CENTRAL CASCADES FOREST MANAGEMENT PLAN



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- 1. Teanaway Community Forest Management Plan
- 2. Plum Creek Habitat Conservation Plan
- 3. Yakama Reservation Forest Management Plan
- 4. Yakima River Basin Integrated Water Resource Management Plan

About The Nature Conservancy in Washington

The Nature Conservancy is the world's leading conservation nonprofit organization, working in all 50 states and more than 60 countries. In Washington a 25-member volunteer Board of Trustees works with 65 staff members who are implementing innovative solutions to the most pressing conservation needs at a meaningful scale so that nature and people can thrive.

List of Acronyms and Abbreviations

DBH	Diameter at Breast Height
DF	Douglas-fir
FC	Federal Candidate
FCo	Federal Concerned
FE	Federally Endangered
FSC [®]	Forest Stewardship Council®
FT	Federally Threatened
ESU	Evolutionarily Significant Unit
Hwd	Hardwood
Mbf	Thousand Board Feet
NCF	Northwest Certified Forestry
NNRG	Northwest Natural Resource Group
РСТ	Pre-commercial Thin
SC	State Candidate
SE	State Endangered
SM	State Monitored
SS	Sitka Spruce
ST	State Threatened
ТРА	Trees Per Acre
WH	Western Hemlock
WRC	Western Red Cedar

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I. MANAGEMENT PLAN OVERVIEW



MANAGEMENT PLAN OVERVIEW

Vision

On December 18th of 2014, The Nature Conservancy purchased 47,921 acres of forestland from Plum Creek in Kittitas County for the purpose of safeguarding clean water, wildlife habitat and outdoor recreation.

These lands are intermingled with extensive federal and state ownership in a checkerboard pattern that is a legacy of the 19th Century.

We envision an expansive forest landscape for the future that is healthy and resilient to environmental changes, supports strong wildlife and fish populations, produces a sustainable supply of wood and clean water, and is recognized for its contribution to community vitality. The forest ecosystem should clearly be seen for its conservation significance and the value it brings to local communities through access to recreation, clean water, safety from catastrophic fire, and jobs.

These lands are irreplaceable habitat, with more than 1000 species of plants and wildlife, including iconic Pacific salmon, towering Ponderosas pines, wolverines, elk and 200 species of birds, including the northern spotted owl and many neo-tropical migrant species which use these forests as they migrate between the southern and northern hemispheres. Communities locally and across Washington State cherish these lands for the diverse array of recreational opportunities and iconic landscapes.

Community Outreach

The Nature Conservancy hosted four community public meetings with more than 300 attendees, presented to more than 35 clubs, groups, committees and associations, worked with local, county, state and congressional government leaders, received more than 1,200 survey responses, hired a community outreach coordinator in Cle Elum, and engaged in hundreds of additional conversations. While our primary purpose for the acquisition is conservation, we have learned of the importance that local and regional communities place on these lands for recreation and have strived to incorporate these recreational values into our management framework wherever possible.

Conservation Goals

Containing a significant portion of the Yakima River headwaters and connecting large, intact wilderness areas to the north and south, the Central Cascades Forest knits

together an enormous landscape of tremendous conservation value. However, wildfire suppression, intensive timber harvesting, mining and grazing throughout the 20th century have led to dramatic changes in these forests, contributing to increases in wildfire and insect and disease mortality, and amplifying risks to local communities, their water supply, timber production, wildlife habitat, and recreational opportunity. Our efforts to restore long-term forest health in an environmentally safe and economically sound manner will include selective harvest and thinning, tree-planting, brush control, and stream habitat improvement, all guided by the best available science and implemented in collaboration with tribal, public agency, and community partners. The Nature Conservancy's primary management goals include:

- 1. Improve landscape health and resiliency through active management, restoration, and stewardship of forest and stream habitats in a manner consistent with the objectives of the Tapash Sustainable Forest Collaborative (http://www.tapash.org/) and in coordination with landscape partners.
- 2. Increase habitat suitability and connectivity for fish and wildlife, and improve their ability to respond and adapt to a changing climate.
- 3. Improve the Upper Yakima Watershed's ability to store and deliver clean water for fish and wildlife, and downstream municipal and agricultural users.
- 4. Sequester carbon in growing forests, and reduce carbon emissions through decreasing the risk of uncharacteristically severe fire.
- 5. Produce income from sustainable forest harvesting to offset costs associated with land management and restoration.
- 6. Support a locally-sustainable natural resource based economy consisting of forest management and forest products, landscape restoration, and diverse recreation industries.
- 7. Improve human well-being in neighboring communities by providing outdoor recreational opportunities that are consistent with conservation objectives, reducing the risk of uncharacteristically severe fire, and maintaining access to resources that are important for sustaining tribal cultures.
- 8. Earn respect as exemplary land stewards from local communities and resource management partners, while also maintaining Forest Stewardship Council certification and Land Trust Accreditation Status.
- 9. Seek long-term ownership and management solutions for the forest that enhance conservation and community values.

Forestry Management Goals

The Nature Conservancy's goal is to restore the forests of the Central Cascades to be more resilient to fire, disease and a changing climate.

The forest comprises a wide range of forest types, from the moist western hemlock and silver fir forests near the Cascade crest to dry ponderosa pine forests in the eastern foothills and rich riparian forests growing along mountain streams. The majority of these forests are young plantations less than 40 years old. Older forests, greater than 80 years old, are found scattered across almost 20 percent of the area in riparian areas and other pockets where past harvesting was lighter and more selective. Weaving through this forest environment lays a web like network of 430 miles of road and nearly 50 miles of summer trails.

To restore the current landscape of dense and young forests active management will be used to develop a healthy and more resilient ecosystem that contains larger trees, more complex and variable habitats, and productive streams flowing with clean water. Active management is expected to include thinning in dense forest stands, logging to create openings and diverse forest structure, prescribed fire and management of forest fuels, planting to build forest diversity, repair of damaging roads and trails, and restoration of stream habitat complexity.

The forest management approach follows the principles of ecological forestry as originally developed by Jerry Franklin at the University of Washington and expanded upon by forest ecologists working throughout the Pacific Northwest.

Ecological forestry uses the structure, composition, and landscape pattern created by natural disturbances and other forest development processes as guide posts for management. It relies on the basic assumption that natural forest ecosystems provide and sustain the broad array of ecological functions that people currently want from many forests. Widely distributed large, old trees, provide a critical ecological backbone for forested landscapes. The goal is to restore and sustain core ecological functions while also providing for economic benefits and other social goods and services.

Working with partners in the Tapash Sustainable Forest Collaborative, The Nature Conservancy's ecologists and foresters will follow the principles of ecological forestry to develop on-the-ground harvest prescriptions and restoration treatments. The Central Cascades Forest will be managed under a certificate of the Forest Stewardship Council, which ensures that our practices meet an international standard of sustainable forest management. Under agreement with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service all forest management will also meet or exceed the requirements of a federal Habitat Conservation Plan designed to conserve a suite of threatened or endangered fish and wildlife species.

Recreational Access

The Central Cascades Forest is a haven for year-round recreation. With nearly 49,000 acres of land in six different geographic regions and 124 miles of designated summer and winter trails, there is ample opportunity for a diverse array of non-motorized and motorized activities. Recreation on The Nature Conservancy's managed land includes, but is not limited to, hiking, bird watching, horseback riding, off-road vehicle riding, mountain biking, skiing, snowmobiling, snowshoeing, dog sledding, and other activities such as hunting, fishing, subsistence gathering, nature and wildlife viewing, and spiritual ceremonies.

The Nature Conservancy has been working with local communities and partners since the acquisition to develop a shared vision for the future of the landscape – a vision that protects nature and supports sustainable recreation. The Conservancy believes that well-managed recreational activities and responsible use can be consistent with the primary objectives of the Central Cascades Forest.

There is no fee for recreational access. Hazards exist, however, so recreationists must use caution and enter at their own risk. In particular, the Central Cascades Forest is a working forest with ongoing logging and land management activities that may pose a danger to recreational users. Recreationists must pack out all garbage and follow Leave No Trace practices across the landscape to protect natural resources, fish, and wildlife.

Here's an outline of recreational uses.

Permitted:

- 1. Non-motorized use on all lands, throughout the year, unless otherwise posted. The Nature Conservancy encourages non-motorized users to stay on roads and trails unless the activity involves cross country travel such as hunting, collecting forest products, or winter travel with adequate snow cover.
- 2. Mountain bikes must stay on designated trails and roads to reduce impacts to soil, vegetation, and wildlife.
- 3. Wheeled motorized use only on open roads and trails authorized for their use. Off-road and off-trail use damages natural resources and disturbs wildlife and is strictly prohibited. Access is prohibited beyond a closed road or trail, even if a gate or sign has been vandalized.
- 4. Snowmobiles and other over-snow vehicles on groomed trails authorized for their use and cross country with adequate snow cover, unless otherwise posted.
- 5. Hunting and fishing in accordance with relevant state laws.
- 6. Dispersed camping, following Leave No Trace parameters, consistent with policies of the Okanogan-Wenatchee National Forest.

- 7. Campfires in accordance with local and state fire restrictions and in compliance with policies outlined by the Conservancy.
- 8. By permit only—noncommercial collection of firewood and non-timber forest products like mushrooms or cones.

Recreationists can access 124.4 miles of authorized summer and winter trails. This includes the following:

- a. 78.3 miles of groomed winter trails
 - i. 73.5 miles of groomed snowmobile trails. These trails are open to non-motorized users as well.
 - ii. 1.4 miles of a groomed dog sled trail system that falls within an area that is voluntarily non-motorized.
 - iii. 3.4 miles of groomed cross country ski trails that are open to nonmotorized users. Dogs aren't permitted on these trails.
- b. 46.1 miles of summer trails
 - i. 1.8 miles of hiking only trails.
 - ii. 12.6 miles of user-made non-motorized trails on the Cle Elum Ridge, including the popular Rat Pac mountain bike trail.
 - iii. 29.5 miles of single track motorcycle trails. These trails are open to non-motorized users as well.
 - iv. 2.2 miles of a regional jeep trail in Little Naches that has historical significance. This trail is open to ATV's, motorcycles, and nonmotorized users as well. It is the only trail or road on Nature Conservancy property that is open to ATV's.

Not Permitted:

- 1. Target shooting and trapping is prohibited year-round.
- 2. Wheeled motorized use will continue to be prohibited on Cle Elum Ridge. Exceptions to this closure are Forest Service roads 4305, 4305-118 and Forest Service Trail #1340/Sasse Mountain Trail.
- 3. Permanent and semi-permanent camping structures or cabins (e.g., hunting or camping cabins) are prohibited from being constructed within the Central Cascades Forest and if found will be removed.

Get Involved

If you are interested in learning more about these lands, please visit:

- Learn more about the Central Cascades:
 <u>www.washingtonnature.org/centralcascades</u>
- Join other talented volunteers for these lands: www.washingtonnature.org/volunteer

II. INTRODUCTION AND MANAGEMENT OBJECTIVES



INTRODUCTION

On December 18, 2014 the Central Cascades Forest LLC (CCF LLC) acquired 47,921 acres from PlumCreek Timber Company, Inc. in Kittitas and Yakima Counties, Washington. The CCF LLC is a private limited liability company comprised of multiple equity investors. The Nature Conservancy (the Conservancy) is both an investor and member of the CCF LLC and, importantly, is the member responsible for managing the property, including all forestry operations and restoration activities.

The acquisition of the Central Cascades Forest from Plum Creek Timber in 2014 was part of a much larger transaction including an additional 117,152 acres in Montana and known as the Great Western Checkerboards Project. Both transactions targeted large "checkerboard" ownerships located within landscapes of regional and global conservation significance - the Cascade Range, and the Blackfoot River Valley/Crown of the Continent. The checkerboard ownership pattern is a relic from 1862 when Congress gave alternating sections of land to the Great Northern and Northern Pacific Railroads to incentivize development of the western United States. Today, these lands are intermingled with extensive federal, state, and tribal ownerships creating a nightmare for land managers and bringing uncertainty to local communities. The Great Western Checkerboards Project will serve to consolidate ownership and prevent fragmentation of these forested landscapes, improving connectivity for wildlife, and supporting collaborative efforts to restore resilient forest ecosystems. The project also serves to provide important benefits to local communities through enhancing public access and recreation, and establishing sustainable management partnerships that can provide jobs, a clean supply of water, and lowered risk from large uncharacteristic forest fires well into the future.

The Conservancy is a tax-exempt 501(c)(3) organization, incorporated in the District of Columbia, and managed from its worldwide office in Arlington, Virginia. The Conservancy works in all 50 states and in more than 35 countries worldwide and is governed by a volunteer Board of Directors that bears ultimate responsibility for all of the Conservancy's operations. The Conservancy's Washington program fulfills the Conservancy's responsibility, as a member of the CCF LLC, for managing the forestry operations and restoration activities of the former Plum Creek lands, including those subject to a federal Habitat Conservation Plan (HCP). The Conservancy currently manages over 300,000 acres of working forest across the United States and over 70,000 acres in Washington.

The forest management plan that follows outlines the Conservancy's goals, objectives, policies, and direction for managing property held within the CCF LLC. The plan is written to be consistent with existing policies and regulations including the Washington Forest Practice Rules, a federal HCP, and standards and criteria adopted

by the Forest Stewardship Council (FSC). In response to lessons learned, changes in ownership and the environment, and community input, the plan is intended to be a living document that will adapt over time.

a. Conservation Significance

Containing a significant portion of the Yakima River headwaters and connecting large, intact wilderness areas in the north and south Cascades, the Central Cascades Forest contain tremendous conservation significance. In concert with the Yakima Basin Integrated Plan and the Interstate-90 wildlife passage project, the Central Cascades Forest represents one of the last substantial, unprotected links in the greater Eastern Cascades Ecoregion. These lands support critical habitat for a range of threatened and endangered species including northern spotted owls, bull trout, steelhead, gray wolves, and grizzly bears. They are also critical to municipal (e.g., City of Roslyn) and agricultural water supplies throughout the Yakima Basin. The entire Central Cascades Forest is also within the geographic bounds of the Tapash Sustainable Forest Collaborative and will contribute to the Collaborative's goals of restoring healthy and resilient forests and streams across the Central Cascades region.

b. Community Significance

Located in close proximity to neighboring communities and easily accessed from I-90, the Central Cascades Forest benefits people across the state. From nearby towns that rely on jobs the forest provides, to communities across the state that depend upon agricultural products the Yakima River Valley yields, the Central Cascades Forest has statewide significance. The diverse array of recreational activities across the landscape generates income for local communities, and enjoyment for locals and visitors alike. From hunting and fishing to cross country skiing, and motorcycling to wildlife viewing and photography the recreational opportunities are endless. Active forest management including logging and restoration will help to improve forest health and reduce the risk of catastrophic wildfires, protect clean water for people and agriculture, and safeguard these iconic forestlands. Economic benefits will also transpire from improved forest conditions including increased fish harvest and recreational use. Conservation of this hard working forest ensures present and future generations will continue to benefit from the many resources it provides for years to come.

c. Habitat Conservation Plan

In 1996 Plum Creek Timber Company established the Central Cascades HCP with the US Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS), which subsequently issued Plum Creek an Incidental Take Permit (ITP) for lands including those now located within the Central Cascades Forest. Further amended in 1998 and 2000, the HCP is designed to provide regulatory predictability and flexibility to manage commercial timberlands, with those lands also providing a meaningful contribution to the conservation of the Northern spotted owl (*Strix occidentalis caurina*), Grizzly bear (*Ursus arctos*), Gray wolf (*Canis lupus*), Bull trout (*Salvelinus confluentus*), Mid-Columbia steelhead (*Oncorhynchus mykiss*), and Canada lynx (*Lynx canadensis*). The HCP also provides general lifeform and habitat targets to cover all vertebrate species, with the intention that additional species may not need to be listed in the future.

The CCF LLC is assuming Plum Creek's HCP as part of ITP applications with USFWS and NMFS. The HCP and ITP will provide the Conservancy management predictability and flexibility. However, the Conservancy considers the HCP protections and habitat, structure, and lifeform targets to represent "conservation minimums" to be met or exceeded.

d. Overarching Conservation Goals

In managing the Central Cascades Forest, the Conservancy and CCF LLC have adopted the following goals which highlight the protection and restoration of conservation values, but include other community and economic values.

- 1. Improve landscape health and resiliency through active management, restoration, and stewardship of forest and aquatic habitats in a manner consistent with the objectives of the Tapash Collaborative and in coordination with landscape partners.
- 2. Increase habitat suitability and connectivity for fish and wildlife, and improve their ability to respond and adapt to a changing climate.
- 3. Improve the Upper Yakima watersheds ability to store and deliver clean water for fish and wildlife, and downstream municipal and agricultural users.
- 4. Sequester carbon in growing forests, and reduce carbon emissions through decreasing the risk of uncharacteristically severe fire.
- 5. Produce income from sustainable forest harvesting to offset costs associated with land management and restoration.

- 6. Support a locally-sustainable natural resource based economy consisting of forest management and forest products, landscape restoration, and diverse recreation industries.
- 7. Improve human well-being in neighboring communities by providing outdoor recreational opportunities that are consistent with conservation objectives, reducing the risk of uncharacteristically severe fire, and maintaining access to resources that are important for sustaining tribal cultures.
- 8. Earn respect as exemplary land stewards from local communities and resource management partners, while also maintaining FSC certification and Land Trust Accreditation Status.
- 9. Seek long-term ownership and management solutions for the forest that enhance conservation and community values.

e. Guiding Principles

To accomplish these goals the Conservancy's management will be guided by the following management principles:

- 1. Conservation is our primary goal.
- 2. To improve landscape health we will focus our management on addressing what we recognize as the primary threats to the landscape and its resilience:
 - a. Altered forest structure and density,
 - b. Altered disturbance regimes, particularly fire,
 - c. Increased water runoff and sediment delivery to stream systems from roads and trails,
 - d. Altered instream habitat and disconnection of stream systems from their floodplain,
 - e. Habitat fragmentation and decreased connectivity across the landscape for wildlife,
 - f. Invasive species, and
 - g. Maintaining the human community's strong connection to the land while managing competing interests and desires for the landscape.
- 3. Our management will use best scientific thinking and principles, including following an adaptive management framework which incorporates monitoring the results of management actions.
- 4. We believe active management is necessary and appropriate for improving forest and landscape health, and expect active management to include, but not be limited to;
 - a. Forest management, including: thinning, selective harvest, tree-planting, and brush control and slash management,

- b. Maintenance and improvement of roads and trails, and removal and construction where appropriate,
- c. Prescribed fire and the creation of fuel breaks,
- d. Invasive species control,
- e. Improving habitat complexity in aquatic systems through reconnecting streams to their floodplain and selectively placing large wood in streams, and
- f. Managing human recreation and access.
- 5. Landscape health cannot be accomplished on a single ownership especially under a checkerboard ownership configuration our management will therefore strive to:
 - a. Compliment and be coordinated with adjacent landowners (WDFW, USFS, DNR),
 - b. Align with the Tapash Collaborative as a framework for coordinating and leveraging management, and
 - c. Respect the Yakima Nation's legal and cultural right to continue traditional uses of the land.
- 6. It's important to the community and we believe that appropriately managed recreational use can be consistent with meeting our conservation objectives.
- 7. We must prioritize our management actions as they are timing and resource dependent.
- 8. The health of the local economy is important to the long-term stewardship of these lands and we will support through using local resources as much as possible.
- 9. Sustainable solutions to forest management and ownership will come through open and extensive dialogue with the local communities and partners who will live within and steward these lands well into the future.

According to the management structure in place for the Central Cascades Forest, the CCF LLC Board of Directors must approve the annual work-plan and budget as presented and recommended by the Conservancy and all management decisions that could affect the material value of the property, the company's liability, or otherwise impact financial or reputational risk.

f. Vision for the Landscape

The Conservancy and CCF LLC envision an expansive forest landscape for the future that is healthy and resilient to environmental changes, supports strong wildlife and fish populations, produces a sustainable flow of wood and clean water, and is recognized for its contribution to community vitality. The forest ecosystem should

clearly be seen for its conservation value and the value it brings to local communities through access for recreation, clean water, safety from catastrophic fire, and jobs.

A primary factor triggering the CCF LLC's acquisition of the Central Cascade Forest was the "checkerboard" nature of the property which decreased natural and human connectivity, and hinders the coordinated management and restoration across the landscape. Through acquiring the land, managing for forest health and resilience, and increasing community dialogue the Conservancy and CCF LLC also hope to accelerate realization of the vision adopted by the Tapash Sustainable Forest Collaborative – a partnership between the Conservancy, U.S. Forest Service, Washington Department of Natural Resources, Washington Department of Fish and Wildlife and the Yakama Nation (http://www.tapash.org/):

The Tapash Sustainable Forest Collaborative is working to improve ecosystem health and natural functions of the eastern Cascades landscape through the use of the best available science, community input and adaptive management.

As stated in the 2007 Memorandum of Understanding forming the Collaborative:

The members of the Tapash Sustainable Forests Collaborative recognize the underlying ecological unity of the landscape that has been divided into administrative boundaries that currently limit the ability to plan and work at the landscape scale. The Tapash Sustainable Forest Collaborative members have an interest in working at the landscape scale and across administrative boundaries to achieve their mutual goals.

LAND OWNERSHIP: FORESTS FOR OUR FUTURE

F





III. GENERAL DESCRIPTION OF THE PROPERTY AND MANAGEMENT CONTEXT



GENERAL DESCRIPTION OF THE PROPERTY AND MANAGEMENT CONTEXT

a. Landscape Setting and Context

The Central Cascades Forest is located along the foothills of the eastern slopes of the Cascade Mountains to the south and north of I-90 immediately west of the town of Cle Elum. The headwaters of multiple tributaries to the upper reaches of the Yakima River are spread across the property. These tributaries include the West Fork of the Teanaway, Cabin Creek, Little Naches River, the North Fork of Taneum Creek, as well as the basins surrounding Keechelus and Kachess Lakes. Also included within the Central Cascades Forest is a forested block along Highway 410 south of Cliffdell, east of Yakima.

Elevation of the Central Cascades Forest and surrounding lands range from over 6,000 feet near Stampede Pass and along the upper Manastash Ridge, down to 1,900 feet around Cle Elum. This elevation gradient combined with the effects of the Cascade Range rain shadow influences the range of climatic conditions across the management area. The area's climate is warm and dry in the summer, and cold and wet in the winter. The geology is complex and derived from a combination of sedimentary and glacial deposits, volcanic, and metamorphic formations.

Mature to old Ponderosa pine and Douglas-fir forests were characteristic of this firedisturbed area in the eastern slopes of the Cascades prior to European settlement. These forests were historically adapted to "high frequency/low intensity" fires that maintained an open structure and supported thousands of species of plants and wildlife. Forest habitat types across the Central Cascades Forest range from dry, pinebased lowland forests to wet, higher elevation grand fir based forests. Deer are abundant in the area year-round, as are a population of 16,000 elk in Kittitas County, both of which use the forest for important wintering and calving grounds. Two hundred species of birds, including many neo-tropical migrant species utilize forest habitat in this area. Other wildlife species include cougars, black bears, and spotted owls. One of the state's gray wolf packs may also occupy the forest landscape.

With over 390 miles of streams and river, the Upper Yakima watershed supported large populations of salmon, steelhead, and bull trout for millennia, but numbers have declined steeply over the past 50 – 100 years. The tributaries within the Upper Yakima watershed are critical to the recovery of the Yakima River steelhead run by providing some of the highest quality streams and cold water fish-spawning and rearing areas in the Yakima Basin. It also provides critical habitat for potential bull trout recovery.

Recent restoration efforts have helped to increase the number of spring Chinook and steelhead in the Teanaway River basin.

Humans have inhabited the area for over 11,000 years. For many generations, multiple bands of Native Americans lived, hunted, fished, and gathered plants throughout the region. The Central Cascades Forest is within an area ceded by the Yakama people to the federal government under the Treaty of 1855, which allowed Yakama tribal members to continue to conduct their "usual and accustomed practices" across these lands.

Agricultural uses, mining, and timber harvesting began in the area as populations of European settlers pushed west in the late 1800s. Timber harvesting began early in the 1900s, and multiple mills and lumber companies sprang up to take advantage of the plentiful resource. Today, water from the Upper Yakima River supports a \$1.8 billion dollar agricultural industry within the Yakama Valley, and the valley has become the second most productive agricultural region in United States., supporting the production of apples, grapes, hops, dairy, tree fruits, and potatoes. The Yakima valley yields 75 percent of all hops grown in the United States., and is home to over 50 wineries.

The upper Yakima watershed has provided a diversity of recreational opportunities to generations of Kittitas County residents and other Washingtonians, including: fishing, hunting, hiking and mountain biking, skiing, wildlife watching, horseback riding, snowmobiling and off-road vehicle use. Outdoor recreation provides a significant contribution to local economies.

b. Ownership & Site History

i. Ownership

Previous ownership of the Central Cascades Forest threads through the various successors of the 1864 Northern Pacific Land Grant, a checkerboard ownership pattern of square mile sections of forestland interspersed between U.S. Forest Service lands and other public lands. The land grant was authorized by the U.S. Congress to facilitate an expansion of the Northern Pacific Railway from Lake Superior to Puget Sound. Instead of direct public funding for the line, the land grant was intended to underwrite the expenses of the rail line. For every mile of completed track, Northern Pacific received every other square mile section in a corridor spanning 40 miles on either side of the track (25,600 acres of land/mile). Ultimately, the land grant transferred 40 million acres in a checkerboard swath from St. Paul to Seattle – 2 percent of the landmass of the contiguous United States.

Plum Creek managed their checkerboard holdings for 25 years, having taken over ownership of the property in 1989 when the timber company was spun off from Burlington Northern. At the time, Plum Creek managed 355,000 acres throughout the Washington Cascades. Burlington Northern had taken on ownership of the lands with the 1970 merger of Northern Pacific and Great Northern railways. Other parcels outside of the original checkerboard were amassed through land exchanges in the 1990s and 2000s as Plum Creek and public land managers sought to consolidate their ownerships. The Central Cascades Forest property is currently under single ownership with no subdivisions or plats filed

ii. Site history

The patchwork quilt of lands comprising the Central Cascades Forest is interwoven into the rich history of the Pacific Northwest and the heritage of the United States. A landscape of rugged mountains and gentle passes was uniquely suited to serve as a transportation corridor, and the land itself has provided the raw materials of timber, coal, and water used to build infrastructure and fuel commerce on both sides of the Cascades.

Trade routes crossing Naches and Snoqualmie Passes connected the native peoples of Puget Sound to those of the Columbia Basin. In the 1840s and 50s, the first pioneer wagon trains traveled up the Naches and Little Naches Rivers over Naches Pass to the fledgling settlements along the Sound. In short time, railroads established the transcontinental routes that were later augmented by state highways and today's interstate highways. The Central Cascades Forest and surrounding lands



Figure III-1. A horse team pulls ~2,250 board feet of Ponderosa pine and Douglas-fir on runners for the Roslyn Lumber Company near Cle Elum Lake; close to the CCF Cle Elum Ridge management block. *Photo courtesy of the Washington State Library and Roslyn Public Library, early 1900s.*

connected the settlements of the Pacific to the rest of the continental United States and in turn connected the coastal states to the trade routes of Asia Pacific.

While much of its eastern holdings were sold to fund the railroad, Northern Pacific recognized the value of the Cascades forests and kept much of the timberland on the western end of the land grant. "These magnificent fir forests, adjacent to the Northern Pacific Railroad, are not only the wonder of travelers, but, what is more

the present point, they constitute an element of vast wealth to the Company, and hence of security to its creditors." (*Charter of the Northern Pacific Railroad Company*, 1865) In the late 1870s Northern Pacific began harvesting timber on its lands, including the Central

Cascades Forest, to supply lumber for extensive railway infrastructure and commodities. Logging camps were established



Figure III-2. Frederick Krueger Photographs. Paper 251. Elsner brothers, Rudolph and Adolph, bucking a tree at Teanaway in upper Kittitas County, Washington. *Photo courtesy of Central Washington University, "Logging"* 1930.

along Lake Keechelus, Lake Kachess, and Cle Elum Lake and sawmills soon followed.

In 1903, Yakima businessmen formed the Cascade Lumber Company. By then, the small mills cutting lumber in the communities of Wenas and Cowiche were no longer viable, as the easily accessible pine forests had all been harvested. Since hauling logs by wagon to mills proved uneconomical, the new Cascade mill was fed by logs floated down the Yakima and Teanaway Rivers. Annual drives occurred during spring high water. In other watersheds, sawmills and boxmills were established along tributary creeks, and logs were skidded out for railroad ties. For instance, a spur track of the railroad was built up the Taneum in 1928 and operated through the mid-1930s. In 1957, Cascade Lumber Company merged with the Boise Payette Lumber Company to form Boise Cascade. In the Taneum watershed, large-scale timber harvest began in the mid-1950s. By 1986, about 30 percent of the Taneum Basin had been harvested, with more intensive partial and clear-cut harvesting in the upper watershed since then.

Much of the early timber logged in Kittitas County was cut into railroad ties, as well as to build mills to manufacture ties and supply lumber for coal mine construction, to build housing for workers, and sold as raw material for commodities for the growing settlements. Construction of the Northern Pacific railroad spurred development of upper Kittitas County and the Northern Pacific land grant has been attributed with having great influence on the modern timber industry of Washington. The land grant spurred the formation of large private timber companies such as Weyerhaeuser, Plum Creek, Champion International, and Boise-Cascade; and provided the



Figure III-3. Passenger train on the Chicago Milwaukee and St. Paul Rail Way near Hyak, Washington. The railway roadbed is now part of the John Wayne Pioneer Trai, close to the Keecheulus/Kaches CCF management block. *Photo courtesy of the Washington State Historical Society, taken by Asahel Curtis, August 23, 1923.*

infrastructure to change the scale and practices used in the industry. In 1900, Norther Pacific sold 900,000 acres of its land in Washington to Frederick Weyerhaeuser; it was the largest private land transaction in America at the time.

Prior to the railroads, logging had been limited to a slow harvest of trees within reach of waterways. Railroads brought steam engines and spur lines up such valleys as the Teanaway, Swauk, Manastash, and Taneum. In 1900, the Little Naches Basin had no developed roads and only a few wagon trails. Before 1962, there were 25 miles of road in the basin, by 1990 there were 280 miles of road constructed. Road densities in 1990 ranged from 0.6 to 5 mile/mile². Before 1963, the rate of timber harvest was minimal. Between 1963 and 1975, however, 17 percent of the available harvestable acres in the Naches Basin were cut. Then, in 1975, clear-cut harvesting began in the lower basin. Clearcutting on private checkerboard lands in the headwaters started in 1985. By then, 26 percent of the harvestable acres in the basin had been cut, increasing to 35 percent by 1992.

The forests of the Central Cascades were also integral for regulating the flow of water to the farms of Kittitas and Yakima Valleys. The first irrigation ditches were dredged as homesteads were established in the 1860s. Homestead communities dredged channels, such as the Taneum Ditch (completed in 1873) to provide irrigation for the croplands along Taneum Creek and the lower Yakima Valley. Rapid expansion of irrigated agriculture was the turning point for economic development in the Yakima Basin.

By the early 1900s, the Kittitas Reclamation District and U. S. Bureau of Reclamation supported the Kittitas Division of the Yakima Project completing a canal from the Yakima River, just above Easton. Reservoirs were created at Kachess in 1912, Keechelus in 1917, and Cle Elum in 1933. Once the Kittitas Project had been completed, the federal government solicited settlers to use the water and transform sagebrush into cash crops. When full irrigation became available, existing farms were able to produce much more. Irrigated farmland was soon producing pea seed for commercial growers, sweet corn, potatoes, tree fruit, and hay.

The Yakima River once supported large runs of anadromous salmonids, with estimated runs of 300,000 to 960,000 fish a year in the 1880s. These numbers have declined drastically, and three salmon species were extirpated from the basin – sockeye, summer Chinook, and Coho. The collapse of the fishery is the result of many activities across the watershed. The storage dams on the four natural glacial lakes eliminated access to previously productive spawning and rearing habitat for sockeye, spring Chinook, Coho, steelhead salmon, and resident fish populations such as bull trout. Irrigation operations also altered stream flows, resulting in flows at certain times of the year that are too high in some reaches and too low in others to provide good fish habitat and create fish-passage barriers. Conditions outside the Yakima River Basin also affected Yakima anadromous fish populations, including the Columbia River dams, and historic fishing pressures in the Columbia River and Pacific Ocean.

iii. State of the timber industry in the Central Cascades

The timber industry remained small in Central Washington through most of the 1800's existing mainly as independent operations that served railways and local building needs. However, the rapid growth of the agricultural industry, created a requirement for storage and transportation containers for which Ponderosa pine, which was abundantly available, proved to be uniquely suited. In response to market opportunity, sawmills were constructed and began producing box shook. This market, coupled with burgeoning regional demand for building materials, provided for the initial establishment of the forest industry in Central Washington.

Timber harvest in the Central Washington counties of Klickitat, Kittitas, and Yakima has declined in recent decades. Washington Department of Revenue records indicate that in the late 1980s, the counties produced a combined average of 300,000 mbf to just over 100,000 mbf in 2008 (these figures exclude Yakama Forest Products volume). Preceding the decline in volume, there has been a loss of mills in Central Washington. Decades ago, the smaller and less-efficient mills went out of business and operations were consolidated with the merger of timber companies. In 1947, at the height of mill distribution, there were 14 sawmills in Kittitas County, and 59 sawmills across the three Central Washington counties. With the closure of the three Boise Cascade mills at Yakima and the Layman mill at Naches in 2005-2006, a threshold was reached, and a decline in regional log markets became inevitable. Today there are no sawmills left operating in Kittitas County and only three in Yakima and Klickitat Counties. Yakama Forest Products (YFP), owned and operated by the Yakama Indian Nation, has two mills in Yakima County; one for large logs and one for small logs. These mills are unique in that they typically source timber supplies from reservation lands rather than from open market purchases. SDS Lumber in southern Klickitat County runs the last private sawmill in Central Washington. As mills become more distant, the net returns from log sales have become increasingly marginal. For some areas far-removed from mills, such as Kittitas County, real log values may no longer support forestry investment.

Declines in timber harvest and disappearance of sawmill capacity are not the only symptoms of infrastructure decline. Harvest and hauling contractors have become scarce as well. In 2009, there were 8 independent loggers and 17 log truck drivers in Kittitas County, as per the membership rolls of the Washington Contract Loggers Association, the Log Truckers Conference of the Washington Truckers Associations, and the Northwest Log Truckers Cooperative. In Yakima County there are only 5 independent loggers and 11 truck drivers.

c. Biophysical environment

The management blocks of the Central Cascades Forest are: the Keechelus/Kachess, Cabin Creek, Little Naches, Cle Elum Ridge, Taneum, Manastash, and Naches River. The distance between the northwestern corner of the Keechelus/Kachess block near Stampede Pass and the southeastern blocks of Manastash and Naches River spans more than 30 miles and crosses a biophysical gradient of marked contrasts. The Central Cascades Forest encompasses several ecoregions differing in physiography, geology, soils, climate, species composition, and disturbance patterns. Discussion of specific elevation, slope, drainage and erosion conditions for each ecoregion are presented in Appendix D: Watershed Summaries.

i. Physiography, Geology and Soils

The landforms of the Central Cascades Forest represent a complex geologic history dominated by glaciation and volcanic processes and the Central Cascades Forest is situated within a transition zone of geological processes.

South of Stampede Pass the land is underlain by andesitic and basaltic lava and other volcanic rock - igneous and metamorphic rocks of varying ages. The Southern Washington Cascades province (part of the Cascades ecoregion) extends south of Snoqualmie Pass to the Columbia River. Andesite and basalt flows dominate the formations with only minor amounts of igneous intrusive, sedimentary, and metamorphic rocks. They include the Naches Formation, deposited largely south of Kachess Lake that consists of basaltic lava flows and interbeds of sandstone. The area is characterized by ridge crests separated by deeply dissected steep valleys. The soils of the province are derived from basalt and andesite and are generally characterized by a reddish-brown loam. Soils to the east of the Cascade crest are largely Haploxeralfs (Noncalcic Brown soils) and Haploxerolls (Chestnut soils), and are derived from andesite, sandstone, and some glacial till, all influenced by volcanic ash.

North and east of Stampede Pass the mountains are part the North Cascades uplift. The North Cascades ecoregion, or province, extends from Snoqualmie Pass to the Canadian border. The province is a topographically mature area of great relief. Valleys are uniformly very deep and steep sided. Glaciers scoured these areas, and the valley bottoms are filled with debris from terminal moraines that formed Keechelus, Kachess and Cle Elum lakes. The gradual uplifting of the Cascade Range, intermixed with intrusions of granite, granodiorite, and quarter diorite, along with volcanic andesite flows and extensive glaciation, have produced a soil pattern across the North Cascades province that is bewildering in complexity. Soils east of the Cascade crest reflect the drier conditions under which they were formed. Most abundant are Haploxerolls (Chestnut soils) formed on a variety of parent materials but generally influenced to some extent by volcanic ash and, in some areas, loess. Textures range from stone-free silt loams to very cobbly loams. Other soils present in the eastern portion of the province include Xerochrepts (Regosols) and Haploxeralfs (Noncalic Brown soils).

ii. Landscape ecology

The Central Cascades Forest is distributed across three ecoregions: North Cascades, Cascades, and the Eastern Cascades Slopes and Foothills. Ecoregions reflect broad ecological patterns occurring on the landscape and have in common climate, landform, soil, hydrology and a distinctive composition of plant and animal species. The Keechelus/Kachess and Cle Elum Ridge management blocks are situated in the North Cascades ecoregion, characterized by glaciated valleys and narrowcrested ridges punctuated by rugged relief peaks. Ponderosa pine, Douglas-fir, grand fir and subalpine fir form major forest zones on the drier east side of this area, whereas Pacific silver fir, mountain hemlock, western hemlock and western red cedar form prominent forest zones in the maritime areas to the west.

The Cabin Creek and Little Naches management blocks are within the Cascades ecoregion and have more gently undulating terrain than that of the North Cascades, influenced by volcanic activity. The dominant species is Douglas-fir, while Pacific silver fir and noble fir are prevalent at mid-elevations, and mountain hemlock, subalpine fir, and Engelmann spruce are common at higher elevations.

The Taneum, Manastash and Naches River management blocks are part of the Eastern Cascades Slopes and Foothills ecoregion that formed through tectonic uplift with mountain ranges and valleys orientated north-to-south and is a relatively young ecoregion with lava flows of andesite basalt. The dominant tree species is ponderosa pine.

iii. Climate

The elevational gradient, combined with the effects of the Cascade Range rain shadow, influences the range of climatic conditions across the Central Cascades Forest. Precipitation varies greatly within the area and influences the plant communities. Mean annual precipitation ranges from 140 inches near the Cascade Crest to 20 inches near Manastash Creek; the majority of the annual precipitation falls from October to March, both in the alpine and dry forests of the Central Cascades.

The Keechelus/Kachess, Cabin Creek, and Little Naches management blocks are just east of the Pacific Crest and experience more alpine conditions. The average maximum monthly temperatures at Stampede Pass range from 29.1 to 65.2° F. The lowest average monthly minimum temperature is 21.0°F. Average annual precipitation totals 87.8 inches with an annual average snowfall of 439.3 inches (1944 to 2012 period of record, Western Regional Climate Center, 2012). Mountainous areas in the Upper Yakima and Naches basins receive most of their precipitation in the form of snow from November to March, and as rain during the rest of the year. Snowpack is generally retained through late spring with isolated areas of perennial snow fields remaining all year in the mountains. Chinook winds (i.e., warm air that descends down the eastern slopes of the Cascades) and rain-on-snow events often cause rapid melting of the snowpack, which can lead to severe soil erosion and stream channel flooding in the valleys.

Near the Cle Elum Ridge and Taneum management blocks at Cle Elum, average maximum monthly temperatures ranged from 34.8 to 81.4°F. The lowest average monthly minimum temperature was 19.8° F. Average annual precipitation totaled 22.51 inches with an annual average snowfall of 83.3 inches (1899 to 2012 period of record).

d. Yakima watershed and irrigation supply

The Yakima River from its headwaters to its mouth at the Columbia River is 214 miles long; the longest river in Washington state. The Yakima River Basin consists of approximately 6,150 square miles largely in Kittitas and Yakima counties and parts of Benton and Klickitat counties. It is bounded by the Cascade Mountains on the west, the Wenatchee Mountains on the north, Rattlesnake Mountain and the Rattlesnake Hills on the east, and the Horse Heaven Hills to the south. The Yakima watershed is designated into three Watershed Resource Inventory Areas (WRIA) by the



Figure III-4. Yakima River Watershed

Washington Department of Ecology, they are; the Upper Yakima Basin (WRIA 39), above the confluence with the Naches River, the Naches basin (WRIA 38), and the Lower Yakima Basin (WRIA 37). The Central Cascades Forest is primarily within the Upper Yakima Basin and drains five of its 17 subbasins. The Keechelus/Kaches and Cabin Creek management blocks are within the Easton subbasin. The Cle Elum Ridge management block drains part of the Lake Cle Elum and Elk Heights subbasins. The Taneum management block drains the Taneum Creek subbasin, while the Manastash management block drains the Manastash Creek subbasin. The Little Naches and Naches management blocks drain through the Naches basin that flows into the Yakima River just north of the city of Yakima. Water is arguably the most important, and most limited, natural resource within the Yakima watershed. It is integral to the agricultural and recreational industries of Yakima and Kittitas counties, the region's growing communities, and for sustaining the ecosystems that support fish and wildlife. The Yakima Basin currently relies on snowpack for a substantial part of water storage that then feeds into basin streams and rivers as melt occurs. The snowpack is forecast to shrink in the decades ahead due to warming from climate change. Demand for water consistently outstrips the supply needed to irrigate crops, to meet the needs of a growing population, and to rebuild depleted fish stocks.

Formerly containing over half a million acres of sagebrush shrub steppe, the Yakima watershed today has 464,000 acres of irrigated cropland. Today, the nearly 500,000 acres of irrigated cropland principally produces fruit-including apples and wine grapes, vegetables, forage-including timothy hay, mint and hops. The agricultural industry is significant regionally, nationally, and internationally. Yakima County ranks first among all counties of the United States in the production of apples, mint, and hops. Irrigation has made the Yakima basin one of the most productive agricultural regions in the United States.

Irrigation diversion and storage systems are essential to the Yakima Basin's economy, but they have also significantly impacted the ecosystem. The Yakima River and its tributaries have been heavily altered for the purpose of irrigated agriculture. There are numerous dams and irrigation canals. Irrigation runoff is in places returned to the river through canal drains. The irrigation system in the Yakima's watershed causes periods of both severe river dewatering and elevated flows, relative to the historic streamflow regime.

The Yakama Nation's time immemorial rights are the oldest water rights in the Yakima watershed. While development of irrigation in the Yakima watershed began as early as the 1850s, most water rights were established in the 1870s and 1880s. By 1902, an estimated 122,000 irrigated acres were served by natural flows in the rivers and tributaries. However, even at that time, the natural flow was inadequate to assure a dependable water supply. In 1905, the U.S. Bureau of Reclamation claimed all unappropriated water for development of the Yakima Irrigation Project.

The Yakima Project is composed of seven divisions: six irrigation divisions and a storage division. The six irrigation divisions provide water to about 464,000 irrigated acres of the Yakima Project and represent about 70 percent of the total diversions of major entities in the Yakima River basin. The remaining 30 percent are made up of other irrigation entities which are mainly non-proratable water right holders. The storage division is composed of the five major reservoirs with a total capacity of about 1,065,400 acre-feet. Other project features include 5 diversion dams, 420 miles of

canals, 1,697 miles of laterals, 30 pumping plants, 144 miles of drains, 2 federally owned power plants, plus fish passage and protection facilities constructed throughout the area.

The six major diversion dams on the Yakima River include Easton (RM 203), Roza (RM 128), Wapato (RM 107), Sunnyside (RM 104), Prosser (RM 47), and Horn Rapids (RM 18). The primary dams on the Naches River include Wapatox (RM 17) and Naches Cowiche (RM 4). The five major reservoirs include four glacially-formed lakes that were dammed to create reservoirs (Bumping, Kachess, Keechelus, Cle Elum Lakes) and one manmade storage reservoir (Rimrock Lake). These reservoirs are managed to store and release water to meet irrigation demands, flood control needs, and instream flow requirements. Kachess Lake was dammed in 1912 with a 115-foot high earthfill structure that brought its holding capacity to 239,000 acre feet. Keechelus Lake was dammed in 1917 with a 128-foot high earthfill structure that brought its holding capacity to 157,900 acre feet. Cle Elum Lake was dammed in 1933 with a 165-foot high earthfill structure that brought its holding capacity to 436,900 acre feet.

Surveys and historic reports suggest the Yakima River supported large runs of anadromous salmonids, with estimated runs of 300,000 to 960,000 fish a year in the 1880s. These numbers have declined drastically, and three salmon species were extirpated from the basin-sockeye, summer Chinook, and Coho. The collapse of the fishery has been the result of many activities across the watershed. The storage dams on the four natural glacial lakes eliminated access to previously productive spawning and rearing habitat for sockeye, spring Chinook, Coho, and steelhead salmon, and resident fish populations such as bull trout. Irrigation operations have altered stream flows, resulting in flows at certain times of the year that are too high in some reaches and too low in others to provide good fish habitat and create fish-passage barriers. The effect of water diversions and water withdrawal in tributary streams is more severe than in the main stem of the Yakima River, because the diversions frequently lack effective fish passage and protective devices, and because proportionately more water is diverted. Water diversions in tributary streams can affect the entire life cycle of salmonids, from egg to returning adults. The effects are more significant on steelhead and Coho than on chinook, since steelhead and Coho spend an appreciably greater proportion of their life cycle as juveniles in the smaller tributary streams. Conditions outside the Yakima River Basin have also affected Yakima anadromous fish populations. These include Columbia River dams, and historic fishing pressures in the Columbia River and Pacific Ocean.

To address water supply challenges of the Yakima watershed, the Washington Department of Ecology and the US Bureau of Reclamation established a working group in 2009. The group included irrigation districts, environmental organizations, natural resource agencies, the Yakama Nation, counties, cities, and other interested people and groups to develop a consensus-based, long-term solution to the problem of inadequate water supplies. The result of the working group has been the Yakima Basin Integrated Plan, finalized in 2012 it calls for the implementation of seven elements with key actions to enhance the water supply and restore ecological functions to the watershed:

- Improving reservoir fish passage
 - At Clear Lake, Cle Elum, Bumping, Rimrock, Keechelus, and Kachess lakes
- Making structural and operational changes
 - Raising the Cle Elum Pool by three feet to add 14,600 ac-ft in storage capacity
 - Modifying Kittitas Reclamation District canals to provide efficiency savings
 - Constructing a pipeline from Keechelus to Kachess to reduce flows and improve habitat conditions during high flow release below Keechelus and to provide more water storage in Kachess for downstream needs
 - Decrease power generation at Roza Dam and Chandler power plant to support outmigration of juvenile fish
 - Make efficiency improvements to Wapatox Canal
- Enhance water conservation
 - Implement an agricultural water conservation program to conserve 170,000 ac-ft of water in good water years
 - Create a fund to promote water use efficiency basin wide using voluntary, incentive-based programs, with a focus on outdoor uses
- Habitat & watershed protection & enhancement
 - Protect ~70,000 ac of land by acquiring high elevation portions of the watershed and forest and shrub-steppe habitat
 - Evaluate potential wilderness area and wild and scenic river designations to protect streams and habitat
 - Create a habitat enhancement program to address reach-level floodplain restoration priorities and restore access to key tributaries
- Surface water storage
 - Build a 162,500 ac-ft off-channel storage facility at Wymer on Lmuma Creek
 - Access an additional 200,000 ac-ft of water by tapping into the inactive storage at Lake Kachess
 - Construct a new dam at Bumping Lake to increase capacity to 190,000 acft
 - Begin appraisal of potential projects to transfer water from the Columbia River to the Yakima Basin
- Market Reallocation
 - Employ a water market and/or a water bank to improve water supply in the Yakima River basin
- Groundwater storage
 - Construct pilot projects to evaluate recharging shallow aquifers via groundwater infiltration
 - Build an aquifer storage and recovery facility allowing Yakima to withdraw water from the Naches River during high flow periods and store it underground for use during low flow periods

Components of the plan call for increasing the storage capacity on the 5 major reservoirs by more than 377,100 acre-feet for a total of more than 1,442,500 acre feet. This increase in storage capacity by more than 35 percent for the overall Yakima Basin includes modifications to the structures at Cle Elum and Kachess lake reservoirs, building off-channel surface storage on Lmuma Creek and potentially building a new dam on Bumping Lake (would increase capacity by an additional 190,000 ac-ft).

A recommendation in the Integrated Plan was to acquire and protect lands key to restoring watershed functions and habitat. Target conservation goals for the plan included 70,000 acres of watershed protection, including: 45,000 acres of high elevation watershed lands, 15,000 acres of shrub-steppe habitat, and 10,000 acres of forest habitat. Areas of acquisition focus included the 46,000 acres of land in the Teanaway watershed, now the Teanaway Community forest (acquired by DNR and WDFW in 2013), 15,000 acres of shrub-steppe habitat in the Yakima River canyon, and 10,000 acres of forest lands at the headwaters of the Little Naches River, Manastash and Taneum Creek basin. The upper reaches of the Little Naches River and Taneum and Manastash Creeks were recognized by the Integrated Plan for their importance for water quality and maintaining cool temperatures for bull trout protection and restoration. They also protect water supply and provide current or potential salmon and steelhead spawning grounds. These forest lands are now part of the Central Cascades Forest.

IV. CONSERVATION TARGETS AND COMMUNITY BENEFITS



CONSERVATION TARGETS AND COMMUNITY BENEFITS

Within the complex and disturbance driven Eastern Cascades Ecoregion, the foundation of the Conservancy's approach to conserve the following diverse suite of targets is the conservation and restoration of the Ecoregion's inherent and underlying ecological patterns and processes. "Pattern" includes the composition, shape, size, configuration, and connectivity of habitat patches. "Process" includes migration, hydrology, and the frequency, severity, and extent of disturbances such as fire, insects, disease, wind, floods, and timber harvest. Collectively, the conservation targets listed below all depend upon the interplay of these patterns and processes.

- 1. Primary conservation targets for the Central Cascades Forest include:
 - Northern spotted owl
 - Coldwater and anadromous fish (steelhead, bull trout)
 - Headwaters riparian forests
 - Dry forests
- 2. Secondary conservation targets also include:
 - Large carnivores (gray wolves, grizzly bears, wolverines)
 - Freshwater provisioning (for Yakima Basin irrigation and municipal uses)
 - Forest carbon sequestration

Conservation and restoration of these targets takes place within a human community which relies on its surrounding forest environment for jobs, recreation, water, and many other cultural and economic values. The Conservancy intends to maintain the Central Cascades Forest as a working forest that supports these values and provides access for appropriate recreational use.

a. Primary Conservation Targets

Northern Spotted Owl

Status: USFWS Threatened, population declining

Threats:

- Loss of complex forest habitat due to fire, climate change, and logging
- Displacement by barred owls

Management Goal:

• Retain sustainable and sufficient levels of complex forest habitats, defined by a landscapes' individual natural range of variability (NRV) and future range of variability (FRV)

- Restore inherent fire regimes and structural stage diversity that can promote sustainability of northern spotted owl habitat within a changing climate.
- Through the Tapash Sustainable Forest Collaborative, coordinate forest management with neighboring land owners and agencies to achieve a landscape scale "shifting mosaic" of habitat that is sustainable for decades to centuries.

Coldwater and anadromous fish (Bull trout and Steelhead) Status: Bull trout and steelhead USFWS Threatened

<u>Threats:</u>

- Decreased aquatic habitat quality (temperature, sediment, instream habitat)
- Altered flow timing/levels

Management Goal:

- Maintain and improve headwater and riparian forest conditions, resulting in an increase in the "hydrologic maturity" or age structure of forests across the watershed
- Maintain low levels and/or reduce road sedimentation
- Restore instream habitat structure and diversity that supports fish productivity
- Protect and improve connectivity for current and potential future climate aquatic habitats
- Decrease risk of sedimentation from uncharacteristic large and severe fires

Dry forests

Status: At Risk, declining forest health, increased risk to human communities from fire

<u>Threats:</u>

- Altered fire regimes
- Inappropriate silvicultural practices

<u>Management Goal:</u>

- Restore natural disturbance and appropriate fire regimes
- Retain and promote large and old trees
- Restore the diversity of canopy layers, species, and spacing within forest stands

Headwaters Riparian forests Status: At Risk

<u>Threats:</u>

- Altered fire and flood plain disturbance regimes
- Inappropriate silvicultural practices
- High degree of interaction between roads and stream systems

Management Goal:

- Restore natural disturbance regimes
- Retain and promote large and old trees, and complex, old-growth stands
- Restore and promote fully connected floodplain function
- Reduce runoff and sedimentation from roads

b. Secondary Conservation Targets

Large Carnivores (Grizzly Bear, Gray Wolf, Wolverine) Status: USFWS Threatened (Grizzly Bear, Gray Wolf),

Threats:

- Loss of connected interior habitat due to timber management, roads and rural development
- Human/large carnivore conflicts
- Reduced winter snowpack due to warming climate and forest conditions

Management Goal:

- Maintain regional connectivity and interior habitat
- Prevent development that would further increase road density and could greatly increase social conflict
- Manage recreation and public access to reduce social conflict
- Restore forest structural conditions and disturbance regimes to promote snowpack retention

Irrigation and municipal water supply

Status: At Risk

<u>Threats:</u>

• Decreased water supply due to warming climate and decreased snowpack

- Increased runoff from roads and low hydrologic maturity across headwater watersheds
- Sedimentation from uncharacteristic large and severe fires
- Conflicts with anadromous fish over flow timing and levels

Management Goal:

- Maintain and improve the hydrologic maturity of headwaters, and riparian forest conditions
- Maintain low levels and/or reduce sedimentation and runoff from roads
- Restore connectivity of streams and floodplains
- Decrease risk of sedimentation from uncharacteristic large and severe fires
- Restore forest structural conditions and disturbance regimes to promote snowpack retention

Forest Carbon Sequestration

Status: Foundational to climate change mitigation strategies

<u>Threats:</u>

• Reduced on-site carbon sequestration due to inappropriate silvicultural practices and altered disturbance regimes.

<u>Management Goal:</u>

- Consider carbon implications in forest management decision process
- Retain and promote large and old trees, and complex, old stands
- Restore natural disturbance regimes

c. Habitat Conservation Plan habitat and lifeform targets

The Central Cascades HCP which the CCF LLC assumed from Plum Creek contains baseline habitat targets intended to cover all native terrestrial and aquatic species found within the HCP boundary (Appendix B). These habitat targets and associated riparian habitat areas and other special protections provide a "conservation baseline" to be met or exceeded by the Conservancy's management. Adopting these HCP habitat targets allows the CCF LLC greater flexibility with regulatory agencies (U.S. Fish and Wildlife Service, NOAA Marine Fisheries Service) as the Conservancy pursues landscape scale forest restoration (as described in Section VI).

The original HCP provided habitat targets for Plum Creek's entire HCP boundary covering the eastern and western Cascades. The following tables are taken from the

Central Cascades Forests LLC Transfer and Assumption Agreement for the Plum Creek Central Cascades HCP and split these targets into a "Westside Block" (remaining Plum Creek ownership) and "Eastside Block" (Central Cascades Forest).

The HCP is a multi-species, ecosystem-based habitat management plan which addresses the biological needs of several ESA listed species, including the northern spotted owl, marbled murrelet, grizzly bear, gray wolf, as well as more than 310 other vertebrate wildlife species that are currently not listed as either rare, threatened, or endangered through the ESA (for a description of listed and unlisted species see Appendix C). The forest structural stages and habitat life form level targets established in the HCP will provide a basis for forest management targets. However, habitat management will ultimately be informed by both these targets and landscape evaluations and forest restoration principles developed by the Conservancy. By considering the habitat requirements of unlisted species, the HCP can provide for early protection and, perhaps, prevent subsequent declines and ultimately the need to list such species, or designate critical habitat in the Planning Area. The HCP also allows for future amendment should these species become listed despite early conservation efforts.

Implementation of the HCP was intended to reduce conflicts over resource management by providing a mechanism for consideration of overall ecosystem health, habitat availability, and the needs of multiple species. This plan: (1) focuses on ecosystems and habitats rather than species; (2) addresses impacts not only at the site scale, but also on an ecosystem scale; and (3) concentrates on potential long-term or future impacts rather than on immediate or short-term impacts.

The HCP also incorporates a riparian management strategy which identifies and protects riparian forests as priority habitat for fish and wildlife, and provides for management of special habitats such as snags, wetlands and talus slopes. The HCP complements the Northwest Forest Plan on Federal lands in the Planning Area. In this way, the HCP augments the protection extended to listed and unlisted species on Federal lands and provides a framework for future coordination with the U. S. Forest Service and private landowners.

A network of riparian habitat areas, older forest types, and dispersal corridors are proposed in the HCP to link habitat on federal lands and provide supplemental latesuccessional habitat. To address long-term habitat conditions, the HCP establishes projections for percentages of the Central Cascades Forest to be maintained in diverse forest structure stages ranging from stand initiation to old growth. Management practices in this Forest Management Plan additionally address a variety of other habitat-related concerns such as structural retention in harvest units, forest health and road location/closures.

d. Community Benefits

The Conservancy intends to maintain the majority of the Central Cascades Forest as a working forest, meaning that it will be managed for a broad range of functions including recreation, fish and wildlife and sustained timber production. The intent of a working forest is to make productive economic use of the resources on a sustainable basis that support both the long-term stewardship of the land and surrounding communities.

Meeting established restoration goals for the Central Cascades Forest will require active management, including both commercial and pre-commercial thinning, tree planting, and the removal, upgrading, and/or maintenance of forest roads. While some logs will be left on-site to achieve ecological objectives, the Conservancy anticipates the removal of significant volumes of timber from these activities, particularly in coming decades as the very young stands (e.g., < 20 years old) reach more mature developmental stages.

As the Conservancy has demonstrated on Washington's Coast, forest management and restoration can provide important income for local communities and support living-wage jobs, particularly through winter months when forest-related employment opportunities are often very limited. Additionally, if improved forest conditions result in increased productivity of fish and wildlife and enhanced aesthetics, additional economic benefits will filter into surrounding communities from increased fish harvest and recreational use. The Conservancy is also committed to maintaining public access to lands for fishing, hunting, subsistence gathering, spiritual ceremonies, and other recreational activities such as hiking, motor and mountain biking, and horseback riding.

Washington State and Kittitas County benefit greatly from spending by residents and visitors as they enjoy outdoor recreation in Kittitas County. A study completed in January 2015 for Washington's Recreation and Conservation Office found that recreationists spent over \$185 million in Washington State to recreate within Kittitas County, leading to the collection of nearly \$9.5 million of state and local taxes. Recreation in Kittitas County creates nearly 1,800 jobs within Washington State. The Conservancy believes that well-managed recreational activities and responsible use can be consistent with the primary objectives of the Central Cascades Forest. The Conservancy will continue to allow limited recreational use of these lands, in accordance with its history as a prime recreation area – and its importance as a source of water and fish habitat in the Yakima Basin.





V. FOREST AND RESOURCE ASSESSMENT



FOREST AND RESOURCE ASSESSMENT

a. Current Conditions & Forest Types

The 47,921 acres in the Central Cascades Forest contain a wide range of forest types and structural conditions. The majority of the ownership is young plantations less than 40 years old (Fig. V-1). Most of the acres have been intensively harvested and currently have young forest with small trees that are not commercially viable. Mature (>80 years old) and old forests occupy approximately 20% of the land base, and most of these acres have been partially harvested in the past.

The ownership contains mixed conifer forest that supports 15 different conifer, and seven hardwood species (Fig. V-2). Douglas-fir, grand fir, silver fir, ponderosa pine, and western hemlock are the major species by basal area. Forests are heavily conifer dominated with hardwoods making up less than 3% of the basal area. Hardwood species include red alder, cottonwood, aspen, willow, big leaf maple, and paper birch. Species composition transitions from dry mixed conifer in the Roslyn area to a complex gradient of moist-mixed conifer forests as one moves west. These moist-mixed conifer forests are a blend of east and west Cascadian, mid to upper elevation forest types. Some cold mixed-conifer forest is present at upper elevations on north facing slopes.

Forest types have been grouped into five major biophysical zones and age classes to describe current conditions (Fig. V-1). The zones correspond with the potential vegetation groups (PVG) used on the Okanagan-Wenatchee National Forest, but were mapped and classified based on climatic water balance deficit¹. The moist forest PVG was split into 3 smaller zones as it covers such a wide range of conditions on the Central Cascades Forest. The zones do not represent clearly differentiated forest types or potential vegetation series, however, as the forests of the Central Cascades are a gradient of dry to cold mixed-conifer forest. Current conditions of the zones are described below. Inventory data used for this analysis was collected and summarized by Plum Creek.

¹ Climatic water deficit (Deficit) estimates vegetation stress due to seasonal lack of water (moisture stress). It integrates the primary environmental conditions faced by plants: solar radiation, temperature, precipitation, and soil water availability (Stephenson 1998). It is similar to plant associations in this respect, but provide managers with a fine scale, quantitative characterization of the biophysical environment. It also provides a quantitative framework to incorporate climate change predictions into project planning by showing the magnitude of projected environmental change and likely shifts in potential vegetation. Deficit was derived for the whole Central Cascades area based on the Thornthwaite approach as described in Churchill et al. (2013).



Figure V-1: Forest types by age class and volume classes. Restricted acres are riparian and old growth set asides from the Plum Creek HCP, plus inoperable acres.

Dry Forests

These forests are mostly found in the Cle Elum Ridge block and at lower elevations, or south facing slopes, on other parts of the Central Cascades Forest. They make up approximately 13% of the ownership. This zone is dominated by dry grand-fir plant associations, but some dry Douglas-fir associations are present on the driest sites. Historically, these areas had frequent fire and were dominated by ponderosa pine and Douglas-fir with some western larch (Harrod et al. 1999, Wright and Agee 2004). Currently these forests are predominantly Douglas-fir with significant amounts of ponderosa pine (Fig V-2) and grand fir. A number of other species are also present in minor amounts (white pine, western larch, lodgepole pine, western red cedar, western hemlock, and hardwoods), especially on wetter microsites. Douglas-fir dwarf mistletoe is quite common in many areas. Defoliation from western spruce budworm has affected much of the dry forest area in recent years, causing some mortality of Douglas-fir and grand fir.

The great majority of this zone is low density forest with multiple cohorts, including 5-10 tpa of large trees (>20" dbh) (Fig. V-3). Some single cohort, young plantations of ponderosa pine and Douglas-fir do exist, but they generally have older trees in them. Almost all of the dry forest stands have had multiple partial harvests, beginning with early selection logging of the large ponderosa pine. Since then, most of the stands have been actively managed by previous landowners, either through thinning entries or regeneration harvests. Regeneration harvests tended to leave significant numbers of retention trees, thus few pure plantation stands exist in the dry forest. Some stands have not been managed in many years and thus have high basal areas and more shade tolerant species (Fig. V-3).



Figure V-2: Species mixes by percent basal area in forest types. Data is from inventory data collected in 2011 of 106 stands, 1889 plots.

Moist Forests (3 zones)

Approximately 80% of the Central Cascades Forest is moist forest. Moist forest occurs in significant amounts in all of the management blocks. Structurally, the great majority of these forest stands are less than 40 year old, single cohort plantations with few legacy trees (Fig. V-1). Often plantations were planted to Douglas-fir, but natural regeneration of many other conifer species has created diverse, dense stands. Structurally complex mature and old forest are present, mainly in HCP riparian and old growth set asides and areas with difficult access. Some dense, single cohort 60-80 and 80-120 year old stands do exist as well, especially silver fir stands.

The moist forests cover a wide gradient of mixed conifer forest types. Plant associations include moist Douglas-fir, moist grand-fir, western red cedar, western hemlock, sub-alpine fir, and Pacific silver fir. Historically, moist forests burned at low to high severity depending on topographic position and landscape context (Camp et al. 1997, Hessburg et al. 2007). Mid to higher elevation western hemlock, sub-alpine fir, and silver fir forests burned mostly at high severities, while Doulgas-fir, grand-fir, and western larch tended more towards mixed severity. North facing moist forests embedded in a dry forest area tended to burn at lower severities and sustain ponderosa pine. Due to its scope and complexity, the moist forest was broken down into three zones to better characterize current conditions.

The moist-dry zone is currently dominated by Douglas-fir and grand fir, with some ponderosa pine. Western hemlock, western larch, and western red cedar are found in significant amounts, along with other conifers and hardwoods (Fig. V-2). Growth rates are slow to moderate on these sites; so basal area, diameter, and volume are low in the younger ages classes (<40 years) (Fig. V-3). The density (tpa) of trees is generally high (400-650 tpa). Plantations in the 40-60 year age class are generally large enough to support a commercial thin. Density (tpa) of trees is generally high (400-650 tpa).

The moist or middle zone of the moist forest is also dominated by Douglas-fir and grand fir, but very little ponderosa pine is present. Western hemlock and western larch become more common. Sub-alpine fir, Engelmann spruce, and silver fir have a significant presence in some stands (Fig. V-2). Structural conditions and commercial volumes are similar to the dry – moist type, although these sites are often the most productive across the Central Cascades Forest.

The moist-cold zone is marked by the emergence of silver fir as a major component and the decrease of grand fir. Douglas-fir and western hemlock are also common, and many of the other conifers can be present in significant amounts (Fig. V-3). Mountain hemlock appears on the colder sites. Although Douglas-fir is a natural component of this zone, the amount of Douglas-fir has been increased through plantation establishment. Ponderosa pine is very rare. Basal area and mean diameter by age class are similar to the rest of the moist zone, but volumes are lower due to shorter trees. Stands are often not commercially viable for thinning until 60-80 years, but some can be thinned before that. Tree density is often very high (Fig. V-3).

Cold Forests

These forests make up only 5% of the Central Cascades Forest and are found near the Cascade Crest and on north facing slopes at higher elevations throughout the forest. Mountain hemlock plant associations define this zone. The historical fire regime was generally low frequency and high severity or at the high end of mixed severity. Currently, these forests are dominated by silver fir, western hemlock, and Douglas-fir. Mountain hemlock and a good mix of other conifers are also found (Fig. V-2). Much of the Douglas-fir is the result of plantation establishment. Natural regeneration of other conifer species has created very dense stands with a mixture of species. Similar to the moist forest, most of the acres are young plantations with some mature and old forest. Productivity is lower and stands are generally not commercially viable for thinning until 60+ years. Densities are very high.



Figure V-3: Summary inventory metrics for forest type zones and age class.







FOREST TYPES: FORESTS FOR OUR FUTURE



The Nature W

b. Forest Roads

Forest roads within the Central Cascades Forest were designed and built with commercial timber hauling as the main purpose. Forest management driven by conservation, restoration, and protection of water quality objectives requires different thinking. Although timber hauling for restoration and forest management will remain a high priority of the road network, ecological considerations have become equally, or more important.

Cursory assessments of forest road conditions were completed for the Central Cascades Forest in the summer of 2015. The general findings of this survey found the majority of the transportation network is in good condition, and is representative of industrial forestlands, with all areas of the ownership comprehensively engineered for the removal of timber. Geographic Information System (GIS) analysis determined a total road network of 430 miles in length, with road densities for the different tracts of: 6.62 mi/mi² in Keechelus/Kachess; 5.49 mi/mi² in Cle Elum Ridge; 6.15 mi/mi² in Cabin Creek; 5.81 mi/mi² in Taneum Creek; and 4.86 mi/mi² in Little Naches. The average road density over the entire ownership is 5.74 mi/mi².

The majority of the transportation network is designed and built for long term timber production and log hauling. These roads are built to standards that far exceed a more typical native surface road found throughout industrial forestlands in eastern Washington. The RMAP (#270090L) initiated by Plum Creek Timber, completed all significant road maintenance and fish blockage issues in 2013. At that time, the RMAP entered a "monitoring and general maintenance" phase, where road maintenance is scheduled and conducted on an as needed basis.

Most management areas within the Central Cascades Forest contain existing rock pits, varying in size and condition from approximately $1,500 \text{ ft}^2$ to as much as $25,000 \text{ ft}^2$, and from overgrown to open and functional. The exception to this is the Cle Elum Ridge block, where geologic limitations have inhibited rock pit development.

In all tracts of the Central Cascades Forest, the road network crosses multiple ownerships, including the United States Forest Service, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, and nonindustrial forestland owners. Historically, road construction and maintenance has been managed under a cooperative, cost-share agreement between major landowners. In most cases, existing road use agreements expired with the change of ownership.

c. Hydrology

The Central Cascades Forest is located within 17 sub-watersheds and hosts nearly 400 miles of streams that serve as tributaries to the Upper Yakima River. Annual precipitation ranges from as high as 80 inches to 140 inches in the upper portions of the watershed and peak flows are typically associated with snowmelt runoff in the spring and early summer, although storm related peak flows also are common through the winter months. Natural low flows are common in late summer/early-fall.

Keechelus, Kachess, and Cle Elum lakes are natural bodies of water on the Yakima-Cle Elum system, raised by storage dams and uses as irrigation reservoirs. The seasonal snowpack acts a temporary store of moisture during winter months. This snowpack is a vital source of water on the flanks of the Cascades. Precipitation that falls as snow does not immediately enter the

TNC Planning Unit	HUC 12 Sub-watershed
Keechelus/	Headwaters Yakima R.
Kachess	Kachess R.
Rachess	Stampede Crk – Yakima R.
	Middle Cle Elum R.
Cle Elum Ridge	West Fork Teanaway R.
	Lower Cle Elum R.
	Crystal Crk. – Yakima R.
	Stampede Crk – Yakima R.
Cabin Creek	Cabin Crk.
	Big Crk.
	Little Crk. – Yakima R.
	Headwaters Little Naches
Little Naches	R.
	Upper Little Naches R.
	Big Crk.
	North Fork Taneum Crk.
Taneum	Taneum Crk.
	Crystal Crk. – Yakima R.
	Little Crk. Yakima R.
Manaala	North Fork Taneum Crk.
Mallastasii	South Fork Manatash Crk.
Nachos Piyor	Lost Crk. – Naches R.
Maches Miver	Dry Crk. – Naches R.

Sub-watersheds within the Central Cascades Forest.

stream system; much is stored until spring. In winter, streams are often reduced to baseflow (groundwater discharge at surface), except during periods of heavy rainfall with warm winter temperatures. In recent years, more runoff is occurring earlier in the year than it did historically. From April to July, snowmelt runoff and precipitation combine with baseflow to create large peaks in stream discharge. This also occurs in November and December during heavy rainfall. Groundwater discharge to streams is important in this region. A portion of the annual precipitation in subalpine areas infiltrates the surface and reaches aquifers. These aquifers are tapped in surrounding areas are important resources in the more arid east slope foothills. Streamflow drops during the summer, often disconnecting streams and harming vital fish habitat. Eroded stream banks, high levels of sediment and a lack of streamside vegetation also affect many stream and river segments across the Central Cascades Forest. The Conservancy has established the following objectives for improving natural hydrologic functions across the forest:

- 1. Improve natural floodplain functions and riparian habitat,
- 2. Slow the rate of runoff and reduce peak flow events,
- 3. Decrease forest road related impacts such as decreased floodplain connectivity, poorly functioning stream crossings, and sediment delivery,
- 4. Increase water storage to make more water available later in the summer for critical fish habitat.
- 5. Reduce mass wasting events related to timber management and forest roads.

Improving forest health will reduce the risk of wildfire, which can also contribute to runoff and sediment entering streams. The Conservancy places a high priority on restoration activities, as reflected throughout this plan.

d. Watershed Analyses

The Central Cascades Forest includes portions of 17 sub-watersheds. In 1994 several watershed analyses were completed for eight of the 17 sub-watersheds, as part of the HCP, to better understand the relationship between timber management activities (e.g., harvesting, forest roads, etc.) and stream flow (summaries of the conditions found within each sub-watershed are included in Appendix D). Given that the majority of these lands occur at higher elevations, the analyses focused on the influence of timber harvest on rain-on-snow storms where the combination of rain and snowmelt can cause significant floods. Removal of forest cover can increase snow accumulation, allow for greater wind speeds, and increase solar radiation, thereby increasing the amount of snowmelt, especially during rain-on-snow events. Increasing the size and frequency of flood flows from timber harvest is a concern because larger and more frequent flood flows can change channel morphology through increased sediment and large woody debris transport and greater bank erosion. Larger and more frequent flood flows can also increase the depth of gravel bed scour, potentially harming fish spawning beds.

The watershed analyses yielded the following general results.

- 1. Timber harvesting increases peak-flow, in particular during rain-on-snow events. Further, clear-cut and younger forests discharge higher volumes of water than mature forests.
- 2. Mass wasting (e.g., landslides) is much less frequent than on the west side of the Cascades despite the presence of comparably steep terrain and geology, particularly near the Cascade Crest. This is undoubtedly due to the lower amount of annual precipitation, especially as rainfall. Mass wasting hazard

areas are typically confined to inner-gorges and toes of ancient landslides adjacent to streams. Prescriptions have been developed for the HCP to minimize, prevent, or avoid management-related mass wasting events in these areas.

- 3. Riparian-related concerns are similar to those found in streams and rivers elsewhere throughout the region. Large woody debris recruitment is a principal concern, as is maintenance of canopy closure for stream temperature protection. Both issues are addressed through the HCP's riparian management strategy.
- 4. Surface erosion from roads also contributes significant amounts of sediment to streams if they are not constructed or managed effectively. Prescriptions from the Watershed Analyses have become Best Management Practices in the HCP for minimizing road-related sediment inputs in the area. As noted above, Plum Creek's RMAP obligations were met prior to ownership change, including fish passage improvements that were identified through a census of potential passage barriers and input from the DNR and Washington Dept. of Fish and Wildlife.
- 5. In several Watershed Analysis areas (e.g., Mosquito-Keechelus, WF Teanaway, Quartz Mt.), highly erodible soils and relatively light vegetation along some intermittent streams could contribute to increased bank erosion and downstream sediment delivery. In these cases, streamside exclusion of equipment and tree retention were prescribed. These are the only cases where specific riparian prescriptions developed in Watershed Analysis exceed the general prescriptions from the HCP.

e. Fish and Wildlife Habitat

The Conservancy is committed to using forest-management practices that are environmentally and economically sound. As part of this commitment, the Conservancy will implement state-of-the-art management practices to preserve and protect wildlife habitat and forestland ecosystems. These management practices are designed to protect resident and migratory wildlife and habitats while allowing economically viable harvests.

The Central Cascades Forest contains a variety of low, mid and high elevation habitats that include both dense and open forests, alpine meadows and riparian areas. This habitat diversity, and the location of the forest in proximity to federally-owned lands and other conservation lands, was a key reason for the CCF LLC's acquisition of the Central Cascades Forest. Deer, elk, bears and mountain lions live throughout the various units comprising the Central Cascades Forest. A gray wolf pack, a federally endangered species, recently formed within the Teanaway River watershed

immediately north of the Central Cascades Forest's Cle Elum Ridge planning unit. Additionally, a confirmed wolverine sighting was made between 2014 and 2015 near the Cooper River, just north of Cle Elum Lake. A wide range of migratory and resident bird species use the forest, including the federally endangered northern spotted owl. Many of these animals use the forest seasonally, moving between their summer and winter habitats.

Many fish species were once abundant in the Yakima River watershed, including spring Chinook, steelhead and bull trout. However, populations have declined to the extent that steelhead and bull trout are now federally protected in the Yakima and other watersheds. All fish species require streams with cold, clean water and deep pools. However, fish habitat has become compromised in much of the upper watershed due to low flows, increasing water temperatures, eroding stream banks and a lack of riparian vegetation.

At the state level, the WA Department of Fish and Wildlife (WDFW) has jurisdiction over management of game species and state-listed species and has developed specific objectives and plans for their conservation and recovery. All major elk herds in Washington, for example, are managed under a herd-specific management plan. Most of the elk that reside across the various planning units of the Central Cascades Forest are considered members of the Colockum elk herd for management purposes. The Colockum Elk Herd is the fifth largest of ten herds identified in the State. It is an important resource that provides significant recreational, aesthetic, cultural, and economic benefits to recreationists, local communities, and Native Americans. Management objectives and guidelines for this herd are part of the WDFW's Colockum Elk Herd plan.

Conservation and recovery of federally listed species, including steelhead, bull trout, wolves, and spotted owls, are addressed through federal and state plans. WDFW, for example, completed the Washington State Wolf Conservation and Management Plan in 2011. The plan details wolf population management objectives and strategies. However, the U.S. Fish and Wildlife Service has primary authority, through the federal Endangered Species Act, for management of wolves in the western two-thirds of Washington, including the range of the pack that utilizes the Central Cascades Forest.

f. Cultural Resources

Since time immemorial, the Yakama people and their ancestors dwelled along the Columbia, Wenatchee, and Yakima Rivers in what is now central Washington State. Their economy was based on fishing for salmon, gathering roots, berries, and nuts, hunting deer and elk, and extensive intertribal commerce. Goods produced in the Columbia Basin included a variety of fish products and other foods, oil, white talc, basketry, skins, furs, jewelry, artwork, cosmetics, feathers, dogs, and horses. The Yakama language belongs to the Sahaptin-Chinook branch of the Penutian linguistic



stock and the Yakama culture is of the Plateau area.

In the Treaty of June 9, 1855 the Yakama, along with 13 other tribes and bands, ceded to the United States 11.5 million acres of territory from the Cascade Mountains to the Snake and Palus Rivers, and from Lake Chelan to the Columbia River. The 14 confederated tribes and bands that were settled on the 1.4-million-acre Yakama Reservation and formed into the Yakama Nation included the Kah-milt-pah, Klickitat, Klinquit, Kow-was-say-ee, Li-ay-was, Oche-chotes, Palouse, Pisquose, Se-ap-cat, Shyiks, Skinpah, Wenatshapam, Wishram, and Yakama.

One outcome of the 1855 Treaty was the protection of the Tribe's rights to fish, hunt and gather all of the tribe's traditional foods on the reservation, as well as across the 12 million acre ceded area. The Central Cascades Forest lies to the north of the Yakama Nation's Reservation, and within the 12 million acre ceded area recognized in the 1855 Treaty. The Central Cascades Forest provides a rich array of cultural resources important to the Yakama Nation, including: fish and game, huckleberries and other foods, medicinal plants, materials for traditional clothing and building, and more. Further, given the millennia across which the Yakama peoples inhabited this land, it is assumed that many artifacts, evidence of shelter and camps, and other historically significant continue to remain on the landscape and may or may not be currently identified as such.

g. Recreational uses

The Central Cascades Forest offers tremendous recreational opportunities across the landscape. Outdoor enthusiasts come from communities on both sides of the Cascades to play on the land year round. With most of the land between Snoqualmie Pass and Ellensburg, it can be easily accessed from I-90. The Conservancy coordinated with partners, local jurisdictions, community groups, businesses and residents to better understand how the land is used for recreation. Recreationists enjoy a diverse array of activities across the Central Cascades Forest including:

- Hunting and fishing
- Collecting forest products
- Camping
- Hiking
- Horseback riding
- Mountain biking
- Riding off-road vehicles
- Winter activities such as snowmobiling, snowshoeing, cross country and backcountry skiing, dog sledding and snowbiking

There are a total of 28 authorized summer trails spanning 46.1 miles of Central Cascades Forest. Seventy-one percent of the trails are recognized and mapped by the Forest Service. The remaining twenty-nine percent are user-made trails on Cle Elum Ridge that are mapped by the City of Roslyn, Roslyn Trails Alliance, and several other groups and organizations. Unauthorized user-made trails weren't included in this summary.

Sixty-four percent or 18 trails are open to motorcycles, mountain bikes, horses and hikers. One of these trails is also open to 4x4's and all-terrain vehicles. These trails are primarily used by motorized users and mountain bikers. Seven percent or 2 trails are open to hikers only. The other twenty-nine percent or 8 trails which are all located on

Cle Elum Ridge are open for non-motorized use only. This includes the popular Rat Pack mountain bike trail.

Of the 46.1 total miles of summer trails, the mileage by type of use is as follows:

- 1.8 miles of hiking only trails.
- 12.6 miles of user-made non-motorized trails on Cle Elum Ridge.
- 29.5 miles of single track motorcycle trails. These trails are open to nonmotorized users as well.
- 2.2 miles of a regional jeep trail in Little Naches that has historical significance. This trail is open to ATV's, motorcycles, and non-motorized users.

The Conservancy completed a Geographic Information Systems (GIS) analysis of density of summer trails in each of the following tracts in the Central Cascades Forest:

Summer Trails						
Management Tract	Miles of Trail	Area (sq mi)	Density (mi/sq mi)			
Central Cascades Forest (all tracts)	46.13	74.71	0.62			
Cabin Creek	1.58	18.14	0.09			
Keechelus/Kachess	1.20	8.56	0.14			
Little Naches	8.48	9.85	0.86			
Cle Elum Ridge	13.88	17.30	0.80			
Manastash / Taneum	20.99	19.91	1.05			

During the winter existing roads are groomed by Washington State Parks to create trail systems for motorized and non-motorized users. There are currently 78.3 miles of groomed winter trails across Conservancy land. This includes 73.5 miles of groomed snowmobile trails which are also open to non-motorized users, 1.4 miles of a groomed dog sled trail system that falls within an area that is voluntarily non-motorized, and 3.4 miles of groomed cross country ski trails on Amabilis Mountain (motorized use and dogs are prohibited on these trails).

Cross country winter travel is also common for a number of different activities such as snowmobiling and snowshoeing. There is a popular snowshoe route on the Central Cascades Forest that traverses Sasse Ridge and makes its way to the top of Hex Mountain.

The Conservancy completed a Geographic Information Systems (GIS) analysis of density for winter trails in each of the following tracts in the Central Cascades Forest:

Winter Trails						
Management Tract	Miles of Trail	Area (sq mi)	Density (mi/sq mi)			
Central Cascades Forest (all tracts)	78.28	74.71	1.05			
Cabin Creek	11.67	18.14	0.64			
Keechelus/Kachess	10.19	8.56	1.19			
Little Naches	9.17	9.85	0.93			
Cle Elum Ridge	24.38	17.30	1.41			
Manastash / Taneum	22.88	19.91	1.15			

Maps displaying authorized summer and winter trails and uses for each tract on the Central Cascades Forest are included in Appendix F. Related tables have additional trail information.

Trail data was provided by Jennifer Hackett, owner of Washington Hometown, a mapping company out of Ellensburg. It includes information from local, state and federal land managers, private land owners, community and user groups, as well as other recreation-based organizations. The data doesn't include unauthorized user-made trails.

The Conservancy is in the process of coordinating with the U.S. Forest Service and outside contractors to complete a detailed assessment of the trails traversing the central Cascades Forest. This effort will include identifying and mapping user-made trails and associated use. Estimated completion for the evaluation is by fall 2016. The Conservancy was able to acquire preliminary information regarding trail conditions from an earlier assessment performed by the U.S. Forest Service in addition to their personal accounts. A summary of this information is available in Appendix F.

The Conservancy is also mapping key ecological values across the Central Cascades Forest to gain a better understanding of the suitability of specific areas for different types of recreation. Trails may be relocated or closed if they conflict with these values.

h. Mining

Mineral Assessments

Mineral assessments completed for the Central Cascades Forest include:

1. August 2013, Mineral Property Evaluation (MPE) prepared a mineral potential report for the Trust for Public Land, covering 31 parcels (17,861.85 acres) previously owned by Plum Creek Timberlands Inc.

- 2. April 2014, Rocky Mountain Environmental Associates, Inc. (RMEA) prepared a mineral assessment report for the Manastash property, formerly owned by Plum Creek Timber Company and located in Kittitas County (T18N, R15E, Sections 7, 15 and 17).
- 3. October 2014, HydroSolutions Inc. (HSI) prepared a geology and mineral assessment report for "the Cle Elum parcels" (aka the entirety of the current CCF LLC property), formerly owned by Plum Creek Timber Company and located in Kittitas and Yakima counties. This report covers 47,220 acres.

Mining Related History of the Property

Between 1880 and the 1950s, there is evidence of coal mining in the Roslyn area, but this appears to have occurred mostly outside of the Central Cascades Forest. Remaining signs of mining activity identified on the property by the mineral assessments, dating back to the early 1900s, include coal mine spoils, clinker outcrops and gravel and sand quarries. There is no history of leases pertaining to coal bed methane exploration in the area. Historically, there have been a total of 34 load or placer mining claims on the property, including iron and gold, but all have been abandoned. Existing quarries were identified, but were likely active only during construction of the forest roads for logging access in the area. No active mines are on record and there is no evidence of large undiscovered mineral or precious metal resources.

No evidence of oil or commercially viable gas deposits, or related historical exploration, was found. Although the Spokane District Resource Management Plan identifies the area as being near a high potential zone for oil and gas, historical exploration near the property has produced little to no evidence of either and the designation is likely due to a history of periodic influxes in leasing interests. The mineral estate for all portions of the property was severed from the surface estate in 1989. The reserved minerals rights were acquired by Plum Creek and the reserved oil and gas rights are now owned by Conoco-Phillips. Per the mineral assessments and Washington DNR records, there are currently no oil and gas leases in Kittitas County, state or private, and the state owns no mineral rights.

Risk of and Response to Mining Activity

The mineral assessments conclude low potential for commercial exploration or development of oil and gas on the property and that the risk of the following types of subsurface exploration or development is so remote as to be negligible: petroleum products, coal resources, sand and gravel, construction materials, metallic and industrial materials, abrasives, peat, and gemstones. The Conservancy and the CCF LLC have no intention of developing its mineral interest, with exception of gravel and rock for forest roads. With regard to Conoco-Phillips or any other party that asserts mineral ownership, the CCF LLC will monitor activity and act to protect its property from damage to the conservation values.

i. Grazing

There are no active grazing leases within the Central Cascades Forest. Prior to acquisition, limited sheep grazing had occurred in the Naches area of the forest. Any future requests for grazing leases will be reviewed by the Conservancy and the CCF LLC Board to ensure compatibility with conservation and restoration objectives. Following policies of the Conservancy a grazing management plan would need to be developed and approved prior to any leasing agreement.

j. Developed Infrastructure

An area on Cle Elum Ridge is currently leased to R & R Cable Co. and Inland Northwest Telephone for the operation of a communications tower. The National Oceanic and Atmospheric Administration (NOAA) has lease for the operation of a weather station near Stampede Pass. Any future requests for the placement of cell towers or other development of communication, energy, or other infrastructure will be reviewed by the Conservancy and the CCF LLC Board to ensure compatibility with conservation and restoration objectives.

k. Invasive species

Invasive species are considered a primary threat to biodiversity and a resilient, functioning ecosystem. Historically, native plant communities in the central Cascades have been extensively influenced by the introduction of non-native insects (e.g., balsam wooly adelgid), fungi (e.g., white pine blister rust) and plants (e.g., knapweed).

Invasive species have the potential to alter the structure, composition, and function of ecological communities and are known to directly eliminate species from an ecosystem. Although the long-term ecological impact of many invasive species is unknown, there is growing concern with the increased number and distribution of species in this region. Moreover, the Central Cascades Forest lies within a unique geographic area near the crest of Cascades and within the Interstate 90 corridor. Recreational opportunities proliferate with many miles of motorized roads and trails, along with major access points to the Alpine Lakes Wilderness. These factors make this

landscape particularly vulnerable to the introduction and establishment of invasive species. For this reason, the Conservancy will implement an early detection/rapid response protocol in conjunction with an integrated pest management approach to controlling the spread of invasive species.

Due to the prevalence of noncontiguous ownership patterns, this strategy is most effectively applied through a cooperative approach. Therefore, the Conservancy will participate in the Upper Yakima Cooperative Weed Management group, a collaboration of public and private partners, including the U.S. Forest Service, the Kittitas County Noxious Weed Control Board and the Mountains to Sound Greenway Trust. This group advocates for further monitoring, surveying, mapping, controlling, and educating the public on the importance of controlling the impacts of invasive species on our forested ecosystems.

Common Name	Scientific Name	Abundance	Distribution	Potential Impact
spotted knapweed	Centaurea biebersteinii	High	Wide	High
Scotch broom	Cytisus scoparius	Moderate	Moderate	High
tansy ragwort	Senecio jacobaea	Low	Local	High
orange hawkweed	Hieracium aurantiacum	Low	Local	High
diffuse knapweed	Centaurea diffusa	Moderate	Wide	Moderate
Dalmatian toadflax	Linaria dalmatica	Low	Local	Moderate
houndstongue	Cynoglossum officnale	Low	Local	Moderate
Canada thistle	Cirsium arvense	High	Wide	Moderate
bull thistle	Cirsium vulgare	High	Wide	Moderate
common St. Johnswort	Hypericum perforatum	Moderate	Wide	Moderate
oxeye daisy	Leucanthemum vulgare	Moderate	Wide	Moderate
common tansy	Tanacetum vulgare	Low	Wide	Moderate

Invasive weeds found within Central Cascades Forest in Kittitas County and general ranking of abundance, distribution and potential impact.

l. Resources and Staff capacity

Under agreement with the CCF LLC, the Conservancy will manage the Central Cascades Forest. With over 70 staff, the Conservancy's Washington program (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/washing ton/index.htm) has considerable experience in forest management, forest and fire ecology, finance, government relations, marketing, and community partnerships. Prior to the acquisition of the Central Cascades Forest, the Conservancy directly managed and worked to restore over 25,000 acres of forest on Washington's Coast, and was a founding partner of the Tapash Sustainable Forest Collaborative.

Staff responsible for day-to-day management of the Central Cascades Forest include the:

- Director of Forest Conservation and Partnerships (Co-team lead)
- Director of Forest Conservation and Management (Co-team lead)
- Washington Forest Manager SAF Certified Forester
- Central Cascades Community Coordinator
- Central Cascades Forester
- Washington Forest Ecologist
- Washington Aquatic Ecologist

The forest management team is supported by staff throughout the Washington program and may also utilize expertise found across the Conservancy's North America region or global programs. Additional forest management support including equipment operators, logging crews, and specialized expertise such as accounting and inventory is supported through independent contractors. The Conservancy seeks local contractors and operators as much as possible.

All forest management operations and restoration on the Central Cascades Forest is financed through earnings from timber management, philanthropic gifts, and private and public grants.

m. Tax Payments and Liability

The Central Cascades Forest property lies within Kittitas and Yakima counties. Of 115 tax parcels owned by CCF LLC in Kittitas County, 111 are under the Designated Forest Land classification. Tax parcels 301834and 811934 (Cabin Creek) and 850134 and 906935 (Roslyn Ridge) are not under current use classification and are taxed as undeveloped land. In 2015, CCF LLC paid \$31,616 in taxes to Kittitas County. The

largest portion of these taxes, \$13,913, went to state forest and Washington DNR fire control fees.

Four tax parcels within the Property are located in Yakima County. Parcel 131931-31001 is under Designated Forest Land classification, 151617-21012 is taxed as agricultural land, and parcels 151607-11001 and 151617-31001 are taxed as noncommercial forest land. In 2015, CCF LLC paid \$5,595 in taxes to Yakima County. The largest portion of these taxes, \$1,484, went to school maintenance and operations fees.

The Central Cascades Forest LLC and The Conservancy are aware of the potential tax liability involved when property ceases to be classified as timber land or designated forest land and will act diligently to notify Kittitas and Yakima counties if the use of the Property changes.

VI. FOREST MANAGEMENT



FOREST MANAGEMENT

a. Scientific Basis and Principles for Management

The widespread degradation of forest and stream habitats across the Eastern Cascades Ecoregion and risks to local communities and ecosystem services (water, timber production, grazing forage, and recreation) from uncharacteristically severe wildfire has promoted a wide scale shift in forest management focus to "ecological restoration". Similar to forests across western North America, a history of wildfire suppression, intensive timber harvesting, and grazing throughout the 20th century has led to dramatic changes in the structure and composition of many the Ecoregion's forests. Shifts in tree species composition and increases in forest density have resulted in decreased drought and fire tolerance for many forests at a time when climate change is projected to increase drought stress and wildfire. During recent decades these changes in forest structure and composition have contributed to dramatic increases in wildfire and insect and disease mortality. Many, but not all, of these disturbances are outside of the range of which the ecosystems are adapted. Twentieth century forest management also led to the building of extensive forest road networks which have dramatically altered watershed hydrology, increased sediment delivery into streams, reduced floodplain functioning, and fragmented aquatic habitats.

Over the last century, the watersheds and forestlands within the Central Cascades Forest have been successfully engineered to grow wood fiber and maximize revenue generation, while meeting regulatory requirements for endangered species, aquatic systems, and road systems. The wood production focus of past management on the Central Cascades Forest has dramatically altered the structure, pattern, and to a lesser extent, species composition of these forests. Transitioning the Central Cascades Forest landscape toward a focus on providing ecological functions, along with some revenue and wood, will require a long term effort. In both dry and moist forests, several decades of research indicate that active management can accelerate this transition (Muir et al. 2002, Carey 2003, Hessburg et al. 2005, Noss et al. 2006, Wilson and Puettmann 2007, Jain et al. 2008, Long 2009, North et al. 2009, USFS 2012, Anderson and Ronnenberg 2013, Stine et al. 2014). While natural processes can do much of the work, walking away from these impaired ecosystems is not the fastest or lowest risk route to restored ecological functionality. Mechanical treatments, prescribed fire, planting, and other treatments are needed to shift the current landscape of dense, simplified, young plantations and selectively logged forests to a more species diverse, structurally complex, spatially variable, and ultimately more resilient ecosystems.

b. Forest Restoration Principles

The forest management approach used to restore and manage the Central Cascades Forest at multiple scales will follow the general approaches of ecological forestry (Franklin et al. 2007, Franklin and Johnson 2012). Ecological forestry uses the structure, composition, and pattern created by natural disturbances and forest development processes as guide posts for management. It relies on the basic assumption that natural forest ecosystems provide and sustain the broad array of ecological functions that humans currently want from many forests. The goal of ecological forestry is not necessarily to fully restore the structure of pre-EuroAmerican forests, however, as ongoing wood production and financial return is often a long term goal. Instead, the goal is to restore and sustain core ecological functions and processes while also providing for economic benefits and other social goods and services. The following seven core principles, adapted from Hessburg et al. (2015), will guide multi-scale restoration of ecological function across the landscapes encompassing the Central Cascades Forest.

Principle 1: Important ecological processes² operate across spatial scales – from tree neighborhoods to regional landscapes (Table VI-1). *Implication: Planning and management must incorporate and link the tree neighborhood, patch, drainage/hillslope, local landscapes, and regional landscapes.*

Principle 2: Topography provides a natural template for vegetation and disturbance patterns across the landscape hierarchy scales. *Implication: Use topography to guide restoration treatments*

Principle 3: Disturbance and succession drive ecosystem dynamics. *Implication: Focus on restoring the ecosystems' inherent fire/disturbance regimes and vegetation successional patterns; other ecological processes will follow.*

Principle 4: Predictable distributions of forest-patch sizes naturally emerge from interactions climate-disturbance-topography-vegetation. *Implication: focus on restoring the natural distribution of forest patch sizes across landscapes.*

Principle 5: Patches are "landscapes within landscapes: *Implication: focus on restoring characteristic tree clump and gap patterns within stands/patches*.

Principle 6: Widely distributed large, old trees, provide a critical ecological backbone for forested landscapes. *Implication: focus on retaining and promoting large/old trees and post-disturbance large snags and down logs*.

Principle 7: Traditional patterns of land ownership and management disrupt inherent landscape and ecosystem patterns. *Implication: develop restoration*

² Fish and wildlife migration, hydrology, and the frequency, severity, and extent of disturbances such as fire, insects, disease, wind, and floods.
projects that effectively work across forest ownership and management allocations.

c. Multi-scale Management Framework: Trees to Landscapes

One of the primary results of past wood production forestry across the Central Cascades Forest has been to restructure and "organize" the variable patterns of the natural forest ecosystems into relatively uniform, 20~100 acre operational units, often called stands (O'Hara and Nagel 2013). Stand-based management effectively decoupled the relationship between the pattern, structure, and composition of vegetation and the natural disturbance regime and biophysical environment (topography, climate, soils, etc) (Lertzman and Fall 1998). Restoring vegetation and habitat patterns that are more in sync with the biophysical environment and disturbance regime cannot be done by applying stand-based approaches to the existing set of operational units (Hessburg et al. 2015), even if ecologically driven approaches such as variable density thinning are used.

Instead, a multiscale approach is needed to restore vegetation and habitat patterns across watersheds over time, as well as to enhance variability and species diversity within management units. The landscape hierarchy presented in Table VI-1 provides a framework for multiscale restoration. Instead of conceptualizing forested landscapes as a collections of stands, it facilitates thinking in terms of forests as "landscapes nested within larger landscapes" (Allen and Hoekstra 1992). A key purpose of the hierarchy is to facilitate defining desired targets for pattern, structure, and composition at each level that are "in-sync" with the topography, forest type, soils, disturbance regime, and forest development processes (Hessburg et al. 2015). Information sources for setting targets for different levels are provided in Table VI-1.

d. Climate change and desired future conditions

i. Predicted climate change across the Central Cascades Landscape

Defining and managing for desired future conditions is a tremendous challenge due to the changing climate and the uncertainty around such changes. Projected climate change for the Central Cascades Landscape was evaluated at two different levels. First, the projected shifts in mean temperature and precipitation were evaluated for the whole landscape. The Climate Western North America website (ClimateWNA 2012) was used to determine both recent climate (1961 to 1990) and the projected climate for the 2055 time period using medium level assumptions³. The magnitude of change was derived by season and averaged across the whole Central Cascades Forest.

Figure VI-1 shows a 2.1-2.9 degree (Celsius) increase in temperate and 1-4% increase in precipitation, except for the summer which shows a major drop in precipitation (18%). The large increase in summer temperatures and sharp decline in precipitation will increase summer moisture stress and dry out fuels. The increase in winter and spring temperatures will significantly reduce snowpack at mid to upper elevations in the Central Cascades, thus reducing water storage and summer stream flows and increasing stream temperatures (Mote et al. 2005, Mantua et al. 2010). Snow and summer moisture stress are two primary factors controlling the distribution of plant species in the Cascades (Franklin and Dyrness 1988), as well as fire frequency and severity (Little et al. 2009). Thus, the combined effects of reduced winter snowpack and increase summer moisture stress Forest.

Figure VI-1: Projected changes in mean temperature and percent change in precipitation from 1961-1990 to 2050's time period. Projections are based on an ensemble average of climate models using a moderate emissions scenario.



³ The Climate WNA system was used to downscale PRISM temperate and precipitation data, as well as future projections, to a 90m grid for the Central Cascades Landscape. The average of an ensemble of multiple general circulation models was selected using the RCP 4.5 emissions scenario. The 2055 time period was used. The 2085 time period was not included due to time period of this management plan and the higher uncertainty of 2085 projections.

To better evaluate the localized effects of these projected climatic changes, future climatic water deficit and actual evapotranspiration (AET) were modeled on a 90m grid using downscaled projections of temperature and precipitation changes. Deficit is a robust measure of moisture stress faced by plants and AET is a decent measure of productivity. The mean deficit and AET values for each forest zone were then derived for the recent past and future time periods (Figure VI-2). The results show a projected increase in deficit for each zone that is roughly equivalent to moving one zone in the drier direction (see description of forest zones in Section V, Forest and Resource Assessment). For example, forests that are currently in the cold zone are projected to face moisture stress levels in 2050 that are currently found in the Moist-cold zone. AET, and thus productivity, is projected to increase for the Cold and Moist-cold zones due to decreases in the snow pack and a longer growing season. AET is projected to stay roughly the same for the other zones.

These results suggest that drought intolerant species such as silver fir that are currently found in the Moist zone (Figure VI-3), may not be viable in that zone in the future. In contrast, the current Moist zone may be more suitable for Douglasfir, grand-fir, western red cedar, western larch, and ponderosa pine by midcentury. Projected increases in deficit will lead to decreases in summer fuel moistures, which will increase fire frequency, extent, and severity (Littell et al. 2010). Note, however, that there is a range of deficit and AET values for each zone and only the means are shown here to clearly illustrate trends. Decisions about what species, and from which seed zones, are likely suitable for future climates will need to account for site-specific climate, soils, topography, and other factors. The 90m resolution maps of current and future deficit can be used as a guide. albeit cautiously. The results shown here use the average projections of all the climate models combined (ensemble approach) for the mid-level emissions scenario (RCP 4.5). There is considerable variation in projections among different models that illustrates the uncertainty surrounding predicting future climates, let alone emissions scenarios.

ii. The historic and future range of variability

Forest management is a long term undertaking, especially restoration of old forests that will take 50-140+ years to achieve. As described above, current climate projections indicate that many current plant communities in the Central Cascades Forest will undergo significant change over the next 50-100 years (Littell et al. 2010). Fire frequency and extent are also predicted to increase. Thus, simply using historic conditions as management targets will likely fail to restore the desired ecosystem functions (Millar et al. 2007, Joyce et al. 2009). The need to incorporate projected future conditions into management targets is increasingly clear (Dunwiddie et al. 2009, Spies et al. 2010, Halofsky et al. 2015).

Managing for plant species, phenotypes, or structural conditions (e.g., more open forests) that are better adapted to projected future climates (e.g. "novel ecosystems") is fraught with uncertainty and risk, however (Dilling et al. 2015, Lourenço et al. 2015). Historic conditions still have value as guideposts for management, even if they are not the eventual goal (Spies et al. 2010). Historic ecosystems persisted through centuries of frequent disturbances and significant climatic fluctuation while sustaining native biodiversity and other ecosystem services (Keane et al. 2009). In dry forests, historic fire regimes generally kept biomass well below carrying capacity and selected for fire and drought tolerant species, thus providing substantial adaptive capacity to handle shifts in climate and increased fire frequency (Fule 2008). Furthermore, 20th century forest management and wildfire suppression has typically moved western forested landscapes in the opposite direction of projected climate changes. Thus, restoring historic conditions are broadly assumed to increase a forest's resilience and adaptive capacity (Stephens et al. 2010).

Management of the Central Cascades Forest will use both historic and projected future climates to define desired future conditions that are resilient to change over the next 100 years. Central to this approach is the notion of a "range of variability". There is no single state that defines historic or future conditions, but instead a range of structural stages, species mixes, and patterns that are possible given the biota, climate, soils, and other biophysical elements (Landres et al. 1999). The historic range of variability (HRV) and future range of variability (FRV) will both be used to guide management. The FRV for a site identifies alternative reference conditions that are suited to a predicted future climate (Keane et al. 2009, Hessburg et al. 2013). HRV and FRV ranges will be used primarily to guide management at the local landscape level. The process and datasets used to derive HRV and FRV for local landscapes is described in the next section.

Figure VI-2. Current and future climate: actual evapotranspiration and climatic water deficit for the five mixed conifer forest zones on the Central Cascades Forest. Lines show the direction of change from the current climate (circles) to the 2050s period (triangles). A sixth zone (Dry-Ponderosa Pine) was added here to distinguish the Dry Zone into dry grand-fir plant associations (Dry) vs. dry ponderosa pine and Douglas-fir (Dry-PP). Almost no Dry-PP currently exists on the Central Cascades Forest, but may in the future. Note that there is a range of deficit and AET values for each zone; only the means are shown for clarity.



Figure VI-3: Departure of cover types in the North Fork Taneum Watershed from HRV and FRV conditions. Percent land is the percent of the subwatershed occupied by each cover type. Patch density is the number of patches for each cover type per 10,000 hectares. Note that the PSME (Douglas-fir) cover type is clearly departed from HRV and FRV, indicating that it should be reduced.



Table VI-1: Landscape hierarchy to guide multiscale restoration. Note that treatment units are outside of the hierarchy.

	Level	Description	Approximate Extent (Acres)	Information Sources for Pattern Targets	
Treatment Units (5-100+ Acres)	Regional Landscapes	Ecoregions & provinces, River basins: HUC 4-8. Examples include the East Cascades Ecoregion or the Upper Yakima Subbasin.	100k to millions	Terrestrial and aquatic species connectivity needs and recovery guidelines. Regional forest condition assessments (e.g., Haugo et al. 2015)	
	Local landscapes	Sub-watersheds or collections of sub- watersheds: HUC 8 -12	10k to 100k	Landscape	
	Drainages - Hillslopes	Areas of common potential vegetation groups with clear topographic boundaries. Size of a medium to large timber sale area.	500-5,000	evaluations and prescriptions	
	Successional Patches	Vegetation with common structure & composition created by disturbance, topography, and/or soil conditions.	5-200+		
	Tree Neighborhoods	Environment experienced by individual or groups of trees. Can be blends/gradients of individual trees, clumps, and small openings or distinct gaps, dense areas, regen thickets, etc.	0.1 – 5+	Patch level reference datasets (e.g. Churchill 2013)	

e. Landscape Level and Multi-Ownership Approach

i. Importance of a cross-ownership approach through the Tapash Collaborative

Collectively, the conservation targets for the Central Cascades Forest are driven by the interplay of ecological patterns and processes operating at multiple scales. Consequently, the conservation targets cannot be achieved on Central Cascades Forest alone. Instead, the conservation targets depend upon a large landscape approach in which the Conservancy's management is informed by and coordinated with adjacent federal, state, and private ownerships. The Tapash Sustainable Forests Collaborative has provided the framework for such an "all lands" approach across the Central Cascades landscape. Multiple local landscape evaluations have been conducted through the Collaborative that provide direction for different landowners to achieve common, large scale goals. Opportunities for joint projects driven by the Collaborative are currently emerging and will be pursued over time. Coordinated forest and aquatic restoration projects between the Conservancy and the USFS are in the early stages of planning for the North Fork Tanuem watershed, for example. Landscape evaluations driven by the Tapash Collaborative will continue to provide key, large scale integration and guidance for both aquatic and terrestrial restoration efforts over time.

Northern spotted owls provide a prime example of a Central Cascades Forest conservation target that depends upon a large landscape approach and coordinated management across federal, state, and private forest ownerships. Northern spotted owls use forest habitats characterized by large trees and dense, multi-layered canopies. The abundance and location of these habitats naturally depended in large part upon the frequency and severity of wildfire, also known as the fire regime, of a landscape. However, fire within a landscape is determined by the abiotic factors such as topography and climate, but also by patterns of forest vegetation and fuels. Northern spotted owl habitats represent areas with high fuel accumulations and an associated high risk of stand replacing fire should they burn. Consequently, the long-term sustainability of northern spotted owl habitats within the Ecoregion depends upon 1) moderating levels of forest fuels and potential fire behavior across large landscapes, 2) maintaining owl habitat within fire refugia (locations that are naturally sheltered from wildfire), and 3) allowing a shifting mosaic approach in which the locations of owl habitat shifts over time, with disturbances, across large landscapes. Thus, the conservation of northern spotted owls on the Central Cascades Forest depends upon the overall conditions and management of the landscapes in which the forest is located.

ii. Use of terrestrial landscape evaluations & prescriptions

Restoring resilience and other ecological functions across local landscapes (Table VI-1) requires intentionally managing for patterns of structure and composition that are "in-sync" with the biophysical environment and disturbance regime. Large scale restoration cannot be accomplished by designing one stand-level prescription at a time. Management of the Central Cascades Forest will be guided by local landscape evaluations and prescriptions. This evaluation system was developed by Hessburg et al. (2013) and is a central component of restoration planning on the Okanogan-Wenatchee National Forest (USFS 2012). The system provides a quantitative framework and tool set to quantify and evaluate departure of composition, structure, and pattern from historical and future reference conditions, and design large scale treatment scenarios that integrate the needs of multiple resource objectives. Through the Tapash Collaborative, evaluations have been conducted or are in process for 6 of the sub-watersheds that make up the Central Cascades Forests. Evaluations for the remaining watersheds will be completed over the next few years. Appendix E provides an example from the North Fork Taneum landscape evaluation to illustrate how this system will be used to guide the "all lands" approach to restoration of local landscapes containing the Central Cascades Forest.

The landscape evaluation system uses early twentieth century conditions as reference conditions from which to quantify spatial pattern targets for subwatersheds (local landscapes) (Hessburg et al. 2013). Sub-watersheds are classified into ecological sub-regions (ESR) based on their climate and potential vegetation types (Hessburg et al. 2000). Each ESR in Eastern Washington has a set of 8-20 reference sub-watersheds where photo-interpreted attributes such as canopy cover, size class, dominant species, were collected for all delineated successional patches (10-100+ ha polygons) from the earliest available historical aerial photographs. For each successional patch, 23 derived attributes such as cover type, structure class, habitat indices, large tree presence, fire susceptibility ratings, and insect and disease susceptibility were calculated from the photo-interpreted attributes. Spatial pattern metrics such as percent land, mean patch size, edge to area ratio, largest patch size, mean nearest neighbor and others were then generated for each derived attribute using Fragstats (http://www.umass.edu/landeco/research/fragstats/fragstats.html). A selection of additional landscape metrics was also derived.

For a target subwatershed, the historical data from the 8-20 reference watersheds in the same ESR form the HRV. To address the need for climate change adaptation, a second set of 8-20 reference sub-watersheds from the next warmer and drier ESR is used for the FRV. This is a climate analogue approach where landscapes that historically experienced the predicted future climate of the target landscape are used as the FRV (USFS 2012).

To evaluate departure from both the HRV and FRV for a target subwatershed, contemporary aerial photography is used to derive the same set of photointerpreted attributes, derived attributes, and respective pattern metrics as was done for the historical reference watersheds. The values for each derived attribute are then compared to the range of values from the HRV and FRV subwatersheds. In this way, departure from can be evaluated for each derived attribute (e.g., cover type, structure class, crown fire susceptibility, white headed woodpecker habit suitability, western spruce budworm susceptibility, etc.). Figure VI-3 shows an example of departure for cover type from the North Fork Taneum subwatershed.

The departure information from a landscape evaluation is then synthesized into a landscape prescription. The landscape prescription provides direction and targets for what structure classes and cover types, as well as habitat, fire, and other types, should be increased or decreased, as well as guidance and target ranges for watershed-level pattern. Managers can then look for opportunities to consolidate, expand, and/or connect some patch types; while reducing or breaking up other patch types. A decision support system facilitates the location of treatment area to achieve prescription targets by combining departure information from the derived attributes and as well as other resource objectives such as interrupting fire flow (Hessburg et al. 2013). Treatment types may include mechanical, prescribed fire, and/or wildland fire depending on road access, economic considerations, and other objectives and constraints. Boundaries for treatment units can be designed to achieve pattern goals vs. perpetuating pattern departures. Most importantly, the landscape prescription provides managers with a concrete framework and direction for how to conceptualize and manage individual treatment units as part of a larger landscape in order to move the landscape towards more ecologically functional and resilient conditions. See Appendix E for an example of a landscape prescription for the North Fork Taneum subwatershed.

iii. Habitat for late successional dependent species

The Conservancy's management of the Central Cascades Forest will protect and restore habitat for late successional dependent species, such as the northern spotted owl, through the Central Cascades HCP habitat targets and through the use of local landscape evaluations and prescriptions as described above. The HCP provides baseline levels of "old-growth" and "managed old growth" that must be maintained on the Central Cascades Forest. More importantly however, the landscape evaluations and prescriptions will assess both the present locations of late successional habitats and evaluate whether they are located within ecologically sustainable locations (e.g., locations that naturally function as fire refugia). These evaluations will assist the Conservancy in incorporating the maintenance and further development of new late successional habitats with forest management activities and potential natural disturbances.

iv. Use of aquatic landscape prescriptions

Similar to the evaluation of local landscapes and development of landscape prescriptions for terrestrial values, the Conservancy's management of the Central Cascades Forest will also use whole watershed/multi-ownership aquatic landscape prescriptions. Management and restoration of forest and stream habitats are intrinsically linked and must be considered in tandem (Rieman et al. 2010, Hessburg et al. 2015). The very nature of aquatic systems dictate that aquatic conservation targets depend upon whole watershed, multiownership approaches that integrate aquatic habitats with terrestrial conditions, disturbance processes, and transportation networks (Luce et al. 2012). Unfortunately, the toolsets and approaches for comprehensive evaluation and prescription development at the scale of local landscapes are not as well developed for aquatic systems as they are for terrestrial.

At present time, development of aquatic landscape prescriptions for the Central Cascades Forest will generally follow the approach taken through the Tapash Sustainable Forests Collaboarative Manastash-Taneum Resilient Landscape Restoration Project. This approach primarily focuses on the interaction of forest roads with aquatic systems and the impacts of these interactions on habitat for target coldwater (e.g., bulltrout, Salvelinus confluentus) and anadramous (e.g., steelhead, Oncorhynchus mykiss) fish species (Gaines and Begley 2015). Given the extensive forest road networks present across the Manatash-Taneum project area (and throughout the Central Cascades Forest), this approach focuses not simply upon road density, but upon identifying particular problem "hotspots" where roads are having the greatest negative impacts due to impaired fish passage, sediment delivery, degraded floodplains, or degraded stream channels. Identifying the subset of problematic road segments, culverts, etc. within a watershed both facilitates synchronizing road repairs with forest management and recreation planning and also promotes the greatest possible return-on-investment for resources committed to improving road-stream interactions. This focus on identifying problematic road-stream interactions is very similar to the State of Washington's Road Maintenance and

Abandonment Plans (RMAP) program. Prior to the CCF LLC acquisition, Plum Creek had entered the "maintenance" phase of RMAP having completed all required RMAP road system upgrades.

The Conservancy's aquatic landscape prescriptions will build upon the RMAP program by focusing on specific habitat values for target fish species (steelhead and bulltrout) and incorporating all ownerships within the HUC12 subwatersheds containing the Central Cascades Forest. Steps 1-4 of the evaluation process will focus upon the impacts of road-stream interactions on priority aquatic habitats while Step 5 evaluates potential impacts of planned timber harvests.

Step 1: Evaluate and if necessary rectify road and stream spatial data. At the core of evaluating road-aquatic interactions is having high accuracy spatial data for road and stream locations across land ownerships. Often the available spatial data does not provide an accurate representation of road and stream locations.

Step 2: Identify and map floodplains. Floodplain mapping tools such as TerrainWorks (Benda et al. 2007) and/or field reviews can be used to develop a floodplains spatial layer.

Step 3: Identify and map target fish species' current and intrinsic habitat potential. A key component of the evaluation is to map current distributions and "intrinsic potential habitat" for target fish species. Focusing on current and potential habitat allows prioritization of fish passage and sediment delivery issues within a watershed. Current fish distribution data is maintained by the Washington Department of Fish and Wildlife while TerrainWorks (Benda et al. 2007) may be used to map intrinsic potential habitat for target species such as steelhead. Climate change impacts on intrinsic potential habitat may be further evaluated using stream temperature projections from the NorWeST regional database of modeled stream temperatures (Isaak et al. 2010, http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html).

Step 4: Assess road-stream interactions. Once the input spatial layers (roads, streams, floodplains, intrinsic potential habitat) are developed, road-stream interactions may be evaluated at two scales. For example, within the Manastash-Taneum project the potential for negative road-stream interactions were first assessed within areas identified as current or potential steelhead habitat (Gaines and Begley 2015). This identified both road segments located within floodplains containing potential steelhead habitat and also areas with high concentration of road-stream

crossings in close proximity (100 meter buffer) to potential steelhead habitat. These identifications were then used to guide field reviews evaluating impaired floodplain functioning, sediment delivery, and fish passage barriers. While not yet completed, the Conservancy will develop and maintain an inventory of all culverts on the Central Cascades Forest. Second, to evaluate the upslope influences that roads may be having on down-slope stream channels within the Manastash-Taneum project area, Gaines and Begley (2015) conducted a moving windows assessment of travel route (roads and motorized trails) density and road-stream crossing density. Once again, these analyses provided guidance for focused field review to determine need for upslope restoration of the forest road network. These focused field reviews may use intensive field survey protocols such as the Geomorphic Road Analysis and Inventory Package (GRAIP; Black et al. 2012, Cissel et al. 2012) which provide very detailed assessments of sediment delivery but are cost-prohibitive to implement at the scale of entire subwatersheds.

Step 5: Evaluating Harvest Sensitivities using Plum Creek's Watershed Analyses. A final step in the development of aquatic landscape prescriptions is to evaluate the potential impacts of harvest areas on aquatic and hydrologic features. These evaluations will largely be based upon datasets developed through Plum Creek's Watershed Analyses. Conducted by Plum Creek primarily during the 1990's, the Watershed Analyses evaluate potential sensitivities to timber harvesting due to factors such as mass wasting, surface erosion, hydrology, and riparian conditions and provide best management practices. These data have subsequently been incorporated into the Washington Department of Natural Resources Forest Practice Applications review process. When planning a timber harvest on the Central Cascades Forest the Conservancy will use the Watershed Analyses as one tool to evaluate potential sensitivities, particularly with respect to mass wasting and surface erosion, and identify best management practices.

v. Use of HCP Habitat and Lifeform Targets, Habitat Restrictions, and Riparian Restrictions

As described in Section IV of this management plan, the Central Cascades Habitat Conservation Plan (HCP) specifies baseline forest structure and habitat targets and riparian protections across the Central Cascades Forest (Appendix B). These targets were established within the context of Plum Creek's industrial wood production forest management objectives. Consequently the Conservancy assumes that future management using ecological forestry and landscape principles based approaches to restore landscape scale ecological patterns and processes will exceed the HCP baselines. Within local landscapes in which the Conservancy has already completed landscape evaluations, the resulting landscape prescriptions far surpass HCP baseline forest structure and habitat targets. Management restrictions around riparian areas and other special habitats (e.g., talus slopes) will continue to follow the Central Cascades HCP. The landscape evaluation/landscape prescription approach does not explicitly consider riparian and other special habitats and the HCP specified restrictions surpass Washington State forest practice laws.

f. Treatment Unit Level Approach

The goals of the local landscape evaluations and prescriptions are necessarily accomplished through treatments on-the-ground that require unit boundaries and operational prescriptions. Incorporating landscape level goals into unit level prescriptions is a challenging task. All forest treatments will be implemented to follow both Washington Forest Practice Rules (Title 222 WAC) and the Central Cascades Forest Habitat Conservation Plan. The following section lays out principles and operational approaches for treatment units that will be used in management of the Central Cascade Forest.

i. Manage units in the context of the landscape hierarchy

First, it is important to recognize that current stand boundaries and future treatment unit boundaries are explicitly not part of the multiscale hierarchy outlined in Table VI-1. Unit boundaries have to incorporate operational factors that often make it difficult and impractical to completely follow natural successional patch boundaries. Instead, unit boundaries should be viewed as a tool that, in conjunction with untreated areas, will achieve the desired patterns of structure and composition at multiple levels of the hierarchy. Where feasible, they should be delineated to blur the sharp stand boundaries created by past plantation forestry. Operational units can comprise a single successional patch, part of a patch, multiple patches together or even cut across patch boundaries (Table VI-1). Unit boundaries are likely to change over time and also vary by treatment type (e.g., multiple mechanical thinning units often make up a prescribed fire unit).

In order to ensure that treatments restore patterns of structure and composition at multiple scales, it is critical to think at spatial scales both above and below the unit when developing unit level prescriptions. In contrast, the stand based approach to prescription development focuses primarily on tree condition (growth, density, composition, health, etc.) and managing for an average condition across the unit, which reduces fine scale variability. The following guidelines will facilitate shifting from a stand to a multiscale approach:

- <u>Incorporate guidance from a local landscape evaluation and prescription</u>. An individual unit will present opportunities to achieve goals from the landscape prescription (e.g., creating a larger patch of a particular structure and cover type by merging surrounding smaller stands created by past management). Guidance on northern spotted owl habitat requirements, aquatic issues, etc. should also be factored into unit prescriptions.
- <u>Prescribe targets for with-unit variability (tree neighborhoods</u>). Targets for clumping, gaps, skips, as well as variation in density, should be included. These can be explicit targets or more informal targets that are achieved through species based prescriptions (e.g., removal of grand fir).
- <u>Integrate unit prescriptions across drainage-hillslope areas.</u> Prescriptions for units in a drainage hillslope area should ideally be written together at the same time. This will make implementing a local landscape prescription more tractable by focusing on specific areas of a watershed. Also, prescribing targets for tree neighborhood patterns (via gaps, skips, heavy and lighter thinning areas) across a drainage vs. in individual units will facilitate aligning pattern with current conditions, topography, and natural disturbances. Unit size can also be increased where feasible to include multiple current stands. Prescriptions should factor in units or areas that will not be treated as these areas are part of the multi-scale pattern across the drainage hillslope and contribute to how it functions.

ii. Use fire regimes to guide prescriptions

The Central Cascades Forest covers a wide range of forest types and ecosystems that require different approaches to restoration (Franklin and Johnson 2012). The most ecologically meaningful factor to differentiate treatment unit level objectives and approaches is the fire regime. For a significant portion of the Central Cascades, relatively frequent (5 ~ 50 years), low to mixed severity fire was historically the dominant disturbance agent that shaped forest structure and composition (Everett et al. 2000, Wright and Agee 2004, McKenzie et al. 2006). The remainder of the landscape experienced high severity, stand replacing fires every 200~400 years (Camp et al. 1997, Agee 2003). While forest type and potential vegetation group are important factors that will be factored into prescription approaches, they do not always align with fire severity (e.g., most dry forest is low severity, but some dry forest is mixed severity).

Key objectives and prescription guidelines for units in low, mixed, and stand replacing fire regimes are presented in Tables VI-2 and VI-3. In general, prescriptions for low severity forest will follow the dry forest restoration approaches described in Franklin et al. (2013) as well as other sources (Brown et al. 2004, Agee and Skinner 2005, North et al. 2009, Jain et al. 2012). Prescriptions in units with stand replacing fire regimes will follow variable density thinning approaches developed to accelerate development of old forest structure in westside Douglas-fir (Carey 2003, Harrington 2005) and coastal cedar-sprucehemlock forests such as is being tested and evaluated the Conservancy's Ellsworth Creek Preserve. Prescriptions for mixed severity forests will use a hybrid of the low and high severity approaches. A major goal in all three fire regime types will be to grow larger, older trees of fire resistant species. Large and old trees are the ecological backbone of resilient forests and have been greatly reduced on the Central Cascades Forest.

Determination of fire regime type for specific units should be based on both the historic regime, projected climate change, and what will best achieve the management objectives.

	Fire Regime			
	High Frequency - Low	Mixed Frequency & Severity	Low Frequency - High	
Characteristic	Severity Fire		Severity	
Key Objectives	 Fire resistance: goal is low severity fire effects with understory thinning from fire and limited patchy, mortality of overstory. Drought resistance Large & old trees Carbon storage in large, fire resistant trees 	 Fire resistance & resilience: goal is low to mixed severity fire effects with variably sized, patchy tree mortality. Drought resistance Large & old trees Fish habitat & riparian function Northern spotted owl habitat Snowpack retention/water Carbon sequestration and storage in large, fire resistant trees 	 Northern spotted owl habitat Large & old trees Fish habitat & riparian function Snowpack retention/water Carbon sequestration and storage Fire resilience: survival of individual trees within stands as well patches of trees, especially Douglas-fir Drought resistance 	
Dominant Historic Composition	Ponderosa pine, Douglas-fir, western larch	Western larch, Douglas-fir, some grand fir and lodgepole pine	Douglas-fir, Engelmann spruce, true firs, lodgepole pine	
Forest Type (from Deficit)	DryDry Ponderosa Pine	 Moist-dry Moist (ridge tops and southerly facing slopes) 	 Moist (valley bottoms & northerly aspects) Moist-cold Cold 	

Table VI-2: Objectives and characteristics of fire regime based management approaches.

Table VI-3: General prescription guidelines for different fire severity types.

	Fire Regime			
	Dry Forests:	Moist & Dry Forests:	Moist & Cold Forests:	
Prescription	High Frequency - Low Severity	Mixed Frequency & Severity	Low Frequency - High Severity	
Element	Fire			
Species	Ponderosa pine, Douglas-fir, western	Western larch, Douglas-fir, western	Douglas-fir, Engelmann spruce,	
preferences	larch. Favor hardwoods in most cases.	white pine, ponderosa pine. Favor	lodgepole pine, true firs. Favor	
		hardwoods in most cases.	hardwoods where rare.	
Old, early seral	Retain and release existing old trees.	Retain and release existing old trees.	Protect existing patches of old trees.	
trees			Shade tolerant species are also ok.	
Spatial pattern	Moderate variability individuals,	Moderate to high variability in	Low to moderate variability in	
for variable	clumps, and small openings. Low levels	individuals, clumps, and small	individuals, clumps, and small	
density thinning	of dense skips and larger openings.	openings. High levels of dense skips	openings. Moderate- high levels of	
Arronado donaitre	Low 20 20 valative dangity Mayba	and larger openings.	Moderate: 25, 40 relative density	
Average density	Low: 20-30 relative defisity. May be	20-40 relative density. Vary density	Moderate: 25-40 relative density.	
thinning	lower if species conversion is needed.	targets from unit to unit.		
Size retention:	Retain larger trees & thin from below	Retain larger trees & thin from below	Retain larger trees with exceptions to	
thinning pool	with exceptions to promote desired	with exceptions to promote desired	promote desired species. Retain mid-	
01	species. Retain some patches of regen.	species. Retain patches of regen.	understory. Thin from middle.	
Canopy layers	Reduce, but maintain and promote	Reduce in some areas, particularly	Maintain and promote.	
	multiple, spatially segregated cohorts	around large/old trees. Maintain in		
	across stands.	other areas such as skips.		
Plant diversity	Promote, fire necessary to restore	Promote. Retain and release	Protect & promote, especially mast	
	understory diversity. Release aspen.	hardwoods.	bearing. Retain & release hardwoods.	
Snags, logs, and	Maintain low to moderate levels. Allow	Maintain & promote patchy	Promote high levels over time.	
decadence.	fire, insects, and pathogens to create	distribution. Encourage creation by	Encourage creation by wind, snow,	
	over time. Retain some decadence areas	fire, wind, insects, and pathogens over	insects, and pathogens. Add during	
	in skips. Reduce mistletoe where	time. Add during treatments where	treatments where low. Retain most	
	infections levels are widespread.	low. Retain most decadence patches in	uecadence patches in skips, unless	
Understow fuels	Poduce through prescribed fire whole	Skips, unless widespread.	Potoin clash in forest	
& clach	tree varding & piling & burning	in some greas leave in others	netam siash mitorest.	
Planting	Doct fire or treatment, when needed to achieve desired energies composition & density levels			
Thunting	Factor in expected natural regeneration.			

The historic regime can generally be inferred from a combination of premanagement species composition (remaining old trees and stumps), potential vegetation group and plant association, AET and Deficit maps, topographic position, and fire history studies where they exist (Table VI-2).

The historic regime for a unit should then be critically evaluated to assess whether a different regime is more appropriate given current conditions across the local landscape and climate change projections. For example, units at midelevations in parts of the Central Cascades Forest that historically had a high severity regime and were dominated by shade tolerant species are likely to experience more frequent fire and greater moisture stress over the next 50 years. Managing some of them based on the mixed severity regime will promote a more resilient landscape. The 90m resolution maps of current and future Deficit can be used to evaluate where to manage for a different fire regime type. Areas that are currently in the middle of the Moist zone, but are projected to shift to the Moist-Dry or Dry zones can be good candidates for the mixed severity guidelines. This will mean favoring more drought and fire tolerant species and thinning to lower densities overall, but with more variability. Similarly, areas projected to shift to the Dry zone can be managed for low severity.

For units that will be managed based on the stand replacement regime, high severity fires are not a desired outcome per se. Instead, the goal will generally be to develop multi-story, old forest structure that is only possible when fires are infrequent. When fires do occur in this type, the reality is that they will burn at high severity given the biophysical conditions and ecology of these forests.

iii. Silvicultural system and treatment types

The silvicultural system used to manage the Central Cascades Forest will follow the treatment types and terminology of ecological forestry (Franklin et al. 2007). Treatment types that will be conducted at different stages of forest development are listed in Table VI-4. Note than all thinning will be variable density thinning. Stand Density Index (SDI) will be used to set average density targets for thinning treatments, as well as to guide variation in density across units (Table VI-5). Maximum density for a site will be derived from the plant association and SDI-max values developed by the Washington DNR. In general, the SDI-max value of the least shade tolerant species will be used. Maximum levels from the Washington DNR tables will likely need to be adjusted for specific stands based on professional judgement.

In terms of long term management, the approach over the next several decades will be to create and ensure options for the future. As the primary objectives of

the CCF LLC are to restore ecological functions and provide for recreational values, regeneration harvests at a specified rotation age are not anticipated. Instead, the focus will be on intermediate treatments that accelerate the development of large trees and other old forest characteristics, while increasing resilience to fire and drought. This will likely included multiple thinning entries in many units. This approach will create options to conduct regeneration harvests in the future if necessary to provide for greater revenue generation. However, variable retention regeneration treatments will be conducted in specific situations to deal with stands that have the wrong species composition, to address major forest health issues, or to provide for early seral habitat where a need is identified through a local landscape evaluation.

In order to achieve targets for within-unit (tree neighborhood level) spatial pattern, both variable density thinning and variable retention treatments will contain four basic patch types (Table VI-5). The amount and size range of each type for a specific unit will vary depending on the desired functions, current conditions, future entries, fire regime type, topography, soils, ongoing and anticipated future natural disturbances, and larger scale context. In general, the goal will be to set units up to interact with natural disturbances to achieve the desired variability over time. Openings, for example, will often be created through prescribed fire, root rots, wind, or other disturbances. Microsites and topographic features will also guide the location and size range of the 4 types. Conditions across the drainage-hillslope area surrounding the unit are another factor. Units adjacent to larger patches of dense, untreated forest, for example, may need fewer skips, while units next to recent regeneration harvest may need more. Targets for the 4 types should ideally be set at the drainage-hillslope level, which will provide more flexibility in individual units.

While site specific factors will be used to tailor variability targets for units, general guidelines for each fire regime are provided below. Variable retention treatments will be majority openings, with some skips (aggregated retention) and heavy thinning (dispersed retention):

- *Low severity fire regime sites*: treatments will consist mostly of thinning and heavy thinning mixed together (~70-90% of the unit), with some skips and large openings. This will create a variable mosaic of individual trees, clumps from 2-30 trees, and small openings across most of the unit, with some larger dense areas (skips) and large openings.
- <u>*High severity fire regime sites*</u>: A low to moderate variable mosaic of individuals, clumps, and small openings will be created through thinning and heavy thinning (~50-80% of unit), with a greater area in skips and relatively few large openings.

• *<u>Mixed severity fire regime sites:</u>* will generally contain a higher ratio of all 4 types.

Operational implementation of unit-level prescriptions will utilize a variety of tools. In general, full leave or cut tree marking will not be feasible due to cost constraints. A mix of some marking, species based prescriptions, and guidelines for contractors will need to be used (Franklin et al. 2013). For example, a basal area target approach can be combined with per unit targets for medium (5-9 trees) and large (10-15) clumps. Alternatively, data from stem maps of historic reference conditions can be used to set targets for variability in terms of the percentage of individual trees, small clumps, medium clumps, and large clumps (Churchill et al. 2014). Skips and large openings can be laid out by the Conservancy's staff or specified via GIS files and implemented by contractors using GPS. The Conservancy's managers will develop and refine approaches that can then be used on public lands where contract requirements are much more burdensome. New technologies such as tracking and mapping apps used on field tablets with accurate GPS are being developed that will make implementation of variable prescriptions more effective and efficient.

iii. Prescription checklist

Developing unit level prescriptions for the Central Cascades Forest will involve a lot of factors. The following checklist has been developed to assist managers. The order does not indicate priority or relative importance level. Prescription development is an iterative process with many factors in play. The goal of prescriptions on the Central Cascades Forest will generally be to create complex forests over time, but prescriptions should be as simple as possible to achieve the desired objectives.

- 1. Large scale factors:
 - i. Regional and ownership objectives: northern spotted owl habitat, fish habitat, riparian function, fire resistance. Secondary ownership wide objectives.
 - ii. HCP requirements
 - iii. Landscape Evaluations and Prescriptions
- 2. Biophysical conditions
 - i. Historic and Desired Future Fire regime
 - ii. PVG, Plant Association, current AET and Deficit.
 - iii. Project changes in climate, especially AET and Deficit.
 - iv. Existing and anticipated future natural disturbances.
 - v. Topographic position
 - vi. Soil considerations

- vii. Site potential and suitable species
- 3. Drainage Hillslope context
 - i. Objectives, management needs, and current conditions of surrounding units.
- 4. Unit-level current conditions
 - i. Appropriate species composition: fire and climate resilience.
 - ii. Tree size distribution. Presence of large and old trees
 - iii. Density
 - iv. Spatial pattern and amount existing heterogeneity
 - v. Tree health and conditions. Crown ratios, height to diameter ratios, etc.
 - vi. Forest health issues.
 - vii. Future entries
- 5. Economic needs & commercial value
 - i. Operating revenue needs of the CCF LLC
 - ii. Feasibility of a commercial (revenue positive) treatment
 - iii. Is PCT needed now, or can the unit wait until an early commercial thin is possible?
 - iv. Log prices

6. Operational:

- i. Logging systems needs and constraints.
- ii. Road access
- iii. Contractor availability and capabilities
- iv. Resources available for layout and marking
- v. Efficient and practical implementation and compliance monitoring of prescription.
- 7. Human uses and Aesthetics
 - i. Current and future recreation use of unit
 - ii. Visibility and public profile of unit
 - iii. Stakeholder interest in area

Table VI-4: Treatment types used on the Central Cascades Forest. All forest treatments will follow Washington Forest Practice Rules (Title 222 WAC) and the Central Cascades Forest Habitat Conservation Plan.

Treatment Type	Acronym	Development Stage	Main Goals
Planting	PLANT	After a major natural disturbance event or treatment.	Ensure that desired density and species composition is achieved and meets state forest stocking requirements. Natural regeneration will be factored in. Planting will follow up vegetation control where needed.
Variable Density Thin: Pre- commercial	РСТ	Young: ~10 to 30 years	Reduce competition and shift species composition. Cut trees are left on the ground or piled and burned. Does not produce revenue.
Variable Density Thin: Early commercial	Early CT	Young: ~25 - 40 years	Reduce competition, shift species composition, and maintain or Increase spatial variability. Break even revenue or modest income.
Variable Density Thin: Commercial	СТ	Mid age to Mature: 40-100+ years	Enhance spatial variability, reduce competition, and shift species composition. Produce revenue.
Variable Retention Regeneration	VR	Mature or in younger forests with major forest health or species composition needs.	Remove overstory in 50-90% of unit to regenerate new cohort. Retain patches (aggregates) and individual trees to provide legacies. Produce revenue.
Prescribed Fire	RxFire	All stages	Reduce surface and ladder fuels. Create limited, patchy mortality or overstory (openings).

Patch Type	Function	Size Range/Density
No-thin skips	 Protect biological hotspots, riparian zones, and other sensitive features. Provide for dense, moist, shady habitats. Allow competitive mortality and disturbances to create snags 	Large: 5+acres Small: 0.3 - 0.5 ac
Gaps/openings	 Regenerate or plant new cohorts and/or species Early seral plant communities Develop understory-midstory layers Contain root rots 	0.1 ~5 + acres Larger for shade intolerant species and variable retention treatments 0-5 trees per acre
Heavy Thin	 Grow big trees w/large crowns Stimulate epicormics. Develop understory-midstory layers Regenerate or plant species with moderate to high shade tolerance 	Single tree or cluster release Patch: 0.5 – 5+ acres 10-20 Relative density
Thinning	 Reduce completion to increase or maintain vigor and growth. Grow large trees Stimulate understory 	25-45 Relative density (% of max SDI)

Table VI-5: Patch types for variable density thinning and variable retention prescriptions.

g. Forest Roads

The Conservancy has developed the following objectives for the management of the Central Cascades Forest road infrastructure:

- 1. Reducing impacts to conservation targets and goals;
- 2. Providing safe access for land management and restoration activities;
- 3. Maintaining safe access for neighboring landowners through road use agreements;
- 4. Meeting or exceeding state Road Maintenance and Abandonment Plan (RMAP) standards and requirements;
- 5. Maintaining a road network that is cost effective for managing points of access and road conditions;
- 6. Providing safe access for public recreation where compatible with conservation and financial objectives.

All road maintenance, upgrade, or removal will be financed through generation of annual operating revenues, contingency funds, or grants.

i. Road maintenance

Regular maintenance of existing road infrastructure is essential in preventing negative impacts to water quality, fish and wildlife habitat, other natural resources, and to protect the investment of the existing road network within the Central Cascades Forest. The objectives of the forest road maintenance program are to:

- Maintain the existing road and structures to the intended design standards,
- Maintain a fully functional drainage system,
- Minimize soil disturbance during maintenance activities,
- Minimize impacts to water quality and other resources,
- Combine professional level expertise and operator experience with on-the-ground decisions, and,
- Develop a system for periodic road inspections.

Standard road maintenance (e.g., grading, pulling ditches, culvert cleaning, rock surfacing, brushing, integrated pest management) will be utilized to meet the road management objectives. Priorities will be set by ecological needs and mitigating unplanned damage resulting from storms, fire, or public use.

ii. Road construction and abandonment

Road construction and abandonment may occur where needed to meet the ecological or road management objectives of the Conservancy. Road construction for operational access will be minimal, as existing transportation infrastructure throughout the planning area is adequate. However, road construction may be utilized to relocate roads where maintenance issues are a persistent problem or where roads can assist in restoration treatments while keeping impacts to a minimum. Where possible, road improvements will be coordinated closely with neighboring landowners to maximize logistical and financial efficiencies.

In addition to road construction, road abandonment may be employed to reduce road densities and decrease impacts to aquatic habitats within the Central Cascades Forest. The ecological effects of forest roads have been extensively researched in the Pacific Northwest. Roads can alter hydrology by reducing soil infiltration, converting subsurface flow to surface flow, concentrating water through road drainage structures, and increasing peak flows. They can result in geomorphic changes, including chronic erosion and elevated sediment delivery into streams extension of channel networks, and increased risk and rates of mass wasting. Roads also influence the ecology of terrestrial and aquatic ecosystems through direct habitat degradation and fragmentation, loss of soil productivity, spread of exotic, non-native species, and associated human impacts as a result of increased access. Individual road segments differ greatly in their ecological impact, however, due to site specific factors such as construction techniques, road grade, hillslope position, climate, basin hydrology, soil properties, and underlying geology.

i. Rock pits

At this time, the material available in existing rock pits is likely to meet any demand for additional rock. However, these pits could also be developed further by adjacent landowners under cooperative cost share agreements. The Conservancy intends to develop and use rock from its own pits, or where easements exist outside of the Central Cascades Forest, to upgrade and maintain the road system with the goal of reducing road related impacts to aquatic habitat. Development of rock resources will occur following the guidelines of the road management objectives.

ii. Road use agreements

Historically, road construction and maintenance has been managed under cooperative, cost-share agreements between major landowners, including the United States Forest Service, Washington Department of Fish and Wildlife, Washington DNR, and non-industrial forestland owners. In most cases, existing road use agreements expired with the change of ownership. The Conservancy will work with neighboring agencies and ownerships in a coordinated effort to maintain and reduce costs to shared road infrastructure through maintaining and developing new cost share agreements.

Many roads within the planning area are shared through easements with neighboring landowners. These easements may influence the nature and timing of maintenance actions on these roads. Easement holders have specific access rights and maintenance responsibilities that are described in the legal title documents for those properties.

Access in many areas is controlled through locked gates, especially in the Cle Elum Ridge and Taneum Creek blocks. Gates are valuable tools to assist in meeting our conservation and operational management goals through managing public access and controlling illegal access. Additional gate installations will be considered in accordance with the road management objectives.

h. Forest Stewardship Council certification

The Conservancy owns and manages more forests than any other non-profit organization in North America and has been involved with both Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) forest certification since 2001. The Conservancy' policies require that certification of Conservancy owned or managed forestlands, on which ongoing, revenue-generating harvests are taking place, be in accordance with the requirements established by the World Bank's 2002 Operational Policy on Forests and detailed in the Forest Certification Assessment Guide. At present, FSC is the only system that consistently meets those requirements and the Central Cascades Forest will be managed under a certificate from the FSC. The Conservancy believes certification is an important forest conservation tool because it can:

- Integrate socio-economic values/concerns into forest management activities;
- Ensure that any active management on Conservancy-owned and managed lands is consistent with, and meets, an internationally recognized standard of management;
- Provide independent verification and monitoring of forest management and chain of custody practices that help reduce illegal logging; and,
- Create incentives for sound forest management by providing some landowners with better access to certain markets and price premiums for certified product.

The following chart of generalized silvicultural prescriptions has been extrapolated from the FSC U. S. Forest Management Standards and applies to all forest stands where active forest management activities will take place.

FSC Silvicultural Guidelines	
Prescription	FSC Criteria
If patch cuts exceed 6 acres in size, 10-30% of pre-harvest basal area will be retained following harvest. The levels of green-tree retention will depend on such factors as: opening size, legacy trees, and adjacent riparian zones, slope stability, upslope management, presence of critical refugia, and extent and intensity of harvesting across the forest management unit. Retention will be distributed as clumps and dispersed individuals, appropriate to site conditions. Retained trees will comprise a diversity of species and size classes, which includes large and old trees.	FSC U. S. Standards 6. 3. e. 5.
Streams, vernal pools, lakes, wetlands, seeps, springs, and associated riparian areas are managed to maintain and/or restore hydrologic processes, water quality, and habitat characteristics. Forested riparian buffers will be maintained around all rivers, streams, ponds and wetlands as per the guidance in this FMP.	FSC U.S. Standards 6.5.m
Legacy trees, old and large trees, snags and woody debris will be retained (or, if absent, recruited) to sustain populations of native plants, fungi, and animals, both within the harvest unit and across the forest management unit.	FSC U.S. Standards 6.3.e.1.
Habitat components necessary to support native species (e.g. vertical and horizontal structural complexity, understory species diversity, food sources, nesting, denning, hibernating, and roosting structures, habitats and refugia for sedentary species and those with special habitat requirements) will be protected, maintained, and/or enhanced within each harvest unit and across the entire forest management unit.	FSC U.S. Standards 6.3.b.3
Where necessary to protect against wind throw and to maintain microclimate, green trees and other vegetation are retained around snags, down woody debris, and other retention components.	FSC U.S. Standards 6.3.e.2.
Native hardwoods and understory vegetation will be retained as needed to maintain and/or restore the natural mix of species and forest structure.	FSC U. S. Standards 6. 3. e. 3.
Live trees and native understory vegetation will be retained within the harvest unit in proportions and configurations that are consistent with the characteristic natural disturbance regime in each community type, unless retention at a lower level is necessary for purposes of restoration.	FSC U.S. Standards 6.3.e.4.
Logging operations and the use of roads and skid trails occur only when soil compaction, erosion, and sediment transport do not result in degradation of water quality, site productivity, or habitats.	FSC U.S. Standards 6.5.a.
Silvicultural systems, integrated pest management, and strategies for controlling pests and/or unwanted vegetation will be developed that result in the least adverse environmental impact, with the goal of reducing or eliminating chemical use.	FSC U.S. Standards 6.6.b.

i. Use of Chemicals

Forest management across the Central Cascades Forest will employ silvicultural systems, integrated pest management, and strategies for controlling pests or invasive species that minimize the need for using chemicals. Specifically, chemicals will only be used where less environmentally hazardous techniques have been shown through research or empirical experience to be ineffective. Chemical use may be necessary to control invasive weed species that have the potential for altering forest habitat function and in some cases where invasive or native species are aggressively encroaching on active forest roads. When chemicals are applied, the least environmentally hazardous option will be used to minimize effects on non-target organisms or ecological systems. Furthermore, where chemical use is deemed necessary, trained applicators will follow all applicable safety precautions and chemicals will be stored and disposed of in a safe and environmentally appropriate manner.

Records of chemical use will be maintained, including the type of chemical, when and where it was applied, on what species it was applied and the effectiveness of the application. All chemical use will be conducted in accordance with FSC-US standards as per the following guidelines:

Chemical Use Standard	Source
Chemical pesticides, fungicides, and herbicides will be used only when	FSC U.S.
and where research or empirical experience has demonstrated that less	Standards
environmentally hazardous, non-chemical pest/disease management	1
practices are ineffective.	6. 6. b.
When and where chemicals are applied, the most environmentally safe	FSC U.S.
and efficacious chemicals are used. Chemicals are narrowly targeted,	Standards
and minimize effects on non-target species.	
	6. 6. C.
Chemicals will be used only when and where they pose no threat to	FSC U. S.
supplies of domestic water, aquatic habitats, or habitats of rare species.	Standards
	~
	6. 6. d.
When showing a way used the offects and imposts will be menitored	ECCUC
when chemicals are used, the effects and impacts will be monitored	FSC U.S.
and the results used for adaptive management. Records will be kept of	Standards
pest occurrences, control measures, and incidences of worker exposure	669
to cnemicals.	0.0.0.

j. Forest Practices Laws and Polices

As a private forest landowner, the CCF LLC and Conservancy must comply with the Washington State Forest Practices Act (FPA – Title 222 WAC) and water quality laws when conducting forest management activities. This requires the Conservancy to apply for permits through the Washington DNR for forest management actions that may affect the resources of the state. The Conservancy considers the FPA as a minimum standard for protecting upland and aquatic resources on forested lands, and in many instances the HCP requires a higher standard for resource protection, in particular relative to streams and upland wildlife habitat.

The following policies represent a subset of the regulations enforced by the Washington DNR:

i. Forest Roads

To protect water quality and riparian habitat, roads must be constructed and maintained in a manner that will prevent potential or actual damage to public resources. This will be accomplished by constructing and maintaining roads to minimize the delivery of sediment and surface water to any typed water in amounts that preclude achieving desired fish habitat and water quality by:

- Providing for fish passage at all life stages;
- Preventing mass wasting;
- Limiting delivery of sediment and surface runoff to all typed waters;
- Avoiding capture and redirection of surface or groundwater. This includes retaining streams in their natural drainages and routing subsurface flow captured by roads and road ditches back onto the forest floor;
- Diverting most road runoff to the forest floor;
- Designing water crossing structures to the 100-year flood level to provide for the passage of bedload and some woody debris;
- Protecting stream bank stability, the existing stream channel, and riparian vegetation;
- Minimizing the construction of new roads;
- Assuring no-net-loss of wetland function; and
- Assuring no-net-loss of fish habitat.

ii. Riparian Management Zones

For eastside forests, riparian management is intended to provide stand conditions that vary over time. It is designed to mimic eastside disturbance regimes within a range that meets functional conditions and maintains general forest health. These desired future conditions are a reference point on the pathway to restoration of riparian functions, not an end point of riparian stand development. The Riparian Management Strategy of the Central Cascades HCP is designed to protect instream habitat for resident and anadromous fish, maintain water quality and streamside habitat necessary to support the survival growth, reproduction, and migration of wildlife species comprising the aquatic and riparian community.

Riparian Management Zones (RMZ's) are required along all typed waters in the State of Washington. Forest management across the Central Cascades Forest will comply with and exceed the WADNR Forest Practices based upon the HCP Guidelines. Along all fish bearing streams, a 200' Riparian Habitat Area (RHA) will be established to protect and to increase the integrity of the riparian areas. Limited silvicultural harvest prescriptions will be allowed within these RHA's unless to address watershed and wildlife concerns (e.g., excessively high tree density or undesirable coarse woody debris species). Within the 200' RHA a 30-foot "no harvest" zone will be located within the RMZ adjacent to fish bearing steams to maintain bank stability, provide nutrients, and to contribute to large woody debris to the streams.

Along nonfish-bearing, perennial streams, within the Late • Successional Reserve Areas, Adaptive Management Areas, and where elevation and topography are suitable for owl dispersal. The Central Cascade forest management will provide a 100' RHA on each side of all nonfish-bearing perennials streams. The primary purpose of the RHA's along nonfish-bearing streams is to protect downstream fish habitat, water quality, and habitat for other aquatic and riparian depended t wildlife species. In areas outside Late Successional Reserve Areas, Adaptive Management Areas, and where elevation and topography are not suitable for owl dispersal, The Central Cascade Forest management will comply with the Washington DNR Forest Practices standards related to perennial stream type requirements. In all cases of nonfish bearing perennial streams, a 30-foot equipment limitation zone will be implemented to minimize damage and retain the integrity of the riparian zone.

iii. Yarding

Ground-based equipment shall not be used in Type S or F Water. Yarding across Type S or F Waters is limited to cable or other aerial logging methods. Ground-based transport of logs across Type Np and Ns Waters shall minimize the potential for damage to public resources. Skidding logs and driving ground-based equipment through defined channels with flowing water is not allowed. Whenever skidding across Type Np or Ns Waters, the direction of log movement between stream banks shall be designed to minimize sediment delivery to the stream. In order to maintain wetland water movement and water quality, and to prevent soil compaction, ground-based logging systems shall not be used in Type A or B wetlands. Where harvest in wetlands is permitted, ground-based logging systems shall be limited to low impact harvest systems. Ground-based logging systems operating in wetlands shall only be allowed during periods of low soil moisture or frozen soil conditions. Locations of temporary stream crossings to Np Waters shall be shown on the base map of the forest practices application. Whenever skidding in or across Type Np or Ns Waters, the direction of log movement between stream banks shall be designed to minimize sediment delivery to the stream.

1. Adaptive Management

A considerable amount of research has taken place in the Pacific Northwest concerning old-growth forest ecology, growth and yield in young-managed forests, stream ecology, and wildlife-habitat relationships and other topics; however, as outlined in this plan, debate continues over how young-managed forest landscapes should be managed for restoration. Hot topics in this debate concern the economic motives of forest thinning, within stand damage caused by thinning treatments, impacts of forest roads, and effects on aesthetic or spiritual values in forest landscapes. Findings from ongoing research do not resolve these issues, and leave managers with several management alternatives – many of which are equally scientifically and socially justifiable. Managing these forest landscapes through an adaptive management process offers a method to test alternative management practices simultaneously and improve our understanding of how these systems respond to various forms of management intervention.

To meet the mutual goals of restoring the Central Cascades Forest, adhering to the Central Cascades HCP, and addressing the key scientific uncertainties that remain regarding restoration treatments, the Conservancy will follow an active adaptive management framework of setting goals and priorities, developing strategies, taking action and measuring results. Furthermore, the Conservancy will work toward linking this project with other landscape restoration efforts throughout the Pacific Northwest and across agencies to promote synergistic mechanisms for increasing our collective knowledge of ecosystem recovery within young-managed forest landscapes.

At a minimum, management activities on the Central Cascades Forest will seek to include the research and data collection needed to monitor the following indicators:

- 1. Yield of all forest products harvested.
- 2. Growth rates, regeneration and condition of the forest.
- 3. Composition and observed changes in flora and fauna.
- 4. Environmental impacts of harvesting and other operations.
- 5. Costs, productivity, and efficiency of forest management.

Beyond requirements of the Central Cascades HCP, additional qualitative forest monitoring will be conducted during regular management activities through the forest. Field notes will be collected and periodically added as an appendix to this management plan. The following attributes will be monitored, at a minimum, via observations:

- 1. Growth of newly planted seedlings.
- 2. Presence of invasive species, including forest access and haul roads and along margins of forest.
- 3. Fish and wildlife presence.
- 4. Snag and downed log recruitment.
- 5. Photo points

VII. FIRE MANAGEMENT – BEFORE, DURING, AND AFTER



Photo: John Marshall. Sinlahekin Wildlife Area

FIRE MANAGEMENT- BEFORE, DURING, AND AFTER

Effective fire management evaluates and tracks fire as a process, from fire environment, to ignition, to fire suppression and management, and to the effects it causes long after it is extinguished. Fire⁴ can make it harder to achieve some desired objectives while also helping to achieve other desired objectives. Given the inevitability of wildfire occurring in the Central Cascades Forest and surrounding landscape at some future date, and the efficacy of fire as a tool, these sections summarize a process for proactive planning and actions that can be taken before, during and after fire to mitigate undesired effects of fire and increase desired outcomes, to proactively live with fire.

a. Before - Vegetation and Fuels Management

Fire has shaped the Central Cascade Forest landscape for millennium. Forests, plants, and animals adapted to fire over time. Native peoples actively used fire as a tool. However, fire has been actively excluded from the landscape for over a century, and along with early grazing and logging, changed forest and fuel conditions decreasing resilience to fire. Restoring forests from stand to landscape level can increase resilience to fire and reduce impacts of fire on a variety of natural and human values. The Central Cascades Forest landscape and patch/stand management approach and context as summarized in Section VI provide a historical context of fire (regimes) as well as a proactive approach to restoring and managing forest ecosystems in a changing climate. Many landscape and stand level restoration and treatment practices, especially in drier Central Cascades Forest and neighboring forests, can be applied to interrupt fire flow, increase firefighter effectiveness, and reduce wildfire severity to protect conservation targets like spotted owl habitat and built infrastructure. Typically restoration treatments change composition and arrangement of tree canopy, vertical arrangement or layering, and surface fuels that influence fire behavior and effects. Treatments can be designed in context of fire risk and management objectives.

Ignitions and Large Fire Growth

While actions will certainly be taken to reduce the likelihood of unwanted ignitions, past ignition from both people and lightening demonstrate that ignitions and wildfire will occur in the Central Cascades Forest and on neighboring lands. In general, the likelihood of large fire growth on the Central Cascades Forest is less at higher elevations where vegetation fuel moisture remains higher for longer periods of time. The Conservancy's approach is to plan for the likelihood that wildfire will occur on the

⁴ A wildfire in this document is defined as any unplanned ignition or fire. Prescribed, controlled, or managed fires are planned to meet specific ecological, social, and economic objectives.

Central Cascades Forest and to review potential actions that can mitigate wildfire impacts to ecosystem values before, during, and after wildfire.

Values at Risk

HRV and FRV forest composition and structure provide a strong basis for setting landscape level goals and planning active restoration treatments that will result in greater forest resilience in face of future wildfires. Using HRV and FRV with spotted owl habitat requirements will not maximize spotted owl habitat in short term, but has stronger likelihood of sustaining durable habitat conditions over time.

Roads have changed delivery and flow of water across the Central Cascades Forest, influencing water quality, flow, and timing. An assessment of existing road infrastructure, culvert and bridge sizing, and mechanisms to reduce advanced delivery to streams will also reduce impacts and hydrologic condition post fire.

Additional investments of built infrastructure such as buildings, cell towers, signage, and fences can be evaluated to assess surrounding fuel loads and structure resistance to burning to determine if actions can be taken to reduce fire susceptibility by structural changes or manipulating surrounding fuel loads.

Prescribed Fire

Prescribed fire may be used as a tool on the Central Cascades Forest when consistent with objectives laid out in this plan and implementation fully adheres to policies described in the Conservancy's Fire Management Manual (http://tncfiremanual.org/). The Manual serves as the Conservancy's guiding document on all aspects of fire management. It is divided into six key sections: introduction, administration and insurance, personnel, requirements and guidelines, planning, and safety. The Manual is a dynamic document, and changes are made as the need arises. The Conservancy has developed and modified fire use protocols over fifty years of implementing prescribed on the Conservancy's lands and working with partners across the globe. If the use of prescribed fire was proposed within the Central Cascades Forest, planning and implementation would be coordinated with Tapash Sustainable Forest Collaborative partners (Forest Service, Washington DNR, Washington WDFW, and Yakama Nation) and county governments.

Liability

The act of lighting a match carries a responsibility to act prudently. Perhaps the greatest deterrent to using fire as a management tool, especially when private land and actors are involved, is the risk of being found liable. In many instances the planning and permitting requirements put in place to regulate managed fire (especially prescribed fire) are also designed to minimize this risk, but do not entirely remove the potential for liability (see <u>RCW 52.12.104</u>).
The Washington DNR, U.S. Forest Service, Bureau of Land Management (BLM), and Bureau of Indian Affairs all use the same four-level industrial regulation system. This system, which helps prevent wildfires by regulating work in the woods, is known as the Industrial Fire Precaution Level (IFPL) system. The Conservancy and its contractors will abide by the IFPL system.

Contractors working for the Conservancy will assume responsibility and provide fire prevention and control action on their operating area. They will also be expected to cooperate fully with the Conservancy and public agency fire personnel while observing all state and local fire regulations.

b. During - Initial fire reporting, fire response to ignition

The Conservancy will immediately notify the proper fire protection agency upon detection of any uncontrolled fire within or adjacent to the Central Cascades Forest. When in doubt, reports are made to the Wildfire Reporting hotline: 1-800-562-6010 or 911. Initial action response will only be initiated where and when the Conservancy's staff has appropriate fire training and can safely provide this support before protection agency crews arrive. The Conservancy's staff will not place themselves, volunteers, or contractors at unreasonable risk during any response to fire, or during the course of firefighting. Safety is our first priority. Upon arrival of a representative from the responsible fire protection agency, the Conservancy will turn over direction of the control action, remaining on the fire if requested to do so.

Multiple federal, state, and local fire protection entities have authority for *initial* wildland fire response on the Central Cascades Forest. Washington DNR would assume responsibility for wildfire management on arrival. Like all private forest owners, the CCF LLC pays a fire protection assessment to the Washington DNR that provides for fire protection and wildfire suppression services on the Central Cascades Forest. All state and federal fire protection agencies use the <u>Incident Command</u> <u>System</u> (ICS) that provides for common system incident management.

A qualified member of the Conservancy's staff will be designated ahead of any fire to work with the Incident Command (IC) Team assigned to fire. It is best to have one key contact as the Conservancy landowner representative to the IC Team, and that representative must have a working knowledge of the ICS. Teams typically hold daily Cooperator Meetings where information is exchanged. This is an opportunity to share information that can assist suppression efforts as well as convey what the Conservancy's resource priorities are during a fire, from specific locations of values at risk, data exchange, to rehabilitation efforts. Important IC Team roles are Liaison Officer, Agency Representative, Public Information Officer, and Resource Advisors. A strong initial point of contact for any team is the Liaison Officer. Teams assigned to wildfires vary based on size and complexity of fire, with from Type 5 Teams that consist of local agency responders to Type 1 Teams that are made up interagency professionals across the country. At minimum, the assigned landowner representative should plan on attending all Cooperators Meetings during the incident as made available.

i. Firefighting Resources and Coordination with firefighting agencies The Pacific Northwest Wildfire Coordinating Group (PNWCG) was established to provide a coordinated interagency approach to wildfire management in Oregon and Washington. PNWCG provides leadership in interface and wildland fire management for local, tribal, state and federal agencies, and their constituents to enhance firefighter safety and protection of life, property, and natural resources. The PNWCG is composed of the US Forest Service, BLM, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, Oregon Department of Forestry, Washington DNR, Washington Association of Fire Chiefs, and The Oregon Fire Chiefs Association.

The <u>Northwest Interagency Coordination Center</u> (NWCC) serves as the northwest area's geographic focal point to provide logistical support and intelligence relative to anticipated and ongoing wildfire activity for all federal and cooperating state wildland fire suppression agencies.

The <u>National Interagency Coordination Center</u> (NICC) based in Boise, Idaho, is the focal point for overseeing all interagency coordination activities throughout the United States. Wildfire suppression is built on a three-tiered system of support – the local area, one of the 11 geographic areas (including the Northwest Coordination Center in Portland, Oregon), and finally, the national level. When a fire is reported, the local agency and its firefighting partners respond. If the fire continues to grow, the agency can ask for help from its geographic area. When a geographic area has exhausted all its resources, it can turn to the National Interagency Fire Center (NIFC) for help in locating what is needed, from air tankers to radios to firefighting crews to incident management teams.

c. After - Post Fire Response

i. Post Fire Assessment Information

Information available from before, during and after fire can inform decisions in allocating resources (staff and \$) to mitigate identified potential hazards and facilitate achieving desired conditions in an appropriate timeframe. A useful starting point to evaluate post fire information is in context of historic or characteristic disturbance regimes for the areas burned. The Central Cascades Forest region is adapted to fire, and quite resilient in response to characteristic fire. Such an understanding can help put in context processes of reestablishment and deciding what post fire actions to invest in.

Post fire data availability will vary by size of fire or resources of the IC Team deployed. With larger fires more information will be collected during and after the incident to assess fire effects, whereas with smaller fires less information is collected but effects are easier to assess by field visits. Some watersheds will have more pre-fire information available and collated. Some variables will be more relevant depending on resources affected by fire and potential hazards produced by the fire. Furthermore, ideally fire information is reviewed in context of watershed or landscape conditions and with affected land managers with the intention of coordinating post fire actions in context of larger scale effects. The following is a summary of information to consider in determining the most important and effective post fire management response in the Central Cascades Forest.

- 1. Fire characteristics
 - a. extent or size
 - b. severity (mortality of tree cover), patch size, and distribution
 - c. intensity (temp. and duration), and soil effects
 - d. landscape position of burned area (riparian, low, mid, ridge, slope & aspect)
- 2. Landform characteristics of area burned
 - a. pre-fire soil erodibility
 - b. landslide potential
 - c. alluvial fans
- 3. Hydrologic response, short and long term
 - a. overland flow potential
 - b. peak flow potential and flooding hazard
- 4. Road system condition pre and post fire
 - a. access (and easements)
 - b. road surfaces
 - c. culverts clear, adequately sized
 - d. ditches
 - e. trails
 - f. signage
- 5. Fire suppression footprint
 - a. Identification and location of bulldozer, handline, safety zones, burn outs, water sources.
 - b. Identification of rehabilitation occurred during fire
- 6. Built infrastructure and cultural site impacts
- 7. Conservation targets post fire
 - a. steelhead, salmon, and post fire habitat characteristics as available

- b. Northern spotted owl post fire habitat characteristics as available
- c. Landscape context
- d. Forest composition and structure
- e. Restoration needs pre-fire
- 8. Reforestation potential
 - a. site potential
 - b. natural regeneration potential
 - c. Washington Forest Practices
- 9. Cost/revenue of considered actions

ii. Potential Hazards to Life and Property

Wildfire changes conditions on the ground and it is important to assess potential hazards created. Potential hazards include:

- Damaged roads and trails
- Falling rocks on roadway
- Damaged or unstable bridges
- Downed powerlines
- Falling trees and snags
- Flooding
- Mass wasting

Some hazards may be more immediate such as downed powerlines, while others may occur with precipitation such as flooding and mass wasting, and others may persist over longer periods of time, such as and falling trees. Small fires are less likely to expedite flooding and certain types of mass wasting. Large fires should be evaluated for the potential risk to human life and property and typically would be done in conjunction with neighboring landowners. Radio activated rain gauges or stream gauge alarms tools can be considered in order to develop early warning system if communities are at risk in lower watershed.

iii. Post Wildfire Reponses Actions

Actions will be evaluated in the context of information summarized to mitigate potential hazards and to facilitate desired conditions in an anticipated timeframe for conservation objectives and stated values. The efficacy of direct rehabilitation efforts post wildfire should be evaluated closely. The disturbance history of the Central Cascades has led to a well-adapted and strong natural revegetation response post fire. Fires are however an opportunity to reevaluate restoration needs defined by management objectives. For example, what actions might increase short or long term aquatic function such as road, culvert, and instream enhancements? What stand level treatments facilitate desired landscape composition and structure and conservation target goals?

Funding

The Conservancy's management priorities will be evaluated to support fire evaluation and response. As with pre-fire management actions, funding for post-fire management will come from program operating budgets, grant funding, and revenue produced through timber management.

Water Movement and Erosion

Decreased plant cover, root mass, and reduced organics in soil equate to greater potential overland flow of water at faster rates and movement resulting in soil movement and higher "peak flows" in streams. Immediate increased levels of erosion can change aquatic environments and could impact aquatic conservation targets. Furthermore, increased flow of water and sediment can impact road systems if they are not designed and maintained proportionally. Vegetative response post fire will vary depending on a variety of factors such as fire severity and intensity, seed sources, forest type or plant association, and soil type, and will also vary across scales from individual sites to landscape level. The most vulnerable time for erosion is the first year post fire and will vary based on weather events and how precipitation is distributed (i.e., short duration high volume events such as thunder storms, or precipitation distributed over longer periods of time with portion in form of snow).

There are numerable erosion control rehabilitation methods. Effectiveness can vary by situation and many are not as effective as once thought. See review and methods for applying in <u>After the Burn (Oregon State University Extension)</u>:

- If flooding is identified as a risk, will the chosen method be applied at a large enough scale to influence flow dynamics?
- Identify proximate impact to conservation target or built infrastructure. What is the likelihood of the method to slow overland water movement and at a scale that reduces sediment delivery to identified fish bearing stream (conservation target)?
- Use materials that are certified weed free seed or products. Nonpersistent annuals or native seed or plants are preferred if used.

Fire Suppression Rehabilitation

In order for fire lines such as bulldozer, handline, and safety zones to be effective burnable material, organic material, and soil must be remove. However, removal provides for the increased potential of channeling of water, increased soil erosion, delivery to water sources, as well as facilitation of nonnative plants or weeds. Based on soil conditions, slope, aspect, extent of surface disturbance, and connectivity to intermittent or perennial water, multiple actions can be taken to facilitate soil and plant rehabilitation:

- Redistributing removed material back into a created fireline with an excavator is effective in reducing water flow by reducing potential for erosion and facilitating plant growth with greater organic soil component. This typically does not require seeding as there is enough plant material and seed source in fill material, which also reduces likelihood of fireline getting used as a trail, thus slowing revegetation.
- Water bars should be placed on steep gradients where it is not feasible to redistribute removed material.

Road Systems

While road systems are not typically directly affected by wildlfire, the amount and flow of water and sediment is increased. Depending on road drainage, design, and maintenance the effectiveness of shedding water may be compromised. The following road conditions may be evaluated to improve the flow of water and minimize potential impacts to the forest, streams, and nearby communities:

- Direct road to stream sediment connection points
- Road ditch function
- Culvert function and capacity.
- Grading
- Debris from road slope failure, or downed trees

Post Fire Mechanical Treatments

Landscape composition and structure, with other conservation target goals, provide a framework to evaluate and design stand level treatments post fire. What treatments would have been proposed before the fire? How does that compare with review of post fire characteristics? How will patch level treatment facilitate desired future composition and structure? Potential impacts and improvements to aquatic targets should be evaluated with forest actions. In this context evaluate:

- Slope stability
- Soil type erosion & compaction potential
- Upland or riparian forest
- Hand thinning only, and/or require machinery
- If machinery:
 - what type machinery
 - harvest system
 - o likelihood of ground condition at time of entry
 - o existing access and road easements
 - \circ $\;$ new access needed, road construction needed

- low cost, low impact road, temporary
- permanent road
- opportunity to reconfigure road system
 - reduce aquatic interactions
 - crossings, sediment deliver, fish passage, water interception
 - reduce road maintenance costs

Tree Planting

The Conservancy will assess the need for tree planting or natural tree regeneration post fire, including:

- Plant association type, forest/ecological/characteristic disturbance type/aspect/slope/topographic position
- Fire severity (composition and structure of live trees) and intensity (soil characteristics)
- Potential and composition of seed sources across burned area. Consider mosaic of burn pattern and spacing of live trees and patches across burned area.
- Assess initial, one year and third year tree density/stocking, species and pattern over burned area.

Appropriate Washington Forest Practice Rules:

- Post fire there is no obligation to replant if no commercial harvest takes place
- If commercial harvest takes place, rules state that 150 trees/ac are planted, although the rules can be negotiated based on site and practice

For many noxious weed species fire creates conditions that encourage establishment and expansion. The Conservancy will monitor burned areas for invasive species.

d. Proactively Preparing and Living with Wildfire

Communities in Washington and across the Central Cascades Forest landscape are increasingly being impacted by wildfire, and predictions indicate even more wildfire in the future. The Conservancy is engaged with partners at national, state, and local levels to proactively prepare for wildfire, reduce risk, and take collective steps to create greater community resilience. The Conservancy is a National partner in the <u>Fire</u> <u>Adapted Communities Learning Network</u> (FACLN) which encourages the development and sharing of best practices and innovations in order to accelerate the adoption of fire adapted community concepts nationwide. Within the network, the Conservancy is working to further accelerate these practices in Washington, including initiating a <u>Washington FAC Learning Network</u>. Fire Adapted Communities (FAC) are communities that take action to reduce their risk of losses from wildfire; a key component of the <u>National Cohesive Wildland Fire Management Strategy</u>. They recognize that each of us has a role in those actions. Nationally, there is evidence of the benefits for communities that are taking steps to live with fire; and the importance for those communities to share information and learn from each other.

Across the Central Cascades Forest landscape, the Conservancy is working with <u>Washington FAC Learning Network community sites</u>, Hidden Valley/Swauk, and Yakima Valley Fire Adapted Communities Coalition to develop and take actions to reduce wildfire risks. These efforts engage local fire responders, home owners and residents, land managers, businesses, and local leaders to define roles and coordinate actions to proactively prepare for wildfire- before, during, and after. As a land manager of the Central Cascades Forest, the Conservancy will coordinate land management actions engaging FAC partners to meet conservation objectives, reduce wildfire risks to identified values, and increase forest and community resilience to wildfire. Within this process, the Taneum/South Cle Elum and Cle Elum Ridge areas have been identified as priority areas.

VIII. CULTURAL RESOURCES



CULTURAL RESOURCES

The CCF LLC and the Conservancy recognize and respect both the historical and current access rights of the Yakama people to the lands encompassing the Central Cascades Forest. The Conservancy will coordinate with the tribe in identifying both specific cultural resources and areas of historic and current use that are important to the Yakama people, and develop appropriate conservation strategies for these resources. As part of moderate cultural resource mitigation, forest practices will be initiated to reduce current and possible future impacts on cultural values including traditional foods and plants. At a minimum, The Conservancy's management practices will follow both Washington State Forest Practices Rules and the requirements of the WA State Historic Preservation Office. The Conservancy and the Yakama tribe will have further opportunity for engagement and communication through the Tapash Sustainable Forest Collaborative.

a. Management Guidelines

As the Conservancy's foresters, other land managers, and partners work to sustainably manage and restore the Central Cascades Forest they will follow these general guidelines to protect cultural resources:

- 1. Utilize forest management practices that meet or exceed regulations and guidelines for preserving and protecting the cultural resources of the Yakama Nation.
- 2. Coordinate with Yakama Nation staff to identify cultural resources of significance within the Central Cascades Forest.
- 3. Preserve, protect, and enhance cultural resources that are significant to the Yakama people.
- 4. Train and educate Conservancy staff about the existence, use, and ecology of cultural plants and to identify and protect cultural resources.
- 5. Allow access to a sustainable level of culturally significant plants that meet the spiritual, cultural, subsistence, and/or recreational needs of tribal members.

b. Management Practices

The following management practices will also be adopted to ensure cultural resources are not damaged or degraded:

1. Cultural resource surveys will be conducted per state, federal and Yakama Nation regulations and management directions.

- 2. State, Federal and Yakama Nation codes, regulations, and management directions will be used as minimums for managing cultural resources.
- 3. Cultural resources management will meet or exceed the NHPA, 36 CFR part 800, AIRFA, and ARPA on all timber sales provided they do not directly conflict with Yakama traditional practices.
- 4. Forest harvest activities will be excluded or restricted in cultural areas identified by both the Yakama Tribal Council Cultural Committee and the Conservancy, or by an archaeologist with approval from both entities. Historic and archaeological resources will be protected in-place.
- 5. When cultural or archaeological sites are discovered during forest management activities, work will be stopped in the immediate vicinity of the discovery, and the Yakama Tribal Council Cultural Committee will be notified.
- 6. The archaeological, cultural, and historic value of meadows, hardwood stands, and natural openings within the forest environment will be protected and maintained by restricting mechanical equipment or vehicular entry into these habitats. Movement of vehicles and equipment will be restricted to existing roadways when adjacent to or passing through these areas. This restriction will include parking of vehicles and equipment, placement of landings or slash piles, and grading or other modifications outside the existing road surface area. Where needed road modification conflicts with these cultural restrictions, consultation will be arranged between representatives of the Yakama Cultural Committee, Department of Natural Resources, and the Branch of Forestry to resolve the modification issue.

IX. RECREATIONAL USE AND MANAGEMENT



RECREATION USE AND MANAGEMENT

The Central Cascades Forest is a haven for year-round recreation. With nearly 49,000 acres of land in six different geographic regions and 124 miles of designated summer and winter trails, there is ample opportunity for a diverse array of non-motorized and motorized activities. Recreation on Conservancy-managed land includes, but is not limited to, hiking, bird watching, horseback riding, off-road vehicle riding, mountain biking, skiing, snowmobiling, snowshoeing, dog sledding, and other activities such as hunting, fishing, subsistence gathering, nature and wildlife viewing, and spiritual ceremonies.

The Conservancy has been working with local communities and partners since the acquisition to develop a shared vision for the future of the landscape – a vision that protects nature and supports sustainable recreation. The Conservancy believes that well-managed recreational activities and responsible use can be consistent with the primary objectives of the Central Cascades Forest. In addition to meeting the conservation goals listed in the introduction, recreational use will be allowed if it doesn't adversely affect the following:

- Ability to effectively manage and restore the land
- Future market value or opportunity for public or private land transfer
- Liability risk of the CCF LLC
- Operating expenses and cash flow
- Safety of the public, the Conservancy's staff, partners, contractors and law enforcement

The Conservancy is committed to ensuring these special places benefit people and nature, now and in the future. One of the Conservancy's core values is respect for people, communities and culture. By maintaining public access to the land, the Conservancy is respecting the interests and traditions of the local communities that rely heavily on the many social and economic benefits these lands provide.

Washington State and Kittitas County benefit greatly from spending by residents and visitors on outdoor recreation in Kittitas County. A study completed in January 2015 for Washington's Recreation and Conservation Office found that recreationists spent over \$185 million in Washington State to recreate within Kittitas County, leading to the collection of nearly \$9.5 million of state and local taxes. Recreation in Kittitas County creates nearly 1,800 jobs within Washington State.

Outdoor recreation provides many substantial social benefits as well. It strengthens families and friendships, improves physical and mental health, provides opportunities for education, and promotes environmental stewardship.

a. Public Involvement

Following acquisition of the Central Cascades Forest in late 2014, the Conservancy began a major effort to share information with the public about the project and gather input around future plans for the land. This involved dialog with all who have an interest in the land, including federal, state, and local agencies, tribes, elected officials, local residents and businesses, recreationists, conservation partners, recreationfocused organizations, and community groups to assure the lands provide benefit for people and nature, now and in the future. Outreach was conducted early on to ensure feedback would play an integral role in land management decisions. These activities included the following:

- Coordinating with media to share news of the acquisition, initial plans for the land, and future plans to involve the public.
- Developing a project website to maximize public access to timely information and quick, easy interaction with the Conservancy.
- Creating a fact sheet about the project and maps illustrating the acquisition area.
- Holding public meetings in Yakima, Ellensburg, Cle Elum/Roslyn and Seattle.
- Providing regular updates to the public through email.
- Participating in one-on-one meetings.
- Using social media to help spread the word and address common questions.
- Responding to individual inquiries about the project.
- Collecting feedback from an online survey about "goals and dreams" for the land.
- Meeting with over 20 clubs and organizations.

Public outreach activities are ongoing and will be an important focus as work is implemented to improve ecosystem health and land management policies evolve. There will be a targeted effort to share information around the completion of the management plan and release of land use and access policies.

b. Land use and access policies

The CCF LLC allows responsible use of the Central Cascades Forest for public access and recreation; including, hiking, snowmobiling, cross country skiing, motorcycling, mountain biking, horseback riding, hunting, fishing, birdwatching and camping. There is no fee for recreational access. Hazards exist, however, so recreationists must use caution and enter at their own risk. In particular, the Central Cascades Forest is a working forest with ongoing logging and land management activities that may pose a danger to recreational users. Recreationists must also follow "Leave No Trace" practices across the landscape to protect natural resources, fish and wildlife.

The following policies govern recreation on the Central Cascades Forest and will be strictly enforced in cooperation with the Washington Department of Fish and Wildlife, U.S. Forest Service, and other state and local law enforcement agencies.

c. Road and trail access

Access in many areas is controlled through locked gates, berms, or deep ditches (tank traps) to prevent unauthorized use. Closed roads and trails are often posted as such by the Conservancy. However, a closed gate or other closure device without a sign should also be treated as closed to all unauthorized wheeled motorized vehicles. Road and trail restrictions apply even if a sign, gate or closure device has been vandalized or damaged. See maps in Appendix F for gate locations. Gates must not be blocked as administrative, contractor or emergency traffic may need to pass through at any time.

Maps displaying trails and appropriate uses are included in Appendix F. Additional trail information including mileage, trailhead access and seasonal closures are available at: <u>www.fs.fed.us; www.parks.wa.gov; www.ci.roslyn.wa.us;</u> www.roslyntrails.com; www.wta.org

i. Motorized use

Wheeled motorized use is permitted only on open roads and trails that are authorized for their use. Off-road and off-trail use damages the land and is strictly prohibited. To travel on open roads, a vehicle must be street legal according to Washington state law, and the operator must possess a valid driver's license.

Off-highway vehicles (OHVs) include motorcycles, all-terrain vehicles (ATV – including side-by-sides and 4-wheelers), and 4x4s. OHV's are required to stay on open roads and authorized trails that are signed and designated for their use. ATV's are only permitted on the Naches Pass Trail (Forest Service Trail #684). Off-road vehicle trails are closed to all motorized travel in the spring until trail systems are snow free. Additional information on opening dates and motorized trail information is available at <u>www.fs.fed.us</u>. Maps in Appendix F illustrate authorized motorized trails.

Washington State law (RCW 46.09.470) requires all OHVs to be equipped with the following:

• Spark arrestor approved by the USDA Forest Service to reduce the risk of human caused wildfires.

• Muffler that limits sound levels to 105 dBA at 20 inches from the tailpipe and 86 dBA as the OHV passes by 50 feet away.

Vehicles are required to be weed-free before traveling off-highway on the Central Cascades Forest. Thoroughly washing OHVs will ensure that seeds are removed and will help mitigate the spread of invasive and noxious weeds.

An over-snow vehicle (OSV) is defined as a motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis while in use over snow. In winter, OSVs are permitted to travel cross country with adequate snow cover.

The Conservancy cooperates with Washington State Parks to allow grooming for snowmobiling, cross country skiing, dog-sledding, and winter bike use. As trail uses are restricted in some areas, users are asked to consult maps produced through Washington State Parks at <u>www.parks.wa.gov</u>.

ii. Non-motorized use

Non-motorized use is permitted on all lands, throughout the year, unless otherwise posted. The Conservancy encourages non-motorized users to stay on roads and trails unless the activity involves cross country travel such as hunting, collecting non-timber forest products, or winter travel. Winter recreationalists are permitted to travel off trail with adequate snow cover.

It is prohibited to cut switchbacks when traveling on an established trail system. Cutting switchbacks destroys vegetation, ruins the trail and causes erosion.

Mountain bikes must stay on designated trails. Riding off trail damages natural resources, endangers wildlife and creates new tracks in unauthorized locations.

iii. Authorized trails

After consideration of environmental, social, economic and historical values of the Central Cascades Forest the CCF LLC determined that all existing authorized trails will remain open for public use. This includes the motorized and non-motorized groomed winter trail systems managed by Washington State Parks. Maps displaying these trails and uses are included in Appendix F. Related tables have additional information.

Motorized use will continue to be prohibited on Cle Elum Ridge until the Conservancy has further evaluated the suitability of this area for motorized recreation and has coordinated with adjacent land owners and other user groups. Exceptions to this are Forest Service roads 4305, 4305-118, and Forest Service Trail #1340/Sasse Mountain Trail. The non-motorized user defined trails included in Appendix F, other than the Rat Pac Trail, will also be assessed as part of this process with a focus on design, placement and compatibility with different user groups.

The CCF LLC will sign an agreement with the Kittitas County Parks and Recreation District (KCPRD) allowing regular maintenance of the Rat Pac mountain bike trail by the district and its volunteers. As part of the agreement KCPRD will also be responsible for signage, including identification of hazardous trail features.

The Conservancy will routinely assess the suitability of all trails across the landscape. Trails may be relocated to minimize impact to forest and stream health, wildlife, or conflicts with other forest uses. In cases where trails continue to impact these values, are seen as being in conflict with the management objectives of the property, or create ongoing conflicts with stated recreation policies, they may be permanently closed. In such a case, the Conservancy would notify and directly work with local, state, and federal partners to minimize the impact on responsible recreational users. The Conservancy would also use regular methods to pro-actively communicate with effected user groups and local communities.

d. Building new trails

The creation of new trails or conversion of roads to single track trails for motorized or non-motorized use without the prior written consent of the Conservancy and the CCF LLC is strictly prohibited. The CCF LLC may agree to the construction of new trails in special circumstances or if an opportunity arises that would support land management objectives and people appropriately using the land. The Conservancy will work closely with local, state, and federal partners to coordinate requests to build new trails that cross property boundaries.

If new trails were approved, the Conservancy will promote and look toward partnerships with recreational user groups, state and federal agencies, and volunteers for trail maintenance. As recreation management is not the mission of the organization, and no internal resources or expertise is available to manage a trail maintenance program, the Conservancy will not take on this responsibility.

e. Domestic animals

Domesticated animals are allowed on the Central Cascades Forest for recreational purposes only and must be attended to at all times. The use of certified weed-seed-free livestock hay, forage and bedding is required. Animals should be kept at least 200 feet from water except when watering animals or traveling on established trails. Livestock shouldn't be tied directly to trees because it can cause damage to the trees, plants and soil around them. A high-line should be used instead. Before leaving a campsite, manure should be scattered and the site should be left in as good or better shape than it was found.

Grazing is not permitted without a permit and prior approval of a grazing plan.

Dogs must be under owner-control at all times. Trail-specific guidelines should be referenced to determine if dogs are required to be on a leash.

f. Special event permits

A permit is required to hold special events such as bicycle races or tours, running races, or other organized activities on the Central Cascades Forest. Event organizers will need to provide a certificate of insurance to the Conservancy and events that conflict with management and conservation objectives will not be allowed. These events often cross property boundaries into land owned by other private entities or public agencies. In such cases, the event organizer will also be required to demonstrate coordination with the other land owners. A request for permits can be made at the Conservancy's office in Cle Elum, Washington.

g. Commercial use

Use of the Central Cascades Forest for commercial purposes will be determined on a case-by-case basis and necessitate the development of a negotiated contract. As a 501 (c)(3) tax-exempt organization, the Conservancy can't allow activities that result in the benefit of a private individual. If third parties will benefit economically from any use of the Central Cascades Forest, the Conservancy must receive fair market value in exchange for the permitted use.

If the use is determined to be consistent with the management objectives for the Central Cascades Forest and doesn't damage the land or natural resources, the requester would also be required to obtain or provide a certificate of insurance.

h. Forest products

i. Timber products

Harvesting of trees or timber products is strictly prohibited without prior agreement. The Central Cascades Forester can be contacted at the Conservancy's office in Cle Elum, Washington.

ii. Firewood

A permit is required to gather up to 5 cords of downed wood. Permits will be available for purchase at the Conservancy's office in Cle Elum, Washington. The Conservancy's staff will provide information on required guidelines, including where firewood can be collected. Vehicles must stay on open roads for wood retrieval. Cross-country travel damages the land and is strictly prohibited. Commercial firewood harvesting is not allowed.

iii. Christmas trees

Cutting or transplanting trees for Christmas is not permitted on the Central Cascades Forest without a permit. Individual permits will not be issued, however non-profit organizations may request permits subject to forest conditions and the Conservancy's discretion. The Forest Service sells Christmas tree permits for the Okanogan-Wenatchee National Forest at their local offices. Additional information is available at <u>www.fs.fed.us.</u>

iv. Non-timber forest products

Collecting or harvesting non-timber forest products for personal use is allowed by permit only. These forest products include, but are not limited to, mushrooms, cones, evergreen boughs, wildflowers, herbs, nuts, berries, moss, burls, bark, rocks, precious and semi-precious stones. Permits and maps will be available at the Conservancy's office in Cle Elum, Washington.

i. Other uses

i. Hunting and fishing

Hunting and fishing are allowed on the Central Cascades Forest in accordance with relevant state laws managed by the Washington Department of Fish and Wildlife (WDFW). Additional information about these laws is available on their webpage at <u>www.wdfw.wa.gov</u>. Other applicable land use and access policies pertaining to the Central Cascades Forest must be followed.

The Conservancy is also coordinating with the WDFW to determine if there are potential ADA accessible hunting areas on Conservancy land. If a route is

identified, this option would go into effect no earlier than the 2016 hunting season.

Trapping of game or-non-game wildlife is prohibited except under special circumstances under written agreement with the Conservancy.

ii. Camping

Dispersed camping is permitted on the Central Cascades Forest following regulations that are consistent with the Okanogan-Wenatchee National Forest.

- Camping is limited to 14 days per site and must not be left unattended for more than 3 consecutive days.
- Camping beyond 14 days requires relocating to a new site at least 5 miles from the original site.
- In order to minimize conflicts with wildlife, food, garbage and all other attractants must be acceptably stored at all times.
- Leave the Central Cascades Forest as clean or cleaner than you found them and pack out all trash.
- Pack out or bury all human waste at least 6" deep, 200 feet away from water, trails and campsites.
- Additional information is available at <u>www.fs.fed.us</u>.

Because the Central Cascades Forest is privately owned and not part of the National Forest system, local and state fire restrictions must be followed. If campfires are permitted, specific use guidelines must be followed.

Permanent and semi-permanent camping structures or cabins (e.g., hunting or camping cabins) are prohibited from being constructed within the Central Cascades Forest. A written notification will be posted on any structures found by forest managers, contractors, or law enforcement partners and the structure will be removed after 14 days or as soon thereafter as resources become available.

iii. Campfires

Check local and state fire restrictions to determine whether campfires are permitted. If campfires aren't restricted the following guidelines must be followed:

- Use an existing fire ring
- Clear all vegetation away from the ring
- Restrict fire to 3 feet in diameter and 3 feet high
- Keep water and a shovel nearby

During campsite occupation, downed wood may be used for firewood only within that campsite. Campers must leave all plants, shrubs, trees, and standing snags undisturbed. No live trees may be cut by campers.

Fires must be extinguished properly by drowning the fire in water and stirring the embers to ensure that everything is wet. Embers should be cool to touch before leaving the fire unattended.

iv. Target shooting

Target shooting is prohibited on the Central Cascades Forest because of risk to the safety of public recreational users, contractors, and forest managers, potential damage to natural resources, and fire risk. Adjacent state and federal public land owners have information available about where target shooting is permitted and their corresponding policies.

v. Fireworks

Possessing, discharging, or using fireworks is prohibited year-round throughout the Central Cascades Forest.

j. Education

The Conservancy's staff, in coordination with government partners and other organizations, will educate the public about work the Conservancy is doing and associated benefits and authorized uses of the land. Following the release of the management plan there will be an initial push to get the word out about the types and location of permitted uses in the Central Cascades Forest. Information will be shared using the following methods:

- Conservancy staff at the Cle Elum project office
- Community briefings
- One-on-one meetings and phone calls
- Project website
- Social media
- Email updates
- Local media sources
- Signs at key locations in the Central Cascades Forest
- Boots on the ground user-group volunteers and Conservancy staff
- Enforcement personnel

The project website and other materials including the project fact sheet, land use policies, and maps will be regularly updated to reflect the most current information.

Conservancy staff will create new materials as needed to address new topics and common questions that come up.

The Conservancy will work with partner agencies and organizations, local groups, and stakeholders to share information with the public through their existing channels of communication. This could also include opportunities to jointly host a public meeting, write a press release, or coordinate with media.

k. Enforcement

The Conservancy has a desire to keep the land as open to a variety of recreational uses as possible, consistent with the conservation purposes for which the land was purchased. The Conservancy recognizes that in order to have appropriately managed recreation and responsible use throughout the Central Cascades Forest, the presence of law enforcement officials is essential. Their regular presence will help to educate users, address repeat violators, and ensure the land remains open for responsible use.

The Conservancy is currently executing a contract with the Washington Department of Fish and Wildlife for law enforcement officials to patrol the Central Cascades Forest for land use and access infractions. Once the contract is in place, coordination will take place with law enforcement personnel for neighboring public land owners as well as the Kittitas County Sherriff's office.

In addition to law enforcement personnel patrolling the forest, gates, signs and other barricades will be maintained and installed as needed to help recreationists understand which areas are closed and what uses are allowed. Signs will include contact information for forest users to report violators. The Conservancy will also encourage user-groups to self-police and educate other users about the importance of responsible use of the land.

1. Compatibility and conflict with conservation goals

Recreational activities must be consistent with the primary management objectives of the Central Cascades Forest. The Conservancy is currently analyzing ecological values across the landscape and mapping where they intersect with trails and other key areas used for recreation, to ensure the suitability of land use in these areas. Trail conditions and type of use are also being taken into consideration. Initial findings suggest that well-managed recreational activities can be compatible with conservation and protection responsibilities.

Trails may be relocated to minimize impact to forest and stream health, wildlife, or conflicts with other forest uses. As outlined above, in cases where trails continue to impact these values, are seen as being in conflict with the management objectives of the property, or create ongoing conflicts with stated recreation policies, they may be permanently closed. In such a case, the Conservancy would notify and directly work with effected partners to minimize the impact on responsible recreational users.

Off-trail recreational activities such as mushroom collecting and snowmobiling will be monitored to ensure they are compatible with conservation goals. If natural resources are becoming damaged, wildlife or fish habitats affected, or other issues arise from specific activities such as dumping garbage, improperly disposing of human waste, poaching, or firearms are being illegally discharged, selected areas may be closed to recreation.

m.Volunteer coordination

Volunteers will play an important role in the success of appropriately managed recreation on the Central Cascades Forest. Recreation management is not the mission of the Conservancy and no internal resources or expertise is available to manage a trail maintenance program or other necessary maintenance activities. Therefore, the Conservancy will look to volunteers to take on this responsibility.

Initial discussions have taken place between the Conservancy and different user groups and members of the community that have an interest in helping to maintain trails, build structures to protect natural resources, and identify funding sources for maintenance activities. User groups have also expressed an interest in helping the Conservancy with education and enforcement.

Volunteer opportunities will be coordinated with adjacent land managers to ensure consistency across ownerships. Discussions are currently underway with the U.S. Forest Service about coordinating volunteer opportunities across ownerships starting in spring 2016. The Conservancy has also had initial discussions with community groups and organizations such as the Evergreen Mountain Bike Alliance and offhighway vehicle representatives about future volunteer partnership opportunities to improve trail systems across the landscape.

Information will be shared about upcoming volunteer opportunities through social media, community groups and organizations, email updates, project website, and word of mouth. Inquiries can also be made by contacting the Conservancy or visiting the Cle Elum project office.

IX. MONITORING



MONITORING

a. HCP Required Monitoring

The original Central Cascades Habitat Conservation Plan (HCP) included an intensive ecological monitoring program including smaller annual reports and major 5 year reports for a wide variety of terrestrial and aquatic habitat values and specific terrestrial and aquatic species (Section 5.1, HCP Revision 2000). Many of these monitoring elements, such as breeding bird and small mammal surveys, were "front-loaded" into the first 20 years of the HCP (calendar years 1996 – 2016) and thus not required of the CCF LLC. Other monitoring elements have been subsequently modified through consultation with US Fish and Wildlife (USFWS) and NOAA Marine Fisheries Service (NMFS). Changes to reporting requirements since the 2000 HCP revision include:

- Changes in stand structural reporting requirements as it is impractical to provide updates on stand structure on US Forest Service lands within the HCP boundary.
- Cessation of stand structure cruising was approved in 2012.
- Cessation of HCP riparian area effects on amphibian populations was approved in 2012 pending compilation of information from relevant studies.
- The Washington State practice of reviewing Watershed Analyses every 5 years has ended and due to their location east of the Cascade Crest CCF LLC lands are exempt from HCP Mass Wasting Storm Trigger monitoring commitments.

The Conservancy assumes the following HCP monitoring responsibilities:

Annual Reporting: On an annual basis, the Conservancy will provide USFWS and NMFS a report summarizing all land management and monitoring activities during the previous calendar year. This will include updates to the long-term projected trends in habitat, lifeform, and forest structure.

Major Reporting: In additional to annual reporting, at 5 year intervals starting with calendar year 2016 the Conservancy will provide USFWS and NMFS major reports with aquatic trend monitoring summaries including stream temperature, fish, and aquatic insects. Also included in the calendar year 2016 major report and continuing at 10-year intervals the Conservancy will also report on northern spotted owl demographic trends and habitat carrying capacity, grizzly bear and gray wolf habitat and road summaries.

Habitat, Lifeform, and Structure Monitoring: The Conservancy's HCP monitoring will follow the same northern spotted owl habitat, forest structure, and lifeform definitions developed by Plum Creek "OPTIONS" timber estate planning modelling and HCP reporting as per below.

 $Plum\ Creek\ /\ OPTIONS\ forest\ structure\ stage\ definitions\ for\ HCP\ reporting\ on\ lands\ east\ of\ the\ Cascades\ crest\ (including\ all\ CCF\ LLC\ lands).$

HCP Structure Stage	Quadratic Mean Diameter (in.)	
Stand Initiation (SI)	<1	
Seedling Sapling (SS)	<2.5	
Young Forest (YF)	<5.5	
Pole timber (PT)	<8.5	
Dispersal Forest (DF)	<12.5	
Mature Forest (MF)	<15.5	
Managed Old Growth (MOG)	>=15.5 and <200 yrs	
Old Growth (OG)	>=15.5 and => 200 yrs	

Note: When all trees QMD>=4.5", use only trees>6" DBH in QMD calculation. All trees excludes DBH = 0".

Plum Creek / OPTIONS Lifeform definitions for HCP reporting on lands east of the Cascades crest (including all CCF LLC lands).

Lifeform	Area Included ^a	Formula ^b
1 - Fish	Water	n/a
2 – Frogs, Salamanders	RHA	(DF + MF + MOG + OG) + (SI + SS + YF + PT)/2
3 – Turtles, Ducks	RHA	(DF + MF + MOG + OG) + (SI + SS + YF + PT)/2
4 – Goats, Falcons	Talus	(PT + DF + MF + MOG + OG) + (SI + SS + YF)/2
5 – Elk, Hares	Edge	n/a
6 – Warblers, Porcupines	RHA	(SI + SS + YF) + (PT + DF + MF + MOG + OG)/2

7 – Sparrows, Thrushes	RHA	(SS + YF + PT + DF) + (SI + MF + MOG + OG)/2	
8 – Flycatchers	НСР	(SS + YF + PT) + (DF + MF + MOG + OG)/2	
9 – Waxwings, Grosbeaks	RHA	(YF + PT + DF) + (MF + MOG + OG)/2	
10 – Squirrels, Tanagers	НСР	(PT + DF + MF + MOG + OG) + (SS + YF)/2	
11 – Hawks, Vireos	НСР	(PT + DF + MF + MOG + OG) + (SI + SS + YF)/2	
12 – Herons, Osprey	RHA	(DF + MF + MOG + OG) + PT/2	
13 – Woodpeckers	НСР	(DF + MF + MOG + OG) + (YF + PT)/2	
13a – Lewis' Woodpecker	НСР	(MF + MOG + OG) + (SI + SS + DF)/2	
14 – Bats, Owls	НСР	(DF + MF + MOG + OG) + (SI + SS + YF + PT)/2	
14a – Vaux's Swift, Fisher	НСР	(MF + MOG + OG) + DF/2	
15 Young – Shrews	НСР	(SI + SS + YF)	
15 Middle – Bears	НСР	(PT + DF)	
15 Late – Voles	НСР	(MF + MOG + OG)	
16 – Otters, Beavers	RHA	(DF + MF + MOG + OG) + (SI + SS + YF + PT)/2	

^a Area included indicates whether all lands within the HCP are included in the calculation, "HCP", only lands within the riparian habitat areas, "RHA", or only areas covered by water "water".

^b Formula for the lifeform calculations are based upon the Plum Creek forest structure stage definitions.

Northern Spotted Owl Demographic and Carrying Capacity Monitoring: At a minimum, the HCP stipulates that the CCF LLC will monitor historic owl sites for 2 seasons prior to the reporting years. In collaboration with the US Forest Service and the USFWS / USGS Barred Owl study, the Conservancy will strive to continue annual demographic monitoring. Combining the demographic data with Plum Creek's Resource Selection Probability Function (RSPF) model, northern spotted owl carrying capacity may be estimated and reported for the HCP Monitoring Major Reports.

Plum Creek / OPTIONS northern spotted owl (NSO) habitat definitions for HCP reporting on lands east of the Cascades crest (including all CCF LLC lands).

NSO Habitat Class	Quadratic Mean Diameter (in.)	Relative Density
Nesting Roosting Foraging (NRF)	>=12.5	>=44
Foraging Dispersal (FD)	>=8.5	>=33

Note: When all trees QMD>=4.5", use only trees>6" DBH in QMD calculation. All trees excludes DBH = 0". Only Douglas-fir and ponderosa pine habitat species groups qualify for NRF.

Aquatic Trend Monitoring: Plum Creek established 8 permanent aquatic monitoring sites within the Central Cascades Forest. These sites represent a collection of upper and lower watershed locations and both "treatment" (Plum Creek timber harvest) and "control" (no harvest) locations. The Conservancy will continue Plum Creek's practice of annual stream temperature monitoring at each location. In addition, at 5 year intervals stream channel characteristics, fish habitat, fish populations, aquatic insects, and macroinvertebrates will be monitored at each location. Detailed protocols for aquatic trend monitoring are found within Plum Creek's 5th year HCP monitoring report.

Grizzly Bear Monitoring: If Grizzly Bears are detected and/or have been identified as recolonizing within the HCP area by USFWS, the Conservancy will report on the implementation of HCP Phase 1 (bears detected) or Phase 2 (bears recolonized) Best Management Practices.

Gray Wolf Monitoring: Similar to grizzly bears, the Conservancy will report upon both habitat provisioning for gray wolf prey species (Lifeform 5) as well as measures taken to protect wolf den sites and minimize road use disturbances should wolves be identified by USFWS on the Central Cascades Forest.

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APPENDIX A. LEGAL DESCRIPTIONS AND EASEMENTS

KITTITAS COUNTY

Parcel 1: Tax Parcel No. 21-11-03000-0001, 21-11-03000-0003 & 21-11-03000-0004

Government Lots 1 and 2, the South Half of the Northeast Quarter and the Southeast Quarter of Section 3, Township 21 North, Range 11 East, W.M., in the county of Kittitas, State of Washington;

Parcel 2: Tax Parcel No. 21-11-09000-0001

All of Section 9, Township 21 North, Range 11 East, W.M., in the County of Kittitas, State of Washington.

Parcel 3: Tax Parcel No. 21-11-15000-0001

All of Section 15, Township 21 North, Range 11 East, W.M., in the County of Kittitas, State of Washington.

Parcel 4: Tax Parcel No. 22-11-25000-0001

All of section 25, Township 22 North, Range 11 East. W.M., in the County of Kittitas, State of Washington.

Parcel 5; Tax Parcel No. 22-11-33000-0001

All of Section 33, Township 22 North, Range 11 East, W.M., in the County of Kittitas, State of Washington.

Parcel 6: Tax Parcel No. 19-12-23000-0001

All of Section 23, Township 19 North, Range 12 East, W.M., in the County of Kittitas, State of Washington.

Parcel 7: Tax Parcel no. 19-12-25000-0001

All of Section 25, Township 19 North, Range 12 East, W.M., in the County of Kittitas, State of Washington.

Parcel 8: Tax Parcel No. 19-12-27000-0001

All of Fractional Section 27, Township 19 North, Range 12 East, W.M., in the County of Kittitas, State of Washington.

Parcel 9: Tax Parcel No. 19-12-35000-0001

All of Section 35, Township 19 North, Range 12 East W.M., in the County of Kittitas, State of Washington.

Parcel 10: Tax Parcel No. 20-12-01000-0001

All of Section 1, Township 20 North, Range 12 East, W.M., in the County of Kittitas, State of Washington.

EXCEPT:

- 1. The Portion of Government Lots 1,2 and 5 and the Southwest Quarter of the Northeast Quarter of Section 1, Township 20 North, Range 12 East W.M., in the County of Kittitas, State of Washington, which lies Northerly of the Northerly boundary line of the former main right-of-way of the Chicago Milwaukee, St. Paul and Pacific Railroad Company,
- 2. Right-of-way Burlington Northern Railroad;
- 3. The right of way of county road as conveyed to the County of Kittitas, a municipal corporation, by deed recorded June 2, 1924, under Auditor's File No. 74038.

Parcel 11: Tax Parcel No. 20-12-11000-0001

All of Section 11, Township 20 North, Range 12 East, W.M. in the County of Kittitas, State of Washington.

Parcel 12: Tax Parcel No. 20-12-13000-0001

All of Fractional Section 13, Township 20 North, Range 12 East, W.M. in the County of Kittitas, State of Washington.

Parcel 13: Tax Parcel No. 20-12-15000-0001

All of Fractional Section 15, Township 20 North, Range 12 East, WM. in the County of Kittitas, State of Washington.

Parcel 14: Tax Parcel Number 20-12-25000-0001

All of Fractional Section 25, Township 20 North, Range 12 East , W.M., in the County of Kittitas, State of Washington.

Parcel 15: Tax Parcel No. 21-12-01000-0001

All of Fractional Section 1, Township 21 North, Range 12 East W.M., in the County of Kittitas, State of Washington.

Parcel 16: Tax Parcel No. 21-12-27000-0001

All of Section 27, Township 21 North, Range 12 East, W.M. in the County of Kittitas, State of Washington.

EXCEPT that portion of the Southeast Quarter of said section 27 lying South of a line parallel with and distant 200 feet Southerly, measured at right angles, from the center line of the main track of the railway of the Northern Pacific Railway Company;

AND EXCEPT right-of-way Burlington Northern Railroad.

Parcel 17: Tax Parcel No. 21-12-35000-0001 & 21-12-35000-0005

All of Section 35, Township 21 North, Range 12 East, W.M. in the County of Kittitas, State of Washington.

EXCEPT that portion of the Northeast Quarter and the Southeast Quarter of said section 35 lying Easterly of the Easterly boundary of the former Burlington Northern Santa Fe Railroad right-of-way as deeded to Washington State Parks and Recreation Commission by Quit Claim Deed recorded December 15, 1989 under Auditor's File No. 525813.

AND EXCEPT right-of-way of Burlington Northern Railroad;
AND EXCEPT that portion of the Southeast Quarter of the Southeast Quarter of said section 35 conveyed to The Burlington Northern and Santa Fe Railway Company for additional right-of-Way by deed recorded on November 25, 1997 under Auditor's File No. 199711250040.

Parcel 18: Tax Parcel No. 22-12-25000-0001

All of Section 25, Township 22 North, Range 12 East, W.M. in the county of Kittitas, State of Washington.

Parcel 19: Tax Parcel No. 19-13-03000-0001

All of Fractional Section 3, Township 19 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 20: Tax Parcel No. 19-13-05000-0001

All of Fractional Section 5, Township 19 North, Range 13 East, W.M., in the County of Kittitas, State of Washington.

Parcel 21: Tax Parcel No. 19-13-17000-0001

All of Section 17, Township 19 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 22: Tax Parcel No. 19-13-19000-0001

All of Fractional Section 19, Township 19 North, Range 13 East W.M., in the county of Kittitas, State of Washington.

Parcel 23: Tax Parcel No. 19-13-29000-0001

All of Section 29, Township 19 North, Range 13 East W.M., in the County of Kittitas, State of Washington.

Parcel 24: Tax Parcel No. 19-13-31000-0001

All of Functional Section 31, Township 19 North, Range 13 East W.M., in the county of Kittitas, State of Washington.

Parcel 25: Tax Parcel No. 19-13-33000-0001

All of Section 33, Township 19 North, Range 13 East, W.M., in the County of Kittitas, State of Washington.

Parcel 26: Tax Parcel No. 20-13-07000-0001

All of Fractional Section 7, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington. EXCEPT right-of-way for Burlington Northern Railroad.

Parcel 27: Tax Parcel No. 20-13-14000-0002

The Second Half of the Southwest Quarter and the Southwest Quarter of the Southwest Quarter of Section 14, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 28: Tax Parcel No. 20-13-15000-0001

All of Section 15, Township 30 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 29: Tax Parcel No. 20-13-17000-0001

All of Section 17, Township 20 North, Range 13 East, W.M., in the County of Kittitas, State of Washington.

Parcel 30: Tax Parcel No. 20-13-19000-0001

All of the Fractional Section 19, Township 20 North, Range 13 East, W.M., in the County of Kittitas, State of Washington.

Parcel 31: Tax Parcel No. 20-13-23000-0001

All of Section 23, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 32: Tax Parcel No. 20-13-27000-0001

All of Section 27, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 33: Tax Parcel No. 20-13-28000-0005

The South Half of the Southwest Quarter of Section 28, Township 20 North, Range 13 East W.M., in the County of Kittitas, State of Washington.

Parcel 34: Tax Parcel No. 20-13-29000-0001

All of Section 29, Township 20 North, Range 13 East W.M., in the county of Kittitas, State of Washington.

Parcel 35: Tax Parcel No. 20-13-31000-0001

All of Fractional Section 31, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 36: Tax Parcel No. 20-13-33000-0001

All of Section 33, Township 20 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 37: Tax Parcel No. 21-13-09000-0001

All of Section 9, Township 21 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

EXCEPT: 0.88 acres overflow area, AND EXCEPT that portion lying below the ordinary highline for Lake Kachess.

Parcel 38: Tax Parcel No. 21-13-19000-0001

All of Fractional Section 19, Township 21 North, Range 13 East, W.M., in the county of Kittitas, State of Washington.

Parcel 39: Tax Parcel No. 19-14-07000-0001

All of Fractional Season 7, Township 19 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 40: Tax Parcel No. 19-14-11000-0001, 19-14-11000-0002, 19-14-11000-0003, 19-14-11000-0004, 19-14-11000-0005, 19-14-11000-006, 19-14-11000-0007, 19-14-11000-0008, 19-14-11000-0009, 19-14-11000-0010, 19-14-11000-0011, 19-14-11000-0012, 19-14-11000-0013, 19-14-11000-0014

Government Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 of Section 11, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 41: Tax Parcel No. 19-14-11000-0015

The Second Half of Section 11, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington. EXCEPT Government Lots 13 and 14.

Parcel 42: Tax Parcel No. 19-14-13000-0001

All of Fractional Section 13, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 43: Tax Parcel No. 19-14-15000-0001

All of Section 15, Township 19 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 44: Tax Parcel No. 19-14-16000-0001

All of Section 16, Township 19 North, Range 14 East W.M., in the County of Kittitas, State of Washington.

Parcel 45: Tax Parcel No. 19-14-17000-0001

All of Section 17, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 46: Tax Parcel No. 19-14-18000-0001

Government Lots 1, 2, 3 and 4, the East Half of the West Half and the East Half of Section 18, Township 19 North, Range 14 East W.M., in the County of Kittitas, State of Washington.

Parcel 47: Tax Parcel No. 19-14-20000-0001

All of Section 20, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 48: Tax Parcel No. 19-14-21000-0001

All of Section 21, Township 19 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 49: Tax Parcel No. 19-14-22000-0001

All of Section 22, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 50: Tax Parcel No. 19-14-23000-0001

All of Section 23, Township 19 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 51: Tax Parcel No. 19-14-27000-0001

All of Section 27, Township 19 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 52: Tax Parcel No. 19-14-28000-0001

All of Section 28, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 53: Tax Parcel No. 19-14-33000-0001

All of Section 33, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 54: Tax Parcel No. 19-14-35000-0001

All of Section 35, Township 19 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 55: Tax Parcel No. 20-14-01000-0002

Parcel 1B of that certain Survey recorded January 10, 2000, in Book 25 of Surveys, Page 148 under Auditor's File No. 200011020017, records of Kittitas County, Washington, being a Portion of Section 1, Township 20 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 56: Tax Parcel No. 20-14-04000-0004, 20-14-04000-0005 & 20-14-04000-0008

Government Lot 2, the Southeast Quarter of the Northwest Quarter and the North Half of the Southwest Quarter of Section 4, Township 20 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 57: Tax Parcel No. 20-14-09000-0003, 20-14-09000-0004, 20-14-09000-0005. 20-14-09000-0006, 20-14-09000-0007, 20-14-09000-0008, 20-14-09000-0009 & 20-14-09000-0010

Parcels 1,2,3,4,5,6 and 7 of that certain Survey as recorded on April 30, 2007, in Book 34 of Surveys, page 24, under Auditor's File No. 200704300039, records of Kittitas County, Washington; being a portion of Section 9, Township 20 North, Range 14 East, W.M., in the County of Kittitas, State of Washington;

Except that Portion of Parcel 6 described as "Exception" and as delineated on the face of said Survey, in the County of Kittitas, State of Washington.

Parcel 58: Tax Parcel No. 20-14-16000-0002

All of Section 16, Township 20 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 59: Tax Parcel No. 21-14-09000-0009

Parcel 4 of that certain Survey as recorded October 25, 1995, in Book 21 of Surveys, page 126, under Auditor's File No. 586547, records of Kittitas County Washington; being the East Half of Section 9, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 60: Tax Parcel No. 21-14-15000-0001

All of Section 15, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 61: Tax Parcel No. 21-14-16000-0002

The East Half of Section 16, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 62: Tax Parcel No. 21-14-21000-0001

Parcel A of the certain Survey as recorded December 13, 1995 in Book 21 of Surveys page 159 and 160, under Auditor's File No. 587743, records of Kittitas County, Washington; being the East Half of Section 21, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 63: Tax Parcel No. 21-14-22000-0001

All of Section 22, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 64: Tax Parcel No. 21-14-23000-0001

All of Section 23, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 65: Tax Parcel No. 21-14-25000-0001

All of Fractional Section 25, Township 21 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 66: Tax Parcel No. 21-14-26000-0001

All of Section 26, Township 21 North, Range 14 East, W.M., in the county of Kittitas, State of Washington.

Parcel 67: Tax Parcel No. 21-14-27000-0001

Section 27, Township 21 North, Range 14 East , W.M., in the cCunty of Kittitas, State of Washington. EXCEPT that portion lying Southwest of the centerline of Salmon la Sac County Road.

Parcel 68: Tax Parcel No. 21-14-28010-0001

Parcel B of that certain Survey as recorded October 23, 2002, in Book 28 of Surveys, page 46, under Auditor's File No. 200210230014, records of Kittitas County, Washington;

Being the Northeast Quarter of the Northeast Quarter of Section 28, Township 21North, Range 14 East, W.M., and Government Lots 5, 8 and 9 as described and/or delineated on the United States Department of the Interior Bureau of Land Management Supplemental Plat of Sections 16 and 28, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 69: Tax Parcel No. 21-14-33000-0002

Government Lot 3, Section 33, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington. EXCEPT that portion conveyed to the United States of America by Warranty Deed recorded April 16, 1917 in Book 31 of Deeds, Page 295, under Auditor's file no. 45690.

Parcel 70: Tax Parcel No. 21-14-35000-0002

Parcel 2 of that certain Survey, as recorded February 6, 2014, in Book 39, Page 27 and 28, under Auditor's File No. 201402060023, records of Kittitas County Washington, being a portion of Section 35, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 71: Tax Parcel No. 21-14-36000-0001

Government Lots 1,2, 3 and 4 inclusive, the West Half of the Northeast Quarter, the Northwest Quarter, the Southwest Quarter, and the West Half of the Southeast Quarter of Section 36, Township 21 North, Range 14 East, W.M., in the County of Kittitas, State of Washington.

Parcel 72: Tax Parcel No. 18-15-07000-0001

All of Fractional Section 7, Township 18 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 73: Tax Parcel No. Intentionally Deleted

Parcel 74: Tax Parcel No. Intentionally Deleted

Parcel 75: Tax Parcel No. 19-15-13000-0001

The North Half of Fractional Section 13, Township 19 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 76: Tax Parcel No. 19-15-15000-0001

The North Half of Fractional Section 15, Township 19 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 77: Tax Parcel No. 19-15-17000-0001

All of Fractional Section 17, Township 19 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 78: Tax Parcel No. 19-15-19000-0001

All of Fractional Section 19, Township 19 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 79: Tax Parcel No. 20-15-05000-0002

The North Half of the South Half and Government lots 5,6,7, and 8 of Section 5, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 80: Tax Parcel No. 20-15-0600-0006, 20-15-06000-0007, 20-15-06000-0008 & 20-15-06000-0009

Parcels A,B, C and D, of that certain Survey as recorded December 10, 2004, in Book 30 of Surveys, Pages 197, 198 and 199, under Auditor's File No. 200412100069, being a portion of Section 6, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 81: Tax Parcel No. 20-15-07000-0004

Parcel 4 of the certain Survey as recorded November 2, 2000, in Book 25, Page 149, under Auditor's File No. 200011020018, records of Kittitas County, Washington, being a portion of Section 7, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 82: Tax Parcel No. 20-15-08000-0001

Parcel 4 of the certain Survey as recorded November 2, 2000, in Book 25, Page 146, under Auditor's File No. 200011020015, records of Kittitas County, Washington, being a portion of Section 8, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 83: Tax Parcel No. 20-15-09000-0004 & 20-15-09000-0004 & 20-15-09000-0001

Parcels 3 and 4, of that certain Survey as recorded March 6, 1998, in Book 23, Page 85, under Auditor's File No. 199803060014, being a portion of Section 9, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 84: Tax Parcel No. 20-15-14000-0002

The North Half of the South Half of Section 14, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 85: Tax Parcel No.20-15-15000-0001 & 20-15-15000-0002

All of Section 15, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 86: Tax Parcel No. 20-15-16000-0001

Parcel 4 of that certain Survey as recorded November 2, 2000, in Book 25, Page 145, under Auditor's File No. 200011020014, records of Kittitas County, Washington, being a portion of Section 16, Township 20 North, Range 15 East, W.M., in the County of Kittitas, State of Washington.

Parcel 87: Tax Parcel No. 19-11-250000-0001

All of Section 25, Township 19 North, Range 11 East, W.M., in the County of Kittitas, State of Washington.

YAKIMA COUNTY:

Parcel 1: Tax Parcel 151617-31001

The Northeast 1/4 of the Northeast 1/4 of the Southwest 1/4 ; The North 1/2 of the Northwest 1/4 of the Northeast 1/4 of the Southwest 1/4 ; in the East 1/2 of the Southeast 1/4 of the Northeast 1/4 of the Southwest 1/4, West of the East line of the Naches River; and the North 1/2 of the Northwest 1/4 of the Southwest 1/4 of Section 17, Township 16 North, Range 15 East, W.M;

Except the Northeast 1/4 of the Northeast 1/4 of the Southwest 1/4 lying Northeasterly of the Naches River;

Situate in the County of Yakima, State of Washington.

Parcel 2: Tax Parcel 151607-11001

Government Lots 2,3 and 4; the Northeast ¼ of the East ½ of the Southwest ¼; the South ½ of the Southeast ¼ ; that portion of the Northwest ¼, of the Southeast ¼ lying North of the South line of the Naches River riverbed in the Northeast ¼ of the Southeast ¼ in Section 7, Township 16 North, Range 15 East, W.M.;

Situate in the County of Yakima, State of Washington.

Parcel 3: Tax Parcel 151617-21012

That portion of Northwest 1/4 lying Westerly of the Naches River in Section 17, Township 16 North, Range 15 East, W.M.;

Situate in the County of Yakima, State of Washington.

Parcel 4: Tax Parcel 131931-31001

That portion of the Southwest ¼ of the Southeast ¼ and the South ½ of the Southwest ¼ in Section 31, Township 19 North, Range 13 East, W.M., lying within Yakima County;

Situate in the County of Yakima, State of Washington.

APPENDIX B. HABITAT CONSERVATION Plan Targets

Excerpted from the **Plum Creek Central Cascades HCP Transfer and Assumption Agreement - Table 25a**. Eastside Block acreage projections for northern spotted owl habitat and Stand Structure stages 2016-2045. 2014 estimates are based on current inventory and harvest data. The size of the Central Cascades Forest in the HCP Project Area totals 45,097 acres. HCP East habitat acres refers to federal, state and private land modeled within the HCP Project Area but not obligated to habitat commitments in the HCP.

	Year											
Category	11/14/20	./14/2014 12/31		12/3	1/2026	12/31/2036		12/31/2045				
	CCF	CCF	HCP East	CCF	HCP East	CCF	HCP East	CCF	HCP East			
Spotted Owl H	Spotted Owl Habitat											
NRF	4,27	2 2,105	37,755	4,392	43,206	4,142	44,447	3,568	44,945			
FD	4,55	8 4,235	41,588	3,360	36,485	2,302	34,733	2,106	34,716			
NON	36,20	67 38,757	76,168	37,345	75,821	38,653	76,332	39,422	75,852			
Total (Area)	45,097	45,097	155,512	45,097	155,512	45,097	155,512	45,097	155,512			

	Year											
Category	11/14/2014	12/31/2016		12/31	1/2026	12/31	L/2036	12/31/2045				
	CCF	CCF	HCP East	CCF	HCP East	CCF	HCP East	CCF	HCP East			
Structural Stages												
SI	3,729	8,960	10,900	8,091	11,576	7,374	9,775	12,056	13,442			
SS	616	2,161	3,766	1,523	2,364	6,048	8,953	3,260	5,413			
YF	14,668	15,812	22,656	8,196	12,292	4,656	7,657	8,458	12,919			
Sub-total (SI/SS/YF)	19,013	26,933	37,322	17,809	26,232	18,079	26,385	23,774	31,774			
РТ	2,133	3,076	12,584	7,635	14,054	9,828	15,744	8,351	13,836			
DF	9,454	5,407	26,056	5,980	24,586	2,736	13,859	2,045	10,801			
MF	11,274	4,541	45,160	5,527	42,466	4,537	44,756	2,346	42,162			
MOG	801	2,743	17,374	5,749	31,262	7,522	33,077	6,125	35,245			
OG	235	183	6,360	183	6,255	183	11,034	245	11,039			
Sub-total (MF/MOG/OG)	12,310	7,467	68,894	11,459	79,983	12,241	88,868	8,715	88,445			
Non	2,188	2,213	10,656	2,213	10,656	2,213	10,656	2,213	10,656			
Total(Area)	45,097	45,097	155,512	45,097	155,512	45,097	155,512	45,097	155,512			

Excerpted from the **Plum Creek Central Cascades HCP Transfer and Assumption Agreement Table 26a.** Eastside Block percentage projections for primary and secondary Lifeform habitats: 2016-2045

Lifeform	Search Area	2014^{a}		2016^{b}		2026		2036		2045	
			d								
		P	SH^{u}	Р	SH	Р	SH	Р	SH	Р	SH
1	Water										
2	RHA	70%	83%	67%	81%	75%	85%	79%	87%	82%	89%
3	RHA	70%	83%	67%	81%	75%	85%	79%	87%	82%	89%
4	Talus	34%	34%	22%	28%	22%	28%	10%	22%	10%	22%
5	Edge	0	0	0	0	0	0	0	0	0	0
6	RHA	22%	59%	23%	59%	10%	53%	3%	49%	2%	49%
7	RHA	46%	71%	47%	71%	33%	64%	27%	61%	22%	59%
8	НСР	39%	63%	47%	62%	38%	59%	44%	62%	41%	56%
9	RHA	45%	68%	46%	70%	33%	64%	27%	61%	22%	58%
10	НСР	53%	70%	37%	57%	58%	68%	59%	70%	49%	60%
11	НСР	53%	74%	37%	66%	58%	77%	59%	77%	49%	72%
12	RHA	70%	72%	67%	70%	75%	80%	79%	86%	82%	88%
13	НСР	48%	67%	30%	51%	41%	59%	37%	53%	31%	49%
13a	НСР	27%	43%	18%	36%	27%	44%	31%	47%	25%	43%
14	НСР	48%	72%	30%	63%	41%	68%	37%	66%	31%	63%
14a	НСР	27%	38%	18%	24%	27%	34%	31%	34%	25%	28%
15 Young	НСР	42%	42%	58%	58%	37%	37%	36%	36%	46%	46%
15 Middle	НСР	26%	26%	19%	19%	30%	30%	29%	29%	24%	24%
15 Late	НСР	27%	27%	18%	18%	27%	27%	31%	31%	25%	25%
16	RHA	70%	83%	67%	81%	75%	85%	79%	87%	82%	89%

^a -2014 values are actual 11-14-2014 inventory values minus projected non-TNC land sales. EASTSIDE

^b-2016-2045 values are OPTIONS projections.

^c - Percentage of the PCTC HCP search area containing Primary Habitat

^d - Percentage of the PCTC HCP search area containing Suitable Habitat = Primary Habitat + (Secondary Habitat/2)

Excerpted from the **Plum Creek Central Cascades HCP Transfer and Assumption Agreement Table 31a.** Eastside Block projected percentages of stand structural stages in the total HCP area, riparian and talus slope areas: 2016-2045. Projected percentages in the HCP column include U.S. Forest Service inventory data that is not as current as Central Cascades Forest inventory data.

		11/14	4/14	12/3	1/16	12/3	1/26	12/3	1/36	12/3	1/45
All Acres	ORG_SS	CCF	нср	CCF	нср	CCF	нср	CCF	нср	CCF	нср
	SI	8.3%		18.0%	7.0%	16.1%	7.4%	14.0%	6.3%	23.6%	8.6%
	SS	1.4%		4.8%	2.4%	2.9%	1.5%	12.3%	5.8%	5.2%	3.5%
	YF	32.5%		35.1%	14.6%	18.2%	7.9%	9.4%	4.9%	16.8%	8.3%
	PT	4.7%		6.8%	8.1%	16.9%	9.0%	22.0%	10.1%	18.5%	8.9%
	DF	21.0%		12.4%	16.8%	13.5%	15.8%	6.7%	8.9%	5.5%	6.9%
	MF	25.0%		11.3%	29.0%	14.0%	27.3%	12.6%	28.8%	9.1%	27.1%
	MOG	1.8%		6.2%	11.2%	13.1%	20.1%	17.7%	21.3%	15.8%	22.7%
	OG	0.5%		0.4%	4.1%	0.4%	4.0%	0.4%	7.1%	0.6%	7.1%
	NON	4.9%		4.9%	6.9%	4.9%	6.9%	4.9%	6.9%	4.9%	6.9%
		100.0 %		100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

		11/14	4/14	12/3	1/16	12/3	1/26	12/3	1/36	12/3	1/45
	ORG_S		НС								
RHA	S	CCF	Р	CCF	НСР	CCF	НСР	CCF	НСР	CCF	НСР
	SI	2.8%		1.0%	1.0%	0.4%	0.4%	0.5%	0.5%	0.5%	0.4%
	SS	0.9%		0.7%	1.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
	YF	18.0%		21.2%	18.4%	9.1%	8.8%	2.0%	2.9%	1.5%	2.5%
	РТ	4.4%		6.1%	6.5%	11.4%	10.3%	13.8%	11.7%	11.3%	9.6%
	DF	22.4%		18.6%	17.9%	12.3%	13.3%	10.8%	10.2%	9.2%	8.8%
	MF	38.9%		40.1%	40.2%	44.1%	42.7%	38.0%	39.7%	37.1%	37.7%
	MOG	5.4%		6.1%	6.8%	16.2%	16.5%	28.3%	27.1%	32.5%	31.8%
	OG	3.1%		2.1%	1.6%	2.1%	1.6%	2.1%	1.6%	3.6%	3.0%
	NON	4.2%		4.2%	6.1%	4.2%	6.1%	4.2%	6.1%	4.2%	6.1%
		100.0 %		100.0 %							

		11/14	4/14	12/3	1/16	12/3	1/26	12/3	1/36	12/3	1/45
Talus	ORG_S S	CCF	HC P	CCF	нср	CCF	нср	CCF	нср	CCF	нср
	SI	0.0%		12.2%	2.1%	12.2%	1.7%	19.8%	2.8%	4.2%	1.3%
	SS	0.0%		0.0%	0.0%	0.0%	0.3%	3.3%	0.5%	7.6%	1.0%
	YF	0.0%		0.0%	0.6%	0.0%	0.7%	0.9%	1.0%	12.2%	2.6%
	PT	0.0%		0.0%	0.5%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
	DF	15.0%		5.7%	15.0%	0.2%	7.9%	0.2%	5.7%	0.2%	5.3%
	MF	16.2%		13.4%	22.7%	18.8%	30.4%	4.8%	30.5%	3.6%	29.4%
	MOG	2.7%		2.7%	0.5%	2.7%	0.5%	4.9%	0.9%	6.1%	1.9%
	OG	0.0%		0.0%	3.9%	0.0%	3.9%	0.0%	3.9%	0.0%	3.9%
	NON	66.1%		66.1%	54.6%	66.1%	54.6%	66.1%	54.6%	66.1%	54.6%
		100.0 %		100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

APPENDIX C. TARGETED WILDLIFE SPECIES IN THE HABITAT CONSERVATION PLAN

ESA Listed Wildlife Species

The following four ESA listed species comprise the primary focus of the Habitat Conservation Plan (HCP) and restoration planning efforts outlined in this forest management plan.

Grizzly Bear

The species, *Ursus arctos*, generally includes both the Eurasian and Alaskan brown bears and the grizzly bear. In the contiguous 48 States, grizzly bears occur in only five areas in mountainous regions, national parks, and wilderness areas in Washington, Idaho, Montana, and Wyoming. They are large bears with long, curved claws, humped shoulders, and a dished face. Coloration varies from blonde to dark brown. Spring shedding, new growth, nutrition, and climate all affect coloration.

The grizzly bear was listed as threatened on July 28, 1975. Grizzly bear distribution has been reduced to less than 2 percent of its historical range in the lower 48 states due to reductions in habitat amount, habitat degradation, direct killing of bears, and increased human-bear conflicts. The northern portion of the Central Cascades Forest is within the Northern Cascades Grizzly Bear Recovery Area. Although grizzly bears may not currently occur in the Planning Area, they may eventually emigrate and reside in the Planning Area. Overall, the recovery area is thought to be capable of supporting between 200 and 400 grizzly bears. Although at present, grizzly bears are not currently known to reside in the Planning Area.

Recent research suggests that open roads with unrestrained public use can contribute to grizzly bear mortality, and females with cubs typically exhibit less preference for areas with high road density. Home range and habitat studies of grizzly bears suggest that optimal bear habitat includes a mixture of forested areas, used for hiding and thermal cover, as well as open meadows, avalanche chutes, and harvested sites where bears forage for plants and small mammals. Concerns regarding open road density and available preferred habitat are related in that excessive open road densities may displace grizzly bears from otherwise preferred habitat or expose bears to greater mortality risk should they become attracted to habitats with road networks used extensively by humans.

Gray Wolf

The gray wolf was listed as endangered on July 1, 1977. Historically, gray wolves ranged widely throughout North America. Unlike the grizzly bear which has low reproductive potential or the northern spotted owl with its specialized habitat requirements, the gray wolf exhibits a high reproductive rate, flexible habitat requirements, and is less affected by forest management activities. Although the status of gray wolves in the planning area is unknown, wolves may eventually emigrate and reside in the planning area. As with the grizzly bear, the Conservancy will avoid or minimize potential impacts to gray wolves by maintaining habitat in a condition that allows wolves and their important prey species to meet their essential biological needs while residing in the Planning Area. The Conservancy will accomplish this by following the policies established in the HCP.

Northern Spotted Owl

Northern spotted owls are found primarily in northern California and the Pacific Northwest. The Federal listing of the northern spotted owl, as a threatened species became effective on July 23, 1990. The primary threat cited by the USFWS in its decision to list the species was the reduction and fragmentation of forest habitat in Washington, Oregon, and northern California. As a primary means for achieving recovery of the spotted owl, the final draft Recovery Plan recommended establishing Designated Conservation Areas (DCAs) to provide Federal forest lands as primary habitat for spotted owls. Portions of four DCAs are located within the Central Cascades Forest. In addition to the management strategies provided for Federal lands under the final draft Recovery Plan and Northwest Forest Plan, protection measures for spotted owls also include Special Emphasis Areas (SEAs), proposed by the USFWS for nonfederal lands. Among the six SEAs designated in Washington, the I-90 Corridor SEA incorporates the entire Central Cascades Forest.

Spotted owls are known to nest, roost, and forage in a wide variety of habitat types and forest stand conditions. For example, spotted owls use Western hemlock, mixed conifer, Douglas fir, redwood, Douglas fir/hardwood, evergreen/hardwood, Ponderosa pine, Western red cedar, and other forest types in different parts of their range. Spotted owls appear to prefer mature and/or old growth forest stands, for nesting, roosting, and foraging. However, it is unclear how strong the causal link is between mature and/or old growth forest stands and nesting, roosting and foraging habitat, and spotted owl reproductive success. In fact, few studies have linked habitat suitability with reproductive success. This is an important issue since the causal link between habitat suitability and reproductive success may be central to determining if habitat modification will disrupt essential spotted owl behavior or result in a significant decline of the species' population.

Unlisted Species

In addition to the four ESA listed species, a total of 311 vertebrate fish and wildlife species, either known or suspected to reside in the HCP Planning Area, will receive special attention through the habitat conservation and restoration strategies outlined

in this forest management plan. These species have been prioritized by their respective legal and biological status into three groups. These groups include:

- 1. **Special Emphasis Species** This group includes 21 species, all of which were Federal candidate species during the development of the HCP. These include those species with the highest likelihood of becoming federally listed during the 50-year Permit period.
- 2. **Species of Concern** This group includes 11 species, two of which are federally listed, two are Federal candidate species, and seven are state species of concern. This group (10 birds and one reptile) includes species that occur in the Planning Area but are not inhabitants of forest types that will be affected by the HCP or other regulatory processes outside of the HCP (e.g., bald eagle site management plans) protect them. This group also contains species that experts and local biologists believe are unlikely to occur in the Planning Area.
- 3. **Associated Species** Plum Creek grouped the remaining 280 species of wildlife (i.e., 68 mammals, 162 birds, 12 reptiles, 8 amphibians, and 30 species of fish) that potentially inhabit the HCP Planning Area, into this general forest wildlife category. This category generally includes big game, small game, and other familiar forest wildlife species.

Special Emphasis Species

Among the 21 Special Emphasis Species, there are eight mammals, four birds, five amphibians, and four fish. One species, the spotted frog is a Federal Candidate species. Another species, bull trout, is a Federal threatened species. The remaining 19 species are Federal species of concern.

The Federal Candidate species include: California wolverine; Pacific fisher; Townsend's big eared bat; long-legged myotis; longeared myotis; fringed myotis; smallfooted myotis; Yuma myotis; northern goshawk; harlequin duck; little willow flycatcher; olive-sided flycatcher; Larch Mountain salamander; the tailed frog; northern red-legged frog; cascades frog; rainbow/ steelhead trout; coho salmon; and chinook salmon.

Species of Concern

To ensure that the HCP is not in conflict with the habitat needs of other species found within the Planning Area, information has been compiled on eleven additional threatened, endangered, or candidate Species of Concern.

Among the 11 Species of Concern there are 10 birds and one reptile. The peregrine falcon is State listed as endangered and was recently federally delisted, and the bald eagle is federally and State listed as threatened in Washington but has been federally proposed for delisting.

Two species were Federal Candidate 2 species. These are northwestern pond turtle and black tern. Seven species (although not Federal candidate species) are listed as State candidate species. These include golden eagle; flammulated owl; Lewis' woodpecker; pileated woodpecker; whiteheaded woodpecker; Vaux's swift; and Western bluebird.

Associated Species

The conservation benefits of the HCP will be substantially enhanced through the Conservancy's consideration of potentially all vertebrate species that may, at one time or another during their life cycle, use or be associated with habitats occurring within the Planning Area during the life of the Permit. By considering the physical and biological needs of a large combination of animals that could potentially use the Planning Area, the Conservancy seeks to develop a comprehensive ecosystem-based management plan for more than 280 Associated Species, including 68 mammals, 162 birds, 12 reptiles, 8 amphibians, and 30 fish.

Fish

Historically, the Yakima River Subbasin supported large populations of spring, summer, and fall chinook salmon; sockeye salmon; coho salmon; and summer steelhead. Although natural runs of sockeye and coho are extinct in the Yakima River Subbasin, sockeye are being restablished by the Yakama Nation, and the first returns have been documented in Cle Elum Lake in 2014. Efforts are also currently underway to determine if summer chinook still exist in the subbasin. Spring and fall chinook are known to still exist in the subbasin, but their respective population levels are far below historical run sizes. Native stocks of rainbow and cutthroat trout, in addition to introduced brook and brown trout, are known to occur in the Yakima River Subbasin. There are also abundant populations of mountain whitefish in the subbasin. Among the resident trout species, rainbows are the most important because of their significance to the recreational fishery above Roza Dam.

The following fish species will receive special attention through the habitat conservation and restoration strategies outlined in this forest management plan:

Bull Trout (Salvelinus confluentis)

Bull trout are native to North America and are distributed from 41 to 60 degrees North latitude along the Cascade and Rocky Mountain ranges. Bull trout also occur in the headwaters of North and South Saskatchewan Rivers of the Hudson Bay drainage in Alberta, and in the headwaters of the Athabaska, Peace, and Laird Rivers tributary to the Mackenzie River system in Alberta and British Columbia. South of the 49th parallel, bull trout occur mainly West of the continental divide in river systems that drain the Columbia River basin, except in Montana and Oregon.

The historical distribution of bull trout in Washington includes most of the State except that portion south and East of the Columbia River, but north of the Snake River; and in the southwest region of the State, that portion West of the Lewis River to Grays Harbor, but south of the Nisqually River basin. Reductions in the historical distribution of bull trout have occurred mainly in Eastern Washington.

As an example, bull trout populations are currently absent from the Chelan, lower Yakima, and Okanogan basins. Although it is presumed that bull trout were once widely distributed throughout the Columbia basin, presently they are only occasionally observed in the Columbia and Snake Rivers. Life history forms of bull trout include: resident, fluvial, adfluvial (i.e., lacustrine), and anadromous

. Stream resident bull trout occupy small, high elevation streams. They rarely move and are seldom larger than 30 centimeters. Adult fluvial and adfluvial bull trout are known to migrate extensively (up to 225 kilometers) to spawning areas. Adfluvial bull trout mature in lakes or reservoirs and spawn in tributary streams. Fluvial forms have a similar life history as adfluvial forms, except they move frequently between mainstem rivers and smaller tributary streams. Juveniles remain between one to six years in nursery streams before migrating downstream to either rivers (i.e., fluvial forms) or lakes (i.e., adfluvial forms). Anadromous bull trout spawn and rear initially in streams, and migrate to saltwater where they grow and mature.

Rainbow/Steelhead Trout (Oncorhynchus mykiss)

The rainbow/steelhead trout originally ranged from the Eastern Pacific Ocean and inland, mainly west of the Rocky Mountains, from northwest Mexico to the Kuskokwim River, Alaska. In Washington, resident and anadromous (i.e., steelhead) rainbow trout occur throughout most of the drainages of Puget Sound, coastal streams, and the lower Columbia River. East of the Cascade Mountains, rainbow trout are commonly found in tributaries of the Columbia basin and tributaries of the Snake River.

Rainbow trout and steelhead (i.e., freshwater phase) inhabit moderate gradient streams and rivers, preferring riffles and pools in summer and primarily pools with adequate cover during other seasons of the year. Primary factors limiting rainbow and steelhead populations in streams and rivers in Washington are stream temperatures that exceed the normal spawning and rearing range, lack of spawning and rearing habitat, high sedimentation and silt input at spawning and rearing areas, and reductions in productivity of preferred food items.

Coho Salmon (Oncorhynchus kisutch)

The coho salmon is native to the northern Pacific Ocean. Coho spawn and rear in streams from Monterey Bay, California, to Point Hope, Alaska, and southward along the Asiatic coast to Japan. The primary area of abundance is North America from Oregon to Alaska. In Washington, coho salmon spawn and rear throughout most of the drainages of Puget Sound, coastal streams, and the lower Columbia River.

Although little is known of the historic distribution of coho salmon in the Yakima Subbasin, many fisheries managers believe that virtually all of the major upper Yakima River tributaries (i.e., the Teanaway River and Taneum, Manastash, Swauk, Big and Umtanum Creeks) supported coho. The Naches River and all accessible tributaries above the Tieton are also considered to have supported substantial numbers of coho.

Coho salmon use a wide variety of habitats in freshwater. Optimal rearing habitat for coho consists of a mixture of pools and riffles, abundant in-stream and bank cover, water temperatures that average between 50 to 59 degrees Fahrenheit in summer, dissolved oxygen levels near saturation, and riffles with minimum concentrations of fine sediment. Side-stream vegetation is a particularly important component of coho

habitat because it provides food, cover, temperature control, and helps maintain stream bank integrity. Spawning occurs mainly in moderate-sized coastal streams and tributaries of larger rivers. As a general rule, coho do not use main channels of large rivers for spawning.

Spring Chinook Salmon

The historic spawning areas of the spring chinook in the Yakima River Subbasin were extensive and included the mainstem Yakima River above Ellensberg, the Naches River, Cle Elum River below Lake Cle Elum, the Tieton River (both North and South forks), Rattlesnake Creek and Bumping, Little Naches and American Rivers. Spring chinook still spawn in most of these areas, especially in the Yakima River above Ellensberg, the upper Naches and American Rivers. Spring chinook distribution in the upper Yakima River Subbasin in the Planning Area, is limited primarily to the mainstem Yakima River, Cabin Creek, and the upper portion of the Little Naches River.

Spring chinook historically comprised one of the largest anadromous fish runs in the Yakima River Subbasin. Production of spring chinook in the Subbasin accounted for nearly 14 per cent of the total Columbia River spring chinook runs in the 1950's. Although historical spring chinook run sizes in the Yakima River Subbasin have been estimated to be approximately 200,000 fish, since the late 1950's, annual returns of spring chinook have ranged from 166 to 9,442 fish.

APPENDIX D. WATERSHED SUMMARIES

Big Creek

The Big Creek watershed consists of the area drained by Big Creek and Little Creek. This watershed has an intermediate level of annual precipitation and stream density compared to other eastern Cascade basins. The watershed spans three precipitation zones with 79 percent of the area within the snow-dominated and highland zones. The results of the assessment indicate that large rain-on-snow events occur infrequently in the watershed with a likely recurrence interval of five to ten years.

The watershed analysis hydrology model for 1993 forest cover conditions predicted rain-on-snow generated peak flow increases ranging from 1 to 4 percent. This magnitude of increase is insufficient to cause significant impacts to channel condition or fish habitat. While the impact of timber harvesting on spring snowmelt peak flows was not evaluated because of a lack of data and appropriate hydrology models, these stream flows have as great a potential to impact channel condition and fish habitat due to their frequent occurrence. Based on a review of relevant scientific literature, however, the limited amount of timber harvest in the watershed has probably not impacted stream flow during spring snowmelt.

Cabin Creek

The Cabin Creek watershed is located directly east of the Cascade crest and shares characteristics of watersheds from both sides of the crest. The basin has relatively high annual precipitation, particularly to the west, and a moderate to high drainage density. Ninety-one percent of the basin is within the snow-dominated and highland precipitation zones. Peak flows, however, regularly originate from both rain-on-snow storms and spring snowmelt.

The ownership consists of a number of small and large private forest landowners, the state of Washington, and the Wenatchee National Forest. The watershed has undergone a significant amount of logging, with timber harvest in the lower Cabin Creek valley since the 1930s and in the upper basin largely from the 1960s through the 1980s.

A moderate hazard rating was assigned to the Upper Cabin Creek and the Log Creek subbasins for predicted peak flow increases resulting from timber management activities over the past 20 years. A potential change in the timing of the spring snowmelt runoff was also predicted, which is a potential concern for downstream irrigation. Ultimately, however, the channel conditions were not deemed vulnerable to this level of hydrological change. The presence of only spring-spawning salmonids that avoid winter rain-on-snow flood impacts and a lack of evidence for significant scour of spawning gravel were reasons for assigning a low vulnerability. Providing more large wood to these channels will be the focus for improving aquatic habitat and reducing flood forces on the channel.

Keechelus Lake and Mosquito Creek

The Keechelus Lake and Mosquito Creek watersheds encompass the headwaters of the Yakima River, immediately east of the Cascade Range crest. The Keechelus Lake watersed has a broader range and higher elevations than Mosquito Creek. The Keechelus Lake watershed also has significantly greater precipitation than Mosquito Creek, although the stream densities are similar. The watersheds span three precipitation zones. The Keechelus Lake watershed has almost 99 percent of its area in the snow-dominated and highland precipitation zones. The lower elevation Mosquito Creek has nearly 88 percent of its area in the rain-on-snow and snow dominated precipitation zones. Ownership in the WAUs includes a number of small private forest landowners, and Boise Cascade Corporation, Washington State DNR, CCF LLC, and the Wenatchee National Forest.

Keechelus Lake and Easton Lake have served as reservoirs for downstream irrigation use during the summer since 1915. The impacts of flow regulation on the Yakima River far outweigh the effects of forest management activities on peak flows. Dam regulation of the Yakima River stream flows has reduced the magnitude of peak flows from 44 to 68 percent for the 2- to 100-year recurrence interval floods. Watershed analysis models found that the timing of water yield has changed, with increasing yields in the spring and decreasing yields in May through July. Analysis of climate and forest cover variables indicates that the increasing trend in April water yield is due primarily to climate conditions alone. The percent of a basin with trees less than 20-year old was significantly correlated with decreasing water yields from May through June.

Naches Pass

The Naches Pass watershed encompasses the entire Little Naches River basin, a major tributary of the Naches River. About two-thirds of the watershed is managed by Naches Ranger District of the Wenatchee National Forest. Six square miles in the headwaters of the South Fork and Middle Fork of the Little Naches River lies in the Norse Peak Wilderness. The Central Cascades Forest includes alternate sections in a checkerboard fashion in the northern half of the watershed.

The basin has relatively high annual precipitation, particularly to the west, but a generally low stream density. Stream densities within the HCP area are nearer to the Cascade crest, however, and significantly higher at 5.69 miles/square mile. Nearly 98 percent of the basin is within the snow-dominated and highland precipitation zones.

The results of this analysis suggest that flows in the Little Naches have increased due to logging. This result is consistent with much of the research on the effects of logging on runoff from spring snowmelt. Such studies have often found significant increased peak flows or water yield following the harvest of substantial portions of forested watersheds.

Peak flow hazards were assessed for each sub-basin on the proportion of hydrologically immature forest and the potential effect of peak flow increase on stream channel processes affecting fish habitat. Field evaluations of channel conditions and a bed mobility analysis were conducted to evaluate the susceptibility to bed scour and bank erosion from peak flow increases. Three sub-basins in the upper watershed, Blowout Creek, Pyramid Creek, and the North Fork Little Naches River, were rated a moderate hazard for increased peak flows.

Quartz Mountain

The Quartz Mountain WAU consists of the area drained by the North and South Forks of Taneum Creek. The ownership in the WAU is primarily split between CCF LLC and the Wenatchee National Forest. The Taneum Creek basin has relatively low annual precipitation and a moderate stream density (Table 3). The watershed spans three precipitation zones with over 97 percent of the area within the snow-dominated and highland zones (Table 4). The relative importance of rain-on-snow versus spring snowmelt generated peak flows was difficult to assess without stream flow data for the basin, but climate observations and stream flow data from nearby basins indicate that large rain-on-snow floods occur infrequently, on the order of once every 10 to 15 years. The Quartz Mountain watershed analysis was conducted in 1994 and reviewed in 1999 to evaluate the results after five years of implementing management changes.

The 1994 watershed analysis predicted increased runoff ranging from 0 to 11 percent due to continuing intensive timber management activities. While riparian logging and associated erosion confounded possible hydrologic impacts, observations of recent erosion, sedimentation and channel movement indicated a potential sensitivity to increased peak flows in this sub-basin. Forest management guidelines were developed for the HCP restricting timber harvest until the vegetation was more hydrologically mature to minimize further peak flow increases. Implementation monitoring of these guidelines revealed that they were effective at minimizing increases in rain-on-snow discharge to less than 10 percent of fully forested conditions. Butte Creek had the highest relative change with a 9 percent predicted increase in the 5-year recurrence interval flood. Further harvest in this basin could increase flood magnitude by as much as 17 percent relative to fully forested conditions. Observations from detailed stream surveys indicated that few changes in channel form or processes had occurred since the original surveys, despite significant runoff events during the past five years.

West Fork Teanaway

The West Fork Teanaway watershed is the easternmost basin within the HCP area. The ownership is primarily divided between CCF LLC, Washington DNR (Teanaway Community Forest), and the Wenatchee National Forest. The basin has the lowest annual precipitation in the HCP area and an unusually high drainage density. The high drainage density may reflect the highly resistant bedrock geology in the upper watershed, as well as an overestimation of stream length within the highly weathered sandstone geology in the lower watershed. Approximately 40 percent of the basin is in the rain-on-snow precipitation zone, with the remainder of the area nearly equally divided into the snow-dominated and highland zones. The watershed analysis showed that this watershed is relatively insensitive to rain-on-snow peak flows, but is potentially sensitive to increases in peak flows during spring snowmelt periods.

Cle Elum Lake and East Lake Cle Elum Tributaries

On the east side of Cle Elum Lake, a number of small streams flow down steep slopes and through residential areas along the shore of the lake. Flooding of properties and questions about the role of timber harvesting upslope warranted a more detailed evaluation of hydrologic conditions.

Four drainages were evaluated on the east side of Cle Elum Lake: Newport Creek, Davis Creek, Bear Creek, and Spring Creek. Three forest cover conditions were modeled: fully forested; new or young forest; and unforested. Only the Newport Creek basin has any area within the rain-on-snow zone at 15 percent of the total area. For new or young forest cover conditions, Davis Creek had the highest proportion of the basin in this condition at approximately 76 percent. The Bear Creek, Newport Creek, and Spring Creek basins had 45, 58, and 38 percent, respectively, in a young forest condition.

The results of the hydrology model indicate that under average storm conditions the peak flow increases range from 1 to 8 percent for young forest cover conditions compared to fully forested conditions. For the fully open scenario, potential peak flow increases ranged from 5 to 16 percent. For unusual rain-on-snow storm conditions, the peak flow increase for young forest cover conditions ranged from 3 to 14 percent. The unforested scenario had peak flow increases ranging from 10 to 27 percent.

The Newport Creek and Davis Creek basins showed the greatest potential for measurable peak flow increases. Under unusual rain-on-snow conditions and young, the predicted peak flow increase reached 12 and 14 percent, respectively. Under average conditions, however, the increases were below the 10 percent hydrologic hazard rating threshold. In addition, these streams only support spring spawning salmonids, such as rainbow and cutthroat trout, and typically would not be subject to rain-on-snow floods. Therefore, all four tributary basins received a low hydrologic hazard rating.

Cle Elum Ridge Tributaries

The elevation of the Cle Elum Ridge ranges from about 2,000 feet at the town of Cle Elum to approximately 3,700 feet at the ridge crest. The tributaries of the Cle Elum Ridge flowing from the Central Cascades Forest include Upper Greens Canyon, No 5. Canyon, No. 6 Canyon, and Cedar Gulch above the City of Roslyn, and the No. 3 Canyon above the town of Ronald. Average annual precipitation is approximately 35 inches. It has a south aspect with moderate slopes ranging from 10 to 40 percent.

The ridge is underlain by the sandstones and shales of the Roslyn Formation. The coal mined from this area was produced from the Roslyn Formation. Numerous abandoned mine shafts cover the area and may have a significant effect on the volume and timing of stream flows in the area, but no data exist to assess their impact. More recent glacial deposits blanket the Roslyn formation on the lower hillslopes. The City of Roslyn has had concerns about increased runoff to their storm sewer system. Hydrologic studies of the Cle Elum Ridge, in particular above the City of Roslyn, indicate an increase in stream flow after timber harvesting.

Kachess Lake

The Kachess Lake watershed shares many characteristics with the adjacent Mosquito Creek watershed. The Kachess Lake basin has a broader range and higher elevations than Mosquito Creek, but similar annual precipitation and drainage densities. The watershed spans three precipitation zones with 58 percent in the rain-on-snow and snow-dominated precipitation zones. Most of the watershed is within the Wenatchee National Forest with the Central Cascades Forest generally at lower elevations closer to Kachess Lake.

No detailed watershed analysis was conducted for the Kachess Lake watershed for a number of reasons. First, most of the streams are steep tributaries that flow directly into Kachess Lake. Most of the streams have limited amounts of fish habitat. Second, the geology is composed of generally competent rocks, such as andesite, basalt, rhyolite, and dacite. The steep stream profile and competent geology indicate that the streams are unlikely to be susceptible to changes in channel morphology as a result of peak flow increases from timber harvesting. Finally, the high proportion of federal ownership suggests that little timber harvesting will occur in this watershed. CCF LLC does not own sufficiently large areas to expect significant effects from forest management in the basin. Therefore, a low hazard rating was given for peak flow increases from timber harvest.

Taneum Canyon and South Fork Manastash

The Taneum Canyon and South Fork Manastash watersheds drain to the middle Yakima River near the city of Ellensburg. The basins have low annual precipitation and drainage densities. The ownership in the upper portions of these watersheds is primarily CCF LLC and the Wenatchee National Forest in a checkerboard pattern. The CCF LLC, however, owns less than 10 percent in each of the WAUs. The Central Cascades Forest in these the basins is almost entirely within the highlands precipitation zone, with a small area in the snow-dominated zone.

Based on the nearby Quartz Mountain watershed analysis, these higher elevation areas are unlikely to have rain-on-snow runoff. Also, the high proportion of federal ownership suggests that only a small proportion of the basin would ever be in a hydrologically immature status. These areas warrant a low hazard rating for peak flow increases from timber harvest.

APPENDIX E:

LANDSCAPE PRESCRIPTION FOR NORTH FORK TANEUM SUBWATERSHED

In this appendix we provide an example of a landscape prescription from the North Fork Taneum Subwatershed and how it can be used to guide prescriptions for treatment units. To provide context for the landscape prescription, we first highlight the key departures from Historic Range of Variation (HRV) and Future Range of Variation (FRV) based upon the landscape evaluation that was completed using the methods of the Okanogan-Wenatchee Forest Restoration Strategy (2012) and Hessburg et al. (2013). See *Section VI – Forest Management* for more description of the HRV and FRV reference conditions and the landscape evaluation process.

a. Landscape Evaluation Summary

The North Fork Taneum subwatershed (UYK_0503) is 29,537 acres comprised primarily of moist forests with smaller amounts of cold forest, dry forest, and other non-forested vegetation types. Ownership is dominated by the US Forest Service (21,030) with a lesser amount of Central Cascades Forest (7,611 ac.).

i. Vegetation

- Overall, vegetation patches are overly fragmented with patch density, mean nearest neighbor, and edge density spatial metrics departed from HRV and FRV for many vegetation measures (Figures AP1 AP4).
- Cover of Douglas-fir is far over abundant compared to both HRV and FRV while the cover of Ponderosa pine (365 ac. current) is on the low end of HRV and is extremely low compared to FRV.
- Within moist forests, the abundance of the young forest multi-story (yfms) and stand initiation (si) structural stages are over abundant compared to HRV and FRV.

Vegetation			
Variable	Current	HRV	FRV
Cover - (acres)			
Douglas-fir	21,933	1,500 - 15,600	0 - 15,700
ponderosa pine	352	0 - 2,900	1,500 - 22,900
Structural Stage - (ac	res)		
Moist Forest –			
YFMS	9,604	0 - 6,000	0 - 5,300
Moist Forests – SI	4,004	0 - 1,500	0 - 3,000

ii. Wildlife Habitat

- The amount of white headed woodpecker and goshawk habitat is within HRV and FRV but is overly fragmented.
- The amount of American marten habitat is over FRV and is overly fragmented.
- The amount of current northern spotted owl habitat is within HRV but is overabundant compared to FRV and is overly fragmented.
- The amount of potential future northern spotted habitat is within HRV and FRV, but is also overly fragmented.

Wildlife measure	Current	HRV	FRV
Habitat - Percent La	nd (acres)		
spotted owl -			
current	7,598	970 - 12,000	0 - 5,400
spotted owl –			
future	8,076	1,700 - 18,100	760 - 18,100
Habitat - Patch Dens	ity (patches p	er 10k hectares)	
spotted owl -			
current	35	9 - 47	0 - 35
spotted owl –			
future	91	9 - 47	2 - 45
Habitat - Edge Densi	ty (meters pe	r hectare)	
spotted owl -			
current	34	4 - 27	0 - 25
spotted owl –			
future	36	8 - 30	1 - 35

iii. Disturbance

- Crown fire potential "high" category is way above FRV.
- Western spruce budworm "moderate hazard" is above HRV and FRV while the "low hazard" category is at the lower end of the FRV range.

Disturbance			
measure	Current	HRV	FRV
Crown Fire Poten	tial (acres)		
Low	6,671	4,200 - 16,100	12,000 - 27,000
Moderate	7,270	23,400 - 8,300	1,500 - 10,700
High	15,592	5,700 - 19,200	0 - 7,100
Western Spruce B	Budworm		
Hazard (acres)			
Low	6,657	1,800 - 10,600	27,100 - 28,200
Moderate	9,103	1,200 - 8,200	3,300 - 8,000
High	13,773	13,700 - 24,700	9,600 - 23,300

b. Landscape Prescription

Landscape prescriptions synthesize the information from landscape evaluations into concise recommendations and targets for modifying forest structure, composition, and pattern within a subwatershed. The goal is to give managers clear guidance on how to use treatment unit prescriptions to achieve watershed level goals such as increasing or decreasing the amount and/or patch sizes of different structure, cover, or habitat types. Below is the landscape prescription for the North Fork Tanuem watershed:

• Reconnect vegetation and habitat patches based on patterns of topography/soil

- Across the sub-watershed, focus on connecting similar patches for most cover-structure and habitat types to reduce to total number of patches and edge densities based upon inherent patterns of topography and soil within the watershed.
- Treat moist-forest stand initiation:
 - Use pre-commercial thinning to accelerate successional development of moist forest stand initiation (mf-si), which is found predominately on the Central Cascades Forest (2,684 ac., 67% of all mf-si) and US Forest Service (1,002 ac., 25% of all mf-si) ownership.
- Treat moist-forest young forest multi-story:
 - Within moist forests, convert ~ 4,000 acres of young forest multi-story (yfms) to stem exclusion open canopy (seoc) in order to accelerate development of old forest structures while reducing crown fire potential and western spruce budworm hazard.
 - Depending upon treatment and succession rates within the current stand initiation (si), another ~1,000 acres of yfms may be converted to stand initiation
 - Treatments of moist forest young forest multi-story (mf yfms) will necessarily be focused on US Forest Service lands which contain 91% (8,773 ac.) of the mf - yfms.

• Promote ponderosa pine and western larch cover

• Where possible, use treatments within si and yfms to reduce Douglas-fir cover and promote ponderosa pine and western larch. This is particularly valuable within relatively drier locations based upon topography and soils.

• Decrease disturbance hazards.

• Use treatments in mf - yfms to reduce fire and insect hazards, particularly in locations where treatment can be used to protect norther spotted owl current and future habitat.

• Long-term habitat shifts across sub-watershed

- Plan for a long term shift of northern spotted owl and other late successional habitats from moist and dry forests "lower" in the subwatershed (eastern half of subwatershed) to the moist and cold forests "higher" in the watershed (western half of the subwatershed).
- Identify landscape locations in the dry and mesic forests, such as north slopes and valley bottoms, where closed-canopy multi-layered habitats are

most likely to be sustained and can be managed for future replacement habitat.

c. Applying a Landscape Prescription to Project Area

Sub-dividing a subwatershed into smaller drainage-hillslope areas (1000- ~ 5000 acres) greatly facilitates translating a landscape prescription into prescription guidelines for treatment units. These drainage-hillslope areas are generally similar in size to a project area, and can be called landscape treatment areas (LTA). Generally, different parts of the landscape prescription will be accomplished in each LTA.

Here, we delineate a landscape treatment area (LTA) within the North Taneum subwatershed and demonstrate how the landscape prescription scales down to this area. The LTA is focused around the Central Cascades Forest within the subwatershed (Figure AP5). This LTA is heavily dominated by stand initiation and young, dense plantations resulting from recent intensive harvesting. A few older and more complex structure stages do exist. The LTA is almost entirely Douglas-fir cover type. The large patch of Douglas-fir cover type that spans most of the LTA cuts across north and south aspects and a range of deficit values.

The elements of the landscape prescription that apply to this LTA are listed below in order of priority. We have tailored the elements to this LTA and translated them into prescription guidelines:

- Reduce moist-forest stand initiation:
 - This can be accomplished through thinning to accelerate the development of structure stages with larger trees.
- Promote ponderosa pine and western larch cover
 - Where possible, use treatments within si and yfms to reduce and break up large patches of Douglas-fir cover type. Stem exclusion closed canopy can also be targeted. Promote western larch, especially on south slopes and higher deficit areas.
- Long-term habitat shifts across sub-watershed
 - Identify landscape locations within the LTA, such as north slopes and valley bottoms, where closed-canopy multi-layered habitats can be managed for future NSO replacement habitat.
- Reconnect vegetation and habitat patches based on patterns of topography/soil
 - Build larger patches of NSO replacement habitat, such as UR, YMFS, and OFMS structure classes.

To accomplish these elements of the landscape prescription, the following treatments are proposed over the next 10 years.

• Focus pre-commercial thinning treatments of stand initiation (SI) on south facing slopes (higher deficit areas). Primary goals of thinning should be to reduce Douglas-fir, shift composition towards western larch, and increase

growth rates. Combine multiple stands together to create large treatment units and successional patches on these south facing slopes.

- Pre-commercial thinning can also be done in stem exclusion closed canopy (SECC) areas on these south slopes to reduce Douglas-fir, increase western larch, and reduce fragmentation of the south facing slopes. Commercial thinning is a preferred option where economically viable.
- Build larger patches of future NSO habitat by pre-commercially, and commercially thinning where viable, SI and SECC that is adjacent to existing patches of OFMS, UR, and YFMS. These existing patches are already located in suitable topographic locations (lower deficit). Ensure that SI & SECC units selected for treatment expand patches onto north facing slopes, valley bottoms, and head walls, and avoid south facing slopes. Goals of thinning should be to accelerate development of closed canopy, multistory old forest with Douglas-fir as a primary species.

Figure AP1: Landscape evaluation metrics for structure classes for the North Fork Taneum watershed.





Struct. Class

Figure AP2: Structure Classes for the North Fork Taneum Watershed.



Figure AP3: Landscape evaluation metrics for cover type for the North Fork Taneum watershed.



Figure AP4: Cover types in the North Fork Taneum Watershed.


APPENDIX F. EXISTING RECREATION TRAIL SYSTEM DESCRIPTIONS AND MAPS

Authorized Trails

Kachess and Keechelus Lakes

Summer Trails*				
Trail name and number	Source	Number of TNC sections trail crosses	Type of use permitted	Trail condition and use**
Lake Lillian, Forest Service Trail #1332	Forest Service	1	Hikers	Moderate to heavy use and in good condition

*For additional trail information visit <u>www.fs.usda.gov/okawen</u> **Based on anecdotal accounts provided by the Forest Service

Winter Trails*				
Trail type	Source	Type of use permitted	Number of TNC sections trail system crosses	
Groomed motorized winter trail system	Washington State Parks	Snowmobiling/snowbiking and other non-motorized winter activities	9	
Groomed cross- country ski loop	Washington State Parks / Kongsberger Ski Club	Cross-country skiing and other non-motorized winter activities (dogs aren't permitted on trails)	1	
Groomed dog sled trail system**	Washington State Parks	Dog sledding, non- motorized and motorized winter activities (voluntary non-motorized area)	2	

*For additional trail information visit <u>www.parks.wa.gov</u> or <u>www.kongsbergers.org</u> **A portion of the dog sled trail system is also illustrated on the Cabin Creek map but accounted for in the Keechelus/Kachess tract

Cabin Creek

Summer Trails*				
Trail name and number	Source	Number of TNC sections trail crosses	Type of use permitted	Trail condition and use**
Goat Peak Trail, Forest Service Trail #1304	Forest Service	3	Motorcycles, Bicycles, Horses and other stock, and Hikers	Very limited use and in poor condition
Big Creek Trail, Forest Service Trail #1341	Forest Service	1	Hikers	Very limited use and in poor condition

*For additional trail information visit <u>www.fs.usda.gov/okawen</u> **Based on anecdotal accounts provided by the Forest Service

Winter Trails*					
Trail type	Source	Type of use permitted	Number of TNC sections trail system crosses		
Groomed motorized	Washington State	Snowmobiling/snowbiking	6		
winter trail	Parks	and other non-motorized			
system**		winter activities			

*For additional trail information visit <u>www.parks.wa.gov</u> **A portion of the dog sled trail system is also illustrated on the Cabin Creek map but accounted for in the Keechelus/Kachess tract

Taneum and Manastash Creek

Summer Trails*				
Trail name and number	Source	Number of TNC sections trail crosses	Type of use permitted	Trail condition and use**
Cle Elum Ridge Trail, Forest Service Trail #1326	Forest Service	2	Motorcycles, Bicycles, Horses and other stock, and Hikers	Major route that is frequently used
Little Creek Basin Trail, Forest Service Trail #1334	Forest Service	4	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Taneum Ridge Trail, Forest Service Trail #1363	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Major route that is frequently used
South Fork Taneum Trail, Forest Service Trail #1367	Forest Service	3	Motorcycles, Bicycles, Horses and other stock, and Hikers	Major route that is frequently used
North Fork Taneum Trail, Forest Service Trail #1377	Forest Service	5	Motorcycles, Bicycles, Horses and other stock, and Hikers	Major route that is frequently used
Lightning Point Trail, Forest Service Trail #1377.2	Forest Service	3	Motorcycles, Bicycles, Horses and other stock, and Hikers	Likely in poor condition from fire line that was built down the trail
Fishhook Flats Trail, Forest Service Trail #1378	Forest Service	1	Motorcycles, Bicycles, Horses and other stock and Hikers	Unknown
Manastash Ridge Trail, Forest Service Trail #1388	Forest Service	2 (trail crosses one section of TNC land in the Naches block)	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Frost Mountain Trail, Forest Service Trail #1366	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Frost Water Trail, Forest Service Trail #1366.2	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown

*For additional trail information visit <u>www.fs.usda.gov/okawen</u> **Based on anecdotal accounts provided by the Forest Service

Winter Trails*				
Trail type	Source	Type of use permitted	Number of TNC sections trail system crosses	
Groomed motorized winter trail system	Washington State Parks	Snowmobiling/snowbiking and other non-motorized winter activities	14	

* For additional trail information visit <u>www.parks.wa.gov</u>

Little Naches River

Summer Trails*				
Trail name and number	Source	Number of TNC sections trail crosses	Type of use permitted	Trail condition and use**
Upper Big Creek Trail, Forest Service Trail #1388.2	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Bear Creek Trail, Forest Service Trail #943	Forest Service	2	Motorcycles, Bicycles, Horses and other stock, and Hikers	Lower part is in good condition and upper part is in poor condition
Cub Creek Trail, Forest Service Trail #943A	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Pyramid Peak Trail, Forest Service Trail #941	Forest Service	3	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Legos Trail, Forest Service Trail #942	Forest Service	1	Motorcycles, Bicycles, Horses and other stock, and Hikers	Unknown
Naches Pass Trail, Forest Service Trail #684	Forest Service	5	4x4's, All-terrain vehicles, Motorcycles, Bicycles, Horses and other stock, and Hikers	Major route that is frequently used/condition is variable

*For additional trail information visit <u>www.fs.usda.gov/okawen</u> **Based on anecdotal accounts provided by the Forest Service

Winter Trails*				
Trail type	Source	Type of use permitted	Number of TNC	
			sections trail	
			system crosses	
Groomed motorized	Washington State	Snowmobiling/snowbiking	8	
winter trail system	Parks	and other non-motorized		
		winter activities		

*For additional trail information visit <u>www.parks.wa.gov</u>

Cle Elum Ridge

Summer Trails				
Trail name and number	Source	Number of TNC sections trail crosses	Type of use permitted	Trail condition and use
Sasse Mountain Trail, Forest Service Trail #1340	Forest Service*	3	Motorcycles, Bicycles, Horses, and other stock and Hikers	Moderate condition and use***
Rat Pac Trail	User made**	3	Non-motorized (no horses or other stock on the down track)	Moderate condition and use
Never Ending Climb	User made**	2	Non-motorized	Unknown
S & G Trail	User made**	2	Non-motorized	Unknown
Crooked Tree	User made**	2	Non-motorized	Unknown
4 th of July	User made**	2	Non-motorized	Unknown
Traverse	User made**	2	Non-motorized	Unknown
Grotto	User made**	2	Non-motorized	Unknown
No. 6 Canyon	User made**	2	Non-motorized	Unknown

*For additional trail information visit <u>www.fs.usda.gov/okawen</u> **Mapped by Roslyn Trails Alliance (<u>www.roslyntrails.com</u>) and the City of Roslyn (<u>www.ci.roslyn.wa.us</u>) ***Based on anecdotal accounts provided by the Forest Service

Winter Trails				
Trail type	Source	Type of use permitted	Number of TNC sections trail system crosses	
Groomed motorized winter trail system*	Washington State Parks	Snowmobiling/snowbiking and other non-motorized winter activities	14	
Hex Mountain/Sasse Ridge Snowshoe Trail**	Washington Trails Association (old abandoned Forest Service trail to Hex Mountain)	Snowshoeing and other non-motorized winter activities	Unknown	

*For additional trail information visit <u>www.parks.wa.gov</u> **Not shown on map – data not available (mapped by <u>www.wta.org</u>)



iowinuse best



















Addendum 1. Bambrick Acquisition

In 2020, The Nature Conservancy (TNC) will purchase fee title to a 20-acre parcel owned by Dale and Cathy Bambrick and Rock and Tracy Lynn Keller, located near the city of Roslyn in Kittitas County (Parcel ID 13519). This forested acreage is adjacent to the Central Cascades Forest (CCF) LLC lands to the north, which are managed by TNC. While under TNC ownership, the Bambrick property will be managed in concert with these lands under this plan. The strategies related to forest management, habitat conservation, recreational support, fire mitigation, monitoring, etc. in this plan will be applied to this property.

