



SCHOOL OF  
ENVIRONMENT AND  
NATURAL RESOURCES

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES



School of Environmental  
and Forest Sciences

UNIVERSITY of WASHINGTON

College of the Environment

# Vegetation dynamics in the Columbia Basin sagebrush-steppe

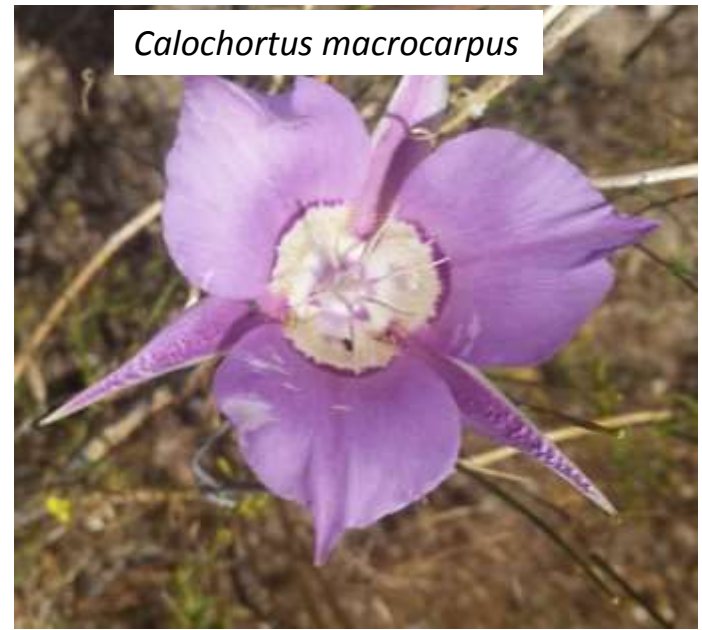
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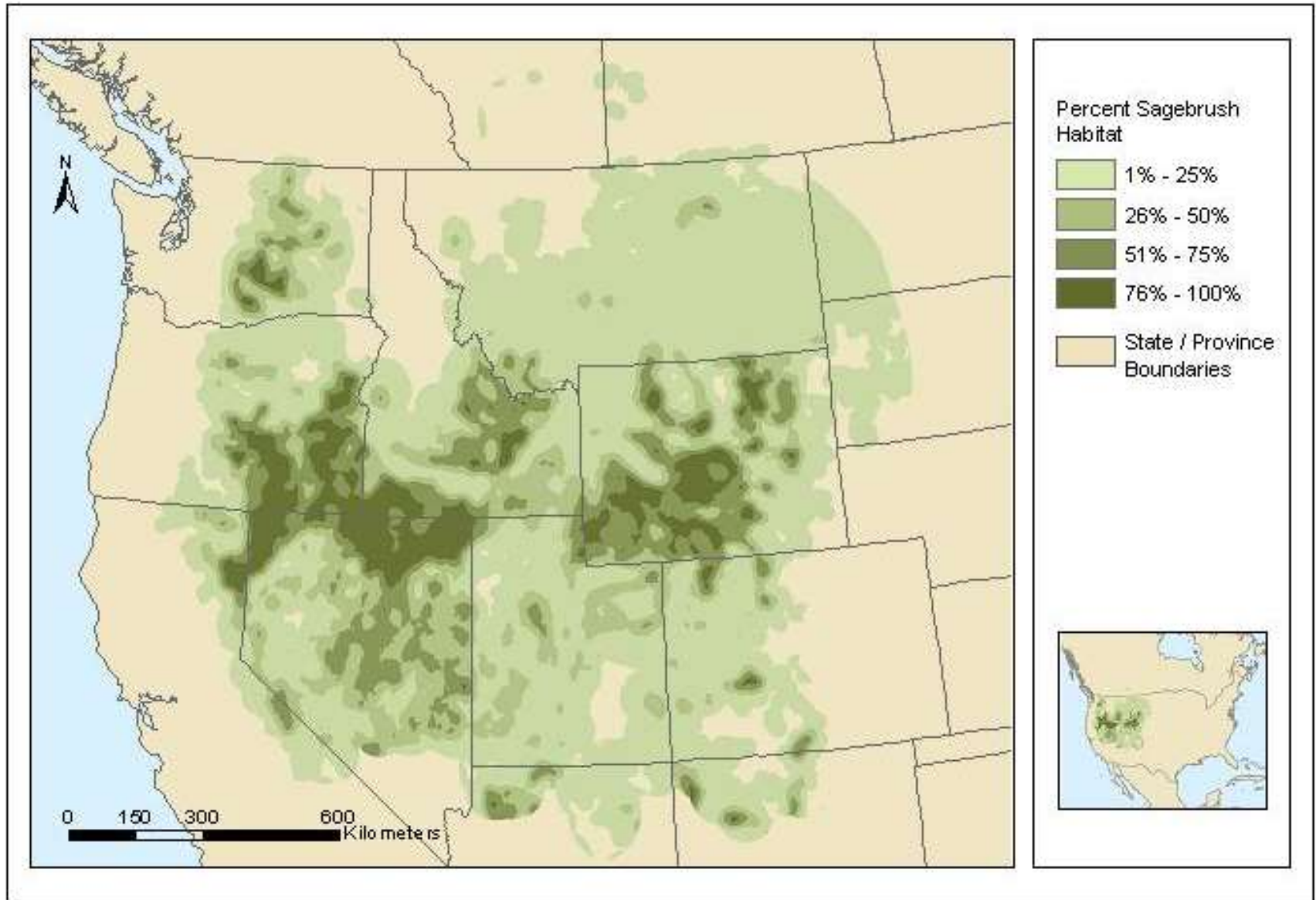


Big Sagebrush  
(*Artemisia tridentata*)

Bunchgrass understory  
(*Poa secunda*, *Pseudoroegneria spicata*, etc.)



# The sagebrush biome



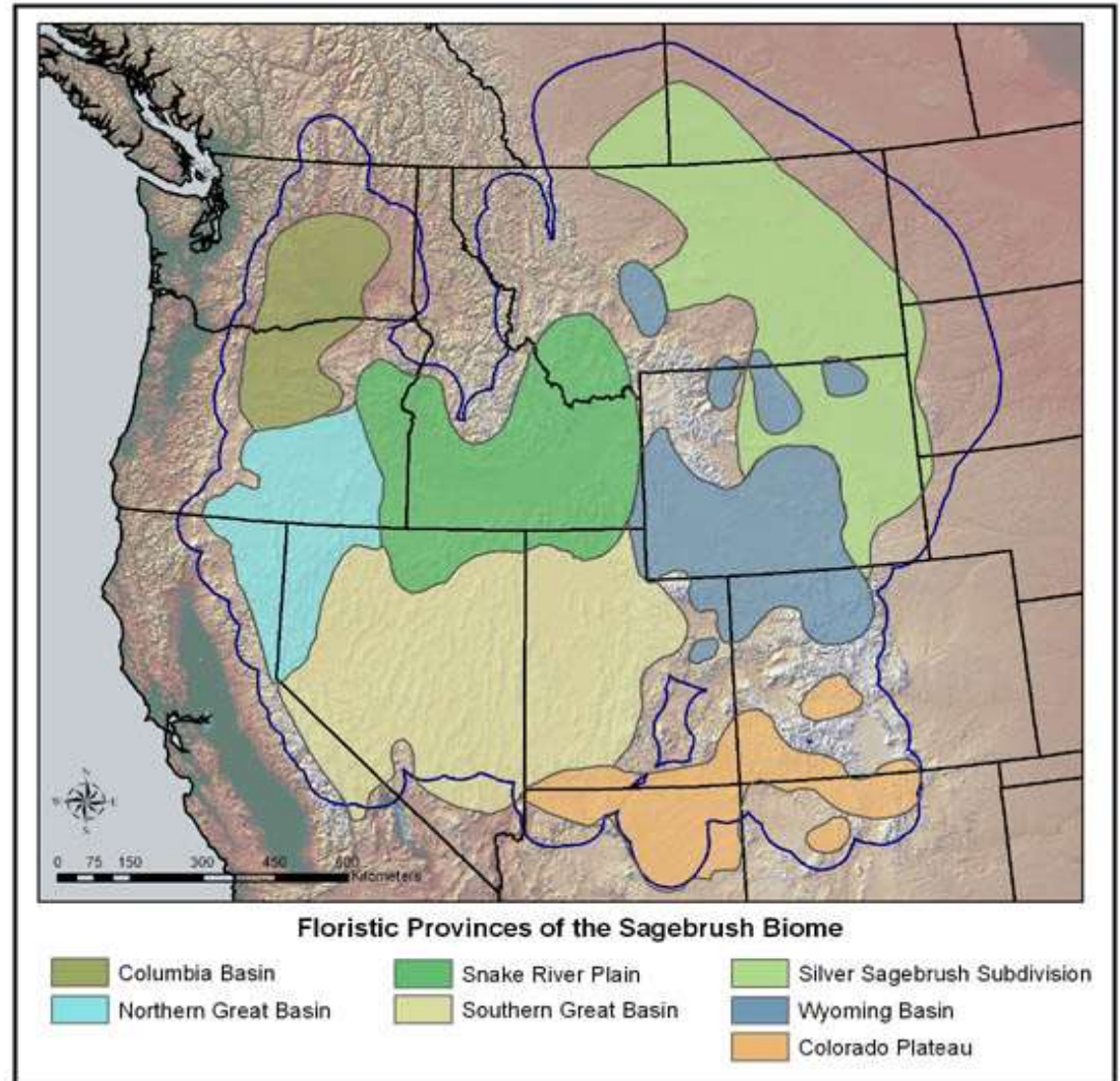
Greater sage-grouse  
(*Centrocercus urophasianus*)



# Columbia Basin sagebrush-steppe

Elevation:  
150 – 1200 m  
(c. 500 – 3600 ft)

Annual rainfall:  
16 – 30 cm  
(c. 6 – 12 in)



# Sagebrush-steppe community types

*A. tridentata* – bunchgrass



*Artemisia tripartita* – bunchgrass

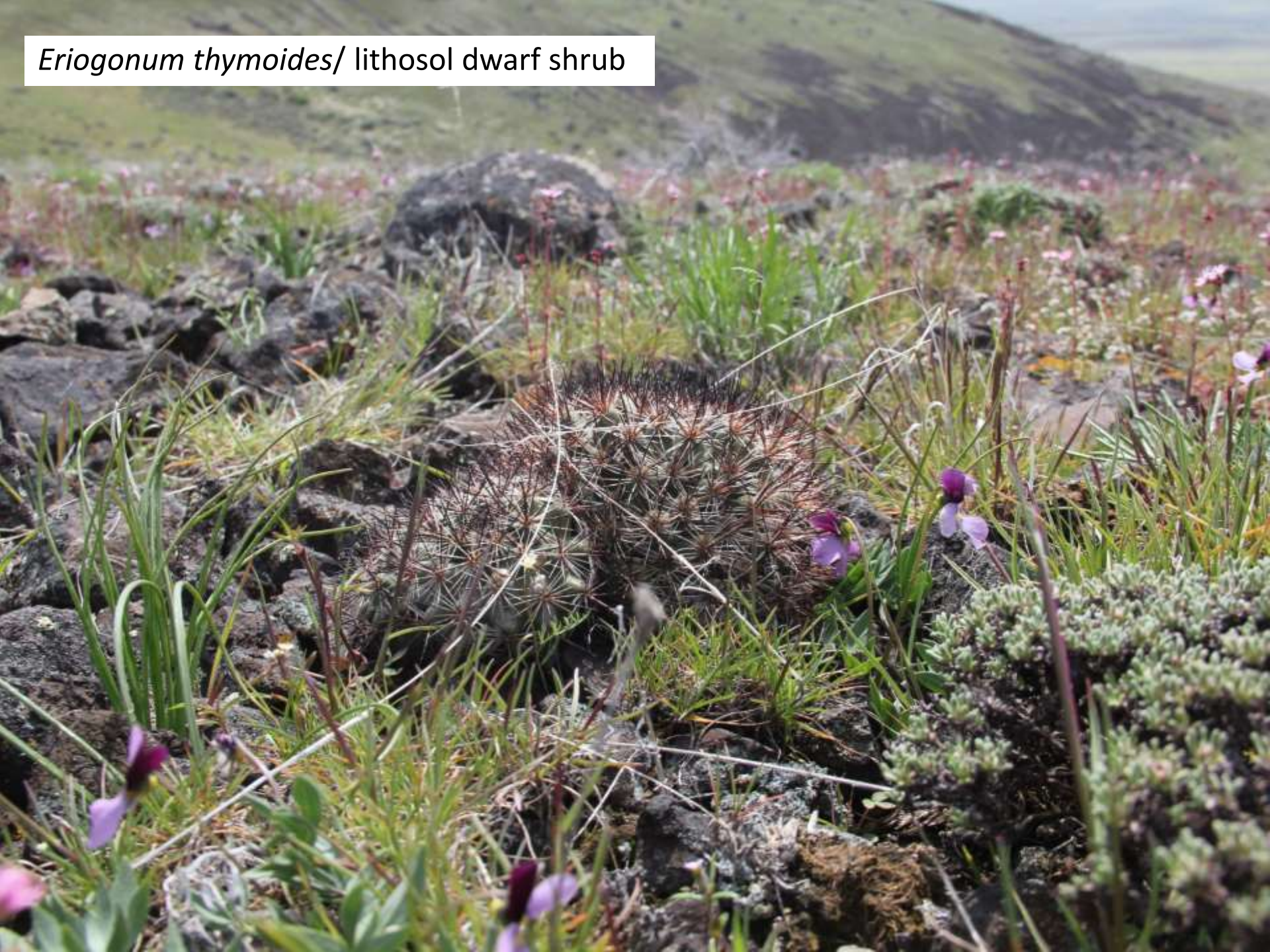




*Artemisia rigida* scabland / dwarf shrub



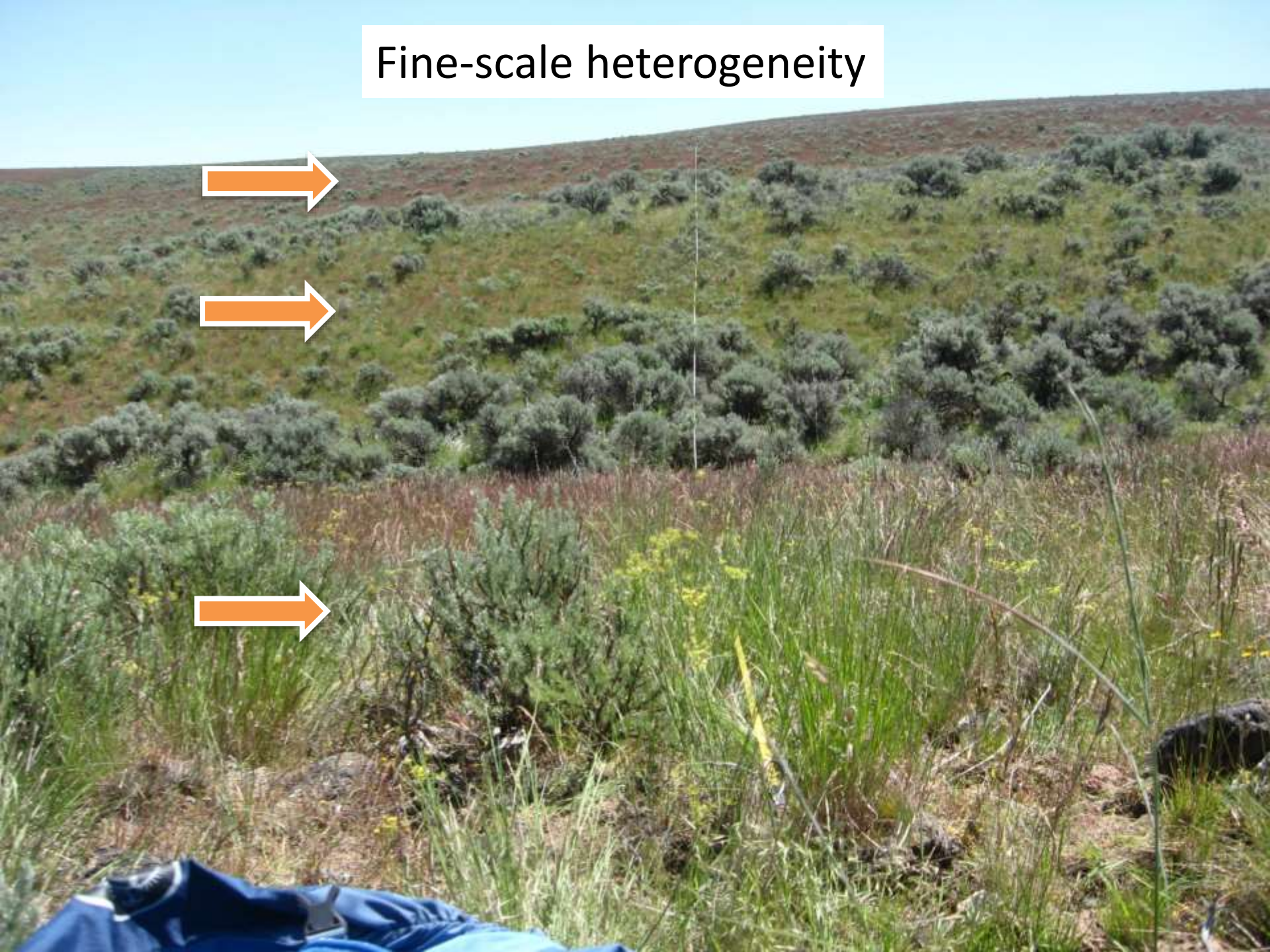
*Eriogonum thymoides*/ lithosol dwarf shrub



Bunchgrass - forb



# Fine-scale heterogeneity



# Threat: land-use change



Forest



Shrub-steppe



Agriculture

Historic



Modern

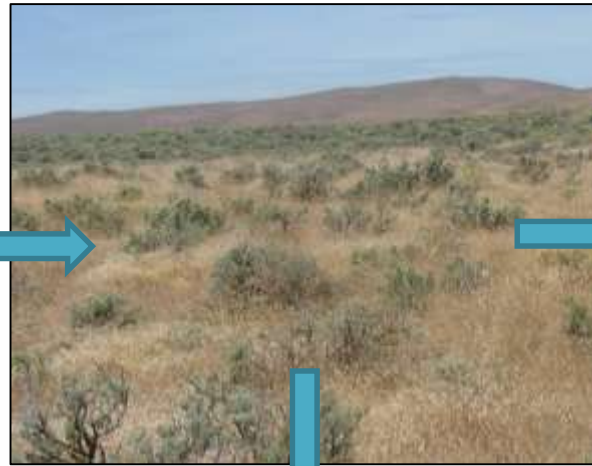


# Threat: invasion and fire

Intact sagebrush-steppe



*Bromus tectorum* (cheatgrass) & weeds



Heidi Newsome/FWS



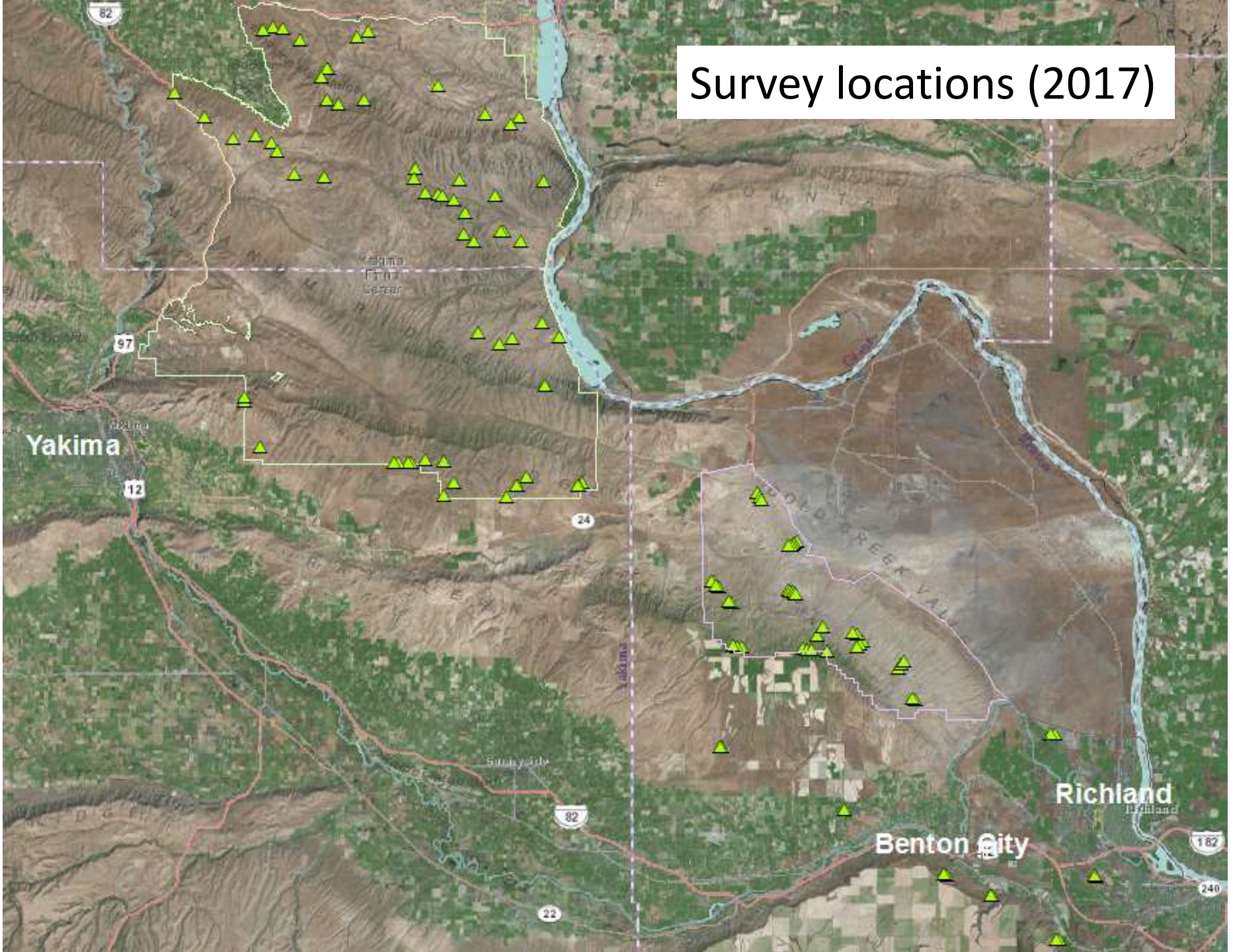
# Project overview



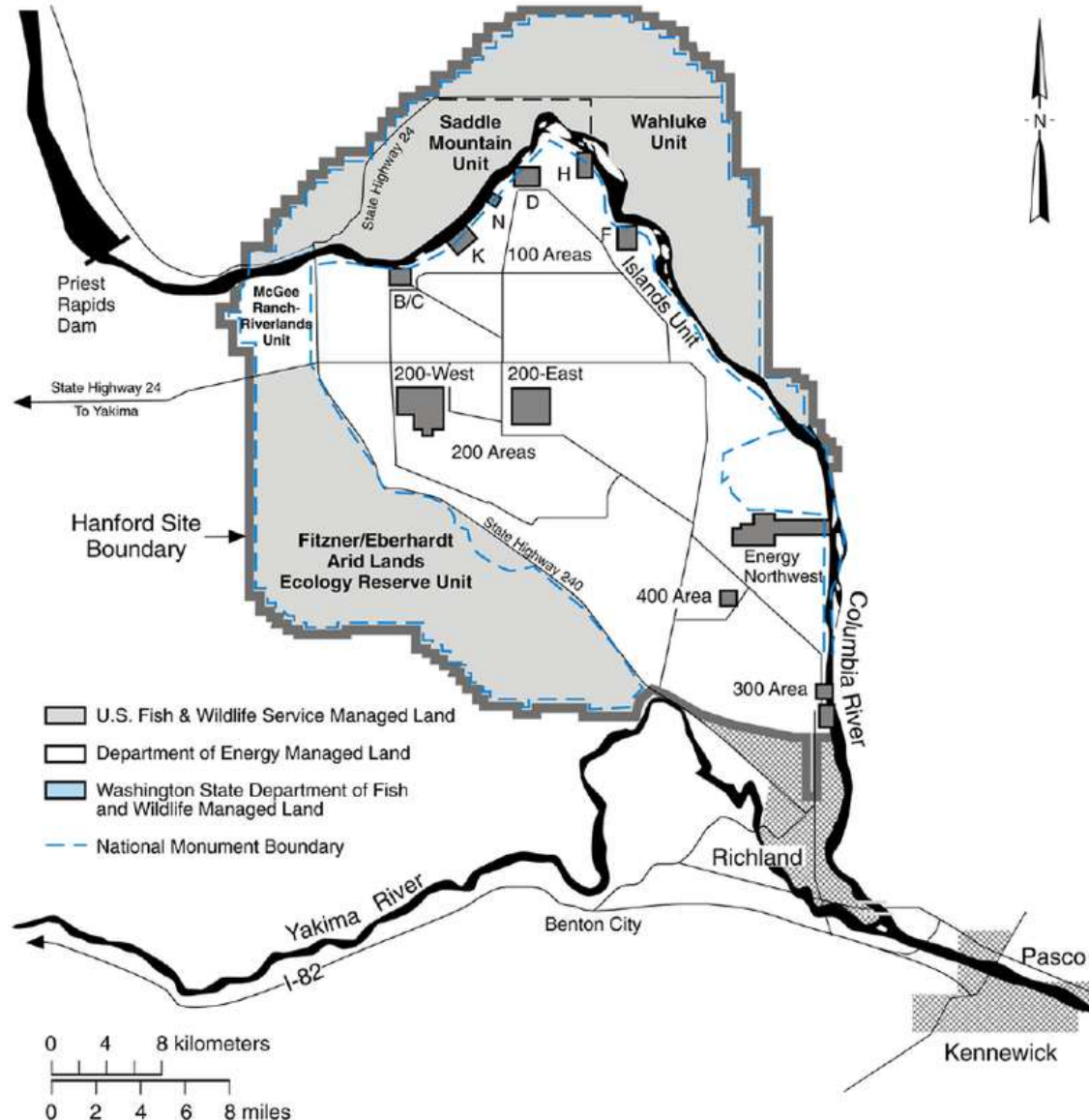
- Gather data from long-term vegetation monitoring programs
  - YTC, Hanford Reach, BLM, private ranchland, Benton Co., WSU
- Re-locate and re-survey in 2017
- Analyze vegetation change in response to fire, restoration, succession
- Share findings with stakeholders



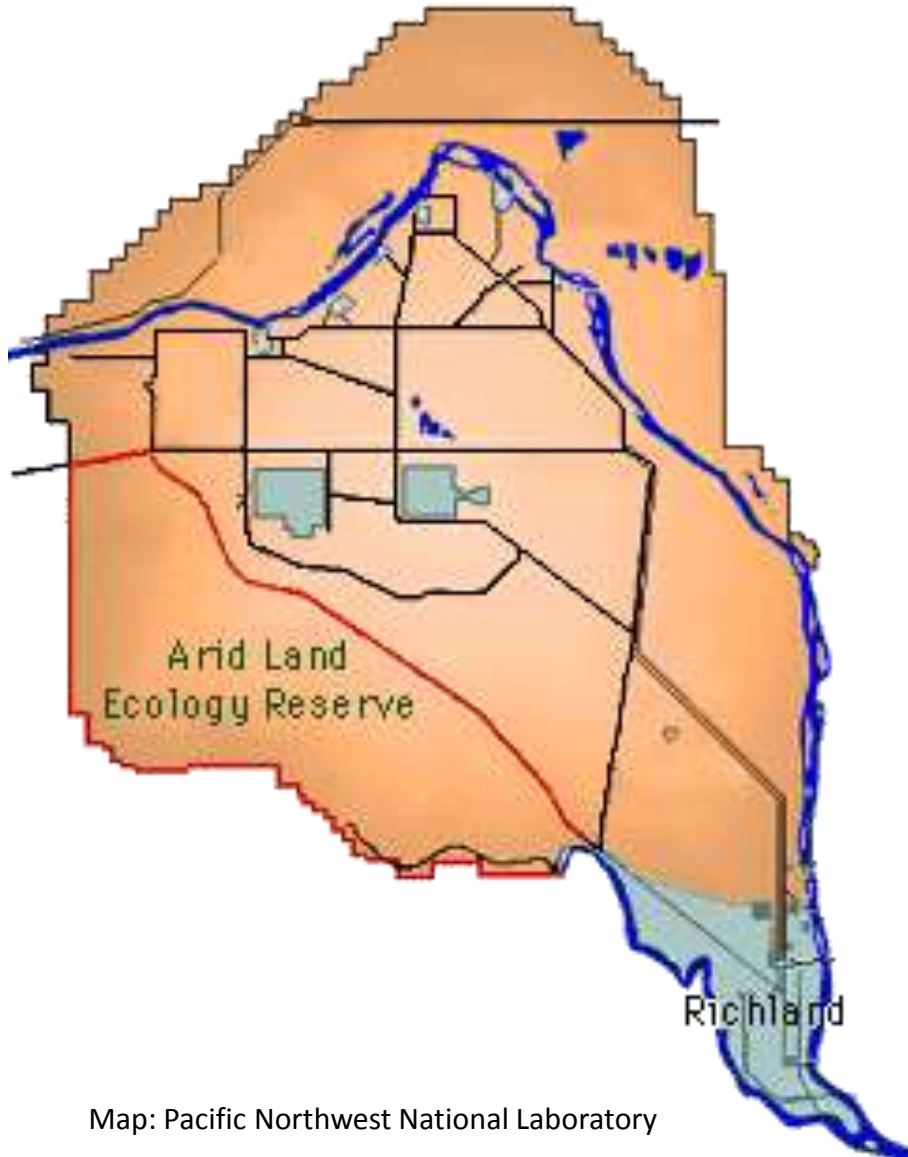
# Survey locations (2017)



# Hanford Reach National Monument

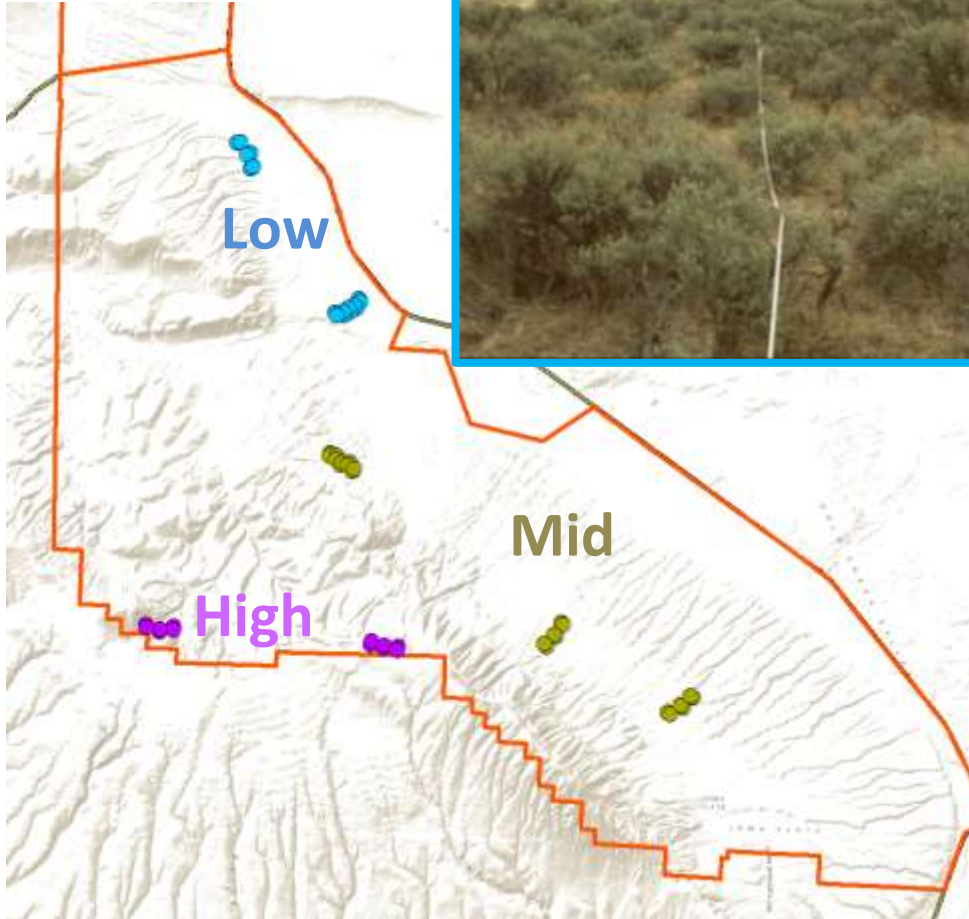


# Arid Lands Ecology Reserve



Map: Pacific Northwest National Laboratory

# Biological Resources Management Plan (est. 1996)



# 24 Command Fire, 2000 (164,000 acres)

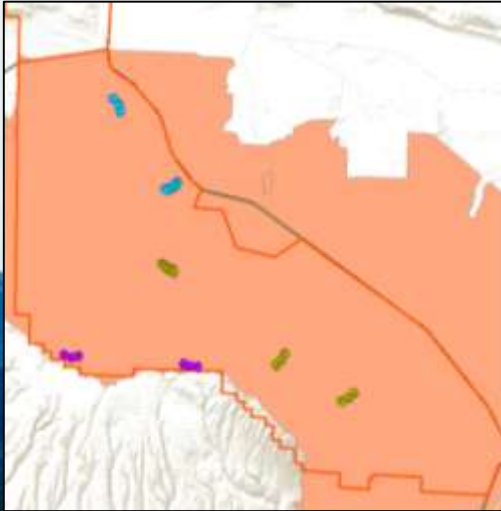


Photo: Heidi Newsome

# Post-fire Burned Area Emergency Rehabilitation



- Grass and forb mix aerial and drill seeded
- *A. tridentata* bareroot outplantings



Mid-1990s



2001

Low elevation

Pre-herbicide & seed



**2003**

**Low elevation**

**Post-herbicide & seed**





**2001**

**High elevation**

**No restoration**



2004

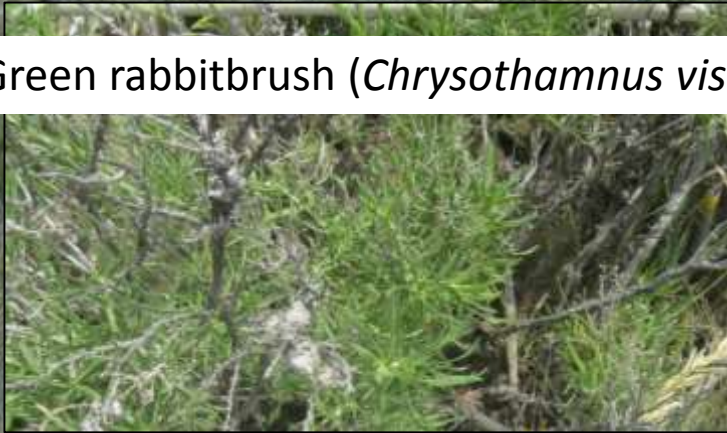
High elevation

No restoration

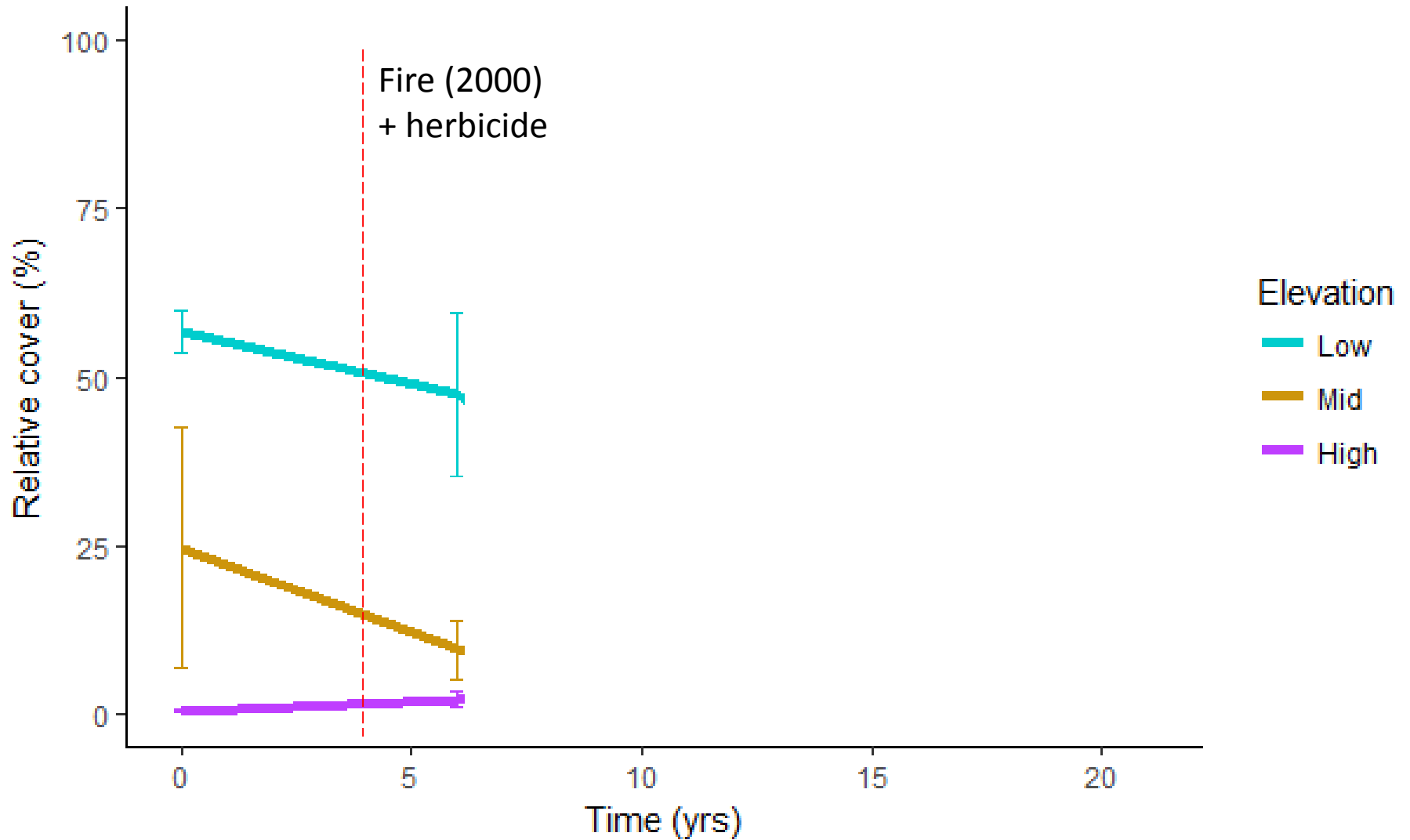
Three-tip sagebrush (*A. tripartita*)



Green rabbitbrush (*Chrysothamnus viscidiflorus*)



# Cheatgrass abundance



# Wautoma Fire & Milepost 17 Fires 2007 (67,000 acres)

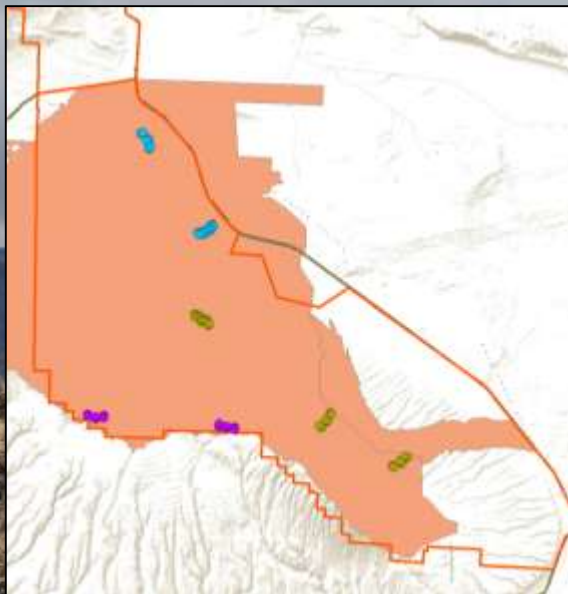
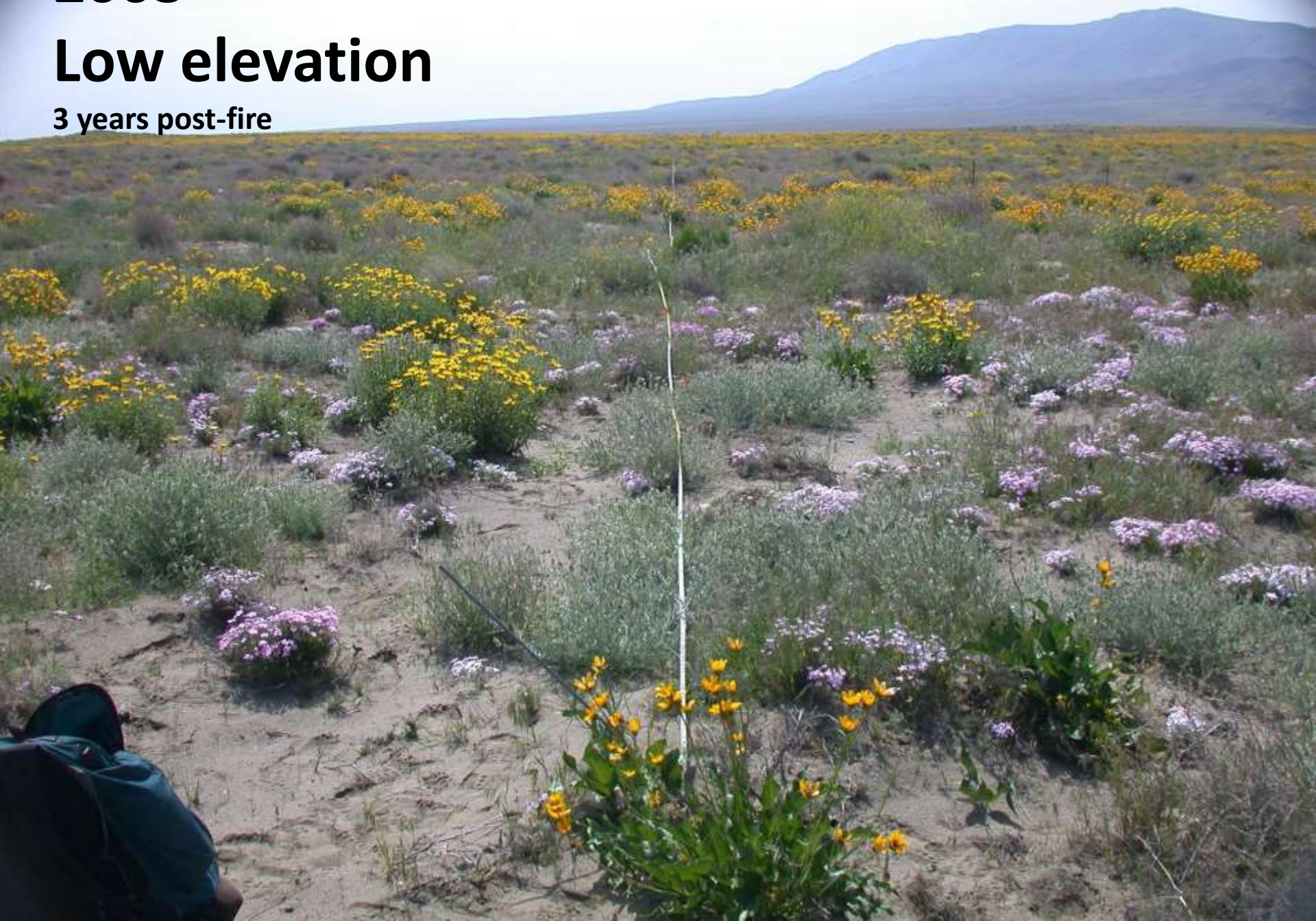


Photo: Heidi Newsome

**2003**

**Low elevation**

**3 years post-fire**



**2010**

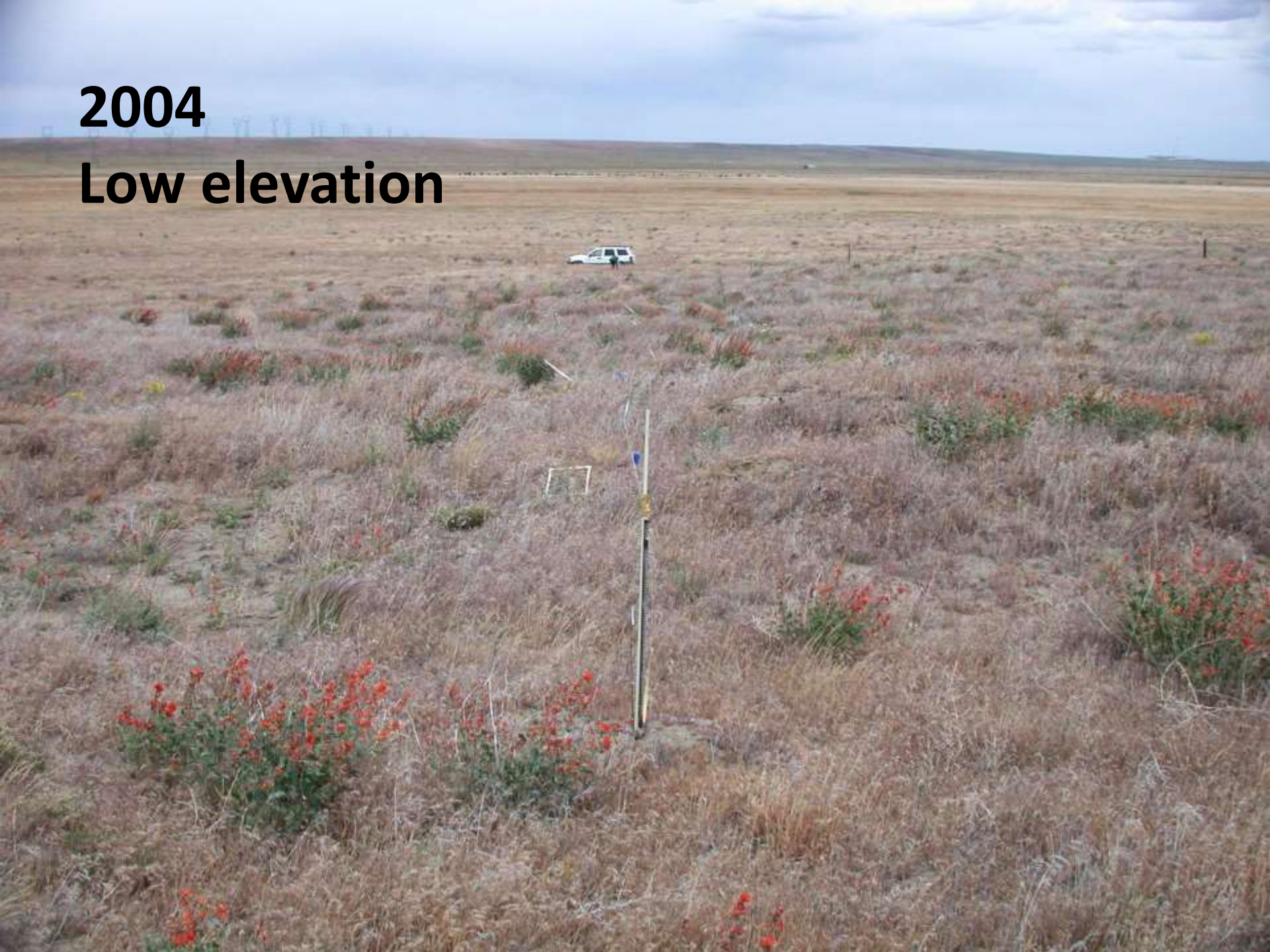
**Low elevation**

**3 years post-fire**



**2004**

**Low elevation**



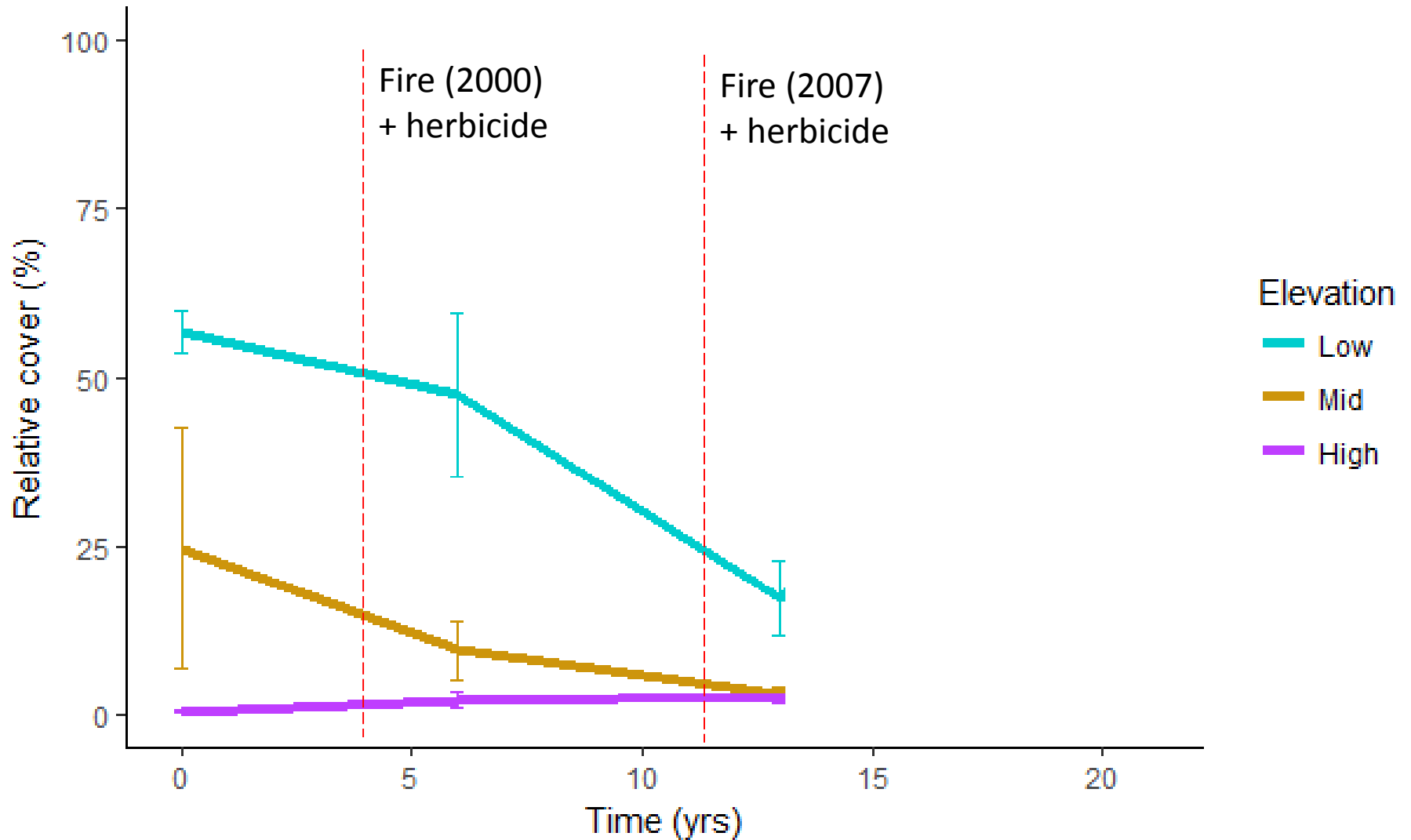
**2010**

**Low elevation**





# Cheatgrass abundance



**2010**

**Low elevation**

No maintenance since 2010



**2017**

**Low elevation**



**2010**

**Low elevation**



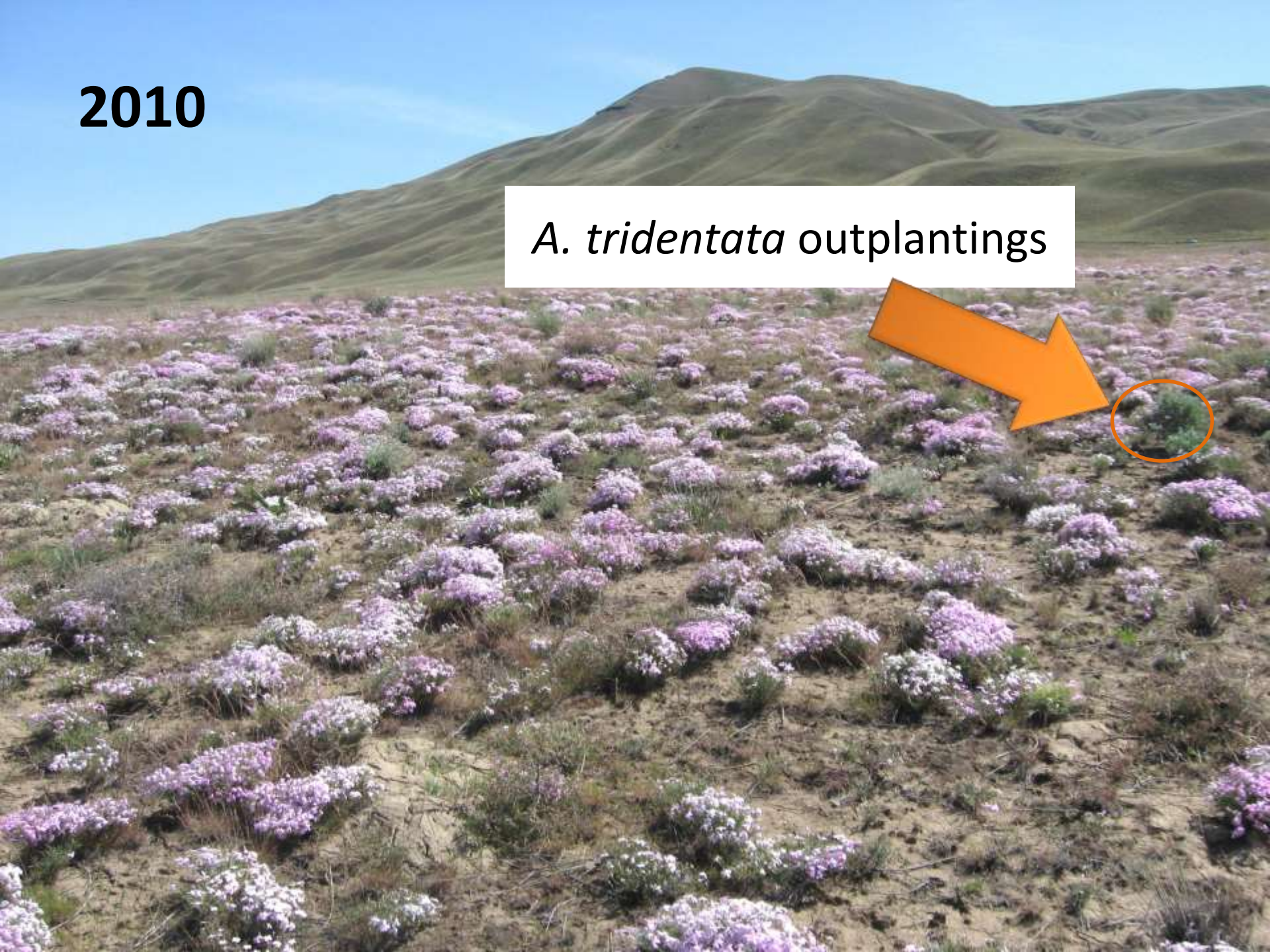
**2017**

**Low elevation**



2010

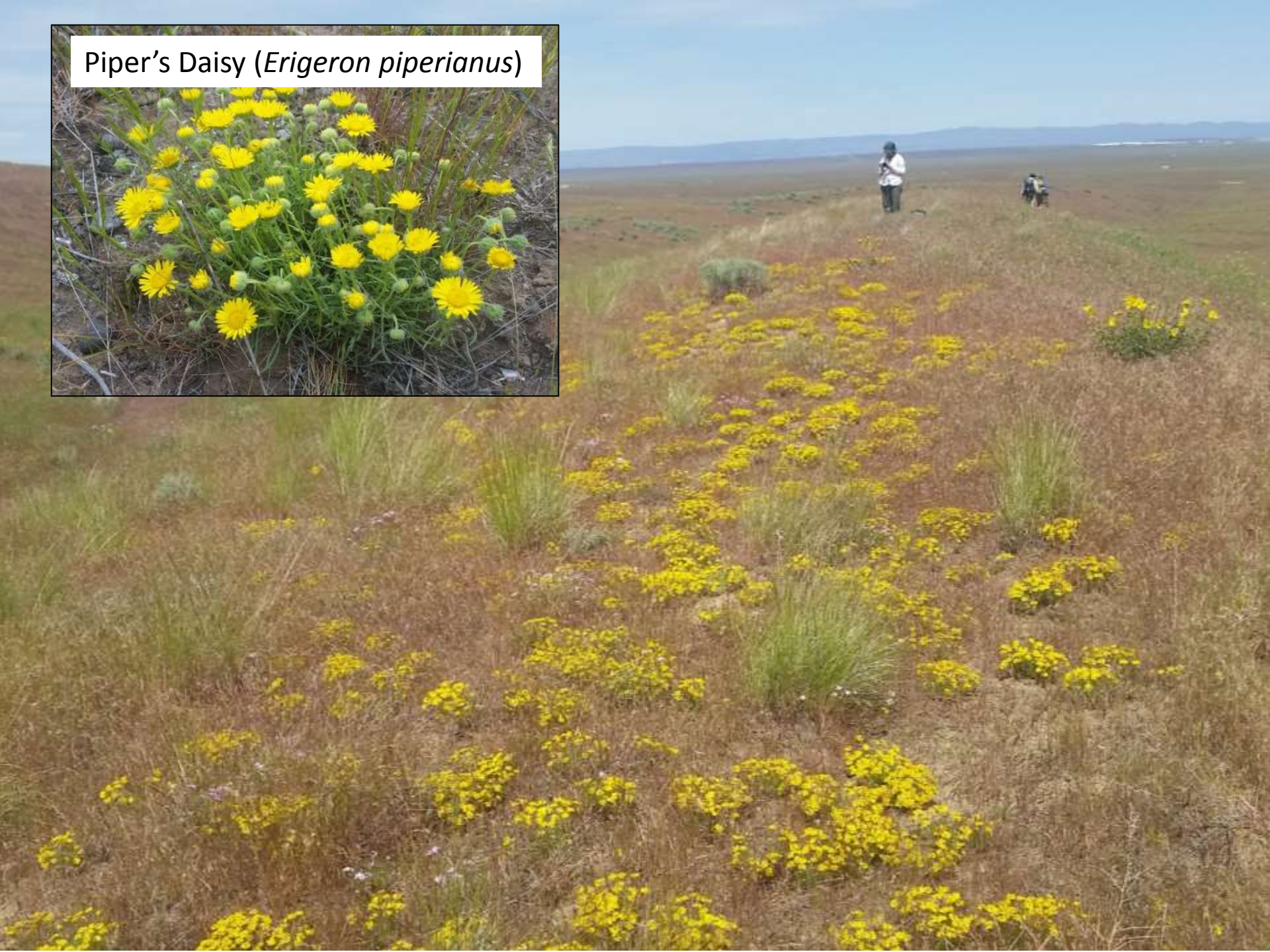
*A. tridentata* outplantings



**2017**

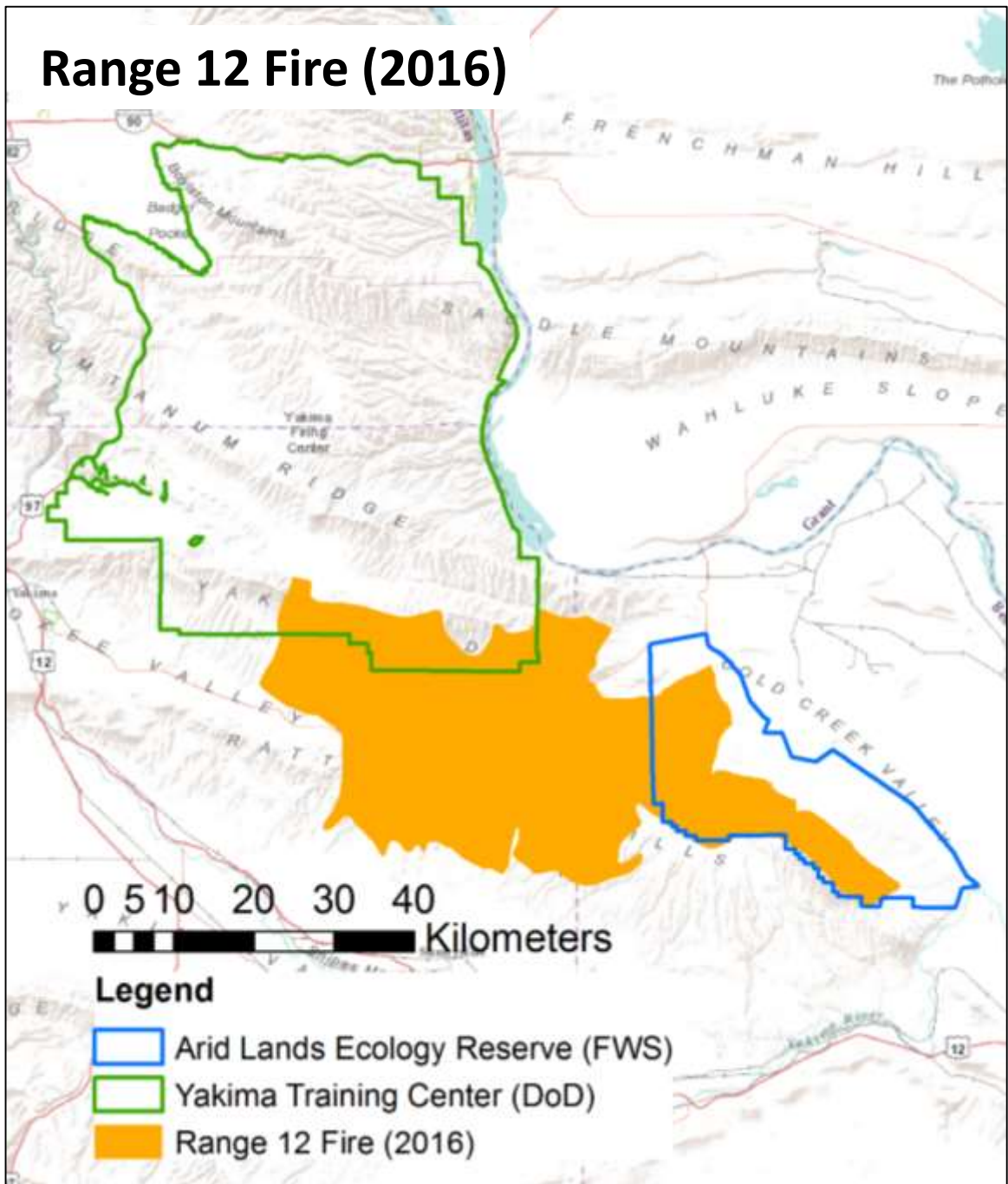


Piper's Daisy (*Erigeron piperianus*)

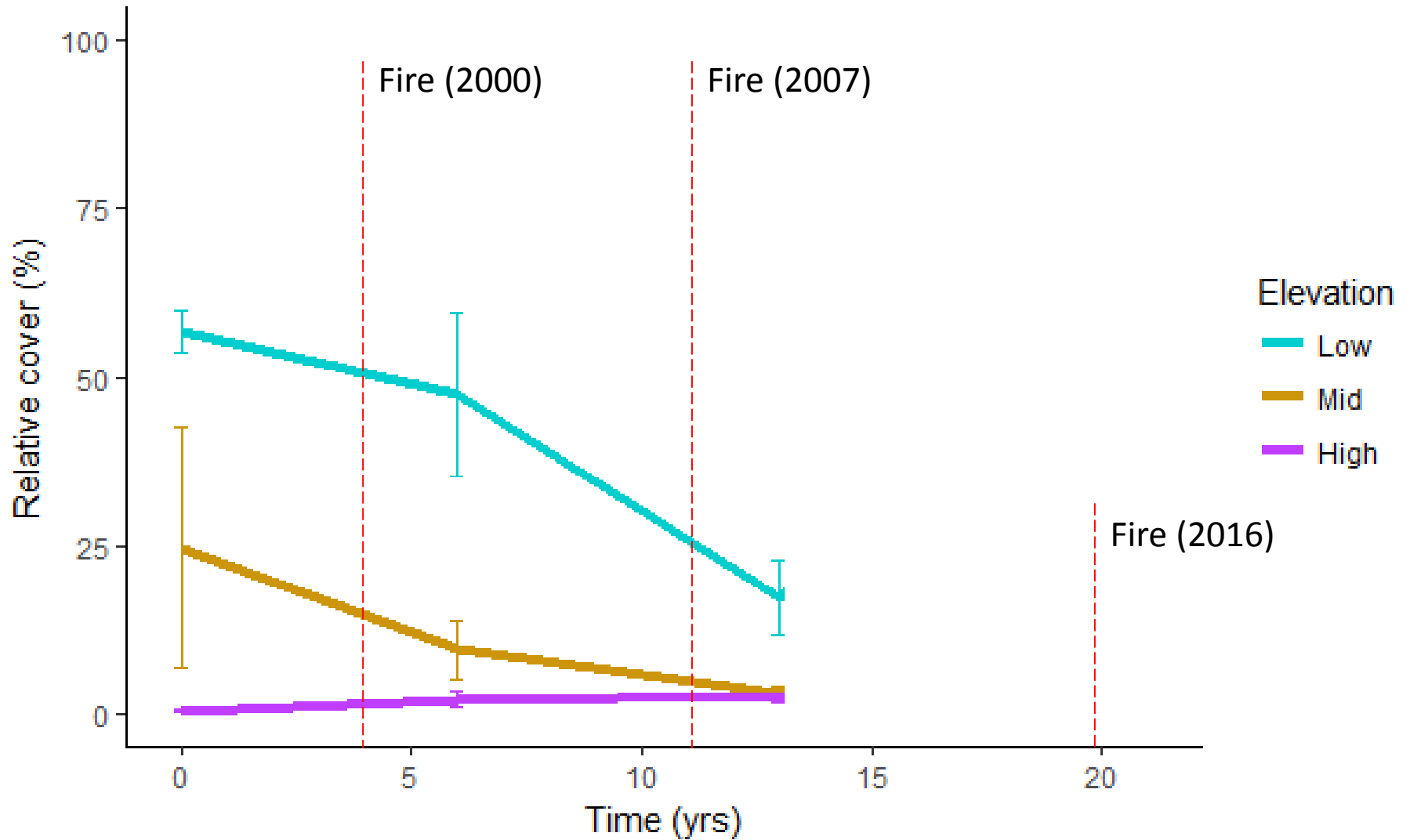




# Range 12 Fire (2016)



# Cheatgrass abundance



**2017**

**High elevation**

**1 year post-fire**

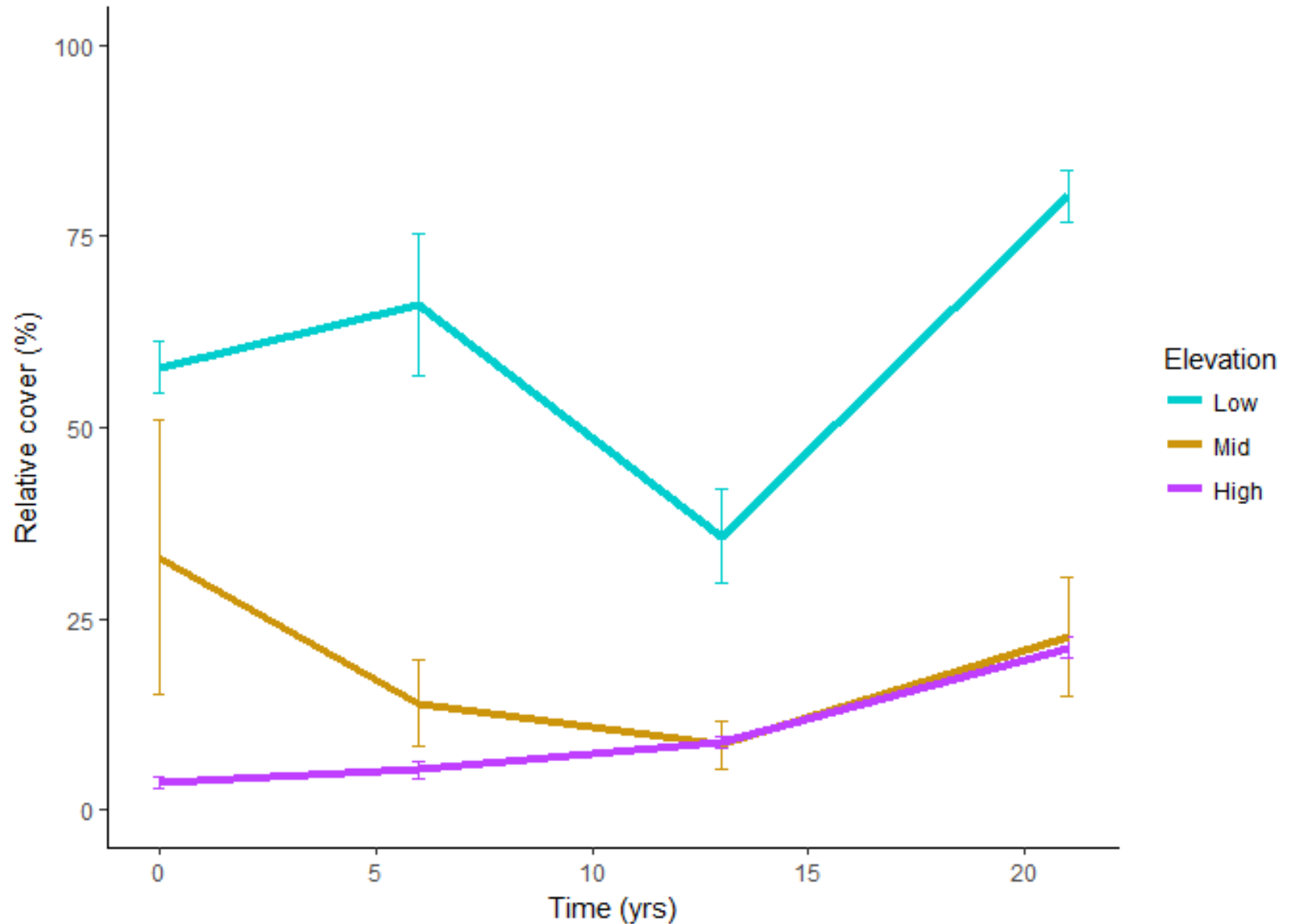


Bulbous bluegrass (*Poa bulbosa*)



Photo: Ben Legler

# Non-native species are on the rise



# Summary

- Sagebrush is complex, diverse, but disappearing
- Wildfire, cheatgrass invasion, and *A. tridentata* loss are key management concerns
- Recovery is context-dependent (vegetation type, disturbance type, etc)
  - Higher elevations more resilient to fire & invasion – but need monitoring
  - Lower elevation recovery may be transient without maintenance
- Threatened species locally abundant, persist in cheatgrass matrix



# Acknowledgements



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