

# Comparing Retardant and Wildfire Impacts on Invasive Grasses in the Post-Fire Environment

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# Acknowledgement

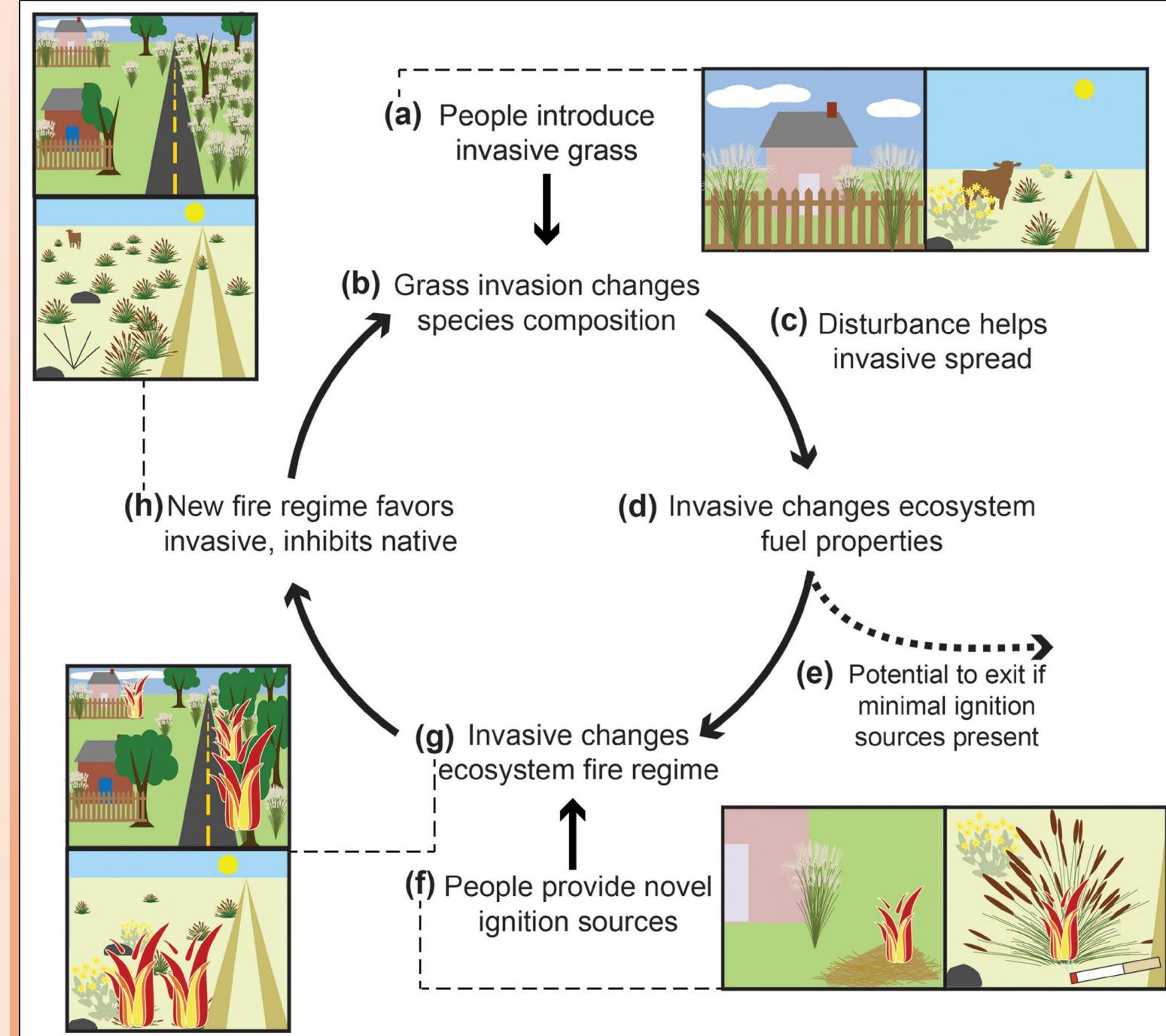
Joshua trees inhabit the stolen ancestral lands of innumerable indigenous peoples. They were known as humwichawa (Cahuilla), sovarampi (Southern Paiute), tsoarömpö (Chemehuevi), huêlye (Mojave), umpu (Western Shoshone), choor-martsh (Serrano) and many other names before they received their western names, Joshua tree and *Yucca brevifolia*.



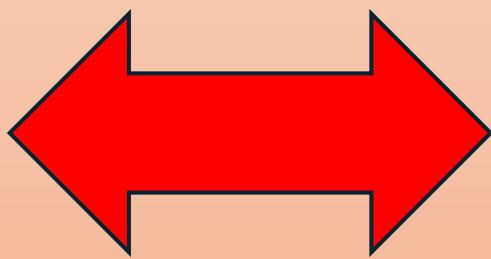
Their continued conservation depends on following the leadership of the many indigenous people working to save them.

# The Human- Grass-Fire Cycle

Fusco et al., 2021



Fire Management



Invasive Plant  
Management

# Federal Fire Management Process

## Pre-planning

- Fuels management
- Fire prevention
- Identifying priority resources
- Fire Management Plans
  - Management Action Points

## Incident

- Decisions made by IMT and Agency Administrators
- Resource Advising

## Post-Fire Plans

- Emergency Stabilization (BAER)
- Burned Area Restoration (BAR)

## Suppression Repair

- Part of incident



# Invasive Grass Management in JOTR

*Bromus tectorum* (Cheatgrass)

*Bromus rubens* (Red brome)

*Schismus spp.* (Mediterranean grass)



## 2023 Geology Fire

- Caused by UTV
- Low elevation western Joshua tree habitat



- Spread by invasive Mediterranean grass
- Retardant and mobile attack used
- 1033 acres, ~10,000 Joshua trees impacted

## 2023 York Fire

- Human-caused
- Large areas of Joshua tree refugia impacted



- Spread primarily by native bunch grasses
- Limited firefighting intervention authorized
- 93,078 acres, 1-2 million Joshua trees impacted

# What is fire retardant?

Ammonium polyphosphate = Fertilizer



Name	Product identifier	%
Ammonium Polyphosphate Solution (Non-hazardous)	(CAS-No.) Trade Secret	80 - 100
Performance Additives (Non-hazardous)	(CAS-No.) Trade Secret	5 - 10
Attapulgus Clay	(CAS-No.) 8031-18-3	1 - 5
Iron oxide	(CAS-No.) 1309-37-1	1 - 5

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

# Eureka Fire, May 2025



# Decision Making and Fire Retardant

## Benefits

- Fire size is reduced

## Risk of Large Fires

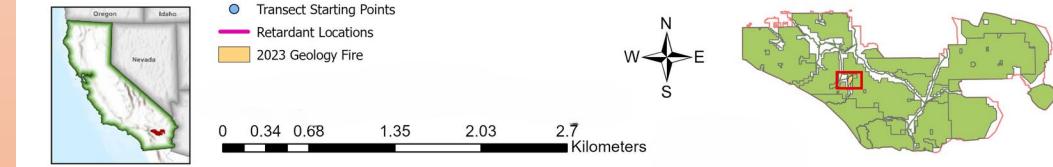
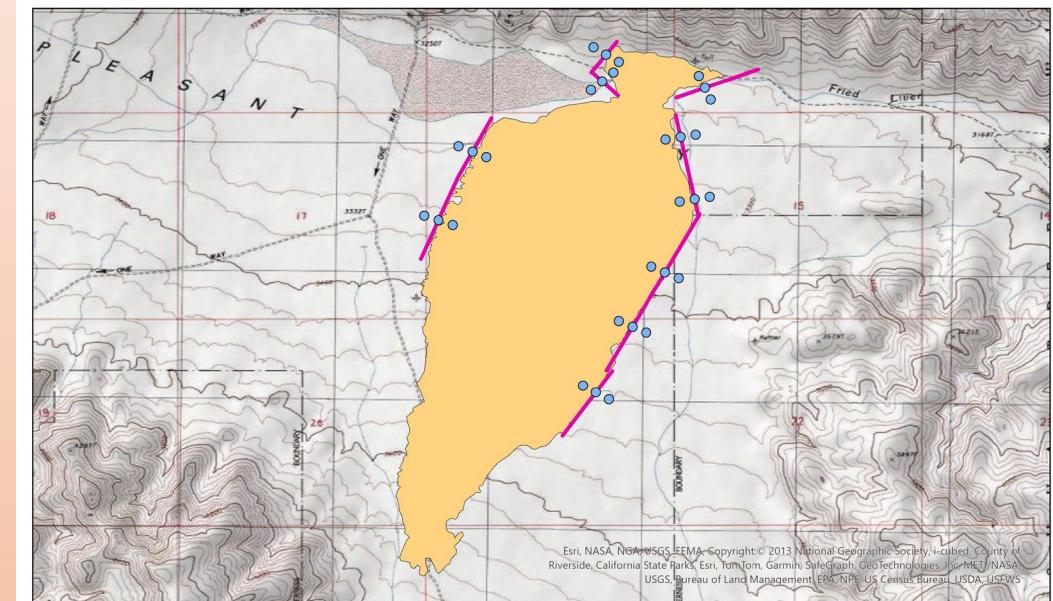
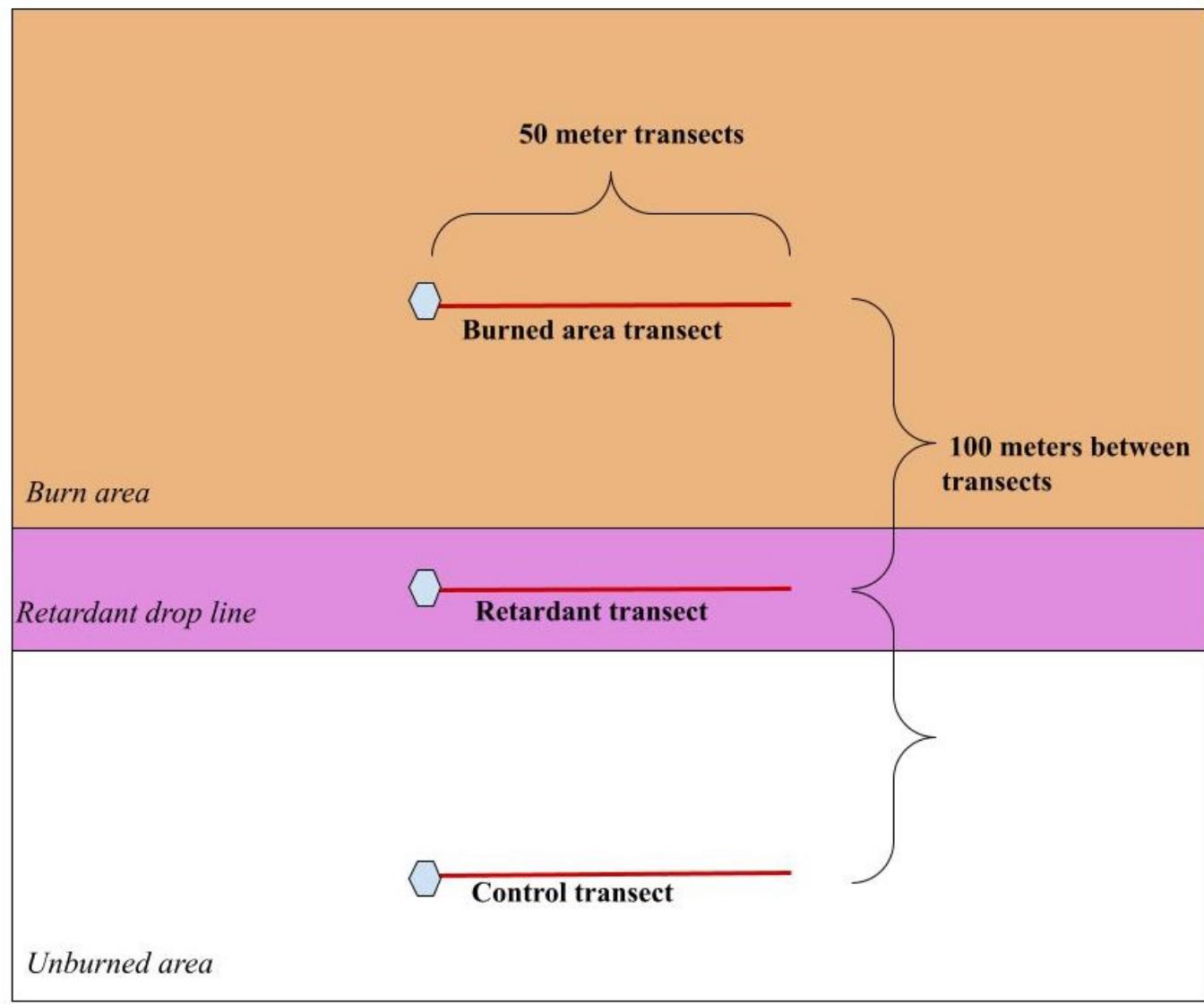
- Impacts to waterways
- Promotion of invasive grasses
- Visual impacts
- Loss of key species
- Long term ecological degradation

## Risks

- Impacts to waterways
- Promotion of invasive plants
- Visual impacts

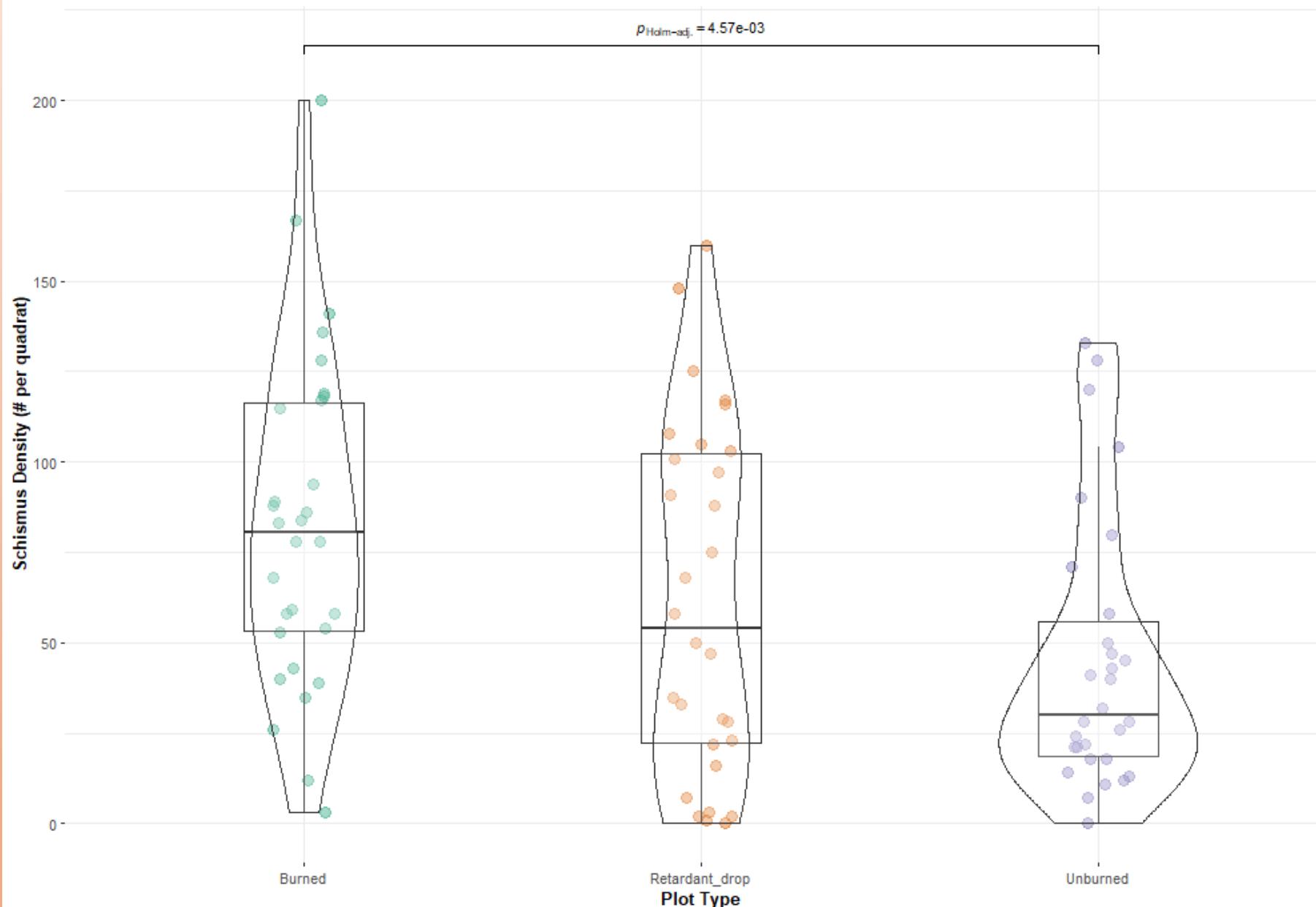


# Study Design

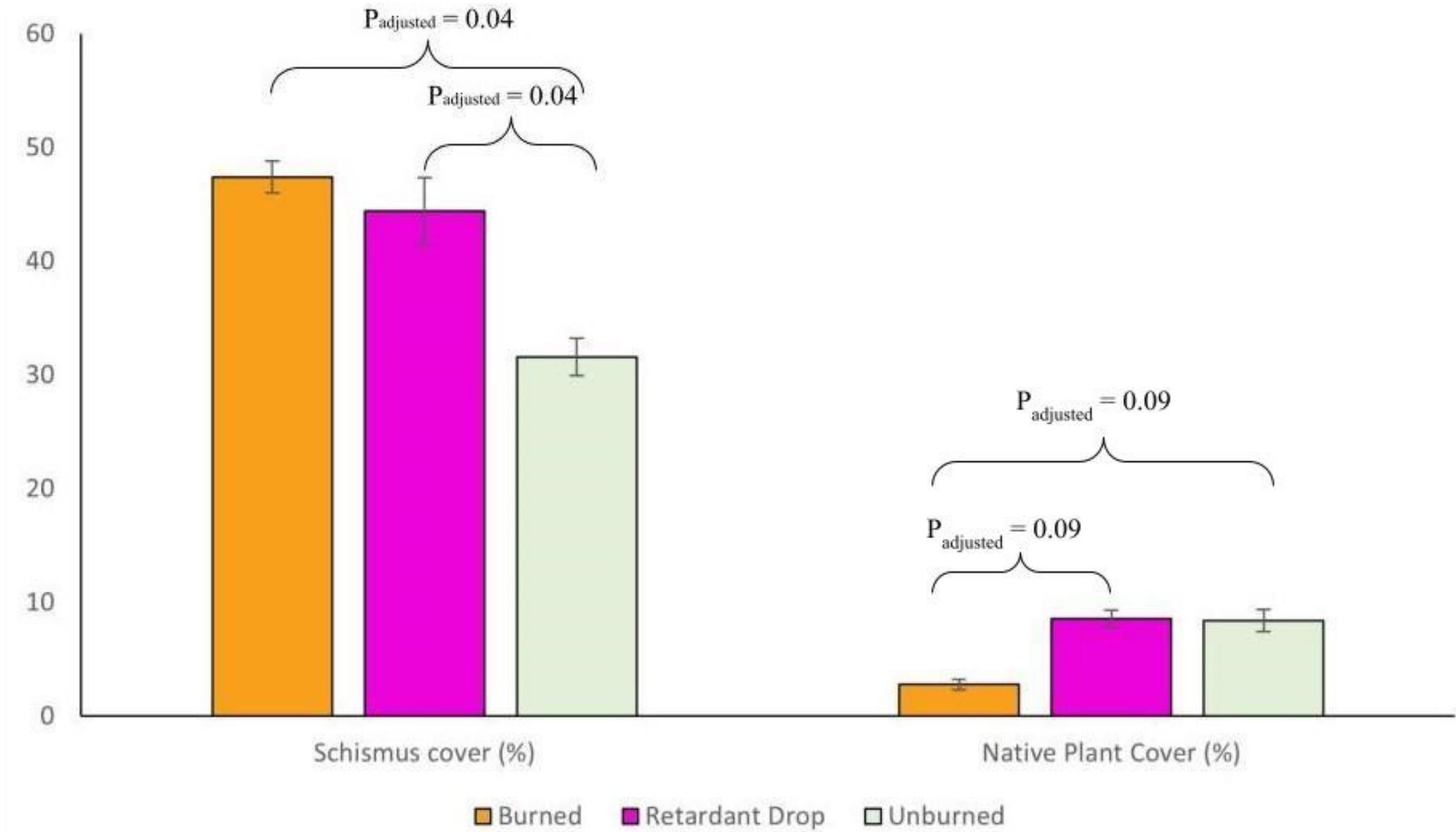


$\chi^2_{\text{Kruskal-Wallis}}(2) = 10.12, p = 6.34\text{e-}03, \hat{\epsilon}_{\text{ordinal}}^2 = 0.11, \text{CI}_{95\%} [0.05, 1.00], n_{\text{obs}} = 90$

$p_{\text{Holm-adj.}} = 4.57\text{e-}03$



***Schismus* density 10 months after the Geology Fire**



***Schismus and native plant cover 10 months after the Geology Fire***



# Recent JOTR fires

2022 Elk Trail: 431 acres

2023 Geology Fire: 1033 acres

2025 Eureka Fire: 212 acres

2025 Black Rock Fire: 72 acres

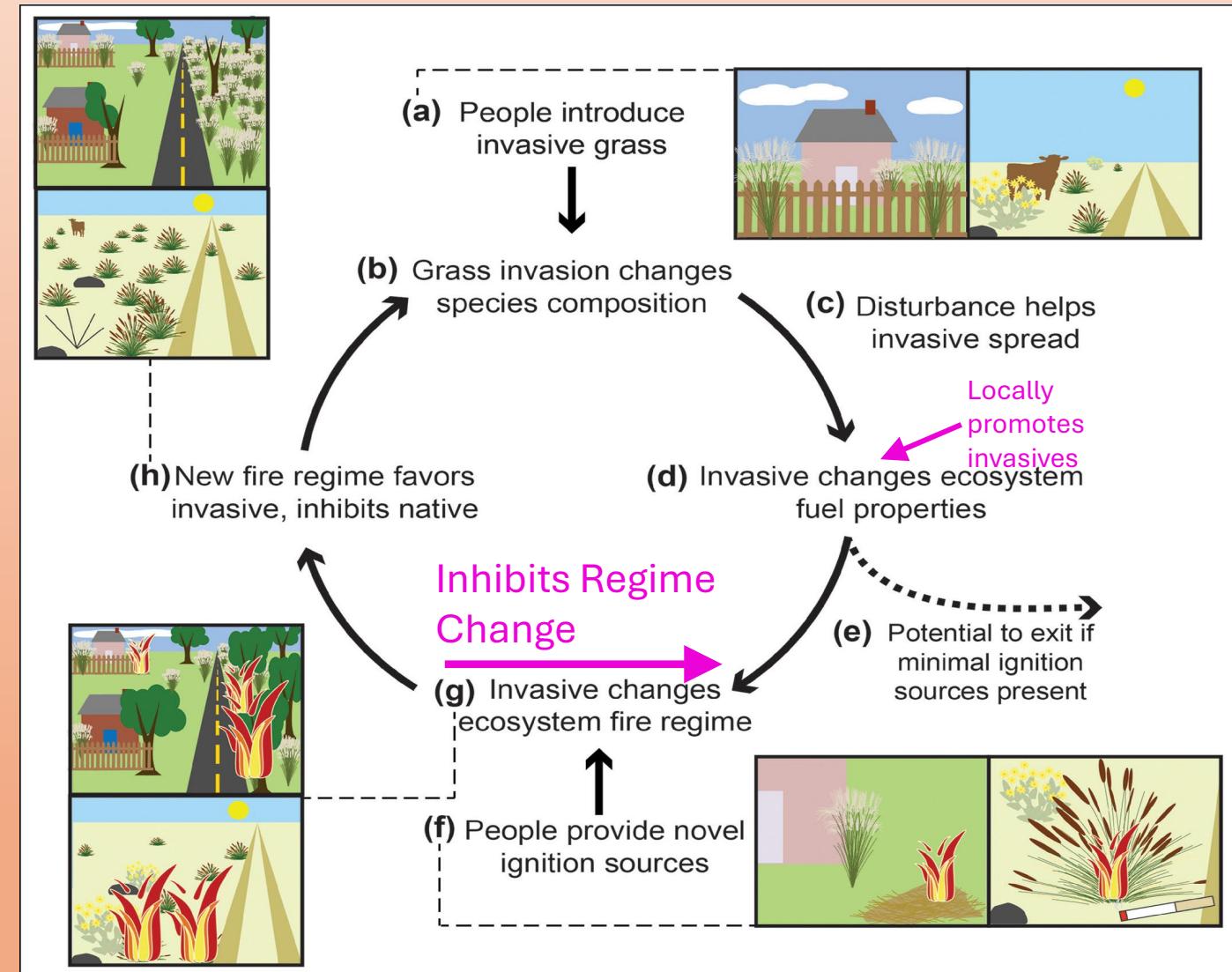
All human caused



NPS / Brian Brenzel

# Human-Grass-Fire Cycle with Retardant

- Retardant does promote invasive grasses
- Retardant-impacted areas similar to burned areas



By keeping fires small, retardant can be an effective tool to combat the human-grass-fire cycle.

# Next Steps

- Multi-year data on Geology Fire
- Expanding to Eureka and Black Rock Fires
- Soil testing
- Invasive Plant Management  Fire Management Plans

# Thank You!

- Joshua Tree National Park Staff and Firefighters
- JOTR VIPs
- Indigenous stewards of the Joshua trees for untold generations
- Neil Frakes, who initiated my love of Joshua trees
- Dr. Lynn Sweet, Melanie Davis, and UCR CCB
- Everyone that has ever measured or cared for a Joshua tree

