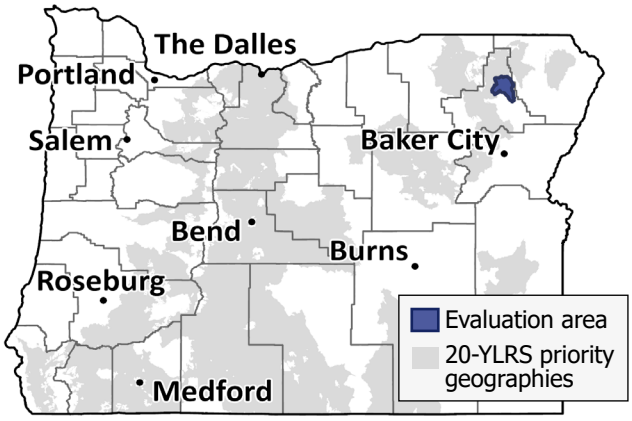
INDIAN CREEK-GRANDE RONDE RIVER
LANDSCAPE EVALUATION SUMMARY (2026)

The Oregon Department of Forestry's 20-Year Landscape Resilience Strategy (20-YLRS)[1] identified the Indian Creek-Grande Ronde 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 Indian Creek-Grande Ronde River watershed (hereafter "evaluation area").[2]

Evaluation area overview



Total acres	Forested acres	Treatment need (acres)
96,214	56,895	14,433

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

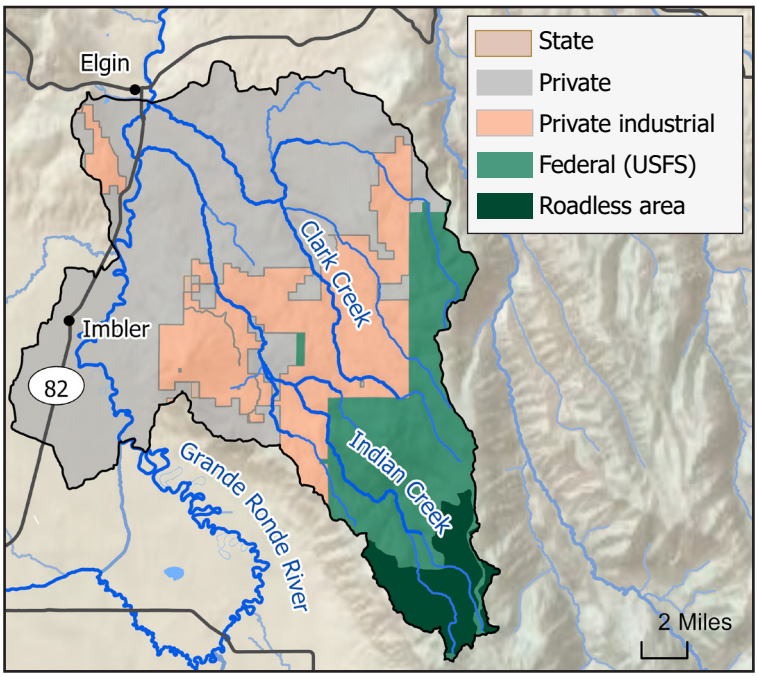


Figure 2. Geographic context. Land ownership (ODF, 2025); Hydrography (USGS, 2023); Highway network (ODOT, 2025); Cities (ODOT, 2024)

The Indian Creek-Grande Ronde River watershed (Figure 1) is in the Lower Snake Basin and includes 17 miles of the Grande Ronde River. Indian Creek flows over 23 miles from the base of Castle Ridge in the Blue Mountains to the Grande Ronde River. Clark Creek flows from Line Bluff into the Grande Ronde River at the evaluation area terminus near the city of Elgin, just over three miles downstream from the junction of Indian Creek (Figure 2). Average annual precipitation ranges from 17 to 48 inches, with the lowest values occurring in the Grande Ronde Valley, and highest values in the Blue Mountains. Elevations range from 2,644 to 7,171 feet.

Land cover in the evaluation area is 53% forest, 22% herbaceous, 15% agriculture, 7% shrub/scrub, and 3% developed.[3]

The Wallowa-Whitman National Forest occupies 22,934 acres in the southeastern portion of the evaluation area (Table 1). There are 5,697 acres within inventoried roadless areas at the headwaters of the Indian Creek-Grande Ronde River watershed.

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

Owner	Percent
U.S. Forest Service	40
Bureau of Land Management	0
Other federal	0
State	0
Local	0
Tribal	0
Private industrial	38
Private non-industrial	22

[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 are predominantly low (0 to 2 feet) in the northern and western portions, with a margin of moderate flame lengths (2 to 6 feet) where herbaceous cover transitions into a mix of forest and shrub/scrub. In higher-elevation forested areas, there are widespread areas with 6-12 feet average flame lengths, and pockets where the average flame length is greater than 12 feet.

Wildfire risk reduction treatments should focus on protecting Elgin and Imbler, the Highway 82 corridor, and private and agricultural lands in the Grande Ronde Valley. Table 2 summarizes fire history in the evaluation area.

2 Adapt ecological systems to persist in a changing climate

Forested areas have departed 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 conditions by lessening water availability, stressing trees, 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 Indian Creek-Grande Ronde River watershed has dried considerably over the last half-century (Figure 4). From the late 20th to early 21st century, mean CWD for forested areas in the evaluation area increased from 61 to 90 mm. Areas of lower CWD show higher 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 the loading and continuity of fuels at both stand and landscape scales.

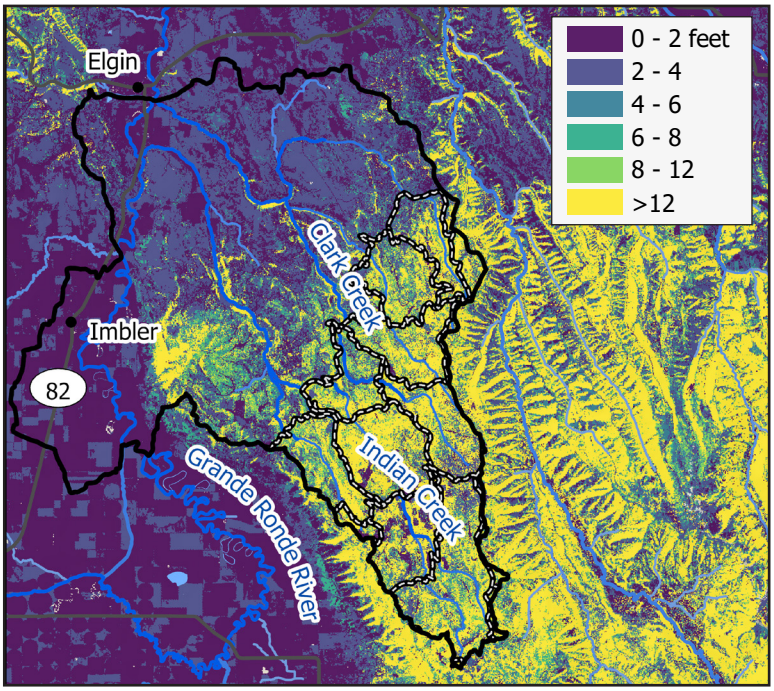


Figure 3. Average flame length (McEvoy et al., 2023), Potential operational delineations (PODs) shown as dotted black and white lines (USFS, 2021)

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	670	11	0
Wildfire ignitions (natural)	7	10	8
Wildfire ignitions (human-caused or unknown cause)	0	2	2

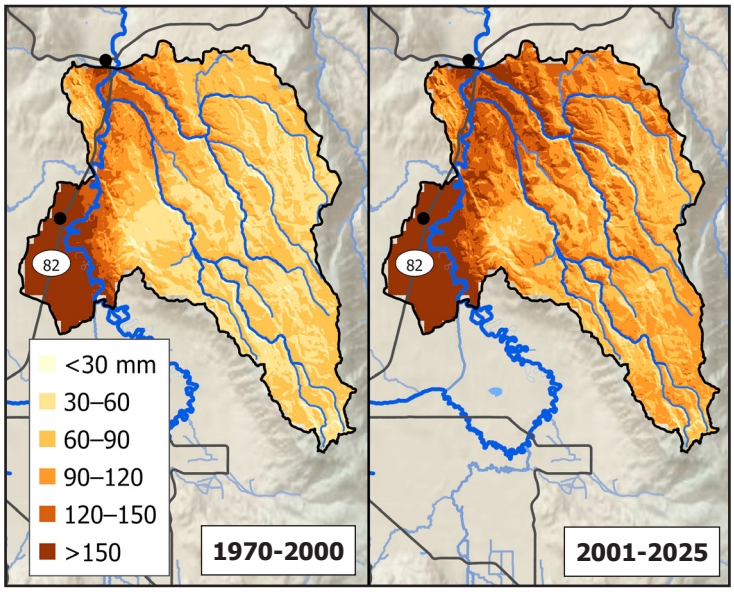


Figure 4. Climate water deficit 1970-2000 shown left and 2001-2025 shown right (University of Oregon, 2026)

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 canopy, 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, lower or inconsistent precipitation, or precipitation as rain rather than snow are primary direct stressors to trees and invite opportunistic beetle pests. Site factors such as steep slopes, south-facing aspects, and rocky or poor soils can exacerbate hot drought impacts, even for drought-tolerant species such as pine. Mitigation and/or prevention strategies for drought and beetle impacts include treatments that reduce forest density and shift species composition to more drought-tolerant seedlots or tree species. Additionally, timely slash management is necessary for preventing beetle outbreaks in pine. Periodic outbreaks from defoliating insects can weaken Douglas-fir, true fir, and larch. Control of these outbreaks is difficult, although they often collapse on their own within a couple of years. Significantly reducing forest density in dry areas can improve resistance to defoliators. Other stressors that cause reduced growth, vigor, or tree mortality include chronic issues such as exotic balsam woolly adelgid (BWA) in true fir at high elevations, root diseases, and mistletoes. Management for BWA includes limiting spread from movement 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 (Figure 5). Root diseases in this area include *Heterobasidion* in true fir and *Armillaria* in Douglas-fir and true fir; the latter disease is particularly impactful to stressed trees. General management for root diseases includes switching 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.

Wildlife habitat

Mapped critical habitat for threatened and endangered species in the evaluation area includes 84 miles of National Oceanic and Atmospheric Administration Fisheries steelhead (*Oncorhynchus mykiss*) critical habitat along the Grande Ronde River, Indian Creek (and several of its tributaries), and Clark Creek (including the Middle and North Fork tributaries). There are also 44 miles of U.S. Fish and Wildlife Service bull trout (*Salvelinus confluentus*) critical habitat on the Grande Ronde River and Indian Creek (including portions of the Camp Creek and North Fork Indian Creek tributaries). There are 25 miles of bull trout spawning and rearing habitat and 27 miles of core cold water habitat as designated by the Oregon Department of Environmental Quality (Figure 6).

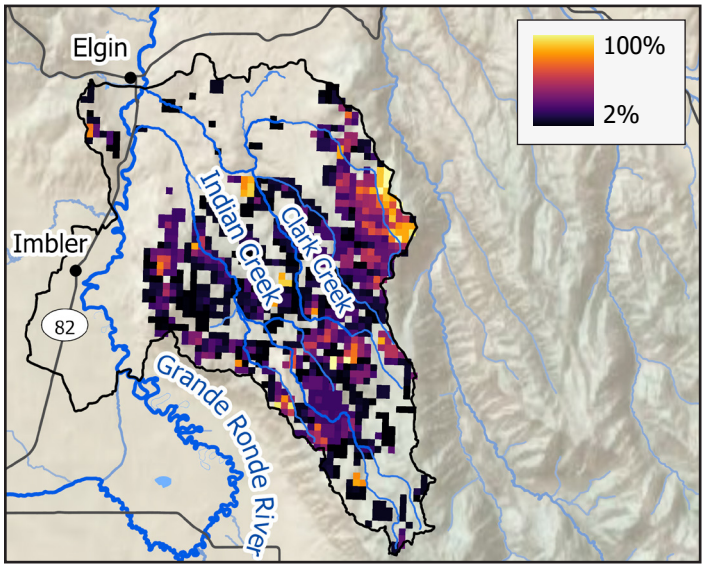


Figure 5. Percent impacted by insect and disease (2015-2025) (ODF, 2026)

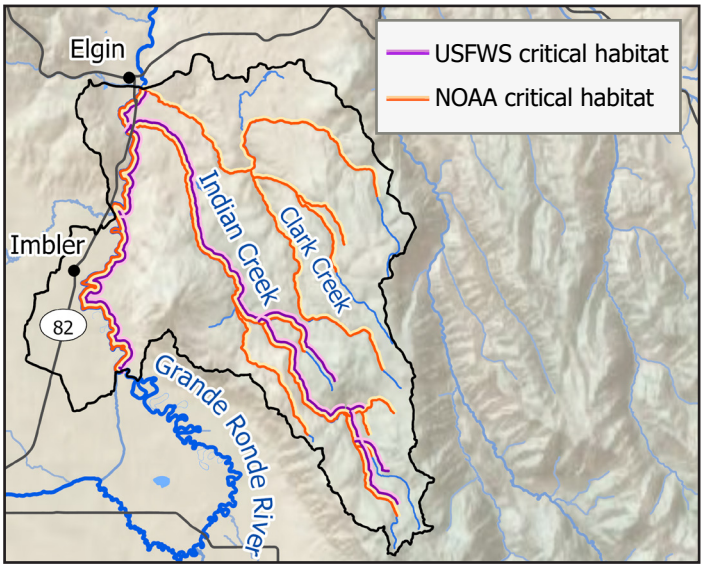


Figure 6. Critical habitat for threatened and endangered species (USFWS, 2026; NOAA, 2025)

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.

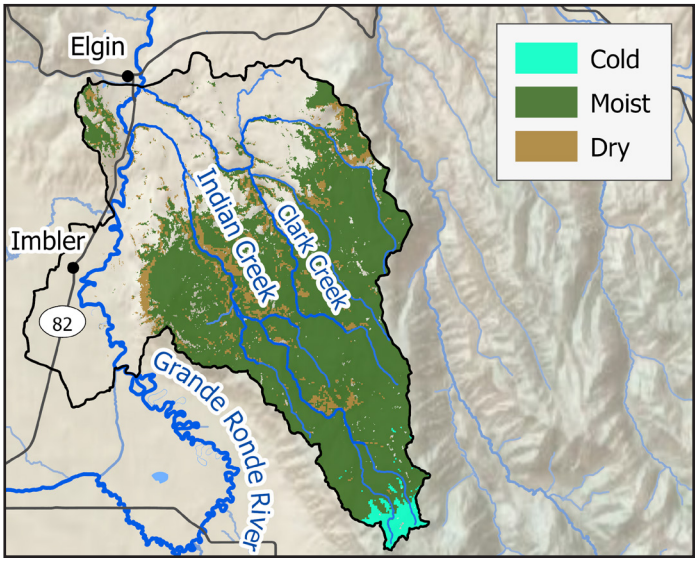


Figure 7. Forest type derived from modified Integrated Landscape Assessment Project Potential Vegetation Types (Laughlin et al., 2025)

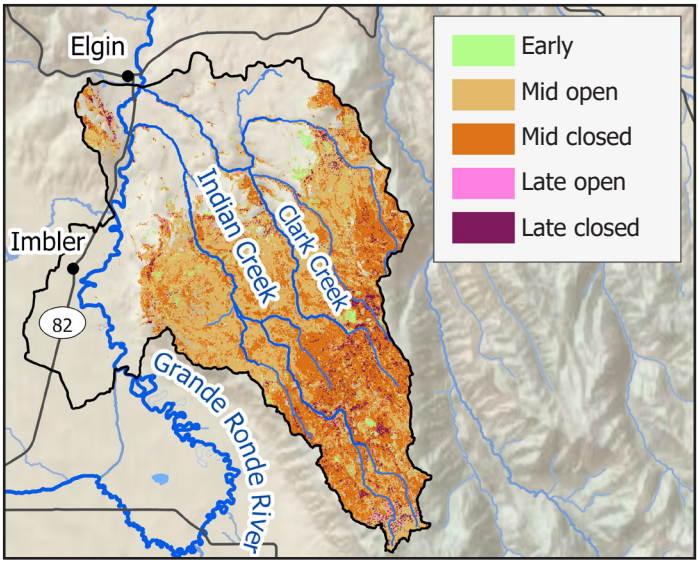


Figure 8. Seral class (Laughlin et al., 2025)

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	State	Private
Moist	Mid open	11,155	2,515	35	8,605
Dry	Mid closed	2,850	351	1	2,498
Cold	Mid open	305	305	-	-
Cold	Late closed	64	64		
Various*	Various	59	35	-	24
Total		**14,433**	**3,270**	**36**	**11,127**

** Various includes dry late closed and cold early*

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.

- **Moist forest**
  Managers should consider a mix of pre-commercial thinning, variable density thinning, and group selection cutting in moist forests to increase landscape-scale structural and compositional diversity and reduce forest density in young even-aged Douglas-fir and grand fir dominated stands (Figure 9). Consider small patch cuts to release larch. Also consider shaded fuel breaks that connect other treatments into linear fuel breaks along PODs, roads, and other strategic features. Shaded fuel breaks should reduce fuel loading and subsequent fire intensity adjacent to existing strategic locations such as roads.
- **Dry forest**
  Use variable density thinning to significantly reduce forest density, shift species composition to ponderosa pine and western larch, and remove ladder fuels. Use post-thinning fuel management including piling and burning and prescribed fire to reduce surface fuel loading. Consider opportunities to restore historical meadow habitat and aspen habitat by removing encroaching conifers.

Cold forest

Cold forests dominated by lodgepole pine, mountain hemlock, and subalpine fir are mostly found in high-elevation roadless areas and are not generally recommended for treatment.



Figure 9. Model of moist mixed conifer group selection and variable density thinning

Presence of old trees

There is very little reliable information about the historical extent of old trees in the evaluation area (Figure 10).

Tree density

Dry forests and some moist forests are significantly more dense than historical conditions although it is likely that there were significant reductions in populations of old trees as a result of historical logging practices. Today, old trees are thinly distributed in the evaluation area. A major goal of management should be protection of existing old trees and silvicultural treatments including thinning and prescribed fire that enhance the survivability of older, shade intolerant tree species.

Fire return interval

Fire history research completed in nearby watersheds indicates historical mean fire return intervals varied from 10-15 years in dry ponderosa pine stands to 25-75 years in moist forests and 75-100+ years in cold forests.

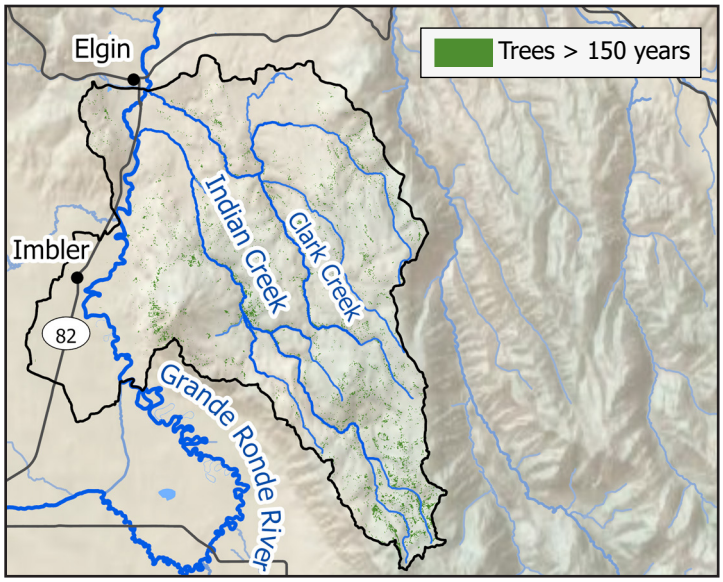


Figure 10. Old trees (LEMMA, 2021)



Group selection and variable density thinning in moist mixed conifer in eastern Oregon. Photo: James D. Johnston

4 Support vibrant local economies

Socioeconomic context

The Indian Creek-Grande Ronde River watershed is located within Union County and adjacent to Wallowa County. The total population in these two counties in 2020 was 33,587 (Table 4). Twenty-seven percent of residents were considered low-income, which is the same as the statewide percentage. Compared to the state overall, the area had a slightly larger proportion of residents under age 18 (21%) and ages 65 and older (24%). In contrast, there was a smaller share of residents ages 25-44 (23%). Workforce non-participation was 42%, which was higher than the statewide average of 38%.

Restoration treatments in the evaluation area were less costly than Oregon's 20-YLRS priority geographies, ranking in the 35th percentile for estimated restoration costs. Restoration treatments were likely to be less costly due to the evaluation area's gentle slopes, extensive road network, and relatively short distance to a timber processing facility. However, at the 23rd percentile, the evaluation area had significantly lower revenue potential compared to other 20-YLRS priority geographies in the state. The evaluation area also ranked in the 20th percentile for local contractor capacity, creating challenges in finding a local workforce for 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	33,587	4,237,256	-
Low-income population	8,956 (27%)	1,140,423 (27%)	0.99
Population under 18	7,192 (21%)	866,604 (20%)	1.05
Population age 25-44	7,562 (23%)	1,159,452 (27%)	0.82
Population age 65+	7,968 (24%)	795,108 (19%)	1.26
Workforce non-participation rate[ii]	42%	38%	1.10

[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.

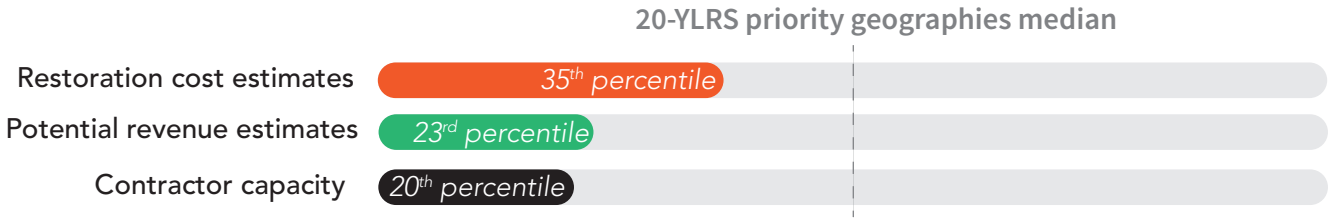


Figure 11. Percentile ranking for potential revenue, cost, and contractor capacity. Percentile rankings show the evaluation area as compared to all other 20-YLRS priority geographies in the state. The 50th percentile line represents the 20-YLRS priority geographies median

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 Indian Creek-Grande Ronde River watershed was approximately 23 minutes, which is about 28 minutes shorter than the mean across all 20-YLRS priority geographies (Figure 12). Nearby timber processing facilities include Boise Cascade Elgin Plywood in Elgin, OR; Woodgrain Millwork in La Grande, OR; JayZee Lumber in Joseph, OR; and Eastern Oregon Custom Milling in Adams, OR.

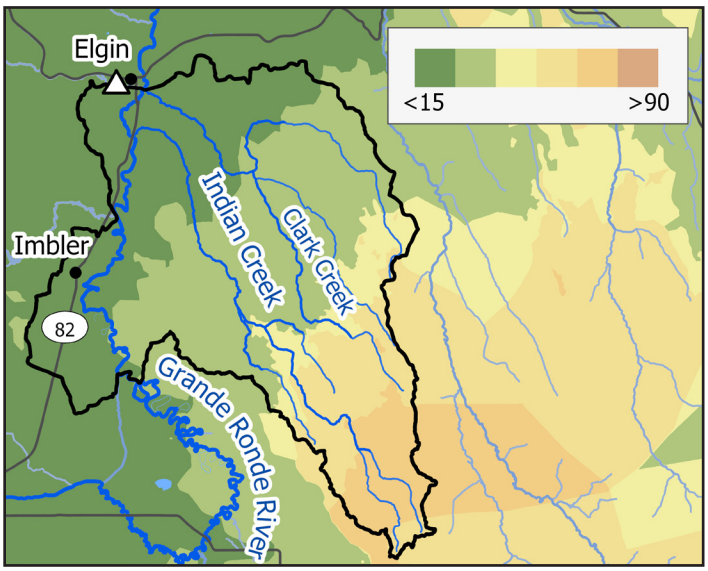


Figure 12. Drive time in minutes to nearest timber processing facility (BBER, 2026; ODF, 2025). The white triangle in Elgin represents the location of a timber processing facility

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.

Ninety-three percent of slopes within the Indian Creek-Grande Ronde 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 low. Road density analysis suggests that the evaluation area is slightly above the mean for all priority geographies.

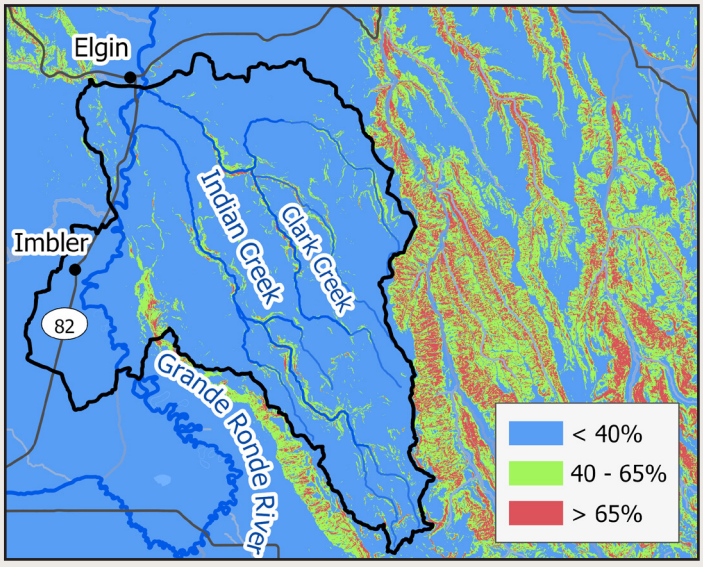


Figure 13. Percent slope for Indian Creek-Grande Ronde River watershed (ODF, 2023)

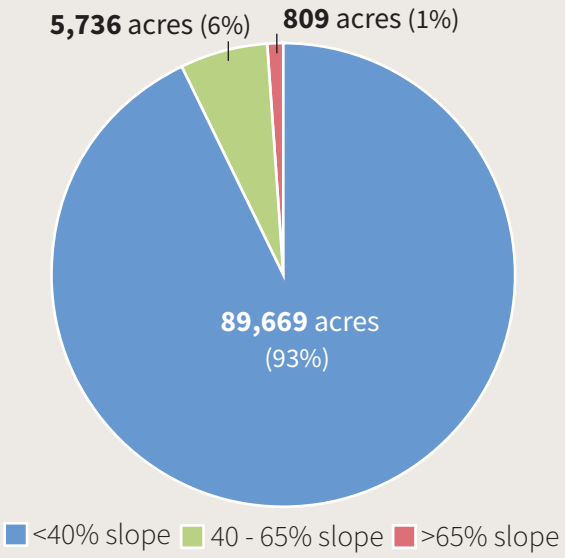


Figure 14. Total acres and proportion for percent slope classes (as shown in Figure 13)

Potential revenue estimates

Median revenue from commercial treatments during the 2017-2023 period was $278 per acre, ranking in the 23rd percentile (Table 5). This suggests that expected revenues from commercial treatments in the evaluation area could be lower relative to all Oregon 20-YLRS National Forest priority geographies, which 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 Indian Creek-Grande Ronde River watershed commercial treatments (TIM, 2023; FACTS, 2023)

Median revenue per acre	Median volume per acre (MBF)	Revenue percentile rank
$278	4.4	23

Contractor capacity

A total of 36 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 56 percent lower than average, ranking in the 20th percentile.

FACT SHEET 47 • SEPTEMBER 2026

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