



# Zena Forest Case Study: Improving Climate Resilience and Restoring Oak in the Willamette Valley

## Quick Facts

**Location:**  
Polk County, Oregon,  
northwest of Salem

**Property Size:**  
1,300 acres

**Forest Type:**  
Mixed conifer-  
hardwood

**Soil Type:**  
The soils are  
primarily well  
drained silt loams  
with a clayey horizon  
below the surface  
layer

**Stand Age:**  
Varied, Oregon white  
oaks are primarily  
80 years and older

## Primary Objectives

Zena Forest strives to be a model for long-term, sustainable forest management in the Willamette Valley through:

- Regenerative, low-impact forestry that ensures harvesting does not exceed growth and regeneration, establishing ecological sustainability alongside economic viability.
- Stewarding a biodiverse, mixed-species, mixed-age forest that enhances structural complexity and ecological resilience.
- Actively restoring oak savanna and woodland habitats, controlling invasives, and nurturing native plant communities.
- Conserving wildlife habitat for sensitive and oak-associated species, such as western gray squirrel and acorn woodpecker, through habitat enhancement and structural retention.
- Building resilience to climate uncertainty by maximizing species diversity, forest complexity, and regenerative potential.

## Beginning Conditions

The 1,300 acre Zena Forest is located in the Eola Hills, northwest of Salem, Oregon. Before 1850, the Willamette Valley—home to the Calapooia people—was largely open oak woodland and savanna, maintained by frequent, low-intensity burns that prevented tree encroachment.

After colonization and the prohibition of traditional burning, Douglas-fir and other trees began to overtake oak habitats.

As of 2008, oak woodlands occupied about 29% of the site, and relict savanna less than 5%. These remnants included oaks of various ages, though most are at least 80 years old. Some areas had been planted with Douglas-fir or ponderosa pine to encourage woodland conditions.

## Property Description

The property is well stocked with commercial timber species, primarily Douglas-fir, Oregon white oak, and bigleaf maple. Minor species include grand fir, ponderosa pine, western redcedar, Oregon ash, and non-native cherry.

Invasive species such as Himalayan blackberry, Scotch broom, and non-native cherry

are present throughout the oak and savanna areas. While the oak stands still hold a significant inventory, they also contain a substantial Douglas-fir component, which continues to threaten oak dominance on the property.

Over the past decade, the forest has experienced significant stress, with hotter, drier summers and fewer, more intense winter rains accelerating Douglas fir decline. Since 2015, nearly 10% of the Douglas firs have died, especially on dry, southwest-facing slopes with poor soils. These changes have prompted a shift toward species better suited to emerging conditions, such as Oregon white oak or Willamette Valley ponderosa pine.

The soils in the Zena Forest are primarily well drained silt loams with a clayey horizon below the surface layer. In some areas the clay component creates a hardpan that limits drainage and creates areas of seasonal wet soils.



Native Oregon white oak at Zena Forest



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## Prescriptions

The decision to restore oak habitats in Zena Forest is rooted in the landowner's observations of how climate change is reshaping the Willamette Valley as summers become hotter and drier. Douglas fir has not done well on the property, while native Oregon white oak has shown remarkable resilience, with deep roots and diverse fungal associations that help them adjust to dry, hot environments. As a result, the landowner sees oak restoration as both a return to historical conditions and an investment in a more climate-resilient future. While they continue to experiment with sourcing Douglas-fir seedlings from warmer, drier regions, their long-term strategy includes expanding oak savanna and woodland to create a forest better suited to the challenges ahead.

## Oak Savanna

The existing residual savanna areas will be expanded to approximately 161 acres over the next two decades. Management will focus on removing competing Douglas-fir through commercial logging while protecting residual oaks and minimizing soil disturbance in areas with native forbs and grasses. Douglas-fir within oak canopies may be girdled to create wildlife snags and avoid damage during harvest. Species such as bigleaf maple and Oregon ash will be evaluated individually. Generally, if these trees are competing with oaks of any age class, they will be removed.

Dense stands of oak over 50 years old will be thinned to 40–50 trees per acre, favoring the healthiest, largest crowns. Invasive species will be controlled with a mix of herbicide application and mechanical mastication. Native woody shrubs like hazelnut will be considered for removal where grassland restoration is the priority. All oak savanna restoration areas will be monitored annually, with follow-up vegetation management, primarily herbicide application, to prevent the return of undesirable species.



## Oak Woodlands

Oak woodlands in Zena Forest display diverse conditions but will be managed to maintain and enhance their oak component over the long term. Thinning will primarily remove Douglas-fir and maple to release oaks, while in dense oak areas, less vigorous trees may be cut to promote large crown development in the remaining individuals. At least two oaks per acre will be designated as legacy trees, protected from encroachment by other species to allow them to grow into large-crowned specimens.

### Takeaways

As summers become hotter and drier, the landowners of Zena Forest are preparing for a more climate-resilient future. Oregon white oak has shown remarkable resilience, and expanding the oak savanna and woodland is a strategy for ensuring long-term economic and ecological resilience.

The landowners urge others not to overlook the ecological and economic benefits of hardwoods. Beyond their merchantable value, hardwoods provide critical habitat for birds, insects, and other wildlife. “In the Willamette Valley, the land simply doesn’t want to grow conifers at the same rate as other areas in the Northwest,” the landowners explained. “Landowners need to manage oak and other hardwoods as an asset, rather than a liability.”



Oregon white oak woodland canopies



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