Restoration of native coastal salt marsh and dune mat communities at the Ocean Ranch Unit of the Eel River Wildlife Area, Humboldt County, California

Northern California Botanists Symposium

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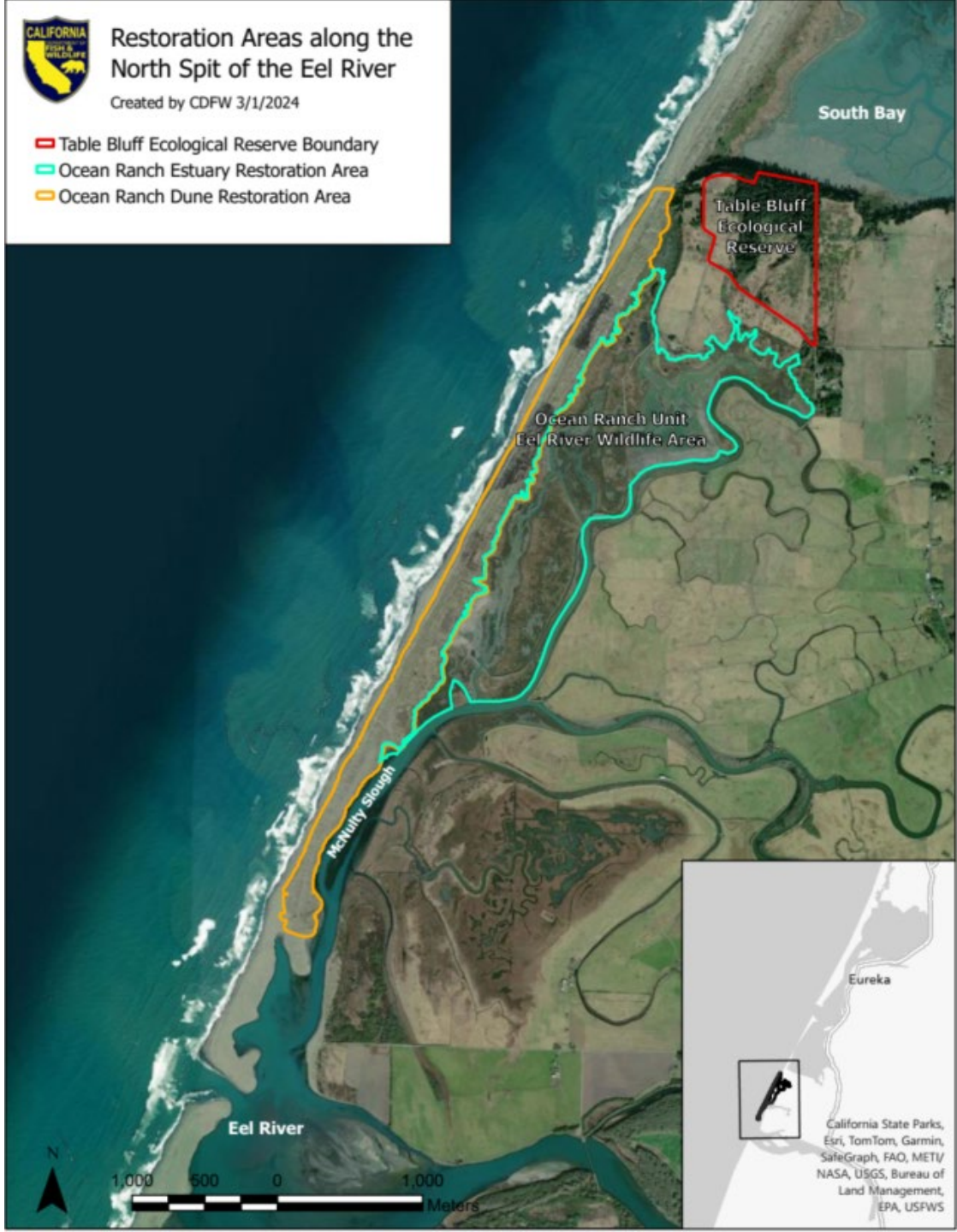
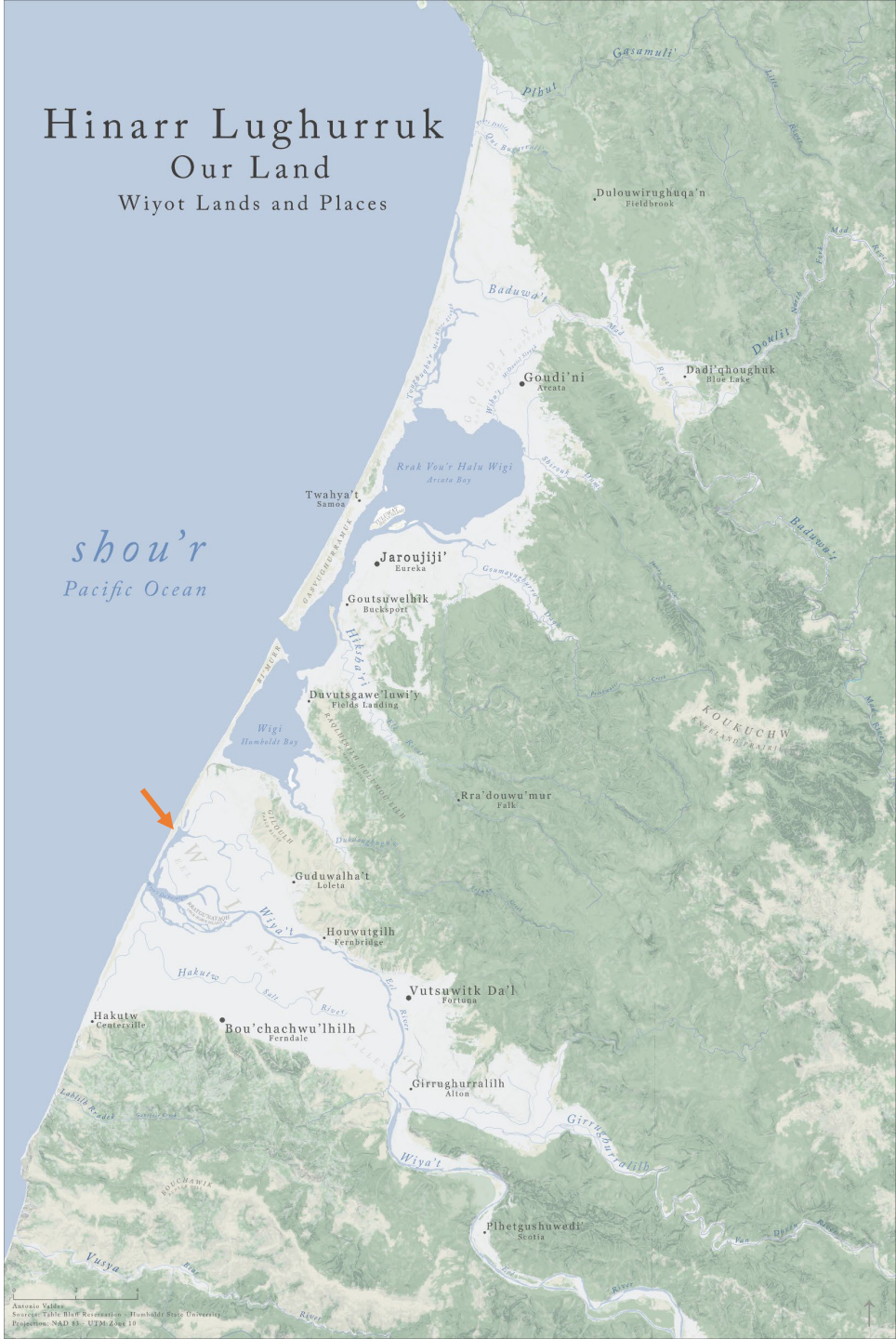
Locations

- Ocean Ranch Unit of the Eel River Wildlife Area
  - 850 acres
  - Estuarine - 571 acres
  - Dune Restoration -279 acres



Wiyot Ancestral Territory

- Central coastal location along an important water resource, *Wiya't* (Eel River)
- Wiyot Tribe an important partner contributing to fisheries monitoring



Ocean Ranch Restoration Project

- **Goal 1** - To restore and expand natural **estuarine function** and **habitat**
- **Goal 2** - To restore natural **dune function** and **habitat** for native species

Ocean Ranch Restoration Team


Native Salt Marsh
Pickleweed (*Salicornia pacifica*) Herbaceous Alliance Sensitive Natural Community (S3G4)

Humboldt Bay Owl's Clover (*Castilleja ambigua* ssp. *humboldtiensis*) 1B.2

Point Reyes Bird's Beak (*Chloropyron maritimum* ssp. *palustre*) 1B.2

Lyngbye's Sedge (*Carex lyngbyei*) 2B.2

Sea-watch (*Angelica lucida*) 4.2

Rare Salt Marsh Plants

Dense-flowered Cordgrass (*Spartina densiflora*)

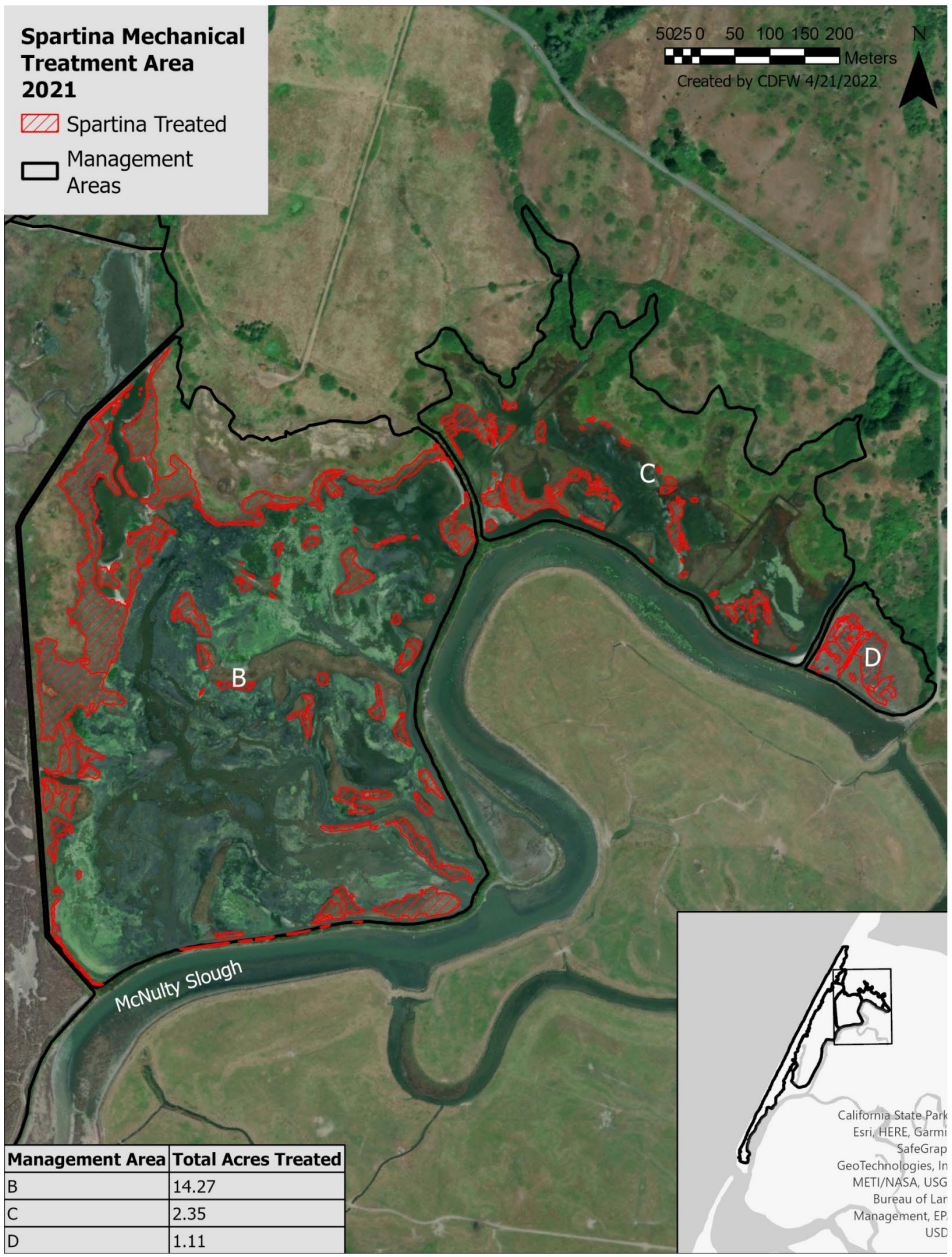
Cal-IPC High Invasive Rating

- Approximately 300 acres of salt marsh invaded
- 193 acres of medium to high density Spartina (26-100% cover)
- Removing invasive Spartina by mechanical grinding with heavy equipment and brushcutters and herbicide application via backpack sprayer

Mechanical Treatment – 18 acres

- Heavy Equipment

- Brushcutters



Management Area	Total Acres Treated
B	14.27
C	2.35
D	1.11

Spartina Heavy Equipment Grinding 2021

Herbicide (Imazapyr)

- Low toxicity to fish, birds, insects, mammals, and aquatic invertebrates
- Blocks plant growth pathway
- Photodegrades rapidly in water, non-detectable in an average of 40 hours (Patten 2003)

Biomass Removal

- Burning, digging, or mowing
- Imazapyr effects may be sublethal and plants may recover if not combined with biomass removal
- An initial trial of burning prior to herbicide was not successful

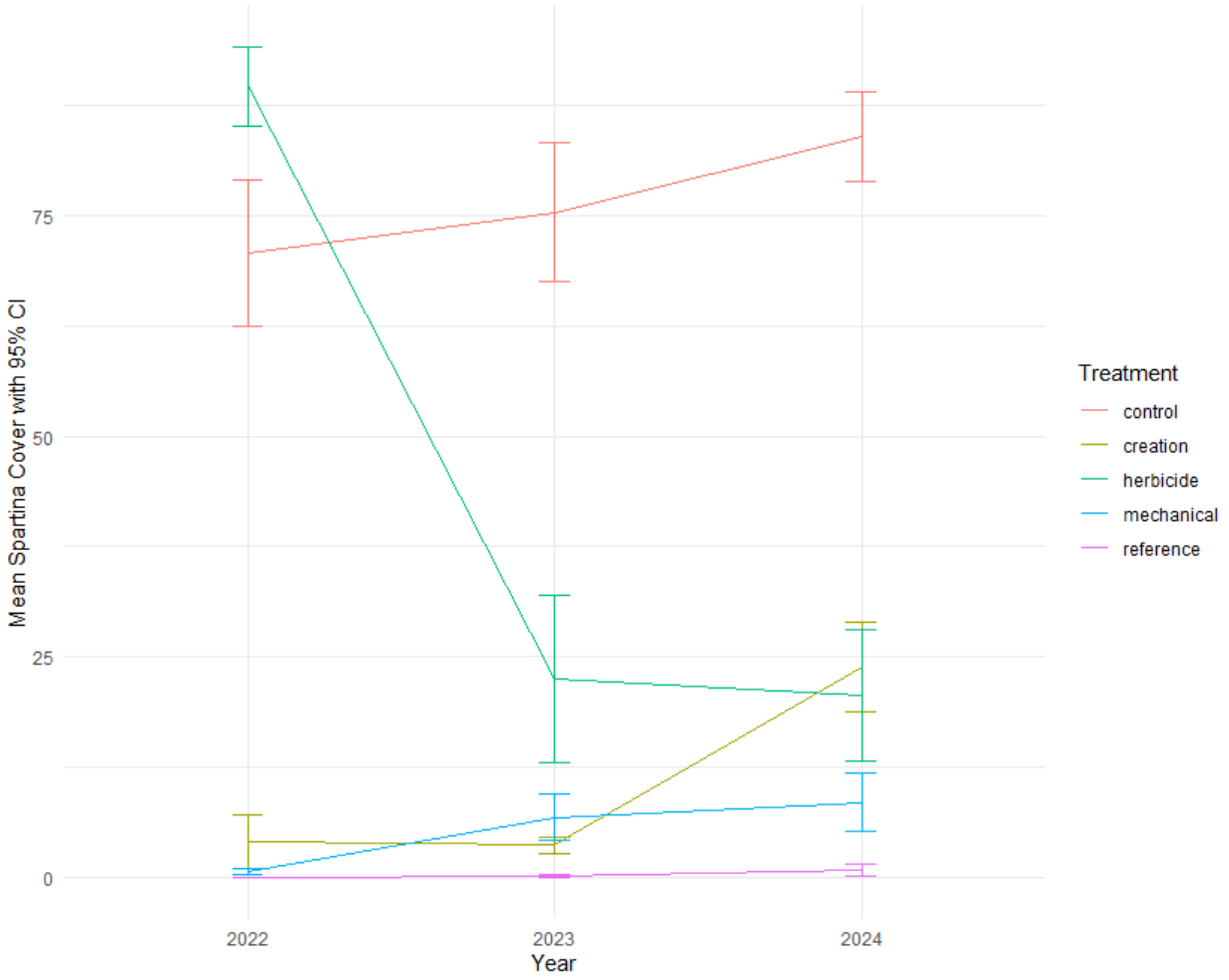

Herbicide Plot Photo 8/17/2023
Sprayed 11 acres in August 2022

High Marsh Creation 2022

High Marsh Creation Photo 8/17/2023

Mean Spartina Cover

- All treatments had significantly lower Spartina cover than the untreated control
- Treatments intermediate between invaded control and native reference levels
- Mechanical treatment and high marsh creation significantly more effective than herbicide alone after one year
- Spartina cover increased significantly in marsh creation areas after two years



Mean Native Salt Marsh Cover

- Mechanical treatment began the earliest in 2021 and has shown significant native vegetation regrowth.

Salt Marsh Restoration Summary

Initial Successes

- All treatments reduced Spartina cover
- Mechanical treatment reduced Spartina cover by 90%, and native cover and richness are increasing

Challenges

- Need to hold the line
- Remaining biomass and regrowth in herbicide treatment area
- Access to remaining salt marsh

Dune Restoration

- Removing invasive European beachgrass (*Ammophila arenaria*) to gradually restore form and function
- 219 acres of invaded dunes

Dune Mat Sensitive Natural Community

Abronia latifolia - Ambrosia chamissonis

Herbaceous Alliance (S3 G3)

Beach Layia (*Layia carnosa*) Federally Threatened/State Endangered, 1B.1

Short-leaved Evax (*Hesperevax sparsiflora* var. *brevifolia*) 1B.2

Dark-eyed Gilia (*Gilia millefoliata*) 1B.2


European beachgrass
(*Ammophila arenaria)*
Cal-IPC High Invasive Rating


Invaded Control

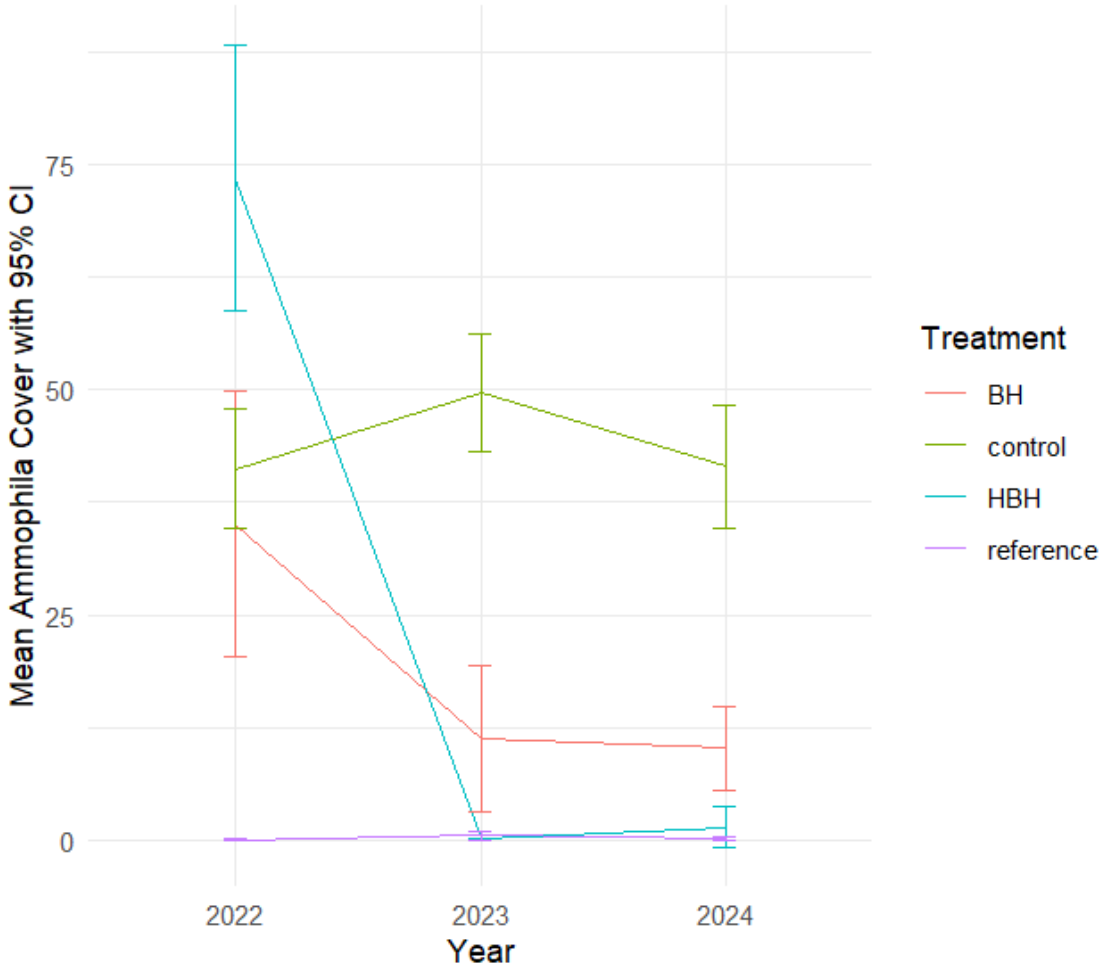

Herbicide (Imazapyr)


Native Reference Dune Mat


Burn

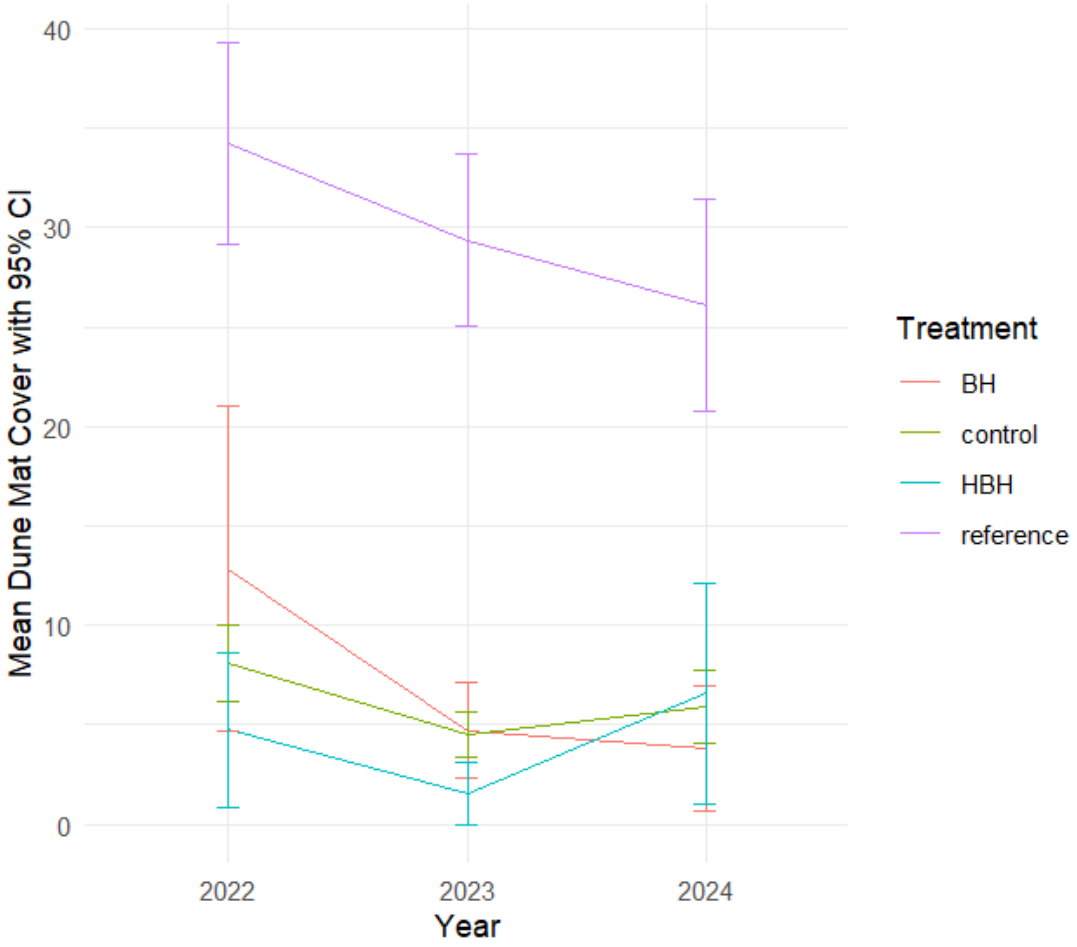
Ammophila Cover 2022-2024

- Herbicide then Burn with Herbicide follow-up (HBH) treatment reduced Ammophila cover to ~1%, equivalent to Reference
- Burn then Herbicide (BH) reduced it to ~10%



Native Dune Mat Cover 2022-2024

- Burn then Herbicide (BH), Herbicide then Burn with Herbicide follow-up (HBH), and Control have similarly low native dune mat cover
- More time is likely needed for native vegetation to recover




Pre-Treatment 5/25/2022


Herbicide then Burn
12/23/2022


Herbicide then Burn
4/12/2023


Herbicide then Burn, 2nd Yr
Herbicide 4/25/2024


Pre-Treatment 5/25/2022


Burn Only 11/15/2022


Burned, During Herbicide
8/29/2023


Burn, Herbicide 4/29/2024

Dune Restoration Summary

- Herbicide then Burn highly effective in reducing Ammophila cover
- Burn then Herbicide less effective
- 92.3 acres treated as of October 2024
- Follow-up treatments to continue

Thank you!

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Questions?

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