

# State of knowledge on pinyon-juniper communities

**Pinyon-Juniper (PJ) communities are complex, important, and extensive across the Western United States**

## Complex

- Two pinyon species and three juniper species, which have different responses to disturbance and management
- Found as woodlands, wooded shrublands, savanna, or closed canopy forests

## Important

- Long history of use for native peoples, and for grazing, recreation, and fuelwood
- Habitat for plants and animals that live nowhere else

## Extensive

- PJ communities occur between dry forests, grasslands, and shrublands, representing one of the most abundant communities across North America



Photo: Jessica Hartsell, USGS

## Database and publication on the state of knowledge of PJ communities

### Newly released review and database

- Review and database document the extensive research on PJ communities from 1909-2018
- Review provides synthesis on the ecology, management and future of PJ communities
- Compiled 441 studies to characterize patterns in research on PJ communities through time, geographic space, climatic conditions, and among focal species

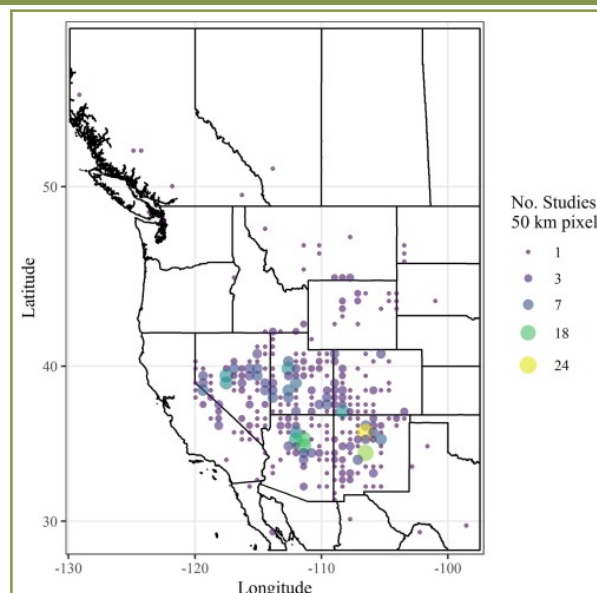
Database available from:

<https://doi.org/10.5066/P9LWZN72>

Publication:

Hartsell, J.A., Copeland, S., Munson, S.M., Butterfield, B.J., Bradford, J.B., Gaps and hotspots in the state of knowledge of pinyon-juniper communities. *Forest Ecology and Management*. January 2020.

<https://doi.org/10.1016/j.foreco.2019.117628>



The geographic distribution of PJ research. Each dot represents a 50km pixel. Larger dots correspond to a greater number of publications.

Taken from Hartsell et al. 2020



## Some areas of PJ communities are expanding, while others are contracting

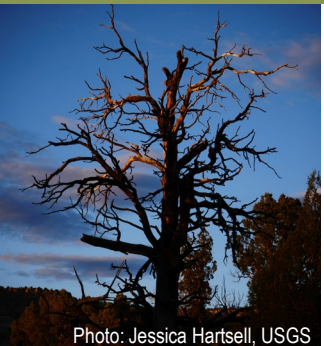


Photo: Jessica Hartsell, USGS

### Expansion

- Human causes: recovery from harvests for fuelwood, charcoal or mine timbers, fire suppression, and grazing through reduced competition and reduction in fine fuels
- Natural causes: cooler, wetter climate periods foster increased regeneration, higher density of trees and expansion into grassland or shrubland areas
- Drivers of increased tree density and expansion can vary among sites

### Contraction

- Pronounced drought events have caused largescale mortality of pinyon and juniper

## Research on the management of PJ communities focuses on tree removal, understory plants, and soil characteristics

- Expansion of trees into grasslands and shrublands motivate tree removal treatments
- \$26.7 million has been spent on Bureau of Land Management lands from 1950-2003 on the Colorado Plateau alone
- Most studies measured results for one year, limiting understanding on the long-term effects of treatments
- Tree removal promotes increased understory plant abundance, production, and diversity
- Juniper is more likely to regrow; pinyon is less likely
- Few publications evaluated grazing's effects on PJ communities as compared to other topics such as tree removal or seeding



Photo: Nichole Barger

## Past range shifts can help anticipate future shifts in an increasingly arid climate



Photo: Jessica Hartsell, USGS

- Anticipating shifts in the distribution of PJ communities is a critical knowledge gap
- Extensive research exists on the past distribution of pinyon-juniper communities
- Pinyon-juniper communities have historically expanded during years with more rain and lower temperatures and contracted during years of drought and higher temperatures
- Combining climate projections with the understanding of previous range shifts can aid in long term planning for PJ communities