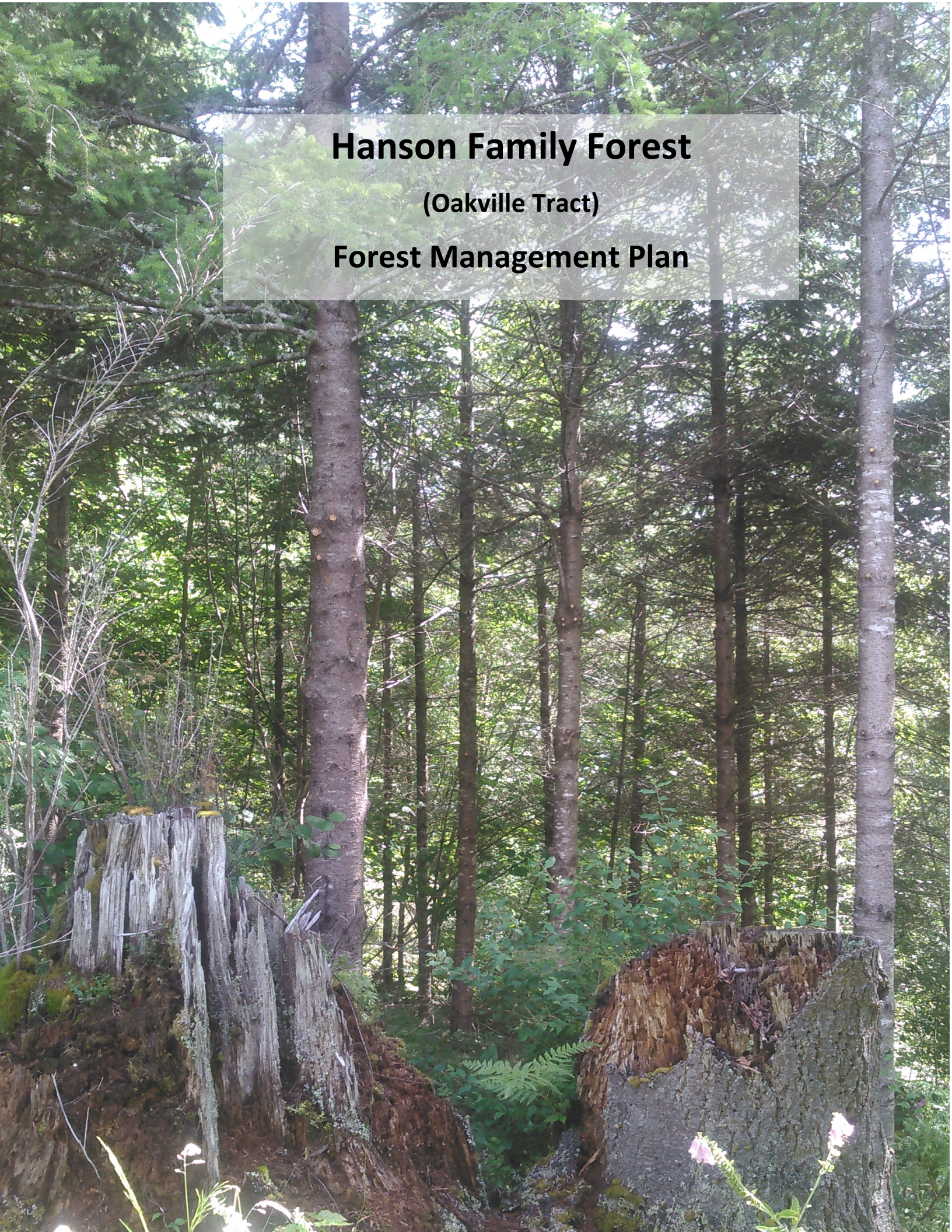


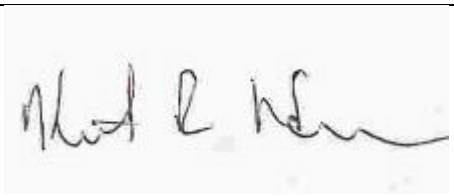
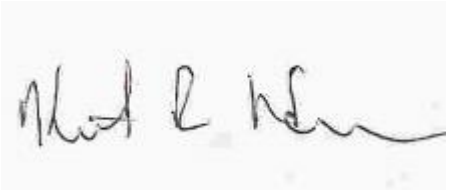
Hanson Family Forest

(Oakville Tract)

Forest Management Plan

There are many silvicultural methods that can be applied to this forest. The management recommendations contained in this plan can be implemented literally, but are more intended to provide guidance when preparing for and implementing forest management activities. In particular, timber harvests may vary in size and location based on current market conditions, revenue needs, logging costs, operational constraints and the recommendations of other forestry and natural resource specialists.

Hanson Family Forest - Oakville
Forest Management Plan

# of acres plan covers:	30
County and state:	Grays Harbor County, WA
Watershed	Chehalis
Forest certification number:	SA-FM/COC 1394HG
USDA Farm & Tract #:	Farm: 485 Tract: 186
Date plan prepared:	May 2019
Plan Preparers	
Kirk Hanson Northwest Natural Resource Group 2701 1st Ave, Ste. 240 Seattle, WA 98121 360-316-9317 kirk@nnrg.org	
Signatures	
Date: 11/30/20	Date: 11/30/2020
 Kirk Hanson Northwest Certified Forestry	 Forest Owner

This plan meets the requirements of the Washington Specification Guide for the NRCS Conservation Activity Plan.

_____

Date

Natural Resource Conservation Service

Table of Contents

Background and Site Information:

Legal Description:

Nearest City or Town:
Oakville, Washington

Parcel Numbers:

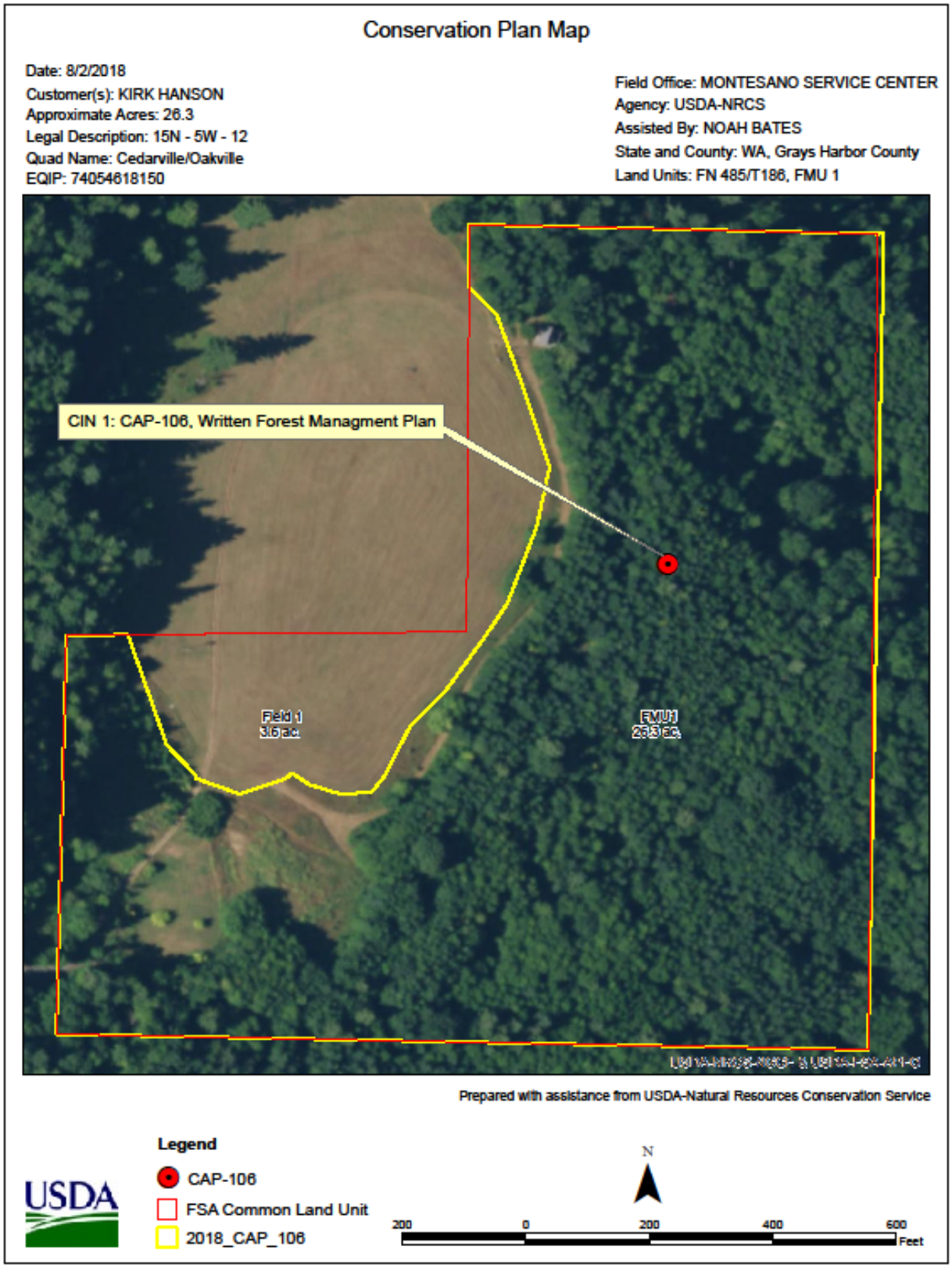
Property Size
30 acres

- -22.4 forest
- -3.82 agroforestry
- -3.17 field
- -0.62 forest management appurtenances (cabin, roads, etc.)

Date of Land Acquisition
1996

Tax Designation
The Grays Harbor County Assessor currently classifies this parcel under Land Use Code 88 as “Designated Forest Land” under RCW 84.33.035(5). "Forest land" is synonymous with "designated forest land" and signifies a parcel of land that is twenty or more acres or multiple parcels of land that are contiguous and total twenty or more acres that is or are devoted primarily to growing and harvesting timber. Designated forest land means the land only and does not include a residential home site. The term includes land used for incidental uses that are compatible with the growing and harvesting of timber but no more than ten percent of the land may be used for such incidental uses. It also includes the land on which appurtenances necessary for the production, preparation, or sale of the timber products exist in conjunction with land producing these products.

NRCS Conservation Plan Map



LANDOWNERS OBJECTIVES

Short term (0-10 years)

1. Identify and mark property corners and lines
2. Continue thinning defective and suppressed trees
3. Control invasive species
4. Plant understory of alder with shade tolerant conifers
5. Plant forest edges with diverse flowering and fruiting shrubs and trees
6. Plant native agroforestry
7. Commercially thin Douglas-fir and red alder
8. Build outhouse, sauna and cold plunge

Long term (10+ years)

1. Manage a working forest that provides a sustained yield of timber by commercially thinning timber thinning every 10 - 15 years. Generate sufficient income to cover all forest ownership and management costs and provide modest dividends to owners.
2. Manage forest in trust as an investment and legacy for the family such that it provides opportunities for recreation, livelihood and periodic dividends.
3. Conserve and enhance wildlife habitat by retaining and/or recruiting snags and large downed logs, maintaining a diverse mix of hardwoods and conifers of varying ages, and promoting mast producing trees and shrubs.
4. Manage forest using uneven-aged silvicultural methods to improve structural and biological diversity and sequester carbon.

Top Three Priorities for Owning Land

1. Family endowment
2. Recreation and aesthetics
3. Ecosystem services: wildlife habitat, carbon sequestration, clean air and water.

INTRODUCTORY OVERVIEW OF THE PROPERTY

Overview

This 30-acre forest and farm parcel occurs in the northern extent of the Willapa Hills in Southwest Washington just a tad over two miles due South of the sleepy town of Oakville. The parcel stretches across the top flank of a south-facing hill with a topography that rolls down via terraces and drainages to the south and east. A hay field occupies the highest and driest portion of the parcel. Forest cover across the property is largely comprised of a mixed Douglas-fir and red alder stand that was established following clearcutting in 1994. Although the Douglas-fir was planted across the entire harvest unit, it currently only remains as a plantation on upper slopes and drier sites. Red alder has colonized lower slopes and wetter sites, and is aggressively competing with the planted Douglas-fir. Throughout the forest, older trees from the prior generation were retained in small groups and as individuals, and represent the full complement of native species typical for this site, including: western red cedar, western hemlock, Douglas-fir, big leaf maple and red alder.

Approximately 7 acres of this parcel is comprised of fields and non-forested areas. Of this, approximately four acres are gradually being converted to agroforestry plantations that include: bamboo, basketry willows, eastern hardwoods, European hedgerow species, and a wide range of native trees and shrubs.

Land Use History

In 1994 the previous landowner clearcut a 60 – 70 year old Douglas-fir dominated stand that covered approximately 26 acres of the property. Douglas-fir seedlings were replanted across the entire harvest area the following winter at ~350 TPA. According to local area residents the original old growth forest was logged in the 20's and 30's. Second growth stumps scatterd around the property that have 60 - 70 growth rings confirm this fact. Collected anecdotes from neighbors and past residents reveal of rich history of agriculture, turkey farming and moonshining. A field of approximately 10 acres was cleared of old-growth stumps in the mid ‘40's.

The most recent significant resident of the property was Leora Sabin, who resided here until 1992. Leora was dubbed the “goat lady” by locals due to the family of goats she shared her cabin with, and who she allowed to free range over the entire neighborhood. Collected anecdotes suggest that Leora was an Inuit native who moved to Washington to practice veterinary medicine. Towards the latter part of her life she grew increasingly isolated at her farm on the property, and apparently increasingly eccentric. She lived in a small plywood cabin located near the entrance to the property. When the current owners investigated the cabin after acquiring the property, a thick layer of hay was found on the floor, indicating the goats

literally lived in the cabin with Leora. The cabin had little historic value, and therefore was demolished in 1999. A few years before Leora passed away, a local resident, Jack Avery, happened across her while hunting in the area. Discovering the decrepit conditions in which she lived, he committed himself to her assistance and saw her through to her final days. For his service, Leora deeded the property to Jack for $1.00. As a memorial, Jack had a wooden bear placed in the field on the property, and spread her ashes across the land. A plaque on the bear reads:

Leora Sabin
"Grinning White Bear"
19XX – 1992

The origins of her nickname "Grinning White Bear" are unknown.

Current Management Practices

Since the current owner acquired the property in 1996, they have engaged in the following activities:

1. Pre-commercial thinning of dense Douglas-fir and red alder stands
2. Cutting back coppicing maple stumps
3. Planting eastern hardwoods, bamboo, basketry willow, wildlife hedgerow and other agroforestry plantations
4. Pruning Douglas-fir along field edge to reduce fire risk
5. Controlling invasive species
6. Transplanting naturally regenerating seedlings
7. Opening and maintaining existing forest access roads

Cost-share funding

Over the years, the owner has applied for a received EQIP funding for a variety of forestry projects. These include:

<u>2010 - 2012</u>

1. Hedgerow planting along eastern edge of field (1,000')
2. Planted pollinator species (1 acre)
3. Pre-commercial thin (7.1 acres)
4. Limed and broadcast clover into field to improve elk habitat (1 acre)
5. Installed 9 bird nesting boxes
6. Constructed 1 habitat pile
7. Underplanted alder with cedar (5.4 acres)
8. Planted wildlife forage shrubs in gaps in forest (0.2 acres)

2019

The owner has applied for funding through the Conservation Stewardship Program to support the ongoing conservation practices being implemented on this land. These practices include:

1. Thinning of dense areas and storm-damaged trees
2. Pruning of trees to reduce fire risk
3. Control of invasive species
4. Planting long-term conifers that will sequester carbon
5. Planting trees & shrubs to restore native plant communities
6. Providing rich and varied wildlife habitat (e.g. snags, downed logs, tree and shrub diversity, etc.)
7. Maintaining forested riparian buffers along seasonal streams
8. Maintaining fuel break along forest edges
9. Improving wildlife habitat through habitat piles, nesting boxes, downed logs, snag creation and forage planting.

Regional Landscape

The landscape of the Willapa Hills and Chehalis River Valley is comprised primarily of forested uplands and agricultural valley bottoms. The majority of the forests are owned by either industrial forestry corporations or the State of Washington. Non-industrial private forestlands are clustered primarily along major roads and highways and/or in the interface between agricultural lands and upland industrial forests.

Although the majority of forests in the region are still actively managed for timber production, the agricultural valley bottoms are going through a transition from dairy and beef production to equestrian use, limited hay production or otherwise left to go fallow. Many old world hay barns still dot the landscape, harkening to an era when grazing, hay production and dairying dominated the area.

Only one small patch of original old growth forest is known to exist in the area. Due east of the property up the Chehalis Valley, a parcel estimated at 40 acres is observable from both the top of the property and from Highway 12 that is comprised of old growth trees. Local rumor attributes this reserve to a state or federal mandate to protect bald eagle nests occurring on the property. The ownership of the property is unknown, and this rumor has not been substantiated. Beyond this singular small reserve of late seral forest, the remaining forested landscape is comprised of forests that are less than 80 years old.

Climate

The climate of eastern Grays Harbor County is greatly tempered by winds from the Pacific Ocean. Summers are fairly warm and dry, and winters are cool and wet with snow and freezing

temperatures occurring only at higher elevations. Irrigation is needed during summer months, because rainfall is extremely light, and many weeks can pass without precipitation. During the rest of the year, rains are frequent, especially in late fall and through winter.

In most winters, one or two storms bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding. Every few years, in either winter or summer, the invasion of a large continental air mass from the east results in temperatures that are well below freezing for several consecutive days in winter, or sweltering heat in summer for a week or more. In winter, the average low temperature is 40.8 degrees F. In summer temperatures average in the mid to high 70's. Total annual precipitation is 57.35 inches. Of these totals, about 21 percent usually falls in April through September, the growing season for most crops. Thunderstorms occur on about 5 days each year. The average seasonal snowfall is about 15 inches.

The prevailing wind is from the Southwest.

Woodland Zone

This forest occurs within the *Douglas fir/red alder zone*. Elevations within this zone range from 0 to 1,700 feet and soils are mostly deep and poorly drained. Soil moisture for tree growth is limited during the summer. Associated tree species include: western red cedar, big leaf maple, western hemlock, grand fir, black cottonwood, Pacific madrone, bitter cherry, and western dogwood.

Common forest understory species are salal, cascade Oregon grape, western bracken fern, western sword fern, western hazel, vine maple, salmonberry, red huckleberry, trailing blackberry, Pacific trillium, northern twinflower, violet, and bedstraw.

RESOURCE CATEGORY I – FOREST HEALTH/WILDFIRE/INVASIVE SPECIES

"Forest health" is an often used and misunderstood concept. In terms of forest management, forest health is often defined as growing trees that are vigorous, free of insects and diseases, of good form, of desirable (a.k.a. commercially valuable) species, and at a spacing in the forest that allows them as fast growth as possible without compromising timber quality. This definition frames health in terms of human (economic) values for wood products. Forest health can also be defined on an ecological basis. Dead, diseased, old, and slow-growing trees of all species naturally occurring on the site are part of a healthy forest from a biodiversity perspective.

It is important to remember and acknowledge that we are most often discussing forest health in terms of human values. The forest does not care if a large veneer quality tree dies, rots, or burns. We humans often do. When viewed through a set of ecological values, the number of reasons to justify timber harvesting decreases noticeably. They might include:

1. Infestation of an exotic, non-native insect or disease whose spread could be prevented or significantly reduced by harvesting.
2. Improving wildlife habitat or maintaining habitat for species that are rare or declining.
3. Significant mortality or blowdown.
4. Addressing years of build-up of fuels due to modern fire suppression.

Silviculture is a practice by which we respectfully remove products from the forest for human use, employing methods which we believe most closely imitate and least impact the "natural" processes occurring there. It is important to acknowledge the distinction between our human and ecological definitions of forest health, and not to use the former to justify creating forests of diminished ecological value.

Disease

Naturally occurring diseases, root and stem funguses, and other pathogens are important agents of forest diversification. When their effect is tree mortality, they contribute snags and downed logs that provide important habitat and nutrient cycling functions, create openings in the forest that allow other tree and shrub species to become established, and overall contribute to a highly heterogeneous and uneven-aged stand composition. Relative to timber production, fungal pathogens can severely decrease the growth rates of infected trees, and lead to excessive mortality that reduces future timber harvest volume. Management of root rot must be consistent with the goals and objectives of the forest owner.

Unless fungal pathogens are demonstrably excessively impacting the growth and productivity of a forest, and if maximizing timber growth is not a top priority, they should be accepted as part of the ecological processes of the forest and allowed to function as agents of forest diversification. Containment and eradication of root rot can require large patch cuts around the last known infected tree in order to isolate the disease. This approach may create large openings or affect the character of the forest in ways that are not compatible with the goals and values of many small woodland owners. Therefore, less intrusive management strategies are recommended here. Maintaining a diversity of tree species is the primary key to limiting the severity of disease impacts in a forest. Given that most common fungal pathogens tend to be species specific, thinning known infected trees and replanting the infected site to a non-susceptible species is the least intrusive strategy.

Laminated root rot

Although the presence of laminated root rot has not been conclusively proven on this property, some common signs of it were observed amongst the Douglas-fir just beyond the eastern edge of the field. Several of the young fir died within close proximity to each other, without obvious signs of other mortality agents, and a small gap within the planted fir seedlings formed early on, remaining in brush until the surrounding fir eventually grew up and the canopy closed over the gap. The remaining fir adjacent to this site do not show signs of root rot. However, the site should be monitored for future occurrence.

Crown die-off in Douglas-fir as symptom of laminated root rot.
Photo credit: American Phytopathological Society.

Laminated root rot (*Phellinus weirii*) is a ubiquitous native soil-borne fungus that is often present wherever Douglas fir occurs. Laminated root rot can also infect western hemlock and grand fir. Indicators of the disease include:

- Groups of dead trees,
- Individual trees setting large numbers of cones,
- Trees with thin crowns and/or yellowish needles,
- Reduction in annual incremental growth, and growth of terminal lead and lateral tips,
- Boles of trees that are weeping significant amounts of pitch, and
- Groups of windthrown trees exhibiting abbreviated roots.

Root rot spreads through ectotrophic mycelium in roots and root grafts and moves outwards from infection centers at a rate of approximately 10 inches per year, slowly creating an expanding pocket of mortality. Wet soils exacerbate root rot potential in Douglas fir, as does soil compaction, disturbance and root damage caused by logging equipment. In a homogenous plantation setting, root rot will spread systematically from tree to tree in a roughly concentric ring from the infected site.

Invasive species

A variety of common non-native and invasive species occupy this forest. They include: Himalayan blackberry, scotch broom, English holly and tansy ragwort.

Himalayan blackberry is prevalent along the western property line where it also persists on the adjacent parcel. The continued spread of the blackberry is kept in check by annual mowing of the field along its eastern edge. Blackberry also occurs in at least three distinct locations beneath stands of red alder on the lower slopes of the property. It is most common along road edges, but is beginning to creep into the stand, as the deciduous canopy does not provide sufficient shade to suppress its growth.

English holly is sprouting in numerous places throughout the forest, and more appear every year as their seeds are transported by birds.

Tansy ragwort occurs in the fields and along the edges of the forest adjacent to the fields. Although it makes an annual return, the quantity of tansy has steadily decreased over the years due to diligent hand-pulling by the owner.

Scotch broom is extremely rare on the property. Although a few plants persist in the field, since it is annually mowed, it never has the opportunity to flower or seed. Plants periodically sprout along the gravel forest access road in the southwest corner of the property, but these are immediately pulled by the owner.

Wildfire

Although wildfire is quite scarce in the western part of Washington compared to the east side of the Cascade Mountains, it is still a relevant natural disturbance regime in this area. Fires tend to be most destructive in young, dense stands and stands with an abundance of downed woody debris and/or standing dead trees. Given increasing residential development in close proximity to this land, and increasingly drier summers, fire risk is a growing concern for this, and surrounding, forestlands. The young Douglas-fir plantations that dominant the area, with limbs that still reach the ground, run the risk of carrying a surface fire into the canopy of the stand.

The Douglas-fir stands along the eastern edge of the field have been pre-commercially thinned, pruned and all resulting slash either lopped and scattered, pulled back from the forest edge, or removed in order to create a fuel break should a grass fire spread into the forest. Most of the remainder of the forest has been pre-commercially thinned, reducing stocking density and removing small diameter standing dead trees. Although pre-commercial thinning can produce a large volume of slash on the forest floor, observations reveal that this wood becomes soft quickly, and typically within three years has rotted to the point of no longer functioning as a potential fuel source.

Management recommendations

Fungal Pathogens

Laminated root rot

When laminated root rot is suspected within soils of a newly regenerating forest, its effects can be mitigated through planting a diversity of hardwood and conifer species, and avoiding reestablishing Douglas-fir, which is its primary host. In natural, mixed species forests, the effects of laminated root rot are greatly diminished by non-host species, which can serve as barriers to the fungus, preventing it from spreading from root to root amongst Douglas-fir. Containment and eradication of laminated root rot can require large patch cuts around the last known infected tree and replanting the site to a non-susceptible species such as red alder, western red cedar or western white pine. In larger stands and/or homogenous plantations, small patch cuts (1-2 acres) may be a desirable and effective strategy while also increasing harvest volumes. On smaller parcels, or where management objectives favor conservation, large patch cuts may not be desirable. Therefore, if evidence of laminated root rot is found, infected trees can be heavily thinned, retaining the most dominant and vigorous looking trees, and the site replanted with non-host species.

Given that trees may continue to die during the time between commercial harvests, trees that show signs of infection can be proactively salvage-logged if the owner wishes to capture their marketable value before they decay.

Invasive species

Controlling the invasive species across this property, in particular Himalayan blackberry and English ivy, will require intensive management for the first few years. Although hand and mechanical cutting will be necessary to initially control the Himalayan blackberry, the long-term silvicultural strategy for limiting the impacts of this species is shade, and the development and maintenance of dense forest canopies. Given the shade tolerance of English holly, and its capacity to perpetually regenerate in the understory, annual monitoring and hand cutting will be necessary to limit the spread of this species. Both Tansy ragwort and Scotch broom will continue to be hand-pulled as they occur.

Chemicals will not be used on this property to control invasive plants.

Wildfire

The objective of fire management is not outright prevention, but rather to reduce its intensity and limit it to surface fires that do not reach the canopy, becoming catastrophic, stand-replacing events. Managing lower forest stocking densities, minimizing woody fuels in the understory, and maintaining fire breaks and buffers are all strategies for mitigating the risk of fire. Employing variable density thinning, in particular thinning from below, reduces the potential for a crown fire by increasing the spacing between trees. Thinning from below also creates larger, more vigorous, and fire resistant trees and raises the base of tree crowns, thus reducing ladder fuels. Further, maintaining a wider spacing on newly regenerating trees in the understory, and minimizing the connectivity between the crowns of low trees and the crowns of dominant canopy trees will further reduce the potential for surface fires from reaching the canopy. Additional recommendations include:

1. Maintain seasonal forest road access throughout property that is sufficient to allow emergency vehicle access (e.g. 4-wheel drive trucks).
2. Prune trees to a minimum of 20', in particular along edges of forest and/or forest roads.
3. Thin understory trees and naturally regenerating seedlings to minimize crown connection, as well as connectivity with canopy of overstory trees.
4. Minimize fine branches and slash on the forest floor. During pruning and both pre-commercial and commercial thinning, avoid contiguous slash mats that exceed 12" thick. Slash should be placed on skid trails and incorporated into the soil as equipment runs over it, and/or aggregated and piled in up to five wildlife habitat piles and constructed habitat logs per acre. Habitat structures should be located at least 15' – 20' away from any tree.
5. Over time, manage for older, larger diameter trees with thicker bark that are more fire resistant. Fire resistant species include: Douglas fir, big leaf maple and red alder.
6. Retain hardwoods throughout the forest.

RESOURCE CATEGORY II – SOILS

See soils maps in Appendix IV.

Soil Types

The property is entirely comprised of Centralia loam on an 8-30% slope. Soils are generally well-draining although overland vernal water flow occurs in natural swales during periods of heavy rain. Vernal standing water also occurs in one area on the lower bench where fill and compaction has disrupted the natural drainage capacity of the soil. The soils capability unit is IVE making it well-suited for timber. Douglas fir is the principal forest species with other trees of limited extent including: red alder, western red cedar, western hemlock, and big leaf maple. Soils are considered a low site class I or high site class II and on the basis of a 50-year site curve, the mean site index for Douglas-fir is 135 with a mean growth-rate of 191 cu. ft/acre/year.

Soil Type/ Map Unit	Acres	% of Area	Slope	Site Class	Site Index (50 year)	Site Productivity
Centralia Silt Loam 28	25.1	88%	8 - 30	II	135 Douglas-fir	186 f^3/acre/year (930 bf/acre/year)
Centralia Silt Loam 29	3.3	12%	30 - 65	II	135 Douglas-fir	186 f^3/acre/year (930 bf/acre/year)

Centralia silt loam

This very deep, well-drained soil is on back slopes and foot slopes in the uplands. It formed in residuum derived dominantly from highly weathered, micaceous marine sandstone. The native vegetation is mainly conifers and hardwoods. Elevation is 200 to 500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 200 days. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The upper part of the surface layer is very dark grayish brown silt loam about 5 inches thick, and the lower part is dark brown silt loam about 5 inches thick. The subsoil to a depth of 60 inches or more is dark brown and dark yellowish brown clay loam.

Permeability is moderate in the Centralia soil. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland. Douglas-fir is the main woodland species. Among the trees of limited extent are red alder, western red cedar, western hemlock, and big leaf maple. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 180. On the basis of a 50-

year site curve, it is 135. The highest average growth rate of an unmanaged, even-aged stand of Douglas-fir is 191 cubic feet per acre per year at 60 years of age.

Salkum silty clay loam

This deep, well-drained soil is on terraces. It formed in residuum derived dominantly from highly weathered, ancient glacial drift. The native vegetation is mainly conifers. Elevation is 200 to 600 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 200 days. Typically, the surface layer is dark brown silty clay loam about 12 inches thick. The upper 27 inches of the subsoil is reddish brown silty clay, the next 12 inches is yellowish red silty clay, and the lower part to a depth of 60 inches or more is yellowish red silty clay.

Permeability is moderately slow in the Salkum soil. Available water capacity is high. Effective rooting depth is 40 to 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Douglas-fir is the main woodland species on this unit. Among the trees of limited extent are red alder, western hemlock, grand fir, big leaf maple, western red cedar, and bitter cherry. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 164. On the basis of a 50-year site curve, it is 126. The highest average growth rate of an unmanaged, even-aged stand of Douglas-fir is 174 cubic feet per acre per year at 60 years of age. Common forest understory plants are salal, cascade Oregon grape, vine maple, red huckleberry, western sword fern, and western bracken fern.

Management Recommendations

The main limitation affecting the management and harvesting of timber is the muddiness caused by seasonal wetness. Use of wheeled and tracked equipment when the soil is wet results in ruts and soil compaction. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing material for year-round use. Establishing a plant cover on slopes that have been cut or filled reduces the hazard of erosion. Disturbance of the protective layer of duff can be minimized by the careful use of wheeled and tracked equipment.

Seedling establishment is the main concern in the production of timber. Reforestation following clearcut harvesting should be accomplished by hand planting seedlings. If the stand includes seed trees, natural reforestation by red alder occurs readily in cutover areas and on disturbed soils. When openings are made in the canopy, invading brushy plants can prevent the establishment of tree seedlings.

Natural tree regeneration will occur if the canopy is thinned and gaps are created to provide sunlight to the forest floor. Shade tolerant species, such as western red cedar, western

hemlock, grand fir and big leaf maple will gradually colonize denser areas of the stand, whereas Douglas-fir and red alder will seed into more open areas. Mechanical disturbance of understory vegetation and soils creates mineral seed beds that stimulate natural regeneration. Shade from dominant canopy trees reduces drought stress on seedlings.

Additional management recommendations include:

1. Retention of Organic Debris:
   During timber harvest operations, logging slash will be redistributed throughout the forest to decompose and build soil. Debris will be well distributed spatially and by size and decay class, with a target of at least four large pieces (minimum 20" diameter x 15' length) retained per acre.
2. Seasonal Restrictions
   Forest soils can be compacted when they are wet, reducing soil tilth and exacerbating soil-borne diseases. Therefore, any activities utilizing wheeled or tracked equipment should be scheduled for the summer or fall, or other periods when soil moisture is low. Additionally, skidder passes across the soil will be minimized through the use of frequent and small log landings located along the extensive network of forest roads. Operate equipment on woody debris (slash) in areas with sensitive or wet soils.
3. Retention of Hardwoods
   Hardwood trees such as red alder, big leaf maple and cottonwood provide a significant amount of annual leaf litter and woody debris to the forest floor, which quickly rots and is incorporated into the soil. Hardwoods also provide an important role in the nutrient cycle of the forest. Therefore, existing hardwoods will be maintained and favored during forest management activities (e.g. releasing maple in the understory) and the species composition of the forest will gradually be managed to a 25:75 hardwood to conifer mix over time.
4. Timber Harvest and Log Yarding Methods
   Commercial thinning entries will be limited on a single site to no less than 10 year intervals in order to minimize compaction of soils. No more than 30 - 40 percent of individual trees will be harvested at one time in order to minimize the potential for post-logging windthrow. Skid trails and yarding corridors will be limited to no more than 800 – 1,000 feet from harvest unit to roads or landings in order to minimize excessive skidder passes.

RESOURCE CATEGORY III – WATER QUALITY/ RIPARIAN AND FISH HABITAT/ WETLANDS.

See Water Type Map in Appendix IV.

This property hosts four seasonal headwater streams to a tributary to Garrard Creek. Each of the streams form along lower slopes and typically only flow during the rainy season once soils have become saturated. The second stream east of the southwest corner maintains flow longer than the other three steams, which may be due to its position in a broad swale that extends northwest up through the neighboring property. Each stream is classified as a non-fish bearing seasonal stream by the WADNR. Further, due to their seasonality and slope, it is highly unlikely any of the stream segments support aquatic life.

The prior owner had a small pond dug into this stream valley in order to impound water for wildlife and emergency use. The berm holding back the pond has since eroded away, and the pond has filled in with sediment, effectively transitioning it to a forested wetland. During periods of high rainfall and soil saturation, springs can form along the lower slopes where the topography focuses into steeper drainages. Springs and surface water also form along the swale in the southwest corner of the property.

Several years ago the current owner accentuated the portion of the swale between the entrance road and the western property line with a bulldozer, and carved two large ponds immediately southeast of the entrance road. The intent for the accentuated swale was to collect water during the rainy season and focus it into the two ponds. Although the seasonality of the stream flow was increased, the ponds only held water for short periods of time, and have since been dismantled and the morphology of the drainage restored to close to its original condition. When the swale was constructed, a small 10” diameter corrugated metal culvert was installed beneath the entrance road to allow seasonal water to pass under the road. This is the only culvert on the property.

There is ample and diverse forest cover surrounding each of the seasonal streams, and red alder and Douglas-fir are the dominant species. Red alder in the northeast drainage was pre-commercially thinned under a Wildlife Habitat Incentives Program (WHIP) grant in 2010, and under planted with a light stocking of cedar (100 TPA, 20’ x 20’) immediately thereafter.

Management Recommendations

The most important forestland protective measure for conserving sensitive hydrologic features is to manage for complex forest structure and multi-canopy stands, and avoiding the use of heavy equipment in their proximity. Within the riparian zone of any stream or wetland, forest management should shift towards uneven-aged practices using individual and small group tree

harvest methods. The desired future condition is for a mixed species and multi-age class forest that is rich in snags and downed logs.

Washington Forest Practices Rules

The WA DNR regulates timber harvest and other forest management activities on all privately owned forestlands in WA State. The WA DNR enforces a minimum set of riparian, steep slope and other regulatory protections as established by the WA State Forest Practices Act. Before conducting any forest management activities in proximity to streams and wetlands, the WA DNR should be consulted for any requirements that need to be met. More information can be found online at: https://www.dnr.wa.gov/programs-and-services/forest-practices.

Applicable WA Forest Practices Rules

1. Type Ns streams require a minimum 30' equipment limitation zone, but no forested buffer.

Forest Stewardship Council Standards

This forest will be managed to meet the U.S. Forest Management Standards of the Forest Stewardship Council (FSC). The FSC Standards emphasize management in riparian areas that meet the following objectives:

> *Forest management will retain and recruit sufficient large live trees, snags, understory vegetation, down logs, and other woody debris in riparian zones to provide shade, erosion control, and in-channel structures. Riparian specific objectives include:*
>
> *a. Increase coarse woody debris input and recruitment*
> *b. Minimize sediment and runoff volume impacts from road and harvest infrastructure*
> *c. Restore hydrologic functionality to support populations of salmonids*
> *d. Create non-conifer forests in appropriate and strategic locations across the landscape*
> *e. Optimize sequestration of carbon in balance with other ecosystem services and products*
> *f. Create older forest structures and functions within managed stands*

Stream and wetland buffer widths and design will consider forest type, slope stability, slope angle, and terrain.

The following chart provides a comparison between the WA State Forest Practices Rules and the Forest Stewardship Council standards relative to riparian buffer protections for Type Ns streams.

Water Type	WA State	FSC
Type Ns Stream (Non-fish bearing, seasonal) Wetlands <1 acre	30’ equipment limitation zone.	Stream supports aquatic species: 75’ buffer. Single & group tree selection.
		Stream does not support aquatic species. BMP’s

Given the seasonal streams on this property do not support aquatic life, the FSC standards do not prescribe specific forested buffer widths, but rather proffer two primary management objectives:

- Maintain root strength and stream bank and channel stability,
- Recruit coarse wood to the stream system

However, for the seasonal streams on this property, a buffer zone that extends from the stream channel up to the break in slope will be maintained in which management activities are limited to those that support the development of late seral characteristics and functions. Other protective measures will include:

- Release co-dominant trees using cut-and-leave, felling trees, where practical, into the stream channel
- Exclude all equipment except for active stream restoration
- Avoid disturbance of mineral soil; where disturbance is unavoidable, mulch and seed are applied before the rainy season
- Avoid the spread of pathogens and noxious weeds
- Reduce sedimentation
- Where hardwoods dominate riparian zones, and/or where brush is the dominant vegetation, replant with conifers.
- Exclude heavy equipment from wet soils and areas where wetland indicative plants occur. Trees may be felled away from these sites and/or cable yarded as an alternative to skidding with equipment.
- Avoid herbicide use on wet soils or adjacent to streams or wetlands.
- Retain and/or recruit additional snags and downed logs through either girdling up to four trees per acre that exceed 20” DBH, or importing logs from upland sites.

RESOURCE CATEGORY IV: FOREST INVENTORY/TIMBER/WOOD PRODUCTS

Overview

Although forest cover across this property is very heterogeneous acre-by-acre, there are common enough characteristics to warrant classifying most of it as a single management unit. The majority of the property is dominated by a 28 year old stand of Douglas-fir that was planted following the previous timber harvest. Naturally regenerated red alder is dominant on lower slopes and wetter sites, having outcompeted the planted Douglas-fir in these areas. Bitter cherry is also common throughout the forest, and typically occurs in dense thickets as it also quickly naturally regenerated and colonized disturbed sites. Scattered throughout the unit are a variety of mature hardwoods and conifers that were retained in small groups and as individuals during the previous harvest. These species include: cedar, big leaf maple, red alder and Douglas-fir. A five acre hay field dominates nearly the entire southwest quadrant of the property. In the far southwest corner of the property, on either side of the main access road, the hay field is gradually being converted to a series of agroforestry plantations that include: basketry willow, bamboo and eastern hardwoods. A wildlife hedgerow was also established along the eastern edge of the field.

The following chart summarizes the various forest management units (FMU):

FMU	Acres	Stand Type	Age
1	22.4	Douglas-fir & red alder	28
2	3.82	Agroforestry	8
Non-forested	3.78	Field, roads, cabin	0
Total	**30**		

Inventory

During the site assessment for this forest management plan, randomly located 1/20th-acre plots (26.3’ radius) were installed, within which a range of timber metrics were collected, including: trees per acre (TPA), diameter at breast height (DBH), live crown ratio (LCR), height, species and age. Additionally, qualitative information was collected both at plots, and between plots, including: forest health, wildlife habitat, understory species, snags and downed logs, and forest structure.

Desired future condition

The long-term desired future condition is a working forest that produces both a broad range of high quality forest products and optimal wildlife habitat and ecosystem services. A key strategy to managing a forest that is economically resilient is to manage for diversity, such as species, age, size and timber product. Additionally, by avoiding reliance on a single species or age of trees, the forest is less susceptible to major natural disturbances such as wind, ice and pest and disease epidemics.

To achieve this desired future condition, the forest will be managed using "uneven-aged" management principles that promote stands that contain multiple species and ages of trees, as well as natural regeneration of both hardwoods and conifers in the understory. Uneven-aged management techniques will be used to improve forest ecosystem functions such as wildlife habitat, clean air, clean water and carbon sequestration.

It is recognized that the desired future condition is not necessarily the past, as climate change and other anthropogenic and environmental factors may not support the historic forest composition. Therefore this forest will be managed for resilience against climate change, fire, pests and disease by promoting a composition of diverse native hardwoods and conifers of multiple age classes that can be expected to tolerate increasingly drier and warmer summers and wetter winters. This may translate to concentrating red alder, red cedar, hemlock, grand fir, cedar and other drought intolerant species in the lower areas of the property, and favoring Douglas-fir, big leaf maple, madrone, Oregon oak, white pine and other drought tolerant species on drier sites.

Annual allowable harvest

Of a total of 30 acres, approximately 22.4 acres will be managed for sustained timber production. The remaining 7.6 acres are comprised of field, roads, a cabin site and the agroforestry plantations that are being managed to produce other non-timber forest products.

Consistent 1/4" growth rings on 50 year old Douglas-fir.

Based on the NRCS soil productivity rates listed earlier in this document, the dominant soil type across this property is capable of producing 172 cubic feet of timber per acre per year, or approximately 860 board feet per acre per year, once the forest reachs approximately 50 years old. This volume of wood fiber is the yield likely to be produced by the most dominant tree species typical for this soil type, in this case Douglas-fir. This number is

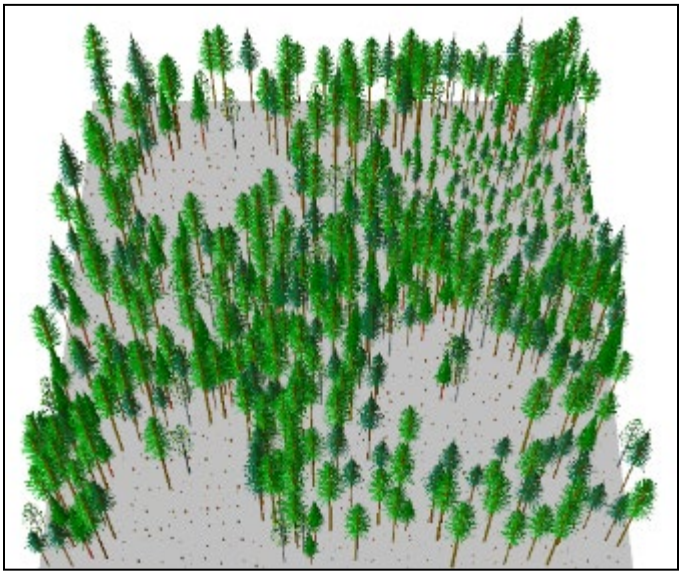
calculated at the age of culmination of the mean annual incremental growth (CMAI), which typically occurs between 45 – 60 years of age, and indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. Therefore, this number can be conservative where forests are actively managed for timber production.

Long-term Sustained Yield Harvesting

Once the average age of the forest reaches 40 years or older, the NRCS soil productivity rates can be used to begin estimating growth and sustained yield rates. The 22.4 acres of manageable forestland should be capable of growing at least 19 thousand board feet (MBF) of timber per year on a sustained yield basis. However, the basic definition of a "sustained yield" is harvesting less than annual growth. Therefore, given a maximum sustained yield of 90 percent of annual growth, with careful management this forest should be capable of producing approximately 17 MBF/year. If a commercial thinning is conducted every 10 years, this will yield 170 MBF of timber per harvest. At a conservative average of $550/MBF, and logging costs of 50%, this would result in a net return to the landowner of $46K every 10 years. From this income, other management costs may need to be extracted, such as road building, stream crossings, consulting foresters fees, planting, etc. The first-entry commercial thinning will yield a lower volume do to the younger age of the stand, and the focus on thinning from below where the least dominant and most defective trees are removed first.

Harvest systems

In order to achieve the desired future condition of a diverse stand that produces multiple timber products, a combination of individual tree selection, group selection and variable density thinning will be utilized. The clay/loam soils across this property are soft, in particular during the wet season. Therefore, logging should be limited to the driest time of year, and tracked equipment given preference over rubber-tired.



Example of pre-commercial thinning, variable density thinning and group selection harvesting. Image courtesy of the Rural Technology Initiative.

Slash management & wildlife habitat enhancement

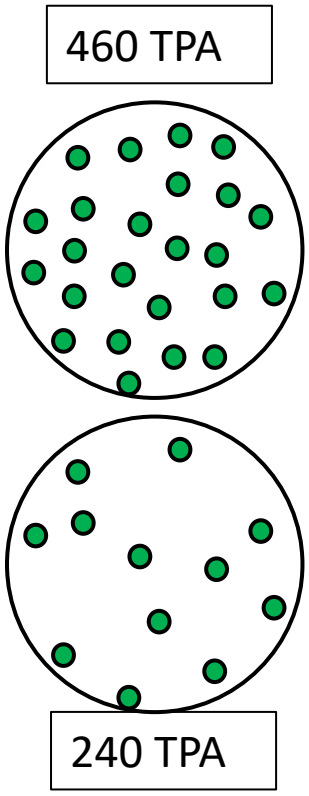
Slash (tree tops, branches, unmerchantable logs) produced during logging operations will be redistributed back into the woods to the extent practical to aid in soil development and minimize soil compaction by

logging equipment. If timber is not processed in the woods, then slash from the landing will be moved back onto skids trails and/or the forest floor during return trips by the skidder. Non-merchantable logs will also be scattered throughout the forest. Further, to the extent prudent, pulp and/or low value trees should be topped and left standing as snags, or cut and stacked into small wildlife habitat piles or constructed downed logs as per wildlife goals later in this document.

The following harvest methods will be used across the property:

Pre-commercial thinning

Pre-commercial thinning is recommended for stands that exceed 350 TPA after canopy closure. Forest stands exceeding 350 TPA typically enter the stem exclusion phase between the ages of 10 – 20 years, depending largely on site productivity. This phase is characterized by a dense canopy with sufficient shade to kill lower branches, suppress understory vegetation, and eventually lead to suppression-based mortality. Live crowns gradually begin receding, and once they diminish below 35 - 40 percent, the basal growth of the tree diminishes. In order to keep these stands in optimum growth, and to minimize the risk for natural disturbance, they should be pre-commercially thinned.



Before and after pre-commercial thinning.

Young stands with diameters that average less than 10" DBH and that exceed 350 TPA should be thinned to 240 – 300 TPA depending on the shade tolerance of the tree (the less shade tolerant, the lower the residual density). It is crucial that the best trees of each species be retained rather than rigid adherence to an exact spacing requirement. If high quality leave trees occur in close proximity to each other, they may be left as a clump to increase spatial diversity. Leave trees shall be those that have the largest live crown, tallest height, straightest stem, and show no signs of defect, e.g. broken tops, scars, leaning. Thinning in this manner typically results in a variable density spacing amongst retained trees that averages approximately 12 ft – 15 ft.

Trees should be cut within six inches of the ground using either a chainsaw or handheld saw. Cut trees should be brought down so they are not leaning on the retained trees. Care should be taken not to damage the trunk of leave trees during thinning. The resulting slash can be managed in any of the following ways:

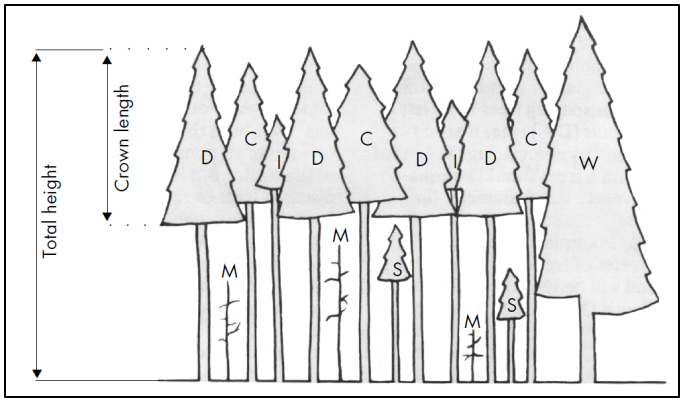
1. Lopped and scattered,

2. Piled into wildlife habitat piles measuring a minimum of 10 feet across and 6 feet high,
3. Constructed into downed logs measuring a minimum of 20 feet long and 20 inches in diameter,
4. Cut into firewood and removed,
5. Chipped.

Thinning should be avoided during the prime bird nesting season between March 15th-June 30th.

Thinning from Below

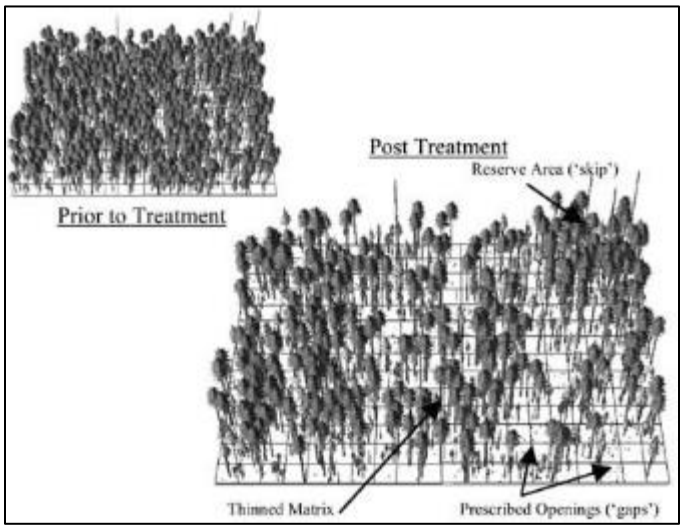
Thinning from below, or low thinning, is a technique typically used during the first commercial thinning entry in a stand or where high tree densities are causing mortality. Harvest tree selection is from the suppressed and intermediate canopy classes in order to promote the growth of the co-dominant and dominant trees, and approximately 30 – 40 percent of the total trees in a stand are removed. If pre-thinning stand density is approximately 300 - 350 TPA, then stands will be thinned to approximately 180 – 230 TPA. This approach to thinning employs a "best tree selection" method similar to pre-commercial thinning where the healthiest and most dominant trees of all species are retained. Groups of trees in root rot pockets, as well as poorly performing sites may be removed and the site replanted with more suitable species. Codominant or dominant trees may be removed if they have defect or will release more desirable species in the understory. Thinning can either select across different species evenly or be used to promote prefered minority species, e.g. hardwoods.



Crown type classes: D=dominant, C=co-dominant, I=intermediate, S=suppressed, W=wolf, M=mortality. Image courtesy of OR State University.

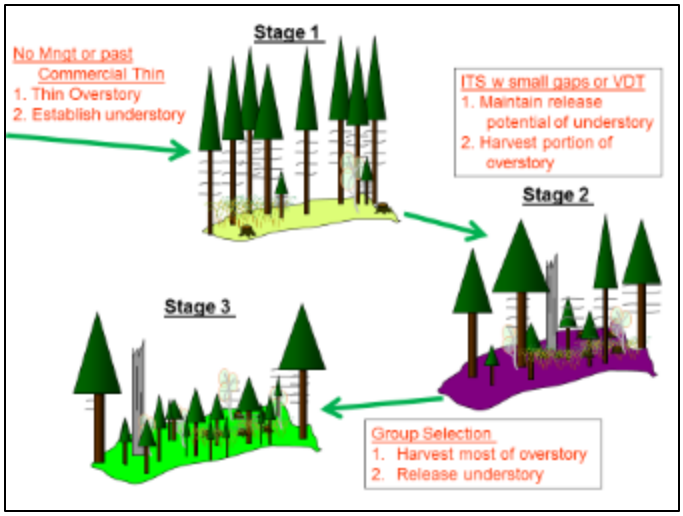
Variable density thinning

Variable density thinning techniques are typically employed during the second and subsequent thinning entries of a stand. Variable density thinning involves varying the thinning intensity to produce a mosaic of unthinned, moderately thinned, and heavily thinned patches. Thinning with skips and gaps can also create this mosaic. Variable density thinning helps generate a more complex forest structure by promoting tree growth at different rates. It also encourages understory development through a diversity of species, a variety of patch types, and growth of tree seedlings and saplings. Variable-density thinning can improve forest health by increasing resistance to disturbance, ability to recover after disturbance, and biological diversity that allows ecosystems to function well through climatic variation.



Before and after variable density thinning. Image courtesy of Forestnet.com.

Variable density thinning typically occurs across both species and diameters, reducing stand density by no more than one-third of the standing trees per entry. If stand density is approximately 180 – 230 TPA, then the 2nd entry will reduce the density to 120 – 150 TPA. During the third entry thinning, stand density will be reduced further to approximately 80 – 100 TPA. The following thinning entry will likely follow variable retention harvesting methods as per below. When selecting trees for harvest, most thinning is still conducted from below. However, dominant overstory trees may be selected for harvest if they will release a vigorous understory tree that has ample live crown. Thinning in this manner produces a more complex forest canopy and stimulates natural regeneration in the understory, thereby minimizing the need for manual planting.



Transitioning from variable density thinning to variable retention harvest to release understory trees. Image courtesy of Rolph Gersonde.

Variable retention harvesting

Variable retention harvesting is typically applied to older stands during the third or fourth thinning entry. During a variable retention harvest (VRH), most of the

dominant and co-dominant trees are removed, with the exception of up to 25 dominant trees per acre. These leave trees will be retained as permanent biological legacies, whether standing or downed. VRH objectives provide habitat for wildlife and retain some of the original forest floor, including shrubs, plants, and populations of beneficial mycorrhizal fungi. Retaining these "biological legacies" enhances the diversity of plant and animal life in the regenerating forest stand over a long time. Operationally, VRH must plan for future access to avoid injuring trees that are left on the site forever. Because the economic value of retained trees will not be realized, poor quality (from a market perspective) trees are typically chosen for retention.

If, during previous harvests, the stand was thinned using variable density thinning techniques, then there may be sufficient natural regeneration in the understory to avoid manually replanting the site. A post-harvest inventory must be made to quantify the species and stocking density to determine if the stand has a desirable composition. If planting will be used to regenerate the stand, retaining large, limby trees with thick, tapered boles reduces the likelihood of blow down. Trees with forked or dead tops are also good candidates for retention. These "defective" trees provide perching or nesting habitat for a variety of birds and small mammals.

Forest Management Units

FMU 1

Total acres	Age	Dominant spp.	Trees per acre	Average DBH	Avg. height	Avg. crown ration
22.4	28	Douglas-fir Red alder	265	10”	62’	+40%

FMU 1 encompasses the majority of the forested area on this property. The unit was mostly clearcut in 1994 (with scattered retention of cedar, maple and alder) then replanted to Douglas-fir at 350 TPA. Douglas-fir remains dominant on drier sites and upper slopes, but over the intervening years, red alder has colonized the lower and wetter areas of the property, competing with the Douglas-fir. Alder is now dominant across most of the lower elevations, having effectively suppressed the planted Douglas-fir on wetter soils. However, fir does still exist in discrete stands and as scattered individuals throughout the alder, and recent pre-commercial thinning has focused on releasing the fir by removing defective and suppressed alder throughout the stand. Bitter cherry formed in dense thickets on drier sites also, and competed with the fir for several years, but is now becoming subordinate in the canopy and succumbing to suppression mortality as the fir outpaces it in height. Both the fir and alder have formed relatively homogenous stands in which individual trees tend to fall within similar height and diameter ranges: 58’ – 69’, and 6” – 14” respectively. Alder tends to be taller than the Douglas-fir, but the fir tends to have larger average diameters. Although canopy competition has reduced the live crown ratio of both the fir and alder, ongoing pre-commercial thinning has maintained crowns of at least 40% total tree height on both co-dominant and dominant trees.

DF @ 200 TPA.

Dense RA @ >360 TPA.

There is a high degree of storm damage across both the fir and alder. Broken tops and snapped trunks occur across 15 – 20 percent of the trees, with damage typically occurring between 25' – 35' on the trunk.

Big leaf maple is the third most common species across this unit and occurs as in a variety of ages and forms, including: scattered mature individuals, coppicing stumps that were cut during the previous harvest, and newly regenerating seedlings in the understory. Timber quality across the mature maples is low, due to heavy branching low in the trunk. Coppice maple rarely develop into high quality timber unless thinned to a single stem. Both forms of maple are very oppressive, effectively shading out nearly all trees beneath their canopy. In some places the maple dominates areas of up to 0.5 – 0.75 acres. Along the southern property line, several small stands of mature cedar, red alder and big leaf maple were also retained during the previous timber harvest.
This unit has been the subject of ongoing pre-commercial thinning for over 10 years. Storm damaged fir and alder have been removed, and the majority of the stand thinned for optimal spacing. Approximately 5-6 acres remain to be thinned, including both Douglas-fir and alder dominated stands. Competing bitter cherry and coppicing maple are also in the process of being removed. Consequently, stocking densities vary considerably, from as high as 360 TPA in areas that haven't been thinned, to as low as 160 TPA in areas where there was excessive storm damage that necessitated heavier thinning.

Management Recommendations
This unit will be managed to optimize timber production and ecosystem services using uneven-aged forest management practices. Long-term forest composition will include hardwoods and conifers at multiple stage of growth and increasing volumes of dead wood. In the short-term, continue pre-commercial thinning to reduce areas of high density and remove defect to improve timber quality and growth. Shade tolerant conifers will be planted beneath the alder at a light density to establish the next cohort. Commercial thinning will begin in 8-10 years, and will follow the thinning guidelines earlier in this plan, starting with a thinning from below.

1. 2019 – 2029: Pre-commercially thin remaining areas of high density
   Approximately 7 acres of alder and Douglas-fir still remain to be pre-commercially thinned. These areas should be thinned to approximately 200 – 260 (13' – 15') by removing the most suppressed and defective trees first, then thinning for canopy spacing. Cut materials should be lopped and scattered throughout the site to aid in soil development and/or collected into wildlife habitat piles.
2. 2019 – 2024: Cut back coppicing maple
   A lot of coppicing maple stumps occur throughout this unit. All coppice will either be thinned to 1-2 primary stems, or completely cut back.

3. 2019 – 2029: Plant and monitor understory trees
   By transplanting naturally regenerating seedlings, and planting nursery stock, the entire understory of the alder dominated sites should be planted with at least 100 TPA (20'). Cedar and hemlock should comprise the majority of the seedlings, but Douglas-fir can be planted into more open areas of the canopy. Existing seedlings should be kept free of competing vegetation, and tree cages straightened and lifted as necessary to protect the terminal leader of each seedling.
4. 2027 - 2032: Commercially thin from below
   Evaluate both alder and Douglas fir for commercial thinning. When live crowns across both have begun to diminish below 40%, thin stand from below by removing the least dominant and most defective trees first. Remove no more than 30% of the total stocking, reducing density to 130 – 170 TPA.
5. 2027 – 2032: Plant understory as necessary
   Evaluate understory trees and plant if there are less than 100 well-distributed crop TPA (e.g. cedar, hemlock, Douglas-fir, high quality maple, etc.). Plant with a combination of cedar, hemlock and Douglas-fir, depending on canopy density.
6. 2037 – 2042: Commercial variable density thin
   Using the guidelines earlier in this plan, variable density harvest by thinning across the diameters, only removing dominant trees where they will release vigorously growing understory trees. Remove no more than 30% of the total stocking, reducing density to 80 – 110 TPA.
7. 2047 – 2052: 2nd commercial variable density thin
   Thin across the diameters through the Douglas-fir, but remove the majority of the alder in order to release the understory cohort. Retain some alder as seed trees and for their biological functions. Overall stocking density of dominant trees will be reduced to 50 – 70 TPA.

Agroforestry

Total acres	Age	Dominant spp.	Trees per acre	Average DBH	Avg. height	Avg. crown ratio
3.82	<20	Bamboo Eastern hardwoods	>350	2"	16'	100%

The agroforestry zone is comprised of a variety of individual plantations that were established over a period of years. The following list details the types of plantations, acreage and approximate planting date:

1. Basketry willow & bamboo (0.95 acres): 1998
2. Eastern hardwoods (0.51 acres): 1998

3. Hedgerow (0.75 acres): 2010
4. Native forage (1.61 acres): forthcoming

These sites were planted in order to experiment with various non-native trees that provide high-value products such as edible shoots, nuts, timber, medicinals, and craft material. Each planted site was formerly comprised of hay pasture, and no naturally forested area has been converted to non-native trees.

View NE across bamboo agroforestry zone.

The basketry willow grove is comprised of approximately 6-8 different varieties of traditional English basketry willows. Within the willow grove is a patch of “stone” bamboo (Phyllostachys angusta) and a black walnut.

Eastern hardwoods line either side of the driveway (copper beech, English & black walnut, burr oak, paper birch), and continue on either side of the swale leading up to the well (sugar maple, aspen, paper birch, green ash).

To the east of the driveway are scattered clumps of bamboo.

Open space in agroforestry zone to be converted to native trees & shrubs.

The wildlife hedgerow is comprised of hawthorn, nootka rose, service berry, elderberry, crab apple, hazelnut and a variety of English hardwoods including: beech, walnut, oak, hornbeam and chestnut.

Most of the trees have been growing long enough to have reached a free-to-grow height well above the surrounding grass, and are now competing effectively with the grass. Metal tree cages that were originally installed to prevent deer browse are being removed.

Approximately 1.6 acres in this area has not yet been planted and is still solely comprised of grass.

Management Recommendations

Now that most of the trees planted into this area are competing effectively with the grass, they will be pruned periodically to improve timber quality and otherwise monitored for growth and productivity. The basketry willow at some point may be coppiced to produce straight whips, and the bamboo will be occasionally thinned to produce poles and edible shoots. The eastern hardwoods are primarily aesthetic, but the sugar maple may be tapped at some point in an effort to produce maple syrup.

Within the next five years the 1.6 acres of grass remaining in this zone will be planted to a mixed of native trees and shrubs that will be specifically chosen for their edible, medicinal and wildlife values. These may include: red and evergreen huckleberry, blue elderberry, bitter cherry, service berry, pacific dogwood, hazelnut, Oso berry, pacific crab apple, mountain ash, and baldhip and nootka rose.

1. 2019 – 2024: Prepare sites for planting native agroforestry zone
   Continue to mow grasses to prevent woody plants and blackberry from invading site. At planting time, prepare planting holes using a PTO-driven auger. Cage trees and mulch with woodchips.
2. 2019 – 2029: Monitor and maintain all agroforestry trees
   Mature trees may require periodic pruning to improve timber quality. Younger trees should have competing grass cut back annually within a 2’ radius until they reach a free-to-grow height of at least 2’-3’ above grass. Straighten tree cages as necessary and make sure seedlings don’t get caught up in mesh of cages.
3. 2029 – 2034: Begin removing tree cages from native agroforestry and prune as necessary
   Prune to improve form and quality of each tree.

RESOURCE CATEGORY V: PROPERTY ACCESS/ ROADS AND TRAILS

Primary access to this property is from Harp Road, a County-maintained paved road that terminates at the southwest property corner. From Harp Road a gravel driveway leads NE into the property, then splits and heads around either side of the field. Although some rock was applied on the roadbed along the lower western side of the field, it ends shortly past the windmill. A small 12" diameter culvert was installed beneath the entrance driveway to allow seasonal stormwater to pass from the swale to the Type Ns stream drainage further south on the property.

There is a diverse network of forest access roads throughout the forested portion of this property that were created when the site was originally logged. The roads were simply carved into the soft loam soils and served as skid trails during previous logging. No surfacing material has been applied to any road segment, and their surfaces are primarily covered by grasses and other native groundcovers. Given that the underlying material of the roads is loamy clay, they are extremely slippery during winter months, and their surfaces easily rutted by heavy equipment.

Management recommendations

1. Annually mow or brush-out forest roads and trails to keep clear of encroaching vegetation.
2. Avoid logging or other heavy equipment on roads during the wet season to avoid damage to road surface.
3. Reseed all forest roads, skid trails and log landings following timber harvest.

RESOURCE CATEGORY VI: WILDLIFE

Overview

This region has a wide variety of habitats for fish and wildlife. These habitats support many interesting and valuable species. They range from saltwater tidelands and shorelines on Puget Sound to the forest plant communities in the Black Hills and the foothills of the Cascade Mountains. Elevation of these areas ranges from 0 to 2,984 feet. Most of the land is privately owned, but there are large parcels of state, federal, and industrial forest property.

Habitat is the arrangement of three essential ingredients: food, cover, and water-required to meet the biological needs of one or more species. Generally, for mammals and birds the critical limiting factor is the availability of their preferred food. Shelter or escape cover is of secondary importance. For salmon and other aquatic species, the most severe limiting factors generally are the sedimentation caused by erosion, the blocking of stream passage by debris, and various forms of water pollution.

Most of the county is woodland. The principal conifer species are Douglas fir and western hemlock. Conifer species of lesser extent are western red cedar and grand fir. The principal deciduous species are red alder and big leaf maple. Deciduous species of limited extent are black cottonwood. Oregon white oak, bitter cherry, and Pacific madrone. These wooded areas have a diverse understory of salal, cascade Oregon grape, huckleberry, and other species. Wildlife attracted to these areas include raccoon, black-tailed deer, woodpeckers, owls, and songbirds.

Appropriate woodland management practices can greatly enhance wildlife abundance. Small-scale clearcutting creates a diversity of successional stages in the vegetation and provides food adjacent to cover. Leaving strips of undisturbed vegetation along stream corridors helps to protect spawning gravel and other aquatic habitats from smothering sedimentation; provides shade, which helps to maintain a cold water temperature; and provides food and cover for terrestrial species. Standing snags provide sites for cavity nesting birds and provide food for other animals. The needs of fish and wildlife should be considered when logging roads and skid trails are constructed. Seeding burns, roads, skid trails, and other disturbed areas to grasses and legumes helps to stabilize soils, provides food, and reduces water pollution. Logging practices that help to keep debris from blocking streams and reduce the risk of erosion should be used.

Current habitat

This property hosts a wide breadth of habitat types that make it suitable for many different species of wildlife. The mixed hardwood/conifer stands with their attendant diverse shrub layer, provide forage and nesting opportunities for many bird species, as well as browse for ungulates. The generally young forest provides early seral habitat with abundant mast

producing shrubs and low trees, as well as browse. The dense, young Douglas-fir stands are the most simplified habitats on the property, with a highly suppressed understory, limited tree diversity and single age. However, this type of habitat does provide thermal cover for nesting and bedding animals, and the dense canopy provides shelter for both birds and small mammals. A few acres of mature mixed conifer/hardwood stands exist on the property, with complex canopies and some level of decay.

The most lacking habitat type on this property, however, is mature forest. There are few trees that exceed 50 – 60 years old, canopies are horizontally simple without multiple layers, and there are very few snags or large downed logs. What dead would does exist in the forest is largely small diameter (<8" DBH).

Forage species that occur across this property include:

type	common name	latin name	exposure	moisture	height (ft)
Tree	**bigleaf maple**	*Acer macrophyllum*	sun - shade	dry - moist	100
Tree	**red alder**	*Alnus rubra*	sun - part shade	dry - wet	120
Tree	**Pacific dogwood**	*Cornus nuttallii*	part shade	dry - moist	60
Tree	**black hawthorn**	*Crataegus douglasii*	sun - part shade	moist - wet	30
Tree	**black cottonwood**	*Populus balsamifera*	sun - part shade	moist - wet	160
Tree	**bitter cherry**	*Prunus emarginata*	sun - part shade	dry - moist	30
Tree	**Douglas-fir**	*Pseudotsuga menziesii*	sun - part shade	dry - moist	250
Tree	**cascara**	*Rhamnus purshiana*	sun - shade	dry - wet	30
Tree	**Pacific willow**	*Salix lasiandra*	sun - part shade	moist - wet	40
Tree	**yew**	*Taxus brevifolia*	part shade - shade	dry - moist	40
Tree	**Western hemlock**	*Tsuga heterophylla*	part shade - shade	moist - wet	225
Shrub	**red-osier dogwood**	*Cornus sericea*	sun - shade	moist - wet	15
Shrub	**beaked hazelnut**	*Corylus cornuta var. californica*	sun - shade	dry - moist	20
Shrub	**salal**	*Gaultheria shallon*	part shade - shade	dry - moist	5
Shrub	**oceanspray**	*Holodiscus discolor*	sun - shade	dry - moist	15
Shrub	**low Oregon grape**	*Mahonia nervosa*	part shade - shade	dry - moist	3
Shrub	**indian plum; osoberry**	*Oemlaria cerasiformis*	part shade - shade	dry - moist	15
Shrub	**devil's club**	*Oplopanax horridus*	sun - shade	moist - wet	9

Shrub	**black gooseberry**	*Ribes lacustre*	sun - shade	moist - wet	5
Shrub	**red-flowering currant**	*Ribes sanguineum*	sun - part shade	dry - moist	6
Shrub	**nootka rose**	*Rosa nutkana*	sun - part shade	moist - wet	10
Shrub	**thimbleberry**	*Rubus parviflorus*	sun - shade	dry - moist	8
Shrub	**salmonberry**	*Rubus spectabilis*	sun - shade	moist - wet	10
Shrub	**red elderberry**	*Sambucus racemosa*	sun - shade	dry - moist	15
Shrub	**spiraea; hardhack**	*Spiraea douglasii*	sun - part shade	moist - wet	12
Shrub	**snowberry**	*Symphoricarpos albus*	sun - shade	dry - moist	5
Shrub	**evergreen huckleberry**	*Vaccinium ovatum*	part shade - shade	dry - moist	6
Shrub	**red huckleberry**	*Vaccinium parvifolium*	part shade - shade	dry - moist	10
Groundcover	**bleeding heart**	*Dicentra formosa*	part shade - shade	dry - moist	1.5
Vine	**blackberry, trailing**	*Rubus ursinus*	sun - shade	dry - moist	0.5

Managing for Wildlife

This forest will be managed to optimize wildlife habitat and plant species diversity. Common management practices will include:

1. Maintaining a broad range of habitat types, from early to late seral,
2. Retaining old growth trees and managing for older forest conditions,
3. Planting and/or conserving a diversity of conifers and hardwoods, including western red cedar, big leaf maple and Madrone,
4. Creating and maintaining horizontal heterogeneity (e.g. both gaps and areas of higher stand density)
5. Conserving and/or recruiting larger diameter snags and downed coarse woody debris,
6. Planting and/or conserving mast (seed, berry and nut) producing species for bird forage,
7. Promoting understory shrub and ground cover diversity by managing canopy density,

Snags and downed logs

Snags and downed logs are two critical habitat components that are commonly missing or in inadequate numbers or sizes in second and third growth forests. West of the Cascade Mountains 39 species of birds and 14 species of mammals depend on tree cavities for their survival. East of the Cascades 39 bird species and 23 mammal species depend on these snags. In total, more than 100 species of birds, mammals, reptiles, and amphibians need snags for nesting, roosting, shelter, denning, and feeding; nearly 45 species alone forage for food in them. Hollow snags and large knot-holes are used by many species of mammals such as squirrels, marten, porcupine, and raccoons. In winter when snow covers the ground, northern flickers and other common backyard wildlife depend heavily on insects and other foods found in snags. Brown creepers, bats, and other small animals will roost behind loose bark and bark

slits for winter warmth and shelter. Hollow snags are very valuable in winter as they are used by many species such as squirrels, raccoons, owls, and bear for denning and roosting.

Snags fall into two primary decay class categories:

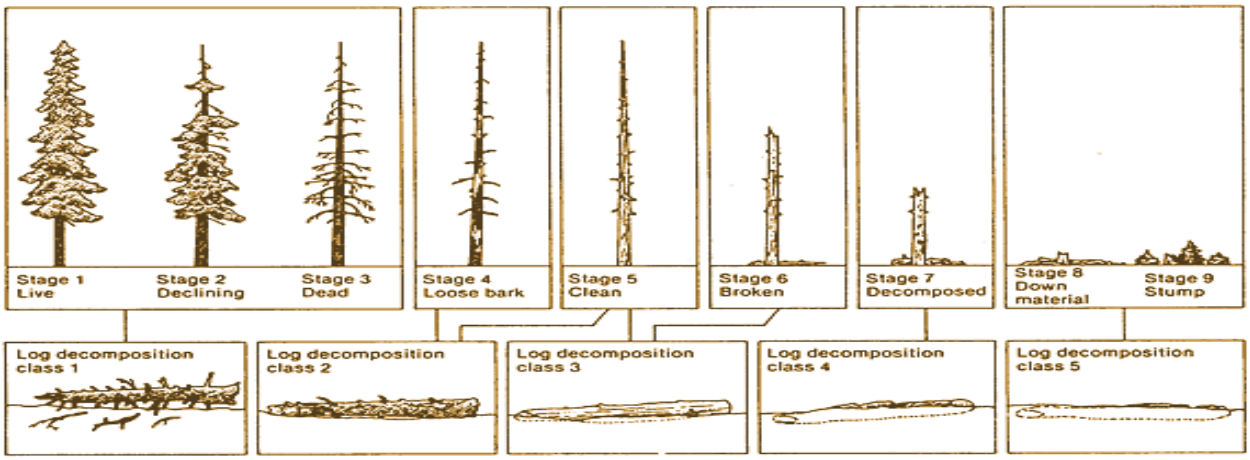
a. Hard snags, with the bark is still intact and with firm heart and sapwoods, and
b. Soft snags, which may have some bark remaining but with the wood beginning to soften.

Large snags more than 12 inches in diameter and 15 feet tall offer ideal hunting perches for hawks, eagles, and owls. They function as resting perches for swallows, band-tailed pigeons, mourning doves and other birds; food storage areas for mice, squirrels, woodpeckers, and jays; and song perches for tanagers and flycatchers. Woodpeckers use large dead tree trunks as a way to announce their presence during courtship, hammering their bills against the tree's resonating surface. Small snags may be used as song posts by bluebirds, hummingbirds, and other songbirds to attract mates and proclaim nesting territories. This high use of snags by a myriad of species underscores the importance of preserving snags and including them in your landscape.

Natural recruitment of snags requires forest conditions that allow for a certain percent of trees to grow old and senesce, succumb to diseases or pests, or be subject to natural disturbance events such as wind and ice storms. High quality snags for our region are defined as standing dead conifers larger than 12" DBH and at least 15' high. These types of snags can remain standing for decades. Even more enduring are wildlife trees that contain portions of large diameter dead wood. Old-growth Douglas-firs and cedars (typically with multiple dead tops) are good examples of this. They are rarer but also very important due to their long expected life span.

Downed logs, aka coarse woody debris, fall into five primary categories based on their decay class:

a. Class 1, bark is still intact and heart and sapwood is still firm
b. Class 2, log is in contact with ground; bark is beginning to deteriorate and inner wood is soft.
c. Class 3, log is in contact with ground; bark has completely fallen off and log is beginning to become incorporated into the forest floor
d. Class 4, log is partially buried and wood is very soft
e. Class 5, log is barely distinguishable from surrounding forest floor



Decay classes of trees and downed logs.

Coarse woody debris includes fallen trees and large branches as well as logs and large pieces of wood left from logging operations. This habitat component serves many of the same purposes as snags: nesting, denning, roosting, foraging, and hiding cover and shelter from inclement weather. At least as many vertebrate species use coarse woody debris as use snags. Some are the same species, such as black bears using large hollow logs and woodpeckers foraging for insects. Some are seen on the exterior such as ruffed grouse using logs for drumming sites as part of their mating ritual. A lot of small mammals use this habitat type for hiding and food caches. Probably the most unique life form using coarse woody debris is several salamander species. Some may spend just their adult life phase in a rotting log foraging for invertebrates and hiding, whereas a few species may spend their entire life in a single log from egg phase through adulthood. Coarse woody debris is host to a huge number (about 400 known) of insects and an unknown but large number of non-insect invertebrates. These are used as food sources by many of the vertebrate species found on and in coarse woody debris. The ultimate fate of all these species, in conjunction with the decomposing forces of fungi is to break down the woody fiber into organic matter that is utilized by the surrounding growing forest.

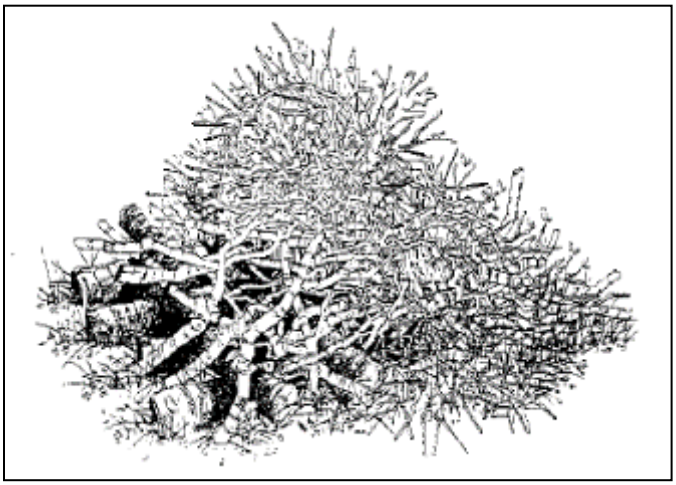
A short and long-term snag and downed log recruitment program will be initiated. Measurements from undisturbed forests indicate that an average of 16 snags/acre and 50-140 downed logs per acre were present in stands containing healthy populations of all snag-dependent wildlife species expected in that area. Short-term snag/log recruitment will be achieved by protecting existing snags and logs during harvest activities at levels as close to the listed targets as possible. Long-term snag/log recruitment will be achieved by retaining defective trees at various stages of deterioration during harvesting activities. Root rot and windthrow will naturally recruit snags and logs, and non-merchantable log sections will be redistributed throughout the forest during harvest activities.

Through conservation and continuing natural recruitment, the forest will be managed for the following targets for snags and downed logs:

Snag	**Minimum Size**	**#/acre**
Hard	20’ tall x 12” DBH	2-5
Soft	20’ tall x 12” DBH	2-5
Downed woody debris	**Minimum size**	**#/acre**
Class 1	20’ x 20” dia.	1-3
Class 2	20’ x 20” dia.	1-3
Class 3	20’ x 20” dia.	1-3
Class 4	20’ x 20” dia.	1-3
Class 5	20’ x 20” dia.	1-3

Wildlife Habitat Piles

In the short term, wildlife habitat piles and constructed downed logs can be created to provide some of the functions of large downed logs. Wildlife habitat piles are typically built from either undesirable or other small diameter trees removed while thinning overstocked stands. Dimensions of the pile should be approximately 10’ across the base by 6’ tall. Larger poles are placed on the ground in 2-3 layers laid perpendicular to each other, then branches and finer slash is laid on top. Constructed logs can be built solely from small diameters poles that are laid parallel to create a log with dimensions at least 20” in diameter and 20’ long.



Wildlife habitat pile

Wildlife habitat log in foreground with wildlife habitat pile in background.

Wildlife habitat logs

Manually placed habitat logs provide an immediate opportunity to create an important forest habitat structure until natural recruitment can sustain a constant influx of dead wood onto the

forest floor. Natural log recruitment from blow down or mortality is the preferred method of maintaining downed wood habitat on the forest floor. The long-term target for habitat logs is a minimum of five logs per acre that are a minimum of 20" in diameter and 20' long. Over time logs will decay, and additional natural or manual recruitment will be necessary to insure continued inputs. Habitat logs can be created in a managed stand by using smaller logs obtained during pre-commercial thinning activities and stacking them parallel to each other. To maximize habitat, logs should be a minimum of 20-foot long with a minimum diameter of 20-inches. Habitat is increased when logs retain some limbs and bark.

Additional Management Recommendations

1. Retain all snags and minimize disturbance of large downed logs during forest management and timber harvesting activities. Over time, manage for the recruitment of at least 4-10 snags/acre >20" DBH and at least 5-15 downed logs >20" dia. and 20' long. Distribute non-merchantable log sections back out into the woods during logging.
2. Avoid significant forest management activities during the prime bird nesting season March 15th – June 15th. This time also corresponds with the period of greatest bark vulnerability during the spring as sap begins rising in trees.
3. Landings and skid trails can be broadcast to a browse mix following logging activities to provide forage for deer and elk.
4. Over time, manage forest towards a mixed hardwood and conifer stand with approx. 30% of the stocking being comprised of hardwoods such as red alder, big leaf maple, bitter cherry and cottonwood.
5. Trees with significant defect (forked or broken tops or doglegs below 26', excessive wane, excessive branching, etc.) can be girdled and turned into a short-term snags.

RESOURCE CATEGORY VII: PROTECTION OF SPECIAL RESOURCES

"There are no known threatened or endangered species, cultural, or historical resource protection issues on this property. A formal review, to identify these resources, if any, and their potential protection requirements, will be conducted by the State Department of Natural Resources if and when the landowner proposes to conduct significant forestry activities which require a DNR-approved Forest Practices Application".

APPENDIX I. NRCS RESOURCE CONCERNS

NRCS Biological Technical Note 14 (attached as appendix to plan) was used as an inventory and analysis tool to identify the following resource concerns on this property.

Site Specific Concern	Resource Concern	Addressed with NRCS Practice Code
There are a lack of snags and large downed logs for wildlife habitat.	INADEQUATE HABITAT FOR FISH AND WILDLIFE: Habitat degradation	649
A variety of non-native, invasive plant species are present and competing with native plants.	Degraded Plant Condition – Undesirable Plant Productivity and Health	
Small areas of high stand density is causing suppression mortality and limiting understory diversity.	Degraded Plant Condition – Undesirable Plant Productivity and Health	666

APPENDIX II. MANAGEMENT PLAN IMPLEMENTATION TIMETABLE (30 years)

Year	Management Practice or Activity	FMU	# of acres	NRCS Practice Code	Comments
2019 - 2024	Control Himalayan blackberry beneath alder & along west property line. Inventory & map occurrences of holly. Cut and spray as necessary.	1, agroforestry	~2		Continue brush cutting blackberry beneath alder and mowing along property lines.
2019 - 2024	Pre-commercially thin	1	7	666	PCT remaining acres of overstocked Douglas-fir and red alder.
2019 - 2024	Build wildlife habitat piles and constructed logs	1	22.4	649	Build up to 3-5 wildlife habitat piles or constructed downed logs using material generated from pre-commercial thinning and site preparation.
2019 - 2024	Continue underplanting RA with RC	1	11.5	490 612	Every year plant 50 – 100 RC @ 100 TPA beneath RA to fully establish an understory cohort.
2019 - 2024	Remove tree cages from hedgerow trees/shrubs that have outgrown cages	Agroforestry	0.75		
2019 - 2024	Begin pruning/shaping hawthorn in hedgerow	Agroforestry	0.75		
2019 - 2024	Plant native trees & shrubs for wildlife	Agroforestry	1.6	490 612	Prepare site by mowing, then auger planting holes. Plant with mixed native trees/shrubs.
2019 - 2029	Monitor planted and naturally regenerating seedlings	1, Agroforestry	13.1		Over the next 10 years both manually planted and naturally regenerating trees should be monitored for vigor, browse and

					density. Tree cages should be monitored annually and straightened and/or lifted to protect the terminal leader of the seedling.
2024 - 2029	Commercially thin from below	1	22.4		Once average diameters reach 10" – 12" DBH thin from below by removing the most suppressed and defective trees first, then thinning for spacing. Thin across both Douglas-fir and red alder. This may result in removal of up to 30 - 40 percent of the trees, in particular in the Douglas-fir dominated areas, depending on stand density. Thin to release any vigorously growing conifers in the understory. Overall stand density will be reduced to 150 – 200 TPA.
2024 - 2029	Replant following thinning	1	22.4		Following commercial thinning, any understory conifers damaged during logging should be removed, and the unit underplanted with western red cedar at 100 TPA (20' x 20'). Plant no closer than 15' to existing conifers. Trees should be caged to prevent deer browse.
2024 - 2034	Monitor and maintain planted and naturally regenerating trees	1	22.4		Over the next 10 years following commercial thinning, both manually planted and naturally regenerating understory trees should be monitored for vigor, browse and density. Tree cages should be monitored annually and straightened and/or lifted to protect the terminal leader of the seedling. Naturally regenerating cedar or Douglas-fir should be caged when found. If natural hardwood or conifer regeneration leads to densities of understory trees that exceed 12' – 15' spacings (>350 TPA), they should be proactively pre-commercially

					thinned by removing the least dominant, most defective, or least desirable tree species. Monitor maple regeneration, but thin and manage for timber quality trees.
2034 - 2039	Commercial variable density thin	1	22.4		After 10 – 15 years of growth, this unit can be commercially thinned again in order to further reduce stocking densities, release vigorous understory trees and generate revenue. No more than 30 percent of the canopy trees should be removed by thinning "across the diameters". Dominant trees in the canopy should only be removed if they will release vigorously growing understory trees. The remainder of the stand should be thinned to spread remaining trees out and reduce density. Thin both Douglas-fir and red alder. Overall stocking of the dominant trees should be reduced to approximately 100 – 120 TPA.
2034 - 2039	Evaluate understory trees and replant as necessary	1	22.4		Following logging, evaluate the stocking and condition of understory trees. Cut out any trees that were damaged by logging. If there are less than an evenly distributed 100 TPA in the understory (20' x 20') throughout both the Douglas-fir and red alder dominated sites, replant with Douglas fir and cedar to achieve that minimum stocking level. Trees may need to be caged to prevent deer browse. Any areas where natural regeneration is leading to high densities amongst seedlings and understory trees should be thinned to 15' x 15'.
2044 - 2049	Commercial variable density thin	1	22.4		A third commercial thinning can be conducted by removing another 30 - 40% of the trees.

					However, harvesting should occur by creating gaps for replanting, and retaining moderately stocked clumps along road margins and unit boundaries where they are more accessible for final harvest in another 10 years. Thinning should occur more heavily around vigorously growing understory conifers, and residual density of thinned clumps should be approximately 60 – 80 TPA. Following harvest, replant gaps with Douglas-fir at 240 TPA (13' x 13'), and underplant residual red alder with cedar at an additional 100 TPA (20' x 20'). Cage trees to prevent deer browse.
2054-2059	Commercial variable retention harvest	1	35		Conduct final harvest across the canopy trees, reducing density to 20 TPA that will be retained indefinitely as long-term legacy trees. Understory trees may be reaching a merchantable age at this time, and can be thinned to optimize spacing and remove defect.

APPENDIX III: TIMBER HARVST REVENUE PROJECTION

Harvest Year	FMU	Acres	Species	Harvest Volume	Gross Value	Net Value
2024-2029	1	22.4	Douglas-fir Red alder	112 MBF	$67K	$40K
2034 – 2034	1	22.4	Douglas-fir Red alder	168 MBF	$100K	$60K
2044 - 2049	1	22.4	Douglas-fir Red alder	224 MBF	$134K	$80K
2054 - 2059	1	22.4	Douglas-fir Red alder	280 MBF	$168K	$100K
						$280K

APPENDIX IV. FOREST MONITORING PLAN

A basic monitoring program will document the following forest management attributes:

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

Additional qualitative forest monitoring will be conducted during regular walks 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. Forest roads and trails (e.g. erosion, invasive species, etc.)
2. Growth of newly planted seedlings
3. Presence of invasive species, in particular along forest access and haul roads and along margins of forest.
4. Wildlife presence and impacts to flora
5. Snag and downed log recruitment

Monitoring record

Date	Observation	Note taker

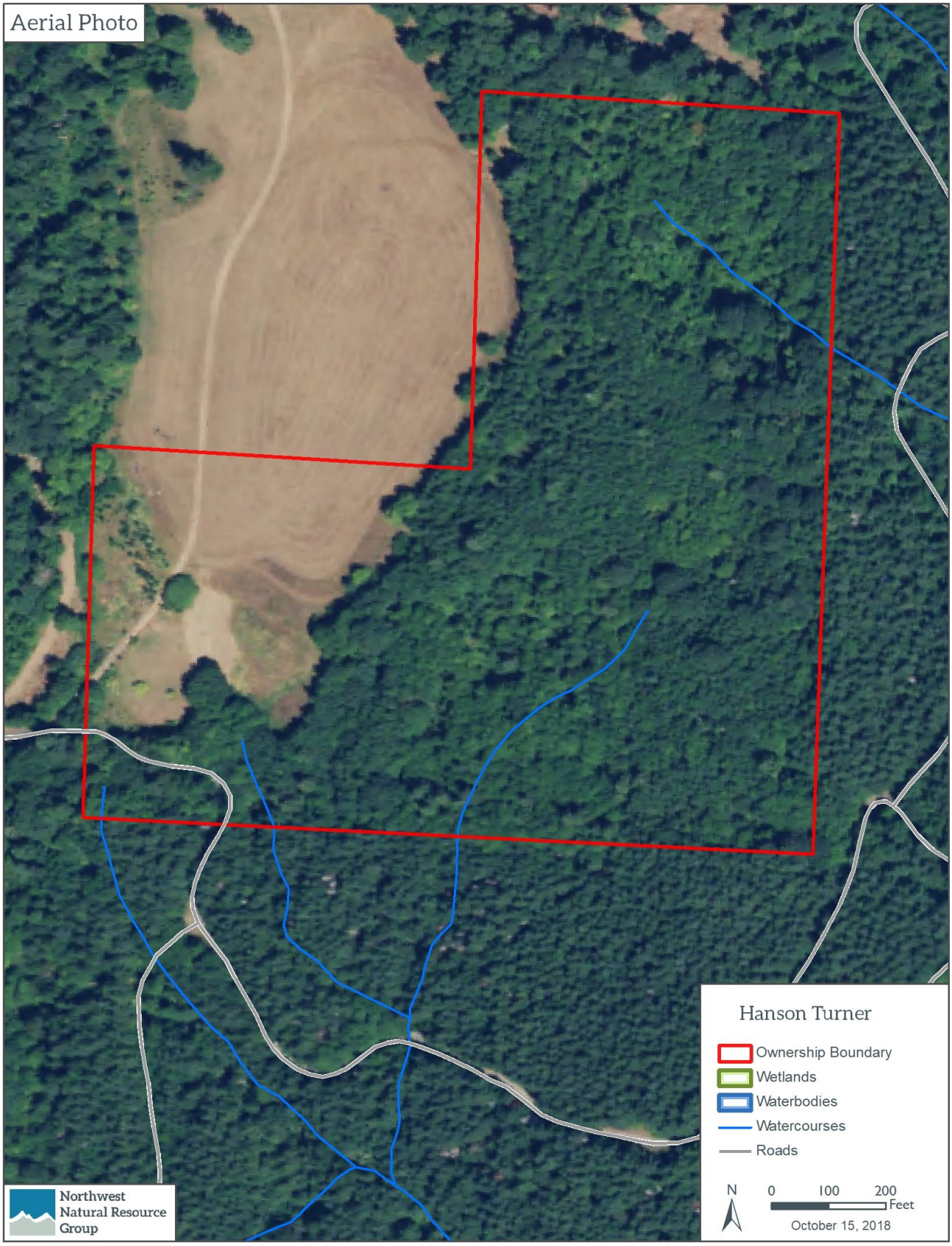
Road Monitoring

The overall goal of monitoring roads is to detect any road deterioration, maintenance needs, or negative environmental impacts so any issues can be addressed before they become significant problems. Per the FSC-US Forest Management Standard, Indicator 8.2.d.2: Landowners need to have a forest road monitoring program in place to assess the condition and environmental impacts. As such, NNRG's FSC-certified members will annually monitor their forest's road system.

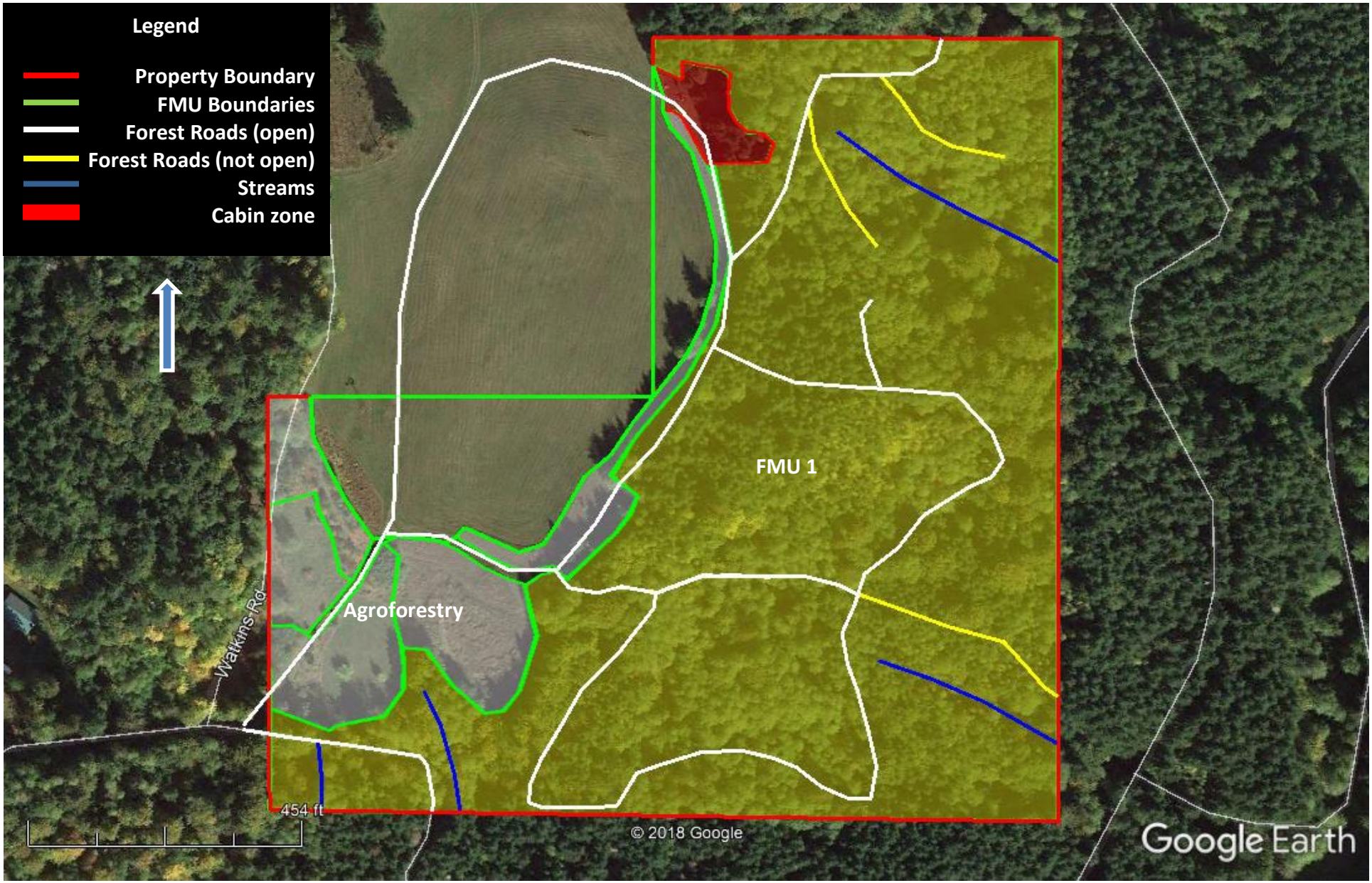
Location: (FMU, road segment, etc.)	Date	Inventoried Structure (Culvert, Drainage, Road Surface)	Water from the road or ditch runs directly into typed water. (Y/N)	Water flows under, over, or around the culvert. (Y/N)	Culvert keeps filling with dirt. (Y/N)	Road has large cracks. (Y/N)	Road has undrivable sinkholes. (Y/N)	Scheduled for maintenance or repair. (Y/N)	Dirt from the uphill side of the road keeps falling into the ditch-line before regularly scheduled maintenance. (Y/N)	Dirt from the cut-slope keeps falling downhill into or near a stream, pond, or wetland. (Y/N)	The road crosses typed water (a culvert, bridge or ford exists). (Y/N)	Orphaned Roads (Y/N)	Additional Notes

APPENDIX V. AERIAL PHOTO(S)/PROPERTY MAP(S)

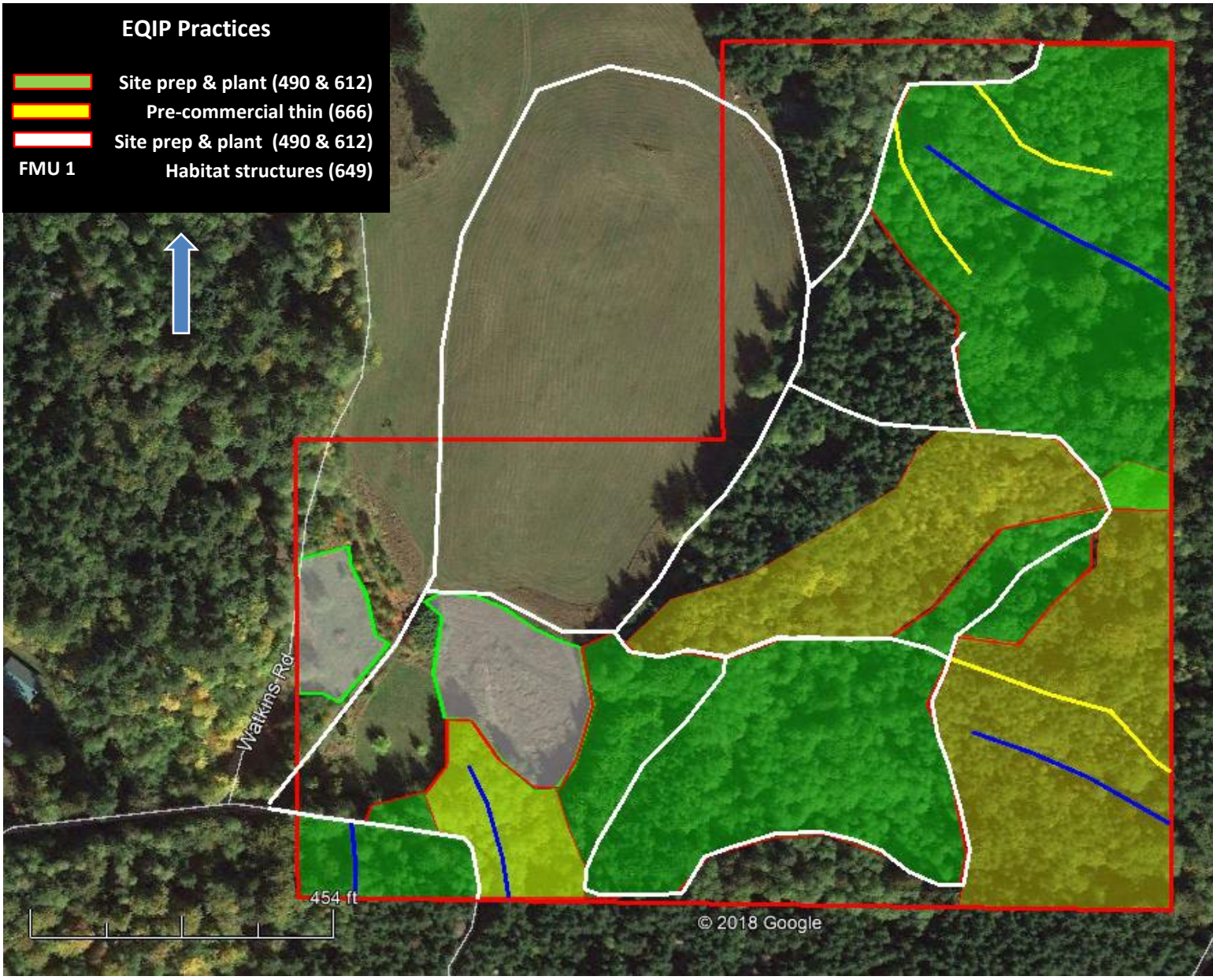
Aerial & Parcel Photo



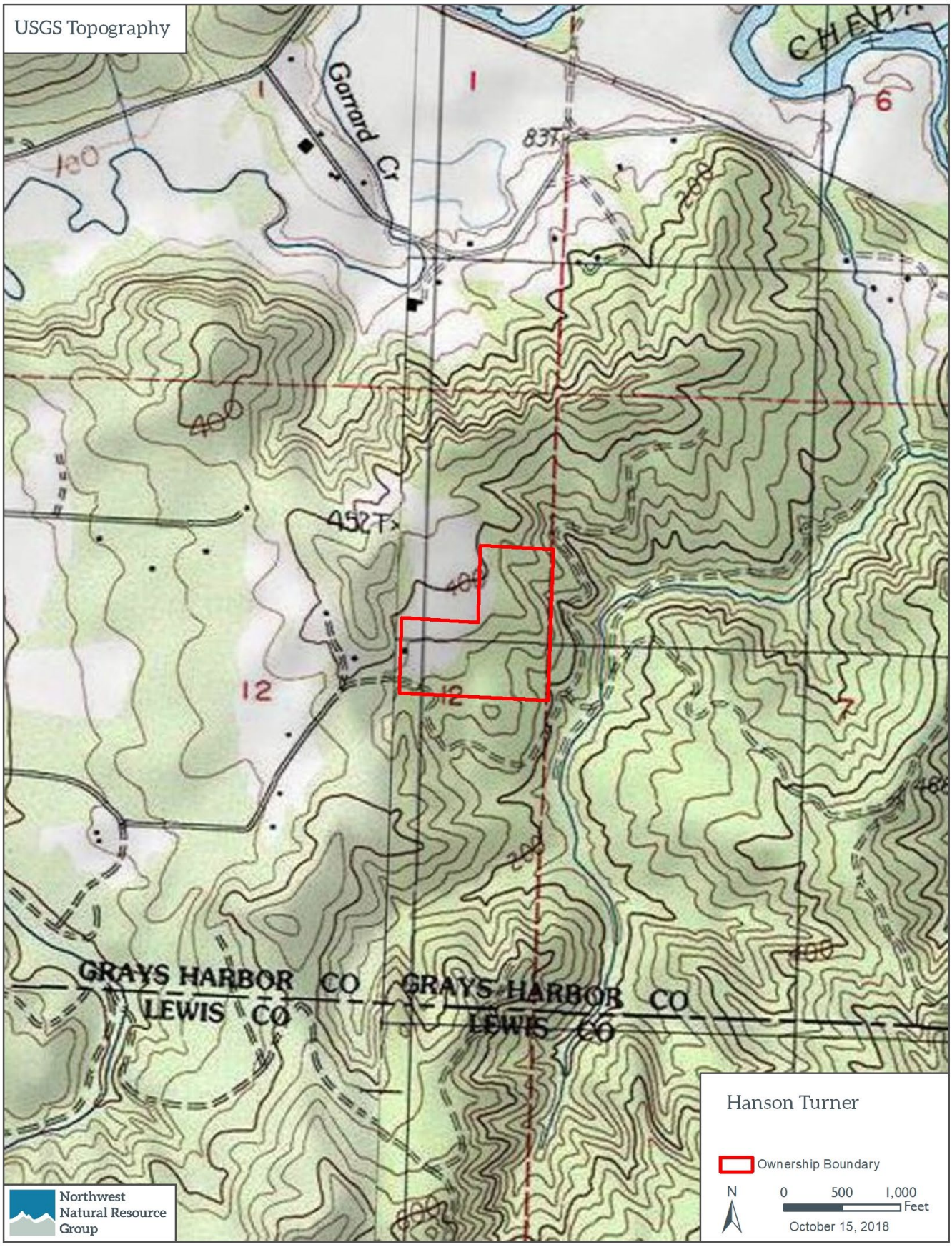
Forest Management Unit Map



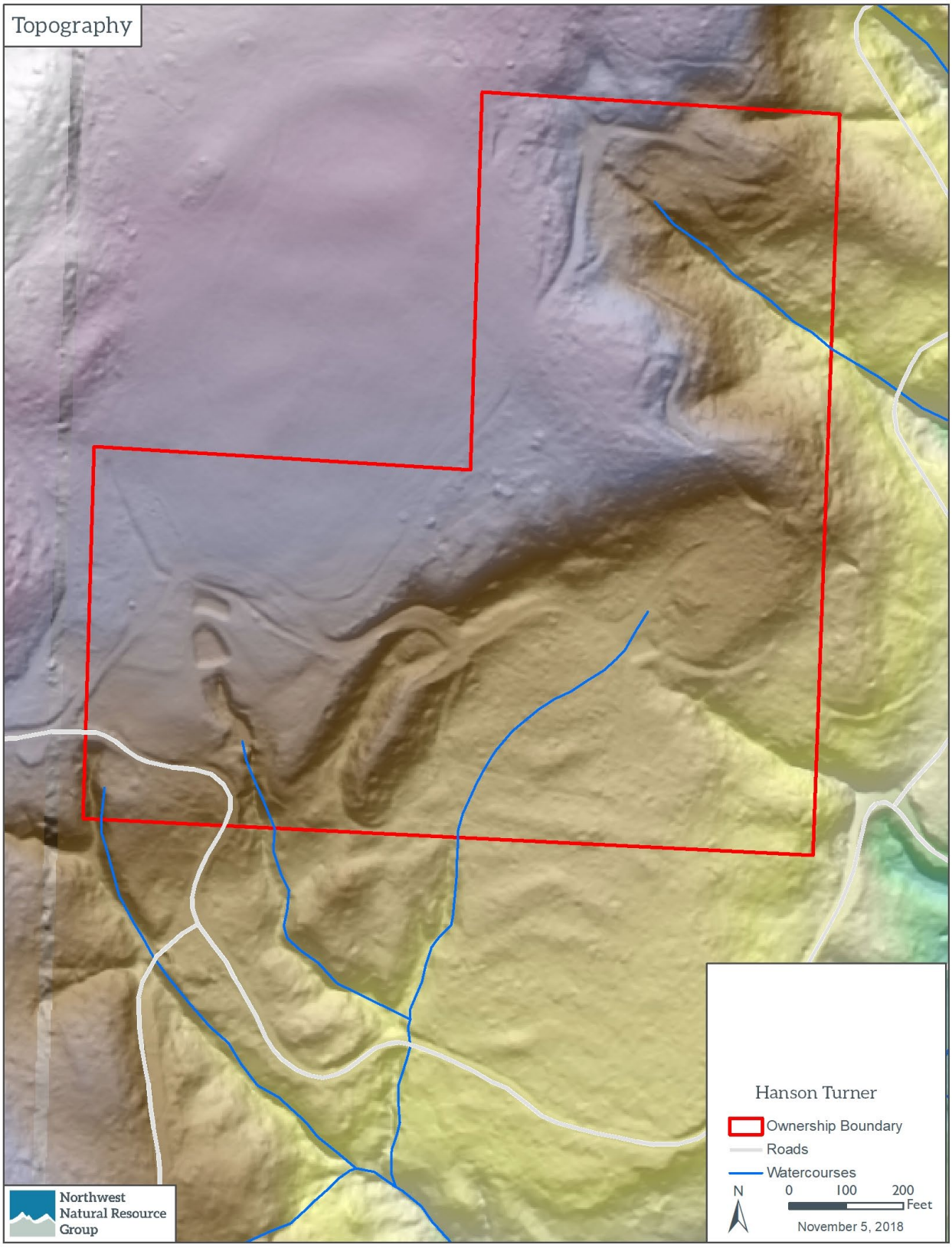
EQIP Practice Map



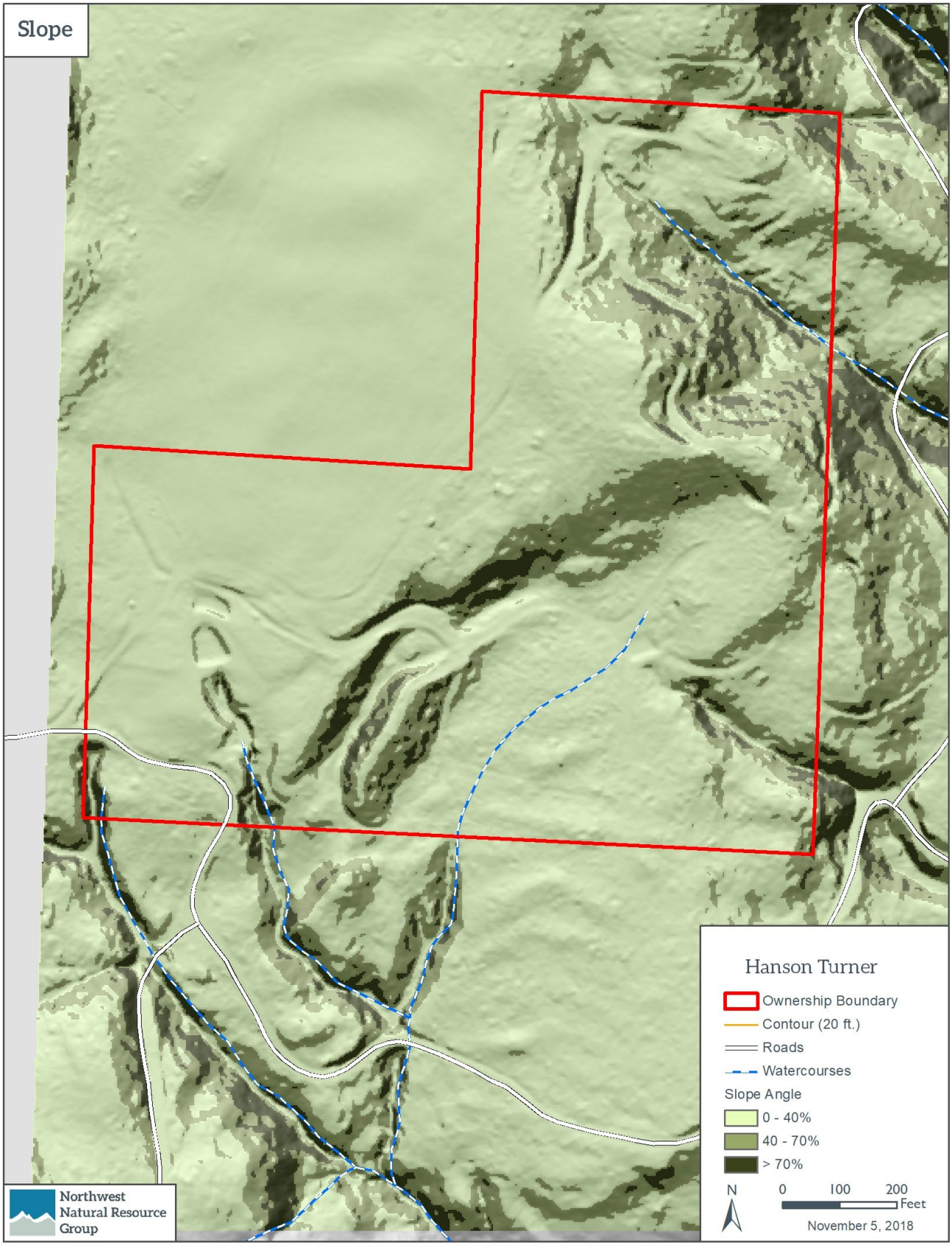
USGS Topo Map



LIDAR Topography Map



Slope Map


Slope
Hanson Turner
Ownership Boundary
Contour (20 ft.)
Roads
Watercourses
Slope Angle
0 - 40%
40 - 70%
> 70%
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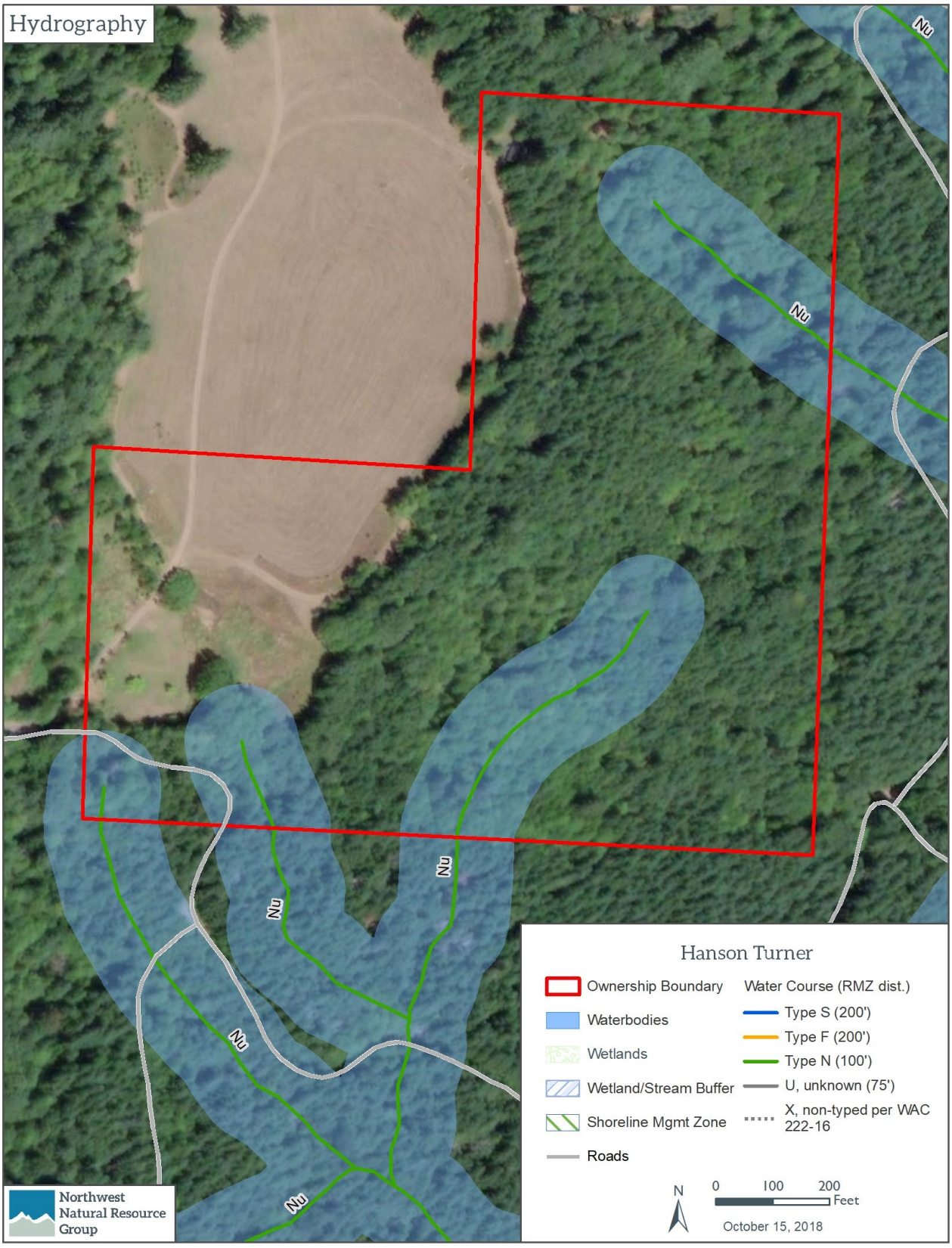
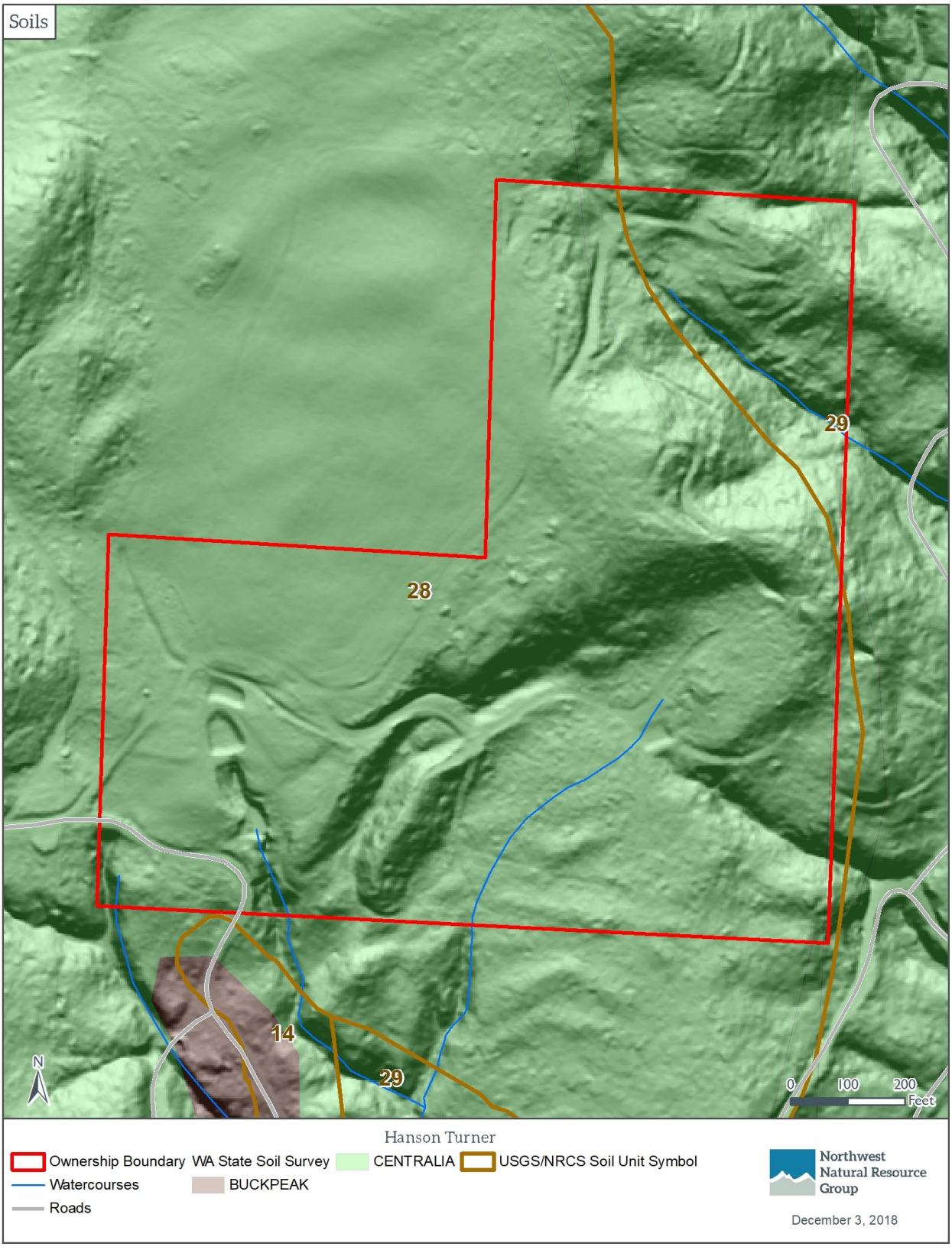
100
200
Feet
November 5, 2018
Northwest
Natural Resource
Group

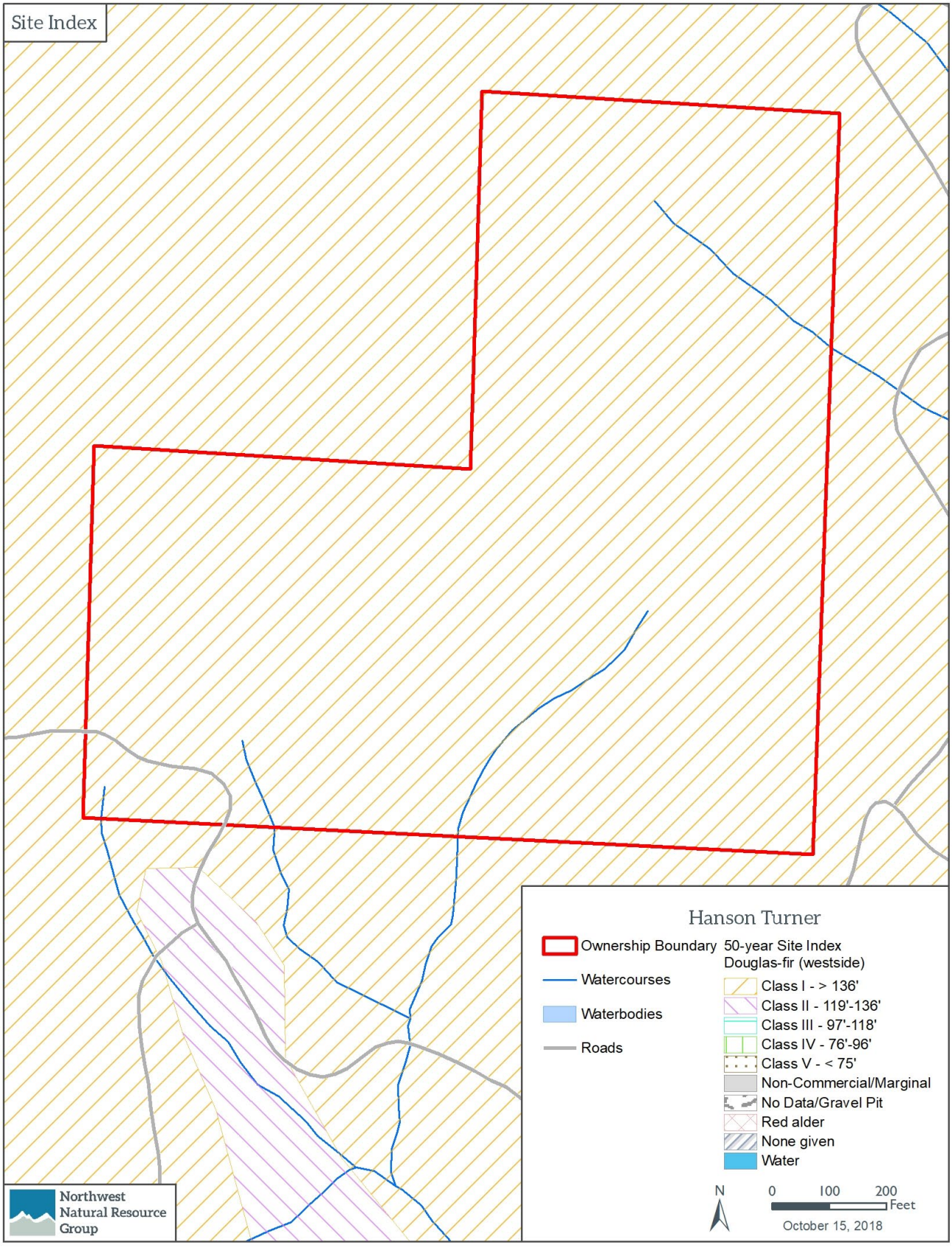
Hydrography Map



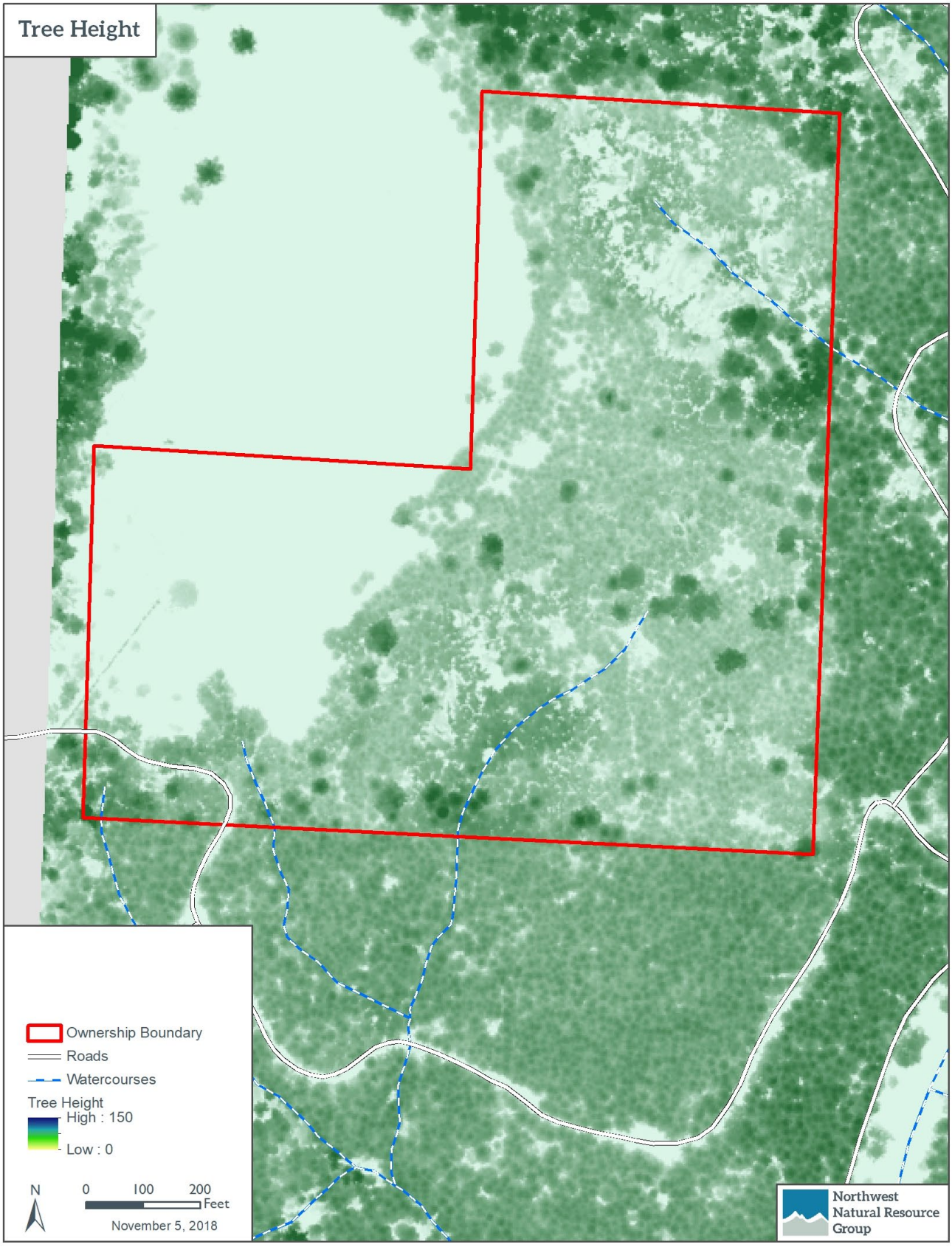
Soils Map


Soils
29
28
14
29
N
0
100
200
Feet
Hanson Turner
Ownership Boundary
Watercourses
Roads
WA State Soil Survey
BUCKPEAK
CENTRALIA
USGS/NRCS Soil Unit Symbol
Northwest Natural Resource Group
December 3, 2018

Soil Site Index Map



Tree Height Map



1990 Aerial Photo

2005 Aerial Photo

2012 Aerial Photo

PLAN APPROVAL SIGNATURES

DNR FOREST STEWARDSHIP PLAN APPROVAL (IF APPLICABLE)

This plan meets the requirements for a Forest Stewardship Plan.

_____WA State Department of Natural Resources Authorized Representative Date

Print Name:

Affiliation:

Address:

Phone :

E-mail:

USDA-NRCS CONSERVATION ACTIVITY PLAN APPROVAL (IF APPLICABLE)

This plan meets the requirements for a USDA-NRCS Conservation Activity Plan.

_____

Signature of USDA-NRCS Authorized Representative Date

Print Name:

Title:

Affiliation:

Address:

Phone:

E-mail:

CERTIFICATION MANAGEMENT PLAN APPROVAL (IF APPLICABLE)

This plan meets the requirements for XXX CERTIFICATION PROGRAM.

_____

Signature of XXX CERTIFICATION Program Authorized Representative Date

Print Name:

Title:

Affiliation:

Address:

Phone:

E-mail:

CURRENT USE TIMBER MANAGEMENT PLAN APPROVAL (IF APPLICABLE)

This plan meets the requirements for a Timber Management Plan for current use property tax programs.

_____

Signature of Authorized County Government Representative Date

Print Name:

Title:

Affiliation:

Address:

Phone:

E-mail: