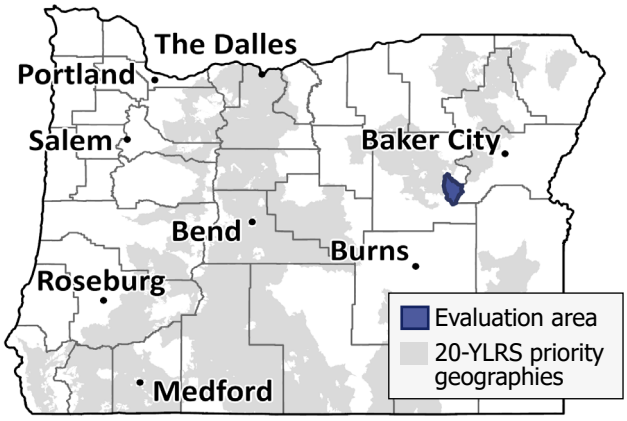
REYNOLDS CREEK-JOHN DAY RIVER
LANDSCAPE EVALUATION SUMMARY (2026)

The Oregon Department of Forestry's 20-Year Landscape Resilience Strategy (20-YLRS)[1] identified the Reynolds Creek-John Day River watershed as high priority for resilience-based management needs. The 20-YLRS aims to 1) reduce wildfire risk to communities, 2) adapt ecological systems to persist in a changing climate, 3) create functional aquatic and terrestrial ecosystems, and 4) support vibrant local economies. Organized around these four elements, this document presents current conditions, identifies restoration needs, and establishes treatment goals for the Reynolds Creek-John Day River watershed (hereafter "evaluation area").[2]

Evaluation area overview



Total acres	Forested acres	Treatment need (acres)
106,715	74,054	28,487

Figure 1. Evaluation area with 20-YLRS priority geographies. Watersheds (USGS, 2023); Counties (BLM, 2023); 20-YLRS Priority geographies (INR, 2023)

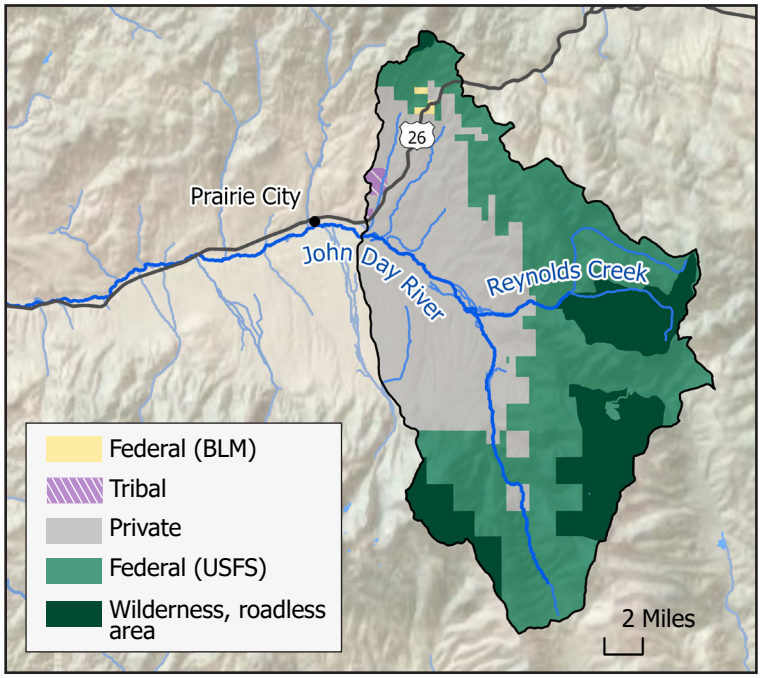


Figure 2. Geographic context. Land ownership (ODF, 2025); Hydrography (USGS, 2023); Highway network (ODOT, 2025); Cities (ODOT, 2024)

Reynolds Creek and the John Day River originate in the Strawberry Range, part of the Blue Mountains, and flow into the John Day Valley. The evaluation area (Figure 1) includes 19 miles of the John Day River, which begins at the base of Sheep Mountain, as well as Reynolds Creek, which runs 10 miles from Deardorff Mountain into the John Day River. Elevations range from 3,601 feet near the town of Prairie City to 8,561 feet at the top of Deardorff Mountain. Annual precipitation ranges from 14 to 35 inches.

Land cover in the evaluation area is 61% forest, 20% herbaceous, 13% shrub/scrub, 4% wetlands, 2% developed, and <1% agriculture.[3] Lower-elevation areas closer to the John Day River are dominated by herbaceous cover, with a smattering of developed areas and agricultural areas close to the river. As elevation increases, land cover transitions to forest with some shrub/scrub.

The Malheur National Forest manages 67,008 acres of the evaluation area, including 3,658 acres of wilderness (Monument Rock Wilderness) and 15,076 acres of inventoried roadless areas (Figure 2, Table 1).

Table 1. Percent land ownership in forested areas (ODF, 2025; Laughlin et al., 2025)

Owner	Percent
U.S. Forest Service	83
Bureau of Land Management	<1
Other federal	0
State	0
Local	0
Tribal	1
Private industrial	0
Private non-industrial	16

[1] *More about Oregon's 20-YLRS at: https://www.oregon.gov/odf/documents/aboutodf/20-year-landscape-resiliency-strategy-booklet.pdf*
[2] *This document is part of a series of landscape evaluations. Other evaluations can be found at: https://hdl.handle.net/1794/33453*
[3] *Herbaceous and shrub/scrub land cover classes may include recently disturbed or regenerating forests.*

1 Reduce wildfire risk to communities

Average flame length shows the average expected flame length at a location based on simulated fires across many modeled fire scenarios. Higher values indicate areas where fires are expected to (on average) burn with greater intensity (Figure 3).

Average flame lengths in the evaluation area are mixed, with low flame lengths (0 to 4 feet) dominating the John Day River corridor and western portion of the evaluation area where the elevation is lower and land cover is herbaceous, agricultural, and shrub/scrub. As the elevation increases and the land cover transitions to forest, there are widespread areas with high or very high flame lengths (greater than 8 feet). Wildfire risk reduction treatments should focus on protecting Prairie City and the Highway 26 corridor. Table 2 summarizes fire history in the evaluation area.

2 Adapt ecological systems to persist in a changing climate

All forested areas have experienced significant departures from historical conditions, including increases in forest density, shifts in species composition, and increases in fuel loading and continuity of fuel, especially in dry and moist forests. Warming exacerbates the effects of increasing forest density by decreasing water availability and increasing susceptibility to disturbances like wildfire, insects, and disease.

Estimates of climate water deficit (CWD), a measure of long-term moisture stress, show the Reynolds Creek-John Day River watershed has dried considerably over the last half-century (Figure 4). The evaluation area's dry forest became much drier. The 90th percentile CWD was 143 mm in the late 20th century, meaning that 10% of the evaluation area's dry forests experienced water deficits greater than 143 mm. By the early 21st century, 65% of dry forests had water deficits greater than 143 mm. Areas of lower CWD showed a greater percent change between the two periods, suggesting that a drier atmosphere takes more moisture from these areas in relative terms.

Trends in declining water availability to trees are likely to continue. Increasing moisture stress could lead to increased mortality, regeneration failures after disturbance, and composition shifts in low-elevation dry forest areas and loss of forest cover. The primary strategies for adapting forests in the evaluation area are reducing competition for resources, shifting composition to more fire- and drought-tolerant species, and reducing fuel loading and continuity of fuels at both stand and landscape scales.

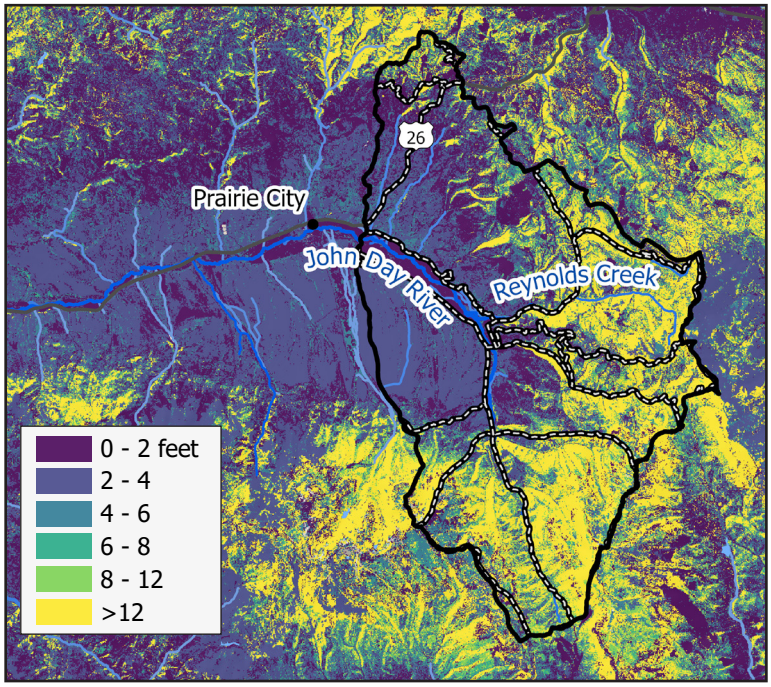


Figure 3. Average flame length (McEvoy et al., 2023), Potential operational delineations (PODs) shown as dotted black and white lines (USFS, 2021)

Table 2. Fire perimeters summarized from the Historic Fires Database (ISU, 2026) and fire points from Wildland Fire Incident Locations (NIFC, 2026)

Fire history	2000-2010	2011-2019	2020-2025
Acres within burn perimeters	5,424	3,134	4
Wildfire ignitions (natural)	46	26	16
Wildfire ignitions (human-caused or unknown cause)	7	5	7

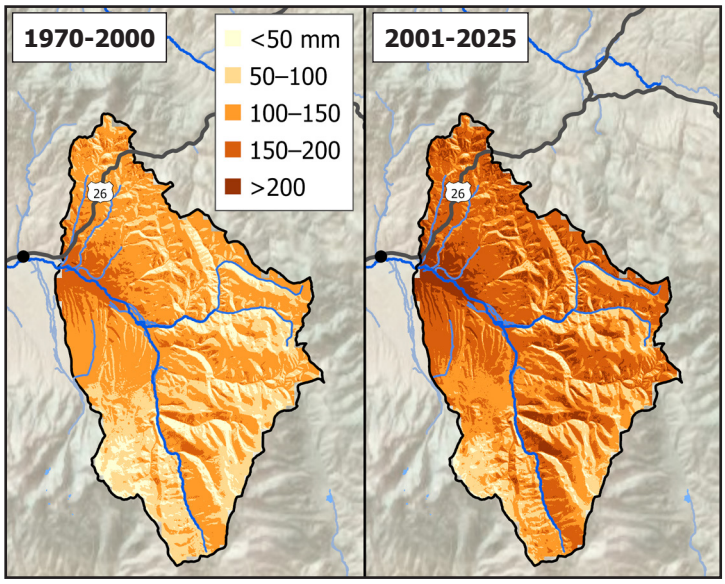


Figure 4. Climate water deficit 1970-2000 shown left and 2001-2025 shown right (University of Oregon, 2026)

3 Create functional aquatic and terrestrial ecosystems

Fuel treatments that aim to return forests to their natural range of variation can improve fish and wildlife habitat by reducing the threat of catastrophic wildfires, which have widespread and long-lasting impacts on terrestrial and aquatic species. These treatments can also create more open, structurally diverse conditions that support a wider array of wildlife than the overly dense, structurally uniform, closed-canopy forests produced by decades of fire suppression. Reducing stand density can also decrease competition and stress on trees, which makes them less vulnerable to insects and disease. By restoring more natural forest conditions, these treatments can create ecosystems that are more diverse and resilient and are better able to support fish and wildlife populations.

Insect and disease risk

Projected warmer average temperatures and lower or inconsistent precipitation are primary direct stressors to trees and invite opportunistic beetle pests. The most important mitigation and/or prevention measure to avoid beetle epidemics is reduction of forest density to increase resources available to residual trees to repel beetle attack. Other stressors that cause reduced growth, vigor, or tree mortality include chronic issues such as exotic balsam woolly adelgid (BWA) established in true fir at high-elevation areas, root diseases, and mistletoes. Management for BWA includes preventing spread of infected material, and in heavily infected areas, switching to less preferred true fir species, or non-*Abies* species. The primary diseases in this area include root diseases, butt and stem rots, and dwarf mistletoes. Root diseases include *Heterobasidion* in true fir and *Armillaria* in Douglas-fir and true fir. General management for root diseases includes shifting species composition to non-host species or creating buffer cuts around heavily infested areas to prevent spread. *Schweinitzii* butt rot may also be present in older Douglas-fir and should be monitored for removal of hazard trees. Dwarf mistletoe prevalence in conifers can be reduced by using the Hawksworth 6-class rating system to guide removal of infected overstory or pruning infected branches (Figure 5).

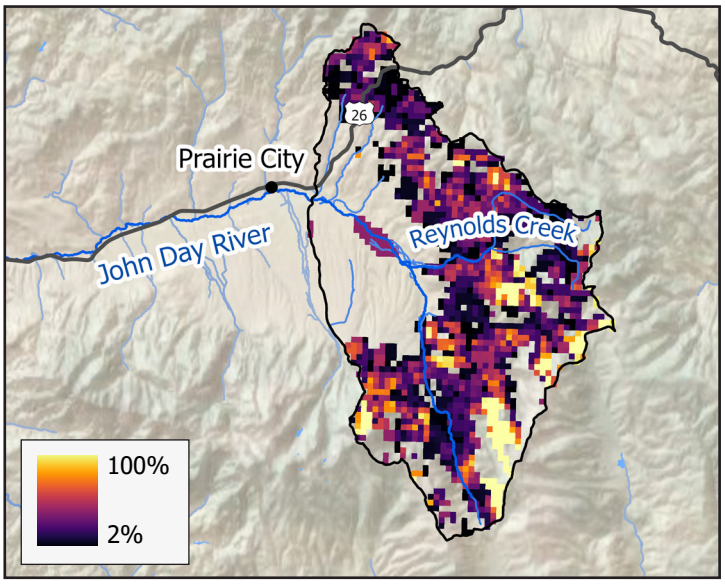


Figure 5. Percent impacted by insect and disease (2015-2025) (ODF, 2026)

Wildlife habitat

Mapped critical habitat for threatened and endangered species in the evaluation area includes a total of 61 miles of U.S. Fish and Wildlife Service bull trout (*Salvelinus confluentus*) critical habitat and a total of 73 miles of National Oceanic and Atmospheric Administration Fisheries steelhead (*Oncorhynchus mykiss*) critical habitat (Figure 6). Numerous tributaries of Reynolds Creek and the John Day River are included in those totals. The evaluation area also contains a total of 104 miles of bull trout spawning and rearing habitat and 59 miles of core cold water habitat designated by the Oregon Department of Environmental Quality.

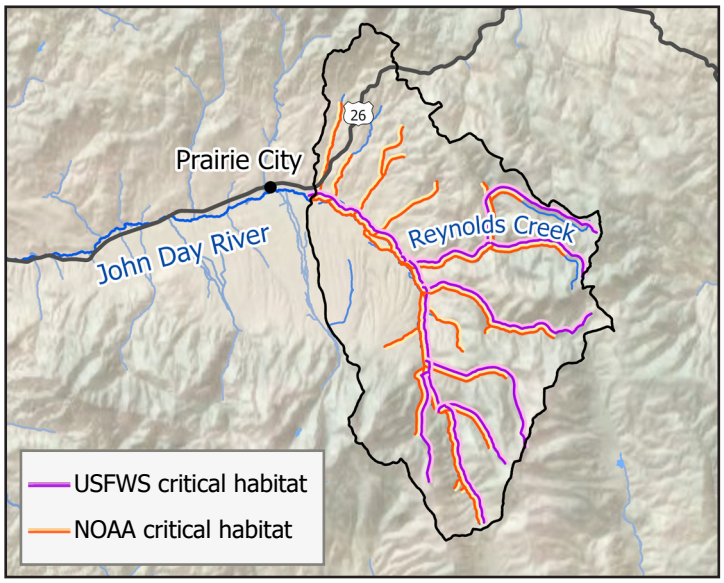


Figure 6. Critical habitat for threatened and endangered species (USFWS, 2026; NOAA, 2025)

Forest types and ecological departure analysis

Table 3 shows acres identified by the Region 6 Ecological Departure Analysis (Laughlin et al., 2025) as needing disturbance, such as fire or thinning, to address departures in forest type and seral class conditions from their historical range of variation (HRV). Current forest type and seral class distributions are shown in Figures 7 and 8, respectively.

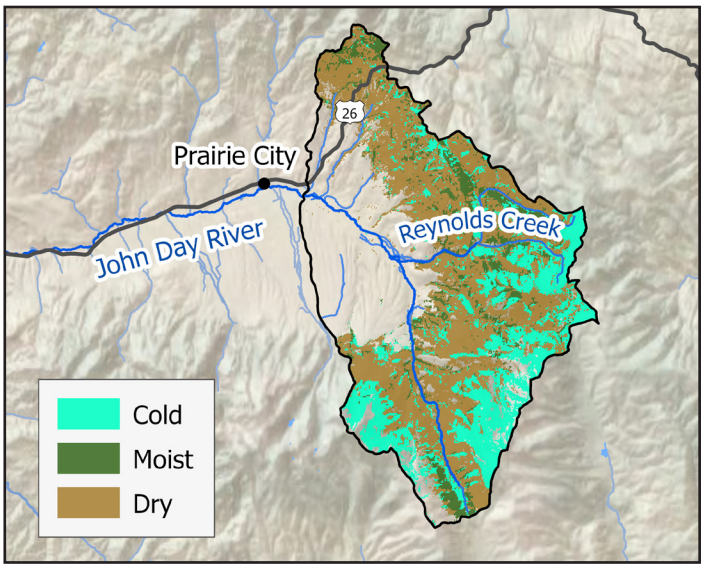


Figure 7. Forest type derived from modified Integrated Landscape Assessment Project Potential Vegetation Types (Laughlin et al., 2025)

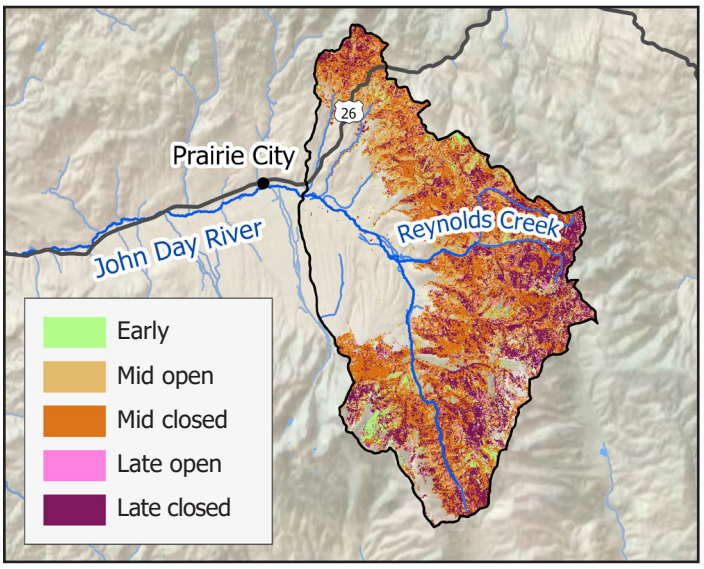


Figure 8. Seral class (Laughlin et al., 2025)

Table 3. Forest type and seral class combinations with departures from historical range of variation (HRV). See methods document for model limitations and historical departures for all forest types and seral classes in the evaluation area

Forest conditions		HRV departure	HRV departure proportional to land ownership		
Forest type	Seral class	Acres	USFS	BLM	Private
Dry	Mid closed	19,554	15,697	62	3,794
Dry	Late closed	2,571	2,273	4	294
Cold	Late closed	2,365	2,274	-	91
Cold	Mid open	1,908	1,814	-	94
Various*	Various	2,089	1,702	4	383
Total		**28,487**	**23,760**	**70**	**4,656**

** Various includes moist mid open, cold mid closed, cold early, and dry mid open*

Forest treatment needs

The treatment narrative below summarizes our professional interpretation of the Region 6 Ecological Departure Analysis and implications for management of forest types in the evaluation area.

- **Dry forest**
  Dry forests were historically dominated by ponderosa pine with western larch and a few older Douglas-fir. Today, almost all dry forests in the evaluation area are significantly denser with extensive cohorts of younger ponderosa pine, Douglas-fir, and grand fir. The desired future condition for a dry forest is a landscape dominated by late open forests. Variable density thinning followed by prescribed fire is the primary tool to restore resilience to dry forests (Figure 9). Thinning from below should be designed to significantly reduce forest density, remove all or most shade-tolerant species (e.g., grand fir and Douglas-fir), and restore historical spatial structure characterized by clumps, individual older trees, and openings that varied significantly in size and shape.
- **Moist forest**
  Moist forests historically had significant western larch, white pine, and some Douglas-fir and ponderosa pine but are today dominated by grand fir. The desired future condition for moist forest is a landscape dominated by late open forests with a mix of other seral classes in small patches. Variable density thinning and group selection that reduce

forest density by removing significant grand fir cover while retaining all or most extant white pine, larch, and ponderosa pine will help restore forest resiliency to the synergistic effects of drought, insects, and fire. Treatment of activity fuel with a combination of hand and machine piling and broadcast burning will be necessary for short- and long-term reduction of surface fuel loading.

- **Cold forest**

  Cold forests currently dominated by lodgepole pine, grand fir, Douglas-fir, and western larch historically experienced a mix of fire severities including patches of high- and moderate-severity fire. The desired future condition for cold forest is a mix of seral classes and diverse future fire effects. Resilience goals in closed-canopy cold forests can be accomplished by shaded fuel breaks along roads and potentially by limited group selection cutting or variable density thinning and treatment of activity fuel that recreates some of the effects of mixed-severity fire. However, the major priority for treatments should be moist and dry forests.

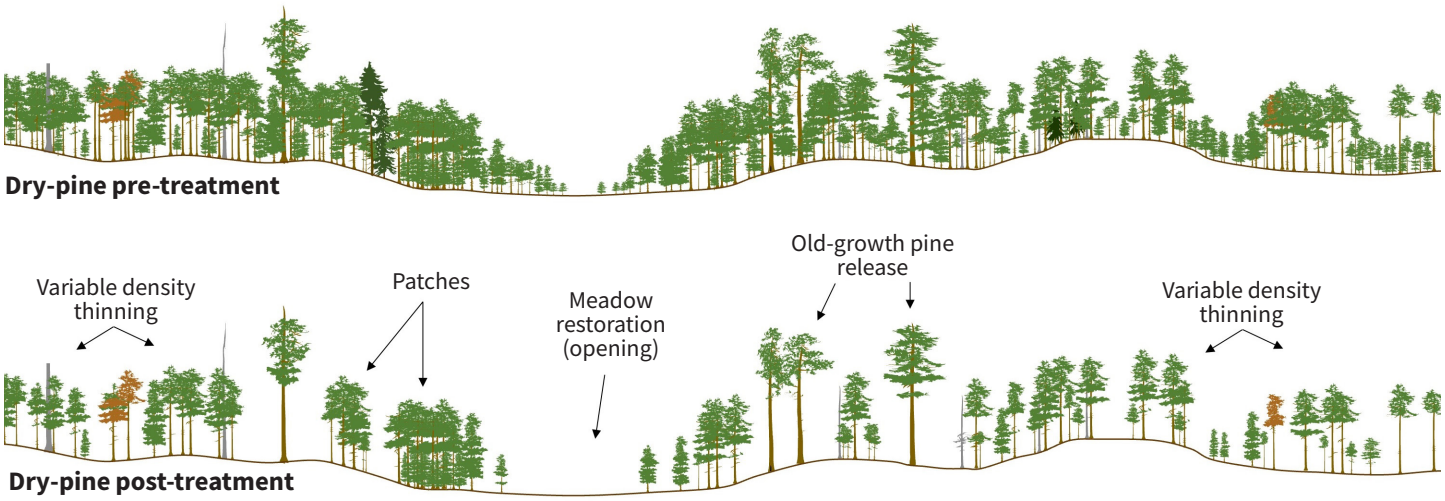


Figure 9. Model of dry mixed conifer variable density thinning

Presence of old trees

Historically, moist and dry forests across the Reynolds Creek-John Day River watershed were dominated by older trees, especially ponderosa pine and western larch. Extensive harvest from the 1950s through the 1980s and large fires in the 1990s and 2000s have significantly reduced the extent of old trees (Figure 10). Restoration treatments should seek to maintain and increase abundance of old trees by retaining old trees of all species >150 years of age during timber harvest and by reducing forest density and shifting species composition to increase the resilience of remaining old trees.

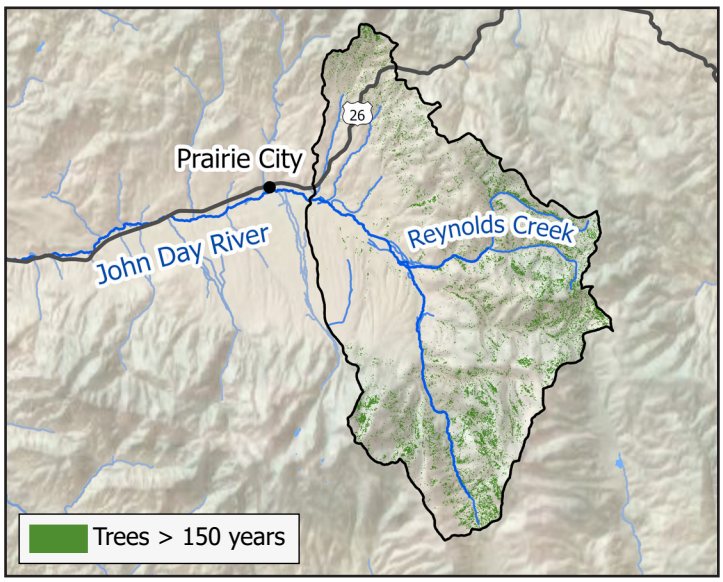


Figure 10. Old trees (LEMMA, 2021)

Tree density

Forest density in all forest types has increased dramatically since the exclusion of fire beginning in the late 1800s. Increases in forest density are most apparent in moist and dry forests.

Fire return interval

Historically, mean fire return intervals varied from 12 to 25 years in dry and moist forests. Historical fire intervals in cold forest were highly variable and may have exceeded 100 years in some cool and shaded high-elevation areas. Reducing surface fuel accumulations across all forest types using a combination of mechanical thinning and prescribed fire should be a high management priority, especially in dry and moist forest types.

4 Support vibrant local economies

Socioeconomic context

The Reynolds Creek-John Day River watershed is located within Grant County and adjacent to Baker County (Table 4). The total population in these two counties in 2020 was 23,901. Thirty-two percent of residents were considered low-income, which is higher than the statewide percentage of 27%. Compared to the state of Oregon overall, the area had a smaller proportion of residents under age 18 (19%) and ages 25-44 (21%). In contrast, there was a larger share of residents ages 65 and older (28%). Workforce non-participation was 51%, which was also higher than the statewide average of 38%.

Restoration treatments in the evaluation area were slightly more costly than Oregon's 20-YLRS priority geographies, ranking in the 54th percentile for estimated restoration costs. However, at the 17th percentile, the evaluation area had significantly lower revenue potential compared to other 20-YLRS priority geographies in the state. The evaluation area ranked in the 28th percentile for local contractor capacity, suggesting challenges in finding a local workforce to implement restoration treatments (Figure 11).

Table 4. Socioeconomic characteristics (U.S. Census Bureau, Decennial Census, 2020 [Table P12]; American Community Survey 5-Year Estimates, 2020-2024 [Tables B23025, C17002])

	Evaluation area counties	State of Oregon	Location quotient[i]
Total population	23,901	4,237,256	-
Low-income population	7,654 (32%)	1,140,423 (27%)	1.19
Population under 18	4,611 (19%)	866,604 (20%)	0.94
Population age 25-44	5,082 (21%)	1,159,452 (27%)	0.78
Population age 65+	6,708 (28%)	795,108 (19%)	1.50
Workforce non-participation rate[ii]	51%	38%	1.35

[i] *Location quotients above 1 mean that the value is higher for the selected counties than the state mean; LQs below 1 mean that the value is lower than the state mean.*

[ii] *Represents the percentage of the labor force-eligible population that is neither employed nor actively seeking employment. High non-participation rates may reflect factors such as retirement and discouragement from seeking work.*

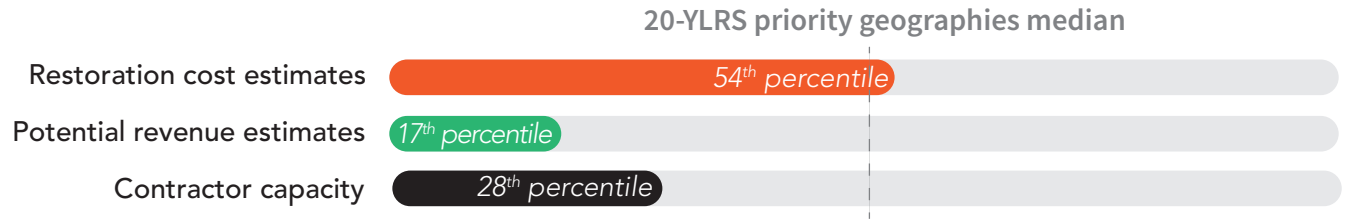


Figure 11. Percentile ranking for potential revenue, cost, and contractor capacity. Percentile rankings show the evaluation area as compared to all other 20-YLRS priority geographies in the state. The 50th percentile line represents the 20-YLRS priority geographies median

Restoration cost estimates

We calculated a restoration cost index that incorporates haul distances to timber processing facilities, watershed slopes, and road density. The composite cost index is the mean of location quotients for those three variables.

Timber processing facilities

Distance to timber processing facilities is a major expense for restoration contractors. The mean drive time to timber processing facilities within the evaluation area was approximately 37 minutes, which is about 15 minutes shorter than the mean across all 20-YLRS priority geographies (Figure 12). Nearby timber processing facilities include Iron Triangle Firewood and Iron Triangle Post and Pole in John Day, OR; In The Sticks in Fossil, OR; and Woodgrain Millwork in La Grande, OR.

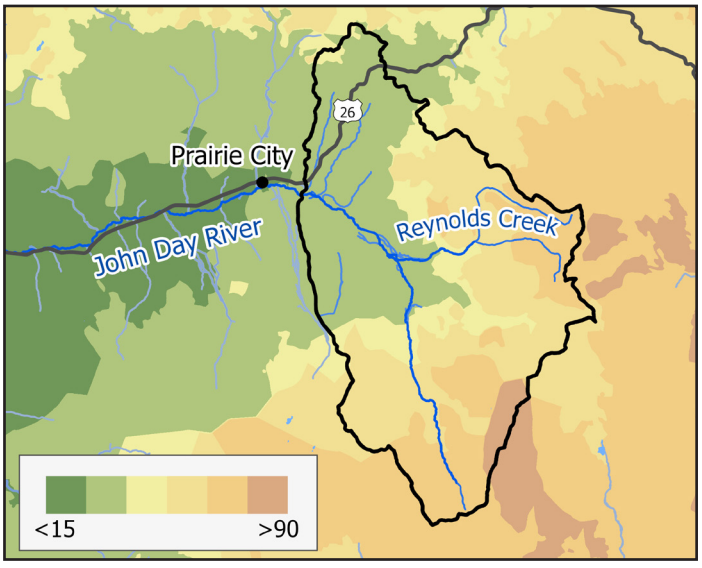


Figure 12. Drive time in minutes to nearest timber processing facility (BBER, 2026; ODF, 2025)

Slope and road density

Forest slopes and road access are important considerations for estimating costs of restoration treatments. Slopes greater than 40 percent require more costly specialized equipment. Slopes greater than 65 percent present even more challenges. Areas with lower density of roads are logistically challenging, as logs and other biomass must be transported longer distances to areas accessible by log trucks.

Seventy-two percent of slopes within the Reynolds Creek-John Day River watershed were below thresholds requiring specialized logging equipment (i.e., 40%; Figures 13 and 14). In terms of treatment costs, the proportion of steeper slopes relative to all 20-YLRS priority geographies is about average. Road density analysis suggests that the evaluation area is slightly below the mean for all priority geographies.

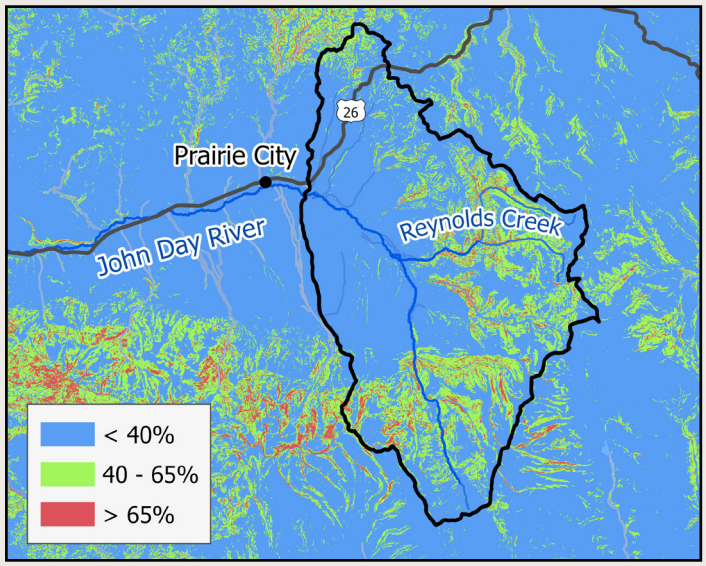


Figure 13. Percent slope for Reynolds Creek-John Day River watershed (ODF, 2023)

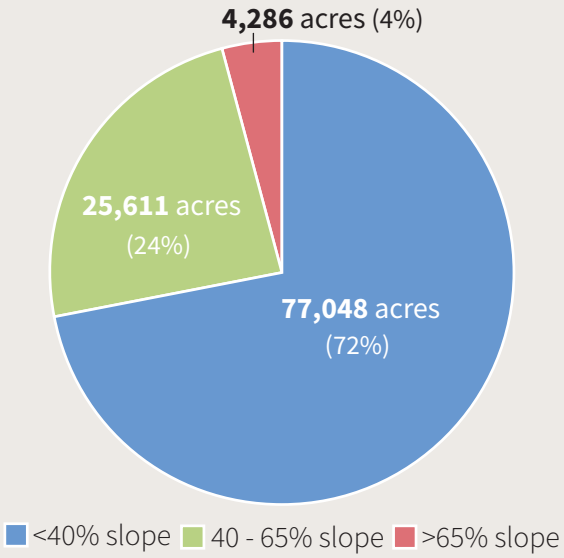


Figure 14. Total acres and proportion for percent slope classes (as shown in Figure 13)

Potential revenue estimates

Median revenue from commercial treatments during the 2017-2023 period was $257 per acre, ranking in the 17th percentile (Table 5). This suggests that expected revenues from commercial treatments in the evaluation area were lower relative to all Oregon 20-YLRS National Forest priority geographies, which also had a median revenue of $357 per acre and median volume of 7.0 MBF per acre.

Table 5. Median per acre revenue, median per acre volume, and revenue percentile rank for Reynolds Creek-John Day River watershed commercial treatments (TIM, 2023; FACTS, 2023)

Median revenue per acre	Median volume per acre (MBF)	Revenue percentile rank
$257	5.1	17

Contractor capacity

A total of 44 Oregon businesses with federal intensive forestry work contracts between 2017 and 2023 were located within a 130-minute drive of the evaluation area. A 130-minute drive is the median drive time for Oregon contractors to 20-YLRS priority geographies. Considering all 20-YLRS priority geographies, contractor capacity for the evaluation area is about 54 percent lower than average, ranking in the 28th percentile.

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METHODS | https://hdl.handle.net/1794/33482