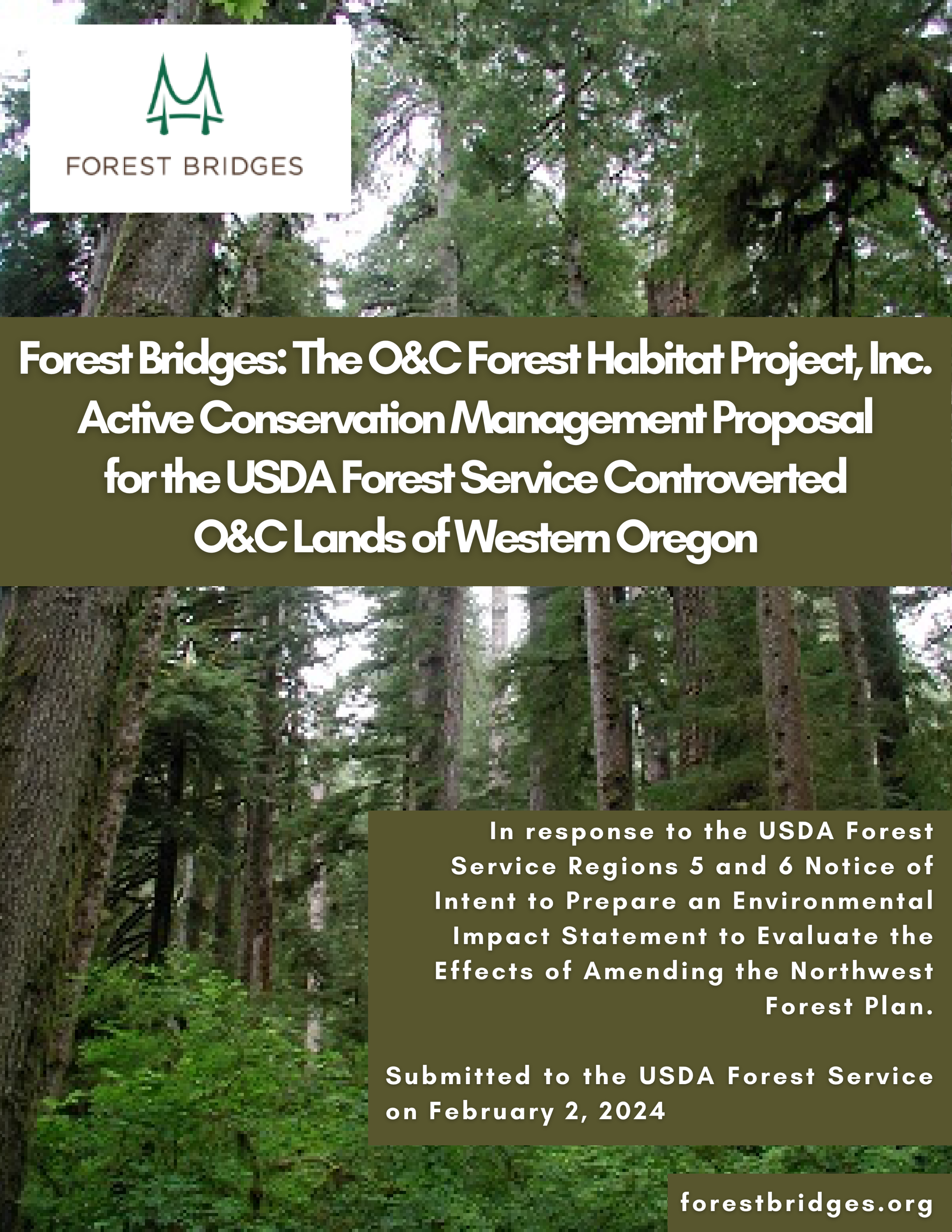

FOREST BRIDGES

# Forest Bridges: The O&C Forest Habitat Project, Inc. Active Conservation Management Proposal for the USDA Forest Service Controverted O&C Lands of Western Oregon

In response to the USDA Forest Service Regions 5 and 6 Notice of Intent to Prepare an Environmental Impact Statement to Evaluate the Effects of Amending the Northwest Forest Plan.

Submitted to the USDA Forest Service on February 2, 2024

forestbridges.org

**Cover Photo Credit:** https://blogs.oregonstate.edu/treetopics/2019/07/22/forests-on-the-rebound-part-1/

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FOREST BRIDGES
THE O&C FOREST HABITAT PROJECT, INC.

Submitted via:
*[https://cara.fs2c.usda.gov/Public/CommentInput?Project=64745&fbclid=IwAR08jom7EamSpmeosRl0abWm09Lx4GnNWof6NSca6b4PK1QauYtj8OiIj_s](https://cara.fs2c.usda.gov/Public/CommentInput?Project=64745&fbclid=IwAR08jom7EamSpmeosRl0abWm09Lx4GnNWof6NSca6b4PK1QauYtj8OiIj_s)*

February 2, 2024

ATTN: USDA Forest Service and the NWFP Amendment Federal Advisory Committee

**Re:** The USDA Forest Service Regions 5 and 6 Notice of Intent to prepare an environmental impact statement as part of the Northwest Forest Plan amendment

Dear USDA Forest Service (Forest Service) and the NWFP Amendment Federal Advisory Committee (FACA):

In response to the Forest Service's Notice of Intent to prepare an Environmental Impact Statement as part of the Northwest Forest Plan amendment, Forest Bridges: The O&C Forest Habitat Project, Inc. (Forest Bridges), respectfully submits substantive public comments in the form of

> **An Active Conservation Management Proposal for the Moist, Dry, and Transitional Forests specifically on the Forest Service Controverted Oregon & California (O&C) lands of western Oregon.**

**For the record:** Our proposal responds specifically and significantly to the directions requested by the Forest Service in its NOI.

Forest Bridges is an Oregon-based 501(c)(3) non-profit collaborative organization that brings together people of diverse viewpoints to foster sustainable forest health and habitats through active management and restoration solutions focused on Western Oregon's O&C Lands.

The federally owned (public) O&C Lands lie in a checkerboard of ownership together with private, state, local and other federal lands in 18 counties of western Oregon. Forest Bridges includes in its definition of the O&C Lands **492,399 acres of controverted O&C lands managed by the Forest Service (Forest Service O&C Lands)**, around 2.1 million acres of BLM O&C lands, 75,000 acres of BLM Coos Bay Wagon Road Lands and 239,000 acres of the BLM public domain lands in western Oregon. These nearly 500,000 acres of Forest Service O&C Lands are located in dry, moist and transitional forests in five National Forests in western Oregon: The Umpqua, Siuslaw, Willamette, Mount Hood Rogue-Siskiyou and Fremont-Winema National Forests National Forests.

**All O&C lands are governed by the O&C Act of 1937 and other federal laws and regulations. As such, Forest Bridges urges the Forest Service to consider Forest Bridges' Active Conservation Management proposal as it amends the NWFP and an alternative in associated new Forest Service Forest Management Plans for the Umpqua, Siuslaw, Willamette, Mount Hood Rogue-Siskiyou and Fremont-Winema National Forests National Forests**.

In our proposal, Forest Bridges, which specifically and exclusively focuses on O&C lands with respect to the Forest Service, has provided a viable Active Conservation Management proposal for these Forest Service O&C Lands. This proposal represents **a paradigm shift in management** which we believe is consistent with the O&C Act. The fundamental shift is to replace fixed location reserves with an all-lands management approach that sets strict specifications for habitat diversity goals, including strong standards for legacy habitat and structurally complex old growth habitat. This is accomplished through the use of metered harvest strategies, tailored to dry, moist and transitional forests.

We have presented Active Conservation Management proposals that are based on Forest Bridges Principles of Agreement and collaboratively approved by the Forest Bridges Board of Directors, with guidance from its Council of Advisors. The detail of these proposals is also grounded in **Ecological Forestry tenets and Ecological Silviculture methods** that promote a metered and active approach to habitat sustainability through variable retention harvest and thinning strategies, beneficial prescribed fire and other actions. They call for carefully defined guidelines intended to increase certainty around the extent and kinds of management based on site-specific characteristics. Management is active, creating new habitats regularly, yet metered in amount and monitored for effectiveness. Harvest and thinning, both with legacy retention, seek to emulate the range of historical conditions, and are limited to work which puts the forests of the O&C lands as a whole on a trajectory for regular habitat renewal as well as increased persistence, storage of carbon, creation of structurally diverse forest, resistance to fire, and sustained growth and development.

We also look to Cultural Burning practices, partnering and co-management with Indigenous tribes on their terms as also integral to these proposals. As we see it, agency staff – working collaboratively with the Tribes whenever possible -- must be entrusted to evaluate stands across the O&C Lands for treatment or "let grow as is" based on each stand's potential to become or remain a contributor to the diversity of wildlife, plant kingdoms or other biological habitats, as well as to store carbon and resist wildfire.

Along the way, the Forest Bridges collaborative has also identified a suite of issues and certain prior considerations in planning. Many of these are laid out in our Forest Bridges Principles of Agreement, found on our website and included as Appendix A in this document. Some barriers are described in our proposal (e.g., prescribed fire use, legal consistency, land use and harvest rules) as well.

Forest Bridges has found that our documents are most reflective of our collaborative energy if they remain as **living documents**. New information and insights, like the process of monitoring and adaptive management, are coming to our attention through collaboration, and certain refinements of our proposals may happen after the deadline for submittal. While this is the reality of a process of planning and deadlines, Forest Bridges will periodically share new insights with the Forest Service, as they become available.

For more information, please go to our website: https://www.forestbridges.org. It is our sincere hope that the Forest Service will consider our management proposals for the Forest Service O&C Lands as a sound ecologically-based strategy for active forest habitat management.

We appreciate, in advance, the Forest Service's efforts to actively engage with the other appropriate Federal agencies, the state governments and appropriate agencies, local county governments, and the Tribes to collaboratively develop a more effective and comprehensive strategy for the conservation and maintenance of our precious forest resources. Thank you for considering our extensive public comments.

Sincerely yours,

| | |
|---|---|
| ***Thomas McGregor*** | ***Denise A. Barrett*** |
| Thomas McGregor | Denise A. Barrett |
| Board Chair | Executive Director |

cc: Forest Bridges Board of Directors, Council of Advisors and Tribal partners

# List of Contributors/Acknowledgements

Collaboration is the driving force of all Forest Bridges: The O&C Forest Habitat Project, Inc., work products. We extend sincere thanks and appreciation to the following individuals and groups who participated in the production of this document, Forest Bridges policy papers, Principles of Agreement and our Active Conservation Management strategies, which form the basis for this current proposal to the Forest Service.

- Denise A. Barrett, Forest Bridges Executive Director (Proposal Author/Co-Editor)
- Rick Sohn, Forest Bridges Co-Founder and Board Secretary (Proposal Co-Editor)
- Sam Freedman, Forest Bridges former Forest Policy Analyst (whose draft technical papers for the moist and dry forests formed some of the basis of this Proposal)
- Sharlyn Cox, Forest Bridges Administrative and Finance Support Specialist (cover page and section compilations)
- The Forest Bridges Board of Directors (for proposal review, collaboration, and approval):
    - Thomas McGregor, Chair
    - Elin Miller, Vice Chair
    - Dana Kjos, Treasurer
    - Garrett Kleiner, Member
    - Robin Hartmann, Member
- The Forest Bridges Council of Advisors (for technical consultation):
    - Travis Joseph, American Forest Resources Council
    - Greg Block, Sustainable NW
    - Ed Shepard, former BLM WA/OR State Director
    - George Smith, Native American Natural Resources Management
    - Matt Hill, Douglas Timber Operators
    - Dan Newton, Silviculturist
- Forest Bridges Scientific and Ecocultural Reviewers (for technical consultation)
    - Jerry Franklin, Professor Emeritus, University of Washington; and author of many books cited in this Proposal
    - Cristina Eisenberg, Associate Dean for Inclusive Excellence, Maybelle Clark Macdonald Director of Tribal Initiatives in Natural Resources
    - John Bailey, Professor, Forest Ecosystems and Society, College of Forestry, Oregon State University
    - John Garland, Professor Emeritus, Forest Engineering Systems, College of Forestry Oregon State University
    - John Marshall, John Marshall, Forest Ecosystems Photographer and Documentarian, Wenatchee, WA
    - And many others who prefer to remain anonymous

We also wish to thank all of the scientists and forest practitioners upon whose research, written books and articles, as well as conversations with Forest Bridges, have influenced our work and are cited throughout this paper.

# Table of Figures

## 1.0 Executive Summary and Introduction

In response to the USDA Forest Service (the Forest Service) Regions 5 and 6 Notice of Intent to prepare an environmental impact statement as part of the Northwest Forest Plan amendment: Forest Bridges: The O&C Forest Habitat Project, Inc. (www.forestbridges.org) offers the following substantive comments in the form of an **Active Conservation Management Proposal for the Moist, Dry, and Transitional Forests specifically on the Forest Service Controverted Oregon & California (O&C) lands of western Oregon** *(Figure 2.)* Founded in Roseburg in 2015 on the basis of trust, Forest Bridges is a grassroots, charitable nonprofit collaborative that brings together people of different perspectives on forest management to foster sustainable forest health and habitats through active management and restoration solutions on the 2.9 million acres of O&C Lands in western Oregon. O&C Lands are managed by the Bureau of Land Management and the Forest Service in accordance with the O&C Act of 1937's sustained yield priority and other laws and regulations.

***Figure 1****: The Shasta Costa Key Watershed and Roadless Area in the Rogue-River Siskiyou National Forest in SW Oregon contains a broad swath of Forest Service O&C dry forest lands across it. Shasta Costa Creek is a tributary of the Wild and Scenic Rogue River. The photo (date unknown) shows overly dense forest stands in a watershed that has been subject to numerous lightning-caused stand replacement fires. The stands in this photo could be next (if they have not already burned). Photo: Barbara Ullian, originally posted at Kalmioposiswild.org.*

The federally owned (public) O&C Lands lie in a checkerboard of ownership together with private, state, local and other federal lands in 18 counties of western Oregon. Forest Bridges includes in its definition of the O&C Lands **492,399 acres of controverted O&C lands managed by the Forest**

**Service (Forest Service O&C Lands)**, around 2.1 million acres of BLM O&C lands, 75,000 acres of BLM Coos Bay Wagon Road Lands and 239,000 acres of the BLM public domain lands in western Oregon *(Fig 2 and source link in caption. Note: the Forest Service Controverted O&C Lands are in dark green).*

The O&C Lands encompass the traditional homelands of several Indigenous groups. Five have reservations within the O&C territory: the Cow Creek Band of Umpqua Tribe of Indians, Confederated Tribes of the Coos Lower Umpqua and Siuslaw, Confederated Tribes of the Grande Ronde, Coquille Indian Tribe, and Confederated Tribes of Siletz Indians of Oregon. Two other Tribes' ancestral homelands include the O&C territory, though these tribes are currently located in eastern and central Oregon: the Klamath Tribes and Confederated Tribes of the Warm Springs. All of these Indigenous groups have been stewarding these landscapes for at least 14,500 years (*Connolly* 1988, *Dobkins et al.* 2017 *Fredrickson* 2004).

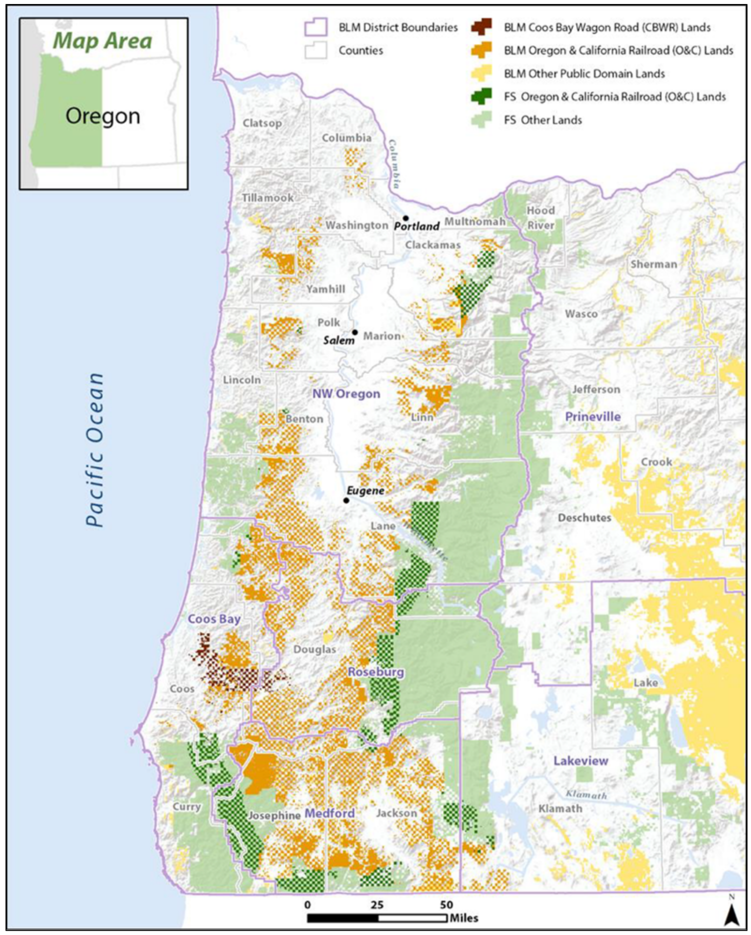


*__Figure 2:__ The federally owned (public) O&C Lands lie in a checkerboard of ownership together with private, state, local and other federal lands in 18 counties of western Oregon. Forest Bridges includes in its definition of the O&C Lands around 2.1 million acres of O&C BLM lands, 75,000 acres of Coos Bay Wagon Road Lands; 239,000 acres of the BLM public domain lands in western Oregon; and 492,399 acres of controverted O&C lands managed by the U.S. Forest Service (dark green areas in the map). These lands are governed by the O&C Act of 1937 and other federal laws and regulations. Map & land ownership statistics source: https://crsreports.congress.gov/product/pdf/R/R42951*

The Forest Bridges collaborative structure includes a Board of Directors (the core decision-making body with a balance of conservation/recreation and forest industry representation), a Council of Advisors, an Independent Scientific and Ecocultural Reviewers Group and a small paid staff.
The organization, which became a 501(c)(3) in 2019, sees itself as 'attempting to fill a void' as the only all-inclusive, consensus-based grassroots collaborative working to shift the management

paradigm on the whole of the western Oregon O&C Lands and move beyond decades of polarization, lack of recognition and inclusion of Indigenous people and their time-honored forest management practices, an entrenched culture of litigation, and land allocations that have impinged the scale of active management and restoration efforts needed to address more than 100 years of fire suppression. These and other issues have contributed to exacerbating detrimental conditions on the O&C Lands, which include increasing high-severity wildfire (six to seven times higher than precolonial times in southwest Oregon dry forests according to The Nature Conservancy); increased climate change-driven drought and invasive species; protracted seasonal wildfire smoke impacting public health; declining rural economies; and reduced public access for recreation.

***All of Forest Bridges Active Conservation Management approaches for the O&C Lands, tailored for specific dry, moist and transitional forest types, center on enhancing complex forest structure, ecosystem functionality, fire resilience, and the presence of diverse, endemic species, as needed. . . .***

***ALL of the O&C Lands are included in Forest Bridges long-term proposals for the O&C Lands without predesignated reserve locations, which replicates the Tribal ways for millenia.***

Over the years, the Forest Bridges collaborative has risen to the challenge of developing management principles and approaches – **Principles of Agreement** (*Appendix 1*) -- that are constructive and viewed as reasonable from the perspective of all our partners and interest areas: Tribal Nations, ecological and climate resilience, legacy forests, plant, wildlife and other biological habitats, timber and wood products production, county revenue expectations, recreation and other material and non-material values important to the community at large. These collaboratively developed Principles of Agreement (PoAs) provide management direction and address barriers, recognizing the diverse interests and breath of ideas that must be included to improve outcomes and be generally accepted. The PoAs – and our Active conservation Management proposals are underpinned by cutting-edge science, Indigenous knowledge and practice and practitioner experience.

**ALL** of the O&C Lands are included in Forest Bridges long-term proposals for the O&C Lands *without* predesignated reserve locations, which replicates the Tribal ways *for millenia*. For the Forest Service O&C Lands, this approach would require a shift from the current Northwest Forest

Plan's land designations, which, leave 80 percent of the O&C forests in reserves with little or no management. The 2020 Bioregional Assessment of Northwest Forests recognizes the limiitation of the current reserve system in meeting fire resilience and multi-species sustainability goals in a changing climate:

> *[T]he needs of some species associated with old forests that experience dynamic disturbance events are not being met by the static boundaries of late-successional reserves. (Marcot et al. 2018) Managing large reserves as dynamic mosaics of vegetative conditions that meet the needs of various wildlife species as well as goals for resilience to climate change and fire might better align with current goals. (USDA, 2020)*

Forest Bridges views the current approaches to O&C Lands management as unsustainable in O&C forests that are overstocked, low in heterogeneity, and facing unprecedented disease and stand-replacing fires. Reserves of naturally developing mature and old growth stands, as well as other land areas (e.g., monuments, wilderness areas) are -- given the increased frequency of megafires in recent years -- at great risk, requiring a rethink of protection, what we call **"Active Conservation Management."** Grounded in Ecological Forestry tenets and Ecological Silviculture methods, Forest Bridges' proposals promote a metered and active approach to habitat sustainability through harvest and thinning, beneficial prescribed fire and other actions. They call for carefully defined guidelines intended to increase certainty around the extent and kinds of management based on site-specific characteristics. Management is active, creating new habitats regularly, yet metered in amount and monitored for effectiveness. Harvest and thinning, both with legacy retention, seek to emulate the range of historical conditions, and are limited to work which puts the forests of the O&C lands as a whole on a trajectory for regular habitat renewal as well as increased persistence, storage of carbon, creation of structurally diverse forest, resistance to fire, and sustained growth and development. We look to Cultural Burning practices, partnering and co-management with Indigenous tribes on their terms as also integral to these proposals. As we see it, agency staff – working collaboratively with the Tribes whenever possible -- must be entrusted to evaluate stands across the O&C Lands for treatment or "let grow as is" based on each stand's potential to become or remain a contributor

***Figure 3:*** *An even-aged Western Hemlock stand on O&C moist forest lands in the BLM Coos Bay District. Photo credit: Denise Barrett, Forest Bridges 2023.*

to the diversity of wildlife, plant kingdoms or other biological habitats, as well as to store carbon and resist wildfire.

**On the 1.5 million acres of coastal and inland moist O&C Lands, including Forest Service O&C moist forests in the Umpqua, Siuslaw, Willamette and Mount Hood National Forests**: Forest Bridges proposes a metered use of Variable Retention Regeneration Harvests. This limitiation on Variable Retention Regeneration Harvests combines active and let-grow management to also double the current stock of structurally complex old growth forests in moist O&C forests from their current level, estimated at less than 25 percent, to 50 percent over time, while regularly creating early seral habitats. Variable Retention Regeneration Harvests and/or Variable Retention Thinning overly dense and younger stands, particularly those surrounding structurally complex old growth in a section, we see as important to reducing fire risk to these stands, especially given current science showing that moist forests are less drought-adaptive in this era of climate change. All of Forest Bridges Active Conservation Management approaches for the O&C Lands, specific for dry, moist and transitional forest types, center on enhancing complex forest structure, ecosystem functionality, fire resilience, and the presence of diverse, endemic species, as needed.

***Figure 4:*** *The Rabbit Ears poking up in dense dry forests on the Rogue River-Siskiyou National Forest.*

**On the nearly 1.4 million acreas of O&C Lands' over-stocked dry forests of SW Oregon, including Forest Service O&C dry forests in the Rogue-Siskiyou and Fremont-Winema National Forests in the Klamath Ecoregion**, Forest Bridges' aim is to restore historical, widely spaced fire-resistant stands and forest structure for multiple and sensitive species. Toward our consensus goal of reducing the occurrence of stand-replacement fires from the current rate of about 36 percent to just 5 percent, we propose an aggressive fuels reduction program using Variable Retention Thinning and carefully applied prescribed fire/cultural burning. Using this dry forest restoration approach on three (3) percent per year of the total 1.4 million O&C dry forest over a 30-year timeframe will develop and sustain multi-species habitats, while retaining legacy and generating early seral communities, and increase wood output over current levels (to be determined through modeling.)

**The Transitional O&C Forests, including Forest Service O&C Transitional Forests in the Umpqua National Forest**, are characterized by historic fire intervals intermediate between classic moist and dry forests. They differ from strictly dry and moist forests in aspect, generally: moist forests on the north and east slopes and dry forests on the south and west slopes. For these forests, Forest Bridges recommends a blended application of its dry and moist forest strategies: on drier forest slopes, use Variable Retention Thinning and on moister slopes use Variable Retention Regeneration Harvests and Variable Density Thinning strategies, with fuels reduction.

**Other major parts of our proposals for the O&C Lands:**

- We look to cultural Burning and other Indigenous practices, partnering and co-management with Indigenous tribes on their terms as also integral to these proposals.
- Short-term impacts are weighed against long-term benefits to the forest ecosystem; forest management is approached with a long-range vision that spans centuries.
- Forest management is carefully defined through metering of restoration thinnings to support trust and confidence of all parties.
- Extensive, transparent monitoring and reporting on forest activities and conditions is made a priority.
- Legal gridlock is reduced while environmental protections continue to be upheld.
- New, additional funding is necessary for prescribed fire and other fuel reduction techniques between commercial restoration thinning, as well as for public safety, monitoring and ongoing adaptive management, and noxious weed control. Note: A reduction in firefighting costs could be a source of funds to help cover additional costs of this program.

**The content on the following pages presents:**

- A Recap of the NOI, including a statement of the Forest Service's five goals for the NWFP Update, current conditions on the NWFP areas, and the management directions sought by the Forest Service.
- Forest Bridges Active Conservation Management proposals for the Forest Service O&C Lands, sub-divided by Moist, Dry and Transitional forest types.

- Forest Bridges Active Conservation Management proposals applicable to all forest types on the O&C Lands, including the Forest Service O&C Lands: e.g., green forest plan substitution following high-severity fire and snag guidelines.
- Conclusion and next steps.

We thank the NWFP Update FACA Committee, Forest Service staff, and others who take the time to read Forest Bridges proposals and consider including them as part of updating the NWFP to yield improved environmental, economic and community outcomes on the Forest Service O&C Lands.

***Figure 5***

### Ecological Forestry and Ecological Silviculture (ES) Methods

Forest Bridges *bases* much of its Active Conservation Management proposals for the dry, moist and transitional O&C Lands on ecological forestry tenets and ecological silviculture methods. Ecological Forestry applies an understanding of the structure, function, and dynamics of natural forest ecosystems to achieve integrated environmental, economic, and social outcomes (Spies and Duncan, 2009; Franklin et al. 2018; Palik et al. 2021). Ecological silviculture as an approach manages forests, including trees, associated organisms, and ecological functions, based on emulation of natural models of development. (Palik et al. 2021; Palik et al. 2024).

**Ecological silviculture**:

- Values the full array of structures, functions, and species found in a healthy forest ecosystem.
- ES builds from an understanding of the impact of natural disturbances and forest development to arrive at silvicultural systems that generate and maintain structural complexity and heterogeneity in ecosystem attributes.
- To achieve those outcomes, ES recommends regeneration harvests (and/or variable density thinning depending upon forest type and site criteria and management objectives) patterned after the prevailing natural disturbance regime for an ecosystem, including their scale, severity, and frequency.
- ES also emphasizes the importance of native species and accounting for the legacies from disturbances, namely surviving trees, and coarse woody material (e.g., snags and downed wood) -- placing equal emphasis on what is left behind relative to what is removed at each silvicultural intervention.

While economic objectives are still a priority with ecological silviculture, those associated with ecosystem diversity and resilience are given high priority in the design and implementation of ecological silvicultural systems. (Palik et al. 2021)

## 2.0 Synthesis of the NWFP Update Goals, Current conditions in the NWFP Area and the Directions Sought by the USDA Forest Service via the NOI

**NWFP Update Goal #1: Improving fire resistance and resilience across the NWFP planning area**

**Current Conditions (from the NOI):** *Recent wildfires, particularly in dry forests, have burned extremely large areas at high severities and at levels that differ from historic reference conditions in dry forests, where large patches of fire-killed trees were historically rare. Such fires have resulted in considerable harm to communities, including tribes, compounding existing social and economic sustainability challenges. The recent trend of increasing high-severity wildfire also threatens the ecological integrity of these forests, including mature and old growth forest conditions and the species, including the NSO, that depend on them—the precise resources that the NWFP was meant to maintain and restore.*

*In the drier portions of the NWFP area, more than a century of fire exclusion and other management practices have resulted in overly dense and homogenous forest conditions that heightens the risk of large, high-severity fires. Such management practices have resulted in forest composition and structure that is more vulnerable to fire, because forests often have higher densities of smaller trees and shrubs and a lower proportion of fire-resilient species than were historically present. In moist forests, remaining mature and old growth ecosystems are being lost and further fragmented by wildfire.*

*The NWFP did not adequately address the severe ecological impacts of a century of fire suppression and removal of Indigenous fire practices and cultural fire regimes on the landscape. Equitable and meaningful Tribal co-management and co-stewardship related to fire is needed, including recognition of the importance of Indigenous fire stewardship and cultural burning regimes to the ecological health of NWFP ecosystems.*

**Directions Sought by the USFS for the Plan Update:** *Improve fire resistance and resilience by clarifying direction for employing prescribed fire, managed fire use associated with natural ignitions, cultural burning, and active management. Direction should reflect* *differences in dry and moist forested ecosystems, non-forested ecosystems, and in riparian areas. Direction would ensure that forests are managed to adapt to changing fire regimes, restore fire in a functional role in the health and integrity of forest ecosystems, and contribute to traditional cultural resources. Improved fire resilience will meet the needs of the Endangered Species Act, support the Forest Service's Wildfire Crisis Strategy, and strengthen relationships between the agency and Tribal Nations and Indigenous peoples.*

*Indigenous fire stewardship and cultural burning regimes can contribute to the ecological health of NWFP forests. Developing and maintaining mature and old growth forest conditions, heterogeneous and complex forest structures, biodiversity, habitat, and cultural ecosystem services is strengthened through inclusion of Indigenous fire practitioners and practice.*

### NWFP Update Goal #2: Strengthening the Capacity of NWFP ecosystems to adapt to the ongoing effects of climate change

**Current Conditions:** *Hot and dry conditions are projected to become increasingly frequent, intense, and prolonged in the NWFP area as temperatures warm and summer rains become less frequent. The Pacific Northwest is rapidly warming, and while changes in total annual precipitation are not projected to be substantial, changes in snowpack and streamflow are anticipated, contributing to the potential for uncharacteristic fire. As a result, climate change is significantly altering the ecological processes and disturbance regimes which shape NWFP area forests. Acute disturbance events in turn leave forests more susceptible to long-term shifts in tree species composition that is less fire resilient. There is also a recognition of the critical role forests within the NWFP area can play in carbon sequestration and storage as a mitigation to climate change.*

*Climate change is also affecting other ecological and hydrologic processes, increasing the vulnerability of NWFP forests and overall ecological integrity. With climate change, the timing and significance of rain events is increasingly atypical with respect to impacts on plants, people, and infrastructure. In the wet systems, atmospheric rivers cause floods, affecting road systems and culverts with impacts to fish, aquatic biodiversity, and access for recreation. Within dry forest systems, climate change is* *increasing the likelihood of drought and is contributing to wildland fires occurring at uncharacteristic scales and severities. Furthermore, climate change is shifting the distribution of forest types, plant and animal communities and fire regimes (e.g., wet versus dry forests) throughout the NWFP area.*

*Climate-related vulnerabilities include increased drought-related stress, increasing insect, exotic species and pathogen damage, and loss of appropriate historical forest type cover in some areas. Drought conditions and longer fire seasons are climate impacts with wide-ranging effects, and improved fire resilience is an important* adaptation strategy.

**Directions Sought by the USFS for the Plan Update:** *Strengthen the capacity of NWFP ecosystems to adapt to the ongoing effects of climate change and to mitigate impacts of climate change. Deliberate focus on climate impacts is needed to help managers address key vulnerabilities of drought-related stress, increasing impacts of disease, insects and exotic species, negative impacts to forest cover, and watershed management strategies that improve conservation of fish habitat and stream flows.*

**NWFP Update Goal #3: Improving conservation and recruitment of mature and old-growth forest conditions, ensuring adequate habitat for species dependent upon mature and old growth ecosystems and supporting regional biodiversity.**

**Current Conditions:** *Protecting and enhancing biodiversity of mature and old growth ecosystems is a central tenet of the NWFP, and the 2012 Planning Rule's focus on ecosystem integrity emphasizes this priority. Mature and old growth ecosystems are critical components of biodiversity and provide carbon storage. The NWFP protects mature and old growth ecosystems primarily through a system of reserves and leave tree requirements, though mature and old growth stands outside of reserves do not have the same level of protection. The NWFP did not adequately address important differences in successional and disturbance dynamics in different types of forests, and so did not adequately account for threats from uncharacteristic disturbance and climate change.*

**Directions Sought by the USFS for the Plan Update:**
*Improve sustainability of mature and old growth ecosystems by providing plan direction to maintain and expand mature and old growth forest conditions and*

*reduce loss risk across all land use allocations. Amended plan content would differentiate and clarify varying conservation goals for moist and dry forest ecosystems. In addition, it would clarify management intent within land use allocations, including matrix and adaptive management areas.*

**NWFP Update Goal #4: Incorporating Indigenous Knowledge into planning, project design, and implementation to achieve forest management goals and meet the agency's general trust responsibilities.**

**Current Conditions [from the NOI]:** *The NWFP area encompasses tribal lands or ancestral territories associated with over 80 federally recognized American Indian Tribes, and additional tribes that are not currently recognized. The development and implementation of the NWFP in 1994 could have involved more consultation, engagement, and partnership with tribes and the inclusion of ecological and traditional ecological knowledge. It is imperative that Tribal governments, representatives, and communities across the NWFP area have the opportunity to engage in amendment of the NWFP to ensure that Tribal sovereignty and treaty rights are accurately addressed and to integrate co-stewardship and co- management frameworks for accomplishing plan objectives. In some cases, cultural resources and other forest products that are important to tribes, or are recognized as treaty rights, should be prioritized over non-native or commercial uses. For example, there may be First Food locations or resources, such as huckleberries, where Indigenous Knowledge and practices are primary/dominant and should be considered for prioritization of management separately from other public interests.*

**Directions Sought by the USFS for the Plan Update:** *Add plan direction incorporating Indigenous Knowledge into planning and plan implementation, including future project design, to identify and support tribal goals, achieve forest management goals and meet the agency's trust responsibilities.*

**NWFP Update Goal #5: Providing a predictable supply of timber and non-timber products, and other economic opportunities to support the long-term sustainability of communities located proximate to National Forest System lands and economically connected to forest resources**

**Current Conditions**

*The development and implementation of the NWFP has had significant socio-economic, cultural, workforce, and financial impacts on communities and publics. The NWFP has largely not achieved its timber production goals, which were the NWFP's primary criteria for supporting economies and community wellbeing (e.g. livelihoods and subsistence practices). Impacts include not only timber-related employment, but also community and industry infrastructure, and community connection to management and conservation practices and activities. In addition, some social, economic, and ecological challenges currently facing communities were not anticipated by the NWFP. For example, communities are facing increasing risks from natural hazards (e.g., wildfire, flooding, debris flows) related to conditions on National Forest System lands.*

**Directions Sought by the USFS for the Plan Update**

*Support the long-term sustainability of communities located near National Forest System lands and those that are culturally and economically connected to forest resources. Clarity is needed regarding opportunities for timber and non-timber products, including from restoration activities. The NWFP should sustain the values, benefits, and other ecosystem services that national forests provide to communities, including tribes, that directly depend on them. Above all, changes in plan direction would ensure effective wildfire risk reduction to reduce risks to communities, life, and property.*

# 3.0 Forest Bridges Active Conservation Management Proposals for the Forest Service O&C Lands

## 3.1 For the Moist Forests on the Forest Service O&C Lands in the Umpqua, Siuslaw, Willamette and Mount Hood National Forests:

### 3.1.1 Introduction to the Moist Forest

Forest Bridges' moist forest strategy for the O&C Lands of western Oregon was formulated as part of its collaborative work with a variety of interests and partners and combines science, professional and Indigenous knowledge. It follows from The Principles of Agreement (Appendix 1) to address gaps and challenges in O&C lands management, including the Forest Service O&C lands. The vision includes multi-species habitat sustainability, doubling structurally complex old growth stands from less than 25% to 50% of forest land base, together with continued development of complex early seral stands, with legacy. Forest Bridges' moist forest proposal calls for active management with certainty (reliability and regularity) and is a viable 21st Century option for sustained yield management under the O&C Act of 1937.

***Figure 6**: Moist Old Growth forests in western Oregon are characterized by vigorous understory growth, copious amounts of standing and downed coarse woody debris, large structural trees as the system's backbone, and high vertical and horizontal complexity (Franklin et al. 2002).*

Moist forests have long been characterized by large-scale fires that cross land ownership boundaries and impact neighbors, particularly the extensive neighboring private forest lands. Forest Bridges now proposes integrating traditional indigenous practices that involved fire with today's practices of managing stand densities to reduce the impact of these large-scale fires in ways appropriate for moist forest habitats. In his PhD. Dissertation, Forest Scientist Andrew Merschel has documented a previously unrecognized and much greater frequency of fire in moist forests (Merschel, 2021), which lays groundwork for consideration of Forest Bridges Active Conservation Management proposal for moist O&C forests.

### 3.1.2 Moist Forest Context

Moist forests comprise around 1.5 million acres (50%) of the O&C Lands of western Oregon, including those on Forest Service O&C lands in the Umpqua, Siuslaw, Willamette and Mount Hood National Forests. *(Figure 7).* These Moist forests are some of the most productive forests in the world—especially in the Coast Range (*Fujimori* 1976, *Waring & Franklin* 1979). Here, Douglas-fir--western hemlock forests dominate at low-to-mid-elevations. This vegetation community is composed primarily of Douglas-fir (*Pseudotsuga menziesii*) as a canopy species, which may persist for hundreds of years in the absence of severe disturbance. Western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and grand fir (*Abies grandis*) are prominent understory species along with western hemlock (*Tsuga heterophylla*), which is theoretically the climax species. Pacific silver fir and mountain hemlock series occupy the highest elevation zones.

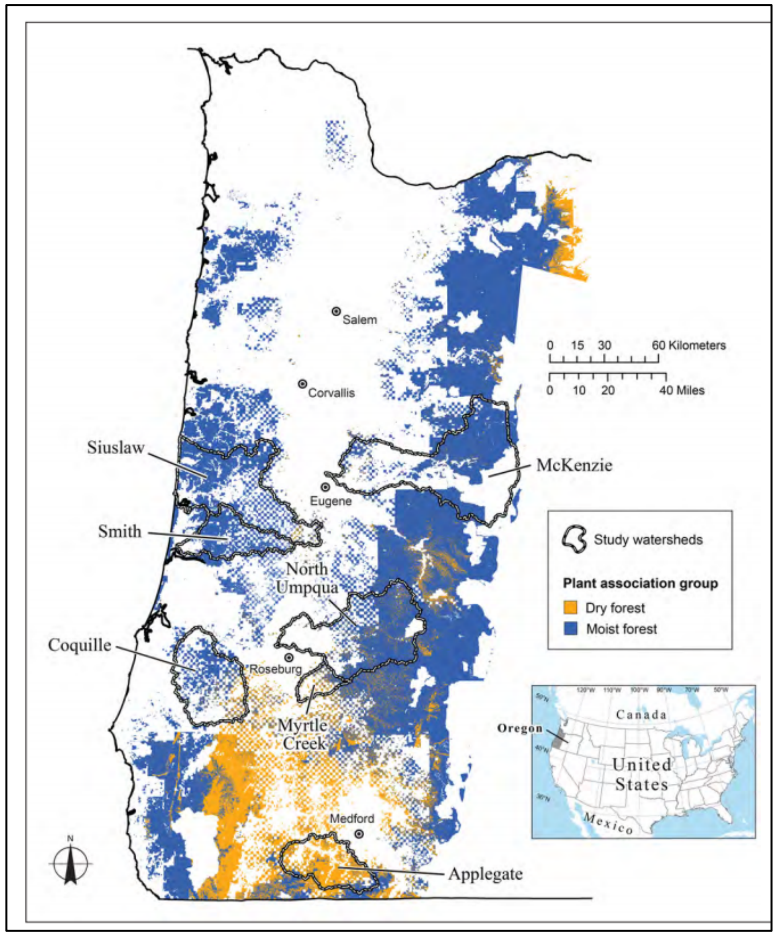


***Figure 7:*** *Moist forest lands are present in the Coast and Cascade Ranges of western Oregon and coalesce with dry forests south of Roseburg. That area of coalescing we call "transitional forests". Shown here are U.S. Forest Service-managed (solid blocks including controverted lands) and BLM lands (mostly checkerboard pattern shown), the latter of which are more numerous in the foothills versus high-elevation mountains (Franklin & Johnson 2012).*

Moist forest stand development follows a pathway of preforest/early seral, young, mature, and structurally complex old growth stages. *(Spies et al. 2018; Figs 8 and 9.)*


***Figure 8:*** *Following a stand-replacing disturbance event, moist forests in this region follow a common developmental pathway from pre-forest to old growth with varying levels of vertical and horizontal complexity (Spies et al. 2018).*

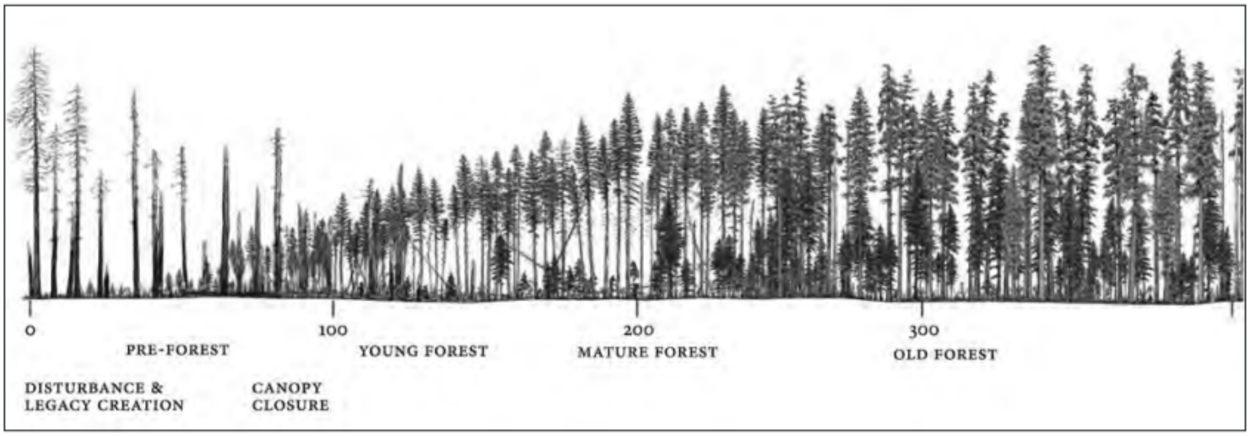


***Figure 9:*** *Following a stand-replacing disturbance event, moist forests in this region follow a common developmental pathway from pre-forest to structurally complex old growth with varying levels of vertical and horizontal complexity (Spies et al. 2018). The timeline of seral stage development varies as site index varies, and in some places, such as in the Coast Range, can be twice as fast as shown above. Further, certain management treatments in previously harvested young or mature stands could also change the rate of progression through seral stages, (e.g., creating a younger cohort by adding gaps or reforestation, where understory layered structure is lacking). A prolonged preforest stage, prior to conifer or hardwood establishment, happens particularly in severe wildfire situations where natural seeding is not possible and in the absence of successful replanting.*

Science on understanding historical fire regimes in moist forests is evolving. Fire history west of the Oregon Cascade crest has varied with elevation, aspect, and topographic position along an east-west gradient from the Pacific Ocean. Typically, the foothill settings where O&C lands reside represent a gradient of ownership and management between valley bottoms and montane forests—both climatically and in terms of human use (*Weisburg* 2009). Until recently, scientific consensus suggested that moist forest ecosystems undergo many centuries of stand development following major disturbances—e.g., severe (east wind-driven) wildfire—before achieving the extraordinary immensity and complexity of old-growth forests (*Franklin et al*. 2002). While such severe events are evident in recorded history and tree rings measured at breast height, recent studies using new tree ring analysis of core samples taken instead at ground level, at several sites in the Umpqua National Forest, suggest greater historical fire frequency and variability of fire severities. The findings counter prevailing scientific view of Old Growth development based solely on stand-replacing wildfires. OSU scientists James Johnston, Andrew Merschel et al (2023) write:

> *We interpret the extraordinary [greater frequency] of fire we observed in stands [in various stages of development of] Douglas-fir and the unique climate pattern associated with fire in these stands to be indicative of Indigenous fire stewardship. This study provides evidence of far more frequent historical fire in coast Douglas-fir forests than assumed by*

*managers or scientists—including some of the most frequent fire return intervals documented in the Pacific Northwest. We recommend additional research across the western Cascades to create a comprehensive account of historical fire in highly productive forests with significant cultural, economic, and ecological importance. (Johnston, Merschel et al, 2023)*

Other studies Forest Bridges has found indicate that fire was 1.7-times more prevalent pre-European settlement and early-conditions might have been relatively high (~30%) in the late 19th century, indicating widespread tending of the landscape via controlled burning (*Morrison & Swanson* 2000, *Robbins* 1999). Indeed, the number of low-intensity fires is likely underestimated, and some fire records reflect this discrepancy (*Teensma* 1987). Indigenous moist, dry and transitional forest management--at a time of less forest density and fuel build-up, where open meadows were more prevalent--was mostly conducted by controlled burning to promote heterogeneity, connectivity, and culturally important foods at small-to-medium scales before fire restrictions were imposed by European settlers in the late 19th century (*Long et al.* 2018*, Morris* 1934). Fire incidence increased during colonization (due to mining and burning for sheep pasture).

Today, many moist forest stands on O&C lands are dense and even-aged—often of plantation origin—that are low in biodiversity and deficient in both early- and late-seral successional features. These systems can be renovated to include the full suite of values that are important to society: biodiversity, climate change resilience, carbon sequestration, fire resistance, timber, and recreation opportunities. The rapid loss of virgin old-growth forests as a result of clear-cut harvests on public lands largely stopped after 1993. However, wildfire losses represent a new and significant challenge to conserving old-growth ecosystems into the future (*Reilly et al.* 2017). The Labor Day fires of 2020 caused a 6-8% reduction of mature and old growth forests alone, in Oregon and California

***Figure 10:*** *An even-aged Western Hemlock stand on O&C moist forest lands in the BLM Coos Bay District. Photo credit: Denise Barrett, Forest Bridges 2023.*

(Johnson et al, 2023). These results raise an important question: What does conservation mean in dynamic, disturbance-dependent systems with histories of continuous human care and management (*Spies et al.* 2018)? In the context of equity, inclusion, and human displacement, are reserves—themselves cultural constructs related to colonial notions of humans as distinct from nature (*Cronon* 1996)—meeting conservation goals compared to more active management, ideally in conjunction with the traditions of Indigenous care that lasted for thousands of years (*Dominguez & Luoma* 2020, *Martinez* 2003, *Schuster et al.* 2019)?

The greater incidence of high-severity fire in NWFP areas because of stand densification (*Reilly et al.* 2017) and climate change may be a primary cause of NSO population reductions in the past decades (*Davis et al.* 2015), illustrating the importance of federal land management approaches that transcend the "reserve" system. Some of these conservation challenges may depend on variables beyond the control of federal forest managers (e.g., barred owl expansion and its effect on spotted owls; *Spies et al.* 2019), but coming to a consensus around multi-objective, ecological forestry in the moist forest federal landscape nonetheless remains a critically important endeavor into the 21st century. In the case of the O&C largely checkerboard of land ownership in western Oregon, Forest Bridges believes that the most successful conservation and long-term active management outcomes arise from active targeted management and letting stands grow where appropriate, to nurture natural, as well as cultural, resources on O&C lands. Co-management opportunities with Tribal partners should be engaged as well.

*Below are Forest Bridges' Moist Forest Variable Retention Regeneration Harvest Proposal, followed by a brief preliminary Moist Forest Thinning Proposal.*

### 3.1.3 Forest Bridges' Moist Forest Variable Retention Regeneration Harvest Proposal

***We propose that the designation [of structurally complex Old Growth moist forest stands] be based on function and stand age rather than reserve locations.***

As with Forest Bridges Active Conservation Management proposals for the dry and transitional O&C forests described in other sections of this document, **ALL** of the O&C Lands are included in Forest Bridges long-term, light-touch proposals for the O&C Moist Forests, without predesignated reserve locations, similar to Tribal ways for millennia. While Forest Bridges does advocate for prolonging the longevity, complexity and ecosystem contributions of structurally complex Old Growth moist forest stands, **we propose that the designation be based on function and stand age, rather than reserve locations**, which can change over very long periods of time in forest development. Furthermore, with the goal of sustaining their function, these areas are not necessarily no-touch, particularly in more fire-prone forests.

Forest Bridges proposed Active Conservation Management approaches allow the managing agencies to evaluate all moist forests for treatment or "let grow as is" based on their potential to become or remain a contributor to the diversity of wildlife and other biological habitats. This is a major change in the current paradigm of management, recognizing the importance of habitat sustainability throughout the O&C Lands rather than a system of reserve areas. In moist forests, utilizing the whole of the moist forest lands leads to a lighter management touch over time and focuses on management where needed most, such as on managed, even-age stands closest to structurally complex old growth patches on O&C Lands. Forest Bridges collaborators agree that taking "no action" in these forests is an action in itself. It leads to the unintended consequence of stand densities and dead wood fuel accumulation beyond that which occurred historically, placing these forests at risk for increasing catastrophic, stand-replacement wildfires and further habitat degradation and fragmentation, especially in a changing climate with protracted periods of drought.

***Forest Bridges proposed Active Conservation management approaches allow the managing agencies to evaluate all moist forests for treatment or "let grow as is" based on their potential to become or remain a contributor to the diversity of wildlife and other biological habitats.***

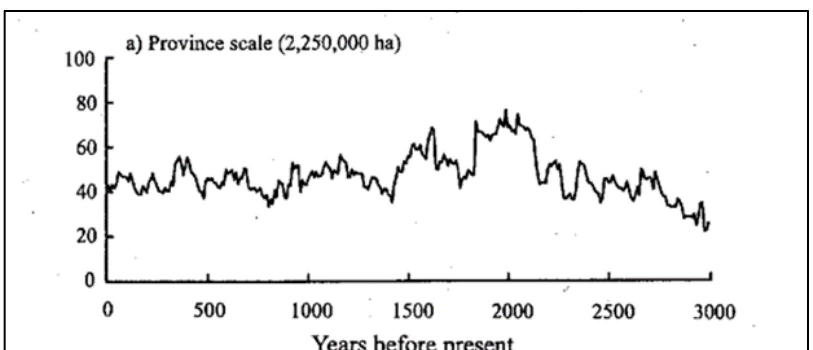

***Figure 11:*** *A graphic representation of 3,000 years of structurally complex Old Growth Forests in the Coast Range. (Spies et al. 2009).*

Early on in their efforts to develop management principles and proposals for the O&C lands, the Forest Bridges collaborators reviewed chapters in the 2009 book, *Old Growth in a New World*. This book is a compendium of individual chapters authored by a wide range of experts on diverse Pacific Northwest forest management. A chapter by Tom Spies, referenced a study which showed that structurally complex old growth forest structure in the Coast Range had occupied about 50% of the moist forest landscape for almost 3,000 years (*Spies et al.* 2009; *Fig. 12*).

Nowadays, the whole of the Moist O&C forests are around 25% structurally complex -- half the historical average. In the organization's early years, Forest Bridges collaborators sought an opportunity to set a goal and develop a management system that would sustainably manage the moist forest on a trajectory to achieve and then maintain 50% of the acreage of the forest as structurally complex old growth, while regularly creating complex early seral habitats with legacy. The early seral forests *(ex. Figure 12)* could grow through the stages of maturity to become structurally complex old growth communities to sustain a diversity of wildlife and other biological habitats consistent with the historical record. The Forest Bridges collaborators concluded that neither a fixed nor a long rotation age management strategy would allow for a diversity of forest types and mimic forests historically.

***Figure 12:*** *Complex early seral habitats following Variable Retention Regeneration Harvest in moist forests can create rich, biodiverse microclimates that contain a mosaic of residual trees, downed wood, young seedlings, and herbaceous vegetation (Reeves et al. 2016).*

The Forest Bridges collaborators believed there needed to be flexibility for the age of harvest built into a harvest rule, and ultimately, management of moist forests to regularly create early seral habitat, including legacy retention. They asked themselves:

**How could Forest Bridges identify a simple, easily described and measurable rule, rooted in nature, for its developing moist forest strategy?**

Forest Bridges Active Conservation Management Proposal for the Moist O&C forests promotes the use of metered, active <u>Variable Retention Regeneration Harvest</u> (*Fig. 13*) and fuel reduction treatments, including thinning and carefully applied prescribed fire, that respect property boundaries and emulate historical stand structure and natural disturbance regimes.


***Figure 13:*** *The photos above provide a visual representation of Variable Retention Regeneration Harvest—an Ecological Silviculture method--based on biological legacies that are typically left behind following natural disturbances. VRRH provides continuity between forest generations by retaining legacy and other living trees and deadwood (e.g., snags and downed wood) at harvest in a range of spatial patterns (dispersed and aggregated) and abundances; includes retention of species or functional groups, e.g. conifers or hardwoods, and can occur stand-wide or at gap-scales depending on natural developmental model being emulated.*

Forest Bridges' Moist Forest Variable Retention Regeneration Harvest proposal at once supports the O&C Act of 1937 sustained yield as a goal AND sustainable multi-species forest ecosystems as the outcome. The approach applies ecological silviculture techniques that provide continuity between forest generations by retaining biological legacies (typically left behind following high-severity wildfire, wind & other weather events), including large and old living trees, snags and downed wood. **In carefully selected treatment areas, 25-40% basal area is retained, in a combination of individual trees, clumps and riparian or other areas.** The Forest Service will determine the extent of legacy retention on a site-specific basis.

Forest Bridges' Moist Forest Variable Retention Regeneration Harvest strategy also aims to set the O&C Lands' Moist forests on a trajectory of attaining and then sustaining 50% structurally complex old growth forests—double the current level—while also continually creating complex early seral habitats.

### 3.1.4 The Collaborative Development of the Forest Bridges Moist Forest Proposal

In 2015, Forest Bridges met with the OSU College of Forestry leadership and scientists in a technical meeting to discuss our goals and how to achieve them. Among many things, we discussed generally the inverted biological population extinction curve. Subsequently, and as further outlined in our full moist forest paper (currently in the process of being edited), the Forest Bridges collaborators applied the inverted population extinction curve (**the green curve in *Figure 14* on the next page)** as the Forest Bridges proposed distribution of age classes throughout the O&C Lands to maintain through annual harvests in the moist forest. The midpoint of the distribution of age classes in this figure is 160 years (illustrative use in modeling). Forest Bridges has subsequently recognized that 160 years is within the range of initiation but is not a universal age of initiation for structurally complex Old Growth forest. The actual age of initiation is determined by ground-truthed, site-specific characteristics.

***Further projections of the age classes showed that 50% structurally complex Old Growth on the O&C Moist Forests could be reached following 180 years of applying VRRH alone on 4,593 acres of O&C moist forests annually. (Fig 15)***

It is this curve itself which provided the annual harvest level of 4,593 acres: the age-zero, or y-intercept value of acres on this curve. Forest Bridges applied this Variable Retention Regeneration Harvest level to a simplified (but now outdated) harvest simulator using 2006 BLM data for 1.1 million acres of BLM O&C Lands' Moist Forests, over 35 decades. Harvests came from stands less than 160 years, where the age class exceeded the green line. The goal was to bring the blue and green lines together, working toward 50% structurally complex Old Growth forests of a distribution of age classes. *Figure 14* shows that 130 years of Variable Retention Regeneration

Harvest alone could achieve a distribution of age classes that became closer to the goal over time.

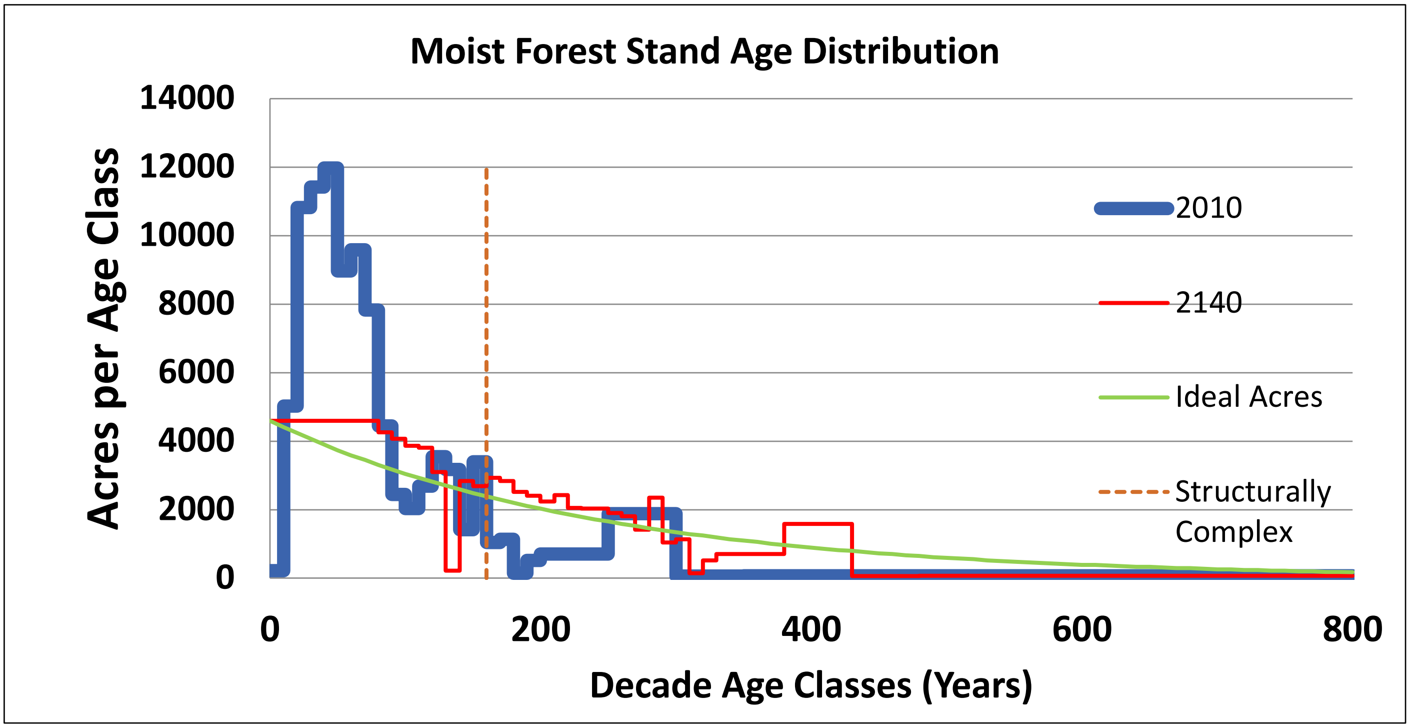


***Figure 14:*** *Forest Bridges Moist Forest Management strategy showing western Oregon BLM O&C lands age class distribution in acres by decade based on 2006 BLM inventory data. The blue line shows an excess of younger stand acres and deficit of older stand acres relative to "Ideal Acres" curve (green line) proposed by Forest Bridges. Annual Variable Retention Regeneration Harvest in stands below the "structurally complex" age shown (160 years, orange dotted vertical line) at the y-intercept harvest level (4,593 acres annually) is simulated as starting in 2010 and proceeding until 2040 (red line). This shows the progress of 130 years of this harvest strategy alone toward achieving the goals of 50% structurally complex forest, 50% stands of younger age classes, toward the Ideal Acres.*

This model of the Forest Bridges management approach met the goals (and satisfied the value-based needs) of the various collaborators because it would continually create complex early seral forests, meet ecological habitat and carbon sequestration objectives (bringing the forests back into greater balance of historical multi-species habitats), and hopefully meet economic objectives, which can only be determined through modeling of this proposal across the O&C Lands moist forest lands. Forest Bridges notes that these figures and acreages are taken from BLM 1.1 million O&C Lands' moist forests and will need to be recalculated on the portion of Forest Service O&C moist forests in each National Forest of western Oregon.

Further projections of the age classes using this example showed that 50% structurally complex Old Growth moist forests could be reached following 180 years of applying the Variable Retention

Regeneration Harvest alone on 4,593 acres of O&C moist forests annually. (See vertical dotted line in *Figure 15*).

**To what extent is there scientific, Tribal or professional experience as justification for this strategy?** At the time this strategy was developed, Tim Vredenburg, Director of Forest Manager for the Cow Creek Band of Umpqua Tribe of Indians and former Forest Bridges Board member, shared a conversation he had with John Gordon, retired Dean of the Yale and Oregon State Schools of Forestry. Gordon had told Vredenburg that Forest Bridges proposal for managing moist forests is not unlike the Continuous Forest Management approaches used in early 1900s Europe. According to Palik et al (2021), one of the earliest forms of nature-based forestry was the Dauerwald approach, which strongly emphasized maintaining mature forest cover in areas being managed for wood products. With its diagram that calculates a y-intercept of forest harvest based on ground-truthed initiation age of structurally complex Old Growth forest, Forest Bridges has taken a more quantitative approach, which is intended to increase transparency and accountability.

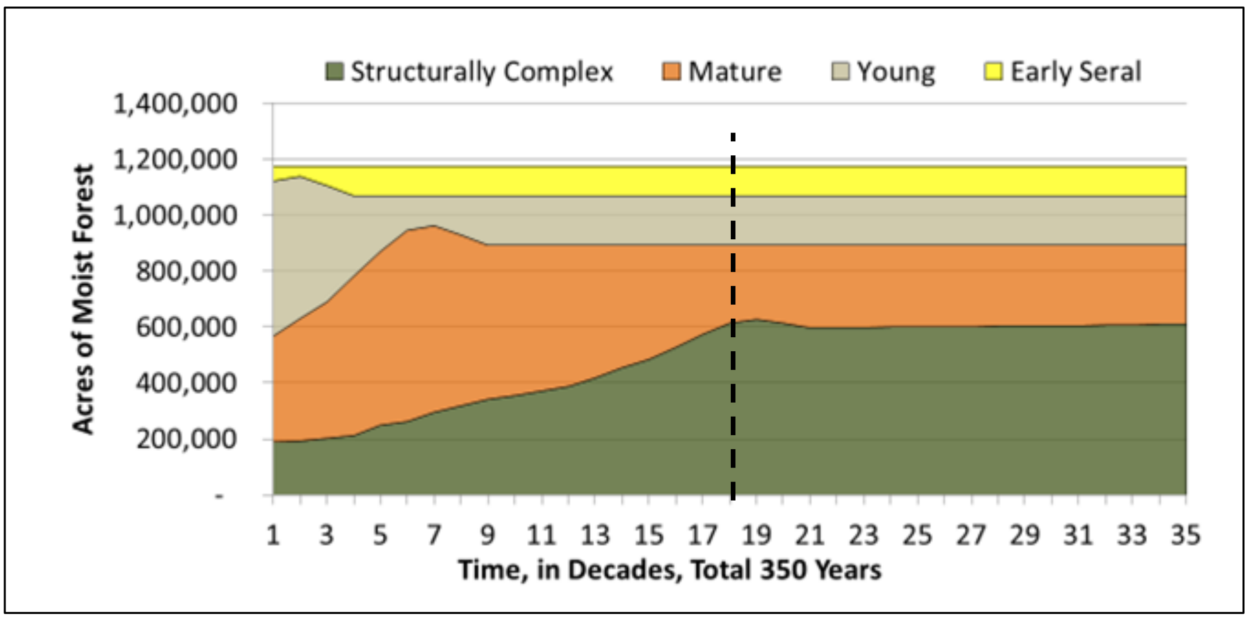


***Figure 15:*** *This chart reflects the decade-over-decade results in the application of Forest Bridges proposed Variable Retention Regeneration Harvest treatments alone on 4,598 acres of O&C moist forests annually. The goal of 50% structurally complex Old Growth is reached after 180 years (as indicated by the vertical dotted line).*

To accelerate the transition to 50% structurally complex Old Growth moist forest, Forest Bridges recommends developing and applying a moist forest Variable Retention Thinning strategy particularly in the drier, transitional moist forests. (See section 3.1.5, which follows this section, for details on our preliminary Moist Forest Thinning Proposal.)

Additional points:

- Through the application of Forest Bridges proposals, as part of a planning alternative, modeling by the Forest Service should be used to calculate more contemporary costs, outputs, and impacts including carbon sequestration, harvest levels, economic impacts and costs, and impacts on habitats.
- The use of a single age for determination of structurally complex Old Growth is purely for modeling illustrative purposes, as explained above.
- As also noted earlier, Forest Bridges proposes identifying structurally complex Old Growth forests by their structural complexity and the Old Growth-associated species that inhabit them rather than by age alone. The age would vary in different regions or watersheds of western Oregon.
- Catastrophic, stand-replacement fires will set back structurally complex old growth stands to age zero. Where the risk is higher, such as in moister areas of the Transitional Forest, steps should be taken to mitigate that stand-replacement fire risk.
- Absent significant high-severity wildfires, the harvest projection suggests that there is a gradual decade-over-decade increase of the average harvest age as illustrated in ***Figure 16***.

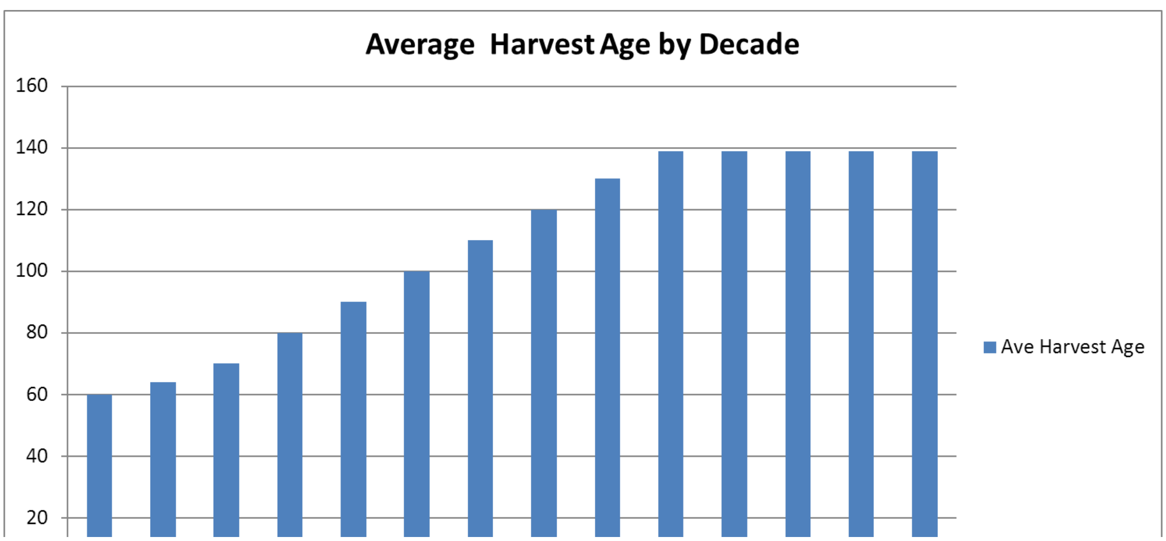

***Figure 16:*** *An early Forest Bridges moist forest model of BLM lands based on 2006 data showed that the average age at harvest will increase each decade as the moist forest age classes shift toward 50% structurally complex old growth composition.*

This moist forest proposal (*Figures 11 - 14*) has the full support of the Forest Bridges Board, our Council of Advisors, scientific experts who we have reviewed it with, and the Friends of Forest Bridges. Forest Bridges would like to see this proposal as the basis of a plan alternative where it could be modeled. Surveys of observations in the forest of species presence and absence, along with site and stand characteristics, will determine if the structurally complex Old Growth stage has been attained. The smaller number of O&C acres per national forest could lend itself to a special case of national forest management within the Plan.

### 3.1.5 Forest Bridges Preliminary Moist Forest Thinning Proposal

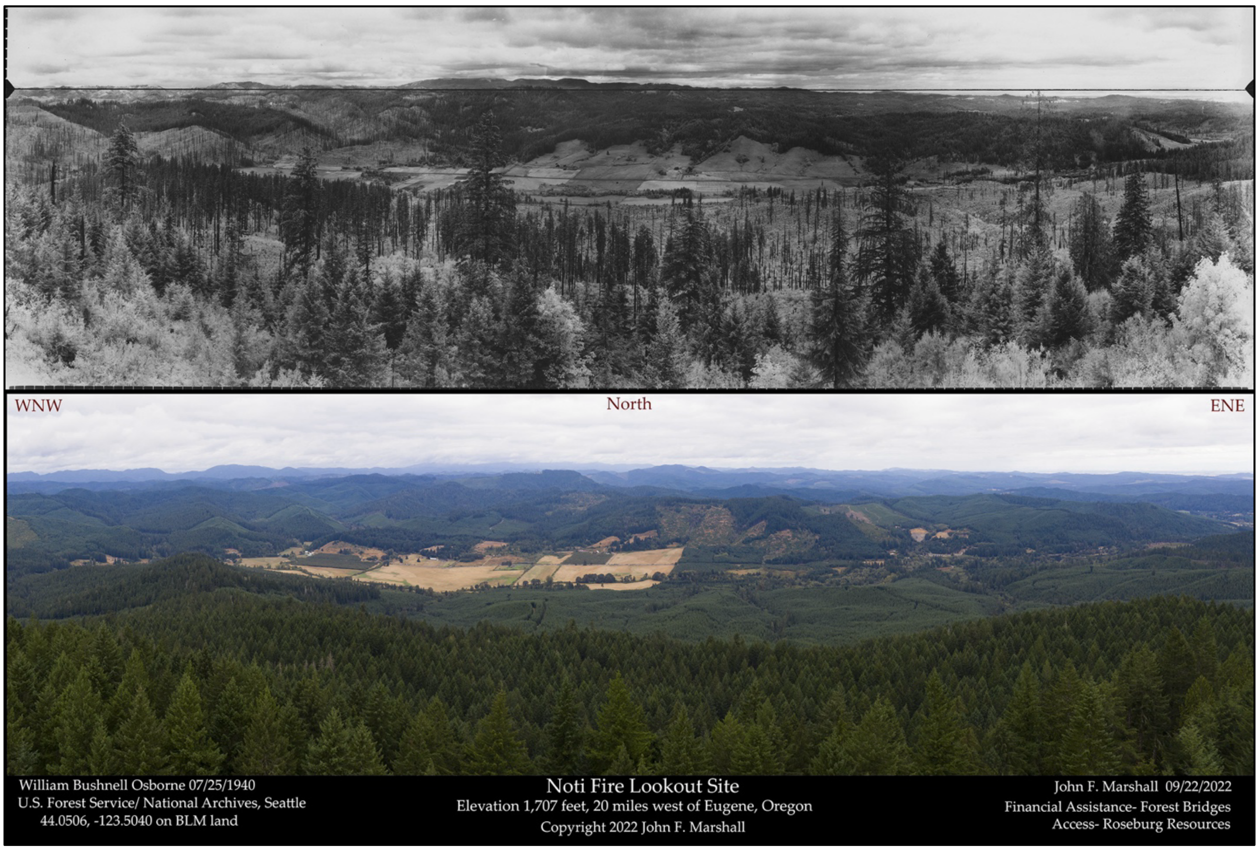


***Figure 17**: Before and after panoramic photos on the Noti Fire Lookout Site, in the Coastal Range of western Oregon near Eugene, illustrates changes in moist forest composition and density between 1940 - 2022. On top, a 1940 photo (part of the Osborne Panoramas Historical Collection) shows a multi-species landscape, with a tall legacy backbone. At bottom, photo taken by John Marshall on 9/22/2022, shows densification and homogeneity of the same moist forests over the decades since the 1940 panorama was taken. Photos provided for Forest Bridges' use courtesy John Marshall.*

More than 100 years of fire suppression has put the moist forests in a precarious position. The new Andrew Merschel fire interval thesis (as discussed on pp 16-17) reinforces the importance of fire and historical stand density management in moist forest areas as practiced for thousands of years by Indigenous people. The buildup of organic matter and ladder fuels is considerably greater than historical conditions, and this is borne out in the Merschel dissertation and John Marshall comparative panoramas (see *Figure 17*). Forest Bridges' work in developing a complete moist forest thinning strategy is in its early stage. In the meantime, we offer the following informed key Variable Retention Thinning recommendations:

- Even-aged stands generally less than 100 years are prime targets for Variable Retention Thinning (defined and described on ) to emulate natural development into structurally complex Old Growth moist forests.
- Thinning in sections where managed forests surround remnant Old Growth stands should be a priority.
- Variable Density Thinning (in addition to Variable Retention Regeneration Harvest) accelerates the development of structurally complex Old Growth forests within the guidelines of Forest Bridges' Moist Forest graph *(Fig 14)*.
- Thin to 0.25 to 0.45 RDI as an initial RDI target range that could be used in stands that originated with harvest or other stand replacement events.
- Thin along roadways where there is a potential for human-caused fires.

All these thinning projects should normally be accompanied by pile and burn or broadcast burning to reduce fuels and the spread of potential future wildfires.

With the exception of intentional openings or gaps in the moist forest, the RDI Variable Retention Thinning targets, while designed to create structural complexity, are not intended to create more extensive early seral conditions. In the moist forests, that is the purpose of Variable Retention Regeneration Harvests.

## **3.2** For the <u>Dry Forests</u> on Forest Service O&C Controverted Lands of the Rogue River-Siskiyou and Fremont-Winema National Forests:

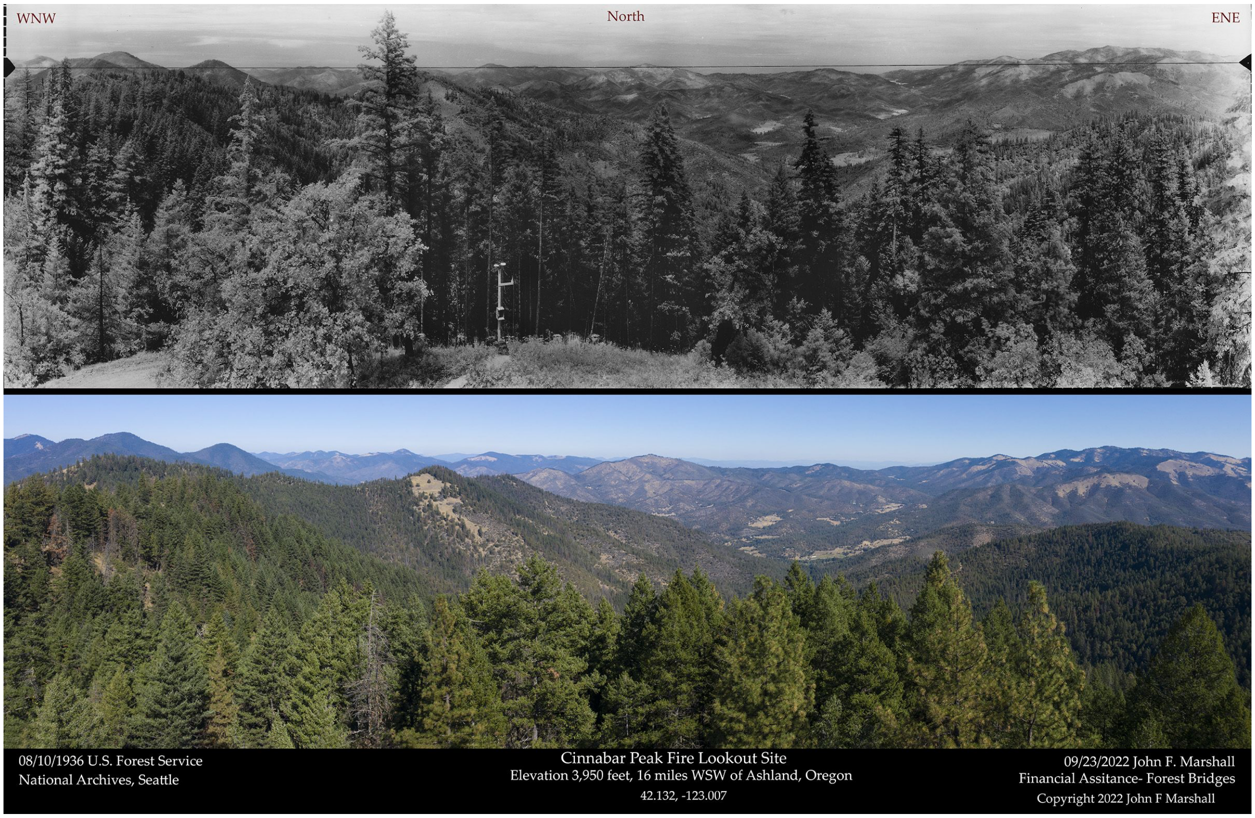


***Figure 18:*** *Before and after panoramic photos on Cinnabar Peak, SW Oregon illustrating changes in dry forest composition and density. On top, circa 1939 photo (part of the Osborne Panoramas Historical Collection) shows predominantly hardwood forests, with a tall legacy backbone. At bottom, photo taken by John Marshall on 9/23/2022 as part of a Forest Bridges-sponsored field trip to the same spot. Notice the densification and homogeneity of the forest of small- to medium-sized mixed conifer trees. Photos provided for Forest Bridges use courtesy John Marshall.*

### 3.2.1 Dry Forest Vegetative Context

Forest Service O&C dry forests of SW Oregon are primarily located in the Rogue-Siskiyou and Fremont-Winema National Forests in the Klamath Ecoregion, which is west of the Cascades and east of the Coast range stretching southward to include the Klamath Mountains on the Oregon-California border. There are several different vegetation zones within the Klamath Ecoregion that vary in terms of plant composition as a function of elevation, temperature, fire regime, and precipitation. Forests are dominated by Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) but include significant populations of white fir (*Abies concolor)*, Jeffrey pine (*Pinus jeffreyi*), and ponderosa pine (*Pinus ponderosa*).

Oak woodlands composed of California black oak (*Quercus kelloggii*) increase in abundance moving east from the coast, while Oregon white oak (*Quercus garryana*) is more prevalent throughout inland valleys and tanoak (*Nolithocarpus densiflorus*) is a major component of forests closer to the coast (Figure 6, *Briles et al.* 2005, *Halofsky et al.* 2016, *Halofsky et al.* 2022). Pacific madrone (*Arbutus menziesii*), canyon live oak (*Quercus chrysolepis*), and golden chinkapin (*Chrysolepis chrysophylla*) may also be present as hardwood components on the landscape in the mixed-evergreen zone (*Tesch & Mann* 1991). The upper Umpqua drainage is a transition zone between forests to the north (dominated by western hemlock/white fir climax groups) and those to the south—the Rogue-River Siskiyou National Forest dominated by Douglas-fir/mixed-conifer groups with select groves of coast redwood (*Sequoia sempervirens*) (*Carloni* 2006, *Halofsky et al.* 2022).

### 3.2.2 General Review of Dry forest Fire Intervals in Broad Strokes

Across vegetation types in dry forests of southwestern Oregon, fire (illustrated in *Figure 19)* tended to occur with low-to-mixed severity at intervals of 15-50 years, with exceptions in moist microclimates on north-facing slopes, in the Umpqua watershed (50-200-year return interval). In contrast in the Coast Range (which have high-severity fire regimes, historically) (*Beatty & Taylor* 2001, *Halofsky et al.* 2022, *Metlen* 2018*, Perry et al.* 2011*, Skinner* 1995, *Taylor & Skinner* 1998). Hessburg et al. (2005) define low-severity events as surface fires that occur every 1-25 years, killing <20% of basal area, and mixed-severity fire as that which occurs every 25-100 years, killing 20-70% of basal area.

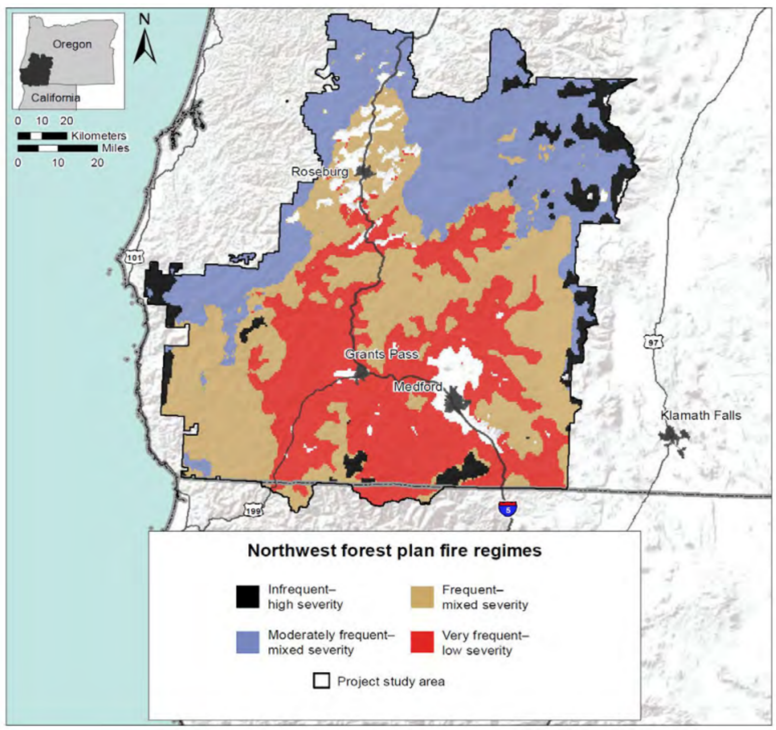


***Figure 19:*** *Historical fire regimes in southwest Oregon are primarily low-to-mixed severity, with 5-50-year fire return intervals. Infrequent, high-severity: >200-year return interval; moderately frequent, mixed-severity: 50-200-year return interval; frequent, mixed-severity: 15-50-year return interval; very frequent, low severity: 5-25-year return interval (Spies et al. 2008).*

It is important to distinguish here between fire *intensity* and fire *severity.* Fire intensity is the net heat energy output of a fire, while severity refers to the resultant aboveground and belowground organic matter consumption—the degree to which a site has been altered or disrupted by fire. This includes plant tissue death from radiant heat. Fire severity is often related to fireline intensity, flame length, and residence time, combined with site-specific biotic and abiotic conditions and plant adaptations (*Keeley* 2009). As such, effects on vegetation differ in extremely complex spatial and temporal patterns. The result is a patchy mosaic of uneven, variable-density, and multi-aged stands across the landscape (*Figure* __).

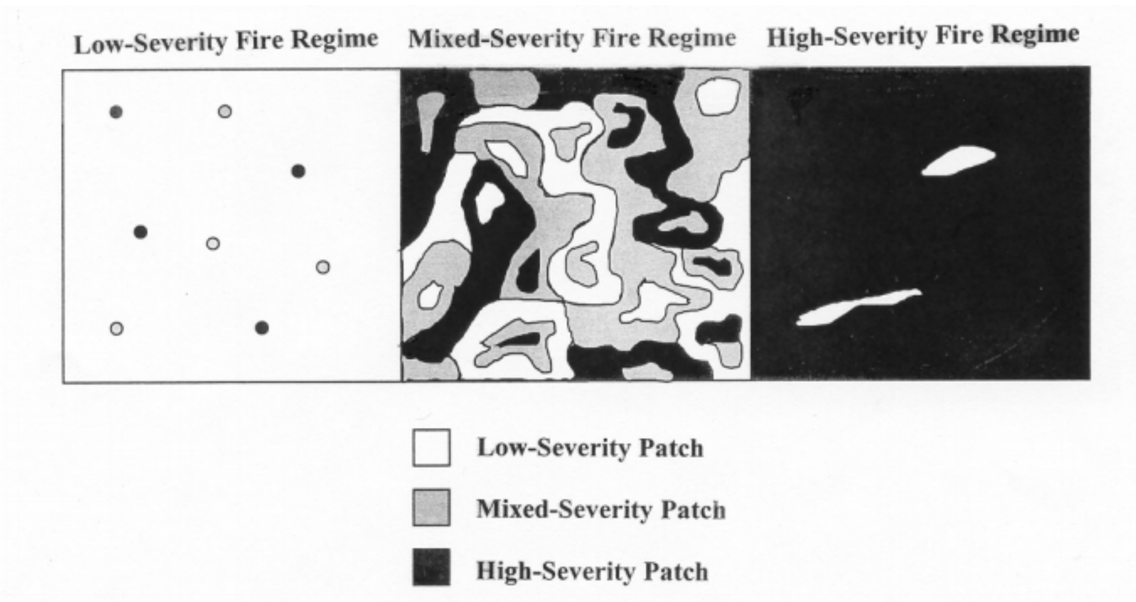


***Figure 20****: Mixed-severity fire regimes of dry forest lands in southwestern Oregon span a gradient between low-severity and high-severity patterns depending on factors like topography, aspect, and vegetation composition or density (Agee 2005). Generally speaking, fire has occurred with mixed severity every 15-50 years in the Klamath Ecoregion (Halofsky et al. 2022).*

Mixed-severity fire regimes are often recognized as a combination of low- to high-severity burn effects within a single fire's perimeter *(Fig. 20)*. However, their ecology is not just a simple intermediate between the two; rather, mixed-severity fire gives rise to unique patch dynamics and ecosystem processes (*Agee* 2005). These include widely ranging fire intervals and complex combinations of surface, torching, and crown fire behavior, resulting in intermixed patches of live and dead fuels (*Lentile et al.* 2005). The concept of mixed-severity fire is typically defined at "meso-scales" (e.g., forest stand or low-order watershed) because at very fine scales (e.g., individual tree) fire effects are binary (mortality or survival), while at broader scales (e.g., larger watershed) nearly all fires exhibit some degree of mixed fire effects (*Halofsky et al.* 2010).

Mixed-severity fires in Douglas-fir/white fir forests of the Siskiyou Mountains were historically small-to-medium-sized, ranging from 210 to 1,420 acres. These mixed-severity disturbances typically maintained low and variable tree densities, light and patchy ground fuels, large fire-tolerant trees, and a sparse cover of fire-tolerant shrubs and herbs (*Hessburg et al.* 2005). More recently larger fires have certainly occurred, including the Biscuit Fire of 2002—the largest wildfire in Oregon's history (*Figures 21 & 22*; *Agee* 2005). Large expanses of atypical high-severity fire occurred.

***Figure 21.*** *Mixed-severity fire regimes can result in complex spatial burn patterns that are a function of weather, fuels, topography, landform features (e.g., riparian zones), and geology. This photo is taken within the perimeter of the 2002 Biscuit Fire scar in the Klamath Ecoregion; it shows a complex patterning of live and dead fuels (Halofsky et al. 2011, photo by Tom Spies).*

Historically, only 6-9 percent of fires in these dry forests were high severity. Now, when these dry forests experience wildfires, 36 percent burn at high severity, taking out many historically resilient trees (Borgias, D. & Metlen, K.L., 2019). This rise in high-severity wildfire, in turn, has increased both the amount of public-health-threatening smoke and carbon release, especially in the last ten years, as well as unprecedented habitat loss in these dry forests.

Forest Bridges' vision for restoring and increasing fire resistance and resilience on O&C dry forests of SW Oregon, including those managed by the US Forest Service, is to maintain and improve the historical range of forest habitats and increase the likelihood of low- to moderate-disturbance regimes through active management, including targeted variable retention thinning and prescribed fire (e.g., a combination of broadcast and pile burning), while incorporating Traditional Ecological Knowledge (TEK) and collaboration with Native groups**.** Restoring the historical ranges and breadth of habitats is an important intervention for reducing stand densities and fuel loads while also addressing climate change resilience.

Forest Bridges understands that "*resistance"* to fire refers to the ability of a system to curb or defy potential changes brought on by the disturbance. *Resilience to fire, a complementary aspect of resistance, is* the adaptive capacity of a system to maintain and resume its ecological functions after disturbance (rather than manipulated to that state by external drivers) (*Carpenter et al.* 2001). It is measured by an ecosystem's ability to resist permanent change and the rate at which it returns to dynamic equilibrium following a disturbance (*Pimm* 1984).

Resistant systems can absorb disturbances without undergoing significant habitat type changes, like a forest transitioning to shrubland (also called a "brushfield") as vegetation communities shift over time, such as from high intensity fire. Anticipated climate change disturbance effects can be used by forest managers to develop and forecast more robust desired conditions and metrics of resistance and resilience (e.g., more high-intensity fire might require the manipulation of fuels as a resistance and resilience tactic) (*DeRose & Long* 2014).

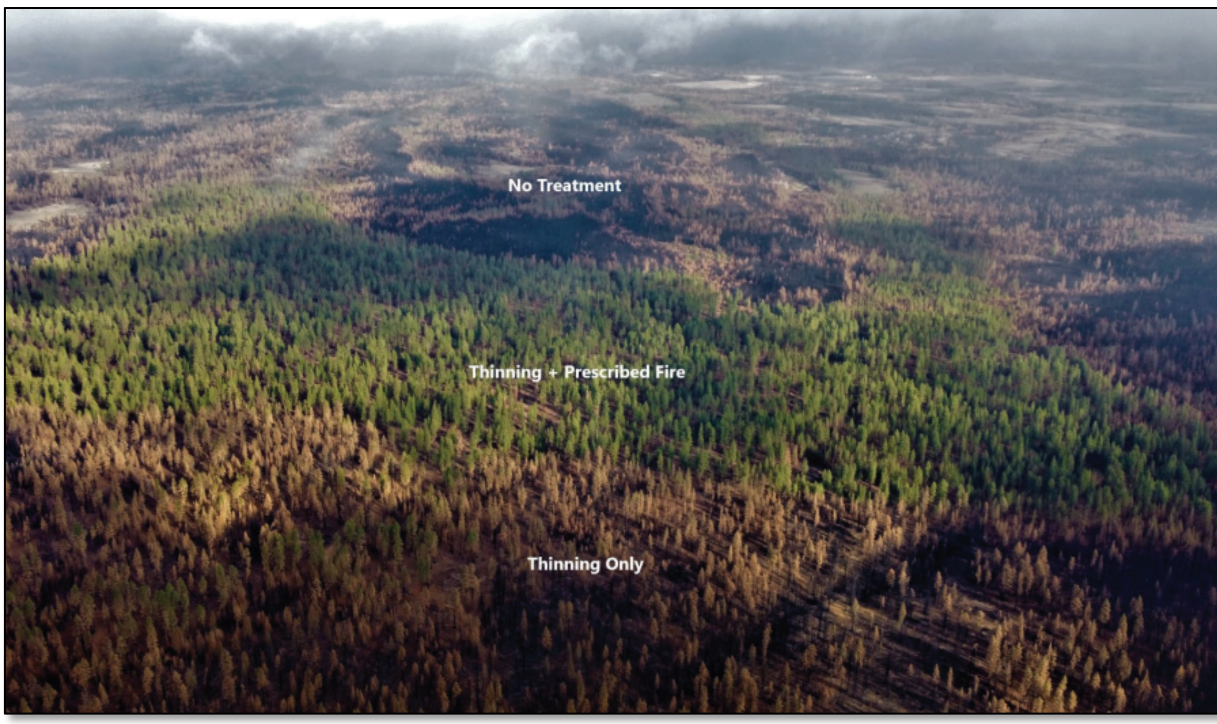


***Figure 22:*** *Areas that had been mechanically thinned and burned were far more resilient during the 2021 Bootleg Fire (OR) compared to stands that received no treatment or that were only thinned  This underscores the importance of prescribed fire in restoring fire-dependent forest systems. (Photo source: Steve Rondeau, Klamath Tribe).*

***"A hallmark of ecologically based forest management is working with, not against, the natural disturbance regime." -- Larson and Churchill, 2024***

### 3.2.3 Forest Bridges' Dry Forest Proposal

To get ahead of more than 100 years of fire suppression in frequent fire and mixed-severity dry forests and return to historical burn patterns, Forest Bridges recommends a very aggressive watershed-scale, variable density thinning program to achieve the goal that 95% of acres burned by wildfire remain at low- to moderate-intensity, reducing by sevenfold the current frequency of stand-replacing wildfires on these dry forests (i.e., from 36% to 5%). The effect is that crown fires become ground fires on these lands due to addressing stand density and fuel reduction. Dry forests thrive with frequent, low-intensity fires that burn every 3-30 years and maintain plants, habitats and an open forest floor. Here, the combination of thinning and controlled burns are proven methods to restore the ecosystem and reduce wildfire risk to communities. (Borgias and Metlen, 2019).

Forest Bridges' collaboratively developed goal for the 1.4 million acres of O&C dry forests, including those managed by the Forest Service on the Rogue-Siskiyou and Fremont-Winema National Forests, is that 95% of wildfire acres burned are at low- to moderate intensity. Towards this Forest Bridges goal, we recommend the following:

- Thin 60-75% of the total O&C dry forest landbase in a maximum of 30 years (approximately 3% annually, if not more to shorten the total treatment time) applying Variable Density Thinning. (Defined and described in box at right.)
- Retain 0.15-0.25 relative density index (RDI), generally. In moist areas (A.K.A., moist refugia) retain 0.25-0.35 RDI. (These target relative densities for dry forest and moist forest refugia areas would accommodate many environmental site factors, including precipitation, soil type and geology, aspect, slope, elevation, vegetation composition, ladder fuels, erosion potential, recent fire history, and lightning strike patterns.)

***"Variable Density Thinning is a silvicultural strategy that varies the density of removal across a stand, including gaps, standard thinning, and no removal; [VDT] accelerates the development of complexity and heterogeneity. Although termed a 'thinning,' this approach includes deliberate consideration for regenerating new cohorts in gaps, so it can also be considered as a regeneration method. (Palik et al, 2024)***

- Embed variable-sized skips and gaps (usually of no less than 2.0 acres) on the remaining 25-40% of the basal area forest unit. Gaps should include scattered live trees, as individuals and small clusters, along with well-distributed populations of snags and downed logs (keep away from private, State and Tribal land boundaries).
- Skips can be entered to reduce excess down wood as fuel & fire hazard.
- Conserve a mix of tree species and sizes, favoring legacy trees that can withstand fire.
- After thinning, pile and burn near private, State and Tribal land boundaries or in-fills to decrease liability risk; broadcast burn centers of sections.
- Snag placement should also align with the broadcast burn area to reduce the risk of fire spread.
- Repeat burning every 8-15 years, one or two times between commercial thinning entries.
- For Riparian Area Treatments: Forest Bridges recommends that the Forest Service adopt the 2016 BLM Resource Management Plan for Western Oregon Riparian Management Strategy. In the absence of a site-specific riparian strategy based on local topographic and vegetative features, Forest Bridges has deferred to the BLM Riparian Strategy as closest to our thinking of how to manage Riparian systems.


***Figure 23:*** *Example of before and after stand density using Variable Retention Thinning. Photo source: forestpolicypub.com.*

By focusing intensive restoration on thinning to the relative density targets and prescribed fire (i.e., broadcast/pile burning) frequency and layout pattern suggested by Forest Bridges, the Forest Service will develop multi-aged, fire-resistant, fire-resilient stands that are consistent with climate change adaptation strategies in terms of density, species composition, and historical disturbance regimes.

> ***Prescribed fire treatments in between commercial thinning, which Forest Bridges sees as essential to yield the primary goal of its Dry Forest proposal as well, as other important outcomes. . . is the biggest single cost of this dry forest restoration proposal and requires additional financial support. This is the cost of our larger populations living in and near the forests.***

Subsequent thinning entries will remove considerably less volume than the initial entry. The goal in subsequent thinnings is to maintain ecologically relevant relative densities across a broad distribution of tree diameters, heights, forms, and species in order to support a broad spectrum of wildlife communities. Designed spatial heterogeneity will also serve to buffer against high-severity, stand-replacing wildfire. Prescribed fire entries without commercial timber removal are necessary to mimic historical conditions and to manage fuels. These treatments will also help address the current imbalances in successional classes, as illustrated in *Figure 24* on the following page.

Prescribed fire treatments in between commercial thinning, which Forest Bridges sees as essential to yield its primary goal in dry forests of increasing fire resistance and resilience, as well as other important outcomes (e.g., sustainable multi-species habitats, restoration jobs and wood products) is the biggest single cost of this dry forest restoration proposal and requires additional financial support. This is the cost of our larger populations living in and near the forests.

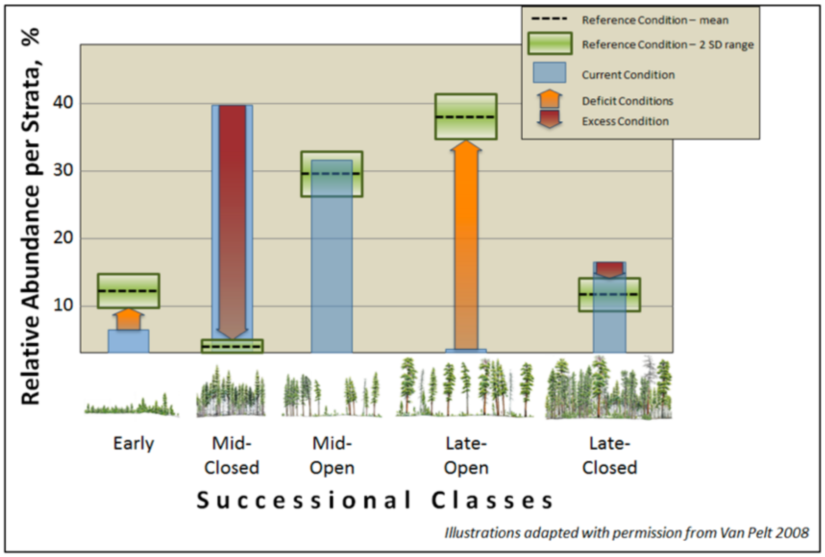


***Figure 24:** A graphic representation of the current conditions and reference conditions for successional classes in SW Oregon Dry Forests. The arrows represent current excess and deficit conditions, pointing in the direction needed to return them to reference – i.e., historical – conditions – a balance of successional classes to set the forest on a trajectory of sustainable health and fire resistance and resilience in a changing climate. Forest Bridges proposed Active Conservation Management approaches, using Variable Density Thinning and prescribed fire are intended to help address these successional imbalances. (Source of image: the BLM.)*

Dry forest type determination should be made by managers on the ground in concert with coarse-filter criteria like vegetation type, aspect, precipitation, soil type and other distinguishing criteria. With creating complex habitat as a management objective, fire or thinning disturbance in plantations that have experienced just one stand-replacing disturbance (e.g., logging) should be a priority for managers (Franklin & Johnson, 2012). Forest Bridges is not advocating for Variable Retention Regeneration Harvests in dry forests. This is a strategy we promote in moist forests, as well as in the moist aspects in Transitional Forests. In dry forests, skips and gaps are larger than our recommendation for moist forests, allowing regeneration of early successional habitats and species.

Forest Bridges Active Conservation Management proposals for restoration of dry O&C forests echo the ecological silviculture goals laid out by Koontz et al.(2020) and Palik et al (2021) to manage stands for heterogeneity in the form of diverse species and age assemblages, along with horizontal and vertical complexity as a function of historically appropriate gaps, skips, openings, and clumps to encourage landscape resilience. *(illustrated in Figure 25)* The goals are to reduce high-severity wildfire risk, restore Traditional Ecological Knowledge and Native stewardship approaches to the landscape, and develop diverse forest conditions with an architecture of large, old trees that is resilient to climate changes and supports as many varied wildlife communities as possible. Generating timber revenue, consistent with the O&C Act designation of these lands, as well as NWFP Update Goal #5, would be a result of active management but not the driving

***Figure 25:*** *Mature mixed-conifer forests of the Klamath Ecoregion are a mosaic of old trees as the "backbone" with patches of younger trees in moister areas and minimal ladder fuels where regular, low-intensity fire is present. Gaps and clumps are variably spaced and sized on the landscape (Robert Van Pelt, in Spies et al. (2005).*

purpose of the management strategy.

### 3.2.4 Moving Beyond Reserves: Applying Forest Bridges All-Lands Active Conservation Approach in the O&C Dry Forests *(Note: Applicable to all O&C Forests but Discussed Below within the Context of the Dry Forest)*

Under the Northwest Forest Plan, three-quarters of national forest land in Northern California, Oregon and Washington are largely off-limits to routine active forest management, including over 7 million acres of late successional reserves. Nick Smith writes:

> *The primary threats to old growth on federal lands are severe wildfires, insect infestations and disease that have already destroyed nearly 700,000 acres of old growth forests on federal lands over the past 20 years. This does not count the millions of acres of designated Wilderness, National Parks, wildlife refuges and other areas that are permanently "protected," and instead are burning up in wildfire.* (Smith, 2024)

Forest Bridges' Active Conservation Management proposal for the O&C Dry Forests that combines thinning and prescribed fire contrasts markedly from a "preservation" approach unimpaired by human influence (*Anderson & Barbour* 2003). For example, *limiting* fire-risk reduction, conservation, and management *around* late-seral stands would be *inconsistent* with restoring ecological integrity in the dry, historically fire-frequent landscapes, which includes management of mature forest (*Spies et al.* 2019). Old growth in the Northwest Forest Plan-governed provinces of the Klamath Ecoregion was reduced by 9.5% from 1994 to 2003 using a reserve, no-management model (*Spies et al.* 2006).

> ***[L]imiting fire-risk reduction, conservation, and management around late-seral stands would be inconsistent with restoring ecological integrity in the dry, historically fire-frequent landscapes, which includes management of mature forest (Spies et al. 2019).***

FB believes that the Forest Service O&C Lands can be co-managed with Tribes to steward natural *and* cultural resources by acknowledging the role of disturbance in forms that include thinning and prescribed fire to maintain ecosystems. After all, these forests are not "simple biophysical spaces" that were once pristine wilderness, but rather "complex socio-ecological systems that simultaneously shape, and are shaped by, people" (*Lake et al.* 2018). As Spies et al. (2005) write:

> *If the current [reserve] approach is found to be deficient, a more flexible and sustainable alternative might be to manage* ***the entire land base*** *[bold for emphasis] for a forest pattern and disturbance regime that better matches the ecological potential of the landscape to produce forests with old trees and that reduces the risk of high-severity fire.*

The case study on the next page helps support Forest Bridges approach, where the layout foresters determine the best locations for 25-40% skips and gaps is an *all-lands or all-of-the-forest* *strategy* without reserves. We recommend that this Active Conservation Management approach to restoration be applied throughout the O&C dry forests in SW Oregon, including the Forest Service O&C dry forests.

***In one case study. . . Metlen et al. (2021) found that active management across as many at-risk acres as possible in the Rogue River Basin of southwest Oregon provided the most wildfire mitigation and climate resilience, reducing risk to homes and northern spotted owl habitat by 50% and 47%, respectively, after modeling. Strategic and sustainable active management must be applied in the dry forests of the Klamath Ecoregion to protect late-seral habitat and confer fire resilience.***

### 3.2.5 Relative Density Targets in Dry Mixed-Conifer Zones

As earlier stated, Forest Bridges recommends establishing a range of densities depending on the landscape variables listed above—somewhere between a relative density index (RDI) of 0.15-0.25 in dry forest types (*John Bailey and Jerry Frankin*, personal communications, 2018 and 2024, respectively; *North et al.* 2022). This is derived from our Forest Bridges consensus view of a sound approach in the O&C dry forests, including those managed by the Forest Service – that 95% of acres burned are ground fires of low-to-moderate intensity, with only 5% high severity. This standard is also generally supported by the work of Borgias and Metlen (2019) which placed the historic level of high-severity fire at 6-9%, compared with 36% today.

***"The spotted owl cannot be our guiding light, [neither can] the marbeled murrelet. Changing our forests to where they can survive a hotter, drier climate with more extreme conditions should be our goal."***

*– John F. Marshall, B.S. Fishery Science, M.S. Wildlife; 30 years forest post-fire photography in the PNW. (quoted with permission).*

That stated, there are questions related to the relative densities we are proposing. One issue is that the amount of brush created calls for a strong commitment to Forest Bridges prescribed fire proposals. **Secondly, the standards for NSO nesting, roosting, and foraging habitats will need to be reconciled with the lower historical stand densities in these areas.**

### 3.2.6 Emulating Historical Forest Openings – A guide to Marking for Thinning

> ***It is not necessary to recreate the exact conditions of historical reference stands (Bailey & Covington 2002), but it is important to ensure a mosaic pattern of large trees, mature clumps, and appropriate opening sizes that is within the range of desired conditions (Figures 26 & 27; Churchill et al. 2016).***

The size and patterning of gaps are crucial considerations for creating heterogeneity, as well as for encouraging shade-intolerant tree regeneration and growth. Before the era of fire suppression, forest openings in dry mixed-conifer forests were mostly less than 1/10th of an acre (but often up to 1 acre) and composed 35% basal area of the landscape. Stands with less than 30 trees per acre (tpa) often contained openings that fused together into larger gaps of 2-5+ acres with sinuous and amorphous shapes (*Churchill et al.* 2016). **Between 1911 and 2011, tree densities across the West have increased six-to-seven-fold while average tree size has shrunk by 50% (*North et al.* 2022).**

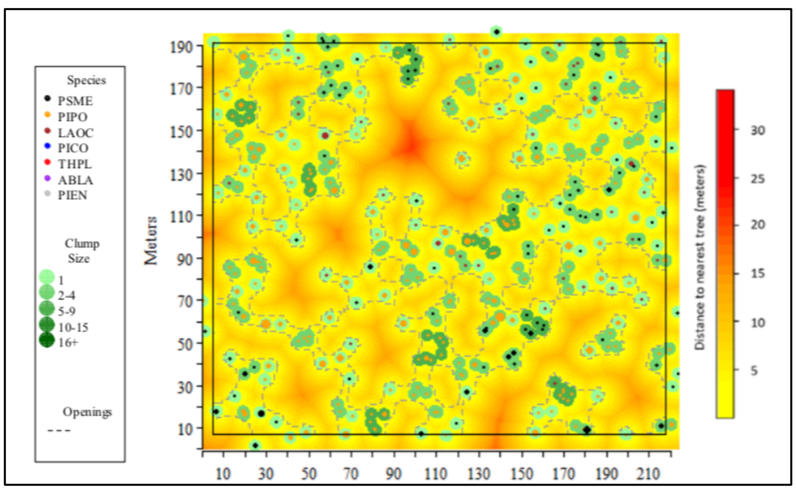


*Figure 26: A reconstructed 10-acre plot from a dry Douglas-fir site in the Colville National Forest shows an historical trees per acre (tpa) of 32 with irregular opening sizes and distribution (the largest being 2.7 acres), multiple species, and a diversity of clump concentrations. Note the wildlife connectivity pathways on the edges (Churchill et al. 2016).*

To counteract overly dense forests, Variable Density Thinning should seek to reproduce a composition of openings that aligns with the Forest Bridges 0.15-0.25 RDI goals with a diversity of gap sizes and shapes distributed across the landscape. Openings (gaps) that are 3-5 acres on the large end, with 1-1.5 acres minimum (mostly above 2 acres) would allow regeneration of shade-intolerant species (John Bailey, personal communication) and be ideally connected to each other so that wildlife species relying on edge or mosaic habitat can migrate *(Figure 26)*.

### 3.2.7 Tree Cluster Size, Structure & Patterning

Spatial distribution of trees in dry mixed-conifer forests has historically demonstrated irregular patterns and sizes of small tree clusters in a matrix of low-density, fire-resistant species, with density increasing from ridges to valleys (*Churchill et al.* 2016, *Ng et al.* 2020). The percentage of tree "clumps" with single or few (2-9) trees has declined since the early 20th century, while large clumps (greater than 10 trees) have increased dramatically over the same period. There is a parallel trend occurring in dry forests of southwestern Oregon as cluster sizes have become increasingly skewed with large numbers of trees because of fire suppression and densification. (See *Figure 18* for an example of the dry forest densification, along with loss of heterogeneity, that has occurred over more decades of fire suppression.)

Following Churchill et al. (2016) and the Individual, Clumps, and Openings (ICO) method for Quantifying and Restoring Forest Spatial Pattern, Forest Bridges recommends a restoration thinning approach based on emulating the historical range of patterns, spacing, and clump sizes

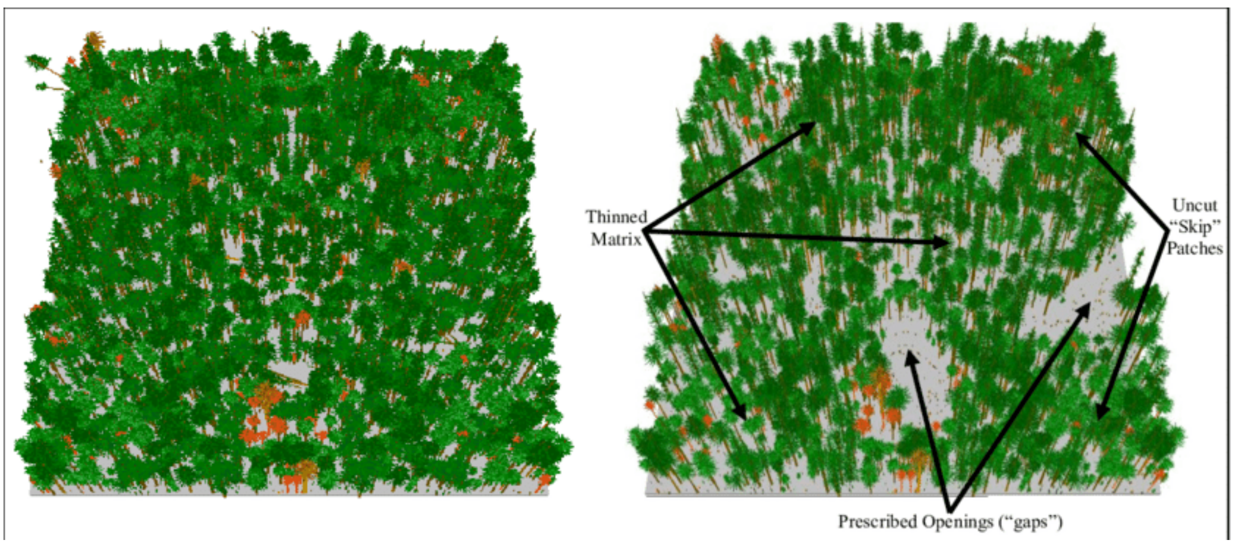


***Figure 27:*** The above image shows what a Variable Density Thinning might look like using the ICO method, within a 20-acre dry forest harvest unit. Small openings (gaps) and unthinned patches are part of a planned thinning which was designed to retain key features necessary to sustain Western Gray Squirrel. (Linders et al., 2010).

in dry, mixed-conifer forest stands, with 25-40% skips and gaps. Forest Bridges flexible range of relative densities is preferred over marking for a fixed basal area or regularly spaced per acre densities. It is not necessary to recreate the exact conditions of historical reference stands (*Bailey & Covington* 2002), but it *is* important to ensure a mosaic pattern of large trees, mature clumps, and appropriate opening sizes that is within the range of desired conditions (*Figure 26; Churchill et al.* 2016).

### 3.2.8 Management Prioritization to Promote Late-Seral Development Stands & Climate Change Resilience

The Forest Bridges Active Conservation alternative proposal for the Forest Service O&C Lands is intended to mitigate climate change over time by continuing to sequester more carbon in larger trees and in the soil (as a result of frequent low-intensity prescribed fire) while the frequency of destructive wildfire and the release of massive amounts of carbon dioxide into the air is decreased. Extensive thinning in dry forests, and on dry aspects in transitional forests, would mostly produce commercial size and grade logs for wood products, thereby extending the carbon sequestration life of this wood. These features and quantification of carbon sequestered over time would need to be determined through a model of this Active Conservation proposal.

***Today's late-seral forests in southwestern Oregon developed during a period of frequent fire from 1700 to 1900, followed by a contemporary period with little to no fire (Sensenig et al. 2013). These stands are now very dense with high dead fuel levels and extremely susceptible to high-severity fire.***

Forest Bridges recommends retaining trees with the best legacy and habitat attributes within its relative density standards which is specified in order to reduce severe fire risk. Intentional thinning around large legacy trees or clumps of trees will decrease both tree density, moisture and other resources competition. Accompanying use of prescribed fire at the time of proper fuel moisture content will help reduce excessive dead fuel build-up. Both treatments will help mitigate disease establishment and spread.

At times there are compelling operational, site-specific reasons for removing certain key legacy trees and there should be leeway for this. As a general rule, Forest Bridges recommends that the relatively oldest trees in a stand, prior to 1800, be retained as legacy unless there is a good ecological silviculture reason for their removal. We established this date as a result of our initial consultations with Tribal members, who cited the onset of pestilence that significantly decreased

Native American populations in western Oregon from that date onward. Trees that were born in 1750 might have survived a burn in the late 1700s. Even so, Forest Bridges is using the 1800 date as a midpoint between the 1750 date and 1850, the date often used as a cut-off for retaining the oldest trees in a stand *(Wheeler et al, 2024).* Although a relatively infrequent occurrence, these decisions should be guided by Forest Bridges' principle of weighing short-term impacts versus long-term benefits. Foresters need flexibility when there is an overabundance of older trees to retain the best for the legacy stand or allocate them to a skip.

Many old-growth stands became established on landscapes with low tree densities and "patchy mosaic" structure that was stewarded by Indigenous peoples' use of prescribed fire (*Agee* 1991*, Zybach* 1993). Today's late-seral forests in southwestern Oregon developed during a period of frequent fire from 1700 to 1900, followed by a contemporary period with little to no fire (*Sensenig et al.* 2013). These stands are now very dense with high dead fuel levels and extremely susceptible to high-severity fire. They currently provide important structurally complex wildlife habitat but may not have been historically present. Johnson et al. (2008), suggest prioritizing restoration efforts on these excessively dense stands in (Forest Bridges adds: and around) old-growth forests in ways that enhance their spatial complexity.

### 3.2.9 Treatment Prioritization & Management Units

***Figure 28:*** *Dense dry forest expanse, with valley-bottom moist refugia, in the Klamath-Siskiyou National Forest. Photo Source:* [*https://foreststewardsguild.org/klamath-siskiyou/*](https://foreststewardsguild.org/klamath-siskiyou/)

In their *Rogue Basin Cohesive Forest Restoration Strategy*, Metlen et al. (2017) suggest that thinning should occur according to variables like vegetation pattern, burn history, topographic position, and sun exposure. For example, cooler valley bottoms, riparian zones, and north-facing mid-slopes might be appropriate locations to maintain the 0.25-0.35 relative density specification. These denser, more closed-forest areas aid species survival because they are typically subjected to less severe fire effects and contain higher canopy densities (*Ng et al.* 2020, *Weatherspoon & Skinner* 1995). Furthermore, these moister sites can be areas where more shade-tolerant species are planted or otherwise promoted.

Retaining higher densities in cool, wet areas does not preclude the need to thin areas to the target of 0.25-0.35 RDI, to prevent the incidence of high-severity, stand-replacing fire. Conversely, dry ridges and warm, south-facing slopes where stands have dramatically departed from historical densities and fire frequency are good candidates for heavier thinning—within the 0.15-0.25 RDI range. These sites are historically well-adapted to climate changes related to drought, which some scientists believe makes them ideal priorities for restoration and fuel management as adaptation strategies (*Metlen et al.* 2017).

### 3.2.10 Climate Change & Refugia

Zald et al. (2022) agree that density reduction in moist refugia may have the greatest net benefit in terms of drought resilience and diameter growth. As Hessburg et al. (2015) write:

> *Cutting trees, whether commercially or pre-commercially, can emulate fire effects on tree density and layering, but it cannot reproduce the effects of fire on nutrients cycling, snag creation, surface fuel reduction, mineral seedbed preparation, and regenerating associated shrub and herb vegetation.*

Consequently, prescribed fire where liability is manageable is likely to be an effective treatment in the centers of sections. Of course, the expanded use of pile and broadcast burning as restoration tools will be aided by programs to create higher public acceptance of smoke during the fall, winter, and spring, as well as modifications to air quality regulations. (See Section 3.4.2 on pages 50-52 for more details on Prescribed Burning, Wildfires and Other Fuel Reductions as Landscape Restoration Tools.)

### 3.2.11 Steep Slope Management on Dry Forests

In the past, portions of the landscape were considered to be too steep or remote to effectively treat stands with traditional mechanical thinning (*North et al.* 2012). Recent advances in mechanized equipment, such as tethered logging systems, may greatly increase the opportunities

– and operational safety -- for thinning on steeper slopes with low soil compaction systems and should be part of the NWFP Update and Forest Service management plans *(John Garland 2023, personal communication).* Beyond this -- in some circumstances on steeper slopes, while always seeking to protect the oldest, largest legacy trees of each stand that are critical pillars of wildlife habitat -- it may be necessary to employ additional management strategies including

***Figure 29:*** *Tethered Forwarder on a steep slope harvest. Photo by Lisa Ball, Pacific Northwest Region, US Forest Service. Photo credit: USDA Forest Service.*

- Strategically placing forest skip, gap and cluster sizes
- Improving structural heterogeneity by mixing dense and sparse patches and
- Planting or favoring endemic species better adapted to future conditions in a changing climate.

### 3.2.12 Oak Woodland Management on O&C Dry Forests

> ***"Hardwoods [such as Oak] in the Klamath-Siskiyou play an important role. They are more resistant to fire, and as large trees have important ecological function. It's nice that they resprout [post-fire]. Ideally we need to keep large hardwoods."***
> ***(Jerry Franklin 2024, personal communication).***

***Figure 30:*** *A majestic oak in SW Oregon. Photo credit: Klamath Bird Observatory.*

Because oaks are shade-intolerant and fire-dependent, they require sustained, active management of mechanical thinning and prescribed fire with site-specific approaches. An active management strategy is important for promoting tribal values and oak woodland vigor because current trajectories in mixed-conifer stands are likely to lead to further conifer encroachment and high-severity wildfire (*Long et al.* 2017). Thinning and prescribed fire are needed to spur oak diameter growth and achieve oaks large enough to withstand fire into the future (*Cocking et al.* 2012). Even heavily and long-suppressed oaks can recover and produce acorns after release treatments, so it is critical to consider even the most compromised trees during restoration planning (*Devine & Harrington* 2013).

After thinning competing conifers, Oregon white oak diameter growth can be up to 194% greater than in untreated, suppressed stands, with much higher acorn production as well (*Devine & Harrington* 2006). Thinning should occur through mid- to late spring until bird nesting begins, with variable density and spacing at five-to-ten-year intervals (*Martinez* 2003). Thinning root sprouts before age 10 has been proven ineffective (*McDonald* 1978) but results from thinning between ages 10 and 30 could be beneficial (*McDonald* 1996).

Canopy coverage targets should be 26-40% for Oak woodlands (*Bigelow et al.* 2011, *Garmon* 2006). Thinning 40-50% of 60-year-old oaks in the northern Sierra Nevada (100-125 $ft^2$ retained) doubled the diameter growth rate of residual trees after 8 years (*McDonald* 1980). Clumps of up to four mature stems can apparently be retained with no growth reductions (*McDonald & Tappeiner* 1996). The shrub and herbaceous layer coverage target is 2-10% with 50-100% of the composition planted to grasses and forbs (*Garmon* 2006). This benefits the herbaceous shrub and animal species that thrive in oak habitats.

***Figure 31:*** *A Lomakatsi Restoration Project controlled pile burn. Photo credit: The Lomakatsi Restoration Project website.*

Oak woodland restoration presents opportunities for establishing tribal-federal partnerships that bridge TEK and western scientific processes and reengage Native peoples as stewards of their ancestral lands via co-management agreements. Some of these collaborative oak restoration ventures are already ongoing. The Klamath Tribes, for example, have collaborated with the National Resources Conservation Services, Klamath Bird Observatory, and the US Fish and Wildlife Service to promote oak restoration through the Lomakatsi Restoration Project in Ashland, Oregon.

## 3.3 For the Transitional Forests on the Forest Service Controverted O&C Lands in the Umpqua National Forest:

Transitional O&C forests are characterized by characterized by historic fire intervals intermediate between classic moist and dry forests -- specifically, between 30 and 100 or more years. They differ from strictly dry and moist forests in aspect, generally: moist forests on the north and east slopes and dry forests on the south and west slopes.

***Figure 32:*** *View of both burned and unburned forest stands in the Umpqua National Forest (estimated two years following the September 2020 Archie Creek high-severity wildfire), from a high point in the Twin Lakes area. (Photo by Jennifer Taylor, U.S. Forest Service)*

Based on Forest Bridges deliberations following consultation with prominent ecological forestry scientists and practitioners, Forest Bridges recommends that the Forest Service manage O&C transitional forests by blending our dry and moist Active Conservation Management strategies on the drier south and west slopes and our moist forest strategy on moister north and east slopes.

Variable retention thinning should be applied across the Transitional Forests, with carefully timed and applied prescribed fire, to create and maintain relative densities in the 0.20 to 0.45 range. Generally, and depending upon site conditions, the south and west slopes, which tend to be drier forest, could be thinned to the lower end of the range, whereas the north and east slopes, which tend to be moister forest, could be thinned to the higher end of the range. This broad range of relative densities is consistent with Klaus J. Puettman et al, 2016, who concluded that there is a wide range of vegetation responses to treatments in terms of direction and speed, and that "the only general rule is that simple general rules do not exist."

***Functioning natural moist Old Growth stands should generally be highest priority as part of the stands on trajectory to becoming structurally complex OG forests – i.e., left to grow.***

More recently for these Transitional Forests, Wheeler et al, 2024, cites a broad range of 0.25 - 0.45 relative density using variable density thinning for moist forests. So, it is not unreasonable to propose that on moister slopes of these transitional forests, slightly lower RDI range should be used than what we and others propose for the Moist Forests.

Functioning natural moist Old Growth stands should generally be highest priority as part of the stands on trajectory to becoming structurally complex OG forests – i.e., left to grow. An exception would be where there is an excess of ladder fuel build-up, which should be considered for removal by thinning in conjunction with carefully applied pile burning and *perhaps* limited broadcast burning in areas that are trailed and can be burned within target fuel-moisture contents and weather conditions. Where dense, even-aged stands exist around or adjacent to moist natural OG stands, we recommend that the Forest Service prioritize applying Variable Retention Regeneration Harvest and Variable Retention Thinning treatments in these stands to increase fire resistance and resilience of those neighboring structurally Old Growth stands.

In the Moist Forest, Forest Bridges recommends the aggregation of Variable Retention Regeneration Harvest treatments from year to year to mimic larger stand replacing fires (Jerry Franklin personal communication, 2018). In the Transitional Forest, unlike the Moist Forest, Variable Retention Regeneration Harvests cannot be aggregated in the same manner because moist and dry forest sites exist in close proximity and require different silviculture treatments.

Variable Retention Regeneration Harvest needs to be strategically applied on slopes where they are most needed to address fire risks and climate change.

## 3.4 Forest Bridges Active Conservation Management Proposals Applicable to All Forest Types on the Forest Service O&C Lands:

### 3.4.1 Snags, Coarse Woody Debris Retention & Wildlife Habitat

In dry forests (and increasingly less fire-prone ecosystems as well), there is a tension between dead wood as habitat and dead wood as fuel (*Knapp* 2015). The presence of coarse woody debris (defined as pieces of dead wood greater than 3" in diameter) on the landscape can intensify fire behavior (*Landram et al.* 2002*,* *Rothermel* 1991, *Stephens* 2004), and high fuel loads (40 tons per acre) can damage soils to a 2-cm depth when temperatures rise above 560° F (*Brown et al.* 2003). Despite these fire risks, coarse woody debris and snags are simultaneously essential structural components of the landscape that provide habitat for a variety of species, including cavity nesting birds, small mammals, insects, and fungi (Figure 23; *Bate* 1999, *Busse* 1994, *Butts & McComb* 2000, *Frankland* 1992, *Harmon et al.* 1986, *Lehmkuhl et al.* 2003, *Maser* 1979, *Parks et al.* 1997, *Payer & Harrison* 2003, *Raphael & White* 1984). According to McClelland et al. (1979), at least 25% of all bird species in western forests are snag-dependent—flocking to the new abundance of wood-boring beetle larvae—and more than 50% of terrestrial vertebrate species nest or den in the boles of dying trees (at least in Washington) (*WDFW* 1995). Overall, an astounding two-thirds of all wildlife species use coarse woody debris for some portion of their life cycle (*Thomas* 1979). Forest Bridges did not attempt to distinguish dry or moist forest species from these numbers, but we know that the importance of coarse woody debris, to the extent it is present, applies generally to use by species in dry forests, as well.

***Figure 33:*** Dead standing trees, or snags, are created via disturbance-related mortality or injury from windthrow, wildfire, drought, and pests or diseases (Johnson et al. 2008).

Forest Bridges has discussed these important habitat issues with forestry and fire professionals who have to address the risks and liabilities associated with wildfire. They point out that snags when struck by lightning and in a windy environment can ignite fire a distance away from the lightning strike, including neighboring properties. The safety of fighting fire on the ground is severely compromised in decaying snag patches where the injury to firefighters is an unacceptable risk. And without ground defense against wildfire, small fires cannot be effectively controlled from the air alone. To this end, Forest Bridges has devised a proposal for post high-severity snag management, which is specific to the O&C checkerboard ownership and can be found in Section 2.4.5 Green Forest Plan Substitution Following High-Severity Fire (pages 55 – 57).

At the time the Northern Spotted Owl's ESA listing, timber harvest was its primary threat; in recent years, however, wildfire has emerged as the primary cause of habitat loss in southwest Oregon (*Davis et al.* 2016), as well as the barred owl. For these reasons, active management via restoration thinning and prescribed fire treatments is needed—even in late-seral moist stands that may harbor higher NSO populations (*Henson et al.* 2013, *Jones et al.* 2016, *Ryan et al.* 2013, *Spies* 2006, *Stephens et al.* 2019), due to their risk of loss.

### 3.4.2 Prescribed Burning, Wildfires and Other Fuel Reductions as Landscape Restoration Tools

Wildfire is serving as a primary driver of biomass reduction (John Bailey, personal Communication, 2022) which is measured on the O&C lands against sustained yield. Overall, between the moist and dry forests, the sustained yield of the O&C Lands is on the order of 1.2 billion board feet per year. To the extent wildfire is outside the norms of historical proportions in terms of severity and magnitude, strategies which moderate fire are proposed which bring management of the O&C Lands, including the 492,000 acres of Forest Service O&C Lands, closer to historic norms. Note: although the Forest Service is calling for natural wildfire to be used as a restoration tool, and in fact wildfire is inevitable to one severity or another on O&C Lands, Forest Bridges promotes wildfire suppression over letting wildfires burn uncontrolled or partially controlled given the recent history of escaped fires and megafires, especially causing accelerated rates of vegetation change, forest conversion and vulnerability of native habitats in response to a warming climate (Prichard et al (2021), especially until thinning and dead fuel management have largely been completed. Furthermore:

*. . . post-fire landscapes are not necessarily on resilient pathways. Fire refugia may be in uncharacteristic locations, and active forests and fuels management are often required after the fire to promote future forest resilience to disturbance and climate change and to protect valued cultural [as well as economic] resources. (Prichard et al., 2021)*

***Figure 34.*** *Prescribed or controlled burns mimic the natural, low-intensity burns that historically reduced flammable vegetation in many of our forest types. Prescribed fire, often preceded by strategic Variable Retention Thinning, provides a range of ecological and cultural benefits. Photo courtesy the Nature Conservancy.*

Under Forest Bridges Active Conservation Management dry forest proposals, in which thinning and prescribed fire go hand in hand, it turns out prescribed fire will be a regular occurrence (moving from initial restoration to maintenance) much more often than commercial thinning. As recent wildfires have demonstrated, structural restoration using thinning alone does not fully reestablish the core ecological functions and forest sustainability that prescribed fire produces and should be accompanied by prescribed fire (or cultural burning) for maximum benefit. These added ecological benefits include carbon and nutrient cycling, soil quality and organic matter improvements, fuels reduction (including minimizing ladder fuels), decomposition, regeneration, organism movement, fine-scale heterogeneity and snag creation (*Stephens et al.* 2020, *York et al.* 2022).

***Figure 35***. *The September 2020 Archie Creek Fire burning on the Umpqua National forest. Source: Open source web page,*

While prescribed fire can mitigate extreme wildfire risk and reduce total smoke emissions, these emissions contribute to smoke exposures in nearby communities. Incorporating public health considerations into forest management planning efforts may help reduce prescribed burn-related exposure impacts. Anecdotally, FB collaborators ask, "How do you want your smoke?" Do we prefer toxic and unhealthy dry season megafires that could occur anywhere on the Forest Service O&C lands or on other nearby O&C lands outside the historic norms? Or, do we prefer small, controlled burns when moisture conditions are right for burning without excess consumption? These same concerns apply around forest stands in proximity to human population centers (*Quinn-Davidson & Varner* 2012) or to the extent that they are needed in wilderness areas (*Kolden* 2019).

In their 2023 study applying a new methodological framework – worthy of consideration for use by the Forest Service -- linking landscape ecology, air-quality modelling and health impact assessment to quantify the air-quality and health impacts of specific management strategies, Schollaert et al found that

> *moderate amounts of prescribed burning can decrease wildfire-specific $PM_{2.5}$ exposures and reduce asthma-related health impacts in the surrounding region; however, the magnitude of that benefit levels off under scenarios with additional prescribed burning because of the added treatment-related smoke burdens. This framework can be applied to other fire-prone landscapes to incorporate public health considerations into forest management planning. (Schollaert et al., 2023)*

Forest Bridges recommendation for fuel reduction burning after thinning on the Forest Service dry O&C forests, which also removes commercial products and adds value and further reduces smoke (as well as BLM O&C forests):

- After thinning, pile and burn near non-federal neighbor boundaries and in-holdings to the extent needed to significantly reduce the risk of loss from escaped fire to those adjoining property owners.
- After the piles have been burned, broadcast prescribed burning can take place in the centers of sections with the aim of containing fire.

***Figure 36:*** *A thinned Forest Service stand receives a prescribed fire treatment. Photo Source: https://www.fs.usda.gov/research/psw/products/multimedia/photos/photo-tour-variable-density-thinning-study*

Furthermore, broadcast and pile burning should be started and monitored by foresters during cooler seasons and weather conditions when the target fuel moisture content is conducive to appropriate burn intensity, so that legacy trees, forest soils and adjacent lands are better protected. Liability protections are reciprocally necessary for all parties involved when the neighbors are Tribal and non-federal owners. This strategy is in effect, a reset of stand density whereby carbon sequestration can be sustained with greatly reduced risk of loss through wildfire.

There are at present, and since the mid 1980's, legal limits in Oregon on the use of controlled burning as a result of BOTH the Clean Water Act at the federal level and smoke management regulations at the state level. Obtaining an **exceptional events permit** for prescribed fire has proven a burden, liability protections are inadequate, and programs to recruit, train and maintain the teams necessary to support expansion of prescribed fire use is underfunded. Furthermore, timing for the right fuel moistures for appropriate burn intensity is straight forward but has been turned into a liability through overregulation, and at present, even with new regulations at the state level, Forest Bridges believes there are too many constraints for an effective burn program. We believe burning needs to be made considerably more accessible to allow the small particle releases of prescribed fire and pile burning throughout year, particularly in seasons of lower wildfire risk.

***Unless existing legal and financial barriers to fire application are modified (Engel 2013), beyond what has been accomplished to date, it is unlikely that controlled burning will be as widely used as we believe it should be throughout the O&C Lands and other federally managed lands.***

Forest Bridges Principles of Agreement recognize these issues as barriers that must be overcome. Unless existing legal and financial barriers to fire application are modified (*Engel* 2013), beyond what has been accomplished to date, it is unlikely that controlled burning will be as widely used as we believe it should be throughout the O&C Lands and other federally managed lands.

This issue is recognized as being outside the scope of the NWFP amendment but is mentioned because of its importance to optimizing cost-effective implementation of fuel reduction programs.

### 3.4.3 Thinned Stands & Low-Density Areas as Safer Places for Prescribed Fire

There are a variety of ways in which commercial thinning prior to burning can aid prescribed fire to slow wildfire spread and severity rates, as well as contribute to ecological restoration. Where there are also stands of non-commercial trees, prescribed fire units can be made safer by thinned stands and other areas with low fire behavior potential (e.g., large rock outcrops, barren ridge tops, or previously burned stands) to safely and efficiently expand restoration into the broader landscape using containment zones which minimize the risk of fire expansion onto neighboring property (*North et al.* 2021). For the correct prescribed fire burn intervals (dry forests), commercially viable thinning treatments are interspersed with one to two noncommercial burns, several years apart. These treatments will require appropriated funds to cover the costs.

After a century of fire suppression and a history of insufficient reduction of relative density of stands compared to the historic norms, almost all suppressed stands would be thinned (commercially to the extent possible) prior to burning with low to moderate burn intensities when prescribed fire is introduced. Widespread pre-thinning can generate important revenues from sawlogs and biomass, for wood-processing infrastructure and to help mitigate some current financial constraints on prescribed fire implementation (*Keegan et al.* 2006). Wood-processing infrastructure is thus an important consideration: due to transport cost constraints, the closer the project area is to the processing facility the more likely to accomplish fuels treatments. Treatments that do not generate a positive cash flow can nonetheless offset some costs, but more importantly pay for themselves in the long term through stand development beyond a stagnation phase. Treatments that yield even some revenue will be win-win situations long term (*John Bailey,* personal communication).

***Figure 37:*** *A group tours Umpqua Indian Forest Products, where tribal timber is processed into lumber. Photo source: The Cow Creek Band of Umpqua Tribe of Indians.*

Forest Bridges' Active Conservation Management proposal -- *of mixed species and size complexity within the relative density guidelines* -- indicates that some larger trees will be included in the restoration prescriptions, and this will increase fuel treatment economic viability, especially when cable logging steeper slopes (*Ince et al.* 2008, *Prestemon et al.* 2012, *Skog et al.* 2006), where tethered systems cannot be used. It is Forest Bridges intent in tree selections that long-term habitat be given primary consideration. Initial stand relative densities vary, and to meet Forest Bridges' relative density target, varying amounts of fire-tolerant, climate-resilient species will be left as legacy trees. Many fire-suppressed stands also contain large shade-tolerant, fire-sensitive individuals (e.g., white fir and hemlock) that may be included in financial offsetting of restoration treatments. Any form of an arbitrary diameter limit for harvest is considered counter-productive to the Forest Bridges proposal. The literature also supports this. Excess large trees can provide protection for undesirable species and *not* for the old, but small, trees that will play important ecological roles now or in the future (*Hessburg et al.* 2020). Diameter rules would also prevent forest restoration to historical density ranges in stands with many large, fire-sensitive (and sometimes fire tolerant) canopy species (*Johnston et al.* 2021).

### 3.4.4 The Importance of Frequent Return Intervals & Repeat Prescribed Fire

Prescribed Fire can be applied at regular intervals to reduce fuels and vegetation density, especially in dry forests, to renew browse production from shrubs and grasses, regenerate shade-intolerant conifers, and improve the vigor of large trees (*Bailey & Covington* 2002). This interval should be every 5-15 years in dry forests, or up to 35 years in transitional forests, depending on the stand. (adapted from *North et al.* 2021, *Tappeiner et al.* 2015). Although Forest Bridges is proposing thinning to the target relative density, following the first entry, the thinned areas require subsequent multiple prescribed fire entries to return fuels to historical, sustainable levels. Herbaceous species will grow vigorously in these heavily thinned forests. Although fixed standards for fire return intervals on Forest Service O&C dry forests are not known at this time, intervals of 5-15 years (in dry forests) are expected and can be best determined onsite by project managers. If prescribed intervals are too infrequent, high light environments will encourage understory growth that fills vertical gaps, creating ladder fuels and ultimately boosting fire behavior (*Cansler et al.* 2022).

The prescribed fire and other fuel management strategies are an expensive part of the Forest Bridges dry forest Active Conservation alternative. The first burn will be the most expensive treatment because it includes piling and burning , fire trailing the first time, etc. However these costs are necessary for managing fire severity, limiting escaped fires, and in the public interest in decreasing wildfire smoke impacts on public health.

### 3.4.5 Green Forest Plan Substitution Following High-Severity Fire

Photo credit: Jeff McEnroe, BLM

***Figure 38:*** *A large burning snag in the middle of a forests of snags during the Archie Creek Fire on BLM O&C Lands adjacent to the Umpqua National Forest.*

As part of the Active Conservation Management proposals, Forest Bridges recommends that restoration harvesting of high severity burn patches be guided by a section in the new Forest Plans (specifically for the Forest Service O&C Lands) **allowing for the substitution of burned forest restoration harvests as needed in heavily burned stands for the allowable green forest thinning quantity per year.** Forest Bridges has collaboratively agreed upon and, therefore, proposes a standard that when stand replacement fire consumes at least 90% of the tree canopy, or in areas of "high-severity fire" as determined in a BAER assessment, the land management agency should immediately implement a restoration harvest or thinning procedure.

The vision of this substitution provision in the Forest Plans would anticipate wildfire, allowing entry immediately after a burn while the dead snags have their greatest economic value, and while still leaving viable green trees. It is in the Forest Plan, not the project proposal, where environmental review to evaluate watershed health and erosion risks is undertaken in anticipation of restoration harvest treatments quickly following fire.

Forest Bridges proposes that post-wildfire recovery and restoration mirrors the Forest Bridges "green" forest Active Conservation strategies: **Save all viable green trees plus legacy snags and freshly downed wood to achieve the respective dry, moist or transitional harvest outcomes.**

In other words, burned trees and snags will be harvested to achieve the same fire-resistant densities as unthinned stands or Variable Retention Regeneration Harvest stands, retaining ALL of the surviving green trees and clumps (e.g., refugia) in the area, with the exception of disease-prone, less vigorous shade-tolerant species (e.g., white fir and hemlock). Like green tree stand management, these treatments should retain a diversity of species and sizes yet be focused on the larger, fire-resistant trees, while also removing the majority of fuels of primary reburn concern: smaller, understory shade-tolerant trees that compose the majority of ingrowth, while leaving the largest, best quality legacy snags to achieve the target percent relative density.

Since time is of the essence following stand replacement fires, thinning and restoration of green stands to historical stand densities and fire resistance, recovery operations as a contingency in the Forest Plan would begin immediately after the fire (as substitute harvest volume) to reduce regeneration kill. The Forest Service Plan, therefore, should allow for immediate implementation of volumes in excess of the Allowable Sale Quantity to treat extensive burned areas, sustain habitats and decrease destructive reburn potential, while capturing O&C Land volumes and revenues as byproducts of this restoration strategy. Applied to the three forest types, we propose:

- In moist forests: substitute a minimum of 75% of the allowable green forest Variable Retention Regeneration Harvest and thinning plan volumes for recovery and restoration of the severely burned areas.
- In dry forests: substitute a minimum of 50% of the allowable green harvest thinning plan substitution.
- In transitional forests, treat according to moist and dry forest recommendations above, as applicable to the burned area(s).

The application of the Forest Bridges Active Conservation thinning strategy on Forest Service O&C Lands in fire recovery and restoration is meant to emulate historical fire patterns (including relative density along with openings and skips), so it can be overlain in burned forests. Removing this amount of burned material utilizes the wood volume, retains legacy, and reduces hazardous fuels on the landscape while retaining volumes of snags that still support important coarse-woody-debris-dependent wildlife species. The materials removed in thinning and manufactured into products also have the carbon cycle benefits of arresting decomposition and extending the life of the sequestered carbon in wood products for human use.

### 3.4.6 Monitoring & Adaptive Management

Monitoring is key to all Forest Bridges' proposals particularly in areas where the scientific basis and professional experience are not as strong. A comprehensive monitoring and adaptive management plan should be used to measure the effectiveness of Forest Bridges proposals to meet management objectives, as well as to provide transparency to the public. Effectiveness monitoring is the basis of refining forest management strategies through adaptive management. Implementation monitoring tracks alignment between the forest management plan and actual practices. If implementation monitoring shows that the plan is not being followed, it is incumbent upon the Forest Service to publicize this finding, and Forest Bridges can work collaboratively to seek a willing public to resolve the issue. Effectiveness monitoring of the Forest Bridges prescriptions against stated goals involves scientific research and has been particularly difficult to fund. Yet, effectiveness monitoring research is crucial to assessing and adjusting Forest Bridges' proposals through adaptive management.

***Figure 39.*** *The Forest Bridges Collaborative meets with BLM Roseburg District staff to consult on its proposed active management strategies (circa 2016). Source: Forest Bridges Archive.*

Forest Bridges believes its collaborative forum has value and should persist as a long-term western Oregon collaborative that partners with, yet is separate from, the Forest Service, to address issues from monitoring and then adaptive management. A long-term, close cooperative relationship between the O&C Land management agencies and Forest Bridges, in a community collaborative policy role, will allow monitoring results and recommendations for adaptive management by these agencies to be vetted by diverse stakeholders and Tribes in the context of our Principles of Agreement and in public settings, seeking collaboration and consensus approaches.

### 3.4.7 Traditional Ecological Knowledge (TEK) and Ethnoecological Assessments

With millennia of ecosystem stewardship experience and more recent intergovernmental affairs coordination expertise, Tribes bring Traditional Ecological and Ecocultural Knowledge that can inform research and the development of science-based best practices for land stewardship. Forest Bridges actively engages and partners with sovereign tribal governments in its efforts for the benefit of the O&C Lands, including the Forest Service O&C Lands, as part of our commitment to promote both increased Tribal co-management opportunities and the integration of time-honored Indigenous knowledge and cultural practices, together with cutting-edge western science and practitioner experience, as the basis of an effective 21st Century Active Conservation Management Program. In reviewing forest management practices throughout the United States, the Indian Forest Management Assessment Team (IFMAT) has documented the valuable role of tribal governments in sustainable forest management, emphasizing their ability to promote forest health and resilience actively while fulfilling tribal goals and objectives. This approach to active forest management relies on the application of site-specific knowledge and tailored prescriptions.

***Figure 40:*** *A successful cultural burn conducted by the Cow Creek Band of Umpqua Tribe of Indians (Cow Creek Tribe) on one of their forest sites in May 2023. Photo credit: The Cow Creek Tribe*

To enhance the management of the controverted O&C Lands, the Forest Service should consider adopting Tribal forest management partnership models as a guide. The utilization of co-management and co-stewardship approaches, whenever feasible, would be beneficial in making decisions regarding the management of Forest Service O&C lands in particular, as well across US Forest Service national forests. By drawing upon the expertise and experiences of tribal forest management, the Forest Service can achieve a more balanced and sustainable approach to forest management while honoring indigenous knowledge and cultural practices.

Forest Bridges also advocates for the use of "ethnoecological assessments" as part of integrating TEK/Indigenous forest management practices and co-stewardship on all O&C Lands. These assessments would extrapolate what is known about cultural uses and management of important plant communities to potentially reproduce historical stands. Because TEK involves a holistic view of the world, in which humans are embedded in nature, and animals and plants are our teachers (*Mason et al.* 2012, *Kimmerer* 2013), this might include:

1) An inventory of native plant and animal species, also known as cultural keystone species, traditionally used by Native peoples for subsistence and cultural lifeways
2) Documentation of landscape management practices employed and the cultural objectives of those practices
3) Recording elders' memories of species' former abundance and distribution on the landscape
4) Quantifying plant parts needed for the making of different cultural items and managing for these quantities

Honoring sovereignty rights would entail creating memoranda of understanding (MOUs) and other documents that protect data from being shared without explicit permission from the Tribes. Through MOUs, designated Tribal representatives and resource advisors work with incident management teams, fostering cooperative job training and fire education for both Tribal and non-Tribal personnel (*Lake* 2021). In this manner, Forest Bridges proposals would exemplify the highest standards in working with Tribes, and archeological, cultural, or heritage resources may be better protected. These assessments would be done in in a manner that honors the sovereignty rights of Indigenous communities, including data sovereignty and the right to protect TEK so that it is not used, as it so often has in the past 300 years in North America, to exploit Tribes and their resources.

***Figure 41*** *(below): According to consultation done with several Tribes and Oregon State University, 78 different ecosystem services have value as First Foods, medicinal plants, or spiritual and cultural purposes (Case et al., in review). The table below shares a collection of the First Foods, medicinal plants, various wildlife species, timber production and culturally significant trees of value to Tribes in western Oregon.*

| First Foods & Medicinal Plants | |
|---|---|
| Common name | Scientific name |
| Huckleberries | Vaccinium spp. |
| Horsetail | Equisetum arvense |
| Ferns | Polypodiophyta |
| Salal | Gaultheria shallon |
| Grass | Poaceae |
| Kinnikinnick | Arctostaphylos uva-ursi |
| Oregon Grape | Mahonia aquifolium |
| Foxglove | Digitalis purpurea |
| Pipsissewa | Chimaphila umbellate |
| Stinging Nettle | Urtica dioica |
| Camas | Camassia quamash |
| Yarrow | Achillea millefolium |
| Devil's Club | Oplopanax horridus |

| Timber production & culturally significant trees | |
|---|---|
| Common name | Scientific name |
| Western Redcedar | Thuja plicata |
| Sitka Spruce | Picea sitchensis |
| Garry Oak | Quercus garryana |
| Douglas-Fir | Pseudotsuga menziesii |
| Ponderosa Pine | Pinus ponderosa |
| Lodgepole Pine | Pinus contorta |
| Western White Pine | Pinus monticola |
| Pacific Madrone | Arbutus menziesii |
| Pacific Silver Fir | Abies amabilis |
| Western Hemlock | Tsuga heterophylla |
| Pacific Yew | Taxus brevifolia |
| Port Orford Cedar | Chamaecyparis lawsoniana |

| Aridland plants | |
|---|---|
| Common name | Scientific name |
| Big Sagebrush | Artemisia tridentata |
| Western Juniper | Juniperus occidentalis |
| Antelope Bitterbrush | Purshia tridentata |

| Mammals | |
|---|---|
| Common name | Scientific name |
| Beaver | Castor canadensis |
| Yellow-Bellied Marmot | Marmota flaviventris |
| American Marten | Martes americana |
| Canada Lynx | Lynx canadensis |
| Black Bear | Ursus americanus |
| Mountain Goat | Oreamnos americanus |
| Black-Tailed Deer | Odocoileus hemionus columbianus |
| Mule Deer | Odocoileus hemionus |
| Elk | Cervus canadensis |
| White-Tailed Deer | Odocoileus virginianus |
| Western Spotted Skunk | Spilogale gracilis |
| Long-Tailed Weasel | Mustela frenata |
| Black-Tailed Jackrabbit | Lepus californicus |
| Mountain Lion | Puma concolor |
| Bobcat | Lynx rufus |
| Fisher | Pekania pennati |
| Northern Pocket Gopher | Thomomys talpoides |
| Northern Flying Squirrel | Glaucomys sabrinus |
| Muskrat | Ondatra zibethicus |
| Northern River Otter | Lontra canadensis |
| Merriam's Ground Squirrel | Urocitellus canus |
| Hoary Bat | Lasiurus cinereus |
| Silver-Haired Bat | Lasionycteris noctivagans |
| Desert Woodrat | Neotoma lepida |

| Amphibian | |
|---|---|
| Common name | Scientific name |
| Columbia Spotted Frog | Rana luteiventris |

| Birds | |
|---|---|
| Common name | Scientific name |
| Canada Goose | Branta canadensis |
| Bald Eagle | Haliaeetus leucocephalus |
| American Pipit | Anthus rubescens |
| Cassin's Finch | Haemorhous cassinii |
| Gray-Crowned Rosy-Finch | Leucosticte tephrocotis |
| Marbled Murrelet | Brachyramphus marmoratus |
| Northern Goshawk | Accipiter gentilis |
| Rufous Hummingbird | Selasphorus rufus |
| Great Gray Owl | Strix nebulosa |
| Brown Creeper | Certhia americana |
| Lewis' Woodpecker | Melanerpes lewis |
| Northern Pygmy Owl | Glaucidium californicum |
| Steller's Jay | Cyanocitta stelleri |
| Osprey | Pandion haliaetus |
| Mountain Chickadee | Poecile gambeli |
| White-Faced Ibis | Plegadis chihi |
| Northern Flicker | Colaptes auratus |
| Gray Jay | Perisoreus canadensis |
| Golden Eagle | Aquila chrysaetos |
| Brewer's Sparrow | Spizella breweri |
| Greater Sage Grouse | Centrocercus urophasianus |
| Pileated Woodpecker | Dryocopus pileatus |
| American Three-Toed Woodpecker | Picoides dorsalis |

| Grazing quality |
|---|

An example to illustrate this kind of assessment and simulation was performed by Hart-Fredeluces et al. (2020) in their work on beargrass (*Xerophyllum tenax*) at three (undisclosed PNW) wildfire sites from 2015 to 2017 (to protect Tribal confidentiality). They simulated the re-introduction of Indigenous stewardship in contemporary contexts by collecting data on beargrass as a function of fire severity and Native harvesting. Then they used population models to project management over time. As expected, Indigenous fire stewardship resulted in higher population growth of beargrass than "no fire" and "business as usual" scenarios. In this way, ethnographic data can be integrated with TEK and contemporary scientific understanding to (attempt to) reconstruct the tended, resilient landscape—or at least an appropriate range of variability when it comes to tree density, openings, cultural food provisioning, and fire mitigation. It is implied that forests have been, and should be, managed for multiple objectives and forest products even when specific vegetation is emphasized.

When seeking to integrate TEK into policy proposals, it is essential to consider a "culturally sensitive best practices framework" (*Grenier* 1998). In a more contemporary context, Tribes are developing co-management relationships with the federal agencies – for example, the Cow Creek

Tribe signed two agreements with the Forest Service in November 2022. For example, how should one request access to TEK? If shared, how might it be used without being appropriated or exploited (i.e., without prior and informed consent or collaboration) (*Lake et al.* 2018, *Lake* 2021). Indigenous elders can be wary of overtures from scientists, academics, and agencies because they have often taken without giving in return; such is the colonial history of discounting or subordinating TEK (*Mason et al.* 2012). Indeed, sharing knowledge is not simple. Long et al. (2018) consider several important questions to address in the process of supporting values important to Tribes:

**1)** What resources within the management area have special value to Native people, and what factors are influencing the quality and availability of those resources—as well as the ecosystems that produce them? How has the reduction of Tribal influence affected these resources? For example, the Western Klamath Restoration Partnership—with the Karuk Tribe—selected indicator species like Pacific giant salamander (for water health), willow (for riverine habitat health), Roosevelt elk (elevational migrant indicator), Pacific fisher (for old-growth with early-seral habitat), and northern spotted owl (for endangered species). These focal species are representatives that can guide management and monitoring approaches (*Lake* 2021). **(Forest Bridges embraces the multi-species approach with a balance of habitats so that all species will thrive in the future.)**

2) What land management strategies can promote tribal ecocultural resources?

3) What processes for engaging Tribes in forest planning and management have been effective in addressing challenges to tribal resources and rights?

Forest Bridges' objective is to seek transitions toward more trusting, collaborative approaches through which Native communities are recognized as—and provided with appropriate resources (financial and otherwise) to be—full nation-to-nation partners in shaping the design and co-management of ecological, cultural, and economic landscapes (*Lake et al.* 2018).

## 4.0 Conclusion and Next Steps for the Forest Service

Among the 7.1 million acres of land the Forest Service manages in the NWFP area of western Oregon, around a half million acres (7%) are controverted Forest Service O&C Lands in six National Forests in western Oregon. They are of varying acreages and forest types (dry, moist and transitional), and are governed by the O&C Act of 1937 (to be managed for Sustained Yield along with other uses), along with other laws and regulations.

> ***"At the time the Norwest Forest Plan was developed, I wished I had brought attention to the planners of the need for the Forest Service to develop a specific plan for the controverted Forest Service O&C Lands, given that these lands are governed by the O&C Act and not the National Forest Management Act, which governs all other Forest Service Management of National Forests.***
>
> *--Retired Forest Service National Forest Senior Administrator (identity withheld), personal communication, 2023*

In the preceding pages, Forest Bridges: The O&C Forest Habitat Project, Inc., which specifically and exclusively focuses on O&C lands with respect to the Forest Service, has provided a viable Active Conservation Management proposal for these Forest Service O&C Lands. This proposal represents a paradigm shift in management which we believe is consistent with the O&C Act. **The fundamental shift is to replace fixed location reserves with an all-lands management approach** that sets strict specifications for habitat diversity goals, including strong standards for legacy habitat and structurally complex old growth habitat. This is accomplished through the use of metered harvest strategies, tailored to dry, moist and transitional forests, and which meets a key direction that the Forest Service requested in the NOI to develop an EIS to assess the impact of an amendment to the Northwest Forest Plan. The decisions of where to manage under these specifications are left to Forest Service professionals.

We have presented proposals which are based on Forest Bridges Principles of Agreement and approved by the Forest Bridges Council of Advisors and Board of Directors. The detail of these proposals is also grounded in Ecological Forestry tenets and Ecological Silviculture methods that promote a metered and active approach to habitat sustainability through variable retention harvest and thinning strategies, beneficial prescribed fire and other actions. They call for carefully defined guidelines intended to increase certainty around the extent and kinds of management based on site-specific characteristics. Management is active, creating new habitats regularly, yet metered in amount and monitored for effectiveness. Harvest and thinning, both with legacy retention, seek to emulate the range of historical conditions, and are limited to work which puts the forests of the O&C lands as a whole on a trajectory for regular habitat renewal as well as increased persistence, storage of carbon, creation of structurally diverse forest, resistance to fire, and sustained growth and development.

We also look to Cultural Burning practices, partnering and co-management with Indigenous tribes on their terms as also integral to these proposals. As we see it, agency staff – working collaboratively with the Tribes whenever possible -- must be entrusted to evaluate stands across the O&C Lands for treatment or "let grow as is" based on each stand's potential to become or remain a contributor to the diversity of wildlife, plant kingdoms or other biological habitats, as well as to store carbon and resist wildfire.In our proposed All-Lands Ecological Forestry/Ecological.

In response to the Forest Service call for directions in its NOI, we have demonstrated specifically for the Forest Service controverted O&C Lands of western Oregon how to, *inter alia*:

- *Improve fire resistance and resilience on Forest Service O&C Lands (with specific prescriptions for dry, moist and transitional forests), ensuring that the forests on these lands are managed to adapt to changing fire regimes by restoring fire in a functional role in the health and integrity of forest ecosystems. (In doing so, we stated the importance of increasing Tribal co-management opportunities, including in the use of prescribed fire and cultural burning on Forest Service O&C Lands, combined with Variable Retention Thinning and other fuel reduction treatments.)*

- *Develop and sustain mature and old growth forest conditions, heterogeneous and* *complex forest structures, biodiversity, habitat, and cultural ecosystem services AND expand current amounts and improve sustainability of Mature and Old growth ecosystems, reducing loss risk across all land use allocations, differentiating and clarifying varying conservation goals for moist, dry and transitional forest ecosystems.*

- *Generate opportunities for timber and non-timber products, including from Variable Retention Thinning treatments in dry forests and Variable Retention Regeneration Harvests in moist forests, as well as to protect communities and Tribal cultural resources from devastating wildfires, to sustain important values, benefits, and other ecosystem services that national forests should provide to communities, including tribes, that directly depend on them.*

**Forest Bridges' Active Conservation management strategy for the Forest Service O&C Lands should form the basis of a Forest Service management alternative (or sub-alternative) within each of the respective Forest Service Management Plans for the six National Forests where they are located in western Oregon.**

And the alternative should be modeled with these factors in mind:

- wildfire behavior over time;
- measures of habitat diversity and habitat sustainability
- endemic species populations, with focus on both sensitive species, and species not currently sensitive;
- invasive weeds;
- monitoring costs (implementation as well as some effectiveness monitoring); and an adaptive management deliberation collaborative for the O&C Lands, such as Forest Bridges;
- standing timber volume and annual growth, as well as Moist, Dry and Transitional forest harvest volume outputs and costs;
- for Moist and Transitional forests, by forest, the age of onset of structurally complex old growth forest, based on habitat use;
- projected harvest receipts to the O&C counties and projected logging as well as fire hazard reduction costs and restoration that accompany thinning and other habitat

improvement projects;

- carbon sequestration and ameliorating climate change;
- various measures of habitats produced;
- costs and acreages of prescribed fire on an annual basis as specified, and the costs to implement these various programs.

In so doing, the Forest Service will ensure that these special O&C Lands are managed under the O&C Act's provision for Sustained Yield and other uses and in alignment with the Forest Bridges Active Conservation Management strategies.

Forest Bridges again thanks the NWFP Update FACA Committee, Forest Service staff, and others who take the time to read Forest Bridges proposals and consider including them as part of updating the NWFP to yield improved environmental, economic and community outcomes on the Forest Service O&C Lands.

**Thank you – The Forest Bridges: O&C Forest Habitat Project, Inc. Team**

# REFERENCES


Agee, J. (1991). Fire history of Douglas-fir forests in the Pacific Northwest. Portland, OR: USDA Forest Service Pacific Northwest Research Station.

Agee, J. K., & Skinner, C. N. (2005). Basic principles of forest fuel reduction treatments. Forest Ecology and Management, 83-96.

Anderson, M. a. (2003). Simulated indigenous management: a new model for ecological restoration in national parks. Ecological Restoration, 269-277.

Bailey, J. a. (2002). Evaluating ponderosa pine regeneration rates following ecological restoration treatments in northern Arizona, USA. Forest ecology and management, 271-278.

Bate, L. (1999). Estimating snag and large tree densities and distributions on a landscape for wildlife management (Vol. 425). Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Beaty, R. &. (2001). Spatial and temporal variation of fire regimes in a mixed conifer forest landscape, Southern Cascades, California, USA. Journal of Biogeography, 955-966.

Bigelow, S. N. (2011). Using light to predict fuels-reduction and group-selection effects on succession in Sierran mixed-conifer forest. Canadian Journal of Forest Research, 2051-2063.

Borgias, D. &. (2019). Transforming our Relationships with Forest and Fire—Scaling Up from Ashland Watershed to the Rogue Basin. Western Forester, 16-18.

Briles CE, W. C. (2005). Postglacial vegetation, fire, and climate history of the Siskiyou Mountains, Oregon, USA. Quaternary Research, 44-56.

Brown, J. K., Reinhardt, E. D., & Kramer, K. A. (2003). Coarse woody debris: Managing benefits and fire hazard in the recovering forest. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Busse, M. (1994). Downed bole-wood decomposition in lodgepole pine forests of central Oregon. Soil Science Society of America Journal, 221-227.

Butts, S. a. (2000). Associations of forest-floor vertebrates with coarse woody debris in managed forests of western Oregon. The Journal of wildlife management, 95-104.

Cansler, C. K. (2022). Previous wildfires and management treatments moderate subsequent fire severity. Forest Ecology and Management, 119764.

Carloni, K. (2006). The Ecological Legacy of Indian Burning Practices in Southeastern Oregon. Ann Arbor, MI: Oregon State University ProQuest Dissertations Publishing.

Carpenter, S. W. (2001). From metaphor to measurement: resilience of what to what? Ecosystems, 765-781.

Case, M. K. (2020). Using a vegetation model and stakeholder input to assess the climate change vulnerability of tribally-important ecosystem services. forests, 618.

Churchill, D. (2016). The ICO Approach to Quantifying and Restoring Forest Spatial Pattern: Implementation Guide. Version 3.0. (Jeronimo SMA). Vashon, Washington: Stewardship Forestry and Science.

Cocking, M. V. (2012). California black oak responses to fire severity and native conifer encroachment in the Klamath Mountains. Forest Ecology and Management, 25-34.

Connolly, T. (1988). A culture-historical model for the Klamath Mountain region of southwest Oregon and northern California. Journal of California and Great Basin Anthropology, 246-260.

Cronon, W. (1996). The trouble with wilderness: or, getting back to the wrong nature. Environmental History, 7-28.

Davis, R. O. (2015). Northwest Forest Plan–the first 20 years (1994-2013): status and trends of late-successional and old-growth forests. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Davis, R., Hollen, B., & Hobson, J. [. (2016). Northwest Forest Plan—the first 20 years (1994-2013): status and trends of northern spotted owl habitats. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

DeRose, R. J., & Long, J. N. (2014). Resistance and resilience: A conceptual framework for silviculture. Forest Science, 1205-1212.

Devine, W. a. (2006). Changes in Oregon white oak (Quercus garryana Dougl. ex Hook.) following release from overtopping conifers. Trees, 747-756.

Devine, W. a. (2013). Restoration release of overtopped Oregon white oak increases 10-year growth and acorn production. Forest ecology and management, 87-95.

Dobkins, R. &. (2017). Tribes of the Oregon Country: Cultural Plant Harvests and Indigenous Relationships with Ancestral Lands in the Twenty-first Century. Oregon Historical Quarterly, 118. 488.

Domínguez L, L. C. (2020). Decolonizing Conservation Policy: How Colonial Land and Conservation Ideologies Persist and Perpetuate Indigenous Injustices at the Expense of the Environment. Land, 9(3):65.

Engel, K. (2013). Perverse incentives: The case of wildfire smoke regulation. Ecology LQ, 40, 623.

Frankland, J. (1992). Mechanisms in fungal succession. In G. &. Carroll, The Fungal Community: Its Organization and Role in the Ecosystem (p. 383). New York, NY: Marcel Dekker, Inc.

Franklin, J. &. (January, 2002). Disturbances and Structural Development of Natural Forest Ecosystems With Silvicultural Implications, Using Douglas-Fir Forests as an Example. Forest Ecology and Management, 399-423.

Franklin, J. F. (2018). Ecological Forest Management. Long Grove, IL: Waveland Press.

Franklin, J. F. (December 2012). A Restoration Framework for Federal Forests in the Pacific Northwest. Journal of Forestry, 429-439.

Fredrickson, D. (1984/2004). The North Coastal Region. In M. Morratto, California Archeology (pp. 471-527). Salinas, CA: Coyote Press.

Fujimori, T. K. (1976). Biomass and primary production in forests of three major vegetation zones of the northwestern United States. Journal of the Japanese Forestry Society, 360-373.

Garmon, J. (2006). Restoring Oak Savanna to Ore'on's Willamette Valley: Using Alternative Futures to Guide Land Management Decisions. Eugene, OR: University of Oregon.

Grenier, L. (1998). Working with indigenous knowledge: A guide for researchers. Ottawa, Ontario, Canada: IDRC.

Halofsky, J. E. D. C. (2011). Mixed-severity fire regimes: lessons and hypotheses from the Klamath-Siskiyou Ecoregion. Ecosphere, 1-19.

Halofsky, J. P. (2016). Developing and Implementing Climate Change Adaptation Options in Forest Ecosystems: A Case Study in Southwestern Oregon, USA. Forests, 268.

Halofsky, J. P. (2020). Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. Heidelberg, Germany: Fire Ecology.

Halofsky, Jessica E. J. J. (2022). Chapter 5: Climate Change Effects on Vegetation and. In D. L. Jessica E. Halofsky, Climate Change Vulnerability and Adaptation in Southwest Oregon (pp. 177-292). Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Harling, W. (2015). Learning together, burning together. Wildfire Magazine 24(1), 26-30.

Harmon, M. F. (1986). Ecology of coarse woody debris in temperate ecosystems. Advances in ecological research, 133-302.

Hart-Fredeluces, G. T. (2021). Simulated Indigenous fire stewardship increases the population growth rate of an understory herb. Journal of Ecology, 109(3), 1133-1147.
Healey, S. C. (2008). The Relative Impact of Harvest and Fire upon Landscape-Level Dynamics of Older Forests: Lessons from the Northwest Forest Plan. Ecosystems, 1106-1119.

Henson, P. T. (2013). Using ecological forestry to reconcile spotted owl conservation and forest management. Journal of Forestry, 433-437.

Hessburg PF, C. S. (2020). The 1994 Eastside Screens large-tree harvest limit: review of science relevant to forest planning 25 years later. Portland, OR: US Forest Service, Pacific Northwest Research Station.

Hessburg, P. A. (2005). Dry forests and wildland fires of the inland Northwest USA: Contrasting the landscape ecology of the pre-settlement and modern eras. Forest Ecology and Management, 117-139.

Hessburg, P. F. (2015). Restoring Fire-Prone Inland Pacific Landscapes: Seven Core Principles. Landscape Ecology, 1805-1835.

Ince, P. S. (2008). Market impacts of hypothetical fuel treatment thinning programs on federal lands in the western United States. Forest Policy and Economics, 10(6), 363-372.

Johnson, K. F. (2008). A plan for the Klamath Tribes' management of the Klamath Reservation Forest: prepared for the Klamath Tribes. Chiloquin, OR: Klamath Tribes.

Johnston, F. B.-A. (2021). Unprecedented health costs of smoke-related PM2.5 from the 2019–20 Australian megafires. Nat Sustain 4, 42-47.

Johnston, J., Schmidt, M., Merschel, A., Downing, W., Coughlan, M., & Lewis, D. (2023). Exceptional variability in historical fire regimes across a western Cascades landscape, Oregon, USA. Ecosphere: An ESA Open Access Journal, 1-25.

Jones, G. G. (2016). Megafires: an emerging threat to old-forest species. Frontiers in Ecology and the Environment, 14(6), 300-306.

Keegan III, C. M. (2006). Timber-processing capacity and capabilities in the Western United States. Journal of Forestry, 104(5), 262-268.
Keeley, J. (2009). Fire intensity, fire severity and burn severity: a brief review and suggested usage. International Journal of Wildland Fire, 116-126.

Kimmerer, R. (2013). Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants. Minneapolis, MN: Milkweed Editions.

Knapp, E. (2015). Long-term dead wood changes in a Sierra Nevada mixed conifer forest: Habitat and fire hazard implications. Forest Ecology and Management, 87-95.

Knapp, E. B. (2021). Variable thinning and prescribed fire influence tree mortality and growth during and after a severe drought. Forest Ecology and Management, 479, 118595.

Kolden, C. (2019). We're not doing enough prescribed fire in the Western United States to mitigate wildfire risk. Fire, 2(2), 30.

Koontz, M. N. (2020). Local forest structure variability increases resilience to wildfire in dry western US coniferous forests. Ecology Letters, 483-494.

Lake, F. (2021). Indigenous fire stewardship: Federal/Tribal partnerships for wildland fire research and management. Fire Management Today, 30-39.

Lake, F. P.-H. (2018). Integration of traditional and Western knowledge in forest landscape restoration. Forest landscape restoration, 198-226.

Landram, M. W. (2002). Demography of snags in eastside. Albany, CA: USDA Forest Service.

Lehmkuhl, J. F. (2003). Cavities in Snags along a Wildfire Chronosequence in Eastern Washington. The Journal of Wildlife Management 67, no. 1, 219-228.

Leigh B Lentile, F. W. (2005). Patch structure, fire-scar formation, and tree regeneration in a large mixed-severity fire in the South Dakota Black Hills, USA. Canadian Journal of Forest Research, 2875-2885.

Linders, M. J. (2010). Management Recommendations for Washington's Priority Species: Western Gray. Olympia, Washington: Washington Department of Fish and Wildlife.

Long, J. F. (2018). Tribal ecocultural resources and engagement. Synthesis of science to inform land management within the Northwest Forest Plan area, 851-917.

Long, J. F. (2018). Tribal ecocultural resources and engagement. In P. A. T. A. Spies, Synthesis of science to inform land management within the Northwest Forest Plan area. Volume 3 (pp. 851-917). Portland, OR: USFS Pacific Northwest Research Station.

Long, J. G. (2017). Managing California black oak for tribal ecocultural restoration. Journal of Forestry, 426-434.

Management, U. S. (2016). Southwestern Oregon Record of Decision and Approved Resource Management Plan. Portland, OR: Bureau of Land Management.

Marcot, B. G., Pope, K. L., Slauson, K., Welsh, H. H., Wheeler, C. A., Reilly, M. J., & Zielinski, W. J. (2018). Chapter 6: Other species and biodiversity of older forests. In U. Service, Gen. Tech. Rep. PNW-GTR-966 (pp. 371-459). Portland, OR: Pacific Northwest Research Station.

Martinez, D. (2003). Protected areas, indigenous peoples, and the western idea of nature. Ecological Restoration, 247-250.

Maser, C. (1979). Woody Material. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Washington, DC: U.S. Department of Agriculture, Forest Service.

Mason, L. W. (2012). Listening and learning from traditional knowledge and Western science: A dialogue on contemporary challenges of forest health and wildfire. Journal of Forestry, 110(4), 187-193.

McClelland, B. F. (1979). Habitat management for hole-nesting birds in forests of western larch and Douglas-fir. Journal of Forestry, 480-483.

McDonald, P. (1978). Silviculture-ecology of three native California hardwoods on high sites in north central California. Corvallis, OR: Oregon State University.

McDonald, P. M. (1980). Growth of thinned and unthinned hardwood stands in the northern Sierra Nevada . . . preliminary findings. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture.

McDonald, P., & Tappeiner, J. (1996). Silviculture-ecology of forest-zone hardwoods in the Sierra Nevada. Davis, CA: University of California Centers for Water and Wildland Resources.

Metlen, K. (2017). Rogue Basin Cohesive Forest Restoration Strategy: A Collaborative Vision for Resilient Landscapes and Fire Adapted Communities.

Metlen, K. S. (2018). Regional and local controls on historical fire regimes of dry forests and woodlands in the Rogue River Basin, Oregon, USA. Forest Ecology and Management, 43-58.

Morris, W. (1934). Forest fires in western Oregon and eastern Washington. Oregon Historical Quarterly, 313-339.

Ng, Jan M. P. (2020). Topographic variation in tree group and gap structure in Sierra Nevada mixed-conifer forests with active fire regimes. Forest Ecology and Management, 118-220.

North, M. C. (2012). Using fire to increase the scale, benefits, and future maintenance of fuels treatments. Journal of Forestry, 392-401.

North, M. T. (2022). Operational Resilience in Western US frequent-fire forests. Forest Ecology and Management, 507.

Palik, B. & D'Amato Anthony (editors), et al (2024), Ecological Silvicultural Systems: Exemplary Models for Sustainable Forest Management. Palik & D'Amato, Chapter 1, The Context of Ecological Silviculture (pp. 1-10); Wheeler, Abraham, Franklin, Jerry F., & Wessell, Stephanie J., Chapter 4, Ecological Silviculture in Douglas-fir—Western Hemlock Ecosystems (pp. 40-51); Hoboken, NJ: John Wiley & Sons, Inc.

Palik, B. D.; D'Amato Anthony W, Franklin, Jerry F.; Johnson, Norman K., (2021). Ecological Silviculture Foundations and Applications. Long Grove, IL: Waveland Press, 3-13; 21-35; 93-98; 124-127.

Parks, C. R. (1997). Wood decay associated with pileated woodpecker roosts in western redcedar. Plant Disease, 551-551.

Payer, D. A. (2003). Influence of forest structure on habitat use by American marten in an industrial forest. Forest Ecology and Management, 179(1-3), 145-156.

Perry, D. H. (2011). The ecology of mixed severity fire regimes in Washington, Oregon, and Northern California. Forest Ecology and Management, 703.717.

Peterson, D. H. (2010). Managing and Adapting to Changing Fire Regimes in a Warmer Climate. In D. M. McKenzie, The Landscape Ecology of Fire (pp. 249-267). Berlin, Germany: Springer Dordrecht.

Pimm, S. (1984). The complexity and stability of ecosystems. Nature, 321-326.

Prestemon, J. A. (2012). Quantifying the net economic benefits of mechanical wildfire hazard treatments on timberlands of the western United States. Forest Policy and Economics, 21, 44-53.

Prichard, S. H. (2021). Adapting western North American forests to climate change and wildfires: 10 common questions. Ecological Applications, e02433, pp 1-30.

Quinn-Davidson, L. a. (2012). Impediments to prescribed fire across agency, landscape and manager: an example from northern California. International Journal of Wildland Fire, 21(3), 210-218.

Raphael, M. a. (1984). Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife monographs, 3-66.
Reeves, G. P. (2016). An Initial Evaluation of Potential Options for Managing Riparian Reserves of the Aquatic Conservation Strategy of the Northwest Forest Plan. Portland, OR: US Forest Service Pacific Northwest Research Station.

Reilly, Matthew J., C. J. (2017, March 24). Contemporary patterns of fire extent and severity in forests of the Pacific Northwest, USA (1985–2010). Retrieved from Ecosphere: https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.1695

Rothermel, R. C. (1991). Predicting behavior and size of crown fires in the northern Rocky Mountains. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Ryan, K. K. (2013). Prescribed fire in North American forests and woodlands: history, current practice, and challenges. Frontiers in Ecology and the Environment, 11(s1), e15-e24.

Schollaert, C. J. (2023). Quantifying the smoke-related public health trade-offs of forest management. Nature Sustainability, 1-10.

Schuster, R. G. (2019). Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas. Environmental Science & Policy, 1-6.

Sensenig, T. B. (2013). Stand development, fire and growth of old-growth and young forests in southwestern Oregon, USA. Forest Ecology and Management, 96-109.

Skog, K. (2006). Evaluation of silvicultural treatments and biomass use for reducing fire hazard in western states (Vol. 634). Madison, WI: US Department of Agriculture, Forest Service, Forest Products Laboratory.

Smith, N. (2024, January 19). Commentary: Old growth is burning up in wildfires. This calls for better land management. Retrieved from Capital Press: https://www.capitalpress.com/opinion/columns/commentary-old-growth-is-burning-up-in-wildfires-this-calls-for-better-land-management/article_1e6160b6-b721-11ee-8301-a7b621f0d176.html

Spies, T. &. (2009). Conserving Old Growth in a New World. In T. &. Spies, Old Growth in a New World: A Pacific Northwest Icon Reexamined (pp. 313-326). Washington, DC: Island Press.

Spies, T. H. (2005). Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology, 351-362.

Spies, T. H. (2006). Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology, 351-362.

Spies, T. H. (2018). Old growth, disturbance, forest succession, and management in the area of the Northwest Forest Plan. Synthesis of science to inform land management within the Northwest Forest Plan area. Gen. Tech. Rep. PNW-GTR-966. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station: 95-243, 95-243.

Spies, T. L. (2019). Twenty-five years of the Northwest Forest Plan: what have we learned? Frontiers in Ecology and the Environment, 511-520.

Stephens, S. (2004). Fuel loads, snag abundance, and snag recruitment in an unmanaged Jeffrey pine–mixed conifer forest in northwestern Mexico. Forest Ecology and Management, 103-113.

Stephens, S. K. (2019). Is fire “for the birds”? How two rare species influence fire management across the US. Frontiers in Ecology and the Environment, 17(7), 391-399.

Stephens, S. W. (2020). Fire and climate change: conserving seasonally dry forests is still possible. Frontiers in Ecology and the Environment, 18(6), 354-360.

Tappeiner II, J. B. (2015). Silviculture and ecology of western US forests. Corvallis, OR: Oregon State University Press.

Taylor, A. &. (1998). Fire history and landscape dynamics in a late-successional reserve, Klamath Mountains, California, USA. Forest Ecology and Management, 285-301.

Teensma, P. D. (1987). Fire history and fire regimes of the central western Cascades of Oregon. Eugene, OR: University of Oregon.

Tesch, S. &. (1991, August). Clearcut and shelterwood reproduction methods for regenerating southwest Oregon forests. Retrieved from ScholarsArchive@OSU: https://ir.library.oregonstate.edu/concern/technical_reports/1v53jz08f

Thomas, J. M. (1979). Wildlife habitats in managed rangelands: the great basin of southeastern Oregon: riparian zones (Vol. 80). Corvallis, OR: Pacific Northwest Forest and Range Experiment Station, US Department of Agriculture, Forest Service.

Tribal Forest Protection Act of 2004, H.R.3846 (108th Congress (2003-2004) July 22, 2004).
USDA, U. (2020). Bioregional Assessment of Northwest Forests. Portland, OR: USDA.

Waring, R. a. (1979). Evergreen coniferous forests of the Pacific Northwest. Science, 204, 1380-1386.

Weatherspoon, C. &. (1995). An Assessment of Factors Associated with Damage to Tree Crowns from the 1987 Wildfires in Northern California. Forest Science, 430-451.

Weisberg, P. (2009). Historical fire frequency on contrasting slope facets along the McKenzie River, Western Oregon Cascades. Western North American Naturalist, 206-214.

Wildlife, W. D. (1995). Priority Habitat Management Recommendation: Snags. Draft Publication. Olympia, WA: Washington Department of Fish and Wildlife, Habitat Management Program.

Winter, G. a. (1999). Fire management planning for Sequoia and Kings Canyon National Park: A public opinion survey of the residents of Three Rivers, California. Draft Report. Bellingham, WA: Paul Schissler Associates.

Zald, H. C. (2022). Tree growth responses to extreme drought after mechanical thinning and prescribed fire in a Sierra Nevada mixed-conifer forest, USA. Forest Ecology and Management, 120107.

Zybach, R. (1993). Native forests of the northwest, 1788-1856: American Indians, cultural fire, and wildlife habitat. Northwest Woodlands, 14-15, 30-31.

Appendix A

FOREST BRIDGES

# Principles of Agreement

BOARD-APPROVED UPDATE – FEBRUARY 24, 2023

## Introduction

Forest Bridges: The O&C Forest Habitat Project, Inc. (Forest Bridges) is a 501(c)(3) nonprofit with deep roots in collaboration. Founded in 2015, our goal is to bring people together as Friends of Forest Bridges, supporting our development of the Forest Bridges Principles of Agreement, along with detailed supporting information.[1] As the collaborating team evolves, it continues to include individuals and representatives of different, historically opposing viewpoints, while working to grow its partnerships with Western Oregon Indigenous tribes. We are committed to the inclusion of underrepresented and underserved people and communities.

Forest Bridges proposes a major paradigm shift in the program of sustained yield forestry driven by habitat outcomes, that also sustains the range of forest resources (soil, water, fish, wildlife, etc. as well as harvest), on the O&C Lands of western Oregon. (These lands are also known as the Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road Grant Lands of Western Oregon.[2]) The work and proposals of Forest Bridges also include the O&C Lands managed by the US Forest Service, as well as Public Domain lands managed as forest land by the BLM in Western Oregon. Hereafter all of these lands in total shall be referred to in Forest Bridges' work as the "O&C Lands").

Current legislative and regulatory restrictions limit which of the O&C Lands can be actively managed. Forest Bridges is developing numerous proposals for a well-funded program of very long-term, metered and active forest management, with a sense of urgency to sustain forest habitats vulnerable to climate change and wildfire. The Principles of Agreement and proposals of Forest Bridges are intended to facilitate on-the-ground actions by providing context and supporting federal agency planning and project implementation processes.

All of the O&C Lands are included in the long-term strategic proposals of Forest Bridges, recognizing the importance of habitat sustainability throughout the O&C forests. Habitat sustainability includes legacy trees, forest stands and landscapes, and uses active management to renew, as well as to sustain, the forest by creating complex early seral and promoting other habitats. In our proposed model, all areas are evaluated for treatment or non-treatment periodically, based on their potential to become or remain a contributor to the diversity of wildlife and other biological habitats. As a result, the land management agencies would regularly and strategically select or bypass areas for active management, based on site-specific conditions for habitat growth, development and renewal (as part of future planning and project implementation processes).

Forest Bridges' proposal for a metered and active approach to habitat sustainability (through harvest, beneficial prescribed fire and other actions) calls for carefully defined guidelines intended to increase certainty around the extent and kinds of management based on site-specific characteristics. Management is active, creating new habitats regularly, yet metered in amount and monitored for effectiveness. Harvest and thinning, both with legacy retention, seek to emulate the range of historical conditions, and are limited to work which puts the forests of the O&C lands as a whole on a trajectory for regular habitat renewal as well as increased persistence, storage of carbon, creation of structurally

[1] For example, Forest Bridges is finalizing policy papers and story maps on the Dry and Moist Forests, which buttress the PoAs, providing more details on our forest management proposals for the O&C lands. These will be living documents posted to the FB website Spring 2023.

[2] For more information and maps of the O&C lands click here.

diverse forest, resistance to fire, and sustained growth and development. We look to Cultural Burning practices, partnering and co-management with Indigenous tribes on their terms as also integral to these proposals.

Forest Bridges finds that certain legal, financial and regulatory barriers to forest management and habitat renewal also need to be addressed. Addressing these barriers is necessary for the amenities of these lands to persist, particularly in the face of habitat losses from climate change and wildfire. As a result of the western Oregon Labor Day Fires of 2020, a recent example of severe habitat loss, FB hopes that public urgency will aid in addressing the barriers to effective forest management and securing the necessary financial support.

These Agreements are brief summary statements of policy. As these Principles of agreement were developed, the collaborators asked themselves, “if we accept the legal framework and governance the guide the O&C Lands, what would be change?” This led to the goal of a comprehensive set of Principles of Agreement. Ultimately, all of these areas of policy need to be recognized or addressed for increased effectiveness and longevity of our forests. Supporting information that expands these statements is being developed for Forest Bridges’ website, where we will post additional supporting policy information. These principles reflect the wisdom of Forest Bridges collaborators, who have contributed to these Principles since inception in 2015. Changes are infrequent, but revisions are made over time to clarify and fill in certain areas when new information or insights become available from monitoring, or after significant events like the Labor Day fires of Western Oregon in 2020.

What follows is the collection of the Principles of Agreement agreed to and endorsed by Forest Bridges[3] for the western Oregon O&C forest lands. It is intended to be welcomed by parties with diverse viewpoints and serve as a framework for improved management. **Asterisks (*) mark areas that need further collaboration to reach broader consensus.**

## Legal Framework/Governance of O&C Lands

1. The O&C Act (The Revested Oregon and California Railroad Lands Sustained Yield Management Act of 1937) requires that the O&C Lands “shall be managed… for permanent forest production… in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating of stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities.”

   Forest Bridges’ is working is to find a path that provides a sustainable diversity of wildlife and other biological habitats on the O&C Lands, as well as a multitude of services for the public including recreation, a source of wood products and revenue for the Counties through active harvest in a plan of sustained yield forest management carried out by the respective land management agencies.

2. In addition to The 1937 O&C Act, the O&C Lands are also governed as applicable by other Federal laws, including the National Environmental Policy Act, the Endangered Species Act, the Clean Air Act, the Clean Water Act, the Federal Land Policy and Management Act, and other federal legislation.

[3] Forest Bridges’ Board has adopted an annual updating process.

3. Forest Bridges' work and proposals focus on the O&C Lands uniquely found across rural Western Oregon, which include lands managed by the Bureau of Land Management (BLM) in the Department of Interior, and the O&C Controverted Lands managed by the US Forest Service in the Department of Agriculture.
    a. The 1937 O&C Act applies to all of the O&C Lands managed in the Department of Interior.
    b. The O&C Controverted Lands managed by the US Forest Service are subject to the disposition of revenues in accordance with the O&C Act but are also subject to management under the National Forest Management Act as well as the Controverted Lands Act of June 24, 1951. As O&C Lands, Forest Bridges is including the Controverted Lands in its proposals.

4. The O&C Lands are to remain in Federal ownership, managed by the respective land management agencies with applicable management guidance.

5. 50% of revenues from O&C harvests are to continue to be distributed to the O&C counties.

## Vision of Management Outcomes on O&C Lands

6. The present condition of much O&C land differs greatly from precolonial conditions due to the removal of Indigenous people, fire exclusion, past forestry activities, and inactivity. These changes have contributed to increased combustible fuel, increased densities of trees and simplification of stands. There is a shortage of both structurally complex forest generally and regularly generated and complex early seral habitats. There are also over- and under-abundances of standing dead trees (snags)* (e.g., snag retention for habitat contribution vs snag removal to reduce fire hazard*), as well as shortages and excesses of some other forest communities*.

7. While continuing to enhance the potential for conifer establishment, reforestation practices that yield longer and more complex early seral stages of habitat development for certain plant and animal species will be used and will generally not include herbicides. The exception: current herbicide practices would continue to be used where prescribed by the agencies for the control of invasive and non-native or noxious weeds on O&C Lands to make room for native species.

8. The specific proposals offered by Forest Bridges are intended to provide continuing sustained yield forestry to renew sustainable forest habitats across the O&C Lands. These proposals also perpetuate dynamic ecosystem integrity and a full range of healthy/resilient wildlife habitats for the endemic native species (as they shift with climate change), while continuing to provide wood, non-wood and economic values. Managing under this paradigm to sustain the diverse range of wildlife and other biological habitats, over time and across the O&C Lands, is a sound basis for a sustained yield forest plan.

9. We believe that continuing active and passive management strategies can speed ecosystem restoration and fire resistance, to support the regular progression of forest aging and development while also adapting those strategies to climate change. The science of managing

for structural forest complexity is rapidly advancing and monitoring will help increase our understanding of the impact of actions taken and not taken.

10. Actions that create typically low, short-term risks or costs (such as thinning, smoke from beneficial prescribed fire, or other tools of fuel reduction) must be weighed against the potential for consequent long-term gains (such as the reduction of severe wildfire and avoiding protracted and hazardous smoke.)

11. Forest Bridges endorses agency management changes that mitigate for climate change and the risk of high severity wildfires through a combination of Cultural, professional and science-based practices.

## Recommended Approaches to Improve Management on O&C Lands

12. Our challenge is to describe an approach to active, long-term management of the O&C Lands that is constructive and viewed as reasonable from the perspective of all our partners and interest areas: Tribal Nations, ecological and climate resilience, legacy forests, wildlife and other biological habitats, timber and wood products production, county revenue expectations, recreation and other material and non-material values of the community at large.

13. An effective forest management plan for the O&C Lands should begin with long-range landscape visions for the dry, transitional and moist O&C forest lands, following the principles of comprehensive ecosystem management.

    13a. Dry Forests: Due to past fire suppression, ineffective forest management, and climate change, the dry forest is overstocked generally and needs immediate site-specific density and fuels management. This includes the reintroduction of prescribed fire and strategic thinning that sustains legacy, fire resistance, appropriate structural diversity, and the full range of wildlife habitats. (Will be further described on the website and is subject to refinement.)*

    13b. Transitional forests: These forests are intermediate in geographic location, moisture and other factors between the dry and moist forests. They behave like dry forests in severe fire conditions and many areas need thinning and prescribed fire to mimic a less frequent low severity fire pattern measured in decades rather than years. Some stands are more appropriate for moist forest treatment based on site specific characteristics, including moisture, lightning patterns, etc. (New category For Forest Bridges management proposals, needs further refinement in our public communications.*)

    13c. Moist Forests: A process to regularly create early seral habitat with legacy and to accelerate toward the goal of 50% structurally complex forest is needed to sustain a range of habitats and ecosystem functions in moist forests over time. (Will be further described on the website and is subject to refinement.)*

14. Adaptive management is critical to successful long-term forest sustainability. Adaptive management means applying the best Traditional Ecological Knowledge, Indigenous Science and Western Science to management actions; monitoring what was done and assessing the changes

over time; then comparing the results with predicted expectations. Future plans and actions are modified based on the comparison of expectations and results.

15. Prescribed fire, other fuel reduction practices, and management should emulate the role of low- and moderate-intensity fire on these O&C Lands, including the reintroduction and flexibility for increased cool season burning modeled after Native American Burning practices. These and other strategies are critical for landscape restoration and resilience. Fire will continue to be suppressed and managed as needed when it poses risk to neighboring properties in the checkerboard. (Specifics supporting increased cool season burning will be developed in partnership with Tribes.)*

16. Recovery and Restoration following wildfire: Future Forest Plans shall anticipate entry into burned stands following stand replacement wildfire. The Plans shall contain the flexibility to relocate multiple years of planned green forest harvest acreage allocations anywhere on agency O&C Lands in Western Oregon. These burned area restoration harvests shall use the same harvest and green tree retention standards as in respective dry, transitional and moist forest stands.

    The purpose is twofold: a) address a severe burn area, where a stand replacement fire resulted in high soil burn severity or killed at least 90% of the forest crown area and b) to minimize green forest harvest when time-sensitive restoration and recovery of burned areas is a higher priority.

    Harvest operations shall mimic the planned green harvest volume with respect to green tree retention. Recovery operations shall begin immediately after the fire, as substitute volume within a previously approved Forest Plan. Green trees in any severely burned unit scheduled for harvest should be prioritized for retention as legacy trees. Additional wildfire acreage burned above multiyear plan capacity shall be fast-tracked to capitalize on value, sustain habitats, including reforestation, and minimize future risk of reburn and landslides, using these same strategies.

    In case of especially large conflagrations the reallocation of green forest planned acreage to burned areas should not preclude continued high priority restoration and resiliency projects in the green forests. These projects increase short term harvest but reduce the potential impacts of future wildfires. Such “doubling up” of harvest during one planning cycle would have to be considered in volume available for harvest in subsequent forest plans or amendments.
    (New Principle, subject to refinement.)*

17. Achieving optimal watershed health requires management across whole watersheds, but this project focuses only on the O&C Lands as Forest Bridges’ area of focus and an achievable step forward. Future adaptive management will further restore and sustain habitats on the O&C Lands within these watersheds.

    17a. Habitat improvements on non-O&C Lands within the O&C checkerboard, beyond the requirements of applicable existing law, would be voluntary and require funding for commensurate compensation.

18. The historic, extensive valley bottom and midslope road systems in these lands impede watershed health and ought to be improved over time while right-of-way road access continues.

The historical natural range of variability of stream channel conditions should be locally optimized.

## Recommendations for Addressing Barriers to Improved Management on O&C Lands

19. Both before and since the Northwest Forest Plan was developed in 1993, adequate monitoring has not been achieved on the O&C lands. Dedicated and sufficient monitoring funds for an evaluative program must be provided. A diverse multi-stakeholder collaborative group should operate long-term on the O&C lands to support adaptive management by the land management agencies.

20. Liabilities: The Loss of neighboring property owner value in the course of diligently conducted prescribed fire and other fuel reduction activities shall be indemnified or fairly compensated by the responsible party for value lost. This applies to all landowners and agencies. Alternative tools to prescribed fire, to reduce fuels and the risk of neighbor exposure, would also be employed. (Specific proposals to be developed)*

21. Reallocations and additional appropriations for the managing agencies will be required to cover the cost of FB's new management programs, over and above the current level of agencies' funding. We call this additional funding, "Sustainability Funds". These include ongoing monitoring and associated research, increased legacy restoration, greatly increased frequency of fuel reduction such as thinning and beneficial prescribed burning, public safety and adaptive management programs (Costs to be determined.*)

22. Implementation of management activities will require a timely path through the legal system. Legal consistency standards among laws, plans, and proposed actions shall allow both legal challenge and a streamlined resolution process for timely implementation. (Specific proposals to be developed)*

23. Public access to the O&C Lands generally shall be a goal, supported by funding that includes on-the-ground human presence for increased public safety capacity. (Specific programs to be developed.)*

## Principles of Inclusive Operation

24. Forest Bridges shall implement Diversity, Equity and Inclusion policies throughout its organization and work. (This Principle is currently reflected in Forest Bridges' draft forest science policy papers and associated story maps (for public release via its website), as well as in its DEI statement, Bylaws, and human resource policies (currently under development or revision).*

25. Recognizing the historical importance of Traditional Ecological Knowledge (i.e., Indigenous Science) and use of beneficial prescribed fire/cultural burning as active forest management approaches to fostering a balance of forest habitats and sustainability of native species and cultures, Forest Bridges promotes their use in active forest management on the O&C Lands,

integrated with current ownership, laws, professional experience and co-management opportunities with the western Oregon Tribes.

* While all principles are subject to periodic update, an asterisk (*) marks principles that need further collaboration to reach broader consensus in the identified areas.