

Impacts of Western Juniper Expansion on Ecological Resources

Research and Data

Background and Excerpts from Juniper Research:

*“Since 1934, western juniper has increased its hold on eastern Oregon rangelands. U.S. Forest Service reports that juniper acreage has increased from 1.5 million acres to over 6 million acres in 1999 (**Editor’s Note: This number has increased in the past 25 years to potentially a 10 fold increase**). Previous studies have shown that water use by juniper can exceed 30 gallons per day when adequate soil moisture is present. Increased juniper dominance has been implicated in the desertification of Oregon’s rangelands. Groundwater mitigation, reintroduction of steelhead into the upper Deschutes River basin, and changes in laws affecting surface water right allocations have driven public policy to look at how water is currently being used and how changes in water use (water law) could affect water availability. Vegetative modeling has shown that 9 to 35 trees per acre are enough to utilize all the precipitation delivered to a site in a 13-in annual precipitation zone (OSU, 2020).*



Analysis indicated that juniper reduction significantly increased late season spring flow by 225 percent (alpha > 0.05), increased days of recorded groundwater by an average of 41 days (alpha > 0.05), and increased the relative availability of late season soil moisture at soil depths of .76 m (27 in) (alpha > 0.1).

A review of the data collected over the course of the last 13 yrs indicated that the cutting of post European aged juniper has changed the water balance equation. Analysis of the first 2 yrs following treatment has shown that spring flow, groundwater, and soil moisture have all increased when compared to pre-treatment levels.

*...with juniper removal, herbaceous vegetation can create a **more uniform groundcover** across the hillslope. Reduced bare ground results in increased infiltration opportunity and decreased soil erosion.*

*...the opportunity to **increase spring flow for livestock, wildlife, and domestic use** along with some mitigation of water diversion. Late season low flows limit land management alternatives. Increasing flows by cutting juniper could partially offset this limitation. Changes in groundwater may have downstream effects, delaying the time it takes water move through the system and by adding to channel or perennial stream flow downslope.*

By combining the upland and riparian benefits of juniper removal, the system will begin to move toward a watershed that is functional in its ability to capture, store, and safely release water while providing a site that is productive and capable of being managed for sustainable use."

"When the juniper trees are killed, large increases in production of understory vegetation occur (Evans and Young 1985,1987, Vaitkus 1986, Vaitkus and Eddleman 1987). Variation in response in these studies was related to the location, i.e. under canopy or in the interspace between canopies, initial canopy cover of juniper, species available, time for response and tree size." "Measurements of available moisture showed higher amounts available later into the season on treated plots compared to check plots (Evans and Young 1985). Total nitrogen in the 0 to 2.5 cm (0 to 1 in) soil zone was closely related to herbaceous production. There was a direct vegetational response as total soil nitrogen increased through time following treatment." -- Western Juniper Woodlands (of the Pacific Northwest) Science Assessment October 6, 1994, Lee E. Eddleman, Patricia Miller, Richard Miller, 1984.

Additional: Biomass Benefits:

As Sabin concluded in her analysis: *"...the negative ecological and ecological ramifications of this encroachment well documented, land managers need to be able to make better inventories of juniper biomass on site (Miller et al. 2005). This not only enhances smoke management assessment of biomass for prescribed burns of early phase encroached sites, but also allows for appraisal for the feasibility of possible stewardship contracts utilizing biomass; such as is needed for determination of cogeneration power plants. With mechanical cutting of juniper trees currently costing \$70-\$80/acre in Lake County, and energy prices at an all time high, land managers and power companies could develop a mutually beneficial partnership in reclamation of juniper encroached sage steppe sites. Removal of juniper biomass for cogeneration power has the added benefit to land managers of removing downed-dead material from the site, and significantly reducing fuel loads, which if otherwise left on site could lead to devastating wildfires."*

Research and Studies:

<https://oregonexplorer.info/content/the-quiet-invasion-managing-juniper-eastern-oregon-0?topic&ptopic>

<https://www.pbs.org/video/oregon-field-guide-season-23-episode-5/>

<https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/rps/rps-procurement-programs/rps-bioram>

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