

Evaluation of Lanphere / Ma-le'l Dunes Humboldt County, California



**For its Merit in Meeting National Significance Criteria as a
National Natural Landmark to Represent
Siskiyou – Klamath Coastal Sand Dunes in the
North Pacific Border Biophysiological Province**

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Executive Summary

The National Natural Landmarks (NNL) Program encourages the preservation of exceptional examples of the Nation's biological and geological features. To qualify for NNL designation, a site must be one of the best examples of a geological or biological feature within a biophysiological province. Lanphere / Ma-le'l Dunes represents a perfect example of this concept, containing one of the most diverse and highest quality remnants of coastal dunes in the North Pacific Border Biophysiological Region. Located 3 miles west of Arcata in Humboldt County, California, it is within the largest system of dunes between Point Reyes National Seashore and the Oregon Dunes National Recreation Area.

While dune ecosystems elsewhere in the bioregion continue to be more heavily impacted by disturbance, invasive species and development, the proposed National Natural Landmark remains in exceptional condition and is by far the best example of the Klamath – Siskiyou Coastal Sand Dunes subtheme. A map of the proposed landmark boundary, encompassing 834.17 acres (337.58 hectares) of lands owned and managed by the U.S. Fish and Wildlife Service and Bureau of Land Management, is included (Figure 4).

Introduction

Source of Site Proposal

The survey of the Biotic Themes of the North Pacific Border Biophysiological Province (Chilcote *et al.* 1976) identified the Lanphere-Christensen Dunes Preserve as a potential National Natural Landmark (NNL). Ten years later Kagan (1985a,b) reviewed the Coastal Dunes Themes of the North Pacific Border, identifying three separate dune types (subthemes), which included a recommendation that the Lanphere Dunes Preserve was worthy of a complete evaluation for possible NNL designation. Later that year, Alpert (1985) completed a comprehensive site evaluation, recommending the site be designated as a National Natural Landmark. Alpert's report recommended the inclusion of some private lands not managed as a preserve, as well as adjacent public lands on which the native vegetation had not been restored and which were not being managed for the natural values. As a result, some of the landowners were not supportive of the NNL designation and it did not proceed.

This evaluation report considers whether the Lanphere / Ma-le'i Dunes site is now suitable for designation as a NNL, due to changes in ownership and public land designations, and whether the resources remain intact and nationally significant.

Evaluators

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Scope of Evaluation

The Lanphere-Christensen Dunes Preserve, as identified in both the 1976 report (Chilcote *et al.* 1976) and the 1985 Alpert evaluation, was owned by The Nature Conservancy. In 1997, the Lanphere-Christensen Dunes Preserve became part of the U.S. Fish and Wildlife Service's (USFWS) Humboldt Bay National Wildlife Refuge and was renamed the Lanphere Dunes Unit. In 2004, the USFWS added the Ma-le'i Dunes Unit to the refuge creating the Lanphere / Ma-le'i Dunes. The majority of the private lands that Alpert recommended be included in the 1985 proposed landmark report have since been either incorporated into the Lanphere Dunes or the Manila Dunes Cooperative Management Area Recreation Area, managed jointly by the Bureau of Land Management (BLM) and the USFWS. Thus, this evaluation considers lands within the Lanphere / Ma-le'i Dunes Units of the Humboldt Bay National Wildlife Refuge Complex as well as the Ma-le'i Dunes South, managed by the BLM as an Area of Critical Environmental Concern (ACEC). This document incorporates and updates information on the status of the site from the earlier theme studies. An additional field visit to the site was completed, and new photographs and references are included.

Characterization of the Primary Natural Features of the Coastal Sand Dunes in the North Pacific Border Biophysiological Province

An initial study of the Coastal Sand Dunes Theme describing the coastal sand dunes contained within the North Pacific Border biophysiological province was completed in 1985 (Kagan 1985a, b). The study identified three coastal dunes subthemes: North Coast Sand Dunes, Siskiyou – Klamath Coastal Sand Dunes and Northern California Coastal Sand Dunes.

The North Coast Sand Dunes subtheme runs from Canada south to Coos Bay, Oregon, and is characterized by open, grass dominated dunes with large dune systems, most notably the Oregon Dunes National Recreation Area, containing large wetlands as well as giant conifer forests often found in dune islands. The Siskiyou – Klamath Coastal Dunes occur in the central portion of the biophysiological province, from Coos Bay to southern Humboldt County, and are found in small patches primarily along coastal river mouths. The Northern California Dunes occur at the southern end of the biophysiological province, often in large dune complexes such as Point Reyes, have forests only in the dune margins, and tend to be dominated by chaparral shrubs. As the Lanphere – Ma-le'l Dunes potential NNL site is representative of the Siskiyou – Klamath Coast Sand Dunes subtheme, the following descriptive sections apply specifically to this subtheme.

Subtheme Description

The Siskiyou – Klamath Coastal Sand Dunes subtheme represents the coastal sand dune habitats found within the central portion of the North Pacific Border biophysiological province. These dunes occur between the ocean and the inland conifer forests which dominate most of the biophysiological province, sometimes intergrading into these forests where the sand is well stabilized. The habitats include beaches, open and unstabilized sand dunes, areas partially stabilized by grasses and forbs, open and closed shrub and scrub-dominated habitats, and open and closed forests and woodlands.

Primary Geological Features

The geology of the substrates below the dunes is extremely variable in this subtheme. Sedimentary and metasedimentary rocks dominate, but with areas of weathered basalt and granitic intrusions. These coastal dunes are formed from deposition of sand moved laterally along the coast by close-in coastal currents. In summer, these currents move sand southward, and deposit much of it on beaches. In winter, the currents and storm-generated wave activity move sand northward, eroding beach deposits. The annual net movement of sand for most of the subtheme is northward (Christy *et al.* 1998).

The Siskiyou – Klamath Dunes generally occur in fairly small areas, usually by river and creek mouths. The dune systems tend to be small and narrow and lack the large dune sheets of the subthemes to the north and south, where a larger percentage of the coastline contains dunes (Cooper, 1967). Transverse dunes, in which the dunes run perpendicular

to the wind in somewhat regular patterns, are the most common dune type in the Klamath – Siskiyou Dunes subtheme. There are occasional parabolic dunes where winds are strongly unidirectional. The large oblique dunes and parallel foredune ridges common in the North Coast Sand Dunes subtheme are largely absent.

Climate

The climate from Coos Bay south to Crescent City is fairly uniform, with mild temperatures and high precipitation. The average annual precipitation is 60 inches (153 cm) at Bandon, increases southward to 82.5 inches (210 cm) at Gold Beach and 75 inches (190 cm) at Crescent City, and then drops rapidly further south to 36.5 inches (93 cm) at Eureka. Rainfall continues to decline southward down the coast to Mexico. Starting in Sonoma County, there is not enough precipitation to support climax coniferous forests on the dunes, and these areas become part of the Northern California Coastal Sand Dune subtheme. The temperatures are very consistent throughout the Siskiyou – Klamath coastal dune subtheme areas, with average annual temperatures of about 52.3° F (11.3° C) and little variation from north to south. Average annual temperatures are higher in the central California coastal dune areas south of the subtheme and lower in the coastal subtheme to the north. The wind conditions in this part of the coast tend to be more variable than those of the north coastal areas of Oregon and Washington and more typical of California coastal sites, having more than one effective wind. However, as in most coastal areas on the Pacific Coast of the U.S., effective winds tend to be from the northwest (Cooper 1967).

Primary Biological Features

Before European settlement, Siskiyou – Klamath coastal areas are thought to have had low, poorly developed dunes immediately behind many beaches (Figure 1, left). However, there is evidence in early 20th Century aerial photographs that semicontinuous foredunes were present in some areas, notably the vicinity of the Lanphere Dunes, and it is possible that foredunes have developed intermittently during more stable climatic periods in the past. These foredunes and hummocks were dominated by species including dune wild rye or sea lyme (*Leymus mollis*), beach peas (*Lathyrus japonicus* and *L. littoralis*), and sand verbenas (*Abronia latifolia* and *A. umbellata*). When sea lyme is present, foredune vegetation is described as “sea lyme grass patches herbaceous alliance” (Sawyer *et al.* 2009). Extensive planting and spread of European beachgrass (*Ammophila arenaria*) has now eliminated the natural vegetation on the foredunes in much of the region, although restoration has begun to reverse that trend in localized areas such as Humboldt Bay.

Secondary dunes are found behind the foredune. These vary from open, unstabilized dunes, to dunes partially stabilized by native grasses and forbs including bluegrasses (*Poa douglasii* and *P. macrantha*), dune morning-glory (*Calystegia soldanella*), beach pea (*Lathyrus littoralis*) and yellow sand verbenas (*Abronia latifolia*), to dunes dominated and stabilized by forbs. The forb-dominated, partially-stabilized dune type is most characteristic of dunes in this subtheme. Other common species include dune wormwood (*Artemisia pycnocephala*), silver bur ragweed (*Ambrosia chamissonis*), black knotweed

(*Polygonum paronychia*), seashore lupine (*Lupinus littoralis*), coast buckwheat (*Eriogonum latifolium*), and seashore daisy (*Erigeron glaucus*). This vegetation type is classified as the dune mat or the *Abronia latifolia* – *Ambrosia chamissonis* herbaceous alliance (Figure 1, right).



Figure 1. Sea lyme dune patches (left) and Dune mat (right)

South of this subtheme, the more stabilized upland dunes support native dune scrub including the shrub species, silver bush lupine (*Lupinus chamissonis*) and yellow bush lupine (*Lupinus arboreus*). Dune scrub is not a natural community in the Siskiyou – Klamath subtheme, however, yellow bush lupine has been extensively planted and naturalized forming the yellow bush lupine shrubland semi-natural alliance, which is subsequently colonized and often dominated by native coyote brush (*Baccharis pilularis*). Coyote brush is native and may occur occasionally in Siskiyou – Klamath dunes, but not as a native alliance (Pickart and Sholars 2016).

Forest and woodlands occur on stabilized dunes as well as on deflation wetlands in this subtheme. These forests are classified as the Beach pine forest (*Pinus contorta* spp. *contorta*) alliance in California. When beach pine is the dominant tree species, it may be accompanied by a depauperate understory characterized by reindeer lichen (*Cladina portentosa* ssp. *pacifica*) and kinnikinnick (*Arctostaphylos uva-ursi*) in the openings. In California, the Beach pine forest alliance is inclusive of stands of Sitka spruce, Grand fir, and Douglas fir (for which plant associations are named). In Oregon and in the International Vegetation Classification System (IVCS), these associations are not recognized, and all but beach pine-dominated forests are classified within the Sitka spruce (*Picea sitchensis*) forest alliance (Pickart and Sholars 2016). Both pine and spruce canopy understories can form dense stands of shrubs including evergreen huckleberry (*Vaccinium ovatum*), wavy-leaf silk tassel (*Garrya elliptica*), and black twinberry (*Lonicera involucrata*). Spruce dominated areas may have more open mixtures of herbs including sword fern (*Polystichum munitum*) and false-lily-of-the-valley (*Maianthemum dilatatum*). In the most exposed areas, the trees and shrubs can become wind-pruned and stunted, appearing to be a tall shrubland. Even a mature forest can succumb to sand blowouts that undermine the roots, or be buried by moving sand.

Deflation plains in this subtheme are fairly similar to those of the North Coast Sand Dunes subtheme, with different species composition depending on the amount of salt input, the presence of a hardpan, and the length of time the habitat has existed. Early successional areas are often dominated by Brewer's rush (*Juncus breweri*) in the drier areas and slough sedge (*Carex obnupta*) in wetter areas. Brewer's rush grows in transitional wetland - upland areas whereas slough sedge is a true hydrophyte, and is dominant in the slough sedge alliance. The coastal dune willow shrubland alliance, sometimes called the coastal dune willow thicket alliance also occurs in deflation plain areas; dominant species include willows (*Salix hookeriana* and *S. lasiolepis*) and California wax myrtle (*Myrica californica*) (Pickart and Sholars 2016).

Distribution and Context

The Siskiyou – Klamath Coastal Sand Dunes occur along the coast in the North Pacific Border Region from the Kings Range National Conservation Area of California, approximately 50 miles (80 km) south of Eureka, north to the Coos Bay area in Oregon. The elevations range from sea level to 164 feet (50 meters), with most examples occurring just above beaches, unlike some of the large dune systems found in the dune subtheme to the north. Their distribution is patchy along the coast, and is often associated with river mouths and bays that provide relatively level areas on which sand has been able to accumulate.

Regional Variation

The subtheme is defined by a fairly major shift in flora, from the Oregon-Washington dune flora in the north to the California coastal flora in the south. South of this subtheme, the climax vegetation on dunes is shrubs, while this theme and the north coast dune theme have coniferous forest as the climax dune vegetation. This shift is exhibited to a lesser extent within the subtheme, with a slightly higher shrub component at the south end of the subtheme and a greater cover of forbs to the north. The subtheme supports a number of locally endemic plant species. Some, like silvery phacelia (*Phacelia argentea*) are found only in the subtheme, while others, such as Menzies wallflower (*Erysimum menziesii*) are limited to a few other sites in California. In addition, tree species change slightly, with Sitka spruce becoming less important further south in the subtheme.

Significance

Dunes are an important ecological feature of the Pacific Coast of the U.S. The open, moving sand supports a diverse and unique set of plants and animals with traits that appear to promote survival in this dynamic habitat. Coastal areas are often prized for development, and coastal dunes are particularly vulnerable to the stabilization efforts associated with human habitation, many of which include planting of introduced, invasive, dune-stabilizing plants such as European beachgrass (*Ammophila arenaria*) and iceplant (*Carpobrotus edulis*). Recreation, especially the use of all-terrain vehicles (ATVs) and other off-road-vehicles has caused significant disturbance on many coastal dunes, including some in public ownership. As a result of these impacts and the spread of additional introduced, invasive species, few dune habitats in the bioregion continue to

support a full complement of native species, and these remnants require active management of human use and control of introduced species (e.g., Alpert 2016).

Distinguishing Features

The Siskiyou – Klamath Coastal Dunes show distinct floristic differences from both the North Coast Sand Dunes and the Northern California Coastal Dunes. In addition to the examples noted above, shrubs such as Pacific rhododendron (*Rhododendron macrophyllum*) and hairy manzanita (*Arctostaphylos columbiana*) are common on stabilized dunes in the North Coast but not in the Siskiyou – Klamath subtheme. Herbs, shrubs, and trees such as beach wormwood (*Artemisia pycnocephala*), goldenrod (*Solidago spathulata*), twinberry (*Lonicera involucrata*), California wax myrtle (*Morella californica*), and grand fir (*Abies grandis*) are frequent in the Siskiyou – Klamath but not the North Coast subtheme.

Lanphere / Ma-le'l Dunes Site Description

Overview

The Lanphere / Ma-le'l Dunes are part of the most extensive dune system in northern California and support the entire range of coastal dune features (Figure 2). As described in the significance section, coastal dunes are particularly vulnerable to human disturbance, invasive species, and intentional stabilization. Most of the dune habitats in the bioregion have been significantly impacted by these threats. However, as a result of exceptional land management and fortunate circumstances, the Lanphere / Ma-le'l dunes have almost entirely retained their natural character.

Natural History Theme Represented

The Lanphere / Ma-le'l Dunes are the best representative of the Klamath – Siskiyou Coastal Sand Dunes subtheme in the Coastal Sand Dunes theme in the North Pacific Border Biophysiological Province. This subtheme is quite distinct from any other subtheme in the region, and Lanphere / Ma-le'l Dunes both characterizes and defines the subtheme. The site also represents the Eolian Landforms geologic theme and the Sand Dunes subtheme from the Landforms of the Present as defined by the National Natural Landmarks Program.



Figure 2. Oblique air photo showing Lanphere / Ma-le'l Dunes landforms. Photo by D. Kenworthy.

Natural Features

Lanphere / Ma-le'l Dunes represent the largest and best quality sand dune ecosystem remaining in the Siskiyou – Klamath subtheme. The primary natural features of the Lanphere / Ma-le'l Dunes include the diverse array of natural vegetation and rare flora and fauna found at the site. Well-developed dune systems are composed of many successional states, ranging from open, mobile sand to stabilized dunes with mature vegetation. The dunes in the subtheme are characterized by foredunes adjacent to the beach vegetated by native dune grasses, partially stabilized long-walled parabolic dunes with a rich, local flora of grasses and perennial forbs. There are deflation plains supporting seasonal wetlands, large transgressive parabolic dunes, and older stabilized dunes with mature coniferous forest. These are described in more detail in the following sections.

Primary Biological Features

Vegetation of the site and vicinity has been intensively studied and described by Parker (1974) and (Pickart 1987), and summarized by Barker (1976), Wiedemann 1984, Pickart and Sawyer (1998), and Pickart and Sholars (2016). These treatments generally recognize the following vegetation types or alliances as classified by Sawyer *et al.* (2009): Sea Lyme Grass Patches (*Leymus mollis* herbaceous alliance), Semi-Stabilized Dune Mat (*Abronia latifolia*-*Ambrosia chamissonis* herbaceous alliance), Slough Sedge Swards (*Carex obnupta* herbaceous alliance), Beach Pine Forest (*Pinus contorta* ssp. *contorta* forest alliance), Red Alder Forest (*Alnus rubra* forest alliance), and Coastal Dune Willow Thickets (*Salix hookeriana* shrubland alliance). In addition, the brackish and salt marshes of the site have been described by Pickart and Sholars (2016) and include Pickleweed Mats (*Sarcocornia [Salicornia] pacifica* herbaceous alliance) and Salt Grass Flats (*Distichlis spicata* herbaceous alliance). The large, transgressive dunes (parabolic and transverse dunes) are mostly bare and have no distinctive vegetation.

The beach vegetation is typically sparse. Scattered individuals of sea rocket (*Cakile maritima*, *C. edentula*), sea lyme (*Leymus mollis*) and yellow sand verbena (*Abronia latifolia*) are most common with silver bur ragweed (*Ambrosia chamissonis*). The short-lived, northern pink sand verbena (*Abronia umbellata* var. *breviflora*), a species endangered in Oregon and at-risk in California, occurs ephemerally. The foredune community is dominated by sea lyme (*Leymus mollis*). Dune bluegrass (*Poa macrantha*), silver bur ragweed, yellow sand verbena, sea rocket, beach pea (*Lathyrus littoralis*), and beach morning glory (*Calystegia soldanella*) are the most frequent associates. Total plant cover is highly variable, ranging from no cover in areas of blowouts to 100% cover in some long-established foredunes (Pickart and Sawyer 1998).

Once characteristic of the edge of land on sandy shores in Washington, Oregon and northern California, these low dune and open beach communities have been nearly extirpated by planting and spread of European beachgrass (*Ammophila arenaria*), which excludes most native species and forms a vegetation with low diversity (Breckon and Barbour 1974, Chilcote *et al.* 1976). Protection of these low dune communities at the site

has maintained possibly the last excellent example of native foredune vegetation in the region. It has been given high priority by the land managers at the USFWS and the BLM, requiring ongoing maintenance of restored areas to prevent re-establishment of European beach grass, which is widespread both north and south of the proposed landmark.

Behind the foredune, the dunes tend to be partly stabilized by a diverse and attractive community of herbaceous plants, including a variety of showy flowers and specialized growth forms, called Dune Mat (*Abronia latifolia* – *Ambrosia chamissonis* herbaceous alliance). Species with the highest cover include dune goldenrod (*Solidago spathulata*), beach pea, beach strawberry (*Fragaria chiloensis*), Douglas bluegrass (*Poa douglasii*), beach buckwheat (*Eriogonum latifolium*) and beach wormwood (*Artemisia pycnocephala*) (Pickart 1987). Other common and colorful species include dune morning-glory (*Calystegia soldanella*), purple owl's clover (*Castilleja exserta*), seaside daisy (*Erigeron glaucus*) and beach primrose (*Camissonia cheiranthifolia*). Total cover is highly variable, with a mean cover of about 40% (Pickart 1987). In more stabilized areas that have been vegetated longer, species such as red fescue (*Festuca rubra*), sea thrift (*Armeria maritima*) and black knotweed (*Polygonum paronychia*) are dominant (Pickart 1987, Pickart and Sholars 2016). This vegetation community has also been almost completely displaced elsewhere in the region by European beach grass. Overall, this type combines rich floral displays with ocean panoramas and provides excellent opportunities for ecological research on species in habitats of frequent disturbance and low soil nutrient availability.

The moist dune swales (deflation basins or plains) are dominated by slough sedge (*Carex obnupta*) in the wettest areas (*Carex obnupta* herbaceous alliance). Brewer's rush (*Juncus breweri*) forms dense swards in drier areas or at the margins of wetter swales. Over time shrubs such as dune willow (*Salix hookeriana*) and California wax myrtle (*Morella californica*) and short, salt-pruned beach pine create dense thickets, classified as the coastal dune willow (*Salix hookeriana*) thicket alliance. Seasonal ponding occurs in deeper areas during winter months.

East of the mobile, transgressive dune fields at Lanphere / Ma-le'l Dunes are forests and woodlands of beach pine (*Pinus contorta* ssp. *contorta*). In places where the beach pine woods are relatively open, the ground is often covered by mats of kinnikinnick (*Arctostaphylos uva-ursi*), reindeer lichen (*Cladonia portentosa* ssp. *pacifica*), and a variety of other lichens and mosses. In the more closed forests, much of the understory is a tall thicket of salal (*Gaultheria shallon*) and evergreen huckleberry (*Vaccinium ovatum*). There are also many stands of Sitka spruce, with fewer of Douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), and occasionally Pacific madrone (*Arbutus menziesii*). Spruce, Douglas fir, and grand fir-dominated stands are all included as associations of the beach pine forest alliance, in recognition of their dissimilarity with those forest types further inland (Sawyer *et al.* 2009, Pickart and Sholars 2016).

In low-lying areas of the stabilized dunes the pine forest is replaced by groves of red alder (*Alnus rubra*) and Hooker's willow, undergrown with creeping blackberry (*Rubus ursinus*) and slough sedge. Areas with permanent standing water support cattails and floating leaved hydrophytes such as mosquito fern (*Azolla filiculoides*) and duckweed (*Lemna* sp.).

The tidal flats east of the sand spit where the site is located support salt marsh fringed with brackish marsh, with the exception of the north end where the marsh has been diked. The dominant species of the low salt marsh is pickleweed (*Salicornia pacifica*), with associated jaumea (*Jaumea carnosa*) and seaside arrowgrass (*Triglochin maritima*). High marsh is dominated by salt grass (*Distichlis spicata*) with associated wetland species such as slender arrowgrass (*Triglochin concinna*), salt sandspurry (*Spergularia marina*), dodder (*Cuscuta salina*), gumplant (*Grindelia stricta*), marsh rosemary (*Limonium californica*), salt marsh plantain (*Plantago maritima*), and several rare salt marsh species discussed below. Where the marshes meet the dunes, fringing brackish marshes are dominated by salt rush (*Juncus lescurii*), Lyngbye's sedge (*Carex lyngbyei*), and hardstem bulrush (*Schoenoplectus acutus*). The transitional, brackish area between dunes and salt marsh can have very high species diversity, including seaside angelica (*Angelica lucida*), western grasswort (*Lilaeopsis occidentalis*), salt marsh baccharis (*Baccharis glutinosa*), sea milkwort (*Glaux maritima*), and low bulrush (*Isolepis cernua*). One distinctive characteristic of the Lanphere and Ma-le'l salt marshes is that they no longer support invasive dense-flowered cordgrass (*Spartina densiflora*). This species was controlled in a vigorous restoration program, as this species dominates much of the region's low marshes elsewhere (Pickart and Sholars 2016).

The relatively undisturbed native vegetation of the Lanphere and Ma-le'l Dunes supports populations of a number of at-risk plant species. The federally endangered Menzies wallflower (*Erysimum menziesii*) and beach layia (*Layia carnosa*) are California endemic plants found only in coastal dunes, with the plants found at the proposed National Natural Landmark representing the best protected populations for both of these species. The salt marshes at the site support populations of Humboldt Bay owl's-clover (*Castilleja ambigua* ssp. *humboldtiensis*) and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*), both salt marsh endemics ranked as imperiled by NatureServe and the California Native Plant Society.

The fauna includes 40 species of mammals, 12 species of amphibians and reptiles, and 151 species of birds (Appendix 1). There is also a large and diverse invertebrate fauna, including over 40 species of native, solitary bees which play an important role in plant diversity as well as ecosystem functioning (Gordon 1984, 1992).

Primary Geological Features

The dunes consist of quartz and feldspars carried to the coast by rivers and of basalt eroded from coastal headlands, all washed ashore by waves and blown inland by wind. Geomorphology of the site has been described variously by different authors (Cooper 1967, Wiedemann 1984, Pickart and Sawyer 1998). The terminology below follows the

international classification of Hesp (2000). Five morphological features are present at the proposed NNL:

- (1) Foredune: a discontinuous, shore-parallel ridge up to 44.6 feet (13.6 m) elevation above North American Vertical Datum of 1988 (NAVD 88), (Pickart 2014).
- (2) Blowouts: gaps in the foredune (or other vegetated areas) formed when the wind is steered into and enlarges a notch or discontinuity, and consist of a mouth or deflation basin, flanking walls, and a depositional lobe.
- (3) Parabolic Dunes: U-shaped transgressive dunes that may begin as a blowout. The trailing ridges of these features, which flank deflation basins, become stabilized with vegetation more quickly than the depositional lobe, and the deflation basins support wetland swales that often contain standing water in winter.
- (4) Deflation Basins or Plains: deflated areas found at the trailing end of parabolic dunes or transgressive dune fields, eroded during summer months to the water table where moisture prevents further sand movement, and saturated or flooded by the winter water table. Can be discrete (basins) or continuous (plains).
- (5) Transverse Dunes: unvegetated dunes that migrate on top of transgressive dunes (including parabolic dunes) in the direction of prevailing wind (slipfaces are perpendicular to wind).

The mild, Mediterranean-type climate at the site is characterized by summers with little rain but considerable fog and by rainy winters. Eureka, 10 miles (16 km) south along the coast, receives 38 inches (968 mm) of precipitation annually, of which 90% falls during October through May, and has only 49% of possible sunshine. Mean temperatures are 48° F (9° C) in January and 57° F (14° C) in July (Chilcote *et al.* 1976, p. 530), with 37 days of frost per year. All-time temperature extremes recorded at Eureka are 19° and 86° F (-7° and 30° C). Winds blow predominantly from the north and northwest during March through October and from the southeast in winter, at a mean speed of 8.2-10.5 feet (2.5-3.5 m) per second (Breckon and Barbour 1974).

Physical Setting

Lanphere / Ma-le'l Dunes lies in the northern portion of a coastal barrier sand dune system that probably migrated up the shelf with rising sea levels after the last ice age ended, reaching its current location about 7,000 years ago. During its evolution, the barrier experienced two or more phases of dune mobilization, with an older stage now present as forested dunes up to 65 feet (20 m) in elevation that extend to the tidal mud flats on the eastern edge of the dune system. Small, swampy areas and short creeks run eastward through the older dunes to the tidal slough. The site thus includes a rich variety of well-developed dune landforms.

Location and Access

Lanphere / Ma-le'l Dunes is located only 3 miles (4.8 km) west of Arcata, California, and Humboldt State University in northwestern California (Figure 3), just north of Humboldt Bay. The site lies at the northern end of the northern peninsula enclosing Humboldt Bay, which is also known as the Samoa Peninsula or North Spit.

The proposed NNL is comprised of three separate management units: Lanphere, Ma-le’l North, and Ma-le’l South, each with differing access and rules to provide options for public use and best protect these very sensitive habitats. The most restrictive is the USFWS’s Lanphere Unit, which can be accessed either with a permit or on guided tours offered by Friends of the Dunes. The website (friendsofthedunes.org) for the Friends of the Dunes lists the schedule of these tours. Permits can be obtained from the USFWS Refuge or Friends of the Dunes staff. All that is needed to qualify for a permit is to go on a Friends of the Dunes guided tour to get familiar with the trails and the rules. Bikes, dogs, and horses are not allowed in the Lanphere Unit, and use is generally restricted to trails, open sand areas and the beach.

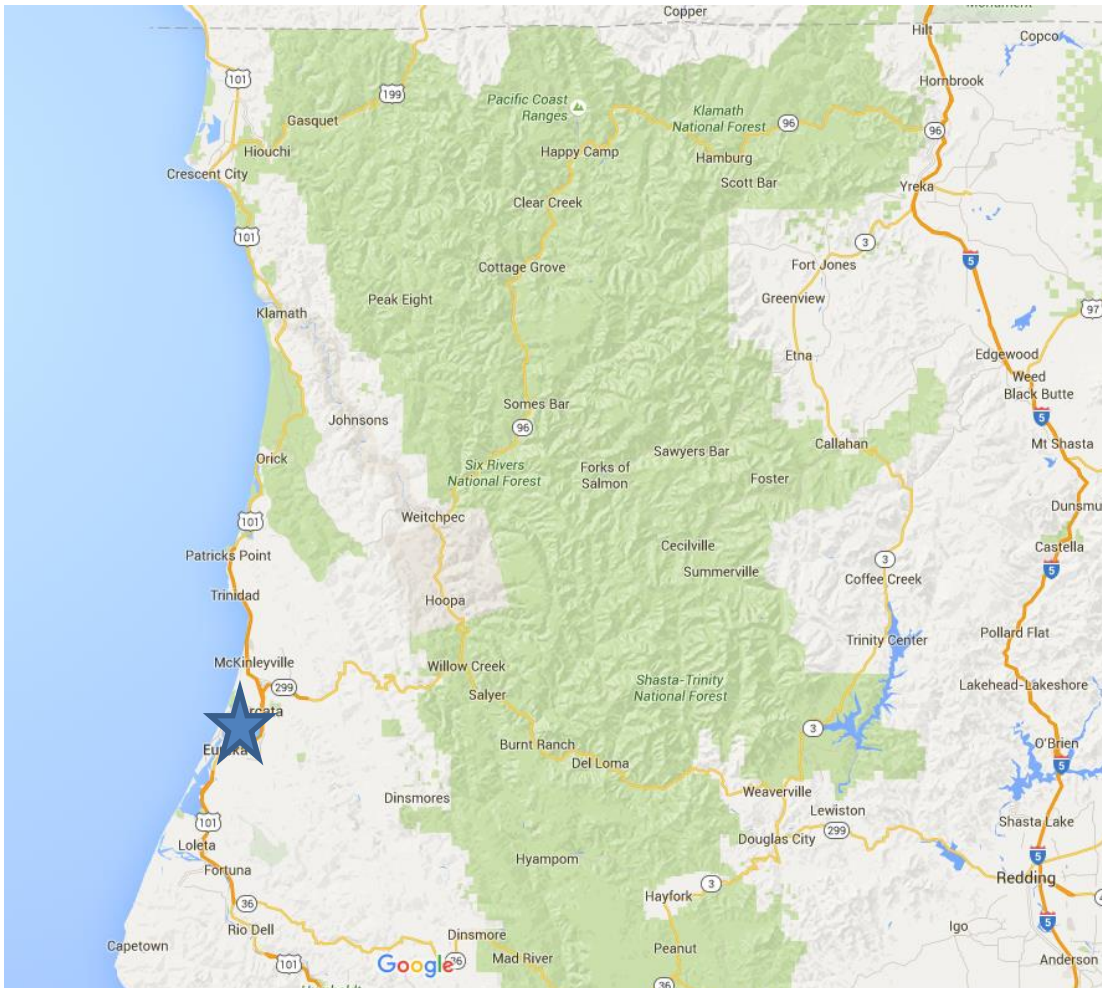


Figure 3. General location of Lanphere / Ma-le’l Dunes PNNL in northwestern California

Ma-le’l North represents the USFWS’s Ma-le’l Dunes Unit. Access to this area is through a gated road to a parking area. The gate is open from Friday through Monday only. On other days, the parking area can be accessed on foot or on a bike. The area is open from sunrise to one hour after sunset, regardless of whether access is by car, bike or walking. On Friday through Monday, the gate is closed and locked other than those hours. No bikes are allowed in this unit outside of the parking area, nor are dogs or horses allowed. Use is restricted to trails, open sand and beach areas in order to protect sensitive habitats.

Ma-le'l South is managed by the BLM Arcata Office. Much of the area has been designated as an ACEC. Ma-le'l South is open seven days a week during daylight hours. Dogs are permitted under the control of the owner, and horses are allowed only on designated trails.

To reach the Lanphere Unit by road, take the northernmost exit for Arcata off U.S. Highway 101, which is marked for Giuntoli Lane and Janes Road. Proceed west to Janes Road, which curves south. About 0.8 miles (1.3 km) from the highway and just beyond Mad River Community Hospital, turn west on Upper Bay Road. After 0.7 miles (1.1 km), continue straight ahead on Lanphere Road. About 300 feet (100 m) after the road crosses Mad River Slough on a small bridge, take the left fork, which is signed for the Humboldt Bay National Wildlife Refuge.

To reach the site from downtown Arcata, travel west to K Street and then turn north (bear left as K Street turns into Alliance Avenue). Turn west onto Spear Avenue. This curves north and becomes Janes Road, after which the first road that branches west is Upper Bay Road, as described above.

The Ma-le'l Dunes South Parking Lot is off of the Vera Linda Lane, most easily reached from State Road 255, New Navy Base Road, which is Samoa Blvd in Arcata. Stay on Samoa Blvd until just west of the Mad River Slough, and turn right on Young Lane, then left at the T intersection on Vera Linda Lane (a sign indicates the Ma-le'l Dunes Cooperative Management Area), and follow the road to the lot. To reach Ma-le'l Dunes North Parking area, turn right at the T where Vera Linda Road begins, and follow the gravel road until it ends at the parking lot.

Ownership

The entire proposed NNL is owned by the U.S. Government (Figure 4). The Lanphere and Ma-le'l Dunes Units are in the Humboldt Bay National Wildlife Refuge Complex. The refuge is part of Region 8, which includes California and Nevada, and the Klamath Basin in Oregon. The refuge unit ownership is shown in green on the left side of Figure 4. The headquarters is located at the Richard J. Guadagno Headquarters & Visitor Center, 1020 Ranch Road, P.O. Box 576, Loleta, California. Their phone number is (707) 733-5406, and their office is open from 8:00 am – 5:00 pm, all week.

The southern portions of the proposed NNL, known as Ma-le'l South, is managed by the Arcata Field Office of the BLM, located at 1695 Heindon Road in Arcata. Their office is open from 7:45 am – 4:30 pm, Monday-Friday and their phone number is (707) 825-2300.

The proposed NNL occupies portions of Sections 13, 14, 23, 24, and 26 in Township 6 north, Range 1 West.

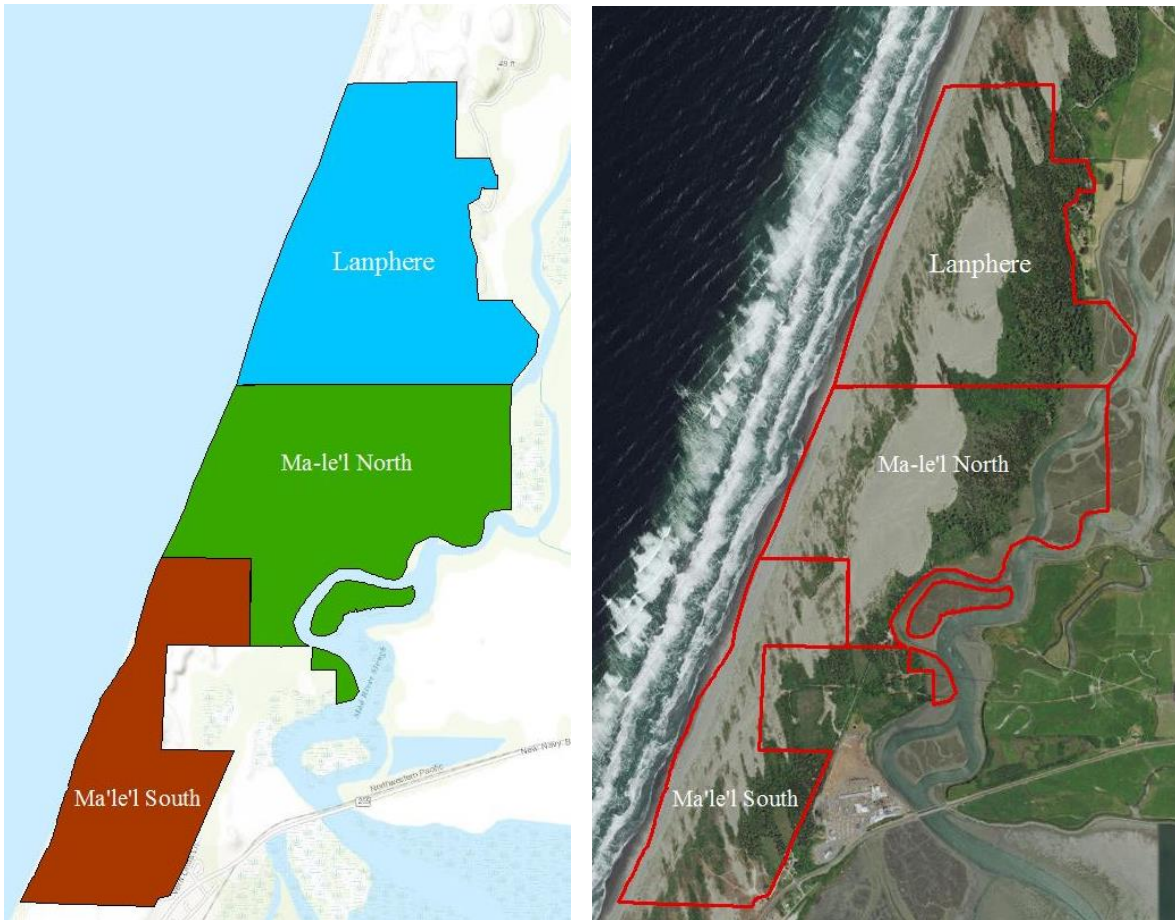


Figure 4. Map and air photograph showing the Lanphere / Ma-le'l Dunes location and units north of Arcata Bay.

Land Use and Condition

Historic Land Use

Historical uses of the area included residential and subsistence use by the Wiyot prior to their displacement by Euro-American settlers. Several homesteads were located on the site, the only remaining early structure is a residence built in the 1920s on the Lanphere Unit and now used as a caretaker residence. There was occasional sand mining up until the 1990s, an activity that has been completely stopped. Parts of the Lanphere Unit were used at one time to break horses, and cows were pastured in some forest clearings during flooding that occurred on the Mad River Slough. Beginning in the 1960s ATV use became popularized and occurred throughout open sand and sparsely vegetated areas on all but the Lanphere Unit (the Lanphere family actively excluded this use). Portions of the Ma-le'l North and South Units were the site of a privately run ATV park until the late 1990s. Duck hunting along the estuarine side of the Lanphere and Ma-le'l North sites is historic and ongoing, although restricted on the salt marsh islands owned by USFWS. All sites had been acquired and protected by 2004.

Current Land Use and Present Condition

Present uses and activities on the land of the proposed landmark within the Lanphere / Ma-le'l Dunes include scientific research, educational field trips, and recreational use is limited in various ways in each of the units. Camping, and disturbance of natural objects are not permitted throughout the area. The two USFWS units of the proposed NNL are managed somewhat differently by the refuge staff. Because of the significant and sensitive resources present in the Lanphere Unit, public access is restricted to Friends of the Dunes naturalist-guided walks and individuals with use permits (call 707 444-1397 for walk and permit information). The Lanphere Dunes Unit has no restroom or visitor facilities. The Ma-le'l Dunes North Unit is open to pedestrian use via the parking area during daylight hours Friday-Monday, but visitors can access by walking or biking the access road past the gate when locked, during daylight hours only. The Ma-le'l Dunes South Unit is managed by the BLM, and is open to hiking or horseback riding on trails only daily during daylight hours. Dogs, under the control of their owner, are permitted on Ma'le'l South only.

Uses of lands adjacent to the proposed landmark include target practice by the Redwood Gun Club, fishing on the beaches (vehicular use on beaches is restricted by ordinance to commercial fishermen, seniors, and disabled users by permit only), oyster farming in the Mad River Slough, and dairy and beef cattle ranching on the portions of the estuarine floodplain that have been diked and drained. Settlement in the vicinity is sparse, and consists mostly of farmers and ranchers.

The most serious threat to the proposed site is invasion by introduced plant species, especially yellow bush lupine (*Lupinus arboreus*), iceplant (*Carpobrotus* spp.) and European beach grass (*Ammophila arenaria*). At present, most of the site is unusually free of all of these species, and efforts are underway to keep them off of the site; these efforts have been much more successful than similar efforts occurring elsewhere along the Pacific Coast.

On the whole, the site is exceptionally pristine, especially as compared to other sites along the sandy coast of northern California and Oregon. The site contains the best examples of native vegetation of foredune and partly stabilized dune in the Siskiyou – Klamath Dunes Subtheme region.

Sensitive or Hazardous Resources

The Lanphere / Ma-le'l Dunes support populations of a number of at-risk plant species, threatened by habitat disturbance and spread of introduced species. These include a large population of the endangered, Menzies wallflower (*Erysimum menziesii*) and beach tidy-tips (*Layia carnosa*).

Anticipated Damage to the Area

The area is managed by the USFWS as a refuge and the BLM as an ACEC, to protect the natural values and ecosystem present at the site, and no damage is anticipated. The main historic use of the site that detracted from its natural character was illegal trespass by ATVs, although trespass is now uncommon due to the passage of a County Ordinance precluding ATV use of beaches and dunes, along with current law enforcement provided by BLM.

Effects of Publicity

Publicity associated with possible designation of this site as a National Natural Landmark is likely to enhance rather than to jeopardize maintenance of the natural character of the site. The USFWS and the BLM's ongoing management adequately discourages use that might degrade the natural features of the dunes, and encourages appropriate educational and scientific uses. Further publicity may increase support for these efforts and could even help to obtain protection for any significant areas adjacent to the site.

Comparative Assessment

Regional Site Inventory

The Regional Site Inventory was compiled through a literature search and conversations with scientific experts and a complete inventory of coastal dune sites when the initial theme study was done in 1985. A total of sixteen sites were evaluated, all of which were visited to complete a more detailed assessment as to their representativeness, quality, and ability of coastal dune vegetation. Three of the sites were revisited as part of other coastal dune studies by one of the authors in 2015 and 2016. The best remaining six sites are listed in priority order below. Of these, only two are fairly high quality sites, which generally meet the requirements of a National Natural Landmark. The remaining four are either not of sufficiently high quality or the occurrence of the subtheme is too small to adequately represent it. The sites are listed in priority order below.

1. Lanphere / Ma-le'l Dunes, California
2. Lake Earl, California
3. Griggs Creek – Ophir Dunes, Oregon
4. Eel River Delta, California
5. Crissey Field, Oregon - California
6. Bullards Beach – Cut Creek, Oregon

Site Descriptions

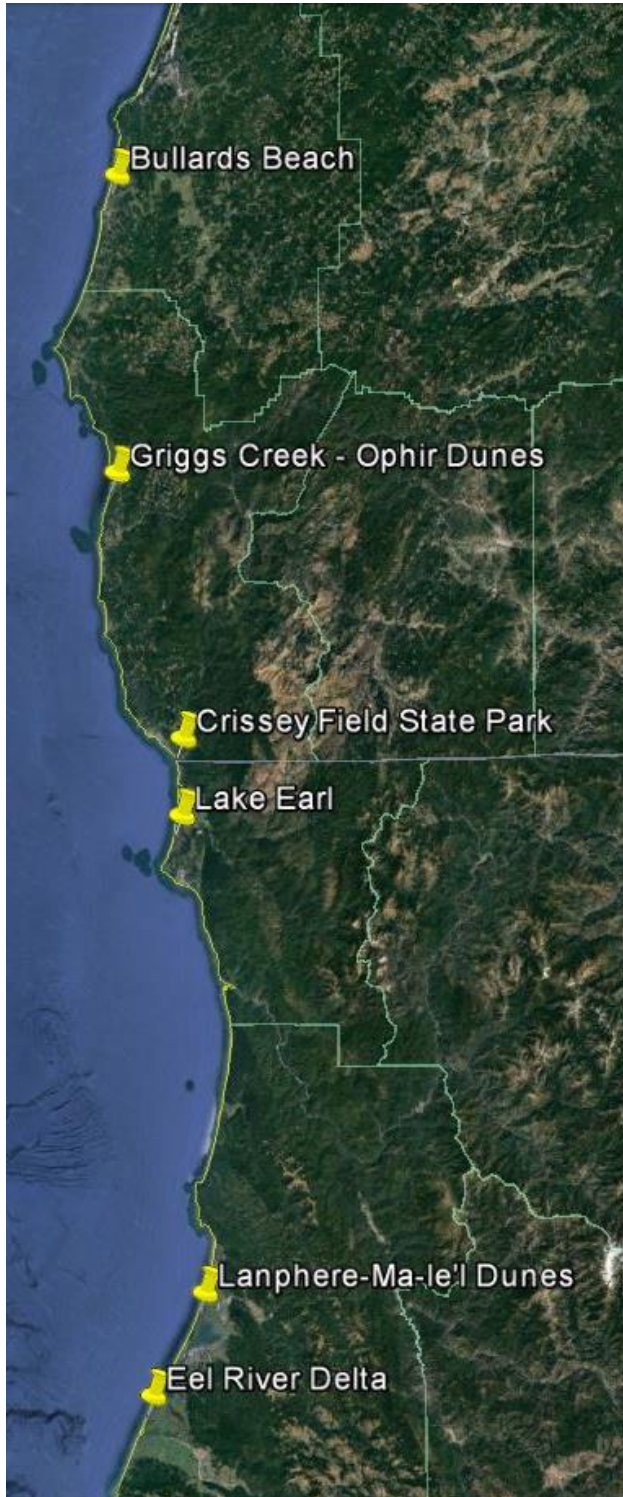


Figure 5. Locations of the six evaluated proposed National Natural Landmark sites.

Lanphere / Ma-le'l Dunes

Lanphere / Ma-le'l Dunes is part of the system of dunes associated with Humboldt Bay in northern California. This is the most extensive dune system between San Francisco and Coos Bay, Oregon, and thus within the latitudinal range in which partly stabilized dunes support a species-rich vegetation of perennial herbs and older dunes tend to succeed to coniferous forest. The site contains particularly good examples of these plant communities and related dune landforms. Many of these features are now very rare, because dunes within this range have been extensively transformed by human activity and the spread of introduced plants. In addition to the characteristic dune vegetation and open sand, Lanphere / Ma-le'l Dunes supports a number of threatened plants and animals.

Lake Earl, California

The Lake Earl Wildlife Area and Tolowa Dunes State Park are adjacent, state-owned management areas located a few miles north of Crescent City. Together they include approximately 4942 acres (2000 ha) of dunes and over 4942 acres (2000 ha) of wetlands, forests, and open water. The dunes are part of an ancient dune complex supporting a diverse array of native coastal vegetation. However, the area receives a fair amount of recreational use, and the dune vegetation is significantly impacted by non-native species.

Greggs Creek – Ophir Dunes, Oregon

Greggs Creek – Ophir Dunes is a narrow (approximately 328 feet [100 m]) band of dunes stabilized by native forbs located between U.S. Highway 101 and the beach. Initially managed by the Oregon Department of Transportation as a rest area, the dunes were managed from 1985 to 2003 by The Nature Conservancy based on an informal agreement, for the protection of the rare species and the relatively weed-free native dunes. The Nature Conservancy is no longer managing the site, but the dunes remain relatively intact, although there appears to be a slow expansion of European beachgrass at this site.

Eel River Delta, California

The Eel River Delta is located at the mouth of the Eel River west of Fortuna and includes the coastal dunes between Centerville beach on the south to Table Bluff on the north. The site is extremely diverse, supporting salt marsh, mudflats, riparian woodland, sloughs, and dunes. However, salt marshes have been extensively invaded by invasive dense-flowered cordgrass, while dunes support large monocultures of European beachgrass.

Crissey Field State Park – Oregon/California border

Crissey Field is located at the Oregon-California border, also occupying a narrow strip between U.S. Highway 101 and the Pacific Ocean. It is bounded on the north by the mouth of the Winchuck River, and to the south by development. The site has lovely forb-dominated dunes, some shrub-dominated dunes, and limited European beachgrass, but is very small.

Bullards Beach – Cut Creek, Oregon

Bullards Beach – Cut Creek comprises the spit and the dunes just north of the mouth of the Coquille River, north of Bandon, Oregon. The Bullards Beach site is largely within Bullards Beach State Park, which occupies approximately 1,280 acres (518 ha). When originally inventoried by Kagan and Alpert, the private lands north of the state park were included, as were the undeveloped lands owned by the Bandon Dunes, the City of Bandon, and the Port of Bandon located at the east side of the spit. The site had diverse dunes, rare plant populations and some Port Orford cedar-dominated dune forests. Since that time, the northern dunes were developed and are now part of the Bandon Dunes Golf Resort, the cedar forests have been infected with root rot (*Phytophthora lateralis*), causing major declines, and the invasive species have expanded, primarily populations of gorse and European beach grass.

Comparative Analysis and Discussion

1. Comparison of Lanphere / Ma-le'l Dunes (California) as a Potential NNL Primary Criteria

Illustrative Character: *Excellent*. This site contains the best quality dunes in this subtheme, including unstabilized dunes, partially stabilized forb dunes, and areas dominated by dune shrub and forests alliances. It has the only undisturbed native foredunes in the region, and has been managed for its natural values for years.

Present Condition: *Excellent*. The area is fairly large and diverse, is low in weeds, and is well managed. Ongoing efforts exist to remove any European beach grass and other exotic species.

Secondary Criteria

Diversity: *Excellent*. The site has very high quality examples of native foredune, open interior dunes, shrub and forb stabilized dune communities, deflation plain wetlands, and dune forests.

Rarity: *Excellent*. The Lanphere / Ma-le'l Dunes supports a number of endemic and rare plant species, including: Menzies wallflower (*Erysimum menziesii*); beach tidy-tips (*Layia carnosus*) Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*); and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*), all at-risk species.

Value for Science and Education: *Excellent*. The area is managed by the U.S. Fish and Wildlife Service as part of the Humboldt Bay National Wildlife Refuge to maintain the natural values of the site, and the Bureau of Land Management as part of the Ma-le'l Dunes Cooperative Management Area. The area is largely managed for education, research and conservation. Also, the site has exceptional value for botanical and ecological research.

2. Comparison of Lake Earl (California) as a Potential NNL

Primary Criteria

Illustrative Character: *Good*. Lake Earl, aside from the typical European beach grass foredune, contains both unstabilized and stabilized dune vegetation characteristic of the theme.

Present Condition: *Good-Fair*. The dunes at this site occupy a relatively small area, with disturbed European beach grass foredune and extensive, unstabilized and partially stabilized native dunes. Some unauthorized off-road vehicle (ORV) use and camping occurs. There is also a network of old roads from an abandoned subdivision.

Secondary Criteria

Diversity: *Good*. The site contains examples of all of the native dune communities, with the exception of a native, unstabilized foredune. It also has examples of high quality salt marsh at the site.

Rarity: *Fair*. Aside from the rarity of the sand dune vegetation types at the site, it supports few rare species.

Value for Science and Education: *Good*. The site is accessible, and is being managed for both natural values and recreation by the California Department of Parks and Recreation as Tolowa Dunes State Park and by the California Department of Fish and Wildlife as the Lake Earl Wildlife Area. However, ORV use and camping on the beach will probably continue.

3. Comparison of Griggs Creek / Ophir Dunes (Oregon) as a Potential NNL

Primary Criteria

Illustrative Character: *Fair*. While fairly small, this site has examples of an unstabilized foredune and partially stabilized forb-dominated dunes.

Present Condition: *Excellent*. This is a very small but very high quality natural area with very minimal amounts of European beach grass and no other exotic species.

Secondary Criteria

Diversity: *Low*. The site is very small, and only has limited examples of the dune vegetation types that characterize this subtheme.

Rarity: *Good*. The site provides a fair amount of habitat for the threatened silvery phacelia (*Phacelia argentea*) and supports a few Wolf's evening-primrose (*Oenothera wolfii*) plants.

Value for Science and Education: *Good*. This site is easy to reach, immediately adjacent to US Highway 101. It is currently not managed, which makes it available for educational and natural values though not protected. However, the site lacks diversity,

4. Comparison of Eel River Delta (California) as a Potential NNL

Primary Criteria

Illustrative Character: *Good*. has limited areas remaining that support native dune vegetation, having been widely invaded by European beachgrass, and is not a wide enough barrier to support dune forests. However, it does support extensive coastal

willow thickets (*Salix hookeriana*). Restoration of dunes and salt marsh would return this site to an excellent functioning dune-estuarine ecosystem.

Present Condition: *Good to Fair*. This site has European beach grass (*Ammophila arenaria*) dominating the dunes, although some patches of native forb-dominated secondary dunes have persisted.

Secondary Criteria

Diversity: *Fair*. The site is extremely diverse, having examples of salt marsh, mudflats, riparian woodland, sloughs, and dunes. However, both the dunes and the salt marshes are highly impacted by invasive species.

Rarity: *Fair*. The site has only limited populations of the endangered beach tidy-tips (*Layia carnosa*) or other dune endemics, although restoration would likely result in recovery of these species.

Value for Science and Education: *Good*. This area is easily accessible and close to Humboldt State University. Because of the diversity of habitats, it could be used for many research projects.

5. Comparison of Crissey Field State Park (Oregon – California border) as a Potential NNL

Primary Criteria

Illustrative Character: *Fair*. This is a very small site, with a very nice example of partially stabilized forb-dominated dunes, and stabilized shrub dunes.

Present Condition: *Good-Fair*. The forb dunes are in very good condition, while the rest of the site is only in fair condition, due to development for recreation.

Secondary Criteria

Diversity: *Low*. The site is very small, and only has limited examples of the dune vegetation types that characterize this theme.

Rarity: *Good*. The site provides habitat for the threatened silvery phacelia (*Phacelia argentea*) and seaside (or dark-eyed) gilia (*Gilia millefoliata*), an annual forb rare in Oregon but not in northern California dunes.

Value for Science and Education: *Excellent*. Although it lacks diversity, this site is easy to reach, being immediately adjacent to U.S. Highway 101, and is being managed for educational use, with remnant habitats managed by Oregon Parks for the natural values present.

6. Comparison of Bullards Beach – Cut Creek (Oregon) as a Potential NNL

Primary Criteria

Illustrative Character: *Fair*. This is a very large site, with some large patches of open, undisturbed, unstabilized and stabilized dunes. When first evaluated, this was considered Good. The expansion of the adjacent golf course has reduced the illustrative character of the site, and the expansion of the invasive species have significantly impacted native diversity

Present Condition: *Fair*. The site also has large areas dominated by exotic weeds including European beachgrass (*Ammophila arenaria*), Scotch broom (*Cytisus scoparius*), and gorse (*Ulex europaeus*), all of which continue to spread in spite of control efforts.

Secondary Criteria

Diversity: *Good*. The site was initially fairly diverse, with high-quality patches of open dunes, including stabilized and unstabilized dune vegetation. Development and expanding weeds have begun to limit this.

Rarity: *Good*. The site supports a large population of a sand dune endemic plant, silvery phacelia (*Phacelia argentea*), and a small population of Wolf's evening-primrose (*Oenothera wolffi*).

Value for Science and Education: *Good*. The site is easily accessible and managed as a state park, with a focus on recreational activities but little disturbance from recreation. Oregon Parks and Recreation Department has the ability to control some of the exotic species, but not necessarily the budget to do so.

Other Sites

This subtheme is rare in that there are not very many sites to consider. The following sites represent those sites that were evaluated but considered not worthy of consideration for NNL designation either because they are not sufficiently representative of the theme or lack the quality to represent the theme.

Dead Lake, California

Elk River, Oregon

Floras Lake, Oregon

Humboldt Lagoons, California (previously recommended as a potential NNL)

Kings Range Coastline, California (previously recommended as a potential NNL)

New River ACEC, Oregon

New River - Langlois, Oregon

Otter Point, Oregon

Pistol River, Oregon

Sixes River, Oregon

Evaluation Recommendations

Lanphere / Ma-le'l Dunes is clearly the best choice for a NNL in this subtheme area. It has the greatest diversity and fits all of the criteria for an exemplary NNL. It is the only site in this subtheme area that is diverse, in good condition, viable, and protected. Bullards Beach - Cut Creek is large and diverse enough but has significant viability problems. Lake Earl is diverse enough to represent many of the values of the subtheme but has problems both with invading European beach grass (*Ammophila arenaria*) and with off-road vehicle and camping use. The other sites considered are too small, have viability problems, or lack the diversity to properly represent this subtheme.

Lanphere / Ma-le'l Dunes is a remarkably undisturbed yet easily accessible site with an outstanding variety of dune habitats and associated wetlands. These habitats are mostly in excellent condition and contain virtually all the species of vascular plants typical of dune systems in northern California and southern Oregon, plus a number of rare species. The site is very scenic and affords the citizen an inspiring view of a natural coastal ecosystem that was once common and is now nearly lost. It also affords a special chance to study the natural relationships among dune organisms and physical processes. Designation as a National Natural Landmark is richly merited.

Potential Landmark Boundary and Ownership Maps

The proposed boundary (Figure 4) includes all of the portions of coastal dune areas included in the Humboldt Bay National Wildlife Refuge Complex's Lanphere and Ma-le'l Dunes Units that are currently dominated by native species, as well as the adjacent restored portions of the BLM's Ma-le'l Dunes South. This boundary would create an 834 acre (337 ha) National Natural Landmark that would include all of the intact, natural dune habitats, associated wetlands, and restored areas at the site. The proposed NNL is bounded by the Pacific Ocean on the west and the combination of the Mad River Slough and some private lands to the east. The northern boundary is defined by the most recent refuge acquisition yet to be restored, while the southern boundary is the boundary of the BLM's Ma-le'l Dunes South Unit. Variations in acreage of the site and the three individual units are a result of different measures of the beach - Pacific Ocean boundary.

Justification

The proposed NNL includes all of the very high-quality dunes at the site on public ownership, and represents the native or restored areas currently managed for the important natural values of this subtheme. It includes all of the lands in the Ma-le'l Dunes Unit of the refuge (Ma-le'l North portion of the Ma-le'l Dunes Cooperative Management Area), all of the BLM lands in the Ma-le'l Dunes South portion of the Ma-le'l Dunes Cooperative Management Area, excluding the road and developed area in the southeast corners of the proposed landmark. And it includes all of the restored lands on the Humboldt Bay National Wildlife Refuge's Lanphere Dunes Unit.

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Appendix A: Photographs of Lanphere / Ma-le'l Dunes PNNL Potential National Natural Landmark (PNNL) by Andrea Pickart



Photo 1. Menzies wallflower, an endangered plant from the PNNL with bright yellow flowers.



Photo 2. Beach tidytops, an endangered plant from the PNNL with white-yellow flowers.



Photo 3. Yellow sandverbena in front of the sea lyme dune patch vegetation alliance.



Photo 4. Forb dunes in the dune mat herbaceous alliance, with seaside buckwheat flowering.



Photo 5. Hooker willow shrub alliance (front) with localized beach pine (back).



Photo 6. Slipface and Hooker willow swamp, with Sitka spruce.



Photo 7. Beach pine forest alliance.



Photo 8. Reindeer lichen and kinnikinnick in beach pine woodland opening.



Photo 9. Vernal pool (dune swale or deflation plain) with a fog bank in the background.



Photo 10. Pacific swampfire estuarine wetland in the Pacific swampfire alliance.



Photo 11. Salt rush estuarine wetland (brackish marsh).



Photo 12. Hardstem bulrush marsh.



Photo 13. Freshwater swamp with slough sedge in front of red alder.



Photo 14. Sunset from the Big Dune, Lanphere.

Appendix B. Vascular Plants of the Lanphere and Ma-le'l Dunes

Vascular Plants of the Lanphere and Ma-le'l Dunes Units. Humboldt Bay National Wildlife Refuge. Compiled by Gordon Leppig ¹ and Andrea Pickart ² . Last updated January 2015*					Status (codes at end)
FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
Aizoaceae					
<i>Carpobrotus chilensis</i> (Molina) N.E. Br.			sea fig	DM	E
Anacardiaceae					
<i>Toxicodendron diversilobum</i> Torrey & A. Gray (E. Greene)			poison oak	CDF, RF	N
Apiaceae					
<i>Angelica lucida</i> L.			seacoast angelica	BM	N, C
<i>Daucus pusillus</i> Michaux			American wild carrot	DM, SW	N
<i>Glehnia littoralis</i> (A. Gray) Miq. <i>ssp. leiocarpa</i> (Mathias) Hultén			American silvertop	DM	N, C
<i>Hydrocotyle ranunculoides</i> L.f.			marsh pennywort	FM	N
<i>Oenanthe sarmentosa</i> J.S. Presel			water parsely	FM, BM, FS, RF	N
<i>Sanicula crassicaulis</i> DC.			Pacific sanicle	CDF	N
Apocynaceae					
<i>Vinca major</i> L.			bingleaf periwinkle	DM, FM, CDF, DS	E, I
Aquifoliaceae					
<i>Ilex aquifolium</i> L.			English holly	CDF	E, I
Araceae					
<i>Lysichiton americanus</i> Hultén & St. John			yellow skunk cabbage	RF, FS	N
Araliaceae					

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Hedera helix</i> L.			English ivy	CDF, RF	E, I
Asteraceae					
<i>Achillea millefolium</i> L.			common yarrow	DM, CDF, SW	N
<i>Ambrosia chamissonis</i> (Less.) E. Greene			beach-bur	DM, DS	N
<i>Anaphalis margaritacea</i> (L.) Benth. & Hook.			pearly everlasting	CDF, DM, SW	N
<i>Artemisia pycnocephala</i> DC.	<i>Artemisia pycnocephala</i> (Less.) DC.		coastal sagewort	DM	N
<i>Aster chilensis</i> Nees	<i>Symphyotrichum chilense</i> (Nees) G.L. Nesom var. <i>chilense</i>	<i>Symphyotrichum chilense</i> (Nees) G.L. Nesom var. <i>chilense</i>	common California aster	SW, BM, FM	N
<i>Baccharis douglasii</i> DC.	<i>Baccharis glutinosa</i> Pers.		saltmarsh baccharis	BM, FM	N
<i>Baccharis pilularis</i> DC.			coyote brush	DM, AW, BM, FM, FS, RF	N
<i>Cirsium vulgare</i> (Savi) Ten.			bullthistle	SW, DM, AW, FM	E, I
<i>Conyza canadensis</i> (L.) Cronq.	<i>Erigeron canadensis</i> L.		Canada horseweed	DM, CDF, AW	E, I
<i>Conyza floribunda</i> Kunth	<i>Erigeron sumatrensis</i> Retz.		asthmaweed	CDF, DM, AW	E
<i>Cotula coronopifolia</i> L.			brass buttons	BM, SM	E
<i>Erechtites glomerata</i> (Poiret) DC.	<i>Senecio glomeratus</i> Desf. ex Poir.		cutleaf burnweed	DM, SW, FM, DS, RF, CDF	E, i

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Erechtites minima</i> (Poiret) DC.	<i>Senecio minimus</i> Poir		coastal burnweed	CDF, DM, BM, FM, DS, RF	E, I
<i>Erigeron glaucus</i> Ker-Gawler			seaside daisy	DM, DS	N
<i>Gnaphalium purpureum</i> L.	<i>Gamochaeta ustulata</i> (Nutt.) Nesom	<i>Gamochaeta purpurea</i> (L.) Cabrera	purple cudweed	DM	N
<i>Gnaphalium palustre</i> Nutt.			western marsh cudweed	SW, DM, AW	N
<i>Gnaphalium ramosissimum</i> Nutt.	<i>Pseudognaphalium ramosissimum</i> (Nutt.) Anderb.	<i>Pseudognaphalium ramosissimum</i> (Nutt.) Anderb.	pink cudweed	CDF	N
<i>Gnaphalium stramineum</i> Kunth.	<i>Pseudognaphalium stramineum</i> (Kunth) Anderb.	<i>Pseudognaphalium stramineum</i> (Kunth) Anderb.	cotton-batting plant	DM, SW, AW	N
<i>Grindelia stricta</i> DC. var. <i>stricta</i>			coastal gumplant	SM, BM	N
<i>Hieracium albiflorum</i> Hook.			white hawkweed	CDF	N
<i>Hypochaeris glabra</i> L.			smooth cat's ear	FM, DM, SW	E
<i>Hypochaeris radicata</i> L.			rough cat's ear	DM, CDF, AW	E
<i>Jaumea carnosa</i> (Less.) A. Gray			marsh jaumea	SM	N
<i>Layia carnosa</i> (Nutt.) Torrey & A. Gray			beach layia	DM	N, C
<i>Leontodon taraxacoide</i> s (Villars) Mérat <i>ssp. taraxacoide</i> s			lesser hawkbit	SW, DM, BM, FM, DS, AW	E, I

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Lessingia filaginifolia</i> (Hook & Arn.)	<i>Corethrogyne filaginifolia</i> (Hook & Arn.) Nutt var. <i>californica</i> (DC.) J.P. Saroyan	<i>Corethrogyne filaginifolia</i> (Hook & Arn.) Nutt var. <i>californica</i>	California sand-aster	DM	N
<i>Leucanthemum vulgare</i> Lam.			oxe-eye daisy	FM, DM, AW	E, I
<i>Madia sativa</i> Molina			coast tarweed	SW, BM, DM	N
<i>Senecio vulgaris</i> L.			old man of spring	DM, DS	E
<i>Senecio elegans</i> L.			purple ragwort	DM, DS	E, I
<i>Solidago spathulata</i> DC. ssp. <i>spathulata</i>	<i>Solidago spathulata</i> DC.		dune goldenrod	DM, CDF	N
<i>Sonchus oleraceus</i> L.			common sow thistle	DM, AW	E, I
<i>Tanacetum camphoratum</i> Less.	<i>Tanacetum bipinnatum</i> (L.) Sch. Bip		dune tansy	DM	N
Azollaceae					
<i>Azolla filiculoides</i> Lam.			Pacific mosquito fern	FM, SW, OW	N
<i>Azolla mexicana</i> C. Presl	<i>Azolla microphylla</i> Kaulf		Mexican mosquito fern	OW, FM	N
Betulaceae					
<i>Alnus rubra</i> Bong.			red alder	RF, FS, SW	N
Boraginaceae					
<i>Cryptantha leiocarpa</i> (Fischer & C. Meyer) E. Greene			coastal cryptantha	DM	N
Brassicaceae					
<i>Cakile edentula</i> (Bigelow) Hook.			American sea rocket	DM	E

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Cakile maritima</i> Scop.			European sea rocket	DM	E
<i>Capsella bursa-pastoris</i> (L.) Medikus			shepherd's purse	DM, DS, AW	E
<i>Cardamine oligosperma</i> Torrey & Gray			bitter cress	DM, AW, DS, SW	N
<i>Erysimum menziesii</i> (Hook) ssp. <i>eurekaense</i> R.A. Price			Humboldt Bay wallflower	DM	N, C
<i>Hirschfeldia incana</i> (L.) Lagr.-Fossat			shortpod mustard	DM, AW	E,I
<i>Lepidium nitidum</i> Torrey & A. Gray var. <i>nitidum</i>	<i>Lepidium nitidum</i> Torrey & A. Gray		shining pepperweed	DM	N
<i>Raphanus raphanistrum</i> L.			wild radish	DM, AW, RF	E
<i>Sisymbrium officinale</i> L.			hedge mustard	AW, CDF	E, I
Caprifoliaceae					
<i>Linnaea borealis</i> L. var. <i>longiflora</i> Torrey		<i>Linnaea borealis</i> L. ssp. <i>longiflora</i> (Torrey) Hultén	twin flower	CDF	N planted
<i>Lonicera hispidula</i> Douglas var. <i>vacillans</i> A. Gray	<i>Lonicera hispidula</i> (Douglas ex Torr. & A. Gray)		pink honeysuckle	CDF, RF	N
<i>Lonicera involucrata</i> (Richardson) Banks var. <i>ledebourii</i> (Eschsch.) Zabel			coast twinberry	CDF, FS, RF	N
<i>Sambucus racemosa</i> L.			red elderberry	RF, CDF, FS	N
Caryophyllaceae					

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Cardionema ramosissimum</i> (J. A. weinm.) Nelson & J.F. Macbr.			sandmat	DM, DS	N
<i>Cerastium glomeratum</i> Thuill.			sticky chickweed	DM, DS, SW, AW, FM	E
<i>Sagina decumbens</i> (Elliot) Torrey & Gray <i>spp. occidentalis</i> (S. Watson) G. Crow			western pearlwort	SW	N
<i>Silene gallica</i> L.			common catchfly	DM	E
<i>Spergularia canadensis</i> (Pers.) G. Don <i>var. occidentalis</i> R. Roszbach			western sand-spurrey	BM, SM	N, C
<i>Spergularia marina</i> (L.) Griseb.		<i>Spergularia salina</i> (L.) (Griseb.) J. Presl & C. Presl	salt marsh sand spurrey	SM, BM, AW	N
<i>Spergularia macrotheca</i> (Hornem.) Heynh. <i>var. macrotheca</i>			sticky sand spurrey	SM, SW	N
<i>Stellaria media</i> (L.) Villars			common chickweed	AW, DM, FM, DS, SW	E
Chenopodiaceae					
<i>Atriplex patula</i> L.			spear saltbush	BM, SM	N
<i>Atriplex triangularis</i> Willd.	<i>Atriplex prostrata</i> DC.	<i>Atriplex prostrata</i> Bouchér ex DC.	triangle oracle	BM, SM, AW	E, I

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Salicornia bigelovii</i> Torrey			dwarf saltwort	SM	N (range ext.)
<i>Salicornia virginica</i> L.	<i>Salicornia pacifica</i> Standl.	<i>Sarcocornia pacifica</i> (Standl.) A.J. Scott	common pickleweed	SM, BM, AW	N
Convolvulaceae					
<i>Calystegia soldanella</i> (L.) R. Br.			beach morning-glory	DM	N
Cucurbitaceae					
<i>Marah oreganus</i> (Torrey & A. Gray) Howell	<i>Marah oregana</i> (S. Watson) Howell		coast wild-cucumber	CDF, RF	N
Cupressaceae					
<i>Cupressus macrocarpa</i> Gordon	<i>Hesperocyparis macrocarpa</i> Gordon		Monterey cypress	CDF, AW, DM	E
Cuscutaceae					
<i>Cuscuta salina</i> Engelm. var. <i>major</i> Yuncker	<i>Cuscuta pacifica</i> Costea & M. Wright var. <i>pacifica</i>		saltmarsh dodder	SM, BM	N
Cyperaceae					
<i>Carex lyngbyei</i> Hornem			Lyngbye's sedge	BM, SM	N, C
<i>Carex obnupta</i> L. Bailey			slough sedge	SW, FM	N
<i>Carex pansa</i> L. Bailey			sand-dune sedge	SW, DM	N
<i>Eleocharis macrostachya</i> Britton			common spikerush	SW, FM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Scirpus acutus</i> Bigelow var. <i>occidentalis</i> (S. Watson) Beetle	<i>Schoenoplectus acutus</i> (Muhl. ex Bigelow) A Löve & D. Löve var. <i>occidentalis</i> (S. Watson) S.G. Sm.	<i>Schoenoplectus acutus</i> (Muhl. ex Bigelow) A Löve & D. Löve var. <i>occidentalis</i> (S. Watson) S.G. Sm.	hard-stemmed tule	FM, BM	N
<i>Scirpus cernuus</i> (Roemer & Schultes) Vahl.		<i>Isolepis cernua</i> (Vahl) Roem. & Schult.	low clubrush	SW, FM, BM, SM	N
<i>Scirpus microcarpus</i> C. Presl			small-fruited bulrush	FM, RF	N
<i>Scirpus maritimus</i> L.	<i>Bolboschoenus maritimus</i> (L.) Palla	<i>Schoenoplectus maritimus</i> (L.) Lye	seacoast bulrush	BM	N
Dennstaedtiaceae					
<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>pubescens</i> L.	<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>pubescens</i> L. Underw.		western bracken fern	CDF, DM, DS	N
Dryopteridaceae					
<i>Dryopteris arguta</i> (Kaulf.) Maxon			coastal wood fern	RF, FM, FS	N
<i>Polystichum munitum</i> (Kaulf.) C. Presl			sword fern	CDF, RF	N
Equisetaceae					
<i>Equisetum telmateia</i> Ehrh. ssp. <i>Braunii</i> (Milde) R.L.Hauke			giant horsetail	FM, RF, AW, CDF	N
Ericaceae					
<i>Allotropa virgata</i> A. Gray			sugar-stick	CDF	N
<i>Arbutus menziesii</i> Pursh			Pacific madrone	CDF	N
<i>Arctostaphylos columbiana</i> Piper			hairy manzanita	CDF	N
<i>Arctostaphylos uva-ursi</i> (L.) Sprengel			bearberry	CDF, DM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Arctostaphylos x media</i> E. Greene			hybrid manzanita	CDF	N
<i>Chimaphila umbellata</i> (L.) Bartram			pipsissewa	CDF	N
<i>Gaultheria shallon</i> Pursh			salal	CDF	N
<i>Pyrola picta</i> Smith			white-veined wintergreen	CDF	N
<i>Vaccinium ovatum</i> Pursh			evergreen huckleberry	CDF, FS	N
Fabaceae					
<i>Lathyrus littoralis</i> (Nutt.) Endl.			silky beach pea	DM	N
<i>Lathyrus vestitus</i> Nutt. var. <i>vestitus</i>			hillside pea	CDF	N
<i>Lotus corniculatus</i> L.			bird's-foot trefoil	FM, SW, AW	E, I
<i>Lotus micranthus</i> Benth.	<i>Acmispon parviflorus</i> (Benth.) D.D. Sokoloff		small-flowered lotus	DM, SW	N
<i>Lotus purshianus</i> (Benth.) Clements & E.G. Clements var. <i>purshianus</i>	<i>Acmispon americanus</i> (Nutt.) Rydb. var. <i>americanus</i>	<i>Lotus unifoliatus</i> (Hook) Benth. var. <i>unifoliatus</i>	American bird's-foot trefoil	SW, DM	N
<i>Lupinus arboreus</i> Sims			yellow bush lupine	DM, DS	E,I
<i>Lupinus bicolor</i> Lindley			miniature lupine	DM	N
<i>Lupinus littoralis</i> Douglas			seashore lupine	DM	N
<i>Melilotus officinalis</i> (L.) Pall.			yellow sweetclover	DM, DS, AW	E
<i>Trifolium glomeratum</i> L.			clustered clover	CDF	E
<i>Trifolium macraei</i> Hook. & Arn.			Macrae's clover	DM	N
<i>Trifolium microcephalum</i> Pursh			small-headed clover	DM	N
<i>Trifolium microdon</i> Hook. & Arn.			thimble clover	DM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Trifolium wormskioldii</i> Lehm.			coast clover	SW, AW, FM	N
<i>Vicia gigantea</i> Hook.		<i>Vicia nigricans</i> Hook. & Arn. ssp. <i>gigantea</i> (Hook.) Lassetter & C.R. Gunn.	giant vetch	FS, RF	N
<i>Vicia hirsuta</i> (L.) S.F. Gray	<i>Vicia villosa</i> Roth ssp. <i>villosa</i>		hairy vetch	CDF, DM, DS	E
<i>Vicia sativa</i> L. ssp. <i>nigra</i> (L.)	<i>Vicia sativa</i> L. ssp. <i>nigra</i> (L.) Erhart		common vetch	AW, DM	E
<i>Vicia villosa</i> Roth ssp. <i>villosa</i>	<i>Vicia hirsuta</i> (L.) S.F. Gray		hairy vetch	CDF	E, I
Garryaceae					
<i>Garrya elliptica</i> Lindley			coast silk tassel	CDF	N
Gentianaceae					
<i>Centaurium muehlenbergii</i> (Griseb.)	<i>Zeltnera muehlenbergii</i> (Griseb.) G. Mans.		Muhlenberg's centaury	FM, SW	N
Grossulariaceae					
<i>Ribes divaricatum</i> Douglas var. <i>pubiflorum</i> Koehne			spreading gooseberry	CDF	N
<i>Ribes laxiflorum</i> Pursh			trailing black currant	CDF	N
<i>Ribes sanguineum</i> Pursh var. <i>glutinatum</i> (Benth)	<i>Ribes sanguineum</i> Pursh var. <i>glutinatum</i> (Benth) Loudon		pink-flowering currant	CDF, FS, RF	N
Iridaceae					
<i>Sisyrinchium californicum</i> (Ker Gawler) Dryander			California golden-eyed grass	SW, FM	N
Juncaceae					
<i>Juncus breweri</i> Engelm.			Brewer's rush	SW, DM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Juncus bufonius</i> L. var. <i>bufonius</i>			toad rush	SW, AW, FM	N
<i>Juncus bufonius</i> L. var. <i>occidentalis</i> F.J. Herm			western toad rush	DM, SW	N
<i>Juncus falcatus</i> E. Meyer var. <i>falcatus</i>	<i>Juncus falcatus</i> E. Meyer ssp. <i>falcatus</i>		sickle-leafed rush	SW	N
<i>Juncus lescurii</i> Bol.	<i>Juncus lescurii</i> Bol.	<i>Juncus lesueurii</i> Bolander	salt rush	BM, SM	N
<i>Luzula comosa</i> E. Meyer			common wood-rush	CDF, DM, DS	N
<i>Luzula subcongesta</i> (S. Watson) Jepson			Donner wood rush	CDF, DM	N
Juncaginaceae					
<i>Triglochin concinna</i> var. <i>concinna</i> Burtt Davy	<i>Triglochin concinna</i> Burtt Davy var. <i>concinna</i>	<i>Triglochin maritima</i> L.	arrow-grass	SM	N
<i>Triglochin maritima</i> L.			seaside arrow-grass	BM, SM	N
Lamiaceae					
<i>Lamium purpureum</i> L.			purple dead-nettle	FM, DM, DS	E
<i>Mentha pulegium</i> L.			pennyroyal	SW, AW, FM	E, I
<i>Satureja douglasii</i> (Benth.) Briq.	<i>Clinopodium douglasii</i> (Benth.) Kuntze		yerba buena	CDF	N
<i>Stachys chamissonis</i> Benth.			coast hedge-nettle	RF, FS	N
Lemnaceae		Araceae			
<i>Lemna minuscula</i> Herter	<i>Lemna minuta</i> Kunth	<i>Lemna minuta</i> Kunth	least duckweed	OW, FM	N
Liliaceae		Alliaceae, Amaryllidaceae, Themidaceae, Liliaceae, Ruscaceae			
<i>Allium unifolium</i> Kellogg			one-leaf onion	CDF	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Brodiaea coronaria</i> (Salisb.) Engl.			early harvest brodiaea	DM, CDF	N
<i>Dichelostemma capitatum</i> (Benth.) A.W. Wood	<i>Dichelostemma capitatum</i> Alph. Wood		blue dicks	DM , CDF	N
<i>Dichelostemma congestum</i> (Sm.) Kunth			fork-toothed ookow	CDF	N
<i>Fritillaria affinis</i> (Schultes) Sealy var. <i>affinis</i>	<i>Fritillaria affinis</i> (Schultes) Sealy		checker lily	CDF	N
<i>Maianthemum dilatatum</i> (Alph. Wood) Nelson & J.F. Macbr.			false lily of the vally	CDF, RF	N
<i>Triteleia hyacinthina</i> (Lindley) E. Greene			white brodiaea	DM, CDF	N
Lythraceae					
<i>Lythrum hyssopifolium</i> L.			hyssop loosestrife	SW, AW, FM	E, I
Myricaceae					
<i>Myrica californica</i> Cham.	<i>Morella californica</i> (Cham.) Wilbur	<i>Morella californica</i> (Cham.) Wilbur	wax myrtle	CDF, RF, FS, SW	N
Nyctaginaceae					
<i>Abronia latifolia</i> Eschsch			yellow sand verbena	DM	N
<i>Abronia umbellata</i> Lam. ssp. <i>breviflora</i> (Standley) Munz	<i>Abronia umbellata</i> Lam. var. <i>breviflora</i> (Standl.) L.A. Galloway		pink sand verbena	DM	N, C
Onagraceae					
<i>Camissonia cheiranthifolia</i> (Sprengel) Raim ssp. <i>cheiranthifolia</i>			beach-primrose	DM	N
<i>Camissonia strigulosa</i> (Fischer & C. Meyer) Raven			strigose sun-cup	CDF, DM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Clarkia davyi</i> (Jespon) Harlan Lewis & M. Lewis			Davy's clarkia	DM, DS	N
<i>Clarkia purpurea</i> (Curtis) Nelson & J.F. Macbr ssp. <i>quadrivulnera</i> (Douglas) Harlan Lewis & M. Lewis.			purple clarkia	SW	N
<i>Epilobium angustifolium</i> L. ssp. <i>circumvagum</i> Mosq.	<i>Chamerion angustifolium</i> (L.) Holub ssp. <i>circumvagum</i> (Mosquin) Hoch	<i>Chamerion angustifolium</i> (L.) Holub ssp.	fireweed	FM, RF	N
<i>Epilobium ciliatum</i> Raf. ssp. <i>watsonii</i> (Barbey) P. Hoch & Raven			Watson's willowherb	SW, FM, BM, AW	N
Ophioglossaceae					
<i>Botrychium multifidum</i> (S. Gmelin) Rupr.	<i>Sceptridium multifidum</i> (S.G. Gmel.) Tagawa		common grapefern	FM, FS, SW	N
Orchidaceae					
<i>Calypso bulbosa</i> (L.) Oakes			fairy slipper	CDF	N
<i>Corallorhiza maculata</i> Raf.			summer coral root	CDF	N
<i>Goodyera oblongifolia</i> Raf.			rattlesnake plantain	CDF	N
<i>Listera cordata</i> (L.)	<i>Listera cordata</i> (L.) R. Br.		heart-leaved twayblade	CDF	N
<i>Piperia elegans</i> (Lindley) Rydb.			coast piperia	SW, CDF	N
<i>Piperia transversa</i> Suksd.			rein orchid	CDF	N
<i>Spiranthes romanzoffiana</i> Cham.			hooded ladies-tresses	SW, CDF	N
Oxalidaceae					
<i>Oxalis corniculata</i> L.			creeping woodsorrel	FS, DS	E
Papaveraceae					
<i>Platystemon californicus</i> Benth.			cream cups	DM, DS	N

Vascular Plants of the Lanphere and Ma-le'l Dunes Units. Humboldt Bay National Wildlife Refuge. Compiled by Gordon Leppig ¹ and Andrea Pickart ² . Last updated January 2015*					Status (codes at end)
FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
Pinaceae					
<i>Abies grandis</i> (Douglas) Lindley			grand fir	CDF, RF	N
<i>Picea sitchensis</i> (Bong.) Carriere			Sitka spruce	CDF, FS, SW	N
<i>Pinus contorta</i> ssp. <i>contorta</i> Loudon	<i>Pinus contorta</i> Loudon ssp. <i>contorta</i>	<i>Pinus contorta</i> Douglas ex Louden var. <i>contorta</i>	shore pine	CDF, SW	N
<i>Pseudotsuga menziesii</i> (Mirbel) Franco var. <i>menziesii</i>			Douglas-fir	CDF	N
Pittosporaceae					
<i>Pittosporum tenuifolium</i> Gaertner			short-leaf box	CDF	E, I
Plantaginaceae					
<i>Plantago erecta</i> E. Morris			California plantain	DM, SW, DS	N
<i>Plantago lanceolata</i> L.			narrow-leaved plantain	CDF, DM, AW	E
<i>Plantago maritima</i> L.			salt marsh plantain	SM	N
Plumbaginaceae					
<i>Armeria maritima</i> (Miller) Willd. ssp. <i>californica</i> (Boiss.)			California sea-pink	DM, DS	N
<i>Limonium californicum</i> (Boiss.) A.A. Heller			western marsh-rosemary	SM	N
Poaceae					
<i>Agrostis hallii</i> Vasey			Hall's bentgrass	CDF	N
<i>Agrostis microphylla</i> Steudel			little-leaf bentgrass	SW	N
<i>Agrostis stolonifera</i> L.			creeping bentgrass	BM, AW, FM	E, I

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Aira praecox</i> L.			yellow hairgrass	DM, DS, SW	E, I
<i>Aira caryophyllea</i> L.			silver hairgrass	DM, DS, SW	E, I
<i>Ammophila arenaria</i> (L.) Link			European beach grass	DM, DS	E, I
<i>Anthoxanthum odoratum</i> L.			sweet vernal grass	DM, DS, SW, AW, FS, CDF	E, I
<i>Briza maxima</i> L.			big quaking grass	DM, DS, SW	E, I
<i>Briza minor</i> L.			little quaking grass	SW, FM	E
<i>Bromus carinatus</i> Hook & Arn. var. <i>maritimus</i>	<i>Bromus maritimus</i> (Piper) Hitchc.		California brome	DM, DS	N
<i>Bromus carinatus</i> Hook & Arn. var. <i>carinatus</i>		<i>Bromus carinatus</i> Hook & Arn.	mountain brome	DM	N
<i>Bromus diandrus</i> Roth			ripgut brome	DM, DS, SW	E, I
<i>Bromus hordeaceus</i> L.			soft chess	DM, BM, SW	E, I
<i>Calamagrostis nutkaensis</i> (C. Presl) Steudel	<i>Calamagrostis nutkaensis</i> (J. Presl) Steudel		reedgrass	CDF, BM	N
<i>Cortaderia jubata</i> (Lemoine) Stapf			jubata grass	DM, SW, CDF, RF	E, I
<i>Cynosurus echinatus</i> L.			dogtail grass	DM, DS, CDF	E, I
<i>Dactylis glomerata</i> L.			orchard-grass	CDF, AW	E, I

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Deschampsia cespitosa</i> (L.) Beauv. ssp. <i>holciformis</i> (C. Presel) W.E. Lawrx		<i>Deschampsia holciformis</i> J. Presl	coastal tufted hair-grass	BM, SM	N
<i>Distichlis spicata</i> (L.) E. Greene			saltgrass	SM, BM, SW, AW	N
<i>Festuca occidentalis</i> Hook.			western fescue	CDF	N
<i>Festuca rubra</i> L.			red fescue	DM, CDF	N
<i>Glyceria occidentalis</i> (Piper) J.C. Nelson	<i>Glyceria xoccidentalis</i> (Piper) J.C. Nelson		western mannagrass	FM, RF	N
<i>Holcus lanatus</i> L.			common velvetgrass	AW, SW, FM, CDF	E, I
<i>Hordeum jubatum</i> L.			foxtail barley	BM, SM	N
<i>Leymus mollis</i> (Trin.) Pilger ssp. <i>mollis</i>	<i>Elymus mollis</i> Trin. ssp. <i>mollis</i>		dune wild-rye	DM	N
<i>Leymus xvancouverensis</i> (Vasey) Pilger	<i>Elymus xvancouverensis</i> Vasey		Vancouver wild-rye	AW, DM, BM	N
<i>Lolium multiflorum</i> Lam.	<i>Festuca perennis</i> (L.) Columbus & J.P. Sm.	<i>Lolium perenne</i> L. ssp. <i>multiflorum</i> (Lam.) Husnot	Italian rye-grass	AW, RF	E, I
<i>Parapholis incurva</i> (L.) C.E. Hubb.			curved sicklegrass	SM	E
<i>Parapholis strigosa</i> (Dumort) C.E. Hubb.			hairy sickle grass	SM	E, I
<i>Poa annua</i> L.			annual blue grass	CDF, DM, DS, AW	E
<i>Poa confinis</i> Vasey			coastline bluegrass	DM	N
<i>Poa macrantha</i> Vasey			large-flowered sand-dune blue grass	DM	N

Vascular Plants of the Lanphere and Ma-le'l Dunes Units. Humboldt Bay National Wildlife Refuge. Compiled by Gordon Leppig ¹ and Andrea Pickart ² . Last updated January 2015*					Status (codes at end)
FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Polygogon monspeliensis</i> (L.) Desf.			rabbitsfoot grass	SW, FM	E, I
<i>Puccinellia nutkaensis</i> (J.S. Presl.) Fern. & Weath.			Alaska alkali grass	SM	N
<i>Spartina densiflora</i> Brongn.			dense-flowered cordgrass	SM, BM	E, I
<i>Trisetum canescens</i> Buckley			nodding oatgrass	CDF	N
<i>Vulpia bromoides</i> (L.) S.F. Gray	<i>Festuca bromoides</i> L.		brome fescue	DM, DS	E, I
Polemoniaceae					
<i>Gilia millefoliata</i> Fischer & C. Meyer			dark-eyed gilia	DM	N, C
Polygonaceae					
<i>Eriogonum latifolium</i> Smith			coast buckwheat	DM	N
<i>Polygonum paronychia</i> Cham. & Schldl.			beach knotweed	DM, DS	N
<i>Rumex acetosella</i> L.			sheep sorrel	DM, DS, SW, CDF, RF	E, I
<i>Rumex crispus</i> L.			curly dock	FM, SW, AW, BM	E, I
<i>Rumex occidentalis</i> S. Watson		<i>Rumex aquaticus</i> L. var. <i>fenestratus</i> (Greene) Dorn	western dock	FM, BM	N
<i>Rumex salicifolius</i> J.A. Weinm. var. <i>crassus</i> (Rech.f.) J. Howell	<i>Rumex crassus</i> Rech. f.	<i>Rumex crassus</i> Reehinger f.	willow-leaved dock	SW, BM	N
Polypodiaceae					
Polypodiaceae, Woodsiaceae					

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Athyrium filix-femina</i> (L.) Roth var. <i>cyclosorum</i> Rupr.			lady fern	CDF, FS	N
<i>Polypodium calirhiza</i> S. Whitmore & A. R. Smith			licorice fern	CDF, DS	N
<i>Polypodium scouleri</i> Hook. & Grev.			leather-leaf fern	CDF	N
Portulacaceae		Montiaceae			
<i>Calandrinia ciliata</i> (Ruíz Lopez & Pavón) DC.			red-maids	DM, DS, SW	N
<i>Claytonia exigua</i> Torrey & A. Gray ssp. <i>exigua</i>			little spring beauty	DM, DS	N
<i>Claytonia perfoliata</i> Willd. ssp. <i>perfoliata</i>			miner's lettuce	DM, DS, RF	N
Potamogetonaceae		Potamogetonaceae, Ruppiaceae			
<i>Ruppia maritima</i> L.			ditch grass	SM, BM	N
Primulaceae		Myrsinaceae			
<i>Glaux maritima</i> L.			sea milk-wort	BM, SM	N
Pteridaceae					
<i>Pentagramma triangularis</i> (Kaulf.) G. Yatskievych, M.D. Windham & E. Wollenweber ssp. <i>triangularis</i>	<i>Pentagramma triangularis</i> (Kaulf.) G. Yatskievych, Windham & Wollenweber ssp. <i>triangularis</i>		gold-back fern	CDF, DM	N
Ranunculaceae					
<i>Ranunculus repens</i> L.			creeping buttercup	FM, RF, AW	E
Rhamnaceae					
<i>Rhamnus purshiana</i> DC.	<i>Frangula purshiana</i> (DC.) Cooper	<i>Frangula purshiana</i> (DC.) Cooper	casacara	CDF	N
Rosaceae					

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Cotoneaster franchetii</i> Boiss.			Francheti cotoneaster	CDF	E, I
<i>Fragaria chiloensis</i> (L.) Duchesne			beach strawberry	DM, CDF	N
<i>Malus fusca</i> (Raf.) C. Schneider			Oregon crabapple	RF, CDF	N
<i>Malus sylvestris</i> Miller	<i>Malus pumila</i> Mill.	<i>Malus pumila</i> Mill.	common apple	CDF, FS	E
<i>Potentilla anserina</i> L. ssp. <i>pacifica</i> (Howell) Rousi	<i>Potentilla anserina</i> L. ssp. <i>pacifica</i> (T.J. Howell) Rousi	<i>Argentina anserina</i> (L.) Rydb., <i>Argentina egedii</i> (Wormsk.) Rydb. ssp. <i>egedii</i>	silverweed	SW, BM, FM	N
<i>Rosa nutkana</i> Presl var. <i>nutkana</i>	<i>Rosa nutkana</i> C. Presl ssp. <i>nutkana</i>		Nootka rose	CDF	N
<i>Rubus parviflorus</i> Nutt.		<i>Rubus parviflorus</i> Nutt. var. <i>parviflorus</i>	thimbleberry	FS, RF	N
<i>Rubus spectabilis</i> Pursh		<i>Rubus spectabilis</i> Pursh var. <i>spectabilis</i>	salmonberry	RF, FS	N
<i>Rubus ursinus</i> Cham. & Schdl.			California blackberry	CDF, RF, FS, DM, DS, SW	N
Rubiaceae					
<i>Galium aparine</i> L.			common bedstraw	CDF, RF, BM, FM, AW	N
<i>Galium trifidum</i> L. var. <i>pacificum</i> Wieg.	<i>Galium trifidum</i> L. ssp. <i>columbianum</i> (Rydb.) Hultén	<i>Galium trifidum</i> L. ssp. <i>columbianum</i> (Rydb.) Hultén	three-petaled bedstraw	BM	N
Salicaceae					
<i>Salix hookeriana</i> Hook.			Hooker willow	SW, FS, DS	N
Saxifragaceae					
<i>Tellima grandiflora</i> (Pursh) Lindley			fringe cups	RF	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat	
<i>Castilleja ambigua</i> Hook & Arn. ssp. <i>humboldtensis</i> (Keck) Chuang & Heckard			Humboldt Bay owl's-clover	SM	N, C
<i>Castilleja attenuata</i> (A. Gray) Chuang & Heckard			narrow-leaved owl's clover	DM	N
<i>Castilleja exserta</i> (A.A. Heller) Chuang & Heckard ssp. <i>latifolia</i> (S. Watson)	<i>Castilleja exserta</i> (A.A. Heller) Chuang & Heckard ssp. <i>latifolia</i> (S. Watson) Chuang & Heckard		purple owl's clover	DM	N
<i>Cordylanthus maritimus</i> Benth. ssp. <i>palustris</i> (Behr) Chuang & Heckard	<i>Chloropyron maritimum</i> (Benth.) A. Heller ssp. <i>palustre</i> (Behr) Tank & J.M. Egger		Point Reyes bird's-beak	SM	N, C
<i>Linaria canadensis</i> (L.) Dum.-Cours.	<i>Nuttallanthus texanus</i> (Scheele) D.A. Sutton	<i>Nuttallanthus canadensis</i> (L.) D.A. Sutton	blue toad-flax	DM	E
<i>Parentucellia viscosa</i> (L.) Caruel			yellow glandweed	SW, FM, AW	E, I
<i>Scrophularia californica</i> Cham. & Schldl.			California figwort	DS, SW, CDF	N
<i>Veronica persica</i> Poiret			bird's-eye speedwell	AW	E
Solanaceae					
<i>Solanum americanum</i> Miller			white nightshade	FM, CDF	N
<i>Solanum aviculare</i> Forst. F.		<i>Solanum laciniatum</i> G. Forst.	New Zealand nightshade	CDF	E, I
<i>Solanum nigrum</i> L.			black nightshade	CDF, AW, FM	E, I
Typhaceae					
<i>Sparganium eurycarpum</i> Engelm. ssp. <i>eurycarpum</i>	<i>Sparganium eurycarpum</i> A. Gray var. <i>eurycarpum</i>	<i>Sparganium eurycarpum</i> Engelm.	bur-reed	BM	N

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FAMILY/SPECIES	Change from Jepson 1993	Flora North America	Common Name	Habitat		
<i>Typha latifolia</i> L.			cattail	SW, BM, FM	N	
Valerianaceae						
<i>Zostera marina</i> L.			eelgrass	MF	N	
* This vascular plant list is based on collections made by the authors primarily between 2001 and 2008.						
Please email comments, corrections, or proposed additions to andrea_pickart@fws.gov						
1. California Department of Fish and Wildlife, Eureka, CA 2. US Fish and Wildlife Service, Humboldt Bay NWR, Arcata, CA						
Nomenclature follows the Jepson Manual, Higher Plants of California, Second edition (U.C. Press 2012).						
Status: Conservation concern (C); Exotic (E); Invasive (I); California Native (N);						
Habitat: Dune mat (DM), Dune scrub (DS), Dune swale (SW), Coniferous dune forest (CDF), Riparian forest (RF), Freshwater swamp (FS), Freshwater marsh (FM), Open water (OW), Brackish marsh (BM), Salt marsh (SM), Mudflat (MF).						
Total taxa: 255						
					total taxa	255

Appendix C. Lichens of Lanphere and Ma-le'l Dunes

North American lichen name 2016	2016 authority	Magnuson & Tweig 2002	Glavich 2003	Lindsay 1973	Carlberg 2004- 2016
<i>Alectoria imshaugii</i>	Brodo & D. Hawksw.		x		
<i>Alectoria sarmentosa</i>	(Ach.) Ach.			x	
<i>Alyxoria varia</i>	(Pers.) Ertz & Tehler			x	
<i>Amandinea punctata</i>	(Hoffm.) Coppins & Scheid.			x	
<i>Arthonia atra</i>	(Pers.) A. Schneider			x	
<i>Arthonia complanata</i>	Fée	x		x	
<i>Arthonia diffusella</i>	Fink			x	
<i>Arthonia ilicina</i>	Taylor		x		
<i>Arthonia pruinata</i>	(Pers.) Steud. ex A. L. Sm.			x	
<i>Arthothelium spectabile</i>	(Flotow) A. Massal.	x		x	
<i>Bacidina assulata</i>	(Körber) S. Ekman	x		x	
<i>Bactrospora dryina</i>	(Ach.) A. Massal.			x	
<i>Bactrospora patellarioides</i>	(Nyl.) Almq.			x	
<i>Blastenia ferruginea</i>	(Hudson) Th. Fr.	x		x	
<i>Bryoria fremontii</i>	(Tuck.) Brodo & D. Hawksw.			x	
<i>Bryoria furcellata</i>	(Fr.) Brodo & D. Hawksw.	x	x	x	x
<i>Bryoria pseudofuscescens</i>	(Gyelnik) Brodo & D. Hawksw.			x	
<i>Bryoria trichodes</i>	(Michaux) Brodo & D. Hawksw.	x	x		
<i>Buellia callispora</i>	(C. Knight) J. Steiner			x	
<i>Buellia muriformis</i>	A. Nordin & Tønsberg		x		
<i>Buellia oidalea</i>	(Nyl.) Tuck.	x	x	x	x
<i>Byssoloma marginatum</i>	(Arnold) Sérus.				x
<i>Byssoloma subdiscordans</i>	(Nyl.) P. James				x
<i>Calicium abietinum</i>	Pers.			x	
<i>Caloplaca californica</i>	Zahlbr.			x	
<i>Caloplaca cerina</i>	(Ehrh. ex Hedwig) Th. Fr.	x			
<i>Caloplaca oregona</i>	H. Magn.			x	
<i>Caloplaca stanfordensis</i>	H. Magn.			x	
<i>Candelaria concolor</i>	(Dickson) Stein			x	x
<i>Candelariella xanthostigma</i>	(Ach.) Lettau			x	
<i>Carbonicola myrmecina</i>	(Ach.) Bendiksbj & Timdal		x		x
<i>Catinarina atropurpurea</i>	(Schaerer) Vězda & Poelt	x		x	
<i>Chaenotheca chrysocephala</i>	(Ach.) Th. Fr.			x	
<i>Chaenotheca furfuracea</i>	(L.) Tibell		x		
<i>Chrysothrix candelaris</i>	(L.) J. R. Laundon			x	x
<i>Chrysothrix chlorina</i>	(Ach.) J. R. Laundon	x			
<i>Cladonia arbuscula</i> subsp. <i>mitis</i>	(Sandst.) Ruoss			x	
<i>Cladonia artuata</i>	S. Hammer		x		
<i>Cladonia cariosa</i>	(Ach.) Sprengel	x			x
<i>Cladonia cenotea</i>	(Ach.) Schaerer		x		x
<i>Cladonia chlorophaea</i>	(Flörke ex Sommerf.)	x	x		x
<i>Cladonia coniocraea</i>	(Flörke) Sprengel			x	
<i>Cladonia cornuta</i>	(L.) Hoffm.			x	x
<i>Cladonia fimbriata</i>	(L.) Fr.	x		x	x
<i>Cladonia furcata</i>	(Hudson) Schrader	x	x	x	x
<i>Cladonia macilentata</i>	Hoffm.		x	x	x

North American lichen name 2016	2016 authority	Magnuson & Tweig 2002	Glavich 2003	Lindsay 1973	Carlberg 2004- 2016
Cladonia ochrochlora	Flörke	x			
Cladonia portentosa	(Dufour) Coem.	x	x	x	x
Cladonia pyxidata	(L.) Hoffm.	x	x	x	x
Cladonia ramulosa	(With.) J. R. Laundon			x	
Cladonia rei	Schaerer			x	
Cladonia scabriuscula	(Delise) Nyl.	x	x	x	x
Cladonia stellaris	(Opiz) Pouzar & Vězda			x	
Cladonia squamosa var. subsquamosa	(Nyl. ex Leighton) Vainio	x	x	x	x
Cladonia transcendens	(Vainio) Vainio	x	x	x	x
Cladonia verruculosa	(Vainio) Ahti		x		x
Cladonia verticillata	(Hoffm.) Schaerer	x	x	x	x
Cliostomum griffithii	(Sm.) Coppins		x		x
Coenogonium luteum	(Dicks.) Kalb & Lücking			x	x
Collema furfuraceum	(Arnold) Du Rietz		x	x	x
Collema furfuraceum var. luzonense	(Räsänen) Degel.				x
Collema nigrescens	(Hudson) DC		x		x
Dendrographa franciscana	(Zahlbr. ex Herre) Ertz & Tehler			x	
Diplotomma penichrum	(Tuck.) Szatala			x	
Enterographa oregonensis	Sparrius & Björk				x
Evernia prunastri	(L.) Ach.		x	x	x
Fellhanera bouteillei	(Desm.) Vězda		x		x
Flavoparmelia caperata	(L.) Hale		x	x	x
Flavoparmelia rutidota	(Hooker f. & Taylor) Hale			x	
Flavoplaca citrina	(Hoffm.) Arup, Frödén & Søchting			x	
Fuscopannaria leucosticta	(Tuck.) P. M. Jørg.			x	
Fuscopannaria leucostictoides	(Ohlsson) P. M. Jørg.		x		x
Fuscopannaria praetermissa	(Nyl.) P. M. Jørg.			x	
Graphis caesiella	Vainio			x	
Graphis scripta	(L.) Ach.	x	x	x	
Graphis striatula	(Ach.) Sprengel			x	
Gyalecta herrei	Vězda			x	
Heterodermia leucomela	(L.) Poelt	x	x		x
Hypogymnia apinnata	Goward & McCune		x		x
Hypogymnia duplicata	(Ach.) Rass.			x	
Hypogymnia enteromorpha	(Ach.) Nyl.	x	x	x	x
Hypogymnia heterophylla	L. Pike	x	x		x
Hypogymnia hultenii	(Degel.) Krog	x	x	x	x
Hypogymnia imshaugii	Krog			x	
Hypogymnia inactiva	(Krog) Ohlsson	x			
Hypogymnia lophyrea	(Ach.) Krog	x	x	x	x
Hypogymnia physodes	(L.) Nyl.	x	x	x	x
Hypogymnia tubulosa	(Schaerer) Hav.			x	
Hypotrachyna sinuosa	(Sm.) Hale		x		x
Kaernefeltia californica	(Tuck.) A. Thell & Goward		x	x	x
Lecania dubitans	(Nyl.) A. L. Sm.			x	
Lecanora allophana	(Ach.) Nyl.			x	

North American lichen name 2016	2016 authority	Magnuson & Tweig 2002	Glavich 2003	Lindsay 1973	Carlberg 2004- 2016
<i>Lecanora caesiorubella</i> ssp. <i>merrillii</i>	Ach.	x		x	
<i>Lecanora chlarotera</i>	Nyl.			x	
<i>Lecanora hagenii</i>	(Ach.) Ach.			x	
<i>Lecanora pacifica</i>	Tuck.	x		x	
<i>Lecanora symmicta</i>	(Ach.) Ach.			x	
<i>Lecidea plebeja</i>	Nyl.	x		x	
<i>Lepraria membranacea</i>	(Dickson) Vainio	x	x	x	
<i>Letharia columbiana</i>	(Nutt.) J. W. Thomson			x	
<i>Letharia vulpina</i>	(L.) Hue			x	
<i>Lobaria anomala</i>	(Brodo & Ahti) T. Sprib. & McCune		x	x	x
<i>Lobaria anthraspis</i>	(Ach.) T. Sprib. & McCune	x	x	x	x
<i>Lobaria oregana</i>	(Tuck.) Müll.	x			
<i>Lobaria pulmonaria</i>	(L.) Hoffm.	x	x	x	x
<i>Loxosporopsis corallifera</i>	Brodo, Henssen & Imshaug		x		x
<i>Megalaria laureri</i>	(Hepp ex Th. Fr.) Hafellner	x		x	
<i>Melanelixia subaurifera</i>	(Nyl.) O. Blanco et al.	x	x	x	
<i>Melanohalea multispora</i>	(A. Schneider) O. Blanco et al.		x	x	
<i>Menegazzia subsimilis</i>	(H. Magn.) R. Sant.		x	x	x
<i>Micarea prasina</i>	Fr.		x		x
<i>Mycoblastus affinis</i>	(Schaerer) T. Schauer		x	x	
<i>Mycoblastus sanguinarius</i>	(L.) Norman		x	x	x
<i>Mycocalicium albonigrum</i>	(Nyl.) Fink			x	
<i>Nephroma laevigatum</i>	Ach.	x	x	x	x
<i>Nephroma resupinatum</i>	(L.) Ach.	x	x	x	x
<i>Niebla cephalota</i>	(Tuck.) Rundel & Bowler	x	x	x	x
<i>Niebla ceruchis</i>	Rundel & Bowler			x	
<i>Normandina pulchella</i>	(Borrer) Nyl.			x	
<i>Ochrolechia androgyna</i>	H. Magn.				x
<i>Ochrolechia arborea</i>	(Kreyer) Almb.				x
<i>Ochrolechia laevigata</i>	(Räsänen) Verseggy ex Kukwa	x			
<i>Ochrolechia oregonensis</i>	H. Magn.			x	
<i>Ochrolechia trochophora</i>	(Vainio) Oshio			x	
<i>Opegrapha herbarum</i>	Mont.			x	x
<i>Opegrapha protuberans</i>	Zahlbr.	x		x	
<i>Pannaria conoplea</i>	(Ach.) Bory			x	
<i>Parmelia hygrophila</i>	Goward & Ahti				x
<i>Parmelia saxatilis</i>	(L.) Ach.			x	
<i>Parmelia squarrosa</i>	Hale	x	x		x
<i>Parmelia sulcata</i>	Taylor	x	x	x	x
<i>Parmotrema arnoldii</i>	(Du Rietz) Hale			x	
<i>Parmotrema crinitum</i>	(Ach.) M. Choisy	x	x	x	x
<i>Parmotrema perlatum</i>	(Hudson) M. Choisy	x	x	x	x
<i>Parvoplaca tirolensis</i>	(Zahlbr.) Arup, Søchting & Frödén			x	
<i>Peltigera aphthosa</i>	(L.) Willd.			x	
<i>Peltigera britannica</i>	(Gyelnik) Holt.-Hartw. & Tønsberg		x		x
<i>Peltigera canina</i>	(L.) Willd.		x	x	

North American lichen name 2016	2016 authority	Magnuson & Tweig 2002	Glavich 2003	Lindsay 1973	Carlberg 2004- 2016
<i>Peltigera collina</i>	(Ach.) Schrader		X	X	X
<i>Peltigera membranacea</i>	(Ach.) Nyl.		X	X	X
<i>Peltigera neopolydactyla</i>	(Gyelnik) Gyelnik	X	X		X
<i>Peltigera polydactyla</i>	(Necker) Hoffm.			X	
<i>Pertusaria subambigens</i>	Dibben	X			
<i>Phaeocalicium curtisii</i>	(Tuck.) Tibell			X	
<i>Phlyctis argena</i>	(Sprengel) Flotow	X		X	
<i>Physcia adscendens</i>	(Fr.) H. Olivier			X	
<i>Physcia aipolia</i>	(Ehrh. ex Humb.) Fürnr.			X	
<i>Physcia stellaris</i>	(L.) Nyl.	X			
<i>Platismatia glauca</i>	(L.) W. L. Culb. & C. F. Culb.	X	X	X	X
<i>Platismatia herrei</i>	(Imshaug) W. L. Culb. & C. F. Culb.	X	X	X	X
<i>Platismatia stenophylla</i>	(Tuck.) W. L. Culb. & C. F. Culb.			X	
<i>Polycauliona candelaria</i>	(L.) Frödén, Arup, & Söchting	X		X	
<i>Polycauliona polycarpa</i>	(Hoffm.) Frödén, Arup, & Söchting			X	
<i>Pyrrhospora quernea</i>	(Dickson) Körber	X		X	X
<i>Ramalina farinacea</i>	(L.) Ach.	X	X	X	X
<i>Ramalina menziesii</i>	Taylor	X	X	X	X
<i>Ramalina pollinaria</i>	(Westr.) Ach.	X	X	X	X
<i>Ramalina roesleri</i>	(Hochst. ex Schaerer) Hue	X	X	X	X
<i>Ramalina subleptocarpha</i>	Rundel & Bowler				X
<i>Ramboldia cinnabarina</i>	(Sommerf.) Kalb, Lumbsch & Elix				X
<i>Rinodina hallii</i>	Tuck.	X		X	
<i>Scytinium intermedium</i>	(Arnold) Otálora, P. M. Jørg. & Wedin		X		X
<i>Scytinium palmatum</i>	(Hudson) Gray	X	X	X	X
<i>Sphaerophorus tuckermanii</i>	Räsänen	X	X	X	X
<i>Sticta fuliginosa</i>	(Hoffm.) Ach.			X	
<i>Sticta limbata</i>	(Sm.) Ach.	X	X	X	X
<i>Strangospora moriformis</i>	(Ach.) Stein		X		
<i>Sulcaria spiralifera</i>	(Brodo & D. Hawksw.) Myllys, Velmala & Goward	X	X		X
<i>Tetramelas triphragmioides</i>	(Anzi) A. Nordin & Tibell			X	
<i>Thelomma californicum</i>	(Tuck.) Tibell			X	
<i>Thelomma carolinianum</i>	(Tuck.) Tibell			X	
<i>Thelotrema lepadinum</i>	(Ach.) Ach.	X	X	X	X
<i>Thelotrema subtile</i>	Tuck.			X	
<i>Tuckermannopsis chlorophylla</i>	(Willd.) Hale	X	X	X	
<i>Tuckermannopsis orbata</i>	(Nyl.) M. J. Lai		X	X	X
<i>Usnea ceratina</i>	Ach.			X	
<i>Usnea cornuta</i>	Körber	X	X		
<i>Usnea dasopoga</i>	(Ach.) Nyl.	X	X		
<i>Usnea diplotypus</i>	Vainio	X			X
<i>Usnea esperantiana</i>	Clerc		X		
<i>Usnea flavocardia</i>	Räsänen		X		X
<i>Usnea fragilescens</i>	Hav. ex Lyngé		X		
<i>Usnea fragilescens</i> var. <i>mollis</i>	(Vainio) Clerc			X	X
<i>Usnea fulvoreagens</i>	(Räsänen) Räsänen			X	

North American lichen name 2016	2016 authority	Magnuson & Tweig 2002	Glavich 2003	Lindsay 1973	Carlberg 2004- 2016
Usnea lapponica	Vainio	x			
Usnea mutabilis	Stirton			x	
Usnea rubicunda	Stirton	x	x	x	
Usnea subfloridana	Stirton			x	
Usnea substerilis	Motyka	x			
Vahliella saubinetii	(Mont.) P. M. Jørg.			x	
Variolaria amara	Ach.	x	x	x	x
Xylographa hians	Tuck.			x	
		73	82	140	82

Species in red are potentially misidentified per Tom Carlberg, being out of range or on habitats not found in the PNNL.

APPENDIX D. CHECKLIST OF THE BIRDS OF THE

LANPHERE DUNES AND MAD RIVER SLOUGH

10/15/98

by C. John Ralph, Kimberly Hollinger,
Linda Long, and Sherri L. Miller

HUMBOLDT BAY BIRD OBSERVATORY
7000 Lanphere Road, Arcata, California 95521

A total of 266 species have been recorded to date in the area of this checklist, quite an unusually high number. This area includes a rich variety of habitat, including nearshore ocean waters, sandy beach, active dunes, conifer forest, riparian edge, pasture, fresh water ponds and ditches, tidal slough, and salt and fresh water marsh. For the past 20 years a great deal of monitoring has been conducted in this area with Mrs. Hortense Lanphere's deeding of a large area of dune and forest to the Nature Conservancy. Notable were Richard Hill and Susan Sferra who did landbird censuses in 1973 and 1983, Linda Long who surveyed the pastures and slough areas in 1989, and the U.S. Forest Service which has conducted ocean censuses since 1991. The Humboldt Bay Bird Observatory has also conducted censuses, trapping, and constant effort mist-netting since 1981, primarily in the summer and fall, and since 1995, essentially throughout the year. All of these resources were used in compiling this report, and differ from the usual checklist in that we had the advantage of quantitative assessment of many of the species.

While all of the habitats provide many species, the riparian edge, that is, the border between the forest and the pasture or slough marsh, is by far the richest. Approximately two-thirds of all species on this list have been recorded here, many captured in mist nets. During the fall, many vagrant landbirds, such as warblers and flycatchers, are found in coastal areas such as this.

We consider this very much a preliminary draft, as many observations that we know of have not yet been tallied. We thank all the observers in all the various projects for many years of hard work.

ABUNDANCE CATEGORIES

These are approximations only, and would differ between bird watchers. They assume about four hour's birding in the area, in the proper season and habitat for a given species, and are adapted from Harris (1996).

A = Abundant. Many individuals seen easily.

C = Common. Seen in smaller numbers on more than about half the trips.

U = Uncommon. Seen in smaller numbers on less than half the trips.

R = Rare. Only a few individuals seen, but usually present in every year.

V = Visitor or Vagrant. Those with very few records, and not expected but once in every 5 to 10+ years.

SEASONAL CATEGORIES

The following are approximations only. For example, many shorebirds arrive in July in early fall migration, and some landbirds arrive in November in late fall migration.

SPRING - March and April

SUMMER - May, June, and July

FALL - August, September, and October

WINTER - November, December, January, and February

HABITAT

The categories represent the primary habitat that the species is found in. Many species are found in more than one habitat, sometimes even quite commonly.

O - Ocean, within telescope range of shore, about a mile, and the beach.

D - Dunes, the active dunes covered with dune mat vegetation, and regenerating willow and low pine hollows.

F - The conifer forest dominated by pine, spruce, and fir, with a huckleberry understory.

R - The riparian zones, mostly the boundary between the forest and pasture, but also along the forest-dune interface, and along some seeps or streams in the forest.

P - The pasture bordering the slough, mostly diked wetlands with some fresh water ditches and small ponds.

S - The tidal Mad River Slough and associated marsh and mud flats.

I - An irruptive species, found in some numbers in one or two years and then gone for many more.

References

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LIST OF THE SPECIES BY HABITAT

Species	Spring	Summer	Fall	Winter	Banded?	Habitat
Pacific Loon	R	R	U	R		0
Red-throated Loon	R	R	-	-		0
Common Loon	U	C	C	U		S
Pied-billed Grebe	U	U	U	U		S
Western Grebe	-	R	C	C		S
Clark's Grebe	-	-	R	R		S
Red-necked Grebe	-	R	-	R		S
Sooty Shearwater	-	R	U	-		0
Buller's Shearwater	-	-	V	-		0
Northern Fulmar	-	V	-	-		0
Brown Pelican	-	U	C	U		0
White Pelican	-	-	V	-		S
Double-crested Cormorant	U	U	U	U		S
Brandt's Cormorant	U	U	U	R		0
Pelagic Cormorant	U	U	U	U		0
American Bittern	-	-	V	-		P
Great Blue Heron	U	U	U	U		S
Great Egret	C	C	C	C		S
Snowy Egret	U	U	U	U		S
Cattle Egret	-	-	R	-		P
Green-backed Heron	-	-	R	-		P
Black-crowned Night	-	R	R	-		R
White-faced Ibis	-	-	R	-		S
Tundra Swan	-	-	-	-		P
Brant	-	-	U	U		0
Greater White-fronted	-	-	R	-		P
Canada Goose	C	C	C	C		P
Snow Goose	-	-	-	R		P
Wood Duck	-	-	V	-		R
Green-winged Teal	R	-	R	R		P
Mallard	U	U	U	U		P
Northern Pintail	R	-	R	U		S
Cinnamon Teal	R	R	R			P
Northern Shoveler	R	-	R			S
American Wigeon	U	-	U	U		S
Canvasback	U	-	U	U		S
Lesser Scaup	U	-	U	U		S
Greater Scaup	C	-	C	C		S
Oldsquaw	-	-	-	V		S
Surf Scoter	C	U	A	C		0
Black Scoter	U	-	U	U		0
White-winged Scoter	C	U	C	C		0
Common Goldeneye	-	-	-	R		S
Bufflehead	U	-	U	U		S
Hooded Merganser	-	-	-	V		S
Common Merganser	R	R	R	R		S
Red-breasted Merganser	-	-	R	-		S

Species	Spring	Summer	Fall	Winter	Banded?	Habitat
Ruddy Duck	R	-	R	U	.	S
Black Vulture	-	-	V	-		R
Turkey Vulture	-	U	U	U		P
Osprey	U	U	U	U		S
White-tailed Kite	U	U	U	U		D
Bald Eagle	-	-	V	-		S
Northern Harrier	C	C	C	C		S
Sharp-shinned Hawk	U	R	U	U	B	R
Cooper's Hawk	-	-	-	U	B	F
Red-shouldered Hawk	U	U	U	U	B	R
Red-tailed Hawk	C	C	U	C		F
Rough-legged Hawk	-	-	V	-		P
American Kestrel	-	-	R	R	B	R
Merlin	-	-	-	R	B	P
Peregrine Falcon	R	R	R	R		S
Prairie Falcon	-	-	-	R		P
California Quail	C	C	C	C	B	R
Sora	-	-	V	-		S
Virginia Rail	U	U	U	U	B	R
American Coot	U	-	U	C		P
Black-bellied Plover	C	-	A	A		S
Lesser Golden Plover	-	-	R	R		S
Semipalmated Plover	U	-	U	U		O
Snowy Plover	-	V	-	-		O
Killdeer	U	-	C	C		P
Mountain Plover	-	-	-	V		P
American Avocet	-	-	V	-		S
Greater Yellowlegs	R	-	U	U		S
Lesser Yellowlegs	-	-	-	R		S
Willet	C	-	C	C		S
Wandering Tattler	-	-	-	V		S
Spotted Sandpiper	-	-	V	-		S
Whimbrel	-	-	C	U		S
Long-billed Curlew	U	-	U	U		O
Marbled Godwit	O	-	C	C		S
Ruddy Turnstone	V	-	-	V		O
Black Turnstone	R	-	-	-		S
Red Knot	V	-	-	-		S
Sanderling	-	-	C	C		O
Western Sandpiper	U	-	U	C		S
Least Sandpiper	U	-	A	A		S
Baird's Sandpiper	-	-	V	-		P
Pectoral Sandpiper	-	-	R	R		P
Sharp-tailed Sandpiper	-	-	V	-		P
Dunlin	C	-	U	A	B	S
Buff-breasted Sandpiper	-	-	V	-		P
Ruff	-	-	V	-		P
Long-billed Dowitcher	R	-	U	U		S
Short-billed Dowitcher	R	-	U	C		S
Common Snipe	R	-	U	U	B	P

Species	Spring	Summer	Fall	Winter	Banded?	Habitat
Hairy Woodpecker	-	U	R	U	B	R
Northern Flicker						
.....	C	C	C	C	B	R
Yellow-shafted Flicker	-	-	V	-	B	R
Pileated Woodpecker	-	-	V	V		F
Olive-sided Flycatcher	-	U	U	-	B	R
Western Wood Pewee	-	C	C	-	B	R
Willow Flycatcher	-	V	R	-	B	R
Least Flycatcher	-	-	V	-	B	R
Hammond's Flycatcher	V	-	R	-	B	R
Dusky Flycatcher	U	-	R	-	B	R
Gray Flycatcher	-	-	V	-	B	R
Pacific-slope Flycatcher	C	C	C	-	B	F
Black Phoebe*	C	C	C	C	B	R
Ash-throated Flycatcher	-	R	R	-	B	R
Tropical	-	-	V	-	B	P
Western Kingbird	-	-	R	-		P
Eastern Kingbird	-	-	V	-		P
Horned Lark	-	-	-	R		D
Purple Martin	-	R	-	V		F
Tree Swallow*	C	A	R	-	B	R
Violet-green Swallow*	C	C	R	-	B	R
Northern Rough-winged Swallow	-	R	-	-		S
Bank Swallow	-	V	-	-		P
Cliff Swallow*	-	C	C	-		S
Barn Swallow*	C	C	C	-	B	R
Gray Jay	-	V	-	-	B	R
Common Crow	R	R	R	-		P
Common Raven	C	C	A	A	B	R
Black-capped Chickadee	R	R	R	R	B	R
Chestnut-backed	C	C	A	A	B	F
Bushtit	C	C	U	C	B	R
Red-breasted Nuthatch	-	-	U	U	B	F
White-breasted Nuthatch	-	-	V	-		F
Brown Creeper	U	U	U	U	B	F
Rock Wren	-	-	V	-		R
Bewick's Wren	U	U	U	U	B	F
House Wren	-	R	R	-	B	R
Winter Wren	C	C	C	C	B	R
Marsh Wren	U	C	C	U	B	D
Golden-crowned Kinglet	U	U	C	A	B	F
Ruby-crowned Kinglet	C	R	U	A	B	R
Swainson's Thrush	R	A	A	V	B	F
Hermit Thrush	C	R	U	A	B	R
American Robin	C	C	C	A	B	R
Varied Thrush	R	-	U	A	B	F
Townsend's Solitaire	-	-	V	-		R
Wrentit	A	A	A	A	B	F
Northern	-	-	V	-	B	R
Brown Thrasher	-	V	-	-	B	R

Species	Spring	Summer	Fall	Winter	Banded?	Habitat
Gray Catbird	-	V	-	-	B	R
American Pipit	U	-	U	U		D
Cedar Waxwing	-	C	C	-	B	F
Northern Shrike	-	-	V	V	B	R
European Starling	C	C	C	C	B	P
Solitary Vireo	-	R	R	-	B	R
Hutton's Vireo	C	U	U	C	B	R
Warbling Vireo	-	C	U	-	B	R
Orange-crowned Warbler	A	C	C	-	B	R
Tennessee Warbler	-	-	V	-	B	R
Nashville Warbler	-	-	R	R	B	R
Northern Parula	-	V	-	-	B	R
Yellow Warbler	R	U	U	-	B	R
Chestnut-sided Warbler	-	-	V	-	B	R
Black-throated Blue Yellow-rumped Warbler	-	-	V	-	B	R
Myrtle Warbler	A	C	C	C	B	F
Black-throated Gray	C	R	C	A	B	R
<i>Townsend's</i> Warbler	R	-	U	-	B	F
Hermit Warbler	V	-	U	-	B	F
Prairie Warbler	-	R	R	-	B	F
Palm Warbler	-	-	V	-	B	R
Blackpoll Warbler	-	-	R	R	B	R
Black-and-White Warbler	-	-	V	-	B	R
American Redstart*	-	V	V	-	B	R
Prothonotary Warbler	-	R	V	-	B	R
Worm-eating Warbler	-	-	V	-	B	R
Ovenbird	-	-	V	-	B	R
Northern Waterthrush	V	V	V	-	B	R
MacGillivray's	-	V	-	-	B	R
Connecticut Warbler	-	R	U	-	B	R
Common	-	-	V	-	B	R
Wilson's Warbler	U	U	U	-	B	R
Hooded Warbler	C	C	C	-	B	R
Hooded Warbler	-	-	V	-	B	R
Canada Warbler	-	-	V	-	B	R
Yellow-breasted Chat	-	R	R	-	B	R
Summer Tanager	-	-	V	-	B	R
Western Tanager	-	R	U	-	B	R
Rose-breasted Grosbeak	-	-	v	-		R
Black-headed Grosbeak	-	C	C	-	B	R
Lazuli Bunting	-	V	V	-		R
Indigo Bunting	-	V	V	-	B	R
Painted Bunting	-	-	V	-	B	R
Rufous-sided Towhee	C	R	U	C	B	F
American Tree Sparrow	-	-	V	V	B	R
Chipping Sparrow	U	-	R	-	B	R
Vesper Sparrow	-	-	V	-		P
Lark Sparrow	-	-	V	-		P
Black-throated		V	-	-	B	R

Species	Spring	Summer	Fall	Winter	Banded?	Habitat
Lark Bunting	-	-	V	-		P
Savannah Sparrow	C	C	C	C	B	P
Fox Sparrow	C	-	C	A	B	R
Song Sparrow	A	A	A	A	B	R
Lincoln's Sparrow	C	U	U	C	B	R
White-throated Sparrow	R	-	R	U	B	R
Golden-crowned Sparrow	C	-	C	A	B	R
White-crowned Sparrow	C	C	C	A	B	R
Gambell's Sparrow	-	-	-	U	B	R
Dark-eyed Junco						
Oregon Junco	C	R	U	A	B	R
Slate-colored Junco	-	-	-	R	B	R
Gray-headed Junco	-	-	-	V	B	R
Lapland Longspur	-	-	-	V		P
Bobolink	-	-	V	-		S
Red-winged	U	U	U	U	B	P
Western Meadowlark	U	-	U	C		D
Brewer's	U	C	C	U	B	P
Brown-headed Cowbird	U	C	U	U	B	R
Bullock's Oriole	U	C	U	-	B	R
Purple Finch	C	A	C	U	B	F
House Finch	C	C	C	U	B	R
Red Crossbill	C	U	U	-	B	F
Pine Siskin	A	C	C	U	B	F
American Goldfinch	U	A	C	U	B	R
Lesser Goldfinch	-	R	U	-	B	R
Evening Grosbeak	-	-	-	-		F
House Sparrow	U	U	-	-	B	R

Appendix E. Amphibians, Reptiles and Mammals of Lanphere / Ma-le'l Dunes PNNL

Wildlife Lists

Reptiles and Amphibians

Common Name	Scientific Name
Class AMPHIBIA (<i>amphibians</i>)	
Order ANURA (<i>frogs and toads</i>)	
Family HYLIDAE (<i>tree frogs and relatives</i>)	
Pacific treefrog	<i>Pseudacris regilla</i>
Family RANIDAE (<i>true frogs</i>)	
red-legged frog	<i>Rana aurora</i>
Order CAUDATA (<i>salamanders</i>)	
Family AMBYSTOMATIDAE (<i>mole salamanders</i>)	
northwestern salamander	<i>Ambystoma gracile</i>
Family DICAMPTODONTIDAE (<i>Pacific giant salamanders</i>)	
California giant salamander	<i>Dicamptodon ensatus</i>
Family PLETHODONTIDAE (<i>lungless salamanders</i>)	
ensatinas	<i>Ensatina</i> sp.
Family SALAMANDRIDAE (<i>newts and salamanders</i>)	
rough-skinned newt	<i>Taricha granulosa</i>
Class REPTILIA (<i>reptiles</i>)	
Order SQUAMATA (<i>lizards and snakes</i>)	
Family ANGUIDAE (<i>alligator lizards and relatives</i>)	
northern alligator lizard	<i>Elgaria coerulea</i>
Family COLUBRIDAE (<i>Colubrids</i>)	
gopher snake	<i>Pituophis catenifer</i>
western aquatic garter snake	<i>Thamnophis couchii</i>
western terrestrial gartersnake (coast gartersnake)	<i>Thamnophis elegans</i> (<i>Thamnophis elegans terrestris</i>)
northwestern gartersnake	<i>Thamnophis ordinoides</i>

Common Name**Scientific Name**

Family PHRYNOSOMATIDAE (*North American spiny lizards*)

western fence lizard

Sceloporus occidentalis

Order TESTUDINES (*turtles*)

Family EMYDIDAE (*box and water turtles*)

northern Pacific pond turtle

Actinemys marmorata
marmorata (*syn. Clemmys*
marmorata marmorata)

Mammals

Common Name	Scientific Name
Order CARNIVORA (<i>meat-eaters</i>)	
Family CANIDAE (<i>coyotes, dogs, foxes, jackals and wolves</i>)	
gray fox	<i>Urocyon cinereoargenteus</i>
Family ERETHIZONTIDAE (<i>New World porcupines</i>)	
North American porcupine	<i>Erethizon dorsatum</i>
Family FELIDAE (<i>cats</i>)	
bobcat	<i>Lynx rufus</i>
mountain lion (cougar)	<i>Puma concolor</i>
Family MEPHITIDAE (<i>skunks and stink badgers</i>)	
striped skunk	<i>Mephitis mephitis</i>
western spotted skunk	<i>Spilogale gracilis</i>
Family MUSTELIDAE (<i>badgers, otters, weasels and relatives</i>)	
river otter	<i>Lontra canadensis</i>
long-tailed weasel	<i>Mustela frenata</i>
American mink	<i>Mustela vison</i>
Family OTARIIDAE (<i>fur seals and sea-lions</i>)	
California sea-lion	<i>Zalophus californianus</i>
Family PHOCIDAE (<i>seals</i>)	
harbor seal	<i>Phoca vitulina</i>
Family PROCYONIDAE (<i>coatis, raccoons, lesser pandas</i>)	
ringtail	<i>Bassariscus astutus</i>
raccoon	<i>Procyon lotor</i>
Order CETACEA (<i>dolphins, porpoises, and whales</i>)	
Family PHOCOENIDAE (<i>porpoises</i>)	
harbor porpoise	<i>Phocoena phocoena</i>
Order CHIROPTERA (<i>bats</i>)	
Family MOLOSSIDAE (<i>free-tailed bats</i>)	
lump-nosed bat (Rafinesque's big-eared bat)	<i>Corynorhinus rafinesquei</i>
big brown bat	<i>Eptesicus fuscus</i>
California myotis	<i>Myotis californicus</i>
long-eared bat (western long-eared myotis)	<i>Myotis evotis</i>
fringed bat (fringed myotis)	<i>Myotis thysanodes</i>

Common Name	Scientific Name
hairy-winged myotis (long-legged myotis)	<i>Myotis volans</i>
Yuma myotis	<i>Myotis yumanensis</i>
Order DIDELPHIMORPHIA (<i>American marsupials</i>)	
Family DIDELPHIDAE (<i>opossums</i>)	
Virginia opossum	<i>Didelphis virginiana</i>
Order INSECTIVORA (<i>insect-eaters</i>)	
Family Soricidae (<i>shrews</i>)	
marsh shrew	<i>Sorex bendirii</i>
Pacific shrew	<i>Sorex pacificus</i>
Trowbridge's shrew	<i>Sorex trowbridgii</i>
vagrant shrew	<i>Sorex vagrans</i>
Family TALPIDAE (<i>desmans, moles, and relatives</i>)	
American shrew mole	<i>Neurotrichus gibbsii</i>
coast mole	<i>Scapanus orarius</i>
Townsend's mole	<i>Scapanus townsendii</i>
Order LAGOMORPHA (<i>pikas, hares and rabbits</i>)	
Family LEPORIDAE (<i>hares and rabbits</i>)	
black-tailed jackrabbit	<i>Lepus californicus</i>
brush rabbit	<i>Sylvilagus bachmani</i>
Order RODENTIA (<i>gnawing mammals</i>)	
Family CRICETIDAE (<i>New World rats and mice, voles, hamsters and relatives</i>)	
white footed vole	<i>Arborimus albipes</i>
California vole (California meadow mouse)	<i>Microtus californicus</i>
long-tailed vole (long-tailed meadow mouse)	<i>Microtus longicaudus</i>
creeping vole (Oregon meadow mouse)	<i>Microtus oregoni</i>
dusky-footed woodrat	<i>Neotoma fuscipes</i>
deer mouse	<i>Peromyscus maniculatus</i>
western harvest mouse	<i>Reithrodontomys megalotis</i>
Family GEOMYIDAE (<i>gophers</i>)	
Botta's pocket gopher	<i>Thomomys bottae</i>
Family MURIDAE (<i>Old World mice, rats</i>)	
house mouse	<i>Mus musculus</i>
black rat	<i>Rattus rattus</i>
Family SCIURIDAE (<i>chipmunks, squirrels, marmots</i>)	
northern flying squirrel	<i>Glaucomys sabrinus</i>
California (Beechey) ground squirrel	<i>Spermophilus beecheyi</i>

Appendix F. Lanphere / Ma-le'l Dunes National Natural Landmark Brief



U.S. Department of the Interior National Park Service National Natural Landmarks Program

Name: Lanphere / Ma-le'l Dunes

Location: Humboldt County, California

Description: 834.17 acres (337.58 ha)

Dunes are an important local ecological feature of the Pacific Coast of the United States. They are significant in that the open, semi-stable dunes support diverse and unique communities of plants and animals that are adapted to the constant change occurring in these systems. The dunes are characterized by a discontinuous foredune adjacent to the beach, interior dunes dominated by mixed herbaceous wildflowers, wetlands, woodlands and forests.

Significance:

Lanphere / Ma-le'l Dunes represents the largest and best quality sand dune ecosystem representing coastal dunes from this area. The primary natural features of the Lanphere / Ma-le'l Dunes include a diverse array of natural, native vegetation, in contrast to most of the other dune systems north of central California. The site also is known for the rare flora found at the site, including one of the best remaining populations of the endangered Menzies wallflower (*Erysimum menziesii*) and beach tidy-tips (*Layia carnosa*).

Ownership: Federal, U.S. Fish and Wildlife Service, in the Humboldt Bay National Wildlife Refuge Complex, and the Bureau of Land Management, managed by the Arcata Field Office.

Designation:

Evaluation: Peter Alpert, University of Massachusetts – Amherst, 1985 and 2019
James S. Kagan, Portland State University 2019.



United States Department of the Interior

NATIONAL PARK SERVICE
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Washington, DC 20240

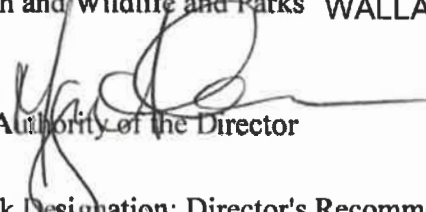
IN REPLY REFER TO:
I.A.2 (2320)

JAN 11 2021

Memorandum

To: Secretary

Through: Assistant Secretary for Fish and Wildlife and Parks **GEORGE WALLACE**

From: Counselor to the Secretary
Exercising the Delegated Authority of the Director 

Subject: National Natural Landmark Designation: Director's Recommendation and Request for Secretarial Action

Digitally signed by
GEORGE WALLACE
Date: 2021.01.13
15:46:49 -05'00'

At a meeting held December 10, 2020, the National Park System Advisory Board (NPSAB) recommended National Natural Landmark designation for the following site:

Lanphere and Ma-le'l Dunes, California

In accordance with National Natural Landmarks Program regulations, the NPSAB reviewed the evaluation materials for this site and found that it meets the criteria for national significance.

Letters of notification to the land managers and public officials, and publication in the Federal Register of the proposed designation, was followed by a 60-day comment period. No letters opposing the designation were received.

Per the National Natural Landmarks Program regulations, I hereby certify that the procedural requirements set forth in 36 CFR Part 62 have been met. I recommend that you approve the Board's recommendations to designate Lanphere and Ma-le'l Dunes as a National Natural Landmark.

APPROVE:  1/15/20

DISAPPROVE: _____

DATE: _____