

Utilizing Rx Fire and Tamarisk Beetles for Tamarisk Management

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Overview

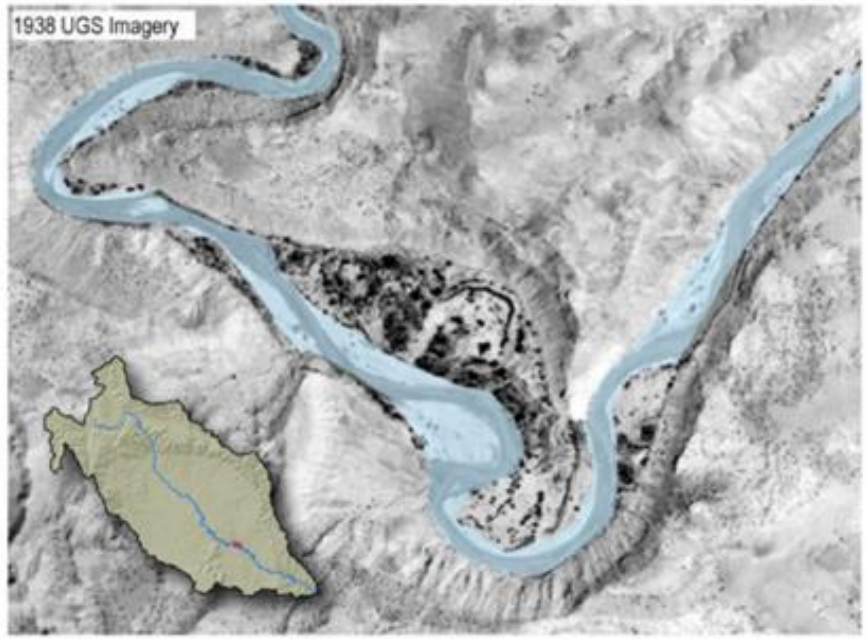
- Introduction: Key Players
- Literature Review
- Pariette Wetlands
- Conclusions and Future Management

Key Players: Tamarisk Beetle, *Diorhabda carinulata*

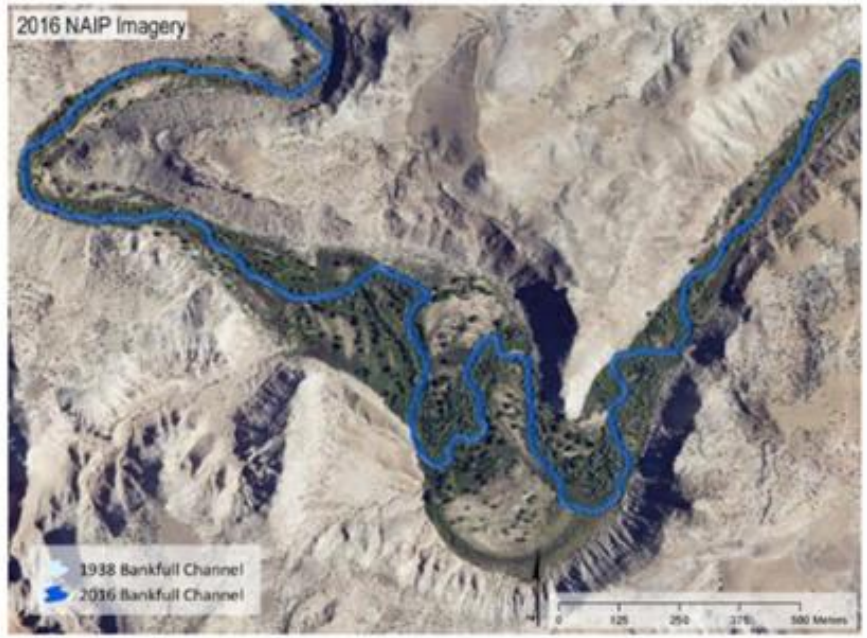
- Introduced in 2001
- Spring temps influence larval development
- Mean defoliation July-August
- Two-six generations per year
- Overwinter in leaf litter
  - (Jamison et al. 2018a)
- High beetle density = defoliation and migration
- Low beetle density at partially defoliated sites = overwinter
  - (Jamison et al. 2018b)

Key Players: Tamarisk, *Tamarix* spp.

- Why eradicate?
  - High water use
  - Soil chemical changes
  - Changes riverscape/erosion
  - This is in turn bad for fish spawning
- Roots (30m) (Baum 1978)



1938
(Light Blue)



2016
(Darker Blue)

APPENDIX FIGURE B 7: REDUCTION IN WIDTH, WIDTH VARIABILITY, AND AREA ON THE PRICE RIVER, UT

- Pennock, C. A., W. W. Macfarlane, P. Budy, J. Jimenez, and J. Goodell. 2021. Conservation, restoration and monitoring plan for the lower White River, Utah. UTCFWRU 2022(1):1-78.

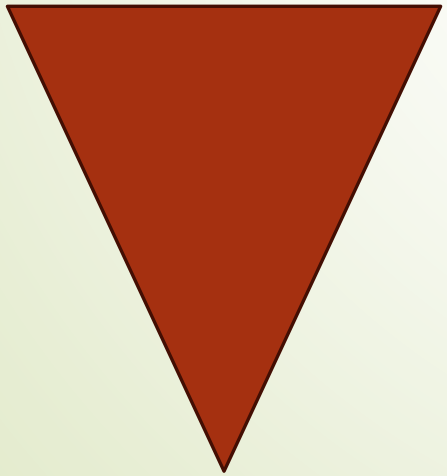
Key Players: Prescribed Fire

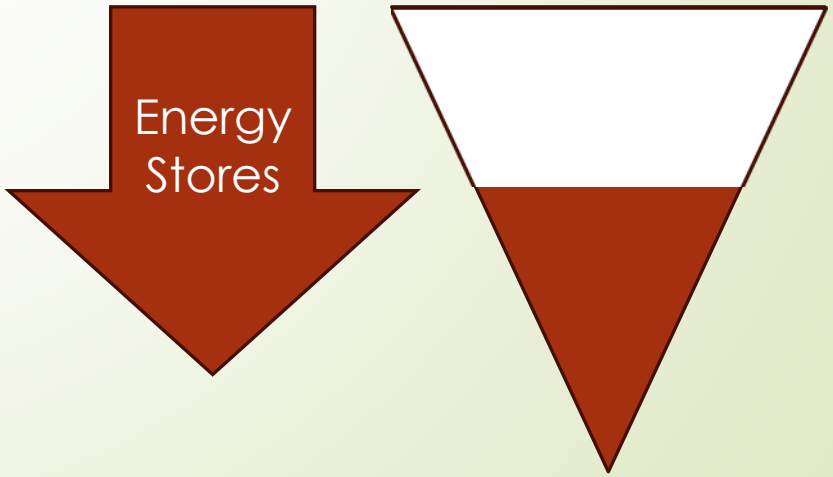
- Wetland burn plan- 50% : 50% open water to cover ratio
  - Spring and fall burns
- Generally, no tamarisk mortality
- Classically focused on lowlands and ponds
- Fire can stimulate *salix spp.* to recolonize post burn areas (Bloodworth et al. 2016)

So: How Can We Kill Tamarisk?

Tamarisk Stores Energy in Large Roots

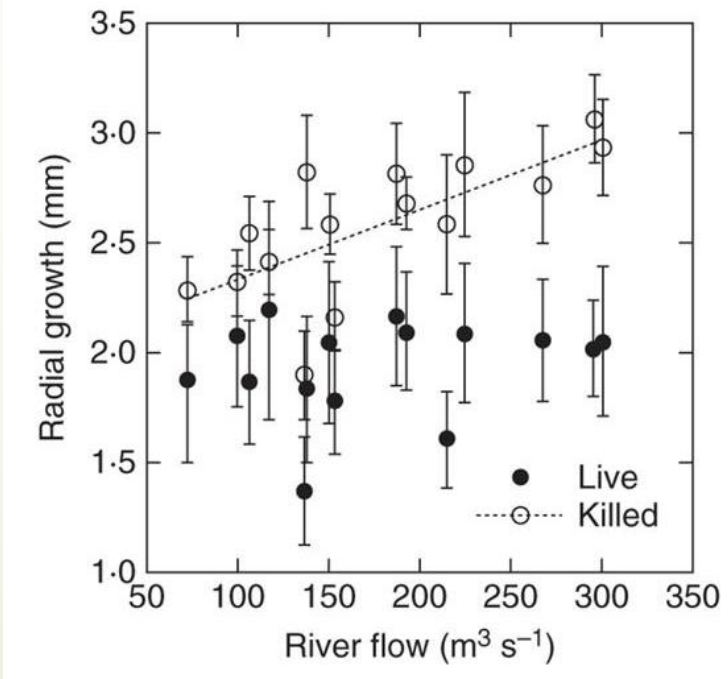
- Goal: Reduce energy stores before burning
- Deplete non-structural carbohydrates from root crown before burning
- Beetles decrease root biomass and increase root respiration (Snyder et al. 2010)

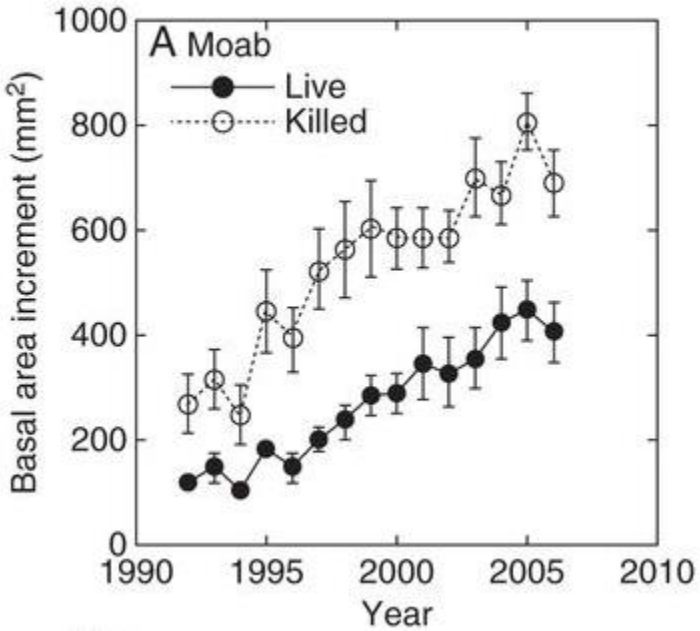




Within-Species Variations in Mortality

- Faster growing individuals (larger growth rings) deplete energy stores more
- Beetle-only treatments
- Dead trees (post treatment) had 45% thicker growth rings
- Potentially related to water availability, genetics
- Hultine et al. (2013)
- Selection -> succession



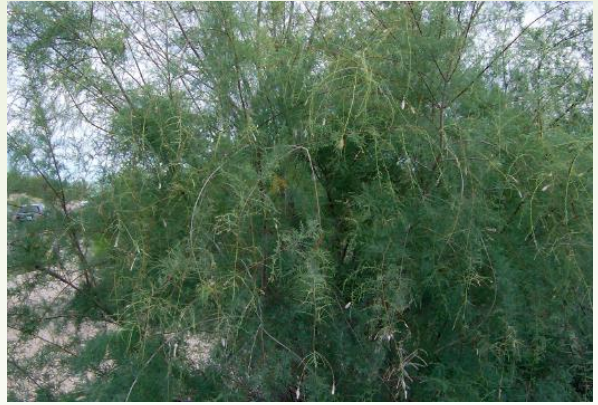


Our Goal: Tamarisk Mortality

- Beetle only:
  - 6-10% (Hultine et al. 2015)
  - 0-56% (Kennard et al. 2016)
  - Highly variable, increased by additional stressors
    - Wildlife, drought, fire, soil chemistry (Bloodworth et al. 2016)
  - Up to 70% after 7 years (Brooks et al. 2008)

- Fire intensity and defoliation positively correlate with mortality (Brooks et al. 2008)
  - Consider drought and ambient temps

Dense Regrowth



+

= M1

Moderate Fire (Spring)

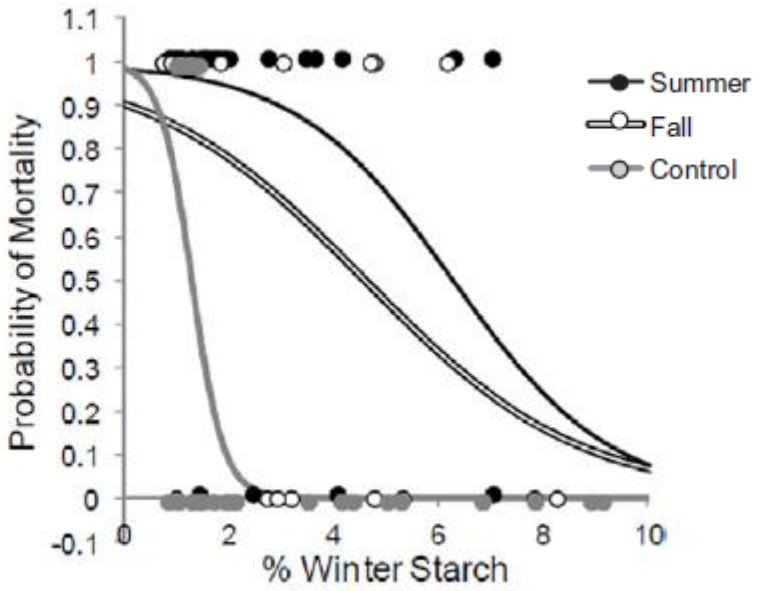
= M2

Intense Fire (Fall)

M1 > M2?

Beetle X Fire Interactions

- Low root starch and high fire intensity = highest mortality
- Synergistic effects of both treatments together
  - Drus et al. (2014)



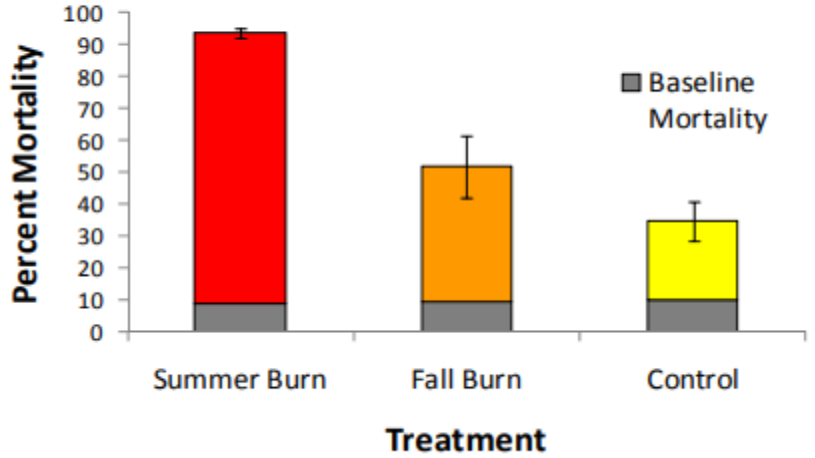
Beetle X Fire Interactions

- Generally, defoliation increases fire severity, but may inhibit spread
  - Reduced fuel continuity, higher fuel loads locally (Drus et al. 2013)

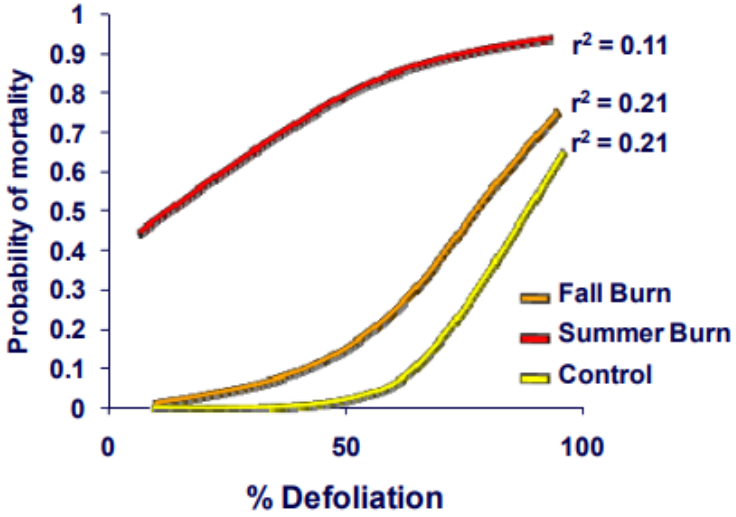
Tamarisk Mortality Beetle X Fire

- One year post burn mortality (Brooks et al. 2008)
  - Summer: August burn
  - Fall: October burn
  - Control: beetles only
- Conclusion: A few years of defoliation and summer fires = highest mortality

Mortality was highest for the summer burn treatment

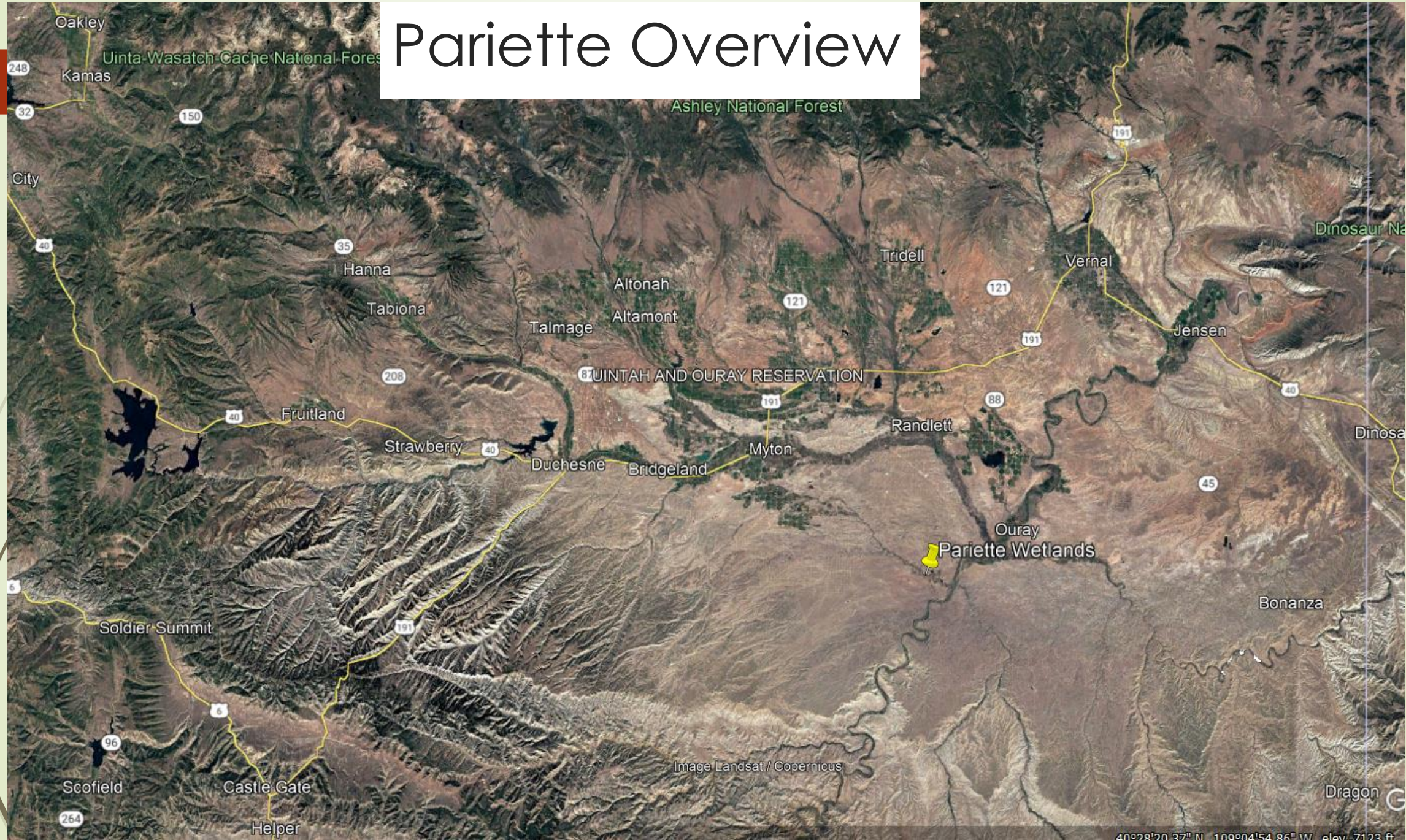


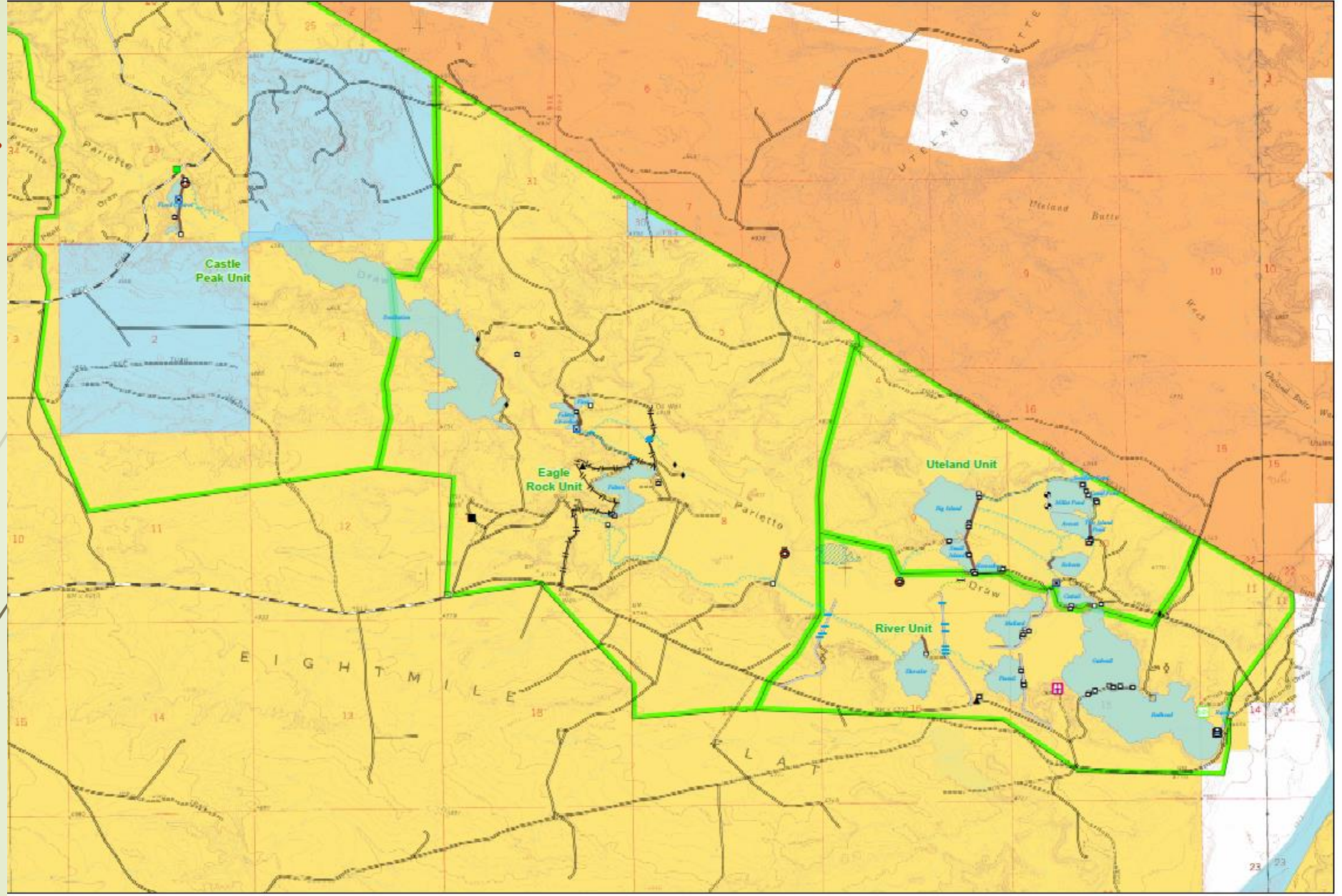
The probability of mortality increases with defoliation intensity in all treatments, although overall mortality rates were much higher following the summer burns.



Pariette Wetlands

Pariette Overview




Castle Peak Unit
Eagle Rock Unit
Uteland Unit
River Unit
Parietto
Draw
Pleiana Butte
UTELAND BUTTE
EIGHTMILE FLAT
Point Data
Bridge
Culvert
Diversion
Fish Fountain
Gabion
Gate
Material Pit
Pariette Admin Site
Recreation Site
Riser/Culvert
Screwgate/Culvert
Sign
Syphon
System Outlet Structure
Trash Rack
Vault/Screwgate/Culvert
View Area
Line Data
Access Road
Product Flowline
Walking Path
Pariette Unit
Land Status
Bureau of Land Management
Indian Trust Lands
Private
State
Pariette Wetlands
Vernal Field Office, Green River District
0 0.25 0.5 Miles
0 500 1,000 2,000 Feet
Date: 11/3/2021

History

- Built in early 1970's
- Goal: Expand wetland habitat, enhance prey base for peregrines, increase waterfowl production, provide habitat for sensitive species
- Designated as a BLM ACEC in 1994
  - "Areas of Critical Environmental Concern or ACEC designations highlight areas where special management attention is needed to protect important historical, cultural, and scenic values, or fish and wildlife or other natural resources…"
- 2008 – Flood control dam raised to accommodate 100 yr flood event

Pariette

- Varying pond depths for feeding diversity

Bureau of Land Management

Pariette Wetlands

Vernal Field Office

Welcome to Pariette Wetlands Day Use Site

Pariette Wetlands is the oasis of the Uintah Basin. Encompasing 9,204 acres, of which 2,529 are classified as wetlands or riparian area. This makes Pariette the largest BLM wetland development in the state of Utah. These wetlands provide a green marshy home for vast wildlife trying to survive in the harsh and arid desert lands of Utah.

What Created This Desert Water Refuge?

Made up of a perennial stream and 25 man-made ponds, Pariette was developed in 1972 to improve waterfowl production as well as provide seasonal habitat for other species of birds.

The waterways fill with snowmelt each spring, decline each summer, and replenish in the fall. The many ponds allow the wetland manager to provide water depths suited to the many species of birds that frequent the wetlands.

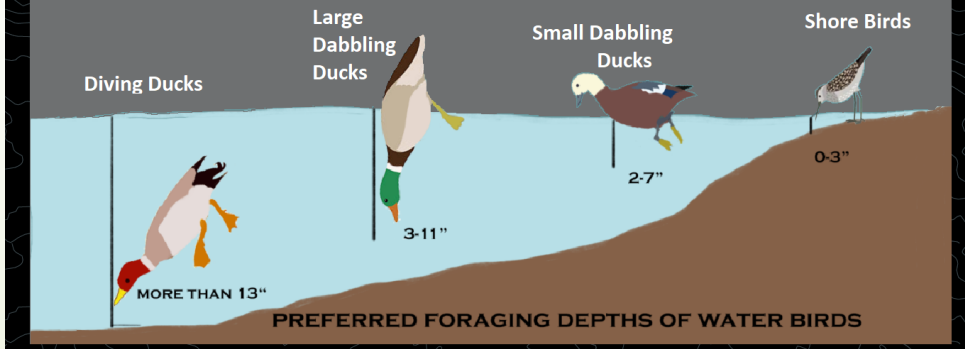
Over time, these management applications have become more challenging as less water makes its' way to Pariette due to improved farming techniques upstream and ever-increasing drought conditions. This is because Pariette's water rights are secondary to other landowners within the watershed. In efforts to offset those challenges, BLM continues to look for alternatives such as permanent water acquisition and improving management prescriptions.

Why So Many Ponds?

The Bureau of Land Management (BLM) installed a system of dikes and dams to create the many ponds. This system allows for the water level in different ponds to be maintained at different depths to accommodate the many species of birds, and the variety of ways in which they forage.

Is it all about the birds?

While the main highlight of the wetlands are the many bird species (more than 100), this habitat is important for a variety of other reasons. Pariette has provided habitat for 15 special status animal species and one special status plant species. As well as is home to more than 20 species of reptiles and amphibians.



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What Is Skinwalker Ranch, and What's Really Going on There?

You May Also Like

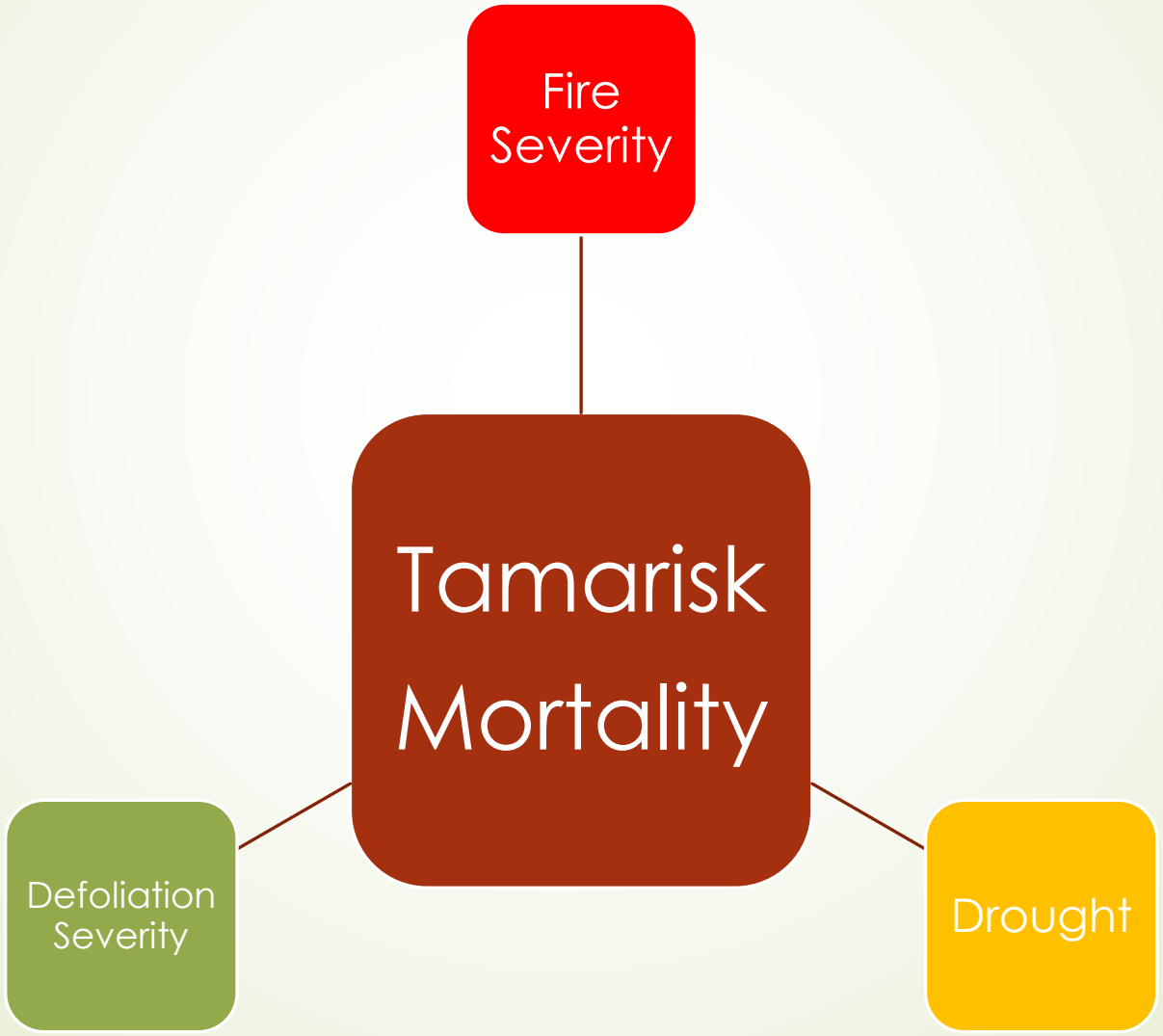
Controlling Tamarisk at Pariette Wetlands

- Water limited system
- Large tamarisk beetle outbreak in the summer of 2023 (endemic)
- First attempt at targeting defoliated areas Fall 2023
- Results to come!

Conclusions

- The two biggest stressors for tamarisk are beetles and fire
- Timing of burns important
  - I.e. target tamarisk stands after large outbreaks for the highest chance of mortality
  - Aim for a hot burn (previous defoliations, drought, summer)
- Burn on drought years
  - Mortality potential higher on the first year of drought after wet growing seasons (Hultine et al. 2013)
- Eliminating herbicide beneficial for wetlands
- Incorporate simulated drought with water control, drowning with flooding

Synergistic Effects: Timing is Everything!



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Questions?