

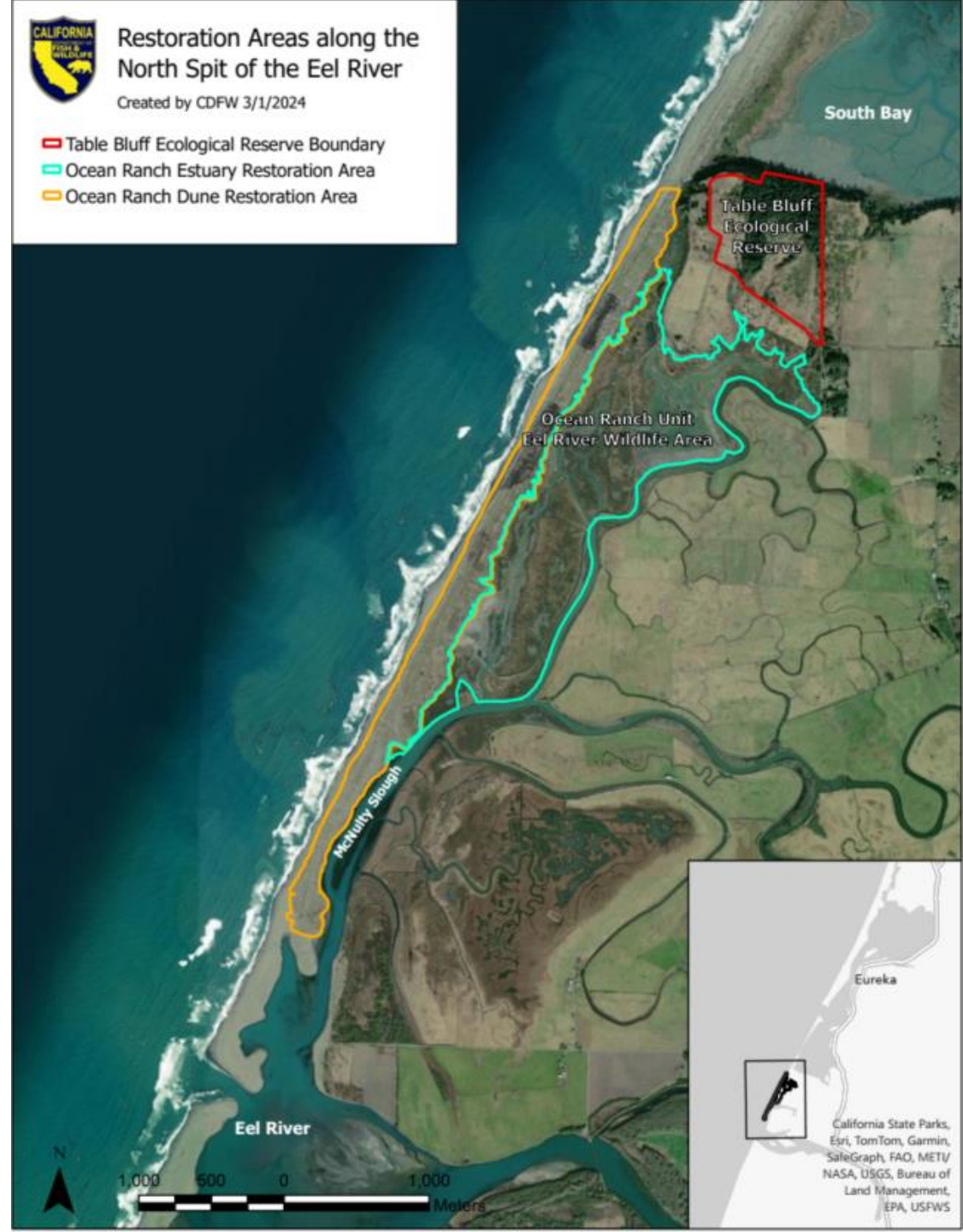
Restoration of coastal dunes and salt marsh at the Ocean Ranch Unit of the Eel River Wildlife Area, Humboldt County

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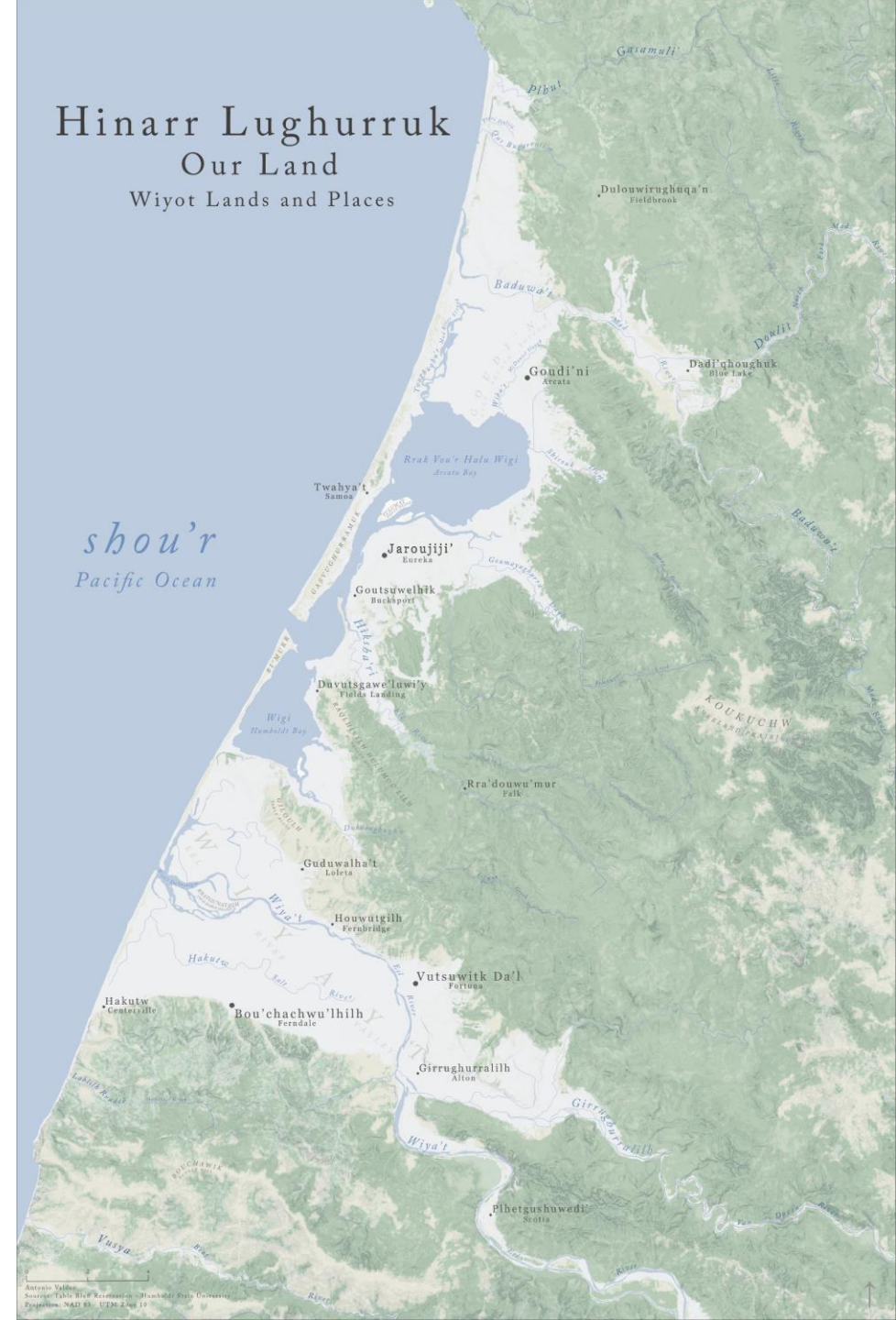
Locations

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



Wiyot Ancestral Territory

- Central location within Wiyot ancestral territory
 - *Wigi* (Humboldt Bay)
 - *Wiya't* (Eel River)
- Wiyot Tribe an important partner



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

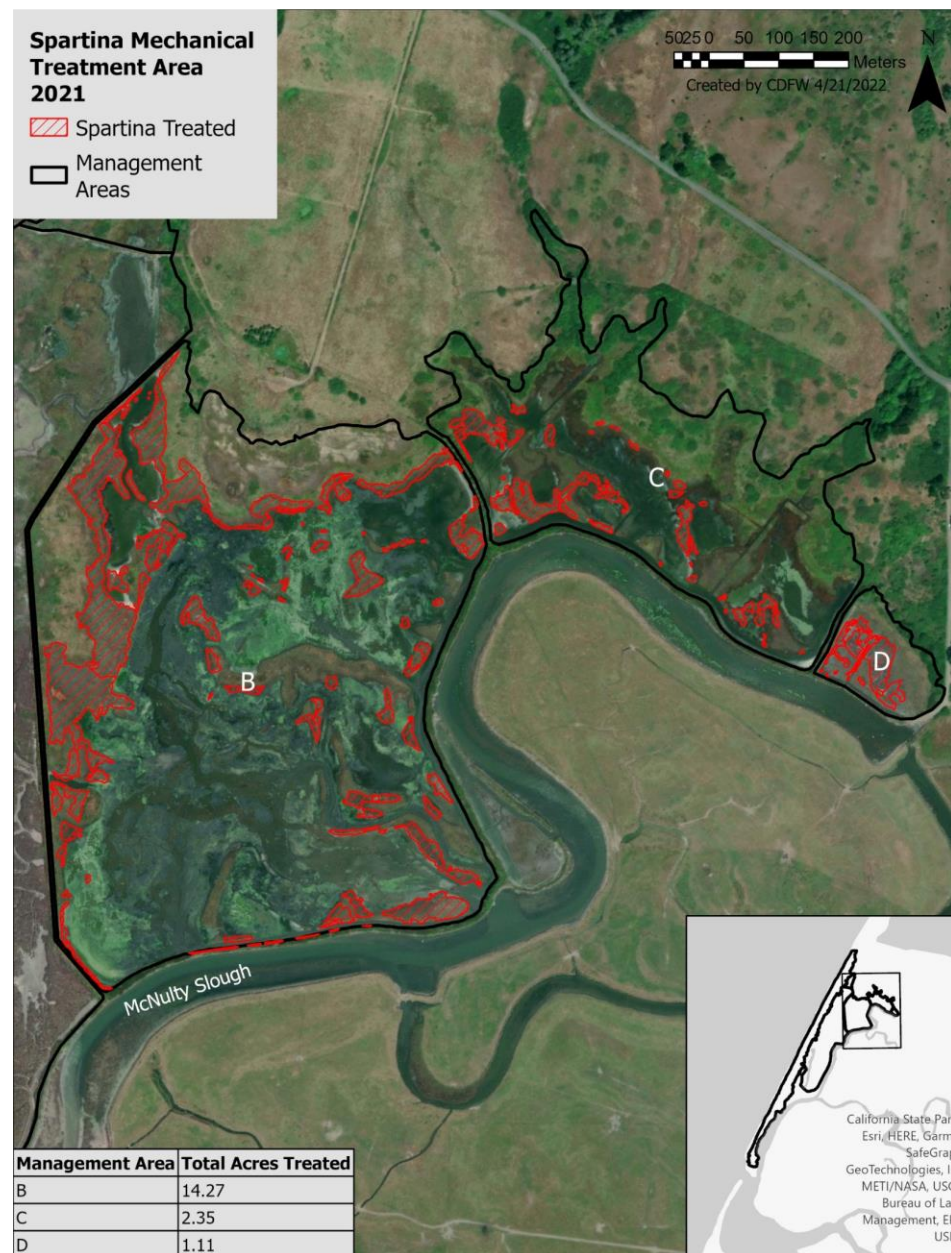
- Approximately 300 acres of salt marsh invaded
- 193 acres of medium to high density Spartina (26-100% cover)
- Removing invasive Spartina by mechanical grinding with heavy equipment and herbicide application via backpack sprayer

Mechanical Treatment – 18 acres

- Heavy Equipment



- Brushcutters



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

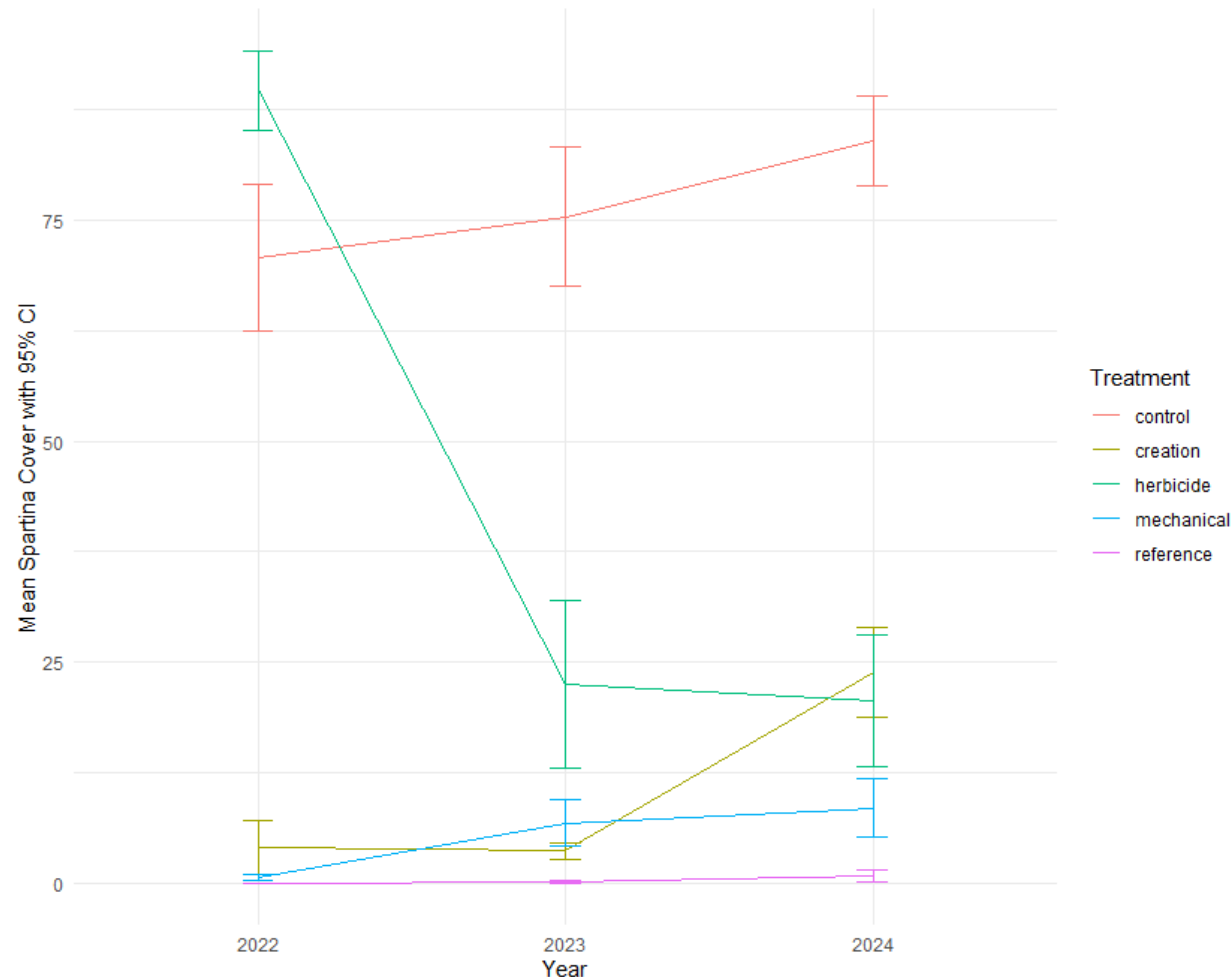


High Marsh Creation Photo 8/17/2023



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)



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



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



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



European beachgrass
(*Ammophila arenaria*)

Cal-IPC High Invasive Rating



Invaded Control



Herbicide (Imazapyr)



Native Reference Dune Mat

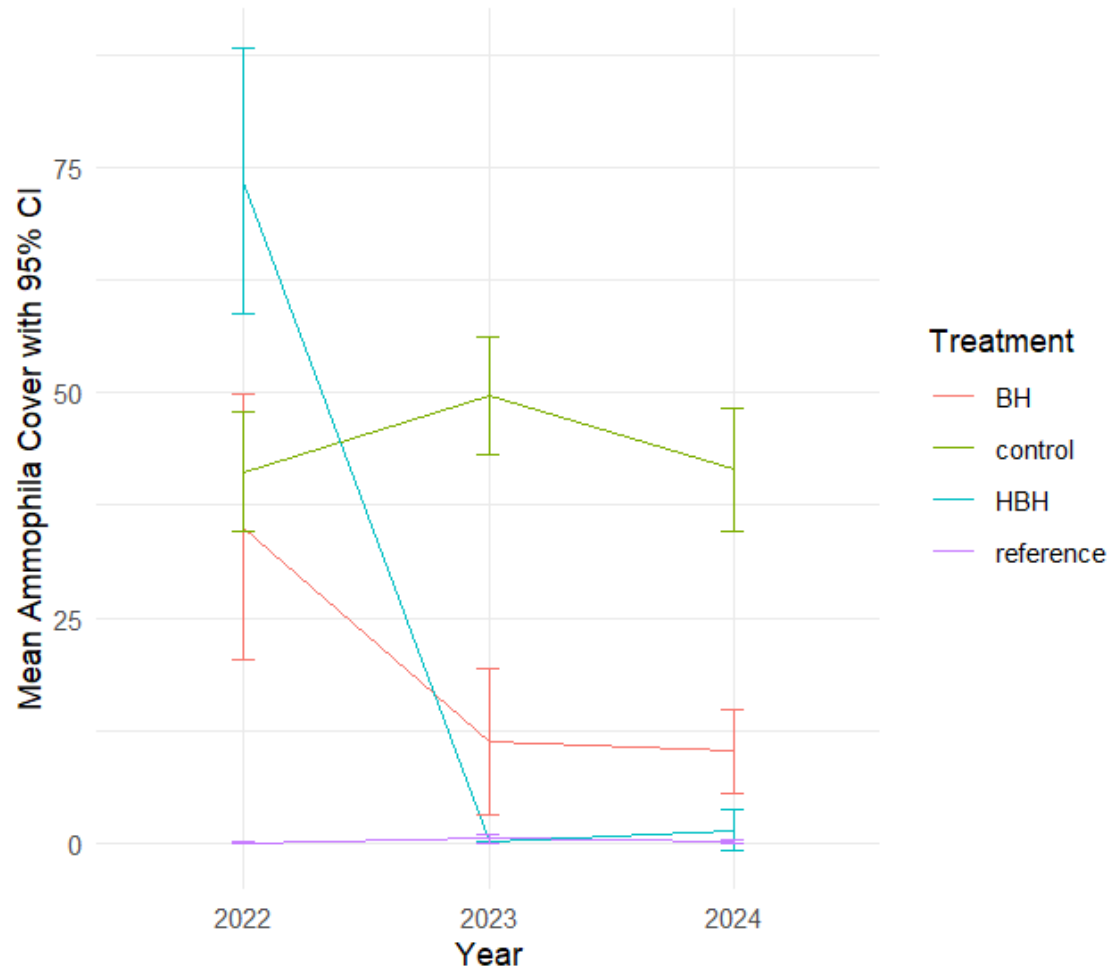


Burn



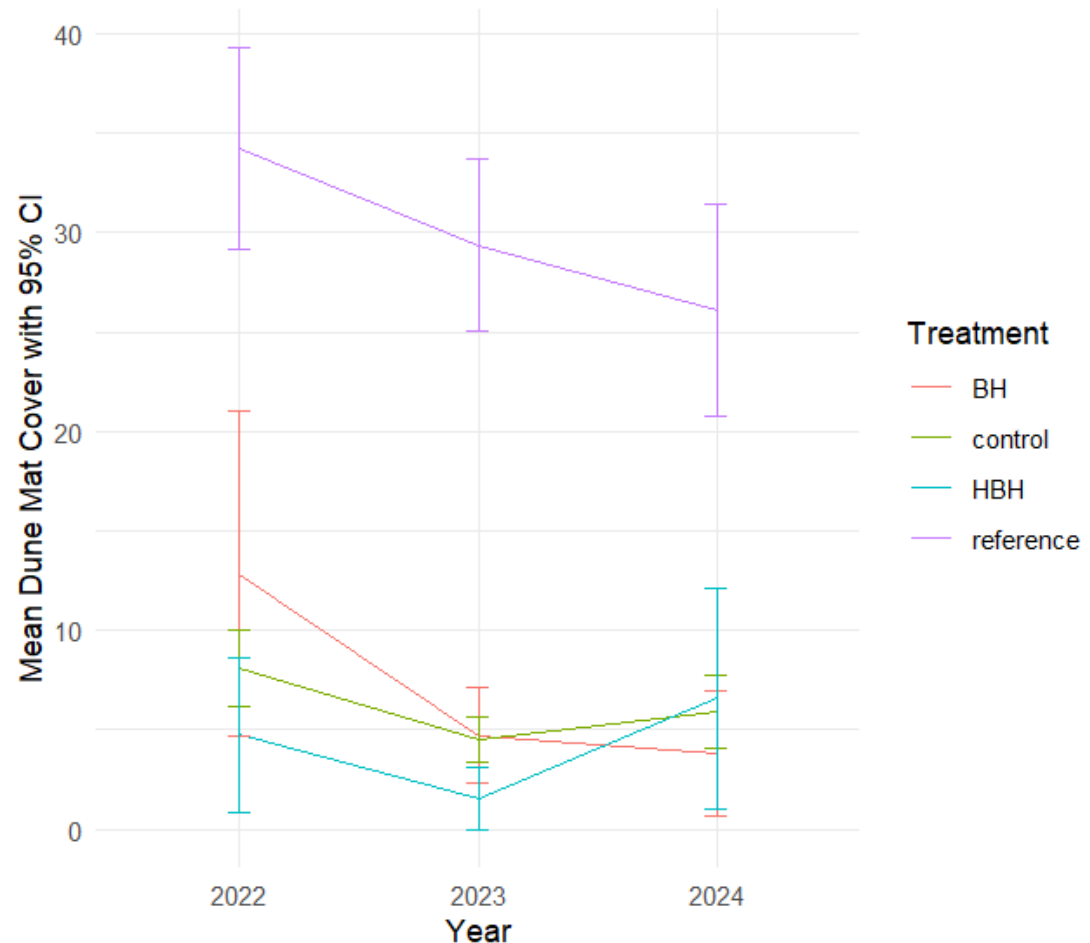
Ammophila Cover 2022-2024

- 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 Herbi
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 Only less effective**
- **Testing order of Burn/Herbicide, with initial year's data to be collected in 2024**
- **Burn then Herbicide appears to take less effort (9.5 compared to 20.6 total person-hours/acre)**
- **Follow-up treatments to continue**



Thank you!



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- CDFW

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Questions?

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