



U.S. Fish and Wildlife Service

Humboldt Bay National Wildlife Refuge
Humboldt County, California

Lanphere Dunes Restoration Photodocumentation



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Beach morning glory and yellow sand-verbena

INTRODUCTION

Restoration of the Lanphere Dunes began with the manual removal of European beachgrass (*Ammophila arenaria*) from the foredune zone between 1992 and 1997. The project was funded by The Nature Conservancy and carried out primarily with labor from the California Conservation Corps. Restoration was implemented in three phases, using a patchwork pattern to minimize destabilization.



The first phase was implemented between 1992 and 1994, and the last areas were restored between 1995 and 1997. This effort was followed by several years of intensive iceplant (*Carpobrotus* spp.) removal by the U.S. Fish and Wildlife Service. Revegetation was not used in these projects, which relied on recruitment and spread from adjacent native vegetation. An annual sweep still occurs to detect and remove any new iceplant and beachgrass.

The photographs on the following pages show the response of the dunes to restoration over the period 1992/1995/1997 through 2014. The baseline (pre-treatment) photographs were mostly taken at the beginning of Phase 3 (1995), although Photo-point 2 illustrates one area from before restoration began in 1992. Some of the Phase 3 photograph series begin at a point just after beachgrass was removed and primarily illustrate the recovery of native vegetation. The photographs presented here depict four points in time: 1) Before or just after beachgrass removal in 1992 or 1995; 2) 2001, when colonizing species of native plants were increasing in cover and diversity; 3) 2011, depicting a shift in species composition and higher cover; and 4) The present condition in 2014. Keep in mind that Phase 3 photos can include patches of already restored dunes from 1992 and 1994, so beachgrass appears less continuous than it was in 1992.



These “time series” show how vegetation and dune

Photos: Restored foredune at the Lanphere Dunes Unit; with seaside daisy (above) and yellow sand-verbena/native dunegrass (below)

forms have continued to change in keeping with the dynamic nature of dunes. In the pre-restoration photos, an incipient fore-dune, built by invasive beachgrass, was present along much of the coastline in the project area. Such incipient dunes are generally cyclic and ephemeral in our region, although in some areas both native and *Ammophila*-built incipient dunes have become long-term features. In the winter of 1995-96, storms eroded much of this incipient foredune in addition to areas of established foredune. The 1997-98 El Niño caused additional localized erosion. As a result of these erosive winters, several blowouts were initiated (Photopoints 3a and 12b), and a 200-meter stretch of the fore-dune near the south end of the project area deteriorated and formed a broad blowout (Photopoints 6a and 6b). Subsequent planting of this area with native dunegrass *Elymus mollis* has resulted in a newly reforming foredune. In most of the project area, the restored foredune resisted erosion and by 2011 a new incipient foredune, built by native dunegrass, had formed. Photopoint 4b illustrates this cycle; in the 1995 photograph beachgrass had been removed from the established foredune but was still visible on the incipient dune. The 2001 photo shows a scarped foredune face, while the incipient dune had completely eroded. By 2011 a new incipient dune had built up, colonized primarily by native dunegrass. In 2014 the incipient foredune has continued to develop and is now densely vegetated with native species. The formation of this incipient dune has caused a number of newer as well as older blowouts to be shut off from new sand delivery, resulting in a trend towards stabilization of the blowouts. The cycle of blow-out formation, their evolution into narrow, migrating parabolic dunes, and eventual stabilization has created the landscape of overlapping dunes characteristic of our dune system. Blowouts create new areas for colonization by pioneer plants, allowing for the high species diversity on our dunes.



Restored foredune at the Lanphere Dunes Unit, with beach sagewort, beach buckwheat, native dunegrass and other species.



Restored areas at the Lanphere Dunes Unit, with flowering beach pea (left) and dune goldenrod (right).

Photopoint 1

1995



2001



Photopoint 1 continued

2011



2014



Photopoint 2



Photopoint 2 continued

2011



2014



Photopoint 3a

1995



2001



Photopoint 3a continued

2011



2014



Photopoint 3b

1995



2001



Photopoint 3b continued

2011



2014



Photopoint 4b

1995



2001



Photopoint 4b continued

2011



2014



Photopoint 6a

1995



2000



Photopoint 6a continued



Photopoint 6b

1995



2001



Photopoint 6b continued

2011



2014



Photopoint 6c

1995



2001



Photopoint 6c continued

2011



2014



Photopoint 11

1995



2001



Photopoint 11 continued

2011



2014



Photopoint 12b

1995



2000



Photopoint 12bcontinued

2011



2014





Photo Credits

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