

One funded MS student position

Discipline Areas: Forest Ecology, Avian Ecology, Rangeland/Forestland Management

Research Topic: Piñon-juniper ecology and management

Start Date: March 2024 or until filled

Compensation: 2 years of \$18,000 annual stipend plus benefits (tuition, fees, and insurance)

Utah State University's Department of Wildland Resources seeks an MS student to work on a project focused on the ecology and management of piñon-juniper woodlands in northern Utah. The piñon-juniper forest type plays an outsized and underappreciated role in Utah's biodiversity and habitat. Utah's piñon-juniper type is now under scrutiny for harboring the oldest trees in the west. The piñon-juniper forest type is Utah's most extensive forest type by area (>10,000,000 acres) and carries the most biomass (~7M ft³) of any forest type—nearly 45% of the state. Despite this importance, the ecology of this forest type is vastly understudied. Low elevation piñon-juniper types in Utah are dominated by Utah juniper and either single-leaf piñon in the Great Basin areas of the state or common piñon in the rest of the state. In Box Elder County, Utah, juniper and single-leaf piñon coexist on the ecotone with *Artemisia* spp. and at higher elevations. The importance of this type of habitat for the piñon jay cannot be understated, but their relative composition, stand dynamics, and population dynamics are virtually unknown in western Box Elder County.

Management of piñon-juniper types is widespread in the west and often occurs under the assumption that there is 'encroachment' into non-woodland types, most often the sagebrush steppe, and that management is 'restoring' stand structure or disturbance regimes. Management typically involves the mechanical removal of piñon and/or juniper from areas that are desired as some other cover type. Encroachment is the very predictable consequence of woodland establishment and natural succession. Over 150 years of domestic grazing and 100 years of fire suppression have created the appropriate conditions for piñon and juniper to establish in typically 'wooded shrubland' areas. There is concern that this type of management is unnecessarily removing long-lived trees that would have predated settlement era management, reflecting pre-settlement woodland conditions, and might also represent important habitats for species like the piñon jay. Similarly, there is concern that this kind of management may be occurring in areas that are not likely to return to a desirable cover type and instead type-change to something like cheatgrass.

In the absence of site-specific stand histories and disturbance regimes, it is possible that restoration efforts are likely to shift piñon-juniper types further outside their natural range of variability. A lack of understanding of stand history and natural disturbance regimes is understandable given the many configurations of the piñon-juniper type, varying by species and location across an area as large as the state of Utah. However, recent advances in tree-ring dating have opened the possibility to reconstructing stand histories in piñon-juniper types.

The applicant for this MS position would address questions regarding Pinon-juniper ecology that followed one of the following themes:

1. Who comes first, pinyon or juniper (thinking about specifically *Pinus monophyla* and *Junipers osteosperma* in Box Elder county)? A question of succession and persistence into the future.
2. What are the population dynamics, and periods of establishment in the past, and are they denser than they were historically?
3. How critical are pinon-juniper trees/sites to the jay, and are pinon there because of the jays or vice versa?
4. How much old growth is in western Box Elder? And what are jay densities in relationship to old-growth vs other age-classes? (do they need old growth?)

The MS student will be supervised by Dr. Justin DeRose (<http://qcnr.usu.edu/labs/derose/>), and work in close collaboration with Dr Eric Thacker and Dr. David Dahlgren, along with a cohort of students that are working in the same area on sage-grouse, pinyon jays and sagebrush obligate songbirds. The student will start in the fall semester of 2020 and is expected to finish in December 2026. The students will be expected to maintain clean, organized databases, make major contributions to reports due to the BLM and the local Working Group. They will also be expected to publish their work in peer-reviewed scientific journals. They will have opportunities to present their work to diverse audiences, including land managers, policymakers, and the scientific community. Ideal candidates should have earned a BS in a field related to forestry, range, or ecology, ideally with experience in woodland ecology; highly qualified candidates with degrees in other fields will be considered. Preferred qualifications include quantitative skills and field experience. Review of applications will start immediately and continue until the position is filled.

To apply, please email the following to Justin DeRose (justin.derose@usu.edu): 1) a cover letter describing your **experience** and **interests**, 2) a CV or resume, 3) unofficial transcripts, 4) GRE scores, and 5) a list of three professional references and their contact information.