



Restoring Critical Coastal Dune Habitat at Point Reyes for Threatened and Endangered Species

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Why are Dunes Important?

- May appear barren and inhospitable, but serve important functions
 - Protect inland areas from tide, wind, and waves
 - Improve quality of water flowing into the ocean
 - Provide habitat for common and rare plants and animals



Point Reyes National Seashore

- Undeveloped, but not undiminished
- 1940's: European beachgrass and iceplant planted to protect adjacent ranches, roads, and homes



By 2009, 60% of 2,200 acres of coastal dune, bluff, and scrub habitat



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Listed species that depend on native coastal dune habitat



Western snowy plover (threatened)



Myrtle's Silverspot butterfly (endangered)



Tidestrom's lupine (endangered)



Beach layia (endangered)

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How Do Invasive Plants Impact Dunes?

- Direct Impacts: Encroach and take over habitat for native dune plant species







How Do Invasive Species Impact Dunes?

- Indirect impacts on listed species:
 - Eliminates habitat for nectar species for Myrtle's silverspot butterfly



How Do Invasive Species Impact Dunes?

- Indirect impacts on listed species:
 - Provides potential cover for predators of Western snowy plover
 - Reduces open areas for nesting



How Do Invasive Species Impact Dunes?

- Indirect impacts on listed species:
 - Provides habitat for native deer mice that consume seeds of Tidestrom's lupine
 - Seeds near beachgrass 70% more likely to get eaten (Dangremond Pardini and Knight 2010)



Early Restoration Efforts



2001-2003

- 30 gross acres
- European beachgrass
- Hand removal

European Beachgrass

- Deep rhizomes (3- to 12 feet)
- Fast lateral growth (~6.6 feet in 6 mos)
- Sprouts from smallest rhizome fragments



Early Restoration Efforts - Results

Untreated Beachgrass

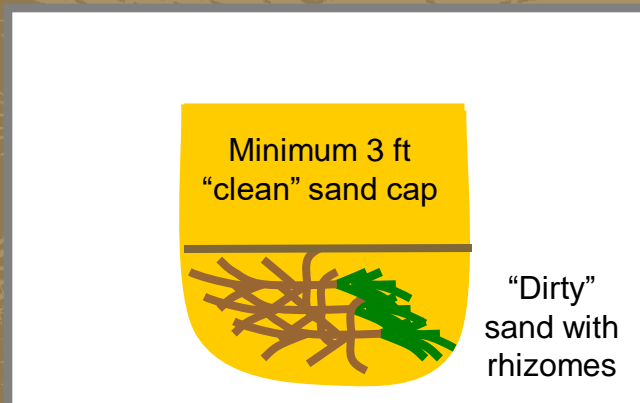
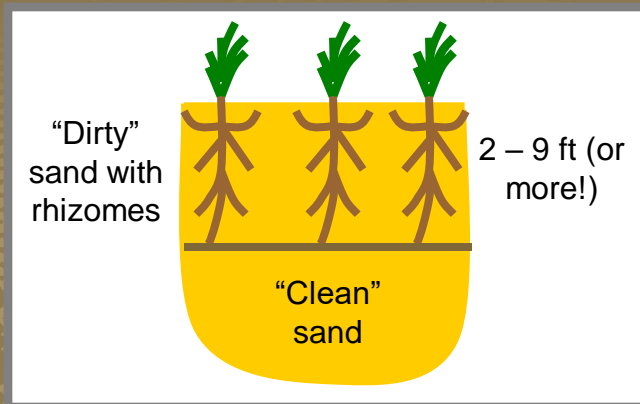
12-month-Old Re-Sprouts

Following 1 Re-Tx Event

- Some areas required as much as 15-20 treatments to reach control



Mechanical Removal – Horizon Flipping



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Abbotts Lagoon Restoration Project

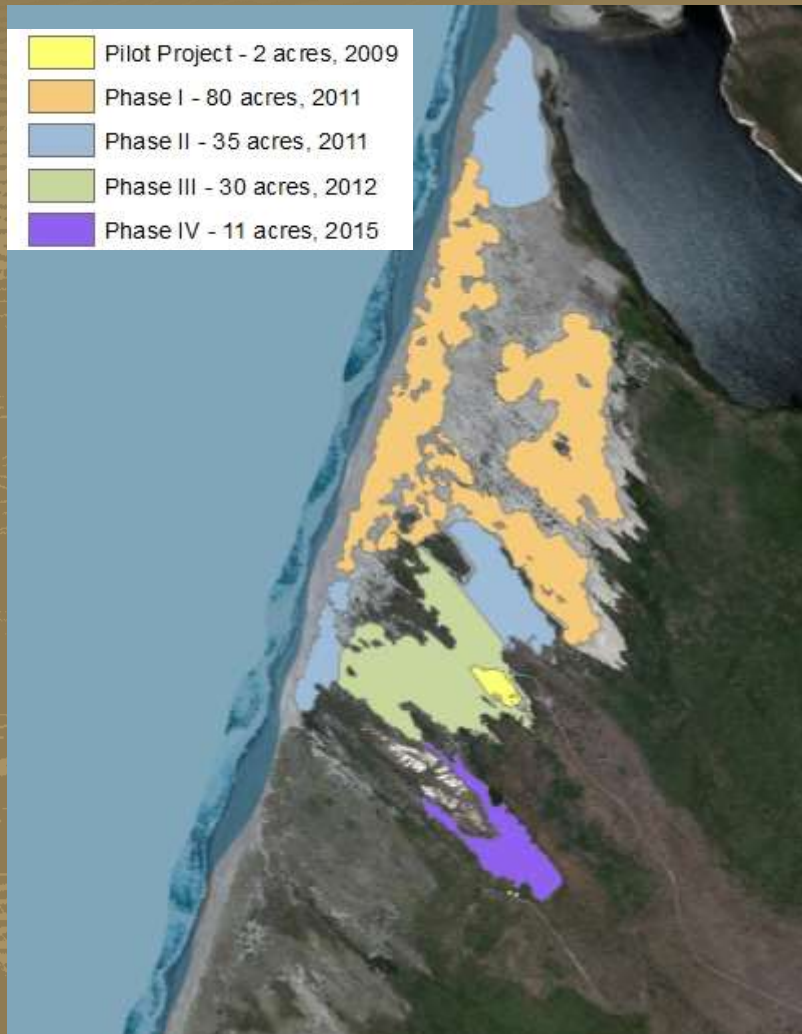


■ Phase I

- Spring/Summer 2011
- Project scope reduced due to costs
- \$25,000 - \$30,000/acre
- 133 acres reduced to 80 acres of mechanical removal



Abbotts Lagoon Restoration Project



■ Phases II - IV

- 2011 - 2015
- ~71 acres of beachgrass
- Chemical treatment
- \$2,500 - \$3,000/acre

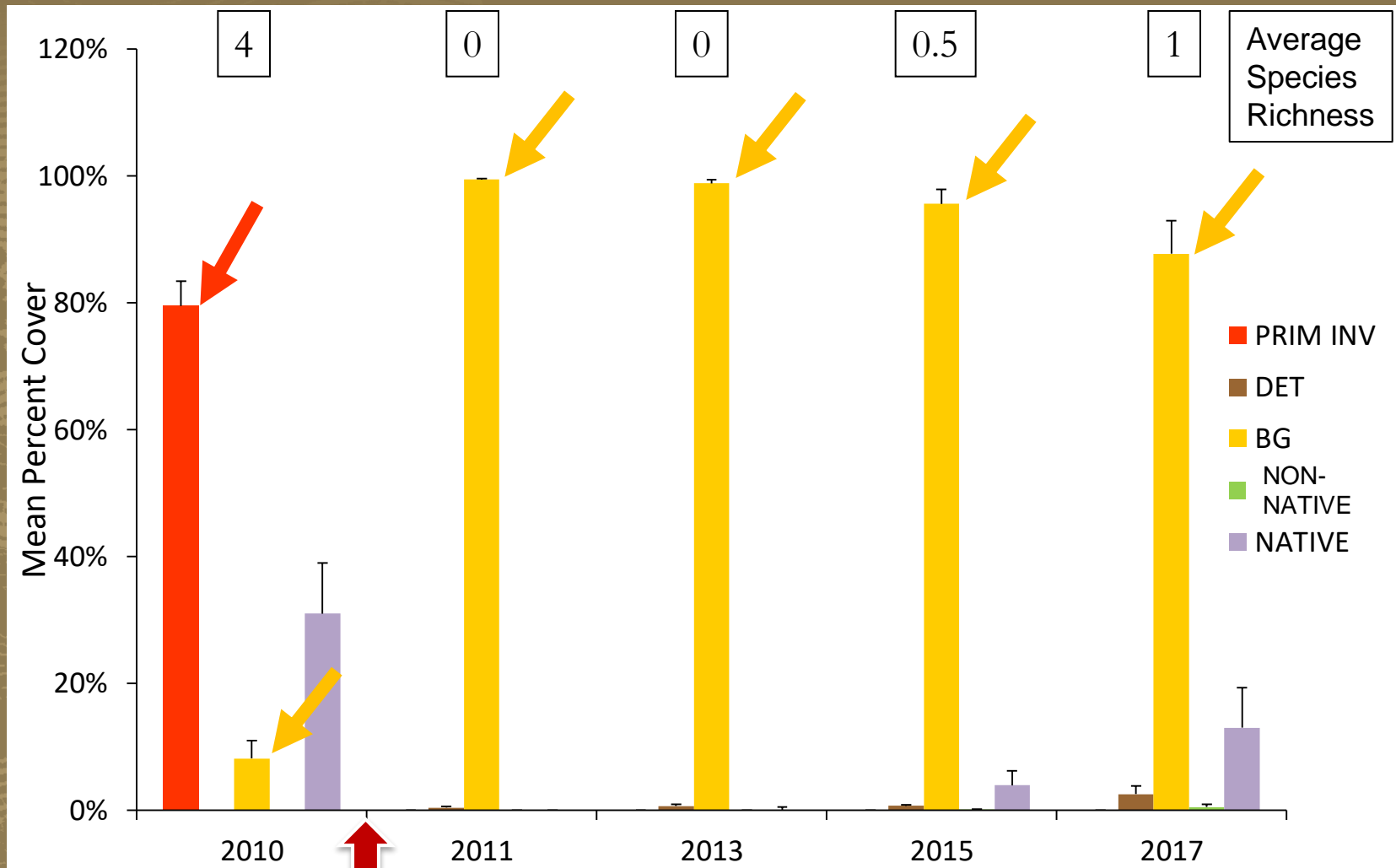


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Restoration Results



Vegetation Monitoring – Mechanical



Mechanical Treatment - Efficacy

2010 - Before



2011 - After



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Mechanical Treatment – Sand Movement

- Impact to existing habitats and adjacent land use
 - *Existing native dune, wetlands*
 - *Adjacent ranchlands*
 - *Rare species*



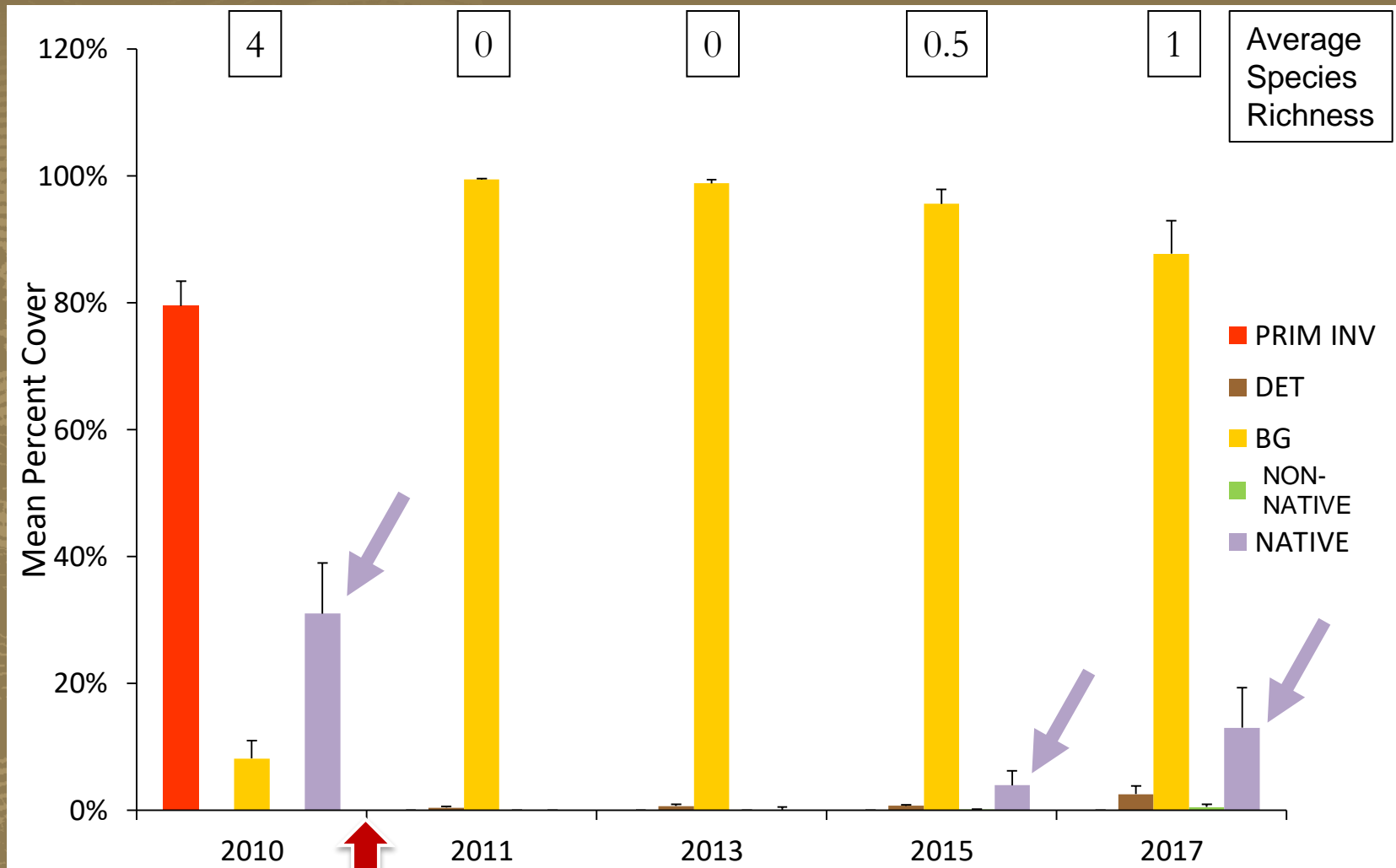
Tidestrom's Lupine – April 2012

- First to colonize restored areas

Tidestrom's Lupine – 2016



Vegetation Monitoring – Mechanical



Treatment

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Mechanical Treatment – Native establishment

- Both “good”



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Mechanical Treatment – Secondary Invaders

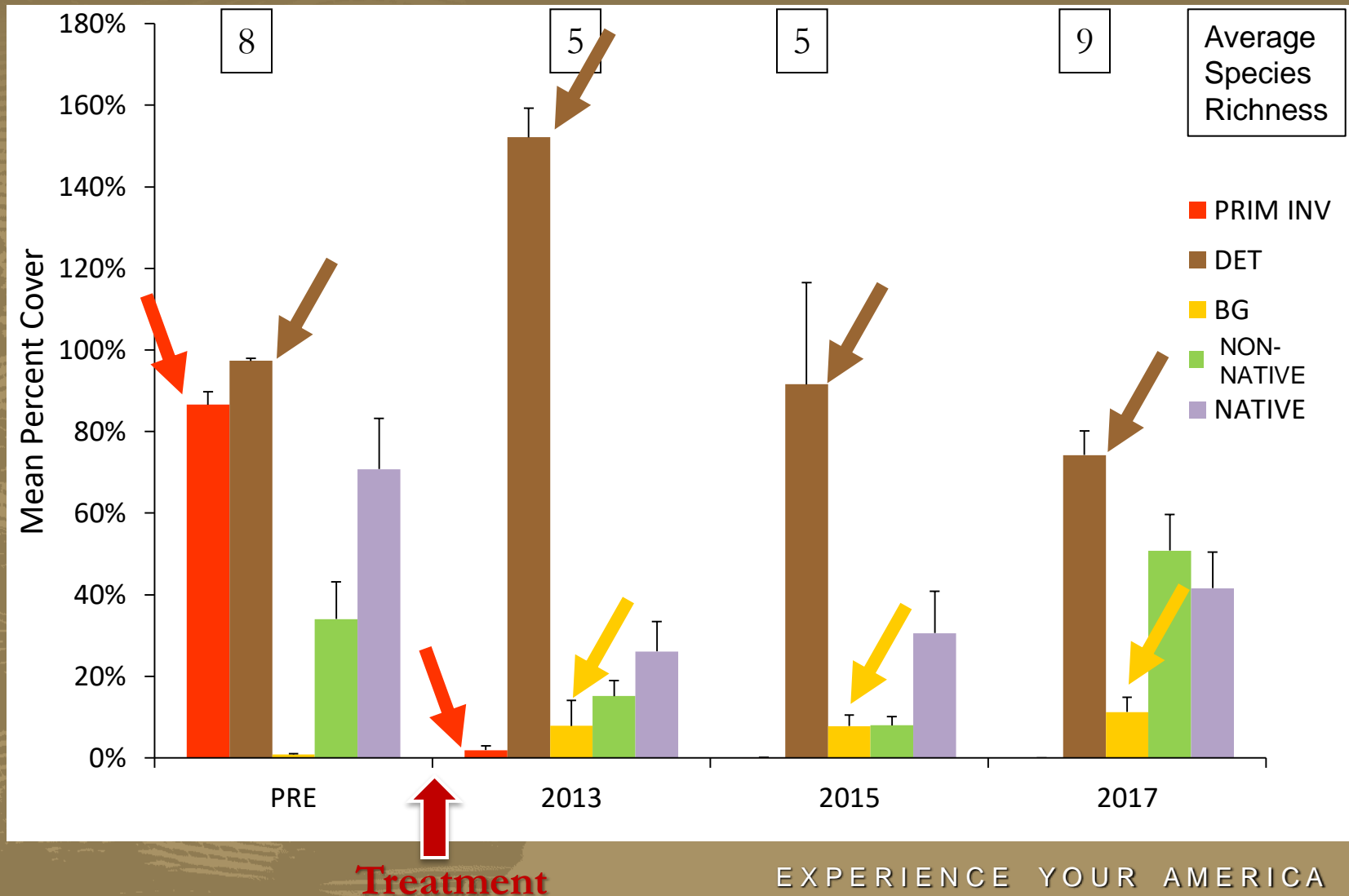
- And “bad”



Restoration Results - Herbicide



Vegetation Monitoring – Herbicide



Herbicide Treatment - Efficacy



- Very effective
- European beachgrass decomposes very slowly
- Fewer rare plants than mechanical



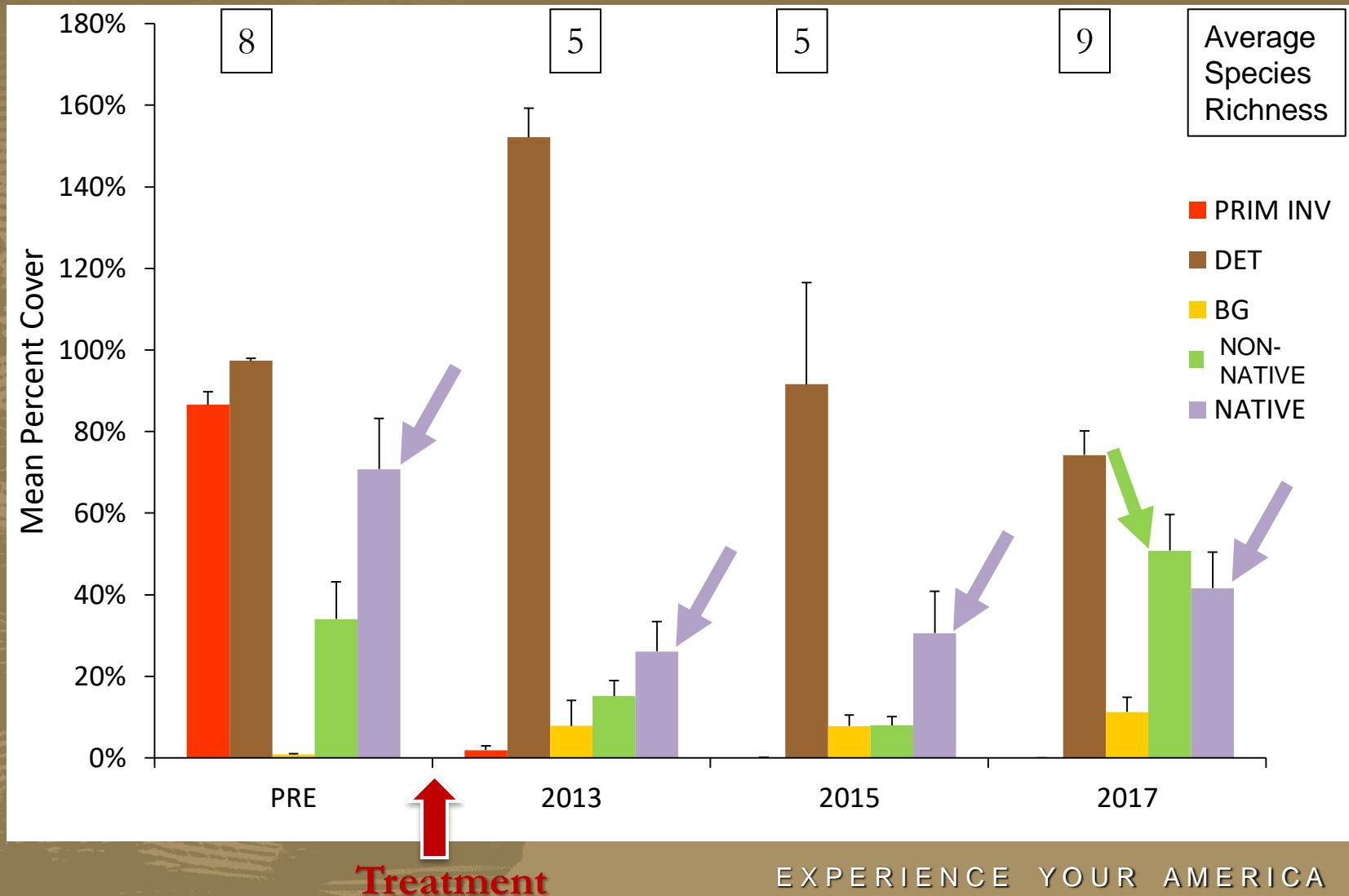
Herbicide Treatment – Native Establishment

- Backpack technique fosters survival of existing plants – and establishment of new ones



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Vegetation Monitoring – Herbicide

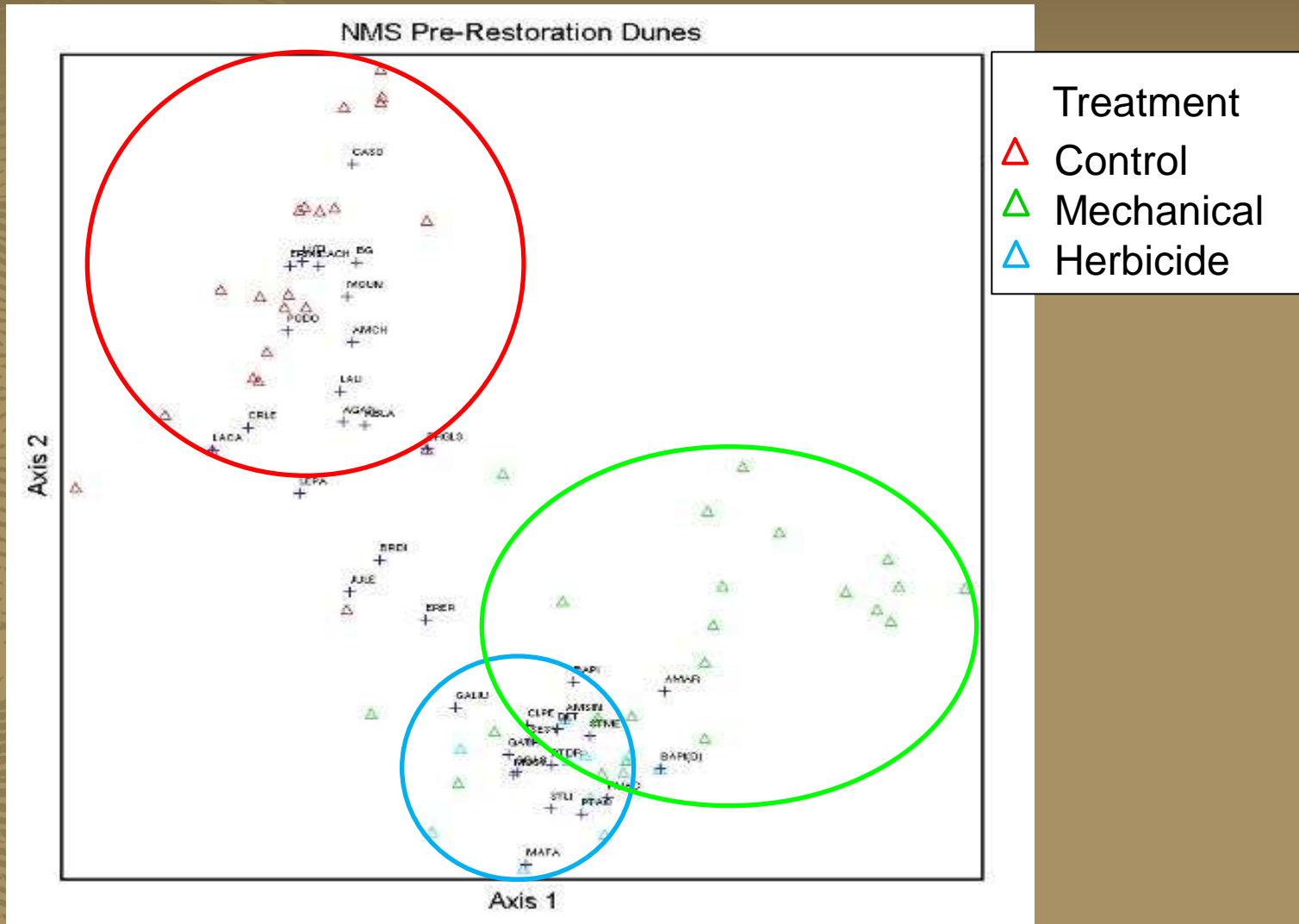


Herbicide Treatment – Secondary Invaders

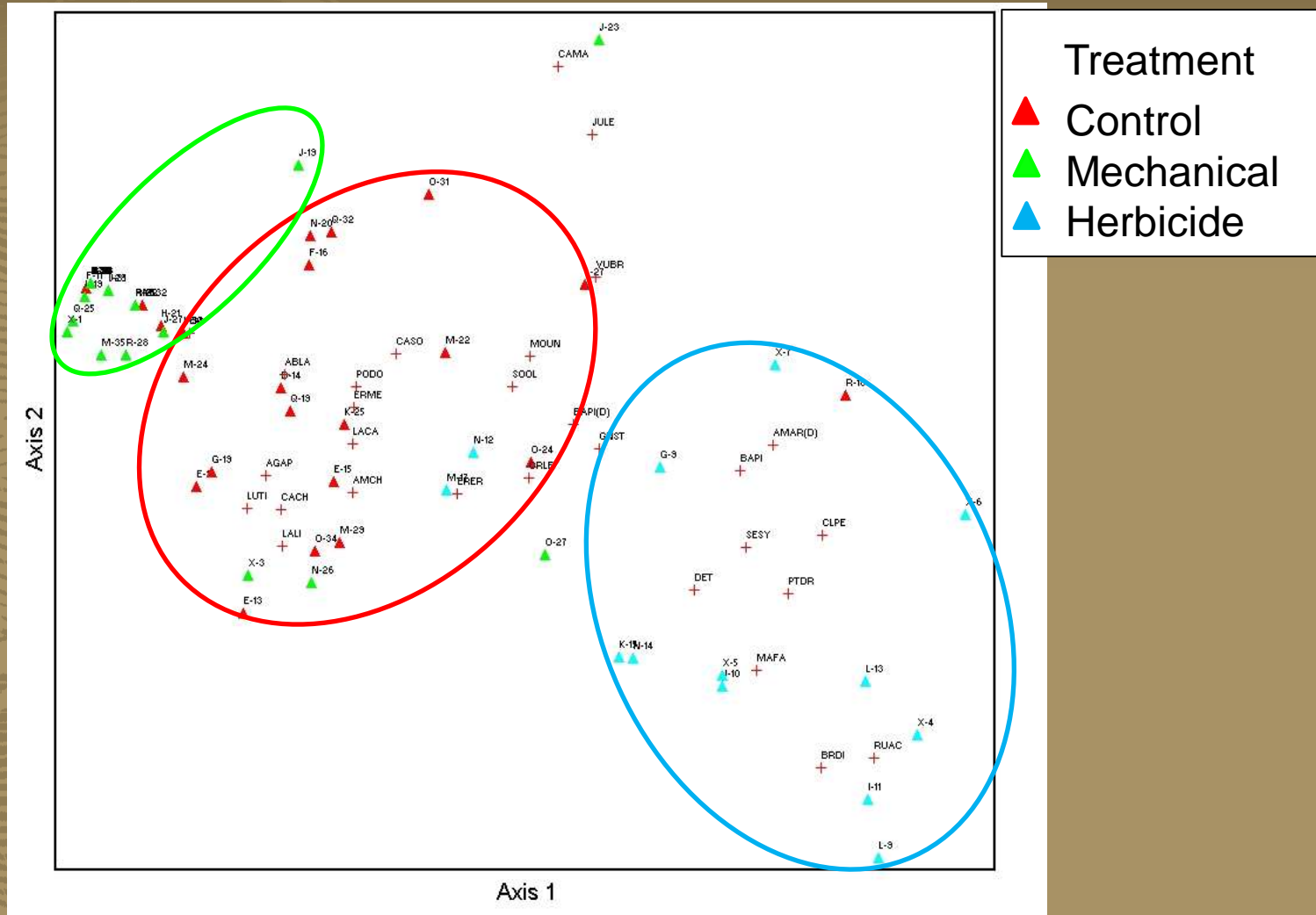


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Vegetation Communities – Pre-Restoration



Vegetation Communities – 2017



Current Restoration Efforts



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Conclusions

- Both techniques very good at eradicating European beachgrass and iceplant
 - *Re-treatment is absolutely critical in both cases*
- Neither technique has – yet – resulted in vegetation communities that resemble native dune ones
 - *Mechanical restoration too intensive*
 - *Herbicide perhaps not intensive enough*



Conclusions

■ Restoration Fallacy

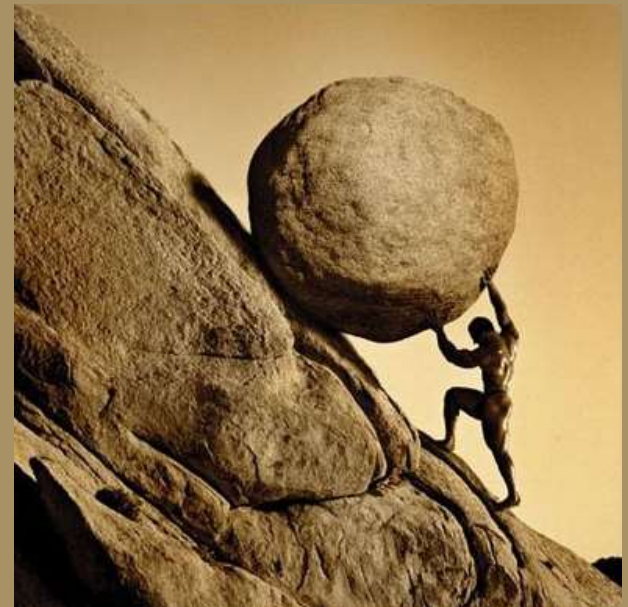
- *“Kill it, and native vegetation will come*”
- Disturbance history and system instability makes restoration areas vulnerable to invasion/re-invasion
 - Even potentially to species not normally considered highly invasive such as European searocket
 - Secondary invader abundance twice that of native plants (Pearson et al. 2016)



Conclusions

■ Take Home Message

- Unless we can find and potentially “fix” some of the underlying problems, we could be doomed like Sisyphus to be rolling the invasives boulder constantly uphill.....



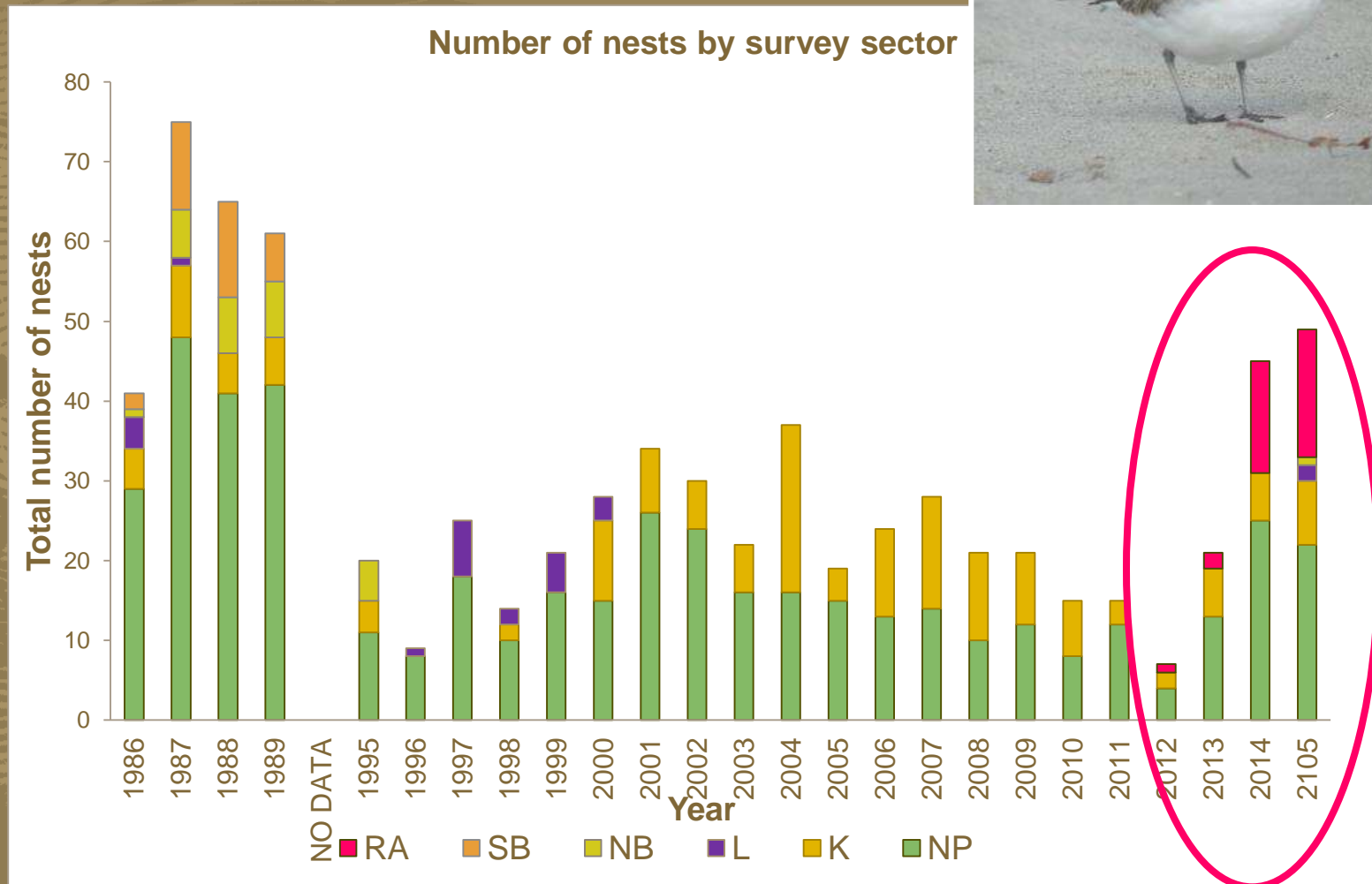
Conclusions

- Take Home Message
 - *Some long-term maintenance may be inevitable....*



But There's Hope!

■ Resiliency of the Rare



But There's Hope!

- *In restored areas in 2017:*
 - *>290,000 lupine*
 - *>880,000 beach layia*
 - *>20,000 curly-leaf monardella*



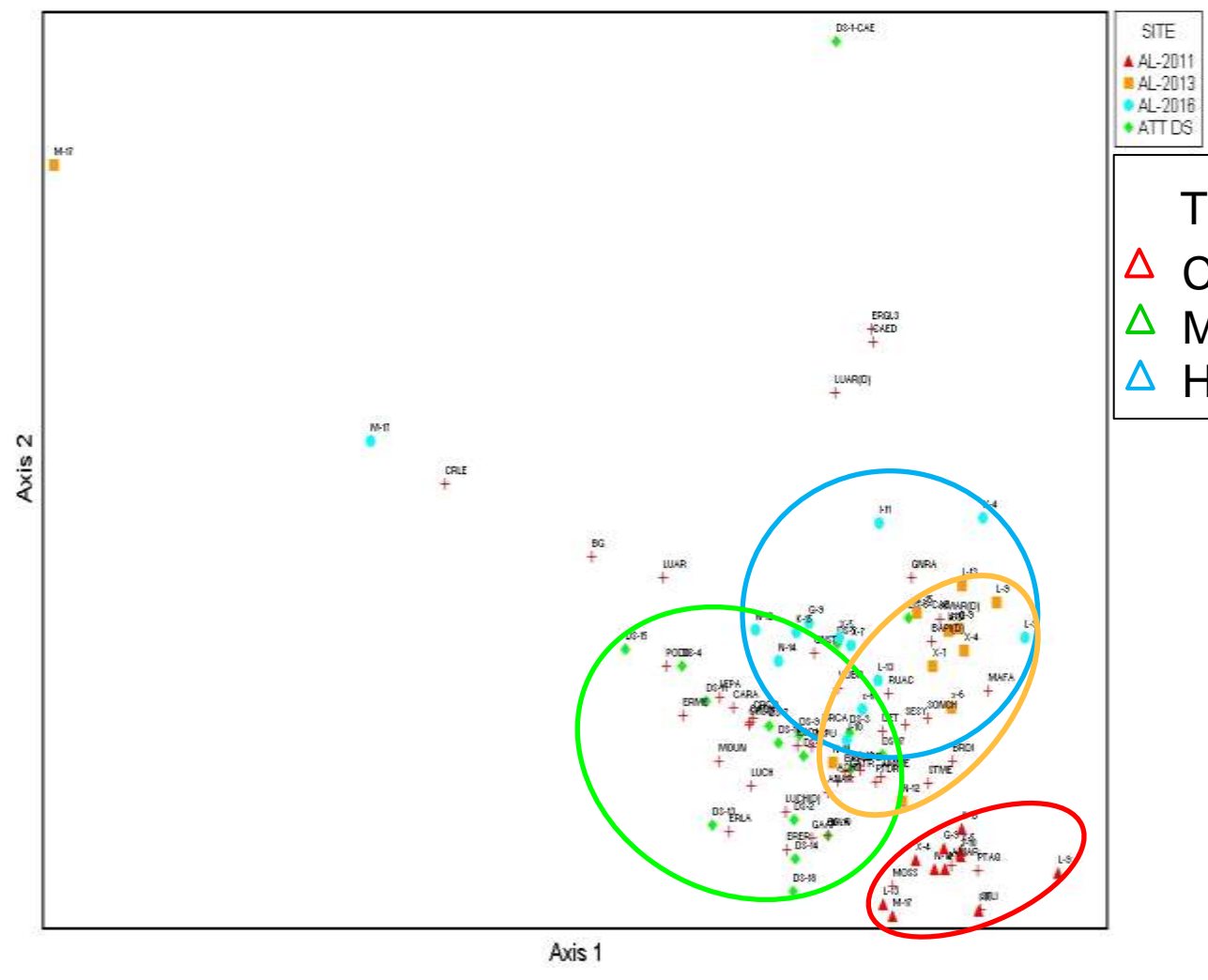


Project Staff:

- Lorraine Parsons
- Sarah Minnick
- Will Johnson
- Amelia Ryan
- and many great interns!

Funding support:

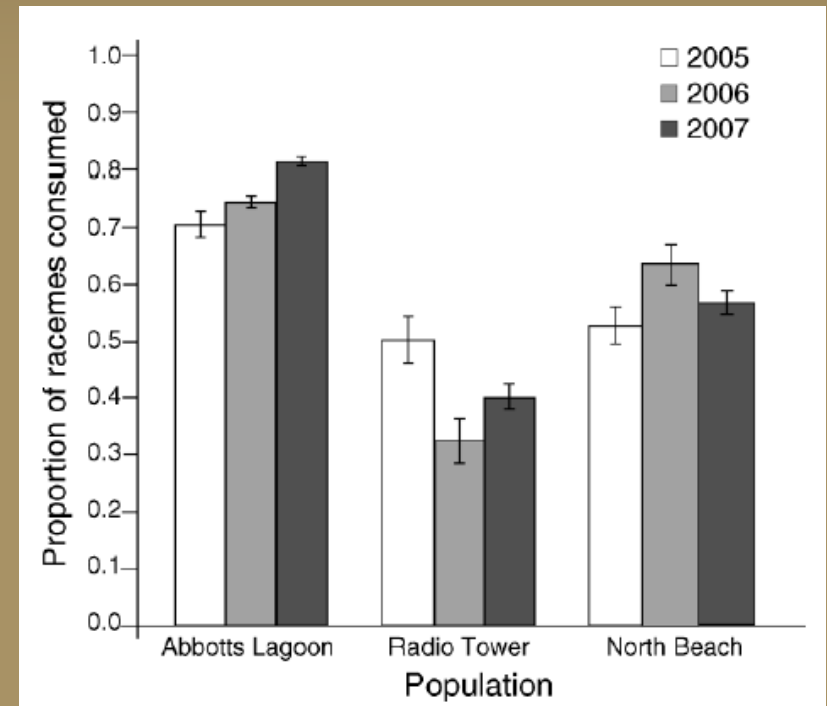
- National Park Service
- Natural Resource Damage Assessment,
- USFWS
- CA - OSPR



Beachgrass Impacts Lupines

■ *Study by Washington University, St. Louis, Missouri*

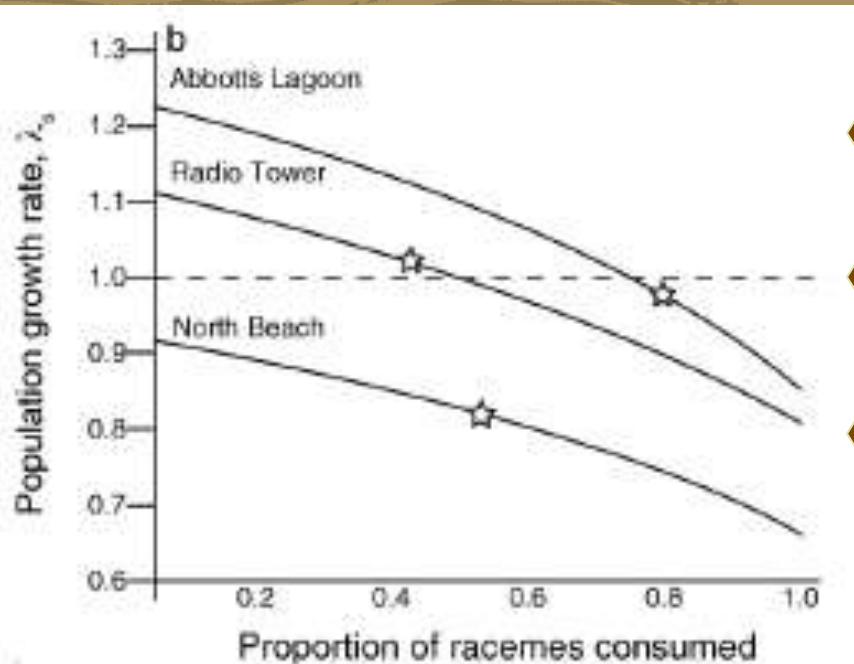
- Up to 82% of seed eaten
- Seeds close to beachgrass 70% more likely to get eaten.



Courtesy of Washington University

Beachgrass Impacts Lupine

- Study by Washington University, St. Louis, Missouri
- Lupine numbers are decreasing drastically in many park populations
- Some populations could go extinct within a few decades



Increasing

Possibly self-sustaining

In decline