

Invasive Annual Grasses in a Coastal Dune Ecosystem



Patti Clifford, Andrea Pickart, Ellen Tatum, Kyle Wear
Humboldt Bay National Wildlife Refuge

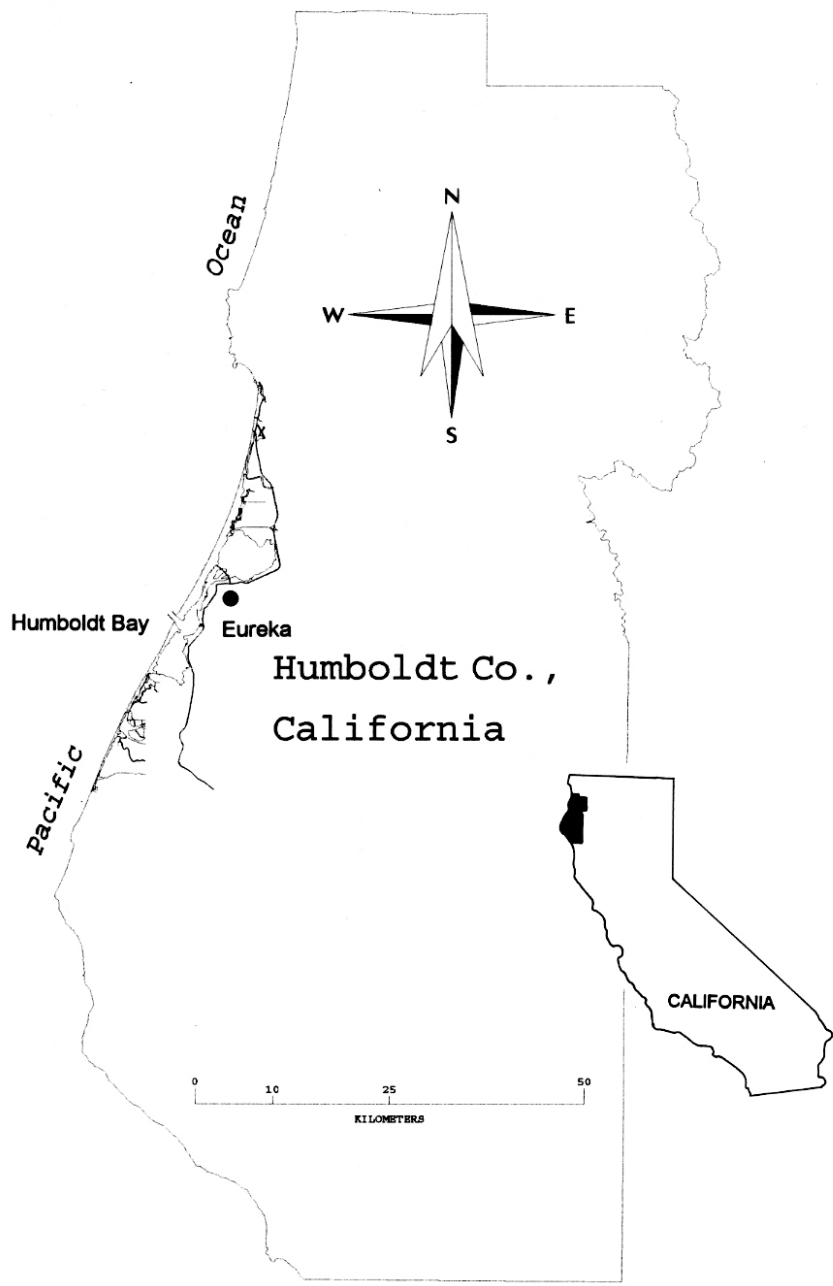




Photo: Gary Todoroff 2005



Aira praecox







Polypogon monspeliensis





Briza maxima



Bromus diandrus



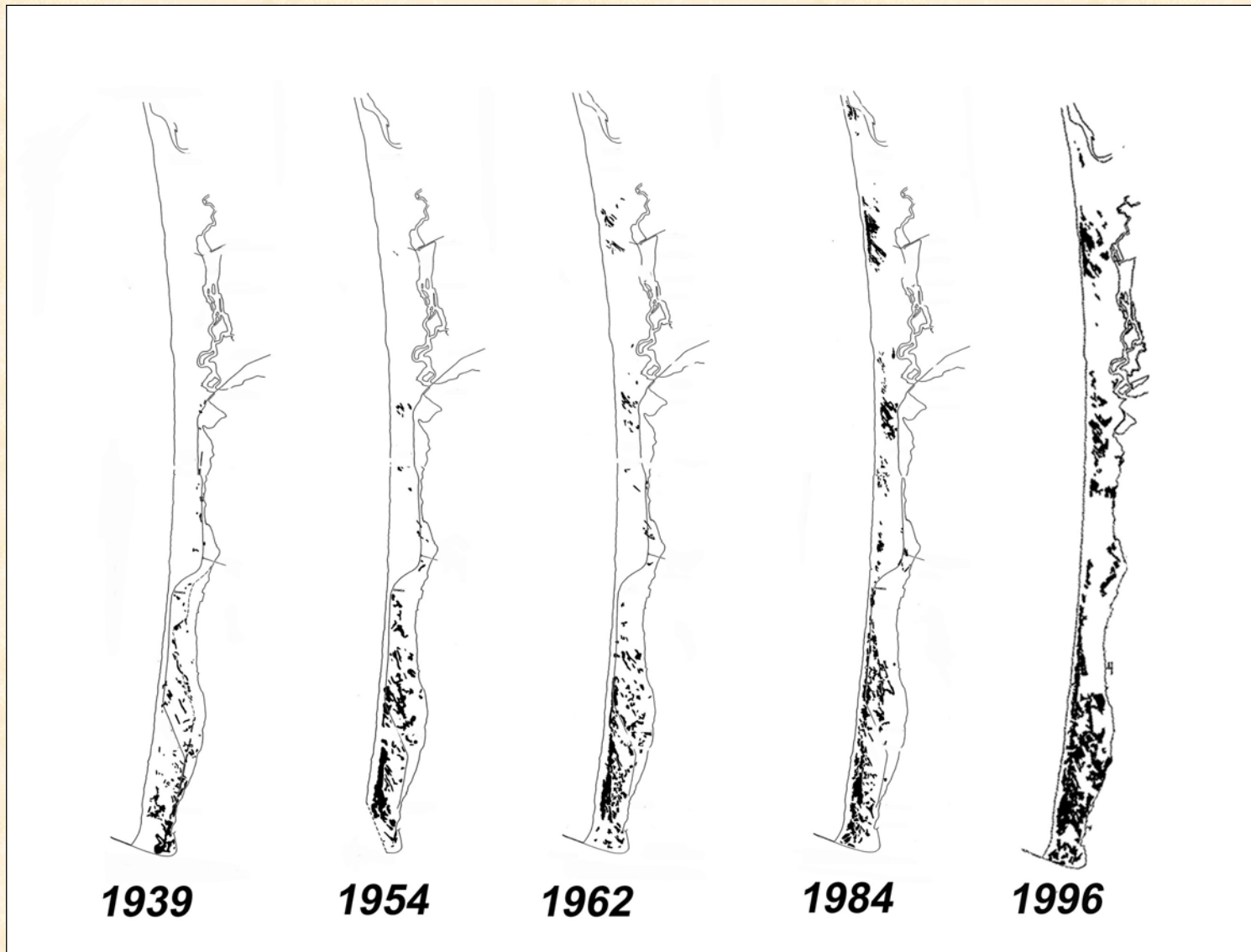






Annual grasses beneath a
dead Lupine bush

Spread of *Lupinus arboreus* on the North Spit of Humboldt Bay



Sources: Miller 1987, Aria 1996

1990's *Briza maxima*, *Bromus diandrus*, *Vulpia bromoides*



Vulpia bromoides



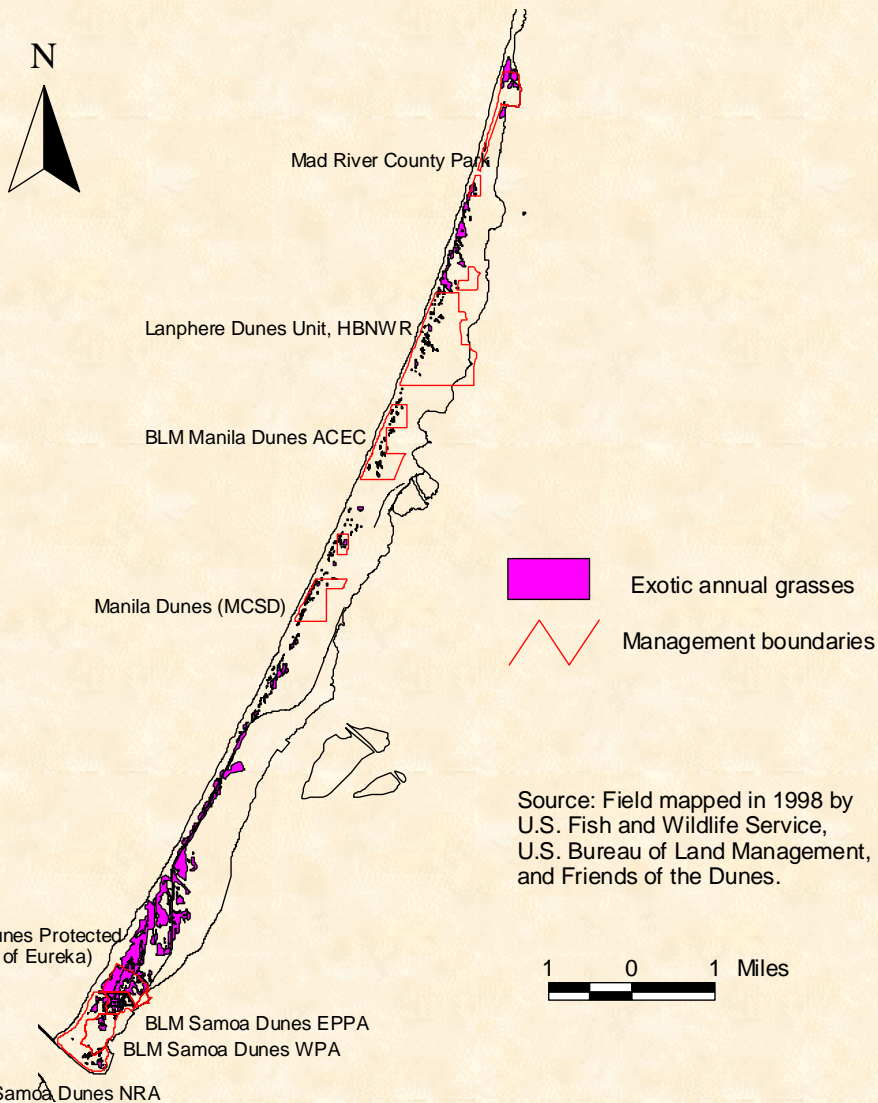




1996 Experimental Manual Removal of *Briza maxima* at the Lanphere Dunes Unit

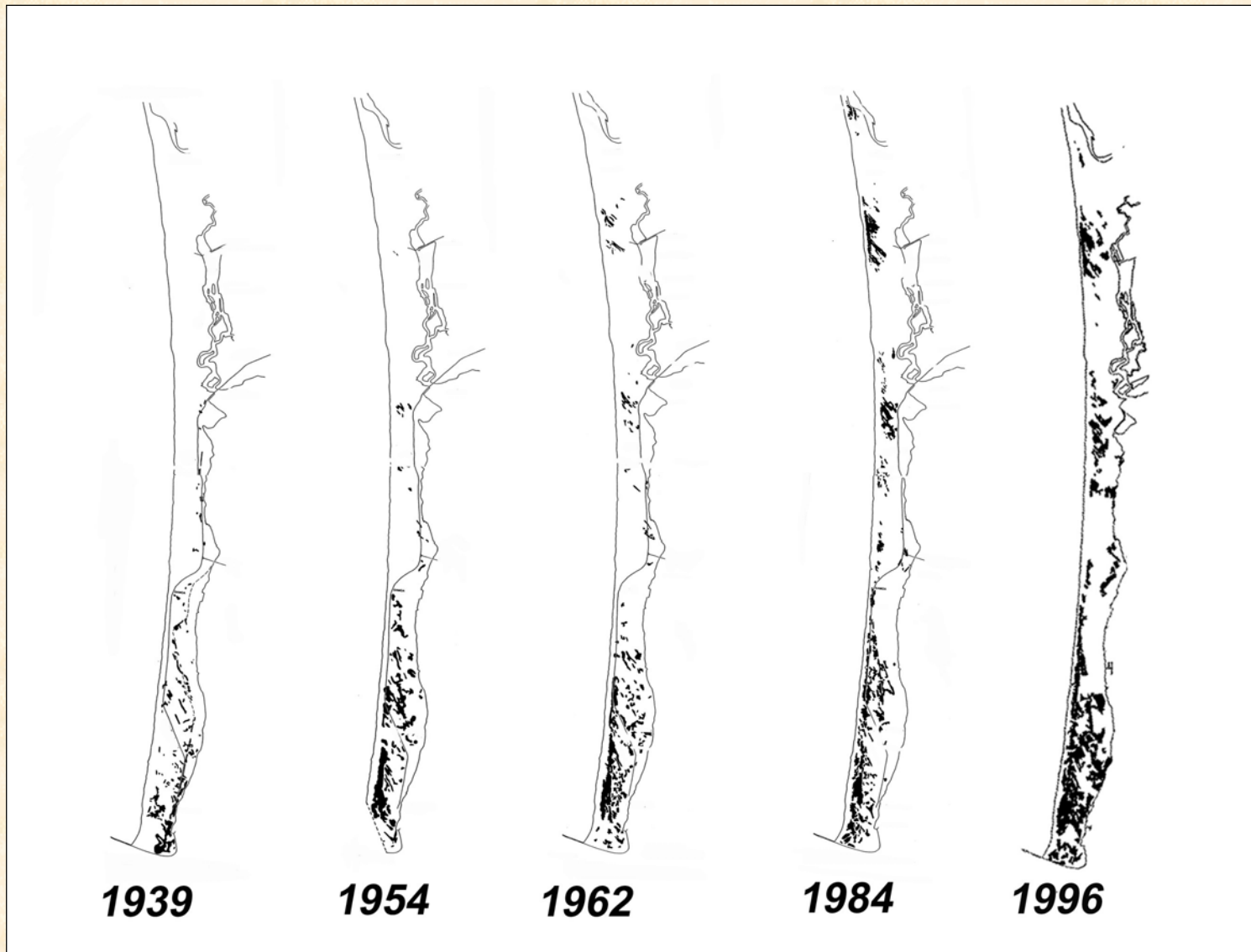


Distribution of exotic annual grasses on the North Spit, Humboldt Bay, 1998



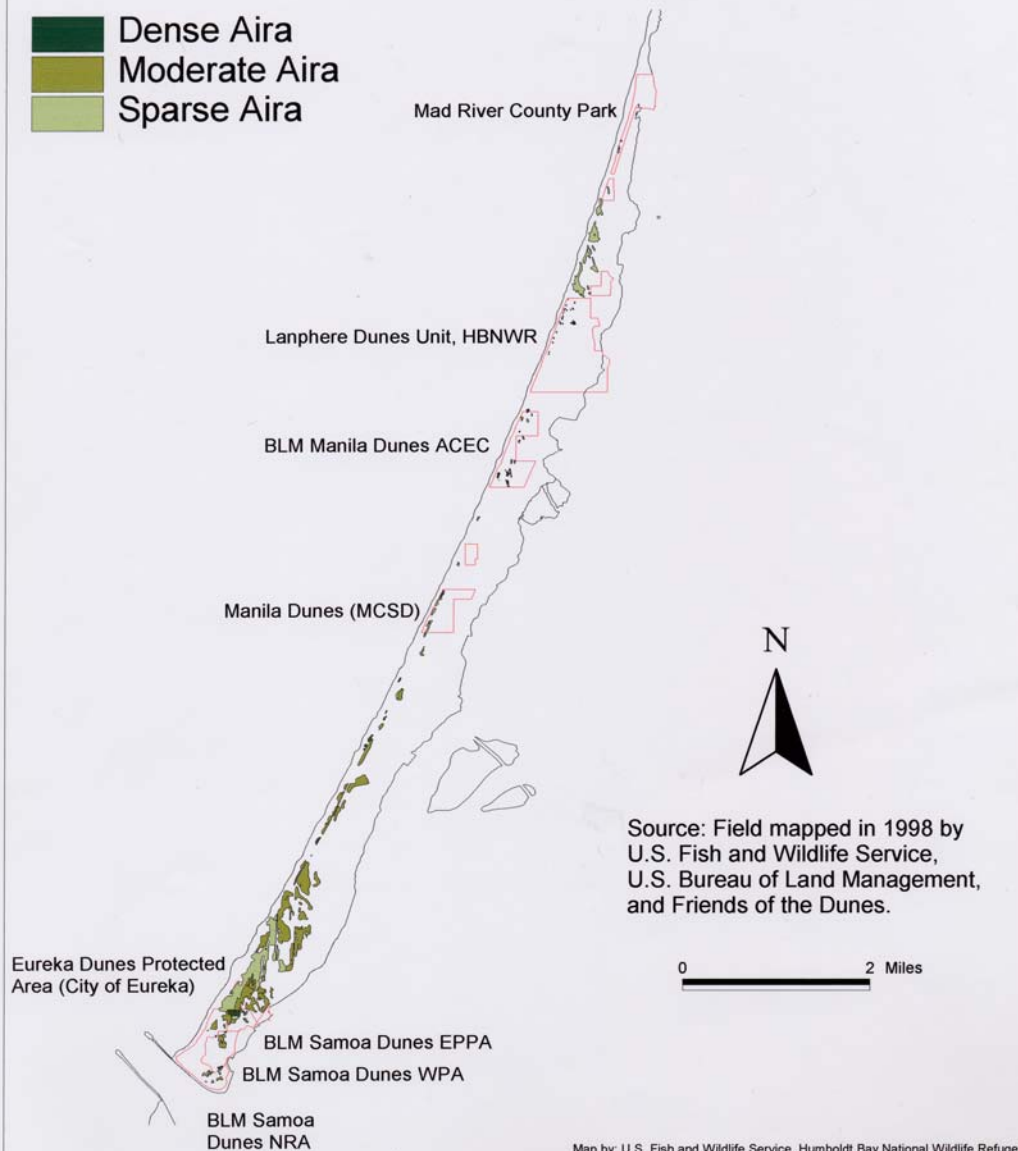
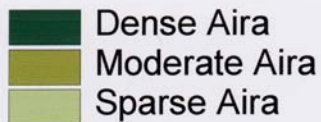
221 hectares
(546 acres)

Spread of *Lupinus arboreus* on the North Spit of Humboldt Bay



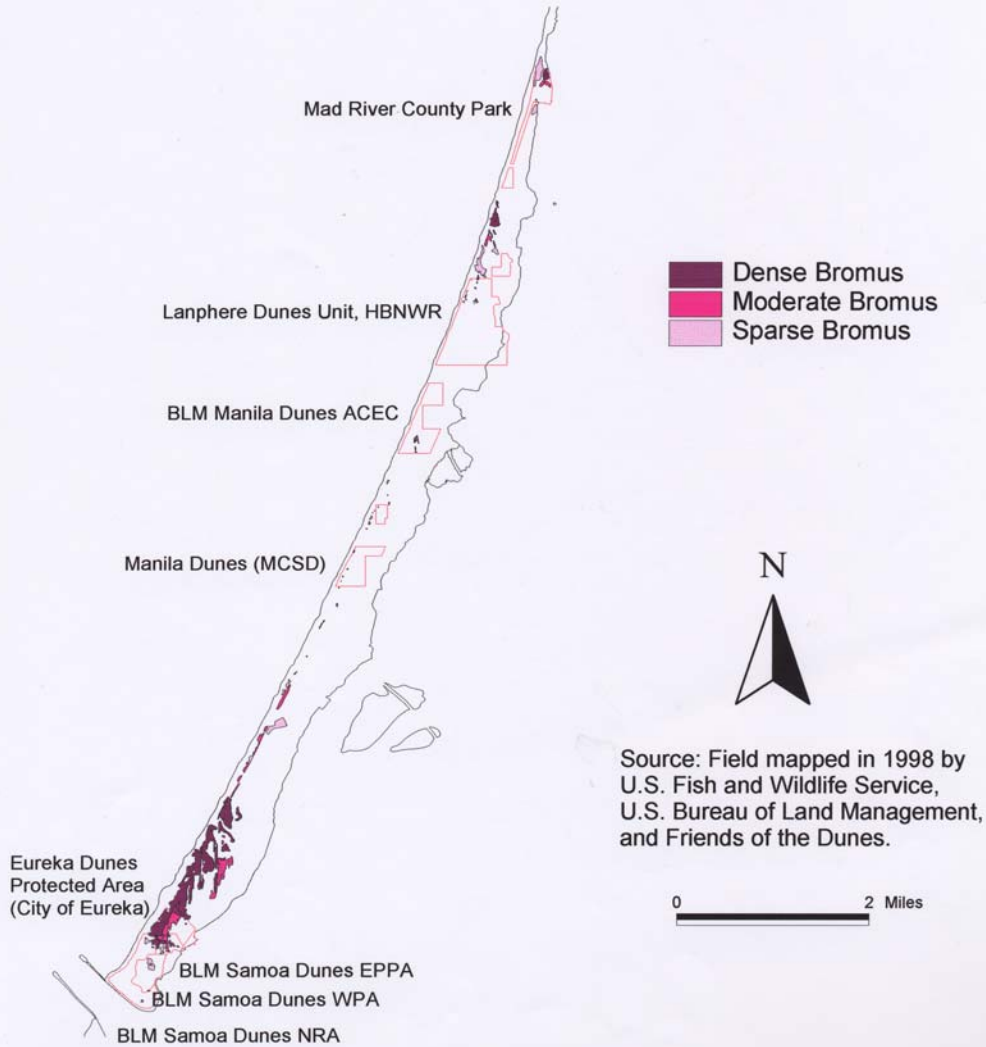
Sources: Miller 1987, Aria 1996

Distribution of *Aira* spp. on the North Spit, Humboldt Bay, 1998



162 hectares
(400 acres)

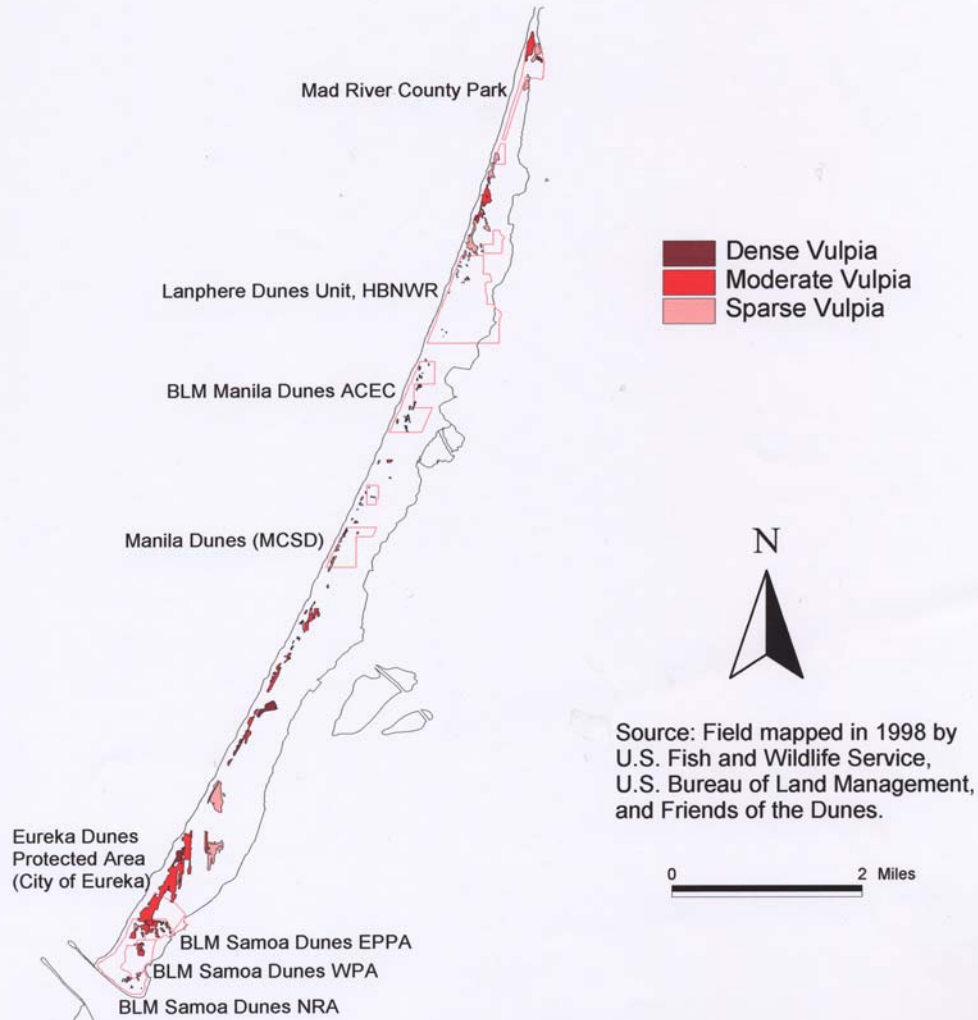
Distribution of Bromus spp. on the North Spit, Humboldt Bay, 1998



Source: Field mapped in 1998 by U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and Friends of the Dunes.

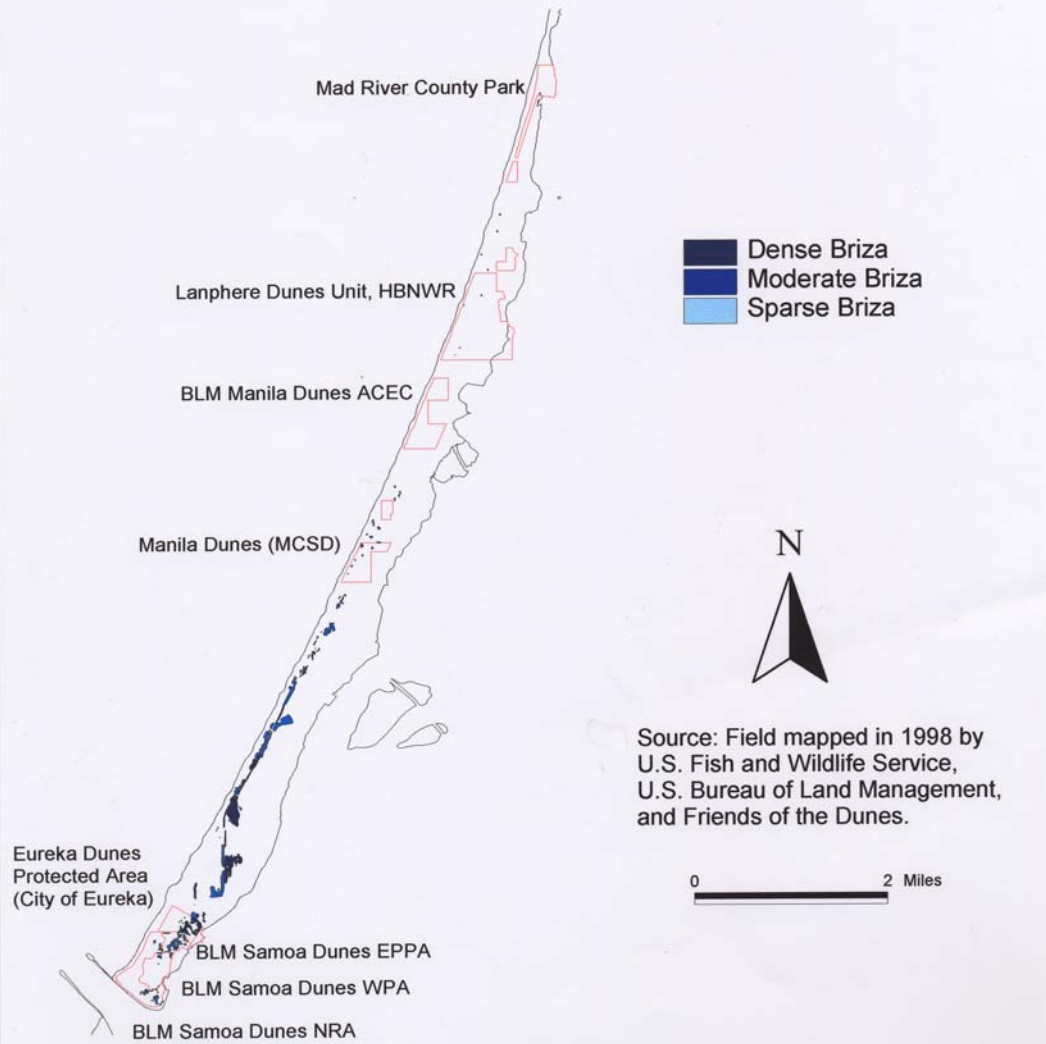
154 hectares
(380 acres)

Distribution of *Vulpia bromoides* on the North Spit, Humboldt Bay, 1998



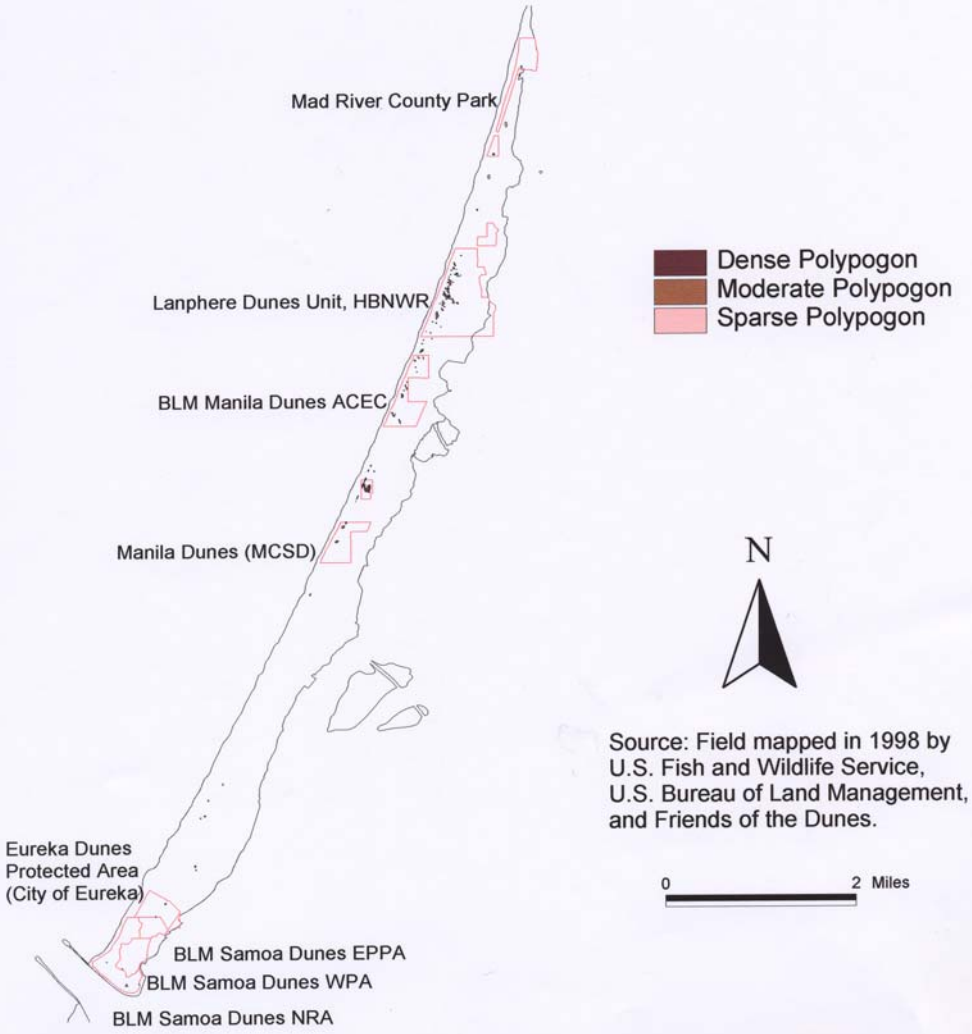
138 hectares
(340 acres)

Distribution of *Briza* spp. on the North Spit, Humboldt Bay, 1998



74 hectares
(183 acres)

Distribution of Polypogon spp. on the North Spit, Humboldt Bay, 1998



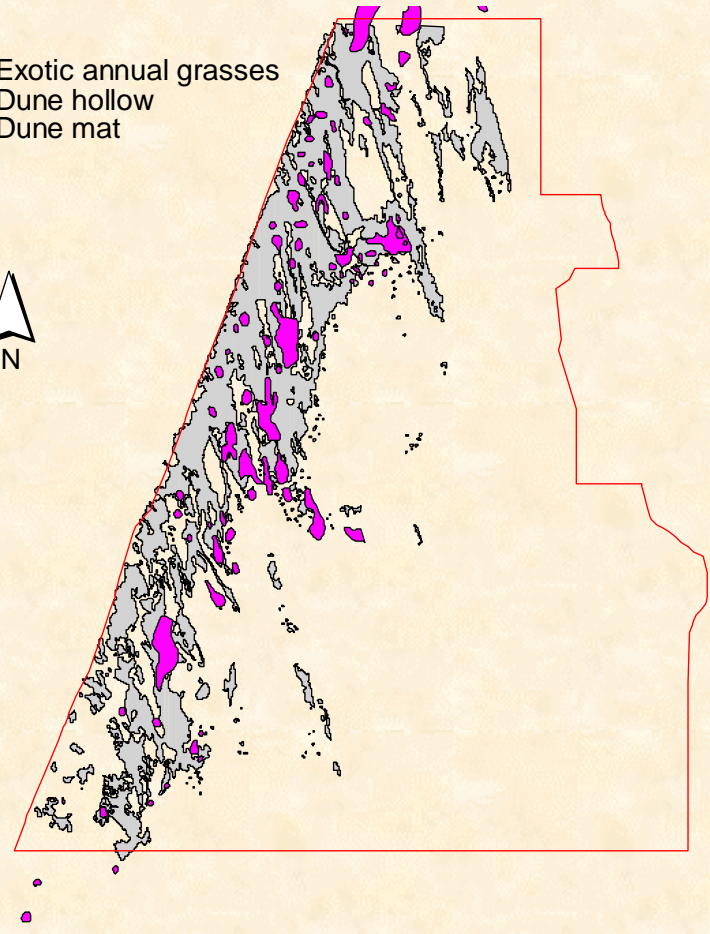
Source: Field mapped in 1998 by
U.S. Fish and Wildlife Service,
U.S. Bureau of Land Management,
and Friends of the Dunes.

Map by: U.S. Fish and Wildlife Service, Humboldt Bay National Wildlife Refuge

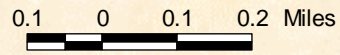
8 hectares
(19 acres)

Exotic annual grasses on the Lanphere Dunes Unit 1998

- Exotic annual grasses
- Dune hollow
- Dune mat



188 hectares
(465 acres)



Source: US Fish and Wildlife Service,
Humboldt Bay National Wildlife Refuge

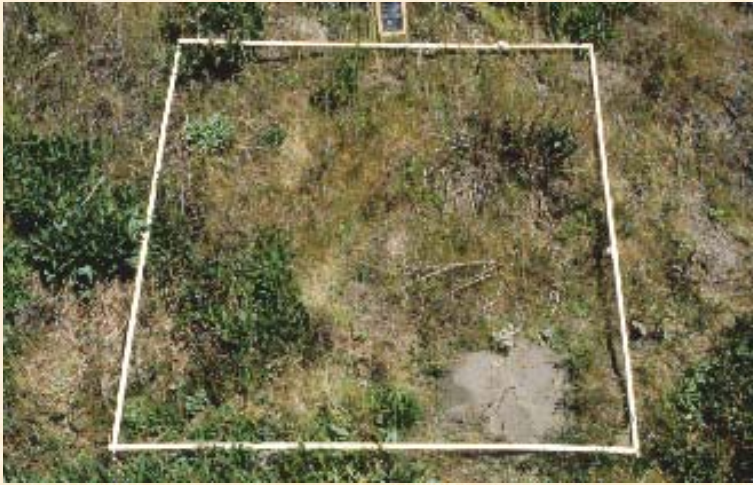
1998 Invasive Annual Grass Restoration/Removal Experiment at Manila Dunes and Lanphere Dunes.

Objective: Comparison of 4 methods: handpulling, burning, weedeating, duff removal for invasive annual grass control

Methods: 40 2x2 meter plots established in moderately impacted areas.

Burn Treatment

1999



Before

2000



After

Control

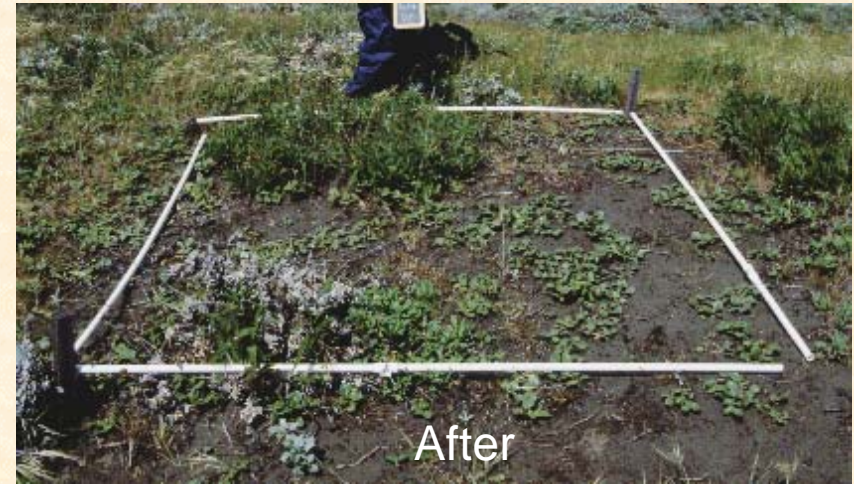


1999

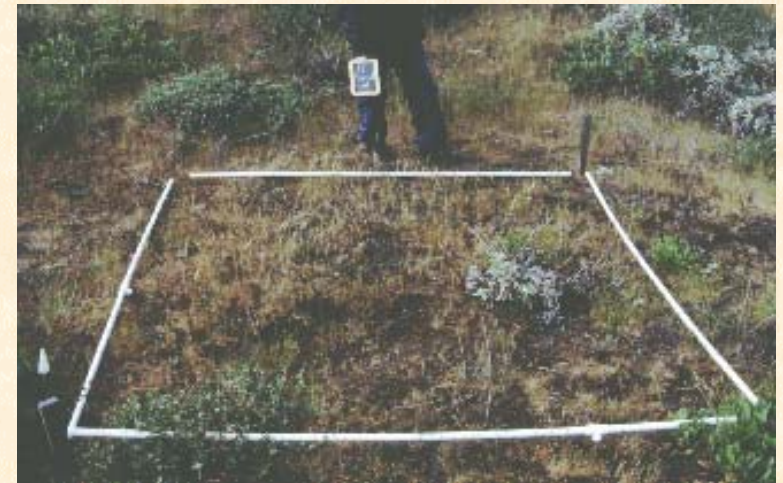


2000

Duff Removal



Handpull



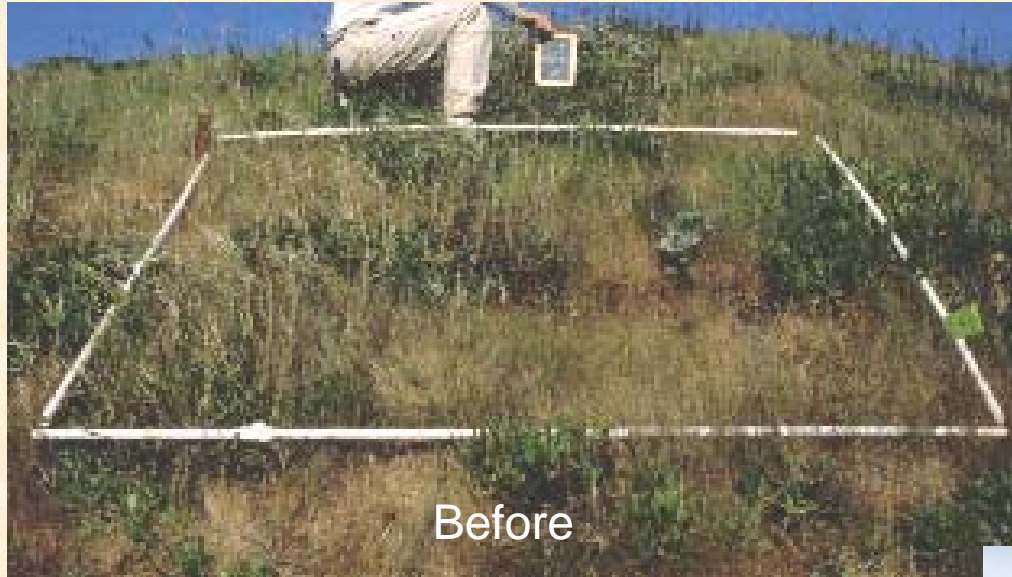


Duff layer

Handpulling



Weedeating

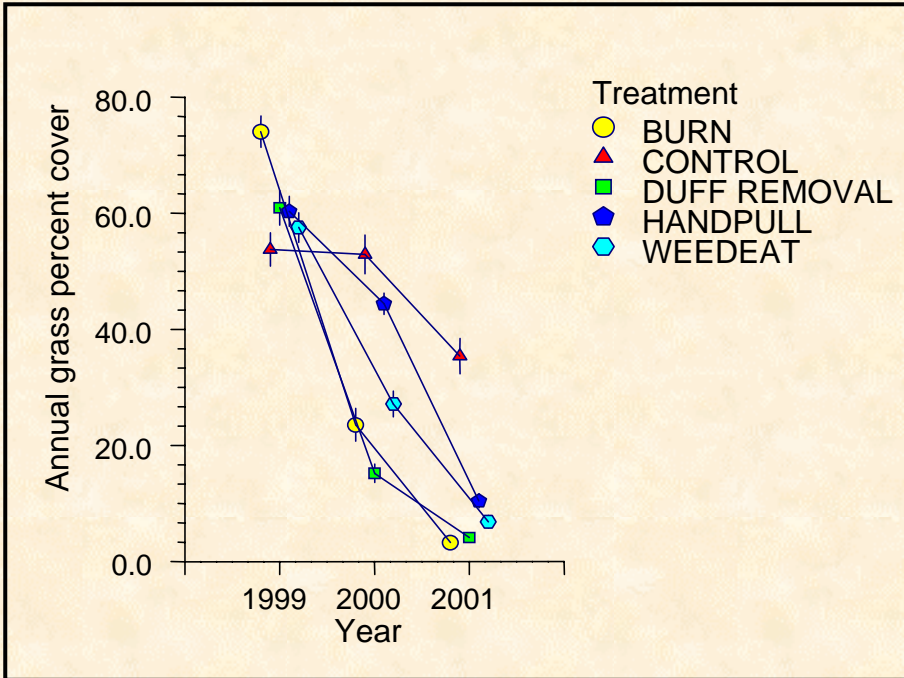


Before



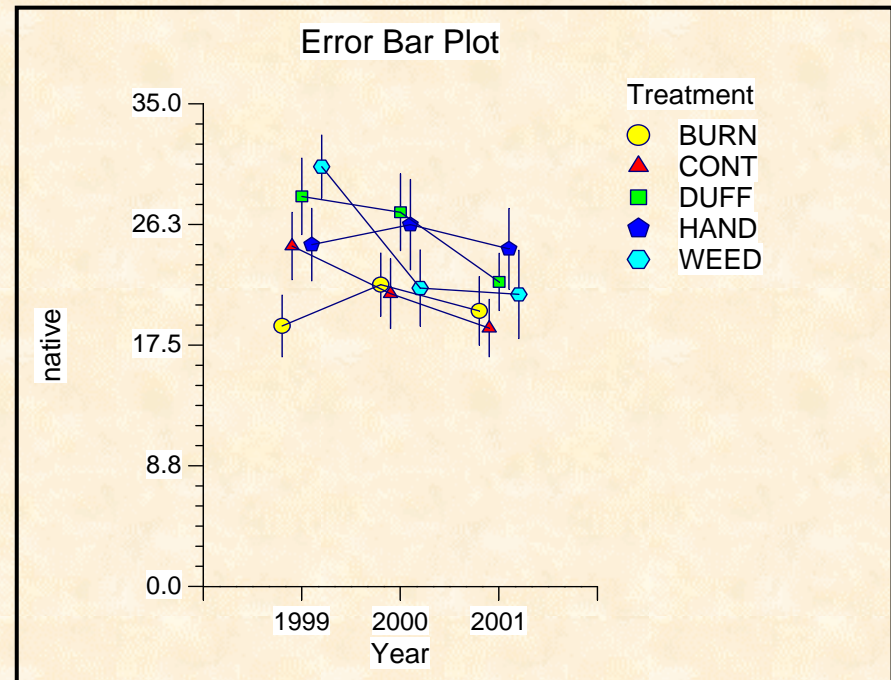
After

Results

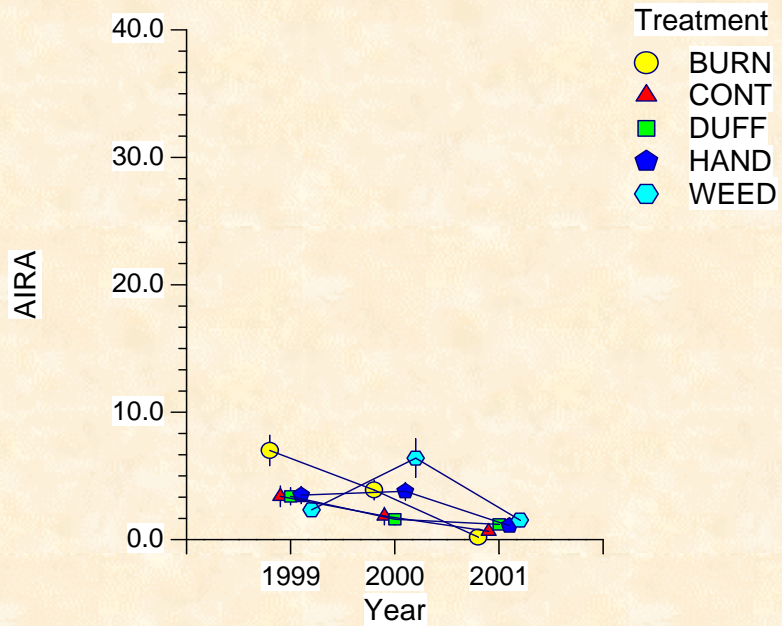


All treatments significantly decreased cover when grasses lumped.

No significant changes to native cover.



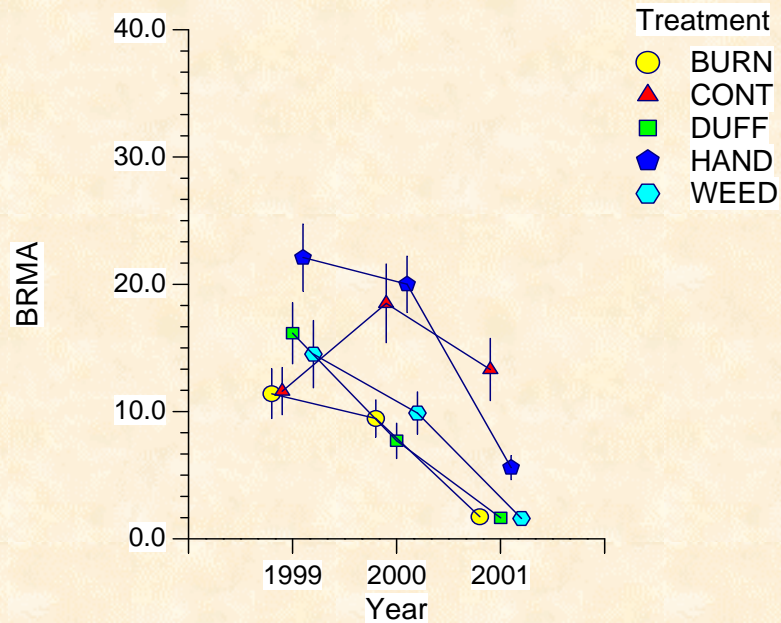
Error Bar Plot



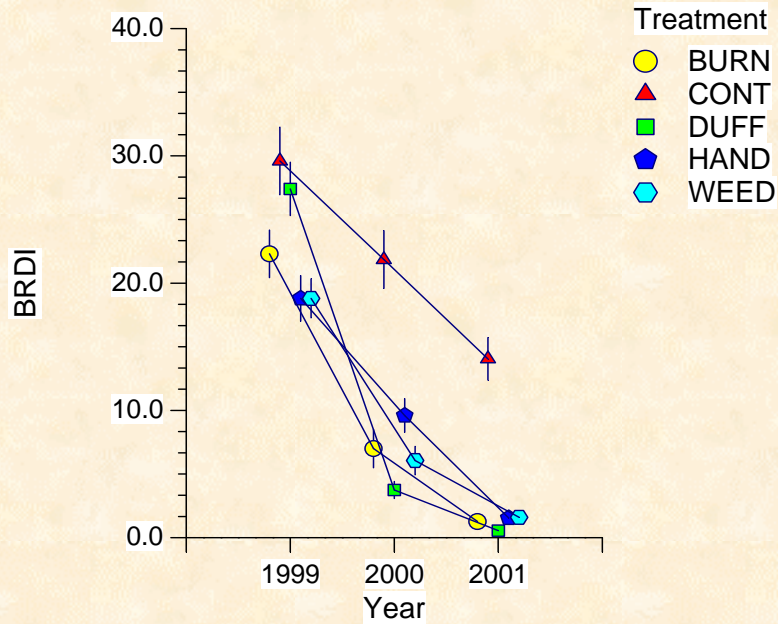
Burning only treatment where cover decreased significantly.

Cover significantly decreased in all treatments except control.

Error Bar Plot



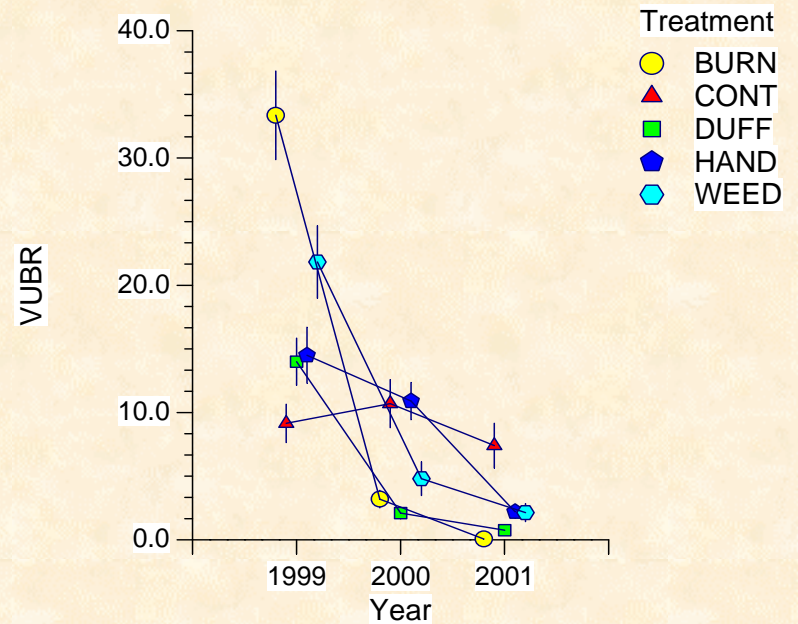
Error Bar Plot



Cover significantly decreased in all treatments except control

Cover significantly decreased in all treatments except control

Error Bar Plot



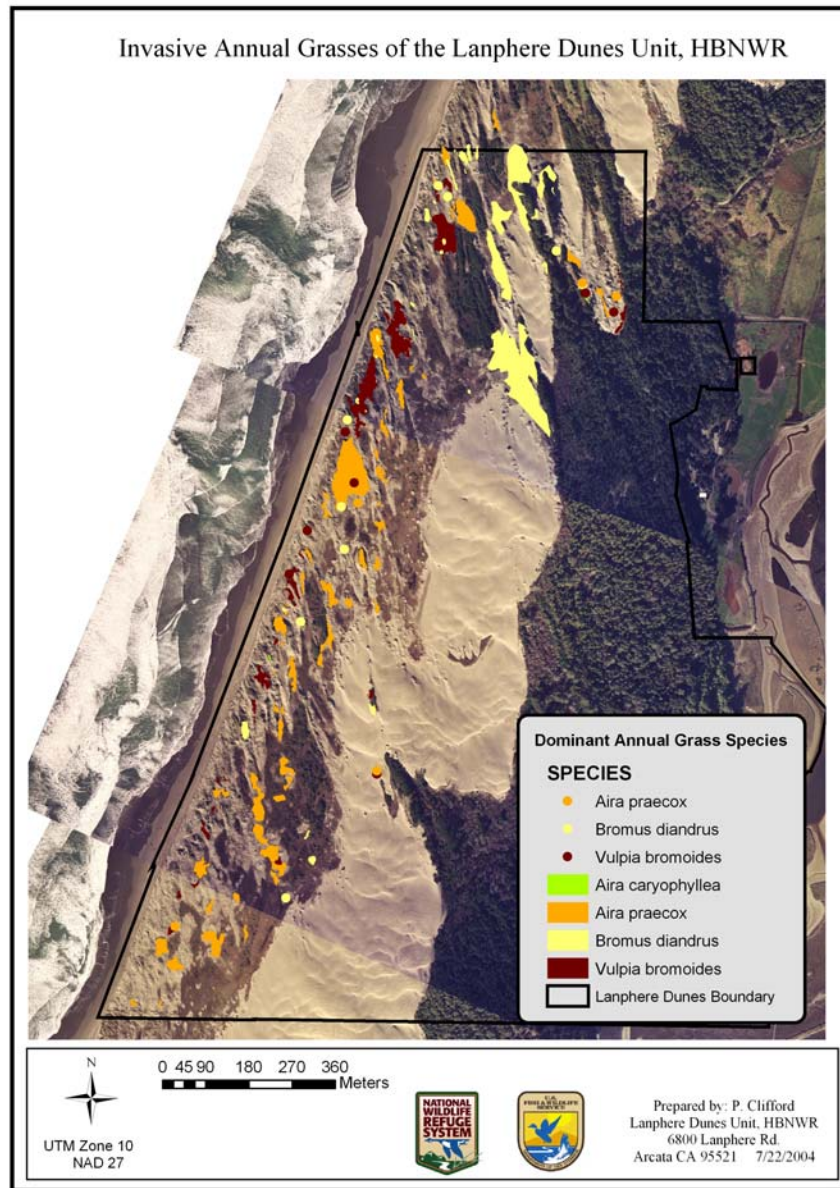
Discussion

- Labor Required for each treatment varied.
 - duff removal – 1 hour +
 - hand pulling – 30 minutes to 1 hour
 - burning – 10 to 15 minutes
 - weedeating – 10 to 15 minutes (one person)
- No single best treatment for removing annual grasses on the North Spit
- Endangered species, density of grasses, vicinity to forest



Humboldt Bay wallflower
(*Erysimum menziesii* ssp. *eurekaense*)

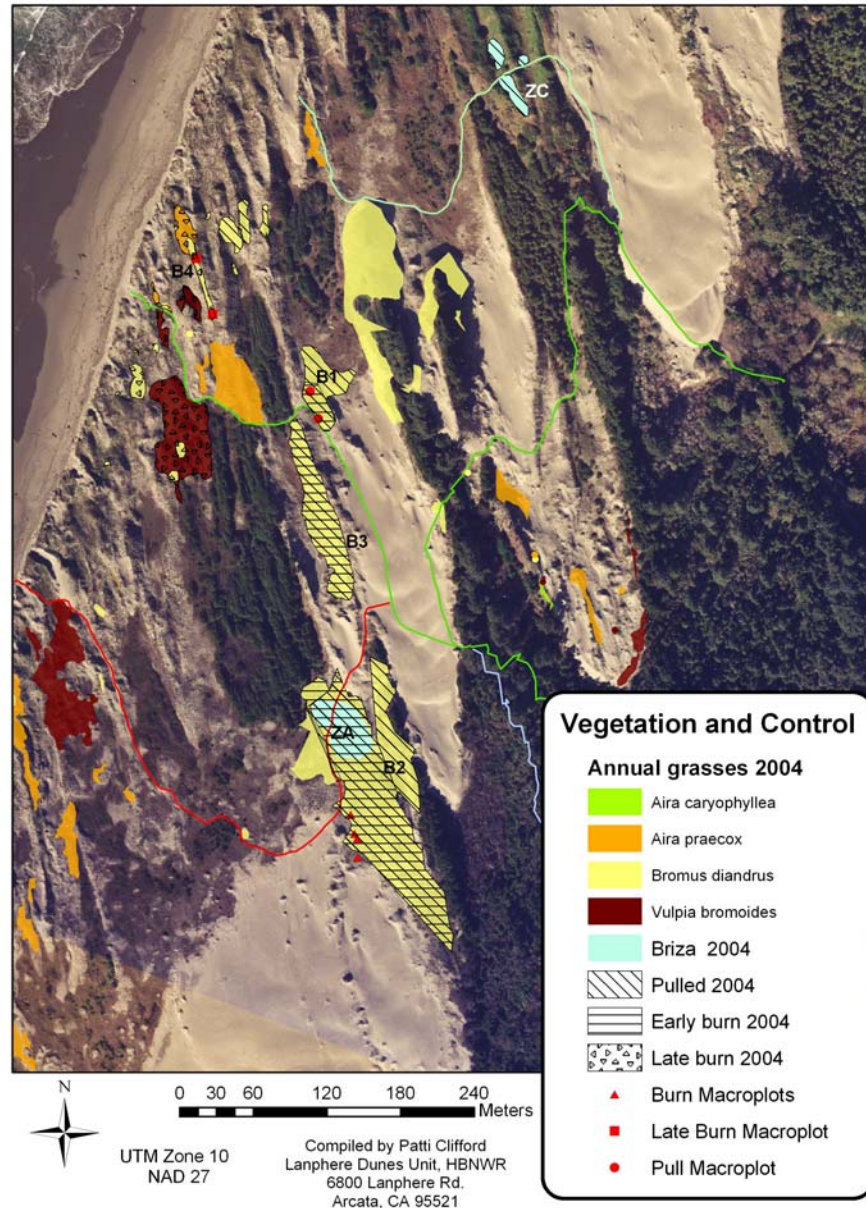
2002 Annual Grass Strategy at Lanphere Dunes



2003 Flaming Experiment at Lanphere Dunes Unit

- Effects on natives and invasives at a larger scale
- Determine most effective season

Annual Grass Distribution & Control Lanphere Dunes Unit 2004, Northern Map



Handpulling and Flaming



Before any control 2003



Before 2005 control after 2 years
pulling/burning





Biotic Soil Crusts

false pixie cup
(Cladonia chlorophaeta)

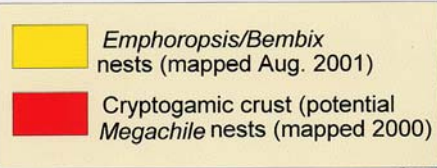


Didymodon vinealis

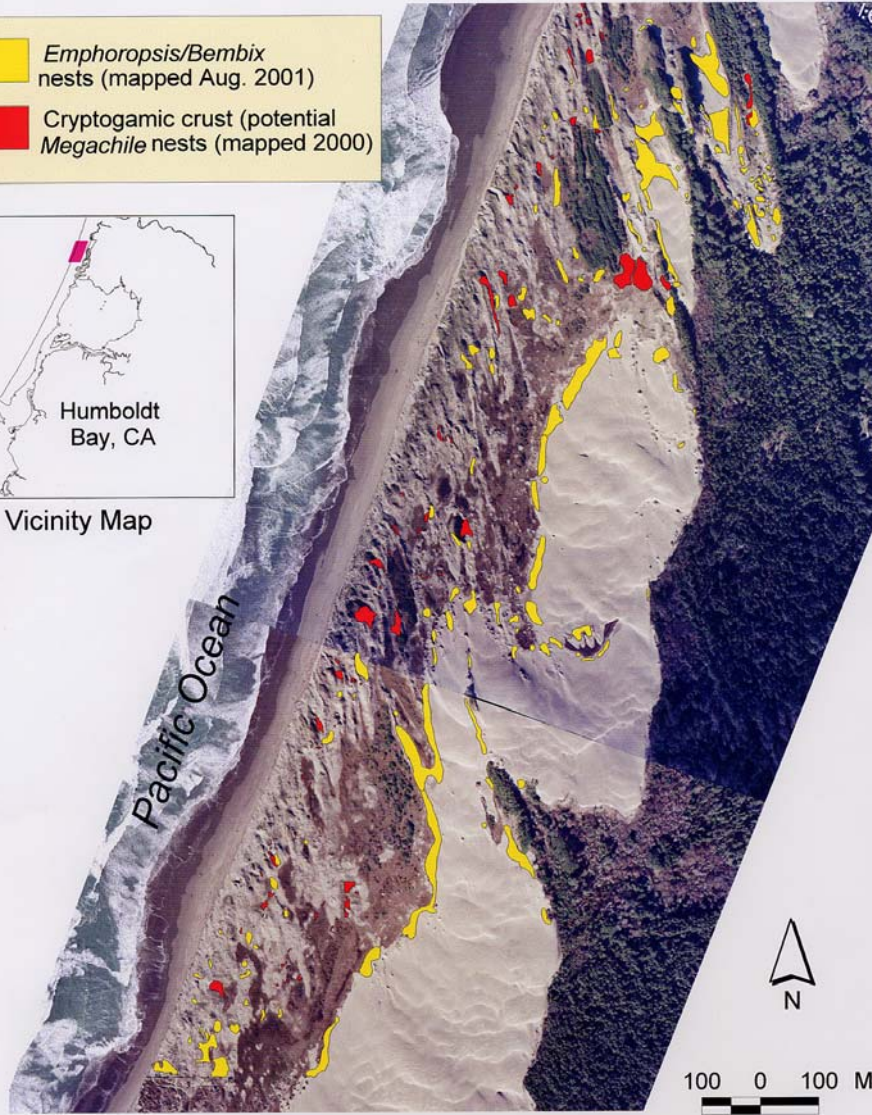
Impacts of flaming one year later



Solitary Bee and Wasp Nest Aggregations



Vicinity Map

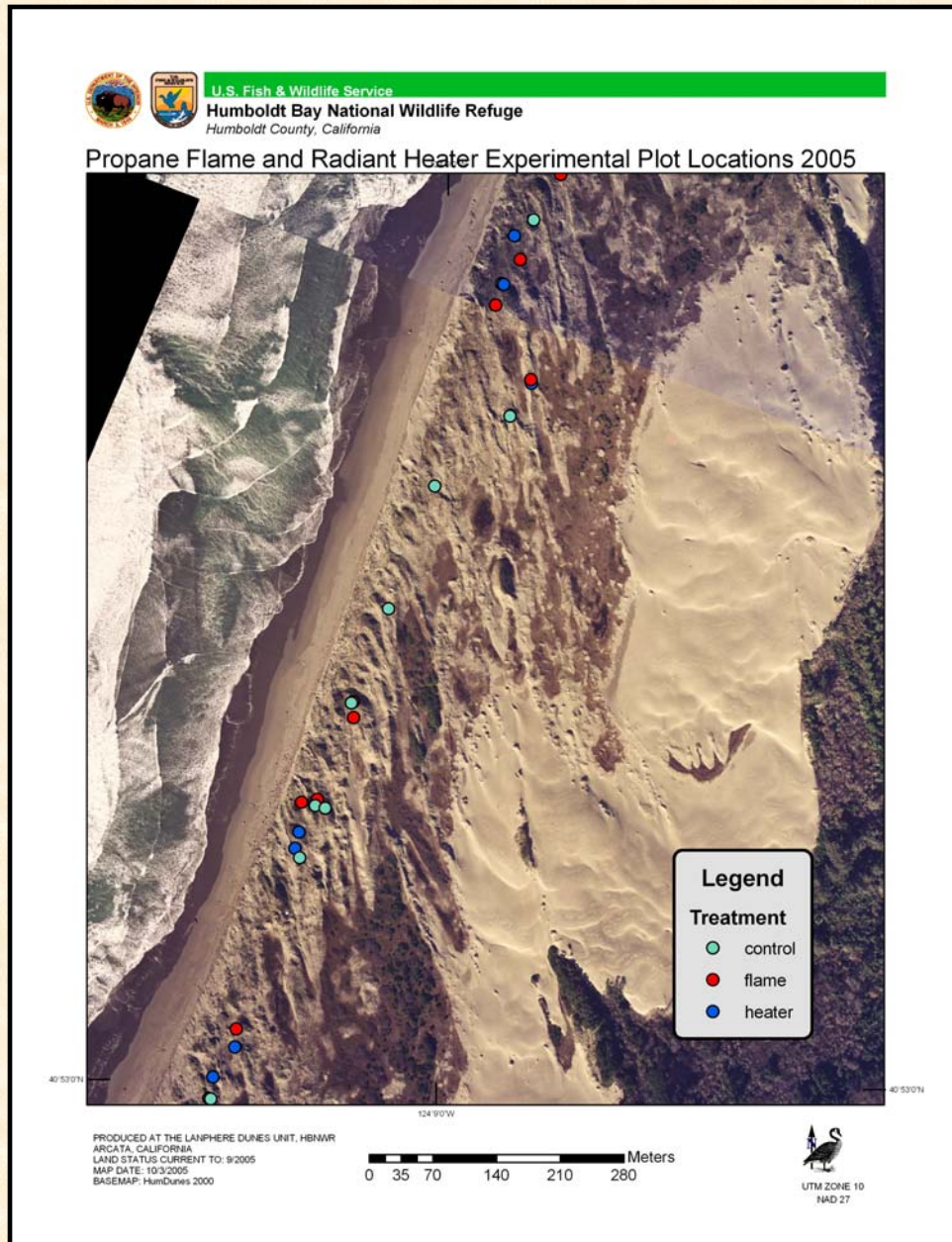


Lanphere Dunes Unit, Humboldt Bay NWR



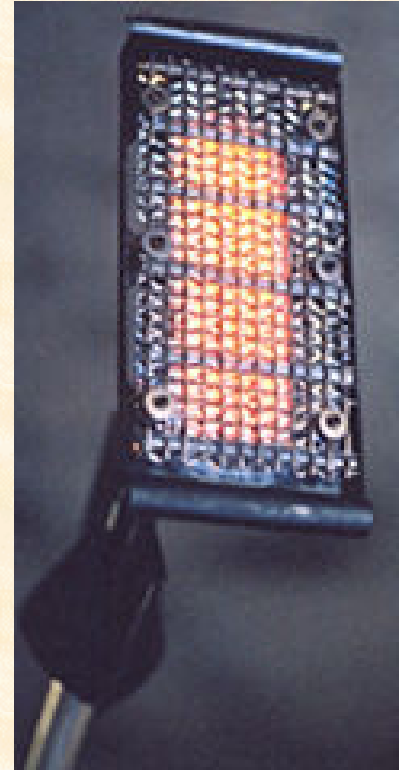
Megachile wheeleri

2005 Flaming and Radiant Heater Experiment





Radiant heater



Acknowledgements

Andrea Pickart, Kyle Wear, Susan Nyoka, Doug Glavich, Abe Walston, Emily Walter, Carrie Sendak, Ellen Tatum, and all the other folks that have helped to control these invasive species on the North Spit.

