



HUMBOLDT BAY
NWR SPARTINA
REMOVAL PROJECT

Preserving, protecting and
restoring our native salt
marshes

RESTORING THE NATIVE SALT MARSHES
OF

HUMBOLDT BAY
NATIONAL WILDLIFE REFUGE

The control of *Spartina densiflora* in Humboldt Bay



Above: A vibrant, restored salt marsh in bloom on Humboldt Bay NWR. The marsh provides habitat for many species of wildlife. This view provides a glimpse of what Humboldt Bay's salt marshes would have looked like historically.

Right: *Spartina* in flower.

Far Right: A complete monoculture of *Spartina* in the Eel River delta. No native salt marsh plants can flourish and wildlife use of the area is extremely limited.



Question: Where does Spartina come from and what steps has the refuge taken to control it?

- ❖ Native to Argentina, *Spartina densiflora* is thought to have been introduced to Humboldt Bay in the ballast of lumber ships traveling from Chile in the 19th Century. It has also invaded the Mediterranean coast of Europe. Plants of the genus *Spartina* are now found invading marshes of Humboldt Bay, San Francisco Bay and other estuaries along the West Coast.
- ❖ Over 90% of Humboldt Bay's historical salt marshes have been lost since the 1850s. Of the remaining 10%, almost 90% is infested with *Spartina*. In essence, only 1% of historical native salt marsh remains. In addition to the risk to our own Humboldt County marshes, the *Spartina* in our bay is capable of spreading to other salt marshes up and down the Pacific Coast. This very real risk prompted the governors of California, Oregon and Washington to set a goal of eradicating all invasive *Spartina* coast-wide by 2018.
- ❖ Humboldt Bay NWR was recently allocated \$1 Million by the US Fish and Wildlife Service to control *Spartina* over all Refuge lands. After several years of research, Refuge staff have developed a range of mechanical methods to eliminate *Spartina*. Mechanical removal of *Spartina* leads to the natural re-colonization of the salt marsh by native flora within three years.

What are the impacts of *Spartina densiflora* to the native ecosystem?

- ❖ Competition with native flora such as pickleweed, Humboldt Bay owl's clover and Point Reyes bird's beak leads to a loss of native plant diversity and in extreme infestations results in a monoculture, meaning no other plants can survive.
- ❖ Invasion of salt marsh negatively affects the habitat of many species of tidal wildlife including species of invertebrates, mammals, fish and shorebirds by limiting ecological diversity and feeding opportunities.
- ❖ Drift card studies showed that *Spartina* seeds from Humboldt Bay can travel as far up the coast as Alaska. Many cards were found in coastal Oregon and Washington, creating great risk for future infestations on the West Coast.

*Question: What methods is the Refuge using to control *Spartina*?*



Left: A test site in Mad River Slough dominated by invasive *Spartina*. This view is a typical scene in Humboldt Bay's salt marshes, with *Spartina* expanding and crowding out native plants.



Left: Researcher Luc Lagarde removes *Spartina*. Brushcutter blades grind up the shallow rhizomes (underground stems) of *Spartina*, resulting in mortality after just one to a few applications.



Left: The test site after mechanical treatment. Some *Spartina* was left to measure how effectively native plants can re-colonize the site.

Right: Three years after treatment the site is nearly completely restored. Native plants have rapidly re-colonized the areas where *Spartina* was removed. Only one follow up treatment was required for this site to be restored.



*Question: What are some local native species negatively impacted by invasive *Spartina*?*



Humboldt Bay Owl's Clover is a rare endemic to Northern California salt marshes, with most of the populations found in Humboldt Bay. The Owl's clover is a hemiparasite, meaning it can photosynthesize and produce its own food, but also parasitizes other salt marsh plants. The vivid pink "flowers" are in fact bracts, or specialized leaves of the plant.



Point Reyes Bird's Beak is another rare plant found only in northern California's salt marshes. Like the owl's clover, it is hemiparasitic. The presence of these plants is important in maintaining species diversity of the marsh. By suppressing more vigorous plants through parasitization, they allow weaker competitors to survive as well.

Restoring the Native Salt Marshes of Humboldt bay NWR



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Join the volunteer team removing *Spartina*! Contact the Refuge for work dates and locations.



Thank you to the Humboldt Bay Harbor, Recreation and Conservation District; California Coastal Conservancy; US Fish and Wildlife Service; Friends of the Dunes; Friends of Humboldt Bay NWR; the USFWS Coastal Program; California Conservation Corps; Ducks Unlimited, Humboldt County Sheriff Department; City of Arcata; City of Eureka; and the North Coast Resource Center for their support of the Humboldt Bay NWR *Spartina* Removal Project.