is found along the waveslope and foredune system of Gold Bluffs Beach in the western edge of the wetland study area.

Samoa-Clam Beach-Dune Land Complex
The Samoa-Clam Beach-Dune Land Complex also consists of very deep soils formed of aeolian and marine sand derived from mixed sources. This complex varies from somewhat excessively drained dunes to very poorly drained deflation basins and dune hollows, with slopes ranging from 0-50%. This soil complex occurs within the stabilized dune system, between the primary foredune and the toe of the adjacent slopes along the eastern edge of the study area. As with the former complex, land use in areas with soils of this complex is typically limited to recreation and/or habitat conservation.

The mosaic of vegetation types occurring throughout this complex within the study area vary according to the hydrological regime and drainage, and in some cases support little to no vegetation at all. Upland plant communities associated with this complex include *Ammophila arenaria* Semi-natural Herbaceous Stands and relictual native dune mat plant communities such as *Elymus mollis* ssp. *mollis* (=*Leymus mollis*) and *Abronia latifolia-Ambrosia chamissonis* Herbaceous Alliances. Vegetation associated with this complex in wetland habitats in the study area includes *Carex obnupta* and *Juncus lescurii* (see above) Herbaceous Stands, and the *Morella californica* Shrubland Alliance.

3.6. Hydrology

Numerous perennial and seasonal creeks (Ossagon Creek, Butler Creek, Boat Creek, Home Creek, etc.) drain the forested slopes adjacent to the wetland study area at Gold Bluffs Beach, and contribute to the freshwater wetlands distributed along the toe of this slope. In some locations, these creeks discharge flow directly into the Pacific Ocean. In other instances overland flow is obstructed by stabilized dunes and associated vegetation, resulting in substantial seasonal

saturation, inundation, and flooding in the reardune system within the wetland study area.

Seasonal and annual variation also influences the hydrology at the site. During the wet season, increased precipitation directly contributes to increased soil saturation throughout the area, and brings the water table much closer to the soil surface than during the rest of the year. In some locations, aeolian scouring of deflation areas throughout the study area exposes this water table, resulting in significant, seasonal inundation and ponding during periods of regular rainfall. Precipitation also contributes to freshwater run-off from adjacent slopes, which further influences seasonal fluctuation of the water table, and therefore, the distribution, depth, and duration of inundation and soil-saturation in wetland habitats at the site.

During periods of high levels of precipitation, increased run-off from adjacent slopes combined with an elevated water table and soil saturation results in substantial inundation and flooding of these reardune concave features, particularly in poorly drained portions of the Samoa-Clam Beach-Dune Land soils complex. Occasionally, estuarine "lagoons" form at the mouths of these creeks, which has occurred at the mouth of Ossagon Creek along the northern boundary of the project area in recent years (since 2005), and presumably at other points throughout history.

The review of historic aerial imagery (Google Earth 2011) since 1989 reveals the dynamic and meandering behavior of the mouths of the creeks at Gold Bluffs Beach. During some years the creeks overtop their banks, discharging some of their stream flow into the low-lying areas within the dune system. Following an early February precipitation event in 2012, a portion of Ossagon Creek was redirected, and flowed south through an extensive, linear, concave dune hollow/swale. Fluvial scouring was observed throughout this geomorphic feature during the period when this fieldwork was conducted, and additional evidence (i.e., eroded features combined with an obvious absence of, or sparsity of surrounding vegetation) indicates this is somewhat regular occurrence.

In contrast, during the dry season the water table recedes and the sandy soils dry out except in deflation areas and/or concave locations that maintain their hydrologic connectivity. During late summer and early autumn, it is common to observe surface flow failing to reach the Pacific Ocean when percolation through well-drained, sandy soils exceeds stream flow, particularly during low tides. This phenomenon is more extreme during years of below-normal precipitation.

4.0. Results

Two distinct palustrine (freshwater) wetland systems were identified within the wetland study area: a relatively recent and developing swale system within the foredune complex, and a more well-established wetland/non-wetland mosaic within the reardune complex along the eastern edge of the study area. In

addition to these freshwater wetlands, the western boundary of the project area is bordered by the Pacific Ocean (part of the marine system).

Portions of these wetland systems include wetlands and Waters of the U.S. that satisfy the criteria for federal jurisdiction according to Section 404 of the Clean Water Act (i.e., "three-parameter wetlands"), and which are regulated by the U.S. Army Corps of Engineers (USACE). These wetlands are also subject to regulation by the California Coastal Commission (CCC) (CCC 1994), as the project area lies within the California Coastal Zone.

Additional wetland habitats exhibiting only one, or two wetland parameters were also encountered in the aforementioned locations within the study area. Although these latter two types of wetland habitats are not typically regulated by the USACE, because the project area lies within the Coastal Zone, these additional coastal wetland habitats are regulated by the CCC (CCC 1994).

The findings of this wetland delineation indicate areas that potentially fall within the jurisdiction of these regulatory agencies. Final decisions regarding jurisdiction of these wetland habitats identified in this delineation are subject to verification by both agencies. Furthermore, while the California Department of Fish and Game (CDFG) does not have permitting jurisdiction over isolated wetlands not associated with lakes or streams, CDFG does serve in an advisory role regarding impacts to wetlands, and is generally a part of the environmental review process associated with potential impacts to wetland habitats.

Table 3. Quantitative Summary of Upland & Wetland Areas.

Habitat Type	Acreage
Project Area Total	550
Upland	229
Three-Parameter Wetlands	11
Two-Parameter Wetlands	14
Single-Parameter Wetlands	29
Wetland (3-, 2-, & 1-Parameter)/Non-Wetland Mosaic	152

A thorough discussion of the wetland and associated upland habitats documented during this effort follows. Total area (acreages) for various wetland and upland habitats within the wetland study area are quantified and summarized in Table 3. The location of all wetland sampling points, and the distribution of all wetland habitats identified within the study area are depicted in Appendix A for verification by appropriate regulatory agencies. Table 4 (below) summarizes the results for wetland sampling points, and completed field data forms for each sampling point is included in Appendix D.

The U.S. Fish and Wildlife Service's *National Wetland Inventory* (NWI) digital mapping data (2012) identify marine, estuarine, and palustrine (freshwater) wetlands throughout Gold Bluffs Beach. Although results from the fieldwork

described herein confirm the presence of some of these wetlands, additional resolution gained during the current effort identify the current extent of these wetlands at a finer scale.

Table 4. Summary of Wetland Delineation Sampling Point Data.

Sample Point ID	Wetland Vegetation	Hydric Soils	Wetland Hydrology	Preliminary Determination
1A				Upland
1B	✔	✔	✔	Wetland (3-P)
1C				Upland
1D	✔	✔	✔	Wetland (3-P)
1E	✔	✔	✔	Wetland (3-P)
2A				Upland
2B	✔	✔	✔	Wetland (3-P)
2C	✔	✔	✔	Wetland (3-P)
2D				Upland
2E	✔	✔	✔	Wetland (3-P)
2F				Upland
2G				Upland
2H	✔	✔	✔	Wetland (3-P)
2I	✔	✔	✔	Wetland (3-P)
3A				Upland
3B	✔		✔	Transition (2-P)
3C	✔	✔	✔	Wetland (3-P)
3D				Upland
3E	✔	✔	✔	Wetland (3-P)
3F		✔	✔	Transition (2-P)
3G				Upland
3H	✔	✔	✔	Wetland (3-P)
4A				Upland
4B	✔	✔	✔	Wetland (3-P)
4C				Upland
4D	✔	✔	✔	Wetland (3-P)
4E	✔	✔	✔	Wetland (3-P)
4F	✔	✔	✔	Wetland (3-P)
5A				Upland
5B	✔	✔	✔	Wetland (3-P)
5C				Upland
5D	✔	✔	✔	Wetland (3-P)
5E	✔	✔	✔	Wetland (3-P)
5F	✔	✔	✔	Wetland (3-P)
6A				Upland
6B				Upland
6C	✔	✔	✔	Wetland (3-P)
7A				Upland
7B				Upland
7C	✔	✔	✔	Wetland (3-P)

4.1. "DIFFICULT SITUATIONS" & "PROBLEM AREAS"

The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Regions (Version 2.0)* (USACE 2010) recognizes a number of "difficult" and "problematic" situations that may be associated with the evaluation of coastal inter-dunal wetlands. Such "difficult"

and "problematic" situations referenced in the Regional Supplement (USACE 2010) that were encountered at Gold Bluffs Beach pertained to the evaluation of wetland vegetation, hydric soils, and the delineation of so-called wetland/non-wetland mosaics. Each of these topics is introduced briefly here, and discussed more thoroughly in each of the following respective treatments, as they apply to specific locations within the study area.

Vegetation

Specific "problematic" situations associated with the evaluation of wetland vegetation in coastal inter-dunal wetlands referenced in the Regional Supplement (USACE 2010) that were observed at Gold Bluffs Beach include:

- the effect of aggressive invasive plants,
- areas affected by natural disturbances,
- temporal shifts in vegetation, and
- sparse and patchy vegetation.

Though identified in the Regional Supplement (USACE 2010) as discrete phenomena, at Gold Bluffs Beach each of these problematic situations associated with the evaluation of wetland vegetation is directly or indirectly related to the colonization of the coastal dunes system by *Ammophila arenaria* as discussed in Section 3.3 (Ecological Context).

Soils

The development of characteristics or indicators of hydric soils occurs over extended periods of time in prolonged, anaerobic conditions. In recently developed wetlands (such as those in the foredune swale system at Gold Bluffs Beach) indicators of hydric soils may be absent or faint. For this reason, the Regional Supplement (USACE 2010) recognizes soils in recently developed wetlands as problematic hydric soils. Sandy soils are also known to present difficulties during wetland investigations, due to the increased leaching of iron and manganese oxides, often indicative of hydric soil conditions in less porous substrates.

Wetland/Non-Wetland Mosaics

Along the length of the eastern portion of the project area between the bluffs and the stabilized, historic foredune system lies a complex mosaic of upland and palustrine wetland habitats. The Regional Supplement (USACE 2010) recognizes wetland/non-wetland mosaics as "difficult wetland situations." Typically, the problems presented by such instances is not that wetland characteristics in these situations themselves are difficult to assess, but rather that the co-occurring wetland and upland features can be:

"...too small and intermingled, and... too many such features per acre to delineate and map them accurately..."

Such is the case throughout the eastern portion of the project area at Gold Bluffs Beach.

4.2. CLASSIFICATION OF WETLANDS & WATERS OF THE U.S.

The wetland habitats and Waters of the U.S. that were documented within the wetland study area are described below, and are discussed within the context of the distinct wetland systems that currently occur at the site. Specifically, these include the marine wetlands and Waters of the U.S. associated with the Pacific Ocean, and the palustrine (freshwater) wetlands associated with the developing foredune swale system, and the reardune wetland/non-wetland mosaic. Wetland system classifications are consistent with Cowardin et al. (1979).

4.2.1. Marine System

Wetland habitats within the marine system occur along high-energy coastlines with increased levels of salinity (> 30 ppt). The following two types of Marine wetlands were identified within the wetland study area:

Pacific Ocean: M1UBL
(Permanently Flooded Marine Subtidal Unconsolidated Bottom)
At the far western edge of the wetland study area is the Pacific Ocean. Part of the Marine system, this water body is described as: continuously submerged, permanently flooded (with tidal water) wetlands or deep-water habitats whose bottom is largely composed (≥ 25 % cover) of small particle sizes (< 6 cm) and has little vegetation (< 30% cover).

Gold Bluffs Beach: M2US2N
(Regularly Flooded Marine Intertidal Unconsolidated Shore)
Also part of the Marine System, the wave slope of Gold Bluffs Beach (up to the extreme high water mark) is composed of sands or predominantly sandy substrate that is regularly flooded by tidal water (i.e., at least once, daily).

4.2.2. Palustrine System

The palustrine system includes both non-tidal (freshwater) wetlands and tidal wetlands with low ocean-derived salinity levels (<0.5 ppt). Palustrine wetlands are typically vegetated, though in instances where they lack vegetation, they are generally both small (< 8 hectares) and shallow (< 2 m). The latter two criteria help to distinguish palustrine wetlands from larger and deeper freshwater wetlands and Waters of the U.S. that are classified as part of the lacustrine system. The palustrine wetland system at the site does exceed eight hectares (19.77 acres), however, it is only seasonally flooded, and maximum depths are less than two meters. It is therefore classified as part of the palustrine system.

Although scrub-shrub and forested wetland habitats do occur *beyond* the eastern study area boundary at Gold Bluffs Beach, only seasonally-flooded palustrine "emergent" and "unconsolidated shore" wetlands occur *within* the wetland study area itself. These are described below.

Seasonally-Flooded Palustrine Unconsolidated Shore Wetlands – PUCSC.
Much of the palustrine wetland habitat in the wetland study area had little to no vegetative cover. Freshwater wetland habitats such as this are classified as palustrine "unconsolidated shore" wetlands with < 30% vegetative cover. At Gold Bluffs Beach, these habitats can be further described to specify the "subclass," indicating that the associated substrates are composed of sand and other similarly-sized particles.

Seasonally-Flooded Palustrine Emergent Wetlands – PEM1C.
Palustrine "emergent" wetlands are characterized as having > 30% aerial cover of (typically perennial) persistent, erect, rooted, herbaceous wetland vegetation. Palustrine emergent wetlands are the dominant type of wetland distributed throughout the study area. Given the limited extent of hydrophytic vegetation in foredune swale system and portions of the wetland/non-wetland mosaic mentioned above, palustrine *emergent* wetlands are restricted to the isolated three-parameter wetlands, and to a lesser extent the two-parameter coastal wetlands where the aerial cover of vegetation exceeds 30%.

4.3. FOREDUNE SWALE WETLANDS

The nearshore, foredune system within the project area at Gold Bluffs Beach is extensively colonized by *Ammophila arenaria*, though isolated and disjunct portions of native dune mat vegetation do persist. This foredune system extends inland (east) from the primary foredune before transitioning into the reardune (historic foredune) complex.

4.3.1. Distribution, Formation, and Maintenance

Within the foredune system, between the primary foredune and the stabilized reardune complex, lies an extensive, linear deflation basin or swale that is oriented parallel to the coastline. This concave geomorphic feature forms a central "trough" between two stabilized, convex landforms. Geomorphic processes contributing to the creation and maintenance of this feature appear to include the contrasting alternation of fluvial and aeolian scouring, and the resulting deposition of mobilized sediments.

During high-flow events this basin receives overland flow from Ossagon Creek and the estuarine lagoon associated with the mouth of that watercourse. Extensive inundation and overland surface-flow were observed throughout the linear foredune swale system during the course of fieldwork.

A largely concentric distribution of one-, two-, and three-parameter palustrine (freshwater) wetland habitats was documented within this extensive foredune swale system during wetland delineation fieldwork. The boundary between these wetland "categories" corresponds to subtle changes in relief where one or more wetland characteristics are lacking. This subtle elevational gradient is essentially a surrogate for variation in the hydrology throughout the site. With increasing

elevation from the lowest points within this deflation basin, fewer wetland characteristics were observed, until the transitional boundary between single-parameter coastal wetlands and upland coastal dunes is indicated by a lack of wetland characteristics entirely.

The distribution and extent of hydrophytic vegetation, the faint appearance (or, in some cases, the absence) of hydric soil indicators observed at some of the sampled locations, combined with the periodic inundation of this landform visible on historical aerial imagery (Google Earth 2011, etc.), all indicate that this coastal foredune wetland system appears to be in the early stages of its development.

This foredune swale system extends beyond the northern boundary of the project area, where it transitions into the estuarine "lagoon" associated with the mouth of Ossagon Creek. For the period in which this study was conducted, the habitat investigated within the project boundary is most appropriately classified as part of the palustrine system based on the presence of vegetation that is relatively intolerant of elevated salinity. Vegetation typically associated with estuarine wetlands must be somewhat tolerant of elevated, marine-derived salinity. Plant species composition was the primary criterion used to distinguish between these two wetland "systems;" water chemistry and salinity were not measured during this effort.

4.3.2. Characterization of Foredune Wetlands

A description of the three categories of wetland habitats documented in the foredune swale system at Gold Bluffs Beach is provided below. A map depicting the distribution and extent of these wetlands is provided in Appendix A.

4.3.2.1. Three-Parameter Wetlands

Several discrete locations distributed throughout this foredune swale system exhibited indicators of all three wetland parameters (i.e., a predominance of hydrophytic vegetation, wetland hydrology, and hydric soils).

One such wetland is contiguous with the estuarine "lagoon" associated with Ossagon Creek, as described above. Additional three-parameter wetlands are distributed throughout the foredune swale system to the south. These wetlands occur within the lowest depressions within the surrounding deflation basin. These locations experience extended periods of inundation and/or soil saturation during the growing season, and a more exposed and accessible water table allows for the establishment and development of hydrophytic vegetation.

The vegetation in these depressions is sparse and patchy. Plant species encountered in these wetlands include: *Rumex crassus*, "willow dock" (OBL); *Carex obnupta*, "slough sedge" (OBL); *Juncus breweri*, "Brewer's rush" (FACW); *Mentha pulegium*, "pennyroyal" (OBL); *Cyperus eragrostis*, "nutsedge" (FACW); *Leontodon saxatilis* ssp. *longirostris*, "hairy hawkbit" (FACU); *Cakile maritima*,

"sea rocket" (FACW); *Plantago lanceolata*, "English plantain" (FAC); and *Anagallis arvensis*, "scarlet pimpernel" (FAC).

Typical indicators of wetland hydrology in these areas include: the sparsely vegetated concave surface, soil saturation and/or observation of the water table within twelve inches of the soil surface, drift deposits, sediment deposits, water marks, algal crusts, drainage patterns, geomorphic position, and the observation of inundation on aerial imagery. Additional noteworthy observations include two locations where partially desiccated, remnant egg masses of *Rana aurora* ("Northern Red-legged Frog") were observed on the moist soil surface near limited and recently established hydrophytic vegetation (Appendix D). This species is generally known to preferentially place such egg masses in deeper, perennial, ponded habitats. These two occurrences indicate that such locations experience extended periods of inundation.

Indicators of hydric soils observed during fieldwork in these wetland habitats were sometimes faint or lacking. Where observed, hydric soil indicators included "Sandy Redox" and "Stripped Matrix" (USDA-NRCS 2010). Occasionally, a substantially compacted and restrictive layer (often coinciding with the apparent water table) was observed within 3-7 (12) inches of the soil surface.

Sampling within these areas revealed soils composed of sand, loamy sands, and/or sandy loams. Soil color (moist) was either 2.5Y or 10YR, with values ranging from 2.5-4, and with chroma of 1-2 (4). In some instances, redoximorphic features (i.e., coated sand grains and diffuse mottling) of significant contrast and abundance, and/or the accumulation, or translocation of organic matter within the soil profile was also observed.

4.3.2.2. Two-Parameter Coastal Wetlands

Regions of the foredune swale system intermediate in elevation between three-parameter wetlands in lower basin depressions, and single-parameter coastal wetlands at the upper hydrological fringe are also intermediate with respect to wetland characteristics; these variously satisfy only two wetland criteria. These, so called "two-parameter coastal wetlands" represent transitional habitats that experience less frequent and prolonged periods of inundation and/or soil saturation than the three-parameter wetlands found at lower elevations.

Vegetation in these wetland habitats was typically lacking. Where it did occur, species included: *Rumex crassus*, "willow dock" (OBL); *Carex obnupta*, "slough sedge" (OBL); *Juncus breweri*, "Brewer's rush" (FACW); *Mentha pulegium*, "pennyroyal" (OBL); *Cyperus eragrostis*, "nutsedge" (FACW); *Leontodon saxatilis* ssp. *longirostris*, "hairy hawkbit" (FACU); *Cakile maritima*, "sea rocket" (FACW); *Plantago lanceolata*, "English plantain" (FAC); *Anagallis arvensis*, "scarlet pimpernel" (FAC); and *Ammophila arenaria*, "European beachgrass" (FACU).

Indicators of wetland hydrology in these two-parameter coastal wetlands include: the sparsely vegetated concave surface, soil saturation within twelve inches of the soil surface, drift deposits, sediment deposits, water marks, algal crusts, drainage patterns, geomorphic position, and the observation of inundation on aerial imagery.

Soils in this portion of the wetland study area were observed to be consistent with those found in the three-parameter wetlands described above.

4.3.2.3. Single-Parameter Coastal Wetlands

Given that wetland hydrology is the causative factor enabling the development of the other two criteria by which wetlands are evaluated (i.e., hydric soils and the establishment and development of hydrophytic vegetation), the presence of wetland hydrological indicators was the primary factor used to determine the distribution and extent of single-parameter coastal wetlands in the foredune swale system.

Specific hydrological indicators observed in these wetland habitats included: drift/sediment deposits, water marks, water-stained leaves (of *A. arenaria*), and algal crusts, all associated with the sparsely-vegetated, upper extensions of the foredune swale system. The presence or absence of these hydrological indicators determined the transitional boundary between 1- and 2-parameter coastal wetlands, as well as between single-parameter coastal wetlands and adjacent coastal dune uplands.

Vegetative cover in these single-parameter coastal wetlands varied with proximity to the basin's edge. These wetland habitats were typically sparsely vegetated, or lacked vegetation entirely. Plant species encountered in these habitats included: *Ammophila arenaria*, "European beachgrass" (FACU); *Leontodon saxatilis* ssp. *longirostris*, "hairy hawkbit" (FACU); *Hypochaeris radicata*, "hairy cat's-ear" (NL); *Cakile maritima*, "sea rocket" (FACW); *Plantago lanceolata*, "English plantain" (FAC); *Fragaria chiloensis*, "beach strawberry" (NL); and *Pseudognaphalium stramineum*, "everlasting" (FAC).

Soils in these single-parameter coastal wetlands lacked primary indicators for hydric soils but were otherwise similar to soils observed in the two- and three-parameter wetlands, with the following exception: redoximorphic features and significant accumulations of organic matter were not observed in soil profiles in these areas.

4.4. REAR DUNE WETLAND/NON-WETLAND MOSAIC SYSTEM

Along the eastern portion of the project area, between the bluffs and the stabilized, historic foredune system lays a complex mosaic of upland and palustrine wetland habitats. Sampling was conducted along transects throughout this mosaic to provide general characterizations of the wetland and upland habitats occurring in this region. Differential delineation of one-, two- and three-

parameter wetland types was not undertaken due to the extensive effort that would be required to do so in this large and complex system. Alternative methods have been proposed to remove *Ammophila arenaria* in these areas (i.e., manual removal), and the use of heavy equipment will be avoided (Transou pers. com.).

The undulating relief and micro-topography within this eastern region is highly variable. Stabilized, historic dunes maintain fixed convex geomorphic features colonized by residual dune mat plant communities, and appear to be undergoing conversion to more stabilized, coastal prairie communities dominated by grasses and other herbaceous plant species. Throughout this mosaic, these upland "islands" are interspersed within a sinuous and anastomosing system of concavities or " dune hollows." *Ammophila arenaria* occurs discontinuously throughout the upland portions of this part of Gold Bluffs Beach, as well as within areas transitional between uplands and wetlands.

4.4.1. Distribution, Formation, and Maintenance

This reardune mosaic system extends beyond the northern and southern boundaries of the wetland study area, where (at the time of this fieldwork) it maintains hydrological connectivity with Ossagon Creek to the north, and Home Creek to the south. Two additional creeks (Butler Creek and Boat Creek), as well as a number of small springs drain the forested slopes and bluffs adjacent to the eastern edge of the project area, all of which actively contribute to the hydrology of the palustrine wetland swale system within this mosaic.

A successional gradient of vegetative development is apparent within this mosaic, progressing in an easterly direction. The most well developed wetland plant communities occur at the eastern-most extent of the project area, where they have been subject to a less frequent disturbance regime. Here, decadent, emergent hydrophytic vegetation transitions gradually into shrub-dominated wetlands, and then into palustrine forested wetlands (beyond the project area boundary, along the base of the bluffs).

At the western edge of the mosaic is the stabilized, historic foredune system which supports the early stages of a developing coastal forest composed primarily of *Picea sitchensis*, "Sitka spruce" (FAC); *Morella californica*, "California wax myrtle" (FAC); *Alnus rubra*, "red alder" (FACW); *Baccharis pilularis*, "coyote bush" (NL); and *Ammophila arenaria*, "European beachgrass" (FACU).

The wetland and upland vegetation within the mosaic itself, exhibits varying levels of establishment and development, coinciding with the successional gradient mentioned previously, and is described in further detail below.
The stabilization of this historic foredune system has initiated a variety of interdependent processes, all of which contribute to the distribution, formation, and maintenance of the reardune palustrine wetland swale system found within this wetland/non-wetland mosaic.

Consistent aeolian scouring inland of the historic foredune has displaced sediments and further excavated these hollows, exposing the water table more extensively than may have occurred previously. Consequently, there is consistent and/or continuous soil saturation and/or inundation where, throughout the mosaic, the water table is superficial, and in many instances, exposed. In fact, much of this area was submerged under shallow water (< 1m) at the time that this fieldwork was conducted. The combined affect of these altered processes has effectively extended the reardune swale system further west from the base of the adjacent forested slopes, than has occurred previously.

4.4.2. Characterization of Wetlands in the Wetland/Non-Wetland Mosaic

Vegetation

The response of plant communities to recent hydrological changes described above is in transition. Generally, the distribution, species composition, and structure of this system vary with the degree of development of these wetlands. Towards the western edge of this mosaic more recently converted wetlands exhibit limited establishment of hydrophytic plant species and the distribution of vegetation is sparse and patchy. The vegetation becomes progressively more well-developed further east along this gradient, and is most appropriately classified as the *Carex obnupta* Herbaceous Alliance (Slough Sedge Swards) as described Sawyer et al. (2009).

In the western portion of the mosaic, existing vegetation consists of scattered individuals and localized patches of *Carex obnupta*, "slough sedge" (OBL); *Rumex crassus*, "willow dock" (OBL); *Juncus breweri*, "Brewer's rush" (FACW); *Mentha pulegium*, "pennyroyal" (OBL); *Plantago lanceolata*, "English plantain" (FAC); *Leontodon saxatilis* ssp. *longirostris*, "hairy hawkbit" (NL); *Cyperus eragrostis*, "nutsedge" (FACW); *Rumex acetosella*, "sheep sorrel" (FAC); *Picea sitchensis*, "Sitka Spruce" (FAC); *Morella californica*, "California wax myrtle" (FAC); and in some instances hummocked *Ammophila arenaria*, "European beachgrass" (FACU) – particularly along the wetland margins.

At the eastern edge of the mosaic, exposed soil was not observed in wetland habitats and dense herbaceous vegetation is overwhelmingly dominated by decadent stands of *Carex obnupta*, "slough sedge" (OBL), with varying amounts of *Mentha pulegium*, "pennyroyal" (OBL); *Juncus breweri*, "Brewer's rush" (FACW); *Leontodon saxatilis* ssp. *longirostris*, "hairy hawkbit" (NL); *Agrostis stolonifera*, "creeping bentgrass" (FACW); *Veronica americana*, "American brooklime" (OBL); *Callitriche heterophylla* var. *bolanderi*, "water-starwort" (OBL); *Cyperus eragrostis*, "nutsedge" (FACW); *Distichlis spicata*, "salt grass" (FACW); and *Ranunculus repens*, "creeping buttercup" (FACW).

Transitional areas between these extremes exhibited variable shifts in vegetative cover composed of the species mentioned above.

Soils

Soils within wetland habitats within this mosaic were fairly consistent, and hydric soil indicators observed included: "Sandy Mucky Mineral", "Sandy Redox", and "Stripped Matrix" (USDA-NRCS 2010). Soils sampled had increased levels of organic material at, or near the surface, and were composed predominantly of sandy loams and occasionally loamy sands. Soil matrix colors were either 2.5Y or 10YR; with values of 2, 2.5, and 3; and had chroma of either 1 or 2. Redoximorphic features, consisting of soft masses in the matrix, oxidized rhizospheres, and coated sand grains varied in abundance, but were typically between 20-50% (2% and 5%). Redoximorphic feature colors were ranged from 7.5YR to 10YR (2.5Y); with values of 3 or 4 (5); and with chroma of either 4, 6, or 8.

Hydrology

Extensive portions of this mosaic were inundated and/or saturated at the time when this fieldwork was conducted, and these areas are likely under water and/or saturated for extended periods throughout the growing season. Specific wetland hydrology indicators documented in this area include: surface water, high water table (within 12 inches of the soil surface), saturation (within 12 inches of the soil surface), algal mats, water-stained leaves, sediment deposits, drift deposits, inundation visible on aerial imagery, sparsely vegetated concave surface, oxidized rhizospheres, and geomorphic position.

4.4.3. Characterization of Uplands in the Wetland/Non-Wetland Mosaic

Appropriate classification of the vegetation in upland habitats within the wetland/non-wetland mosaic is difficult due its transitional state. The vegetation does exhibit some characteristics of both *Ammophila arenaria* Semi-Natural Herbaceous Stands (European beachgrass swards) and *Abronia latifolia-Ambrosia chamissonis* Herbaceous Alliance (Dune Mat) as described in Sawyer et al. (2009), but the on-going conversion of these habitats is not typical of any specific vegetation alliance or association.

Vegetation observed in these areas was predominantly composed of: *Ammophila arenaria*, "European beachgrass" (FACU); *Anthoxanthum odoratum,* "vernal grass" (FACU); *Cynosurus echinatus*, "hedgehog dogtail" (NL); *Poa douglasii*, "sand dune bluegrass" (UPL); *Polygonum paronychia*, "knotweed" (NL); *Cardionema ramosissimum*, "sandmat" (NL); *Pseudognaphalium stramineum*, "cud weed" (FAC); *Anaphalis margaritacea*, "pearly everlasting" (NL); *Fragaria chiloensis*, "beach strawberry" (NL); *Aira praecox*, "early hair grass" (NL); *Hypochaeris radicata*, "hairy cat's-ear" (NL); *Rumex acetosella*, "sheep sorrel" (FAC); *Picea sitchensis*, "Sitka spruce" (FAC); and *Baccharis pilularis*, "coyote bush" (NL).

Soils sampled in upland habitats within this mosaic were composed of sands and loamy sands, with colors ranging from 2.5Y, 5YR, to 10YR, values ranging from 2.5 - 3, and with chroma of 2 or 3 (1).

5.0 Conclusion

The transformative effects of colonization by *Ammophila arenaria* have dramatically altered the habitats and processes within this already dynamic coastal system. Clearly, the landscape and distribution of wetlands have been altered by the spread of this species, and consequently, much of the site is in a state of transition.

Although marine wetlands border the western edge of the wetland study area, the majority of the wetlands identified at Gold Bluffs Beach can be classified as palustrine emergent wetlands. These are distributed throughout two swale systems: a well-established and apparently expanding wetland/non-wetland mosaic between the historic foredune (contemporary rear dune) ridge and the base of Gold Bluffs; and a recently established and developing swale system between the historic foredune (contemporary rear dune) ridge and the present-day foredune. Three-parameter wetlands exist in each of these systems. Two- and single-parameter wetlands also typically occur concentrically around the three parameter wetlands in both systems, and represent gradual extensions of the margin of these coastal wetland habitats with decreasing hydrological influence (hence the increased absence of wetland indicators).

While avoidance of impacts to wetland habitats should be prioritized in all projects, the potential ecological benefits of the North Gold Bluffs Beach Coastal Dune Restoration Project to this altered coastal dune system are compelling. If substantial reduction of *Ammophila arenaria* is achieved, numerous special-status plants, plant communities, and wildlife species could respond positively, where they may otherwise be excluded. Such benefits, in addition to the dynamic and continuously changing nature of native coastal dune systems should be considered during project development, permitting, and implementation; while avoiding and/or minimizing impacts to identified wetland habitats to the maximum extent possible.

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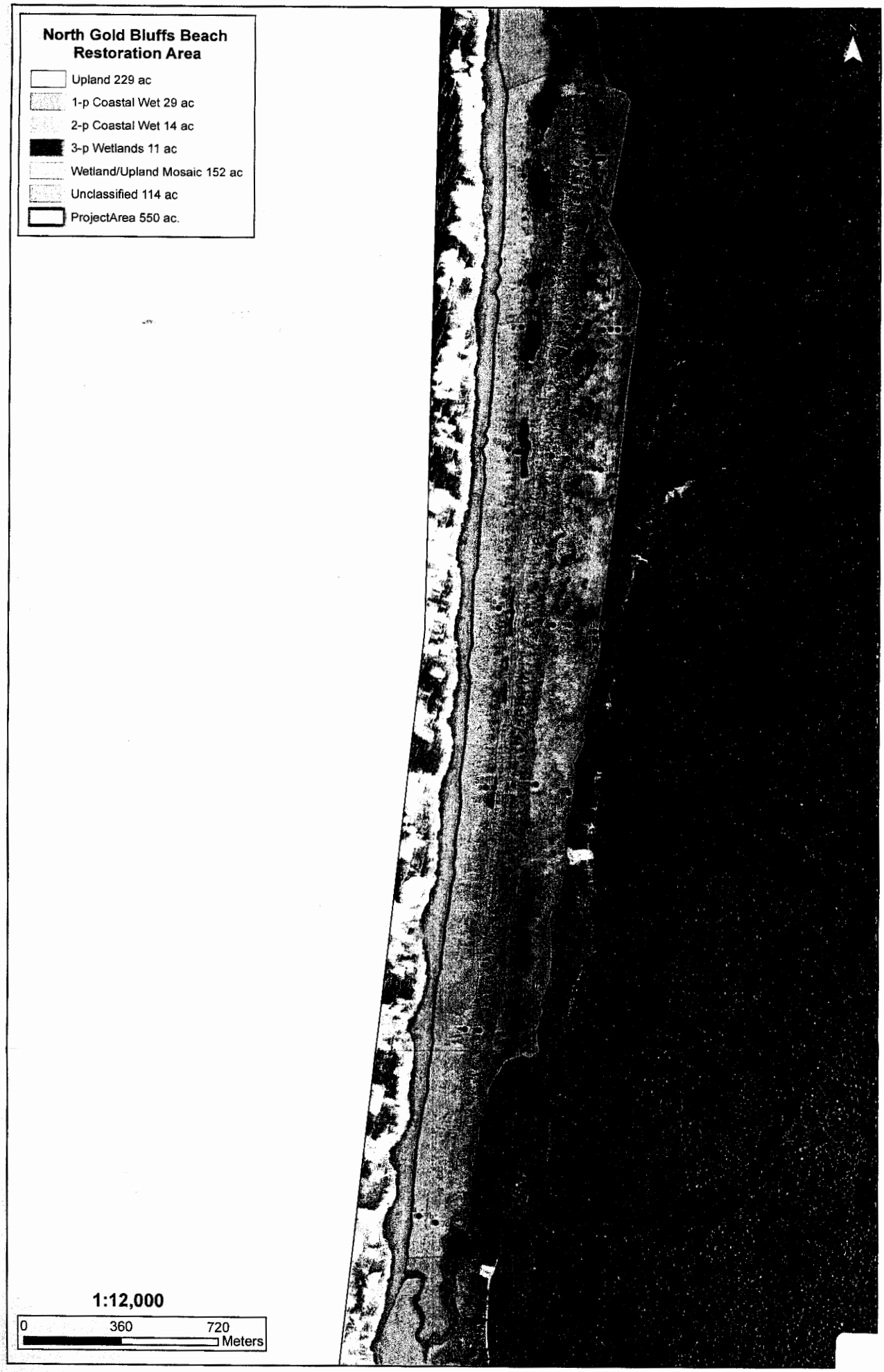

North Gold Bluffs Beach Restoration Area
Upland 229 ac
1-p Coastal Wet 29 ac
2-p Coastal Wet 14 ac
3-p Wetlands 11 ac
Wetland/Upland Mosaic 152 ac
Unclassified 114 ac
ProjectArea 550 ac.
1:12,000
0
360
720
Meters

Appendix B.

List of Plant Species Encountered During Fieldwork.

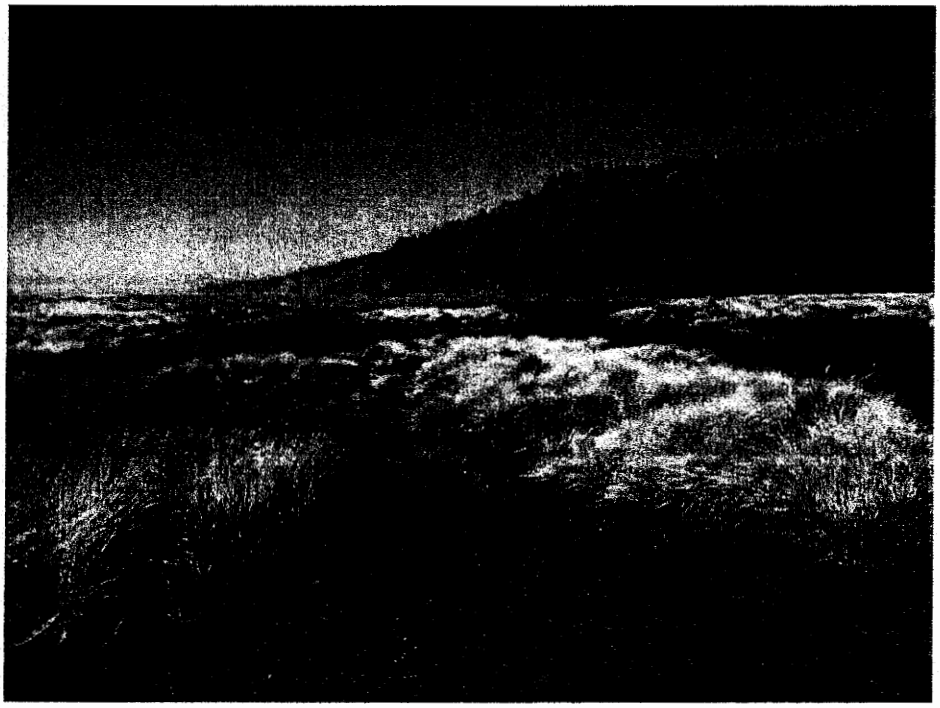
Taxonomical nomenclature is consistent with: *The Jepson Manual, Second Edition* (Baldwin et al. 2012) for vascular plants. Wetland Vegetation Indicator Status Ranking is consistent with the *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988).

Wetland Indicator Status	Species	Common Name	Family
Tree Species			
FACW	*Alnus rubra*	red alder	Betulaceae
FAC	*Morella californica*	California wax myrtle	Myricaceae
FAC	*Picea sitchensis*	Sitka spruce	Pinaceae
Shrub Species			
FACW	*Alnus rubra*	red alder	Betulaceae
NL	*Baccharis pilularis*	coyote bush	Asteraceae
NL	*Garrya elliptica*	silk tassel	Rosaceae
FAC	*Morella californica*	California wax myrtle	Myricaceae
FAC	*Picea sitchensis*	Sitka spruce	Pinaceae
FAC	*Rubus parviflorus*	thimbleberry	Rosaceae
FAC	*Rubus spectabilis*	salmonberry	Rosaceae
NL	*Rubus ursinus*	California blackberry	Rosaceae
NL	*Vaccinium ovatum*	evergreen huckleberry	Ericaceae
Herbaceous Species			
NL	*Abronia latifolia*	yellow sand verbena	Nyctaginaceae
NL	*Abronia umbellata* var. *breviflora*	pink sand verbena	Nyctaginaceae
NL	*Achillea millefolium*	yarrow	Asteraceae
FACW	*Agrostis stolonifera*	creeping bentgrass	Poaceae
NI	*Aira caryophyllea*	silver European hairgrass	Poaceae
NL	*Aira praecox*	early hairgrass	Poaceae
FACU	*Ammophila arenaria*	European beachgrass	Poaceae
FAC	*Anagallis arvensis*	scarlet pimpernel	Myrsinaceae
NL	*Anaphalis margaritacea*	pearly everlasting	Asteraceae
FACU	*Anthoxanthum odoratum*	vernal grass	Poaceae
NL	*Bromus carinatus* var. *carinatus*	California brome	Poaceae
FACW	*Cakile maritima*	sea rocket	Brassicaceae
OBL	*Callitriche heterophylla* var. *bolanderi*	water-starwort	Plantaginaceae
NL	*Camissoniopsis cheiranthifolia* (=*Camissonia cheiranthifolia*)	beach evening-primrose	Onagraceae
NL	*Calystegia soldanella*	beach morning glory	Convolvulaceae
FACW	*Cardamine oligosperma*	bitter cress	Brassicaceae
NL	*Cardionema ramosissimum*	sandmat	Caryophyllaceae
OBL	*Carex obnupta*	slough sedge	Cyperaceae
FAC	*Cerastium viride*	field mouse-ear chickweed	Caryophyllaceae
NL	*Cynosurus echinatus*	hedgehog dogtail	Poaceae
FACW	*Cyperus eragrostis*	nutsedge	Cyperaceae
FACW	*Distichlis spicata*	salt grass	Poaceae
NL	*Elymus mollis* ssp. *mollis* (=*Leymus mollis*)	American dunegrass	Poaceae

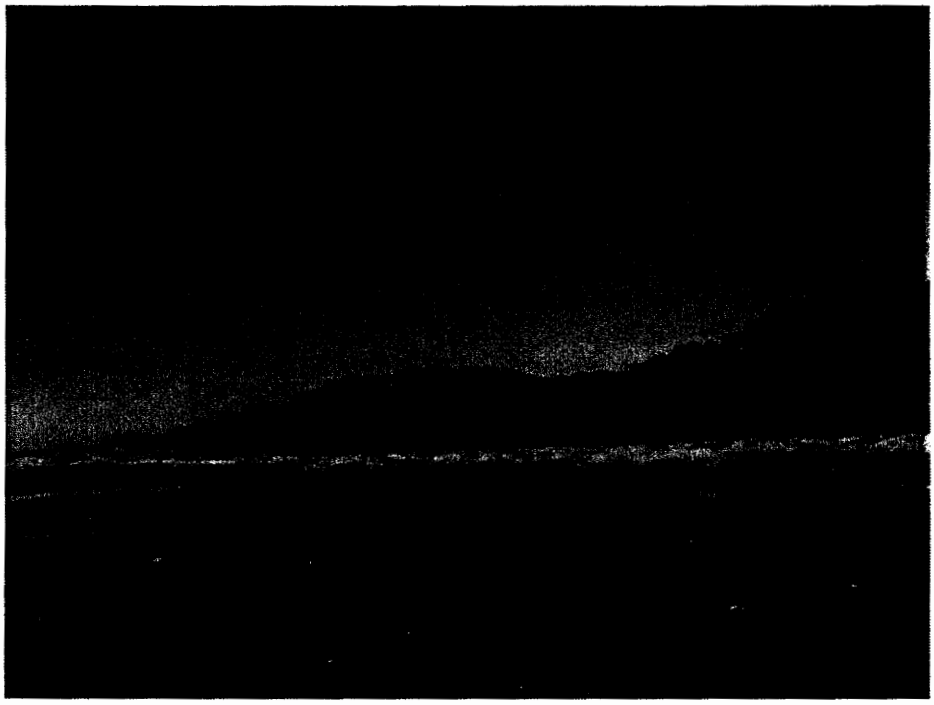
Wetland Indicator Status	Species	Common Name	Family
FAC	*Festuca rubra*	red fescue	Poaceae
FACW	*Festuca bromoides* (=*Vulpia bromoides*)	brome fescue	Poaceae
FACU	*Festuca myuros*	rattail six weeks grass	Poaceae
NL	*Fragaria chiloensis*	beach strawberry	Rosaceae
FACU	*Heracleum maximum*	cow parsnip	Apiaceae
NL	*Hypochaeris radicata*	hairy cat's-ear	Asteraceae
FACW	*Juncus breweri*	Brewer's rush	Juncaceae
NL	*Leontodon saxatilis* ssp. *longirostris*	hairy hawkbit	Asteraceae
NL	*Linaria dalmatica* ssp. *dalmatica*	Dalmatian toadflax	Plantaginaceae
FAC	*Lotus corniculatus*	bird's-foot trefoil	Fabaceae
-	*Lupinus* sp.	lupine	Fabaceae
OBL	*Mentha pulegium*	pennyroyal	Lamiaceae
FAC	*Plantago lanceolata*	English plantain	Plantaginaceae
FACW	*Plantago major*	common plantain	Plantaginaceae
UPL	*Poa douglasii*	sand dune bluegrass	Poaceae
NL	*Polygonum paronychia*	knotweed	Polygonaceae
NL	*Polypodium calirhiza*	polypody	Polypodiaceae
OBL	*Potentilla anserina* ssp. *pacifica*	Pacific silverweed	Rosaceae
FAC	*Prunella vulgaris* var. *lanceolata*	self heal	Lamiaceae
FAC	*Pseudognaphalium stramineum*	cud weed	Asteraceae
FACW	*Ranunculus repens*	creeping buttercup	Ranunculaceae
FAC	*Rumex acetosella*	sheep sorrel	Polygonaceae
OBL	*Rumex crassus*	willow dock	Polygonaceae
OBL	*Sisyrinchium californicum*	golden-eyed-grass	Iridaceae
FACW	*Trifolium wormskioldii*	cow clover	Fabaceae
OBL	*Veronica americana*	American brookelime	Scrophulariaceae

Primary foredune colonized by *Ammophila arenaria*.
(Perspective: north towards Ossagon Rock).

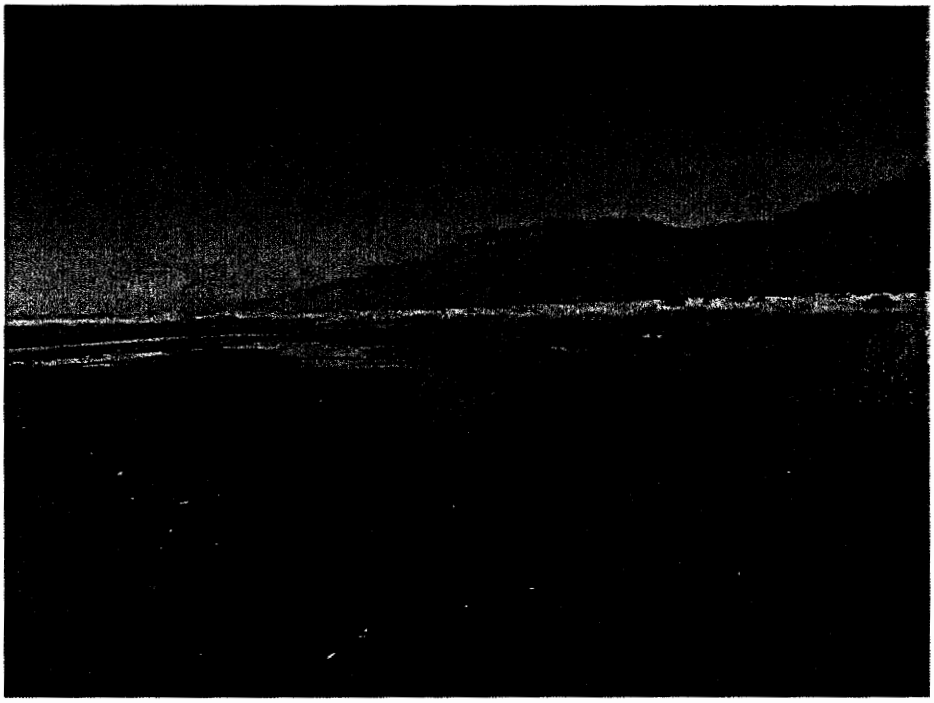
Nearshore dune system stabilized by *Ammophila arenaria.*
(Perspective: north).



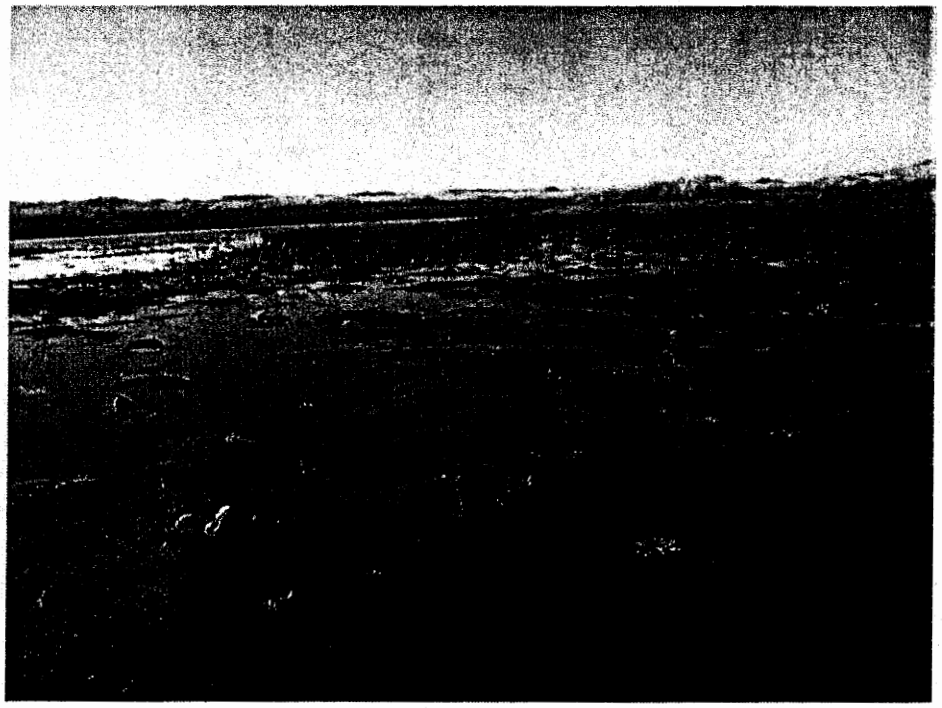
1 & 2 *of* 15. Foredune palustrine swale system with hydrological connectivity with Ossagon Creek. A series of 6 images follows, progressing from north-south. (Perspective: north towards Ossagon Rock.)



3 *of* 15. Sparse and patchy vegetation with localized occurrence of recently established hydrophytic vegetation at lowest point in "basin."

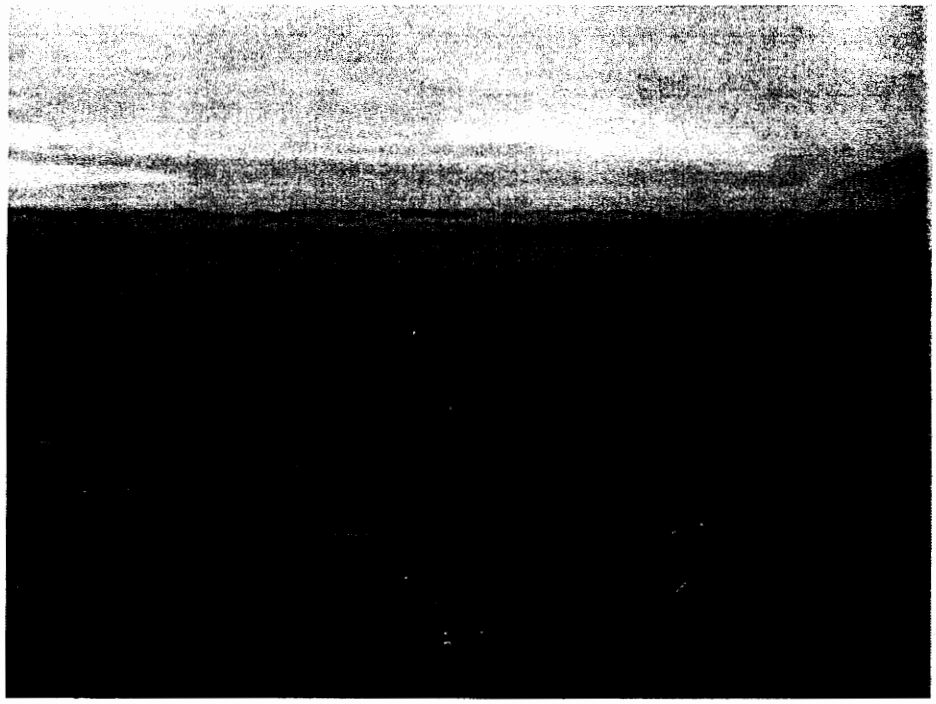


4 *of* 15. Same location with high water mark evident.

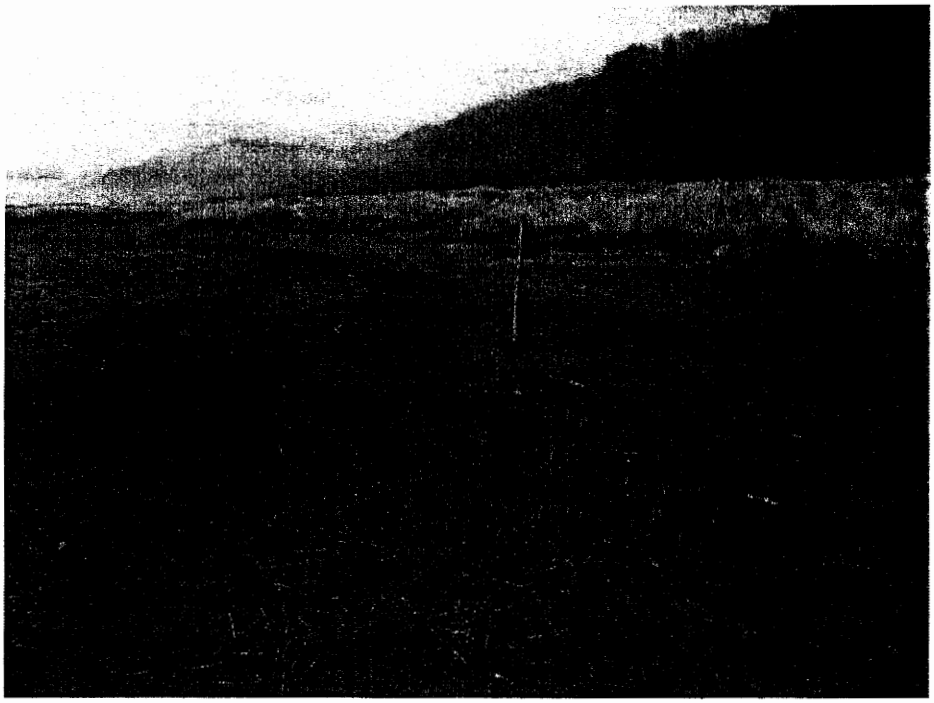


5 *of* 15. Same location with surface water and algal development.

6 *of* 15. Similar location further south.

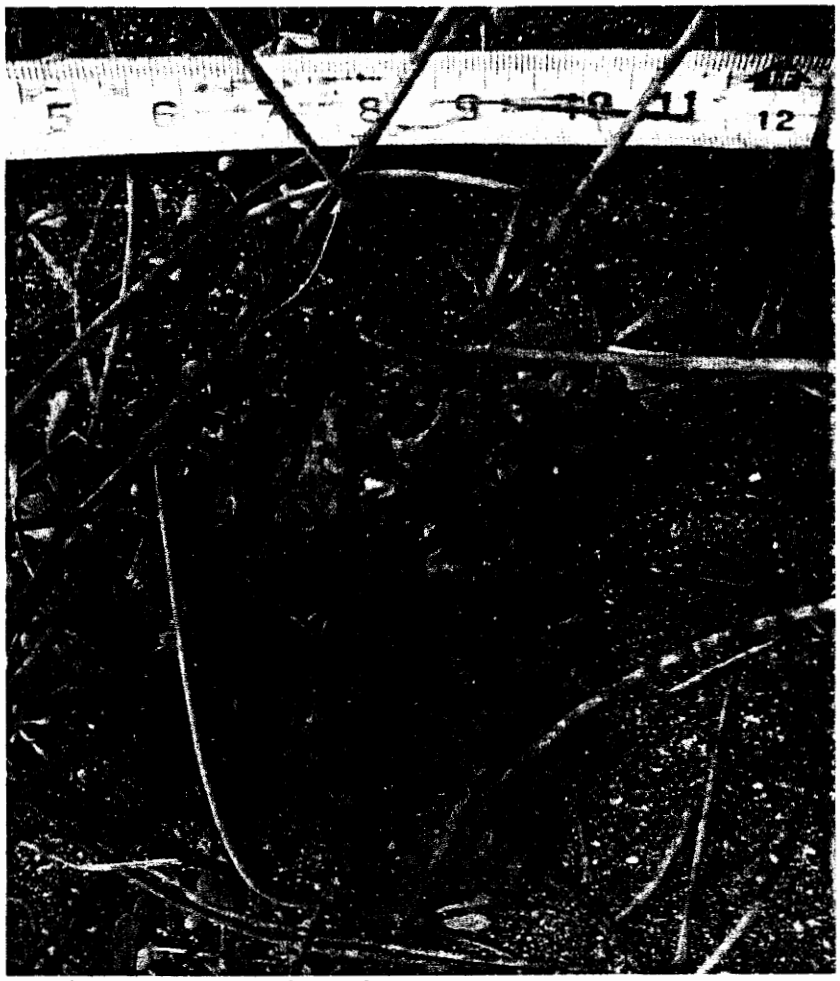


7 *of* 15. Similar location further south. Sparse and patchy vegetation and water marks evident.

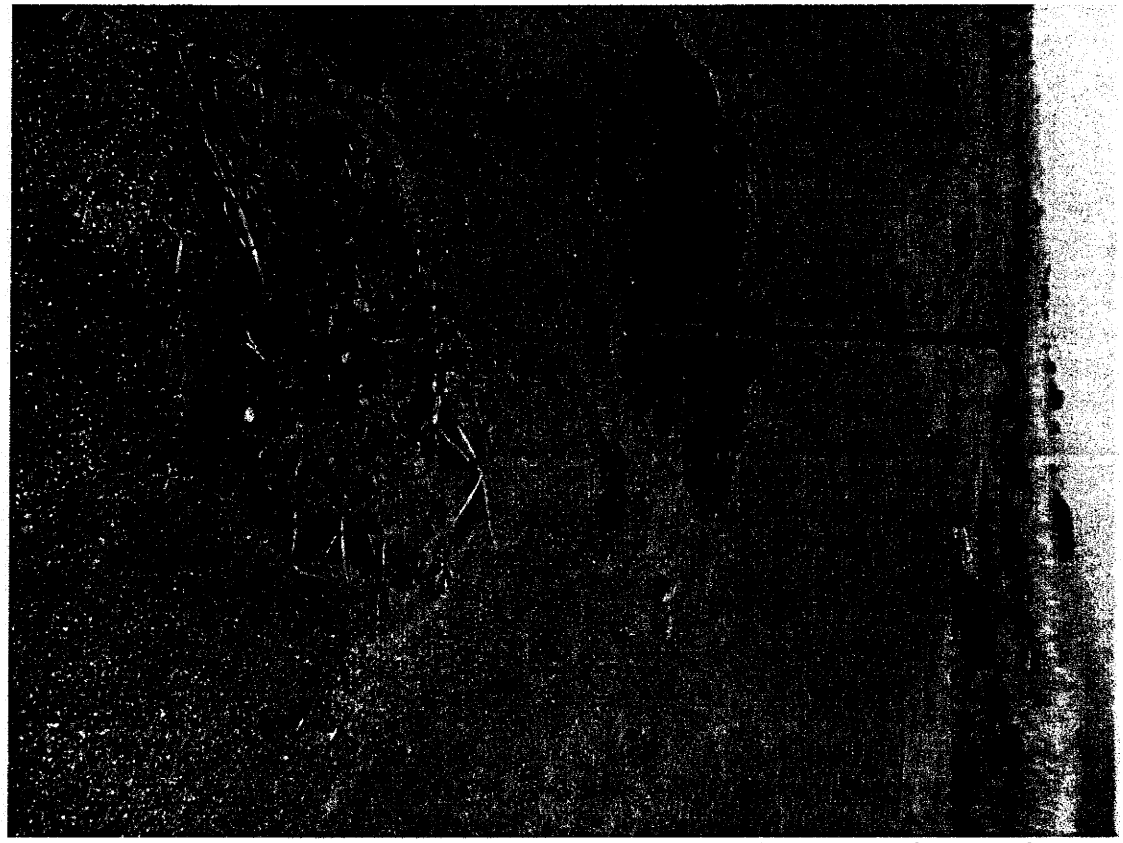


8 *of* 15. Same location.

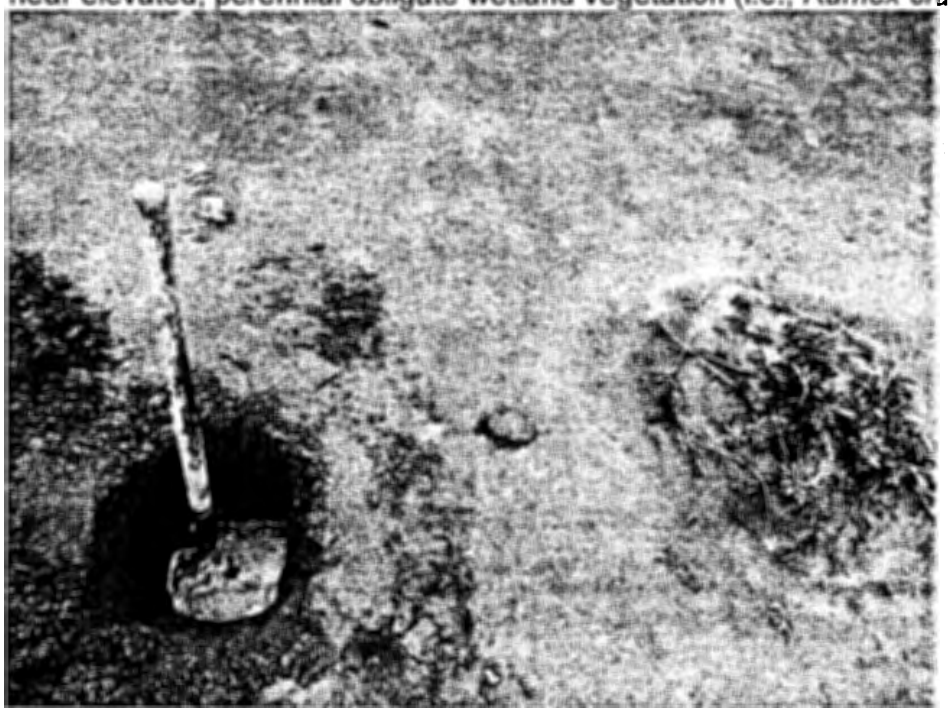
9 & 10 *of* 15. Similar location further south, with remnants of *Rana aurora* (Northern Red-legged Frog) egg mass near tape measure in foreground.

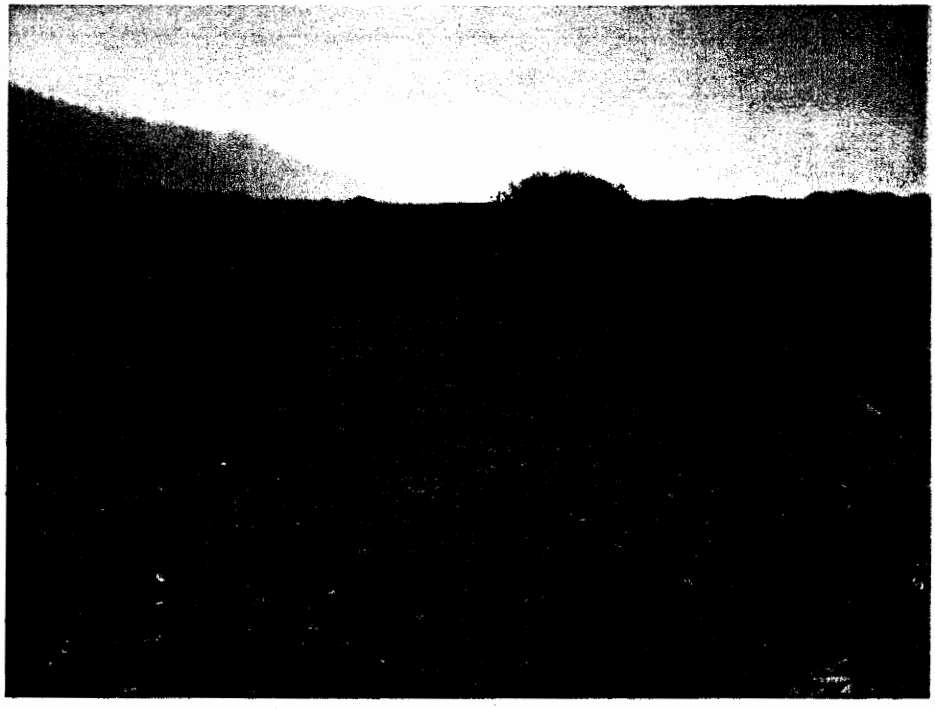


11 *of* 15. Close-up view of *Rana aurora* egg mass.

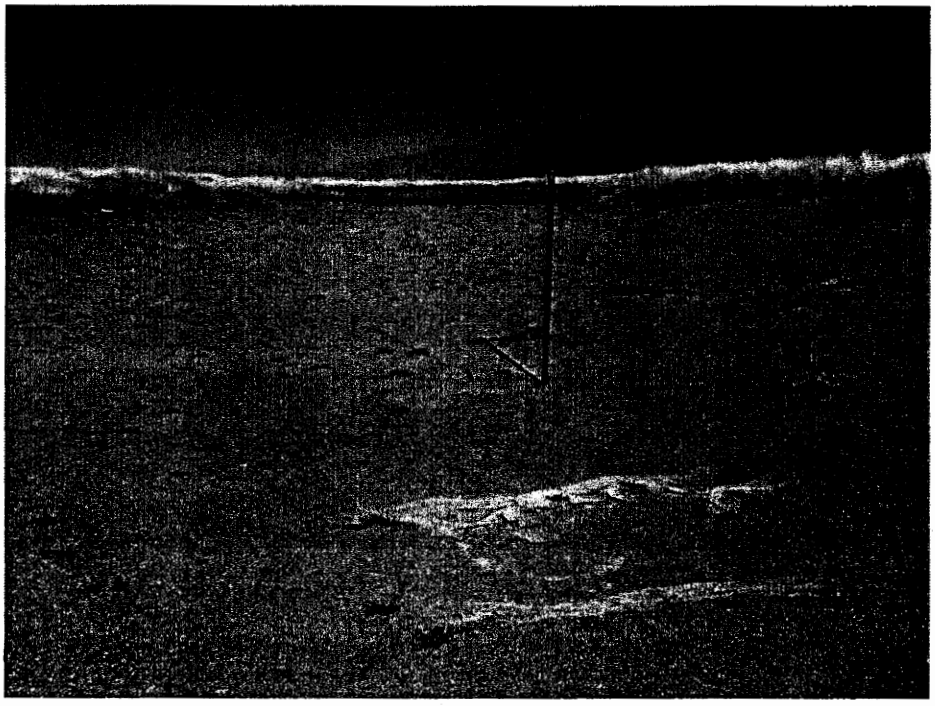


12 & 13 *of* 15. Soil pit revealing the water table within 12 inches of the surface, near elevated, perennial obligate wetland vegetation (i.e., *Rumex crassus*).



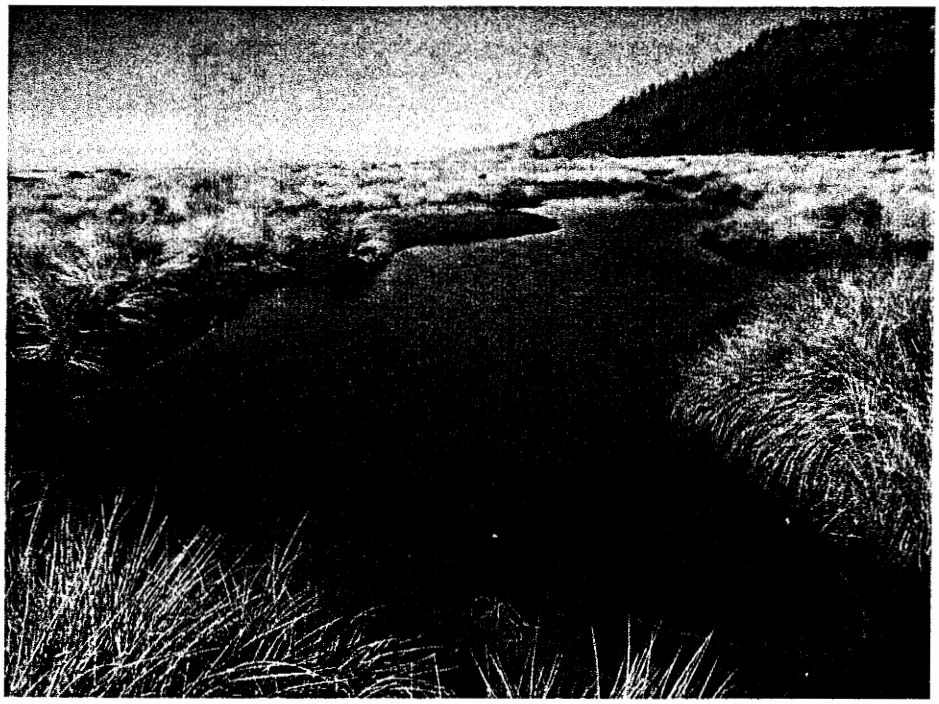


14 *of* 15. Algal mat within an isolated sparsely-vegetated opening in *Ammophila arenaria*-dominated vegetation.

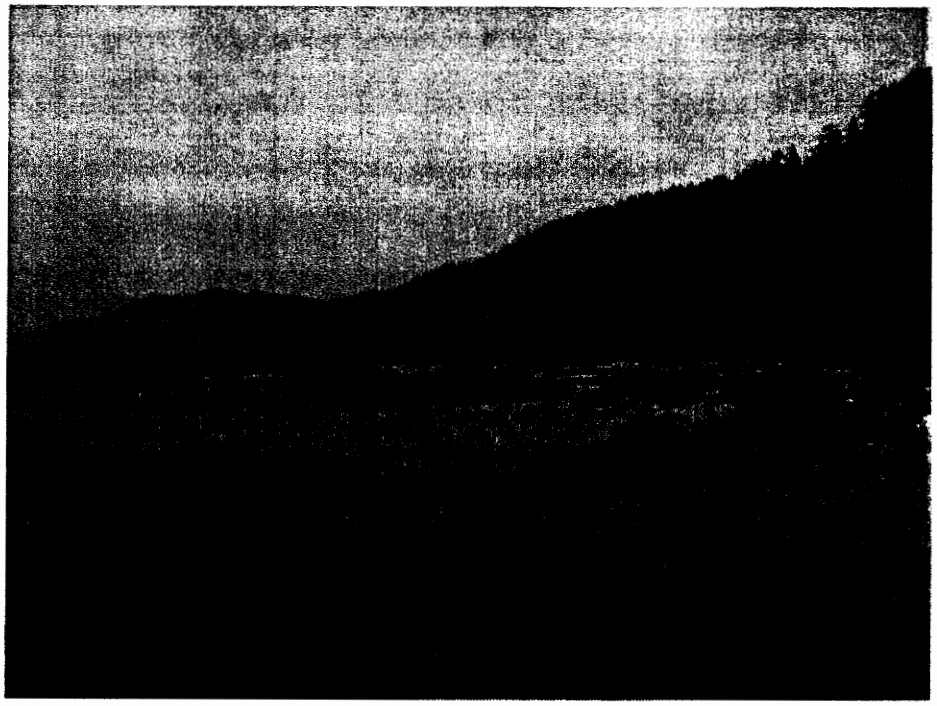


15 *of* 15. Location with remnants of algal mat near southern end of the foredune swale system.

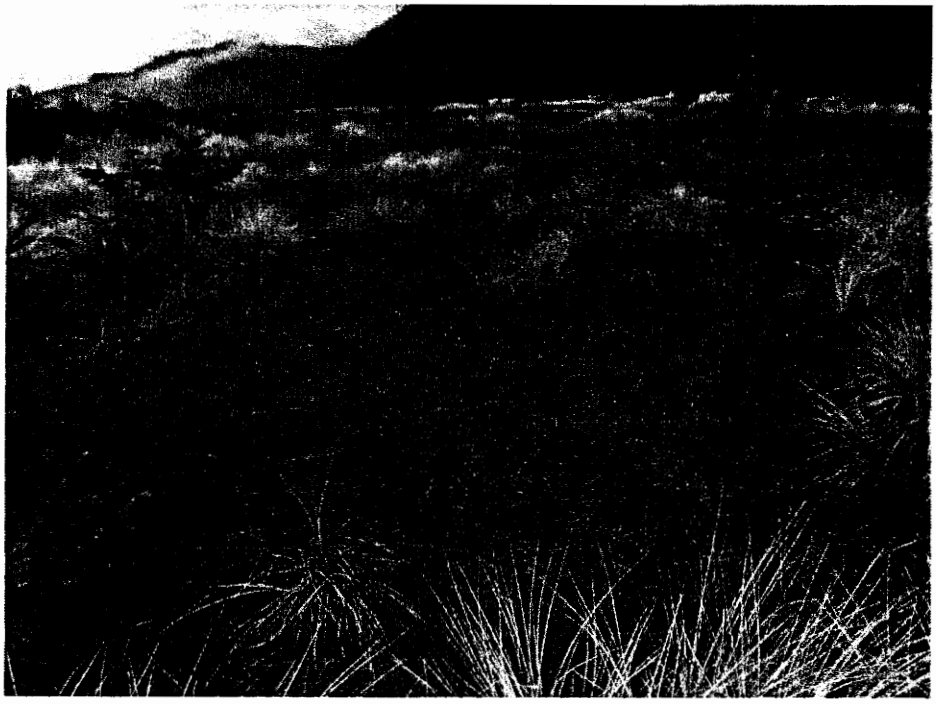
Sparsely-vegetated foredune basin.



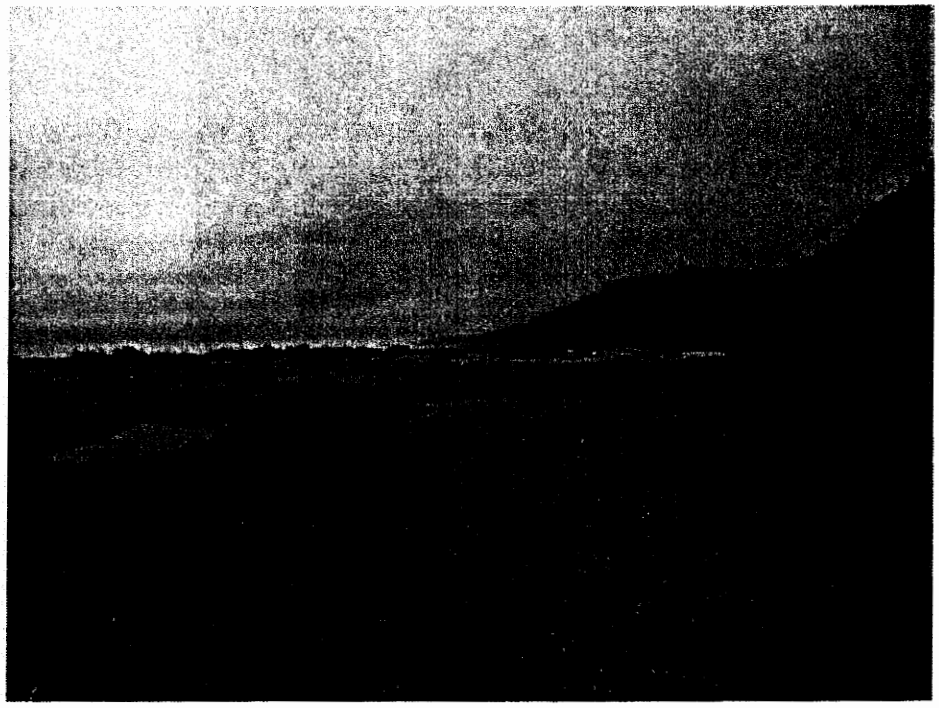
Inundated portions of the reardune (historic foredune) system dominated by *Ammophila arenaria*.



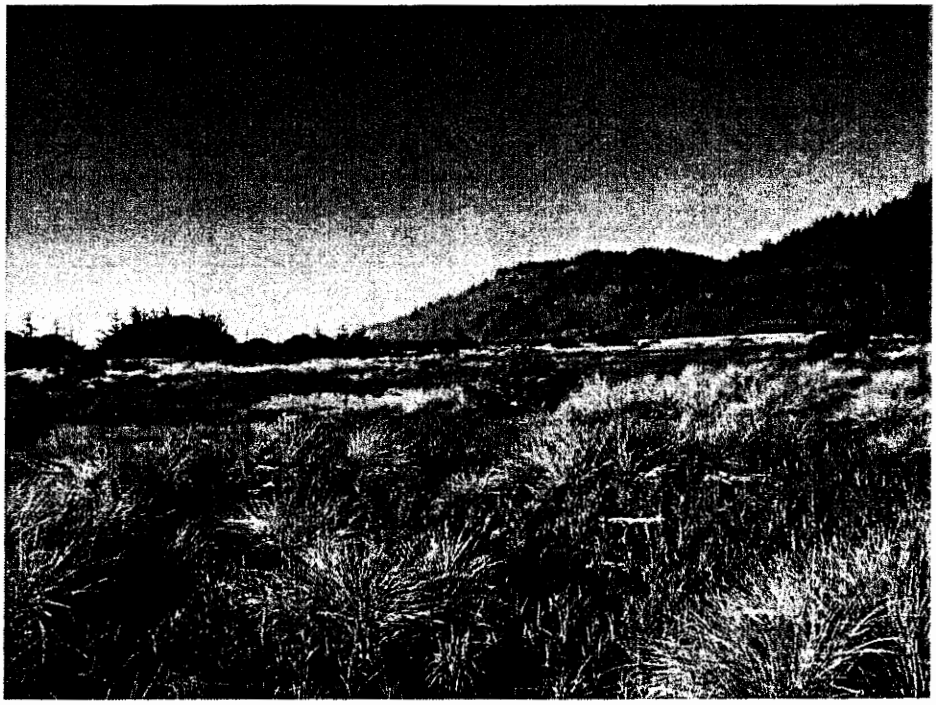
Reardune (historic foredune) system stabilized by *Ammophila arenaria*, and supporting young *Picea sitchensis* and *Morella californica*.



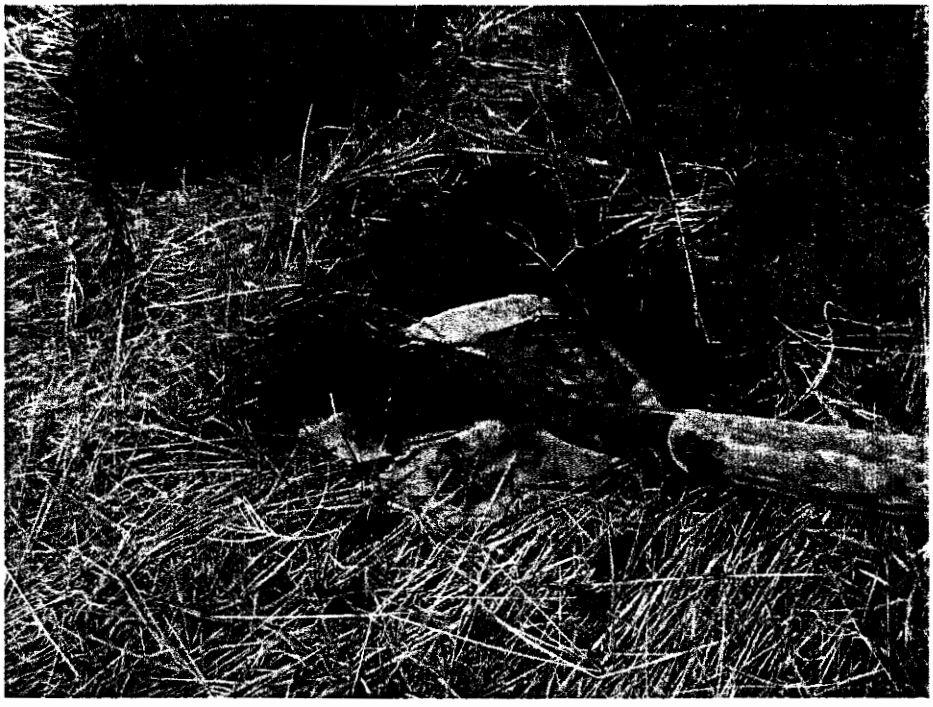
Edge of reardune (historic foredune) system and wetland/non-wetland mosaic, with *Picea sitchensis*, *Ammophila arenaria Juncus breweri* and *Carex obnupta*.



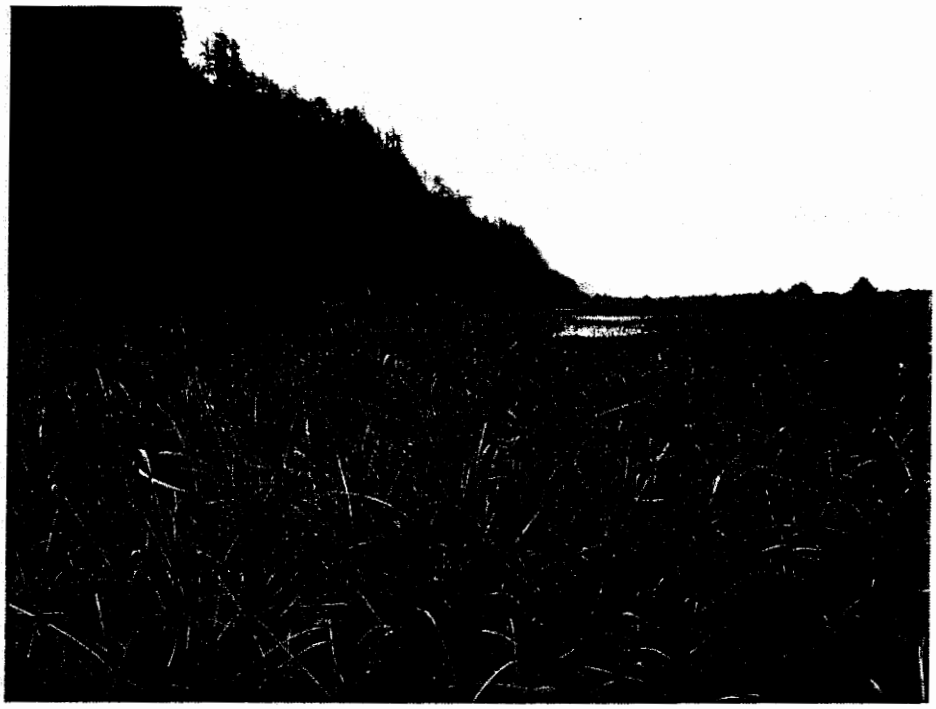
Two images of different locations within the wetland/non-wetland mosaic between reardune (historic foredune) system and the adjacent slope-toe.



Wetland/non-wetland mosaic between reardune (historic foredune) system and the adjacent slope-toe.



Soil pit within wetland/non-wetland mosaic, revealing water table within twelve inches of the soil surface.



Two images of the well developed palustrine wetland system, dominated by *Carex obnupta* along the base of Gold Bluffs.

V. CULTURAL RESOURCES

ENVIRONMENTAL SETTING

The North Coast Redwoods District of California State Parks contracted with the California State University, Chico Research Foundation in June 2011 to conduct an archaeological survey of the approximately 600 acres Gold Bluffs Beach in Prairie Creek Redwoods State Park. The Area of Potential Effects (APE) was subject to an intensive pedestrian survey. The culmination of the survey is a comprehensive report titled, "A Linear Archaeological Survey at Gold Bluffs Beach, Prairie Creek Redwoods State Park, Humboldt County, California" (Dalton 2011). The following information originates from this document.

ETHNOGRAPHIC BACKGROUND

The project, spanning approximately eight linear miles and 600 acres in area, is located within the ethnographic territory of the Yurok peoples. Prior to 1850, the traditional Yurok region extended "along the Pacific coast between modern Trinidad and Crescent City and on the lower 45 miles of the Klamath River" (Pilling 1978:137). Close to seventy permanent ethnographic villages have been identified within the Yurok territory; the locations of two of these villages, Ossagon and Espau, are located within ¼-mile of the project area.

The Yurok language appears to be linguistically similar to that of their southern neighbors, the Wiyot. Kroeber noted that "To the ear, the two languages are more similar than any others adjacent, and the suggestion was long ago made that they might be genetically related" (1911:414). Sapir (1913) reported on linguistic connections between the Wiyot and the Yurok, placing them within the Algonquian linguistic family primarily due to morphological structures, thus differentiating them from their Athabaskan speaking Hupa, Chilula, and Tolowa neighbors. However, as Pilling (1978) noted, many Yurok were multilingual, sharing resources, kinship, and ceremonial ties with their neighbors.

Various forms of material culture were manufactured by ethnographic Yurok peoples. Yurok crafters were adept at woodworking, lithic technology, basket making, and leather work. Both riverine canoes and ocean-going boats were constructed primarily from redwood trees. Utensils and storage containers were also carved from wood. Flint, chert, and obsidian, obtained through trade with native peoples up the Klamath River to the east, provided blades for various lithic tools including knives, spear points, and arrow heads. Groundstone tools were used for processing acorns and other seeds and nuts. Bone and antler were also fashioned into awls, arrows, fish hooks, pipes, and musical instruments. Basket weaving technology was elaborated into both functional and decorative forms, including fish and animal traps, hopper baskets, cooking baskets, storage vessels, cradleboards, and especially decorative hats worn by women. Prehistoric clothing forms were made primarily of deer or elk hide, embellished with shell, seed, and stone beads. Hides were tanned and used in making shawls, blankets, quivers, and ceremonial items. Various forms of taxidermy and feather work were also

important craft skills utilized for the creation of ceremonial regalia, which added to the makers' wealth and status.

The Yurok have experienced significant hardships since the mid-1800s, with the arrival of Euro- American settlers, miners, and logging industry. In 1862, the U.S. government relocated Yurok people to the Smith River Reservation. A subsequent closure and reestablishment of the Hoopa Reservation in 1867 once again relocated Yurok peoples away from their ethnographic territories. After nearly a century the Yurok won federal recognition with the Hoopa – Yurok Settlement Act of 1988, qualifying them for enrollment and establishment of the Yurok Tribe and its reservation of approximately 44 miles along the Klamath River, bordered to the east by the Hoopa Reservation. Today there are more than 5,000 registered members of the Yurok Indian Tribe, the largest in the State of California (Yurok Tribe 2011).

ARCHAEOLOGICAL BACKGROUND

Within the northernmost portion of northwest California, early archaeological research by scholars such as Loud (1918) at CA-HUM-67, Bennyhoff (1950) at CA-DNO-2, CA-HUM-67, 118, 124, 169, and 170, Elsasser and Heizer (1966) at CA-HUM-118 and CA-HUM-169, andGould (1966) at CA-DNO-11 (The Point St. George Site) was concerned with the identification and description of Native American assemblages, as well as the delineation of a prehistoric chronology for the region. Following these initial nvestigations, however, little additional research was conducted until the late 1970s and early 1980s, when Fredrickson's (1984) chapter, "North Coastal Region" was included in Moratto's (1984) California Archaeology. Since that time, the area has been the focus of multiple synthetic publications derived from graduate student research and small-scale cultural management projects, including (but certainly not limited to) the works of Hughes (1978), Hildebrandt and Swenson (1982, 1985), Hildebrandt and Hayes (1983, 1984, 1993), Levulett and Hildebrandt (1987), Fitzgerald and Hildebrandt (2002), Hildebrandt and Levulett (2002), Verwayen and colleagues (2007), and Tushingham (2008, 2009). These more recent studies have built on past archaeological investigations to address research issues ranging from prehistoric trade (Hughes 1978; Levulett and Hildebrandt 1987) and technological innovation (Hildebrandt and Hayes 1983, 1984, 1993; Tushingham 2008, 2009) to paleoenvironmental reconstruction (Hildebrandt and Hayes 1983, 1984, 1993) and adaptive responses to environmental change (Hildebrandt and Swenson 1982, 1985; Hildebrandt and Hayes 1983, 1984, 1993; Tushingham 2008, 2009).

In particular, the seminal work of Hayes and Hildebrandt (1983, 1984, 1993) in the Pilot Ridge area of the North Coast Range and the recently completed dissertation research of Tushingham (2008, 2009) along the Smith River in Del Norte County at CA-DNO-26 (Red Elderberry Place) and CA-DNO-33 have provided important data and interpretations regarding the major environmental and archaeological trends in the region during the past 8,000 years. The following is a summarization of the prehistoric cultural sequence for the region, and describes both environmental and archaeological trends apparent through time (Dalton 2011).

Paleoindian Period (13,500 to 8,500 B.P.)

The earliest cultural manifestation in northwest California, referred to as the Post Pattern, is represented by a limited number of ephemeral sites and isolated artifacts confined to coastal and lacustrine habitats, none of which lie within or in close proximity to the project area (Hildebrandt 2007:86-87). The characteristic artifacts of this period include large, Clovis-like (fluted, lanceolate, and concave-based) projectile points and chipped stone crescents. Unfortunately, a well-defined Post Pattern assemblage has not been found outside of the Clear Lake region, and isolated fluted points and crescents discovered to the north of this area were either in isolated contexts or lacked a strong association with well-dated strata or other artifacts (Hildebrandt 2007:87). Obsidian hydration readings from artifacts recovered at the Borax Lake Site (CALAK-36) suggest that both crescents and fluted projectile points most likely correspond to the Pleistocene/Holocene Transition (Fredrickson and Origer 2002:153,162).

Currently, there is no evidence of a developed plant food milling technology (e.g., milling gear such as milling slabs and mortars and pestles) during this period. In addition, there is a lack of faunal remains found in direct association with diagnostic artifacts, and no evidence of extensive regional exchange. These notable absences suggest that subsistence patterns consisted of highly mobile hunting and plant gathering amongst small social units such as the extended family.

Lower Archaic Period (8,500 to 5,000 B.P.)

In comparison to the Paleoindian Period, much more is known about the Lower Archaic and the Borax Lake Pattern that defines it as a result of greater site densities throughout the interior of northwest California that date to this time. Although the Borax Lake Pattern extends to the Clear Lake Basin and Santa Rosa Plain in the south, along its northern distribution this pattern is represented by large Borax Lake wide-stemmed dart points with indented bases (predominately made of chert), seriated bifaces, ovoid flake tools, dome scrapers, handstones, millingslabs, edge-flaked spalls, and an overall paucity of obsidian artifacts (suggesting a lack of exchange with surrounding obsidian-rich localities; Hildebrandt and Hayes 1993; Hildebrandt and Levulett 2002:305-306). Given that such assemblages are present at sites located across a wide range of environmental contexts, including those in areas above 4,500 feet AMSL, subsistence patterns were most likely based on large foraging territories where generalized hunting and gathering by small, highly mobile family groups took place at seasonally available resource patches. The similar array of artifact types at Borax Lake Pattern sites additionally suggests that these resources served as base camps for similar types of activities rather than more specialized tasks.

Based on Hildebrandt and Hayes (1983, 1984) obsidian hydration research in the Pilot Ridge- South Fork Mountain region, the Borax Lake Pattern was initially assigned a date range of between 3,000 and 6,000 years B.P. However, more recent radiocarbon samples taken from a house floor feature at CA-HUM-573 on Pilot Ridge suggest that the assemblage dates to much earlier at 7,120 +/-·50 radiocarbon years, making it one of the oldest sites on the northwest coast (Fitzgerald and Hildebrandt 2002:4). The temporal range of the Borax Lake Pattern corresponds to a period of significant

xerothermic warming following the Ice Age. This warming trend allowed for higher elevations to be occupied for longer portions of the year, and resulted in the upward migration of the oak woodland environment (Hildebrandt and Hayes 1983:108).

Middle Archaic Period (5,000 to 2,500 B.P.)

This period is represented by the Mendocino Pattern, which first appears in several places throughout the region around approximately 5,000 years B.P. (Hildebrandt 2007:91). Hildebrandt and Hayes (1983, 1984) initially described what they termed the Willits Pattern during the Pilot Ridge-South Fork Mountain project, but the pattern has subsequently become more commonly referred to as the Mendocino Pattern today. Unlike the previous Borax Lake tradition, which was represented by predominately upper elevation base camps used by highly mobile foragers, the Mendocino Pattern is oriented toward the use of larger, low elevation residential sites along major waterways that sustained higher populations by more heavily exploiting locally available salmon and acorn resources. Hildebrandt and Hayes (1993) argue that a shift toward more sedentary lowland subsistence strategies dependent on storage occurred in response to declining upland resource productivity. Such declines, in turn, coincide with the Neo-glacial cooling trend beginning between 2,800 and 3,300 B.P. (Hildebrandt and Hayes 1993:115). Evidence of initial coastal resource exploitation is evident in Mendocino Pattern components at sites along the Mattole River as well (Levulett and Hildebrandt 1987:27-28).

As relative sedentism increased, and resources were transported to residential sites through logistical forays rather than being acquired through more mobile foraging, a variety of functionally different site types that reflect more specialized activities also developed during the Middle Archaic (Binford 1980; Hildebrandt and Hayes 1993). The Mendocino Pattern artifact assemblage is largely reflective of increasing site type diversity in that it too contains a greater variety of projectile point forms (Willits Series, Oregon Series, Trinity Series, and McKee Unifaces) and various types of flaked stone and cobble tools than were previously evident in earlier patterns. Mortar and pestle prevalence also increases as milling slab and handstone prevalence declines at lower elevations; this is most likely associated with higher rates of acorn processing (Hildebrandt and Levulett 2002).

Adding support for a more settled, riverine-oriented subsistence strategy are the findings and interpretations of Tushingham (2008, 2009), West (1993), and Weigel (1993). At CA-DNO-26, located along the Smith River, Tushingham (2008, 2009) found large redwood plank house structures associated with small amounts of salmon bone and acorn macrofossils, indicating that a more sedentary settlement system was supported by the intensive harvest and storage of salmon and acorns along major waterways. Lastly, a more intensified use of the local landscape is supported by a study of prehistoric fire ecology in the Pilot Ridge area, where an analysis of upland pollen spectra generated by West (1993) led Weigel (1993:240) to conclude that large upland prairie habitats were intentionally created and maintained by human intervention after 2,500 B.P.

4 of 12

Upper Archaic Period (2,500 to 1,100 B.P.)

The Upper Archaic Period is marked by the continuation of the Mendocino Pattern in many respects, but with higher artifact densities, more variable toolkits, and broader artifact categories in cultural deposits. Much like the Middle Archaic, sites dating to this time are found throughout the central North Coast Ranges in moderate density. While large side and corner-notched projectile points continue to appear, shouldered lanceolate and leaf shaped points are also present in site assemblages, and obsidian becomes the preferred toolstone for flaked stone tool production (as opposed to chert during the Middle Archaic). The presence of obsidian in the region over the duration of the Upper Archaic indicates that complex exchange systems allowed for regular, sustained trade to occur between local and non-local social groups (Hildebrandt and Hayes 1984).

Salmon and acorn procurement and storage continue to contribute greatly to the subsistence patterns of local and neighboring groups. The handstone and milling slab technologies present in
Middle Archaic assemblages are almost entirely replaced by bowl mortars and pestles at this time, indicating further elaboration of the acorn complex (Basgall 1987). Bone tools and fishing weights are present in assemblages also, illustrating a continued reliance on fisheries to regional subsistence systems.

During the Early Late Holocene, a number of important changes begin to set the stage for a transition to the Emergent Period and the Gunther Pattern, including the development of status distinctions based on wealth and the emergence of group-oriented religious traditions (Hildebrandt and Hayes 1984). For the first time in northwest California prehistory, non-utilitarian features indicative of social status differentiation such as shell beads, pendants, and rock art begin to appear in considerable number. In particular, shell beads (including disks, saucers, and saddles) become important burial associated artifacts and provide additional evidence for a greater reliance on exchange.

Late or Emergent Period (1,100 to 150 B.P.)

The Emergent Period in northwest coastal prehistory is represented by the Gunther Pattern, which dates from ca. 1,100 years B.P. to historic contact and characterizes the material cultures of several ethnographically documented tribes, including the Wiyot, Yurok, and Tolowa. This pattern exemplifies some of the most socially complex hunter-gatherer populations to have relied predominately on marine and/or riverine resources throughout the entirety of California (Fredrickson 1984; Kroeber 1925; Loud 1918). First described by Loud (1918) as the Gunther Pattern at the Gunther Island site (CA-HUM-67), subsequent revisions to the initial pattern have led to it being more commonly referred to as the Gunther Pattern today. In comparison to the preceding Mendocino Pattern, even higher degrees of sedentism and cultural elaboration (e.g., well-developed woodworking technologies, riverine fishing specialization, wealth consciousness) are evidenced, with structurally complex, permanent coastal sites often exhibiting well-defined houses, cemeteries, artifact caches, and midden or refuse areas with faunal assemblages that are dominated by seals, sea lion, and marine fish

(Hildebrandt 2007:93-94). These sites concentrated ever-increasing populations in villages around Humboldt Bay, coastal lagoons, along the coastline, and adjacent to major river ways.

Artifact assemblages for the Gunther Pattern are equally complex to the coastal village sites themselves, with specialized toolkits for procuring marine and terrestrial mammals, fish, and various types of plant resources. Gunther barbed projectile points, concave-based points used to tip composite harpoons, flanged pestles, mauls, notched net sinkers, steatite bowls, polished stone adze handles, zooform clubs, and oceangoing canoes characterize Gunther Pattern assemblages along the north coast. In addition to zooform clubs, ceremonial items include large obsidian blades, dentailia, and clam shell disc beads that reflected high levels of social stratification (Hildebrandt and Levulett 2002). Exchange networks for these trade goods were regularized by the end of the Emergent Period, and are documented both archaeologically (Hughes 1978; Levulett and Hildebrandt 2002) and ethnographically (Powers 1976; Loud 1918; Kroeber 1925; Nomland 1935, 1938).

According to Golla (2007:73-74) and Moratto (1984:481-484), the Gunther Pattern probably relates to the arrivals of Algic speaking peoples into the region beginning with the Wiyot around 1,850 B.P. and followed by the Yurok at about 1250-1150 B.P. Subsequent waves of Athabaskan migration also presumably occurred around 1150-1050 B.P., leading to the linguistic and cultural diversity that ethnographers encountered in the late nineteenth and early twentieth centuries.

Post-Contact Period (150 B.P. to Present)

Following contact with Russian fur traders, Spanish explorers, Euro-American settlers, and United States government officials, the traditional lifeways of Native northern Californians such as the Yurok, Wiyot, and Tolowa were dramatically altered in terms of material, economic, social, and ideological culture (Elsasser 1978; Gould 1978; Pilling 1978). As Euro-American settlers converged on the region, exploiting its natural resources and displacing entire native communities from their traditional homelands, indigenous northern Californians were forced to relocate to reservations and adopt Western traditions. Assimilation and acculturation pressures changed settlement patterns and procurement strategies significantly. Bottle and window glass was used to make flaked tools and projectile points, and glass beads replace clam shell disc beads, dentalium, and obsidian, as the central trade item. Despite the hardships that Native Americans in northwest California faced following culture contact, the indigenous populations of the area did not disappear. Rather, they adapted to cultural disruptions and continue to proudly call northwest California their home to this day.

HISTORICAL BACKGROUND

Discovery of Gold Bluffs Beach 1850-1872

One of the more prominent and historically important geological features of the region are the bluffs. The bluffs, and their gold, were first "discovered" by J.K. Johnson in the spring of 1850 while searching for the mouth of the Trinity River. In passing the beach

they stopped to examination the gold located in the sands. However, upon their return they found nothing but gravel. In May 1850, B. Nordheimer, J.H. Stinchfield, Charles D. Moore, and several other prospectors were en route to Klamath City when they stopped at the bluffs and collected some of the flakes. However, the gold was so intermixed with the gray and black sand that they made no attempt to work the seashore with diggings (Bearss 1969). That fall J.W. Maxwell and Richardson traveled to the bluffs with the intent to gather gold. The bluff, subsequently named Gold Bluffs, was several miles long and several hundred feet high, but only a few feet of beach between it and the Pacific Ocean. When the incoming surf revealed gold grains in the sand, Maxwell and Richardson filled bags with the mixture of gold and sand and carried it back to the bluffs. The gold and sand were so intermixed that they saved only a small percentage of what they gathered (Bearss 1969).

In December 1850, the Pacific Mining Company was organized with the goal of developing the beach. When the tide ebbed, workers would gather the sand. Many prospectors ventured to Gold Bluffs Beach but news quickly spread that no process could be devised to separate the gold from the sand, and efforts to mine the gold were a waste of time and money. All efforts to work the beach on an extensive scale were abandoned (Bearss 1969).

In 1872, Captain Taylor of New York visited the Gold Bluffs with the intent to obtain potential gold deposits offshore. The Gold Bluffs Submarine Mining Co. began mining operations in early May. Over the course of three weeks, over 100 tons of sand was raised from an area one-half miles to within 40 feet of the bluffs, ranging in depths from eight to four fathoms of water. However, no gold containing deposits were located, and this effort was abandoned (Alta California, June 2 1873).

Mining at Gold Bluffs Beach 1872-1920

Subsequent to the early years, later efforts to mine gold were more substantial. Three mines operated within the specific project area: The Pioneer Mine (Upper Gold Bluff Beach), the Union Gold Bluff Mine (Lower Gold Bluff Beach), and the Ossagon Mine (Hydraulic). The Pioneer mine was located 12 miles from the Klamath River (T. 11 N, R 1 E) and contained 1,500 acres and extended along the beach for four miles. It was worked by collecting sand on the beach and washing it in toms. This mine was owned ty Edson T. Adam of Oakland (Alameda County) and was managed by Chas Savage of Orick. This claim became idle in 1889 (California State Mining Bureau 1894; Report of the State Mineralogist 1896).

The Union Gold Bluff Mine was located 16 miles south of the Klamath River (extending south from Ossagon Creek for approximately 5 miles) and contained 1,900 acres with 4 miles along the ocean. This claim was directly adjacent to the Pioneer Mine. The sand was collected on the beach and washed in toms. This mine also used hydraulic mining at the bluffs involving a 1,000-foot tunnel dug to divert water from Prairie Creek. In 1879 a survey was conducted that divided the claim into lines that formed 180 intersections. A prospect shaft was sunk at each intersection, but only one shaft resulted in a gold find. This mine was owned by Chas F. Kapp of San Francisco. This mine operated from

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1872-1901 (California State Mining Bureau 1894; Report of the State Mineralogist 1896).

The Ossagon Mine was located on Ossagon Creek, 9 miles south of the mouth of the Klamath. Water was obtained from Prairie Creek via a 1,000-foot tunnel. This mine was owned by F. Adams of Oakland and in 1896 was reported as idle for years (Report of the State Mineralogist 1896); it was operated under the title Eureka Gold Mining Co., of Ossagon Creek. The dam and supporting facilities were erected hastily and were washed away the first winter after construction. It was rebuilt with a stronger dam that was 250 feet long, 13 feet high, with a capacity of 80,000,000 cubic feet of water. By 1920 all mining operations at the Gold Bluffs had been closed down (Bearss 1969).

The Lumber Industry

Lumbering began in Humboldt County in 1850, but it was not until 1855 that the redwoods were utilized. The first sawmill on Humboldt Bay, the Papoose, began operation during the summer of 1850 but failed within the year. In 1852 James T. Ryan and James Duff established the first successful mill in the county. By 1854 nine mills were in operation on Humboldt Bay. Several of the mills combined to form the Humboldt Lumber & Manufacturing Company. However, by April of 1855 the mills of the association suspended operation were turned over to their creditors. By 1860 only four sawmills were still in operation; Dolbeer & Company, John Vance, Titlow & Price, and Lyman Fish & Son (Bearss 1969).

ARCHAEOLOGICAL RECORDS SEARCH RESULTS

On June 20, 2011 Greg Collins, the North Coast Redwoods District Archaeologist for California State Parks completed an archaeological records search at the North Coastal Information Center (NCIC) in Klamath, California, and the cultural resource files at the North Coast Redwoods District office in Eureka, California Additionally, Mr. Collins requested a search of the Sacred Lands File by the Native American Heritage Commission via fax on June 13, 2011. The records search focused on an area within a 1/4-mile radius of the Gold Bluffs Beach Project Area. The records search indicated that four previous archaeological surveys have been completed and five archaeological sites recorded within a 1/4-mile radius of the project area. The archaeological survey reports within the search area are summarized below.

1. **S-1977** Polly Bickel (1979) prepared A Study of Cultural Resources in Redwood National Park, California. This study was completed under U.S. National Park Service Contract No. CX-2000-7-0062. The primary goal of the project was to contribute to the formulation of a cultural resources management plan for Redwood National Park. Bickel recorded 22 new archaeological sites. One site CA-HUM-454H is located within a 1/4- mile of the current project area.
2. **S-1982** Michael J. Moratto (1982) prepared An Archaeological study of Selected Areas within Redwood Nation Park. This study was completed under U.S. National Park Service Contract No. 4970L10834. Moratto recorded/visited 22 archaeological sites. Two sites visited by Moratto, CA-HUM-133 and CA-HUM-

136 are within 1/4-mile of the project area. CA-HUM-133 is the ethnographic village of Espau. Waterman (1920) describes this village as containing 4 houses and 1 sweathouse. Moratto was unable to find any evidence of the site and suggested that it may have been destroyed as a result of logging and mining activities. CA-HUM-136 is the ethnographic village of Ossegan. Waterman (1920) describes this village as containing 3 houses and 2 sweathouses. Moratto was unable to find any evidence of the site and suggested that it may have been destroyed as a result of logging, mining, and farming activities.

3. **S-25010** Don Verwayen, Jerry Rohde, Jennifer Burns with the Cultural Resources Facility at Humboldt State University (2007) prepared A Cultural Resources Investigation of the Ossogan Trail Rehabilitation Project Located in Humboldt County. This project was located in Township 12N, Range 1E, Sections 9, and 10, Humboldt Base Meridian, on the 7.5' USGS Topographic Quadrangle Map, Fern Canyon, California 1966. Verwayen and colleagues was re-visited and updated the archaeological site for CA-HUM-136, the ethnographic village of Ossogan.
4. **S-25278** Kate Sloan (2004) reported on Initial Cultural Resources Study of Espa Lagoon at Prairie Creek Redwoods State Park, Redwood National and State Parks. Sloan's study was conducted in conjunction with the Espa Lagoon Enhancement Project. The primary goal of the study was to identify the ethnographic village of Espau (CA-HUM-133). While the findings from the surface survey were negative, the location of Espau was confirmed through consultation with Yurok elders. Sloan notes that although historic impacts to the site may have obscured or destroyed features, there is still a high probability of sub-surface deposits.

The results of the archaeological record search indicated that 4 prehistoric sites and 1 historic previously documented archaeological site were within 1/4-mile of the project area. One site, CA-HUM-779, occurs immediately adjacent to the project APE. Based on the findings from the research search and the background search, there is expected to be a mixture of prehistoric and historic archaeological resources in the project area. The prehistoric resources are likely to consist of small fishing camps comprised of fire cracked rock and small midden deposits, seed processing localities marked by the presence of groundstone, and possibly vision-quest sites and trials. However, as the Historic background has shown, this area was heavily disturbed by historic activities, making the potential of discovering prehistoric resources in the study area unlikely. Historic resources in the vicinity are expected to consist of mining and logging era materials, and possible ranching remnants.

NATIVE AMERICAN CONSULTATION

Per California State Parks Departmental Notice 2007-05, Native American consultation for this project was initiated by Greg Collins of California State Parks and is ongoing. On June 16, 2011, Mr. Collins contacted the Native American Heritage Commission (NAHC) requesting a Native American contact list and a search of the Sacred Lands File. At that time a letter and map were submitted to the NAHC describing the nature

and location of the proposed Dune Restoration project at Gold Bluffs Beach, Prairie Creek Redwoods State Park. The NAHC reply (Appendix B) indicated that Native American cultural resources were present in the vicinity of the project area, the sacred sites of Johnson Creek, Fern Canyon and Espau (CA-HUM-133).

The NAHC provided a list of 13 Native American individuals and/or groups that may have heritage interests in cultural resources within the proposed project area. The NAHC's letter encouraged additional contact with these interested parties, including a letter and follow-up phone call to each individual or tribal organization. Letters of consultation (Appendix B) were prepared and mailed to each recommended tribal contact on June 22, 2011.

In addition to the consultation activities outlined above, on July 12, 2011, Kevin Dalton and the CSU, Chico survey crew met with Mr. Collins, Mr. Robert McConnell, Tribal Historic Preservation Officer for Yurok Tribe of California, and Mr. David Severns, Yurok Cultural Monitor. The purpose for this meeting was to provide an introduction to the Yurok Tribal views and to the project area.

Should the Yurok Tribe, through the ongoing consultation process, request that a paid tribal cultural monitor be on site during project implementation funding should be allocated for such. Coordination and contracting of a tribal cultural monitor will be conducted by the North Coast Redwoods District Archaeologist.

FINDINGS AND RECOMMENDATIONS

The archaeological field survey completed for this project identified no archaeological sites within the APE (Dalton 2011). Although, the pre-field research indicated that one previously recorded site, CA-HUM-779, was immediately adjacent to the project area, relocation attempts were unsuccessful. A previous attempt to relocate CA-HUM-779 in 2001 also produced a negative result. Additionally, two archaeological sites were relocated that are adjacent to, but outside the Area of Potential Effects of this proposed project (CA-HUM-133 and CA-HUM-221).

As illustrated in historical background discussion, Gold Bluffs Beach has been a site of ample historic activities, including logging. Throughout the archaeological survey numerous logs and lumber pieces were noted. While the majority of these are thought to be remnants of the historic logging activities that took place on at the beach, some may have been deposited as a result of tides, tsunamis, and other ocean events.

When discussing the log and lumber litter with Dave Severns, Yurok Cultural Monitor and lifelong Humboldt resident, Dave informed us that much of the logs left by the early logging activities had in recent decades been salvaged and cut to create redwood stakes and other products for use in California's wine country. When logs were discovered, the lumber and immediate areas were inspected for signs of notching, nails, metal, historic glass, and other artifacts. When not associated with other historic period artifacts, the logs were noted as contributing to the larger background of more recently

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modified historic lumber remains within the project area. Additionally, there is a large concentration historic lumber bordering the project area but outside of the APE at the southern end of the project.

Would the project	Potentially Significant Impact	Less than Significant with Mitigation	Less Then Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains including those interred outside of formal cemeteries?	☐	☒	☐	☐

DISCUSSION

a) Dalton surveyed the APE in June 2011 for prehistoric and historic cultural resources. A confidential report was prepared and no archaeological sites within the APE were identified (Dalton 2011). No restoration efforts are proposed in an area of historic site. If any archaeological or historical resources are inadvertently encountered during the construction phase of the proposed project, implementation of Mitigation Measure Cultural 1 below will reduce the impact to a less than significant level.

MITIGATION MEASURE CULTURAL 1

1. If requested by the Yurok Tribe, a paid tribal cultural monitor will be on site during ground disturbing activities. Records of consultation with Native Americans are on file at the North Coast Redwoods District office in Eureka, California.
2. In the event that previously unknown cultural resources (including but not limited to dark soil containing shell, bone, flaked stone, groundstone, or deposits of historic trash) are encountered during project construction by anyone, the project manager will put work on hold at that specific location and workers will redirect to other tasks. A DPR-qualified archaeologist will record evaluate the find and work with the project manager to implement avoidance, preservation, or recovery measures as appropriate prior to any work resuming at that specific location.
3. In the event that human remains are discovered, work will cease immediately in the area of the find and the project manager will notify the DPR North Coast Redwoods District Archaeologist. Any human remains and/or funerary objects will be left in place or returned to the point of discovery and covered with soil. The DPR Sector Superintendent or District Archaeologist will notify the County Coroner, in accordance with section 7050.5 of the California Health and Safety Code.

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b) A confidential report was prepared and no archaeological sites were identified within the APE (Dalton 2011). If any archaeological resources are inadvertently encountered during the implementation phase of the proposed project, implementation of Cultural Mitigation Measure #1 will reduce the impact to a less than significant level.

c) Based on surveys conducted to date and a records search no human remains or burial sites have been documented or are known to exist at the proposed project sites. However, there is a potential for discovering undocumented human remains. Implementation of Cultural Mitigation Measure #1 will reduce the impact to a less than significant level.

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EXHIBIT NO. 10

APPLICATION NO.
CALIF. DEPT. OF PARKS & RECREATION
SUMMARY OF RESTORATION WORK CONDUCTED UNDER CDP 1-05-022 (1 of 11)

Method

Beachgrass is dug out of the top layer of sand and buried under a cap of clean sand taken from underneath it.

- Beachgrass and all roots (rhizomes) are dug up
- Hole is deepened to 3 meters

This method was used successfully at Lanphere Christensen Dunes Preserve in 1998 and since 2004 at Pt. Reyes National Seashore. Beachgrass and all rhizomes are dug up and stockpiled on adjacent beachgrass.

2011

- Clean sand is stockpiled nearby
- Beachgrass is placed in bottom of hole, up to a depth of 1.5 meters

Beachgrass goes into the bottom of the hole

Cap of clean sand going on top, then hole is filled back to grade.

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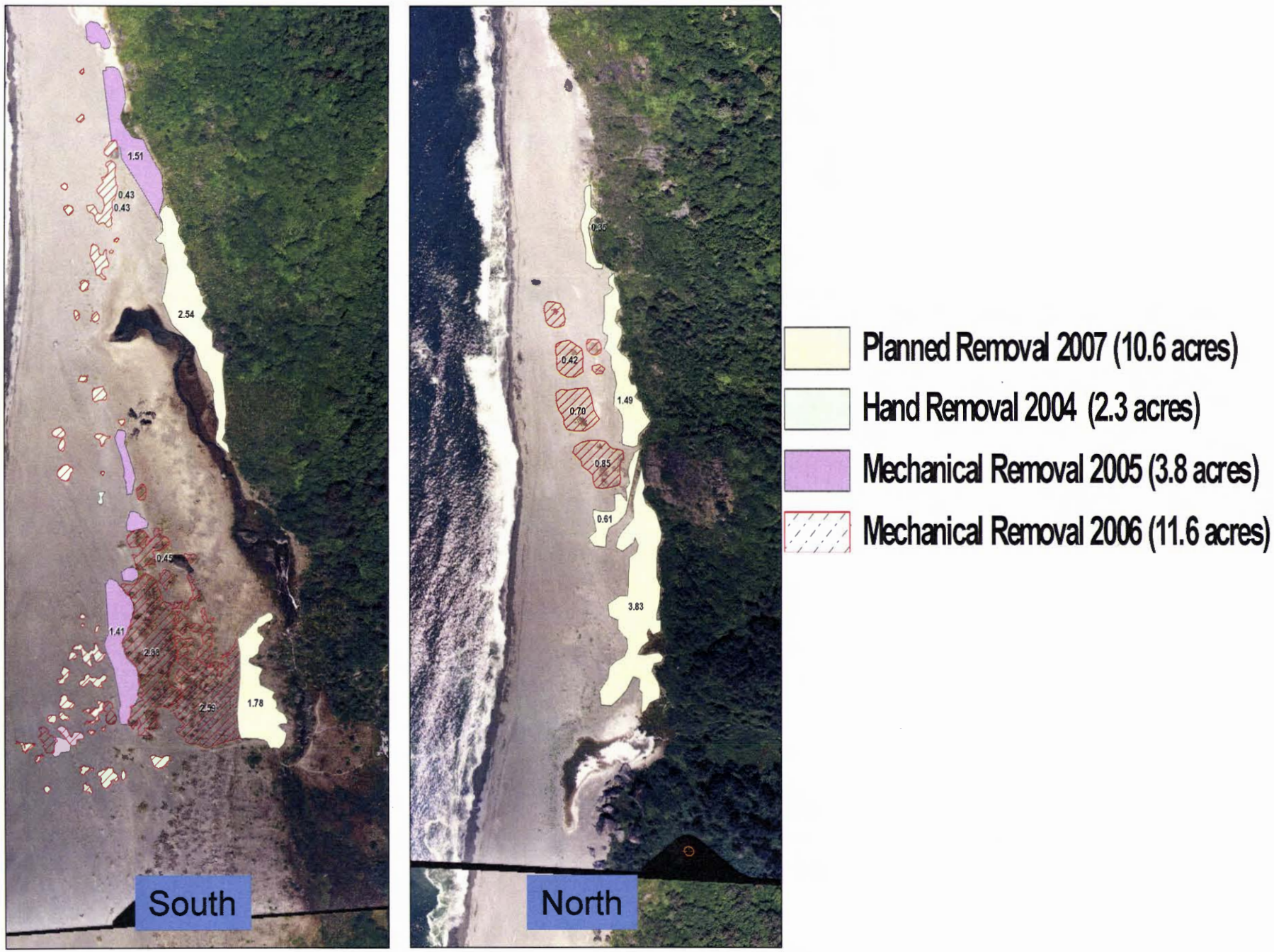
Ossagon
Carruthers
1.51
0.43
0.43
2.54
0.45
1.41
2.88
2.59
1.78
0.36
0.42
1.49
0.70
0.85
0.61
3.83
South
North
Planned Removal 2007 (10.6 acres)
Hand Removal 2004 (2.3 acres)
Mechanical Removal 2005 (3.8 acres)
Mechanical Removal 2006 (11.6 acres)

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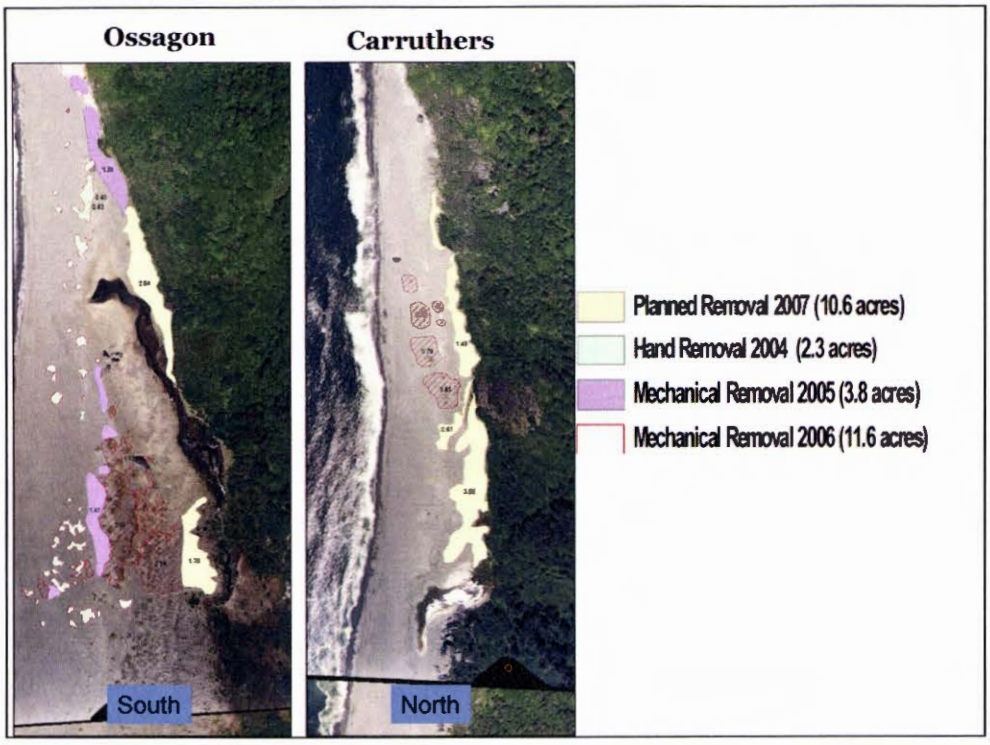

The original 2.3 acres where beachgrass was removed by hand in 2004 is in green. Using heavy equipment in 2005 we removed 3.8 acres in 2 months (shown in pink). We had to end the project prematurely when the water table flooded the area. We implemented changes based on our experience in 2005, and used two excavators and a dozer with two operators, working in tandem. In 2006 our acreage jumped to 11.6 acres in the same time frame (crosshatching outlined in red). Our strategy is to create a defensible compartment where beachgrass is eliminated on all but one side, making long term maintenance feasible.

7911

Targets for Vegetation Condition

- **To reduce the mean density of beachgrass to between zero and 5 culms/m2, with a 95% confidence that this is within +/- 5% of the true population mean, after one year of treatment.**
- **To increase the mean frequency and cover of native species by 25%, with a 95% confidence level, within +/- 5% of the true population mean, 2 years after treatment.**

Vegetation Monitoring

We placed two 50 x 25 meter macroplots for vegetation monitoring, in an area that was as solid a stand of beachgrass as we could find. Each macroplot has 50- 1 m plots. This is one from 2007, showing pink sand verbena, which was not in the plot initially. We have met one of our quantitative targets, as we have no beachgrass in the plot at all. There has been some follow up removal, but nothing more than occasional volunteers or a single biotech sweeping through the area in a day or two.

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Ossagon Before

Ossagon after