



Restoring Coastal Dune Dynamics at Point Reyes Headlands

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Point Reyes National Seashore is home to a unique coastal dune ecosystem at the Headlands near the lighthouse. This system is comprised of climbing dunes perched upon paleodunes — essentially ancient sedimentary dune deposits — which serve as a sand source for the climbing dunes via erosion by wind and waves. There are only three active climbing dune sites remaining on the California coast due to geographic limitations, impacts from human development and the spread of invasive species. Additionally, as a result of varying substrates and exposure over relatively short distances, the Headlands support a highly diverse and uncommon combination of species, including 14 rare and special status native plant species.

What are the major threats to coastal dunes at Point Reyes National Seashore?

The main invasive, non-native species jeopardizing this unique habitat is iceplant (*Carpobrotus edulis*). It is a succulent, mat-forming, perennial species with triangular leaves and yellow or pink flowers that expands primarily by clonal growth (although it also produces seeds that can be dispersed by animals.) Iceplant spreads rapidly. A single shoot segment can grow up to 1 meter a year, and a single individual can eventually form a dense mat up to 50 meters in diameter and half a meter thick. It was brought to California from South Africa around the turn of the 20th century to control erosion, and used specifically at Point Reyes to stabilize the sand around the access roads to the lighthouse. However, over the past 60 to 100 years, iceplant has spread throughout the dunes and bluffs at Point Reyes Headlands to the detriment of the native plants and animals that live there. It is choking out native vegetation, lowering biodiversity and preventing the natural sand erosion and deposition that characterize dune systems.



Paleodunes and associated climbing dunes at Point Reyes Headlands.

Another threat to coastal dunes at Point Reyes is European beachgrass (*Ammophila arenaria*), which was also introduced during the late 1800's for sand stabilization. European beachgrass is a deep-rooted, clumping perennial, which expands rapidly and mostly clonally, stabilizing the shifting sands of coastal dunes. The dune system is a perfect habitat for this invader because sand movement actually stimulates the production of new beachgrass shoots. As European beachgrass expands, it also traps sand, creating higher and steeper dunes at the beachfront which are oriented parallel to the shoreline, decreasing the flow of sand to interior dunes. This arrangement is in contrast to non-invaded dunes, which are typically perpendicular to the shoreline.



Iceplant (foreground) and European beachgrass (background) at the paleodune restoration site.

Invasive species removal at Point Reyes Headlands

As part of the plan to restore the coastline at Point Reyes National Seashore, iceplant was removed from 100 acres of the rocky bluffs near the Lighthouse in 2002-2004. Many native plants have returned to areas formerly dominated by iceplant, which contain

nearly twice as many native plant species on average than the number present before removal. Where iceplant has resprouted, volunteer groups continue to keep this invader in check.

Drawing on lessons learned from this effort and similar restoration projects, the park is currently removing invasive species within an 80-acre area of coastal dunes to restore dune dynamics and preserve habitat for the many rare and special status species that thrive there. Contractors and park staff completed the initial phase of iceplant and European beachgrass removal in fall 2008, treating an estimated 25 acres of iceplant and 2 acres of European beachgrass.

The project incorporates both manual removal and soft backpack herbicide application to remove iceplant and European beachgrass from the Headlands. Manual removal occurred where rare plants and other sensitive native species were interspersed with iceplant, or where proximity to water prevented the use of a low application concentration of herbicide.

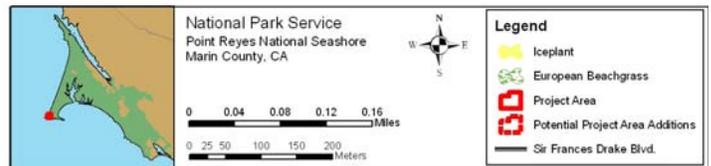
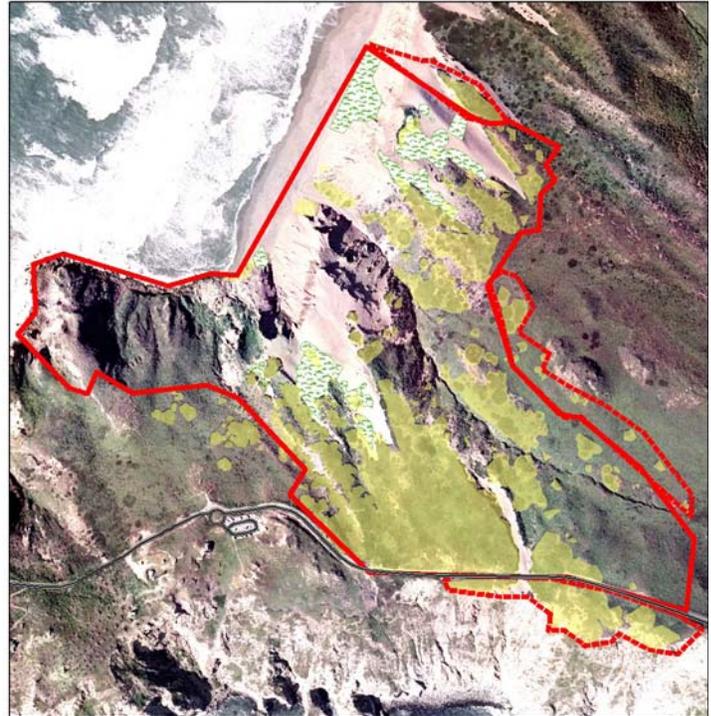
Monitoring plots and photo-points were installed by park biologists and volunteers prior to treatment of iceplant and European beachgrass. These plots will be monitored annually through 2012 to evaluate how the dunes and associated flora change over time, and to assess any possible difference between the two removal methods. A select amount of native seed was also collected from Headlands dune species, which will be planted in winter 2008-09 to facilitate native plant recovery.

Follow-up is critical to keep any remaining seeds and fragments of iceplant and European beachgrass from reinvading the site. Resource Management staff is looking for volunteers that would like to get involved. Through restoration of a particularly attractive and highly visited location, the park hopes not only to revitalize and protect an uncommon coastal feature, but also to increase awareness of coastal resources and restoration at Point Reyes National Seashore.

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Overview of the current dune restoration project area showing the extent of iceplant and European beachgrass invasion.



Contracted crews removing iceplant.