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FOREST MANAGEMENT PLAN

NEZ PERCE TRIBE

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FMP APPROVAL SIGNATURE PAGE

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Forestry & Fire Management Director, Nez Perce Tribe

Date

NAME
Dept. Of Natural Resources Manager, Nez Perce Tribe

Date

NAME
Chairman, Nez Perce Tribe Executive Committee

Date

Under the National Indian Forest Resources Management Act of 1990 (P.L. 101-630), all forest management activities on Tribal Trust lands must follow a federally approved Forest Management Plan (FMP). This FMP serves as a comprehensive strategy for holistic stewardship and aligns with the Nez Perce Tribe's 2023 Integrated Resource Management Plan (Resolution NP 23-367). This FMP applies to all forest land management activities both in federal trust and Tribal 'fee' status. While the Tribe and the Bureau of Indian Affairs (BIA) share signing authority under P.L. 93-638, the BIA's formal concurrence, to this FMP, applies exclusively to forest management activities held in federal trust and does not extend to trust resources on usual and accustomed areas. The FMP does not apply to forest lands in 'fee' land status and is exclusively managed by the NPT Wildlife division of the Natural Resources Department (e.g., wildlife mitigation lands).

NAME
BIA Superintendent, NIA

Date

NAME
NWRO BIA Regional Director

Date

RESOLUTION

PREPARERS & CONTRIBUTORS

The following members of the Forest Management Plan's Interdisciplinary Team and other Tribal, BIA, and support organizations provided primary drafting and support during the Forest Management Plan's revision process.

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PREFACE

The Nez Perce Tribe's Forest Management Plan (FMP) is a multifaceted guidance document for enhanced forest ecosystem monitoring and conservation-based implementation strategies blending traditional and current knowledge. As stated in the National Indian Forest Resources Management Act of 1990 (P.L. 101-630), FMPs are required for Indian forest lands in federal trust status. Federal trust lands are also subject to the Code of Federal Regulations (CFR) which lists Forest Management Inventory and Planning (FMI&P) as a statutory requirement: CFR 163.11. The Nez Perce Tribe's forested land holdings are in north central Idaho and NE Oregon and are collectively a small fraction of the Nez Perce Tribe's forested territory.

The history of forest management planning began in 1963 with the contracting of Ernest Wohletz, Dean of the College of Forestry of the University of Idaho. This plan is commonly referred to as the 'Wohletz Plan'. Thereafter, revisions in 1982 (NP82-566), 1992 (NP92-25) and 1998 (NP98-339) have guided forest management actions. The 1998 plan was drafted as a non-expiring plan with periodic updates as needed (citing guidance from 25 CFR 163.11). With concerns related to adverse climate impacts to the Nez Perce Tribe's forested resources, an ongoing effort to implement an Integrated Resource Management Plan (IRMP), and a need to update desired future condition objectives, the forest management plan has been revised to synthesize forest ecosystem management objectives that are enhanced by peer-reviewed scientific and traditional knowledge that is culturally sensitive (NPXX-XXX).

This plan will be known as the Nez Perce Tribal Forest Management Plan, and it will be in effect upon signature of the Nez Perce Tribe and BIA. The period covered by this plan shall not exceed 15 years from the FMP activation date unless an extension is authorized by NPTEC and BIA.

Preferred Alternative

Alternative D – Forest Health & Resilience (AAC – 4.8MMBF/Year; 23% of forest growth)

The primary purpose of forest management is to maintain the health and productivity of the Tribal Forest resource with a secondary objective of producing revenue necessary to provide essential government services for the Nez Perce people. The Nez Perce forestlands are an important historic, religious, and cultural tie to the forebearers of the present Nez Perce people. Forest management decisions will recognize the intrinsic and less easily measured values of forest resources other than timber. The timber resource is only one component of the forest resource and as such, the health and productivity of the timber resource is dependent upon maintaining the overall health and productivity of the forest ecosystem. These values are reflected in the desired future conditions (DFCs) detailed in this document as well as the other planning mechanisms to which it is tiered.

The preferred forest management alternative, Alternative D – Forest Health & Resilience, recommended by the FMP interdisciplinary team (IDT) and adopted by the Nez Perce Tribal Executive Committee (NPTEC) provides a strategic and transparent pathway towards desired future conditions. The implementation strategy identifies forest restoration and maintenance needs as an 'acres in need' identification that translates to 4.8 million board feet (MMBF) timber volume (annually) or approximately 900 acres/year during the 15-year forest planning duration on Trust and Allotted land tracts.

RELATION TO OTHER DOCUMENTS

This 15-year planning document is designed to tier to the on-going development of the IRMP which incorporates the concepts of multiple use, and diverse values of the Tribe's forested resources.

An area of departure from the 1998 FMP is the inclusion of Individual Indian owned Allotments. The FMP is designed as a holistic forest management guidance document for all Nez Perce owned forestlands (e.g., Trust and fee status). Individual Allotment owners may have specific management goals and objectives in addition to the FMP DFCs. Management goals defined by a majority allotment ownership that does not correspond to the FMP's preferred management strategy will be reviewed by an IDT, NPTEC, and Bureau of Indian Affairs (BIA) for implementation approval.

Allotment forested acres are assessed holistically to an Annual Allowable Cut (AAC) value; however, activation of timber sales on Individual Allotment Forest Management will require approvals from a majority ownership or power of attorney authorization from the BIA. Forest development, fuels treatments, fire suppression and other investments do not require allottee approval.

VISION AND GOALS

The following vision statement was developed for and included in the 2023 Nez Perce Tribe IRMP. Refer to *<u>Chapter 3: The Vision</u>* *in the IRMP to view the vision statement along with desired future conditions for each resource recognized in the plan.*

The Nez Perce Tribe strives to reestablish a homeland in which:

- Our people thrive due to improved social and environmental conditions,
- Our Treaty-reserved rights are upheld and perpetuated for future generations,
- Opportunities for traditional cultural practices and the exercise of our Treaty-reserved rights are common,
- Our resources, landscapes, and development initiatives sustain vibrant, healthy, multigenerational communities,
- Our natural and cultural resources are managed in a comprehensive, collaborative, and interdisciplinary manner to promote healthy and sustainable resource conditions,
- Our natural and cultural resources which were previously lost or degraded are fully restored,
- We play an active role in guiding land use and development initiatives, and
- Our neighbors and partners are well-educated regarding the Tribe's history, values, and vision.

This vision encompasses a wide range of resources and associated interests. The Tribe's desired future condition of these resources and interests within our Reservation are described below. We intend that these desires become realities through a shared embrace of the Tribe's vision and consistent, dedicated implementation of the Tribe's management strategy and policies as described in Chapter 4.

As stated in the Nez Perce Tribe's DNR Strategic plan (2017), the Forestry & Fire Management division of the DNR's purpose *'…is to restore, perpetuate, enhance, and manage the forest resources of the Nimiipuu, including by providing wildland fire prevention and suppression services.'*

The Forestry & Fire Management's strategies in which to achieve this programmatic purpose include:

- *Assisting Tribal leadership in treaty rights protection,*
- *Implementing, monitoring, and revising the Tribe's Forest & Fire Management Plans*
- *Managing for a fire-safe environment,*
- *Managing for healthy, resilient forest ecosystems, and*
- *Producing forest products and income.*

The Forestry & Fire Program provides seven key services:

Forestry & Fire Program

In addition to services listed below, the Forestry Program includes silviculture, forest pest management, timber and fire trespass, free-use permits, and the Seniors Firewood Program along with the utilization / collaboration with other federal, state, and private agencies such as the NRCS and other collaborative programs/agreements.

Forest Management Inventory & Planning (FMI&P)

The FMI&P Program implements, monitors, and revises the Nez Perce Tribe Forest Management Plan as adopted by NPTEC, as well as monitors and reports current forest inventory metrics pertinent to a sustainable forest resource.

Presales & Timber Sale Administration (P&TSA)

The Presales & Timber Sale Admin Program facilitates the harvest of the annual allowable cut (AAC) within 10% of the targeted cut volume over forest management planning periods and provides income to the Tribe.

Forest Development & Timber Stand Improvement (FD&TSI)

The FD&TSI Program works to develop and maintain healthy, productive forests on Tribal lands, including the reforestation of non-stocked forest land as well as the control of tree species composition and stocking levels for healthy forest conditions. The FD&TSI Program prioritizes projects based on forest productivity and available funding.

Fire Preparedness & Readiness

Fire Preparedness & Readiness staff include a Fire Management Officer, Wildland Fire Engine Crews, and dispatch. The program ensures the annual process of planning and implementing activities is completed prior to wildland fire ignitions and collaborates with adjoining agencies to ensure fire readiness.

Fire Suppression

The Fire Suppression Program ensures the efficient and effective suppression and management of wildfires by keeping track of all fires occurring on the Reservation and dispatching resources off the Reservation as requested. The BIA contracts with the State of Idaho as the protection agency for wildland fire suppression on a portion of Tribal lands.

Fire Prevention

Fire Prevention staff reduce wildland fire ignitions, the risk of damaging wildfires, the threat to people & communities, and the cost to federal and Tribal funds.

Fuels Management

Fuels Management staff restore fire-prone ecosystems to desirable conditions and reduce the risk of damaging wildfires through hazardous fuel reduction.

1 FOREST DESCRIPTION

Forests of the Inland Northwest have undergone compositional and ecological changes since the region was settled by Euro-Americans. The conversion of forestland to agriculture, selective harvest and high-grading, introduction of exotic species, and the exclusion of fire from the landscape are some of the practices that have directly influenced the development of forestlands and their departure from historic conditions. These changes have created a myriad of challenges for modern forest managers who, currently, contend with the fragmentation of forestlands, poor forest health, the spread of insects and disease, extreme wildfire conditions, and the influence of climate change.

This section provides an overview of the current condition of the 1863 Nez Perce Reservation, the ecological history of the general forest types that overlap the Reservation boundary, and the history of forest management practices conducted by the Nez Perce Tribe.

High-grading is a type of selective harvest where the most valuable trees are removed based on highest economic value verses the Tribe's preferred management strategy that improves or maintains ecological function. The 'High-grading' strategy typically leaves trees with undesirable characteristics: stagnate growth, poor health, and reduced species and structural diversity. The Nez Perce Tribe actively purchases lands to resolve land fragmentation concerns related to wildlife habitat and stream ecosystem health. Previous landowners may 'High grade' the forest resources prior to sale resulting in costly forest restoration efforts to meet desired future conditions (DFC).

1.1 LOCATION & SETTING

1.1.1 Reservation Location

The Nez Perce Indian Reservation is located along the western foothills of the Bitterroot Mountain range in north central Idaho (Figure 1-1 and Figure 1-2). It covers 770,486 acres (1,203 mi^2) making it the largest Tribal reservation in the state of Idaho. The Bitterroot Mountain range is a subrange of the Rocky Mountains and divides Idaho from Montana. The Nez Perce Tribe currently owns 15.8% of the 1863 Reservation area (121,604 acres). The Clearwater River of northern Idaho flows within the 1863 Reservation as the Middle and South forks converge to form the main stem of the Clearwater River. The Snake River is approximately 5 miles to the west, the Clearwater Mountains (part of the Bitterroot Range) begin 15 miles to the east, and the Main Salmon River lies to the south of the 1863 Reservation.

The Nez Perce Indian Reservation boundaries extend into Nez Perce, Clearwater, Lewis, Idaho, and Latah Counties. The principal administrative offices of the Nez Perce Tribe, the Northern Idaho Agency - Bureau of Indian Affairs (BIA), and the Indian Health Service are in Lapwai, Idaho. The twin cities of Lewiston-Clarkston are about 15 miles west of Lapwai and have a population of about 35,000 (US Census, 2020).

North central Idaho is characterized by high prairies and forested mountain terrain with deep-cut river valleys. The Reservation is located on a plateau cut by three deep, steep-sided, rocky canyons formed by the Clearwater River, Lawyer Creek, and Big Canyon Creek. The Clearwater River and the Snake River are the two main waterways in the area and form a confluence in Lewiston. Further west they join the Columbia River and flow to the Pacific Ocean.

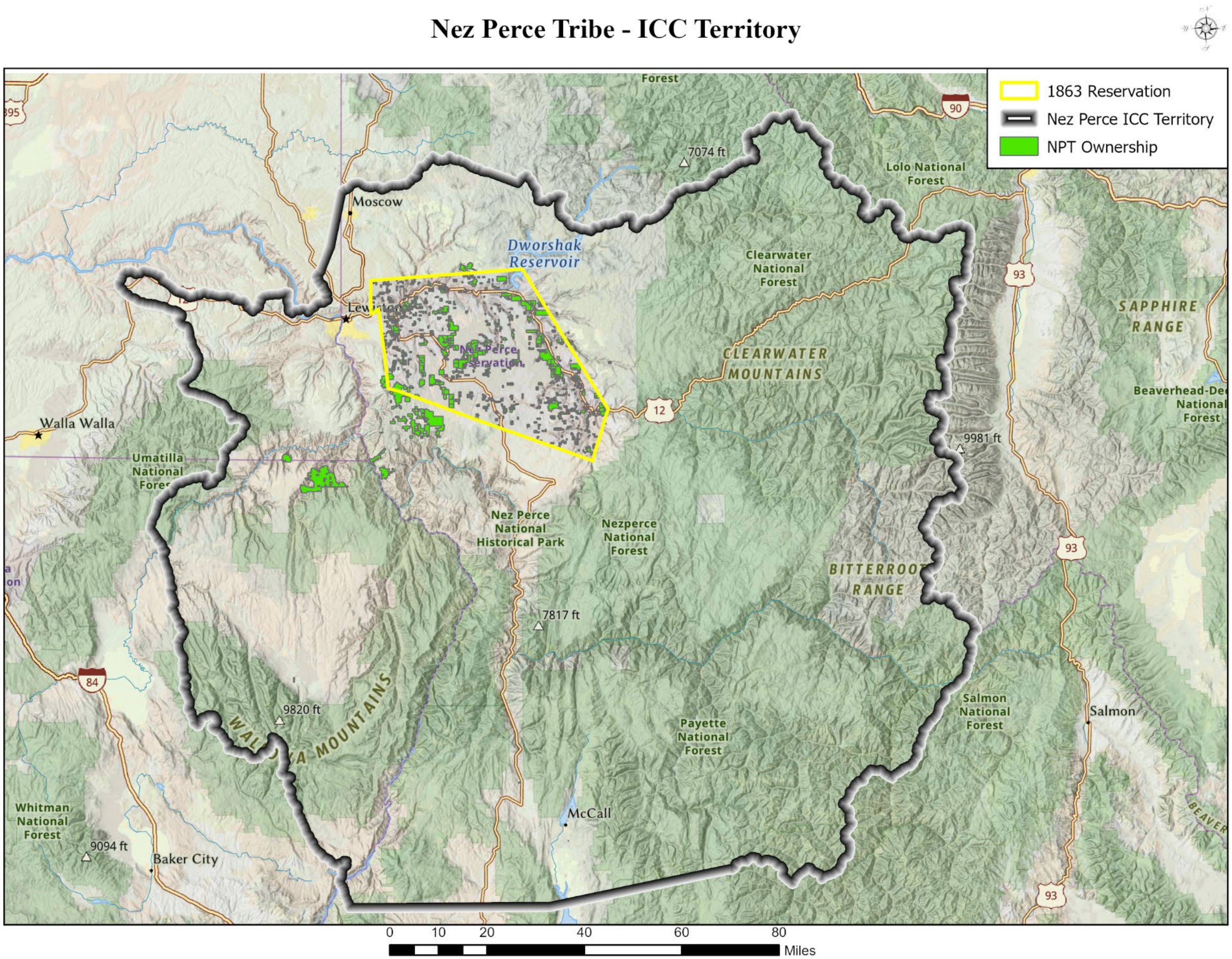


Figure 1-1) Nez Perce Tribe Indian Claims Commission Map. The ICC territory boundary is not representative of the broader Nez Perce Tribe Usual and Accustomed Places geographic zone.

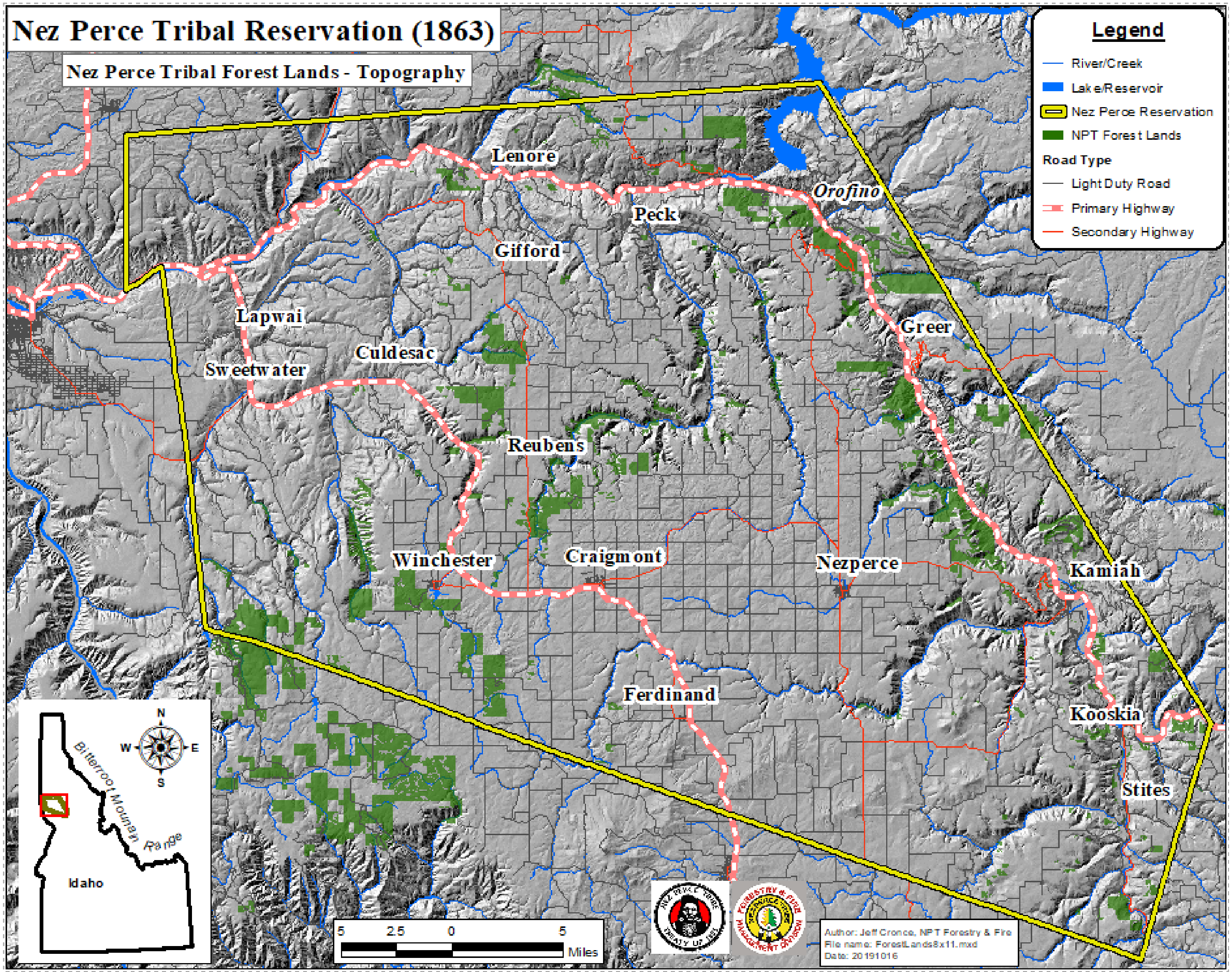


Figure 1-2) Topography of Nez Perce Tribal Forest lands.

The Nez Perce Tribe maintains their sovereignty on usual and accustomed (U&A) places for fishing, hunting, gathering, and maintaining cultural values. The Nez Perce Tribe's territory spans across ~13 million acres in northcentral Idaho, southeastern Washington, and northeastern Oregon where shared land management efforts with other federal, state, local governments, and non-profit groups coexist.

1.1.2 Climate

Winters on the Reservation are dominated by cool air masses from the Gulf of Alaska and summers by a stationary high-pressure zone over the Pacific Northwest coast. On an annual basis, temperatures within the Reservation are several degrees cooler at the higher elevations than on the valley floors. Record temperatures range from a high of 117 degrees Fahrenheit recorded during the summer of 1939 (Lewiston, Idaho) to a low of -40 degrees Fahrenheit during the winter of 1968 (Winchester, Idaho). At lower elevations, average annual daily maximum temperatures range from 42 degrees to 63 degrees (Lewiston, ID), with an average high temperature of 89 degrees in July. Average temperature ranges from 34 to 55 degrees in the higher elevations (Winchester, ID), with an average low temperature of 21 degrees in December (U.S. Climate Data, 2024).

The growing season approaches 200 days in the lower elevations of the valley floors. Where elevations are higher, the length of the growing season is reduced, especially in geographic locations in the eastern portion of the Clearwater Basin and southwestern Craig Mt. region where freezing temperatures can, and frequently do, occur during every month of the year.

Annual precipitation on the Reservation is also affected by elevation, with the higher mountain areas receiving about twice as much precipitation per year as the lowest areas. Average annual precipitation ranges from just over 12 inches at the lower end of the Reservation near Lewiston to approximately 27 inches on the Salmon River Divide. Although precipitation falls during all months of the year, a smaller amount occurs during the summer months of July and August. In the higher elevations much of the precipitation from November to April falls as snow, averaging 82 inches per year at Winchester (U.S. Climate Data).

1.1.3 Ecosystems and Biological Communities

Much of the information in this section was excerpted or derived from the publication Ecoregions of Idaho (McGrath et al. 2002). There are three major ecoregions that overlap the boundary of the 1863 reservation. Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (McGrath et al. 2002). More information about management priorities and subregions can be found in the Plant & Wildlife Conservation Strategy of the Nimiipuu (Nez Perce Tribe 2019). The distribution of ecosystems and biological communities is depicted in Figure 1-3.

Ecoregions is a landscape level review of similar vegetation cover types, wildlife species, climate conditions, and other important characteristics. Ecoregions can be broken down into smaller, more specific units (e.g., habitat types or fire-related successional pathway groups) as needed.

Level IV ecoregions (McGrath et.al., 2002)

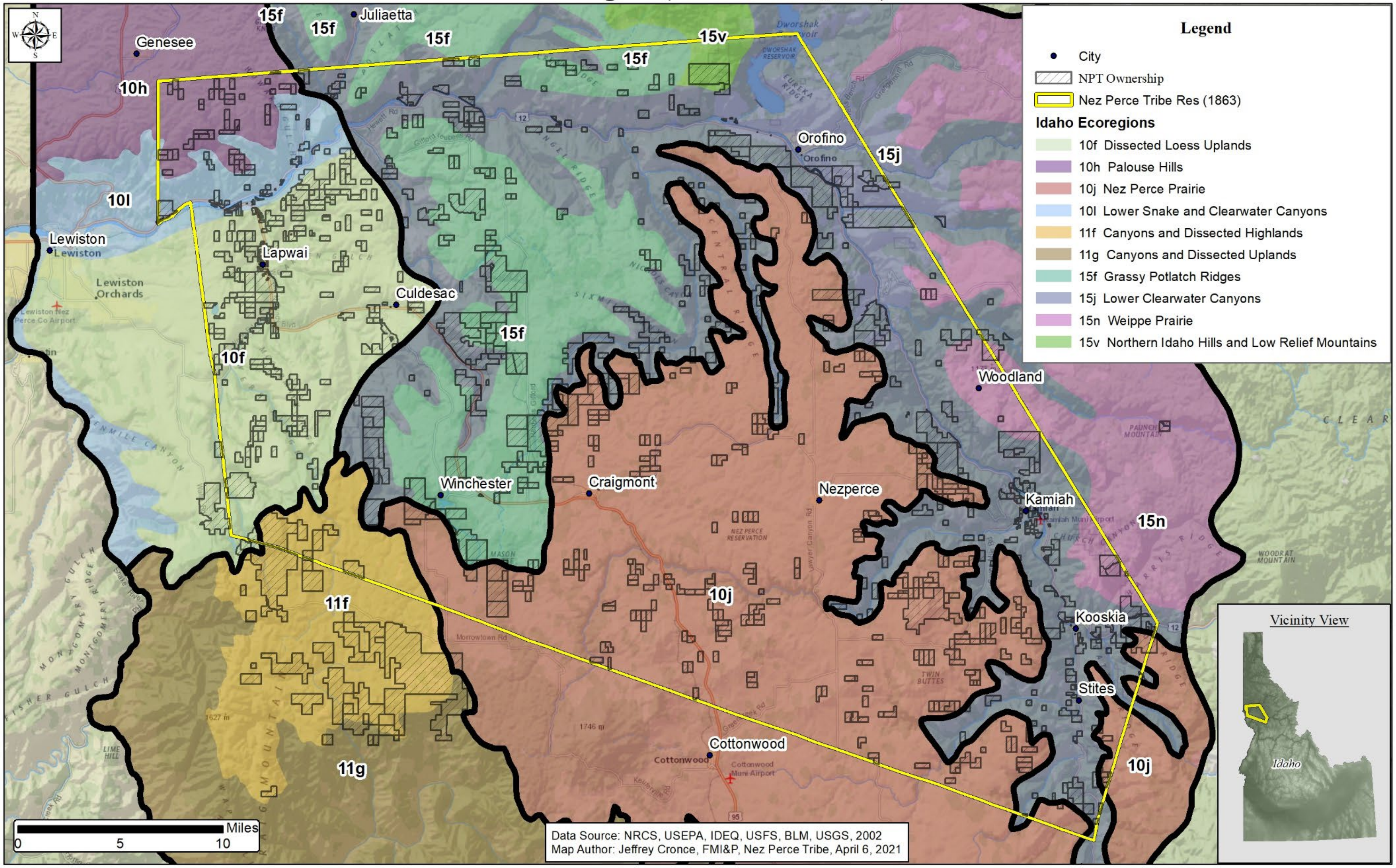


Figure 1-3) Level IV ecoregions that overlap the boundary of the 1863 Reservation boundary.

Columbia Plateau (10): The Columbia Plateau ecoregion is an arid sagebrush steppe and grassland comprising 1,975 square miles (9.5%) of the Nez Perce homeland and 608 square miles (50.5%) of the Nez Perce Reservation. Underlain by basalt up to two miles thick, the Columbia Plateau is covered in some places by loess soils that have been extensively cultivated for wheat, particularly in the eastern portions of the region where precipitation amounts are greater.

Blue Mountains (11): The Blue Mountains ecoregion is a complex of mountain ranges comprising 6,076 square miles (29.2%) of the Nez Perce homeland but only 25 square miles (2.1%) of the Nez Perce Reservation. Unlike the Northern Rockies, the region is mostly volcanic in origin. Only the few higher ranges, such as the Wallowa Mountains, consist of granitic intrusive and metamorphic rocks that rise above the dissected lava surface of the region. Unlike the Idaho Batholith and Northern Rockies, much of this ecoregion is grazed by cattle.

Northern Rockies (15): The Northern Rockies ecoregion is mountainous and rugged. Despite its inland position, climate and vegetation are generally marine influenced. Douglas-fir, subalpine fir, Engelmann spruce, and ponderosa pine as well as western red cedar, western hemlock, and grand fir are found in the ecoregion (western hemlock is not on the Reservation). The vegetation mosaic is different from that of the Idaho Batholith which is not dominated by maritime species. Alpine characteristics occur at highest elevations and include numerous glacial lakes. Granitics and associated management problems are less extensive than in the Idaho Batholith. This ecoregion represents 3,471 square miles (16.7%) of the Nez Perce homeland and 571 square miles (47.4%) of the Nez Perce Reservation.

1.2 Historic Forest Conditions

Historically, the dry ponderosa pine and mixed conifer forests of the Inland Northwest were shaped by frequent low- and mixed severity fires. Low- and mixed-severity fire regimes influenced the development of these dry forest types which, as a result, often featured light and patchy ground fuels, simplified forest structure, variable tree densities, fire tolerant tree species, such as ponderosa pine, and fire tolerant shrubs and herbs (Hessburg et al. 2005). Collectively, these stand conditions made dry forest types resilient to natural disturbance regimes.

Disturbances are biotic or abiotic impacts that affect where and how forests grow. Many types of disturbances result in damage to or the death (mortality) of one or many trees. Disturbances can include lightning, strong winds, wildfire, insect, disease, and wildlife activity, human activity, and more. When these events result in tree mortality, the space in which that tree was growing is now available to other trees or other types of vegetation. Dependent on frequency and extent, disturbances can lead to a spatial shift in the type, size, age, and spacing of trees in a forest.

The exposure of dry forests to natural disturbance regimes produced stands that were fire-resistant, multi-aged, and distributed across the landscape as individual trees and tree-clumps interspersed with openings of various size (Larson and Churchill, 2012; Churchill et al., 2013 as cited in Hessburg et al. 2019) The primary drivers creating disturbances were climatic conditions and wildfire but insects, pathogens, and weather events also influenced the distribution of dry forest types across the landscape.

Wildland fires, within the forested land classification, consume available fuels (e.g., grasses, shrubs, trees, and woody debris). Fires become historically uncharacteristic when excessive fuel is available and during extreme weather conditions.

1.2.1 Wildfire

Prior to Euro-American settlement, dry ponderosa pine and mixed conifer forests experienced low- and mixed-severity fires that typically occurred at 5-to-25-year intervals (Hessl et al., 2004). These fires, which were started by lighting or aboriginal burning (Agee, 1993; Barrett and Arno, 1982; Boyd, 1999; Robbins, 1999; Whitlock and Knox, 2002 as cited in Hessburg et al. 2005), typically started as surface fires on grassy benches, ridge tops, or valley bottoms and then migrated into adjacent dry forests (Hessburg et al. 2005). In dry forests, frequent low- and mixed-severity fires maintained a surface-fire dominated regime (Larson et al., 2013 as cited in Hessburg et al. 2019) in which fire spread and occurrence were typically self-regulating (Parks et al., 2015 as cited in Hessburg et al. 2019). These fires were integral in shaping dry forest stands and landscapes as burning (Hessburg et al. 2005):

- Periodically exposed patches of bare mineral soil which favored the regeneration of fire-tolerant tree species.
- Maintained fire-adapted forest structure by elevating tree crown bases and by scorching or consuming seedlings, saplings, and pole-sized trees in the understory.
- Cycled nutrients from leaf litter, branches, and other coarse woody debris on the forest floor back into the soil where they would be available for other plants.
- Reduced the threat of running crown fires by maintaining irregular spacing between individual trees and forest patches, which isolated incidents of torching, and reduced competition for resources amongst surviving trees, shrubs, and herbs.

Overall, exposure to a regime of low- and mixed-severity fires resulted in a dry forest stand structure and composition that favored future low- and mixed-severity fires and isolated conditions that supported high-severity fires (Hessburg et al. 2005). Stands resilient to fire primarily featured fire-tolerant species, such as ponderosa pine and western larch, and inhibited the growth of shade-tolerant and fire intolerant species such as Douglas-fir and grand fir. Fire resilient forests were characterized by patchy stand distribution, low tree density, and medium to large trees. This stand structure and distribution promoted fire and drought resilience as well as resilience to insect outbreaks (Johnston et al. 2018).

1.2.2 Insect Outbreaks

In addition to wildfire, insect outbreaks are one of the most significant disturbances, both ecologically and economically, that affect the structure and composition of dry forests (Westerling et al 2006, Kurz et al 2008, Hicke et al 2013 as cited in Meigs et al 2016). Under a historic low- and mixed-severity fire regime dry forests were adapted to insect outbreaks, and high severity insect outbreaks may have produced conditions that further increased dry forest resiliency to wildfire (Meigs et al. 2016). Severe outbreaks reduced the amount of live vegetation available for wildfire and altered the distribution of fuels within an affected stand. For instance, as trees defoliate and die, fuels begin to transition from the canopy to the forest floor as they decompose and break apart (Hummel and Agee 2003, Simard et al 2011, Hicke et al 2012, Cohn et al 2014, Harvey et al 2014 as cited in Meigs et al. 2016).

Insect activity in forests can also affect the way wildfires burn. Under certain conditions insect activity in a forest can create more wildland fuel by killing trees. Trees are more likely to die from insect activity when needed resources (e.g., water and nutrients) are severely altered. During periods of drought many trees can become vulnerable to insect attacks which can lead to insect outbreaks and extensive mortality.

Insect outbreaks may have reduced impacts from wildfire on residual vegetation through a thinning effect that resulted from insect-caused mortality (Meigs et al. 2016). For instance, this effect is evident with mountain pine beetle (MPB) as outbreaks generally lowered burn severity in forests affected by MPB (Meigs et al. 2016). The thinning effect and reduced burn severity resulting from MPB outbreaks may have persisted until vegetation and fuel conditions returned to pre-insect conditions (Meigs et al. 2016). As an important component of dry forests in the Inland Northwest and a host species for MPB, this thinning effect, in conjunction with wildfire, would have influenced the development of ponderosa pine forest types, including those on the Reservation.

1.3 Current Forest Conditions

Nez Perce Tribe forestlands began to depart from historic conditions during the industrial age when Reservation lands were open to non-tribal occupancy. The removal of larger, high value overstory trees and fire suppression resulted in changes in forest composition and structure. Stands became younger and more crowded with shade tolerant, fire intolerant species such as grand fir and Douglas-fir. Changes in species composition and stand structure have, subsequently, altered stand dynamics by changing disturbance regimes.

Human activity associated with European settlement has impacted where forest grow, how they grow, and what grows within. These changes, which have resulted in greater accumulations of wildland fuels and undesirable ecological function, have been a leading cause for increased modern wildfire frequency and severity.

1.3.1 Wildfire

Large swaths of dry pine and mixed conifer forest no longer appear or function as they did historically. At the landscape level, dry forests are now more homogenous in composition and structure which increases the likelihood for severe, large fire and insect disturbance events (Hessburg et al. 2005). Historically, dry pine and mixed conifer forests were primarily composed of shade intolerant and fire tolerant species, such as ponderosa pine and western larch, but those forest types now feature a substantial component of shade tolerant and fire intolerant species, such as Douglas-fir and grand fir (Johnston et al. 2018). Secondary succession of shade tolerant, fire intolerant species in dry pine and mixed conifer forests has largely been the consequence of fire exclusion and suppression and past forest management practices (Hessburg et al. 2005). For instance, fire-tolerant, shade intolerant cover types were harvested and widely replaced by fire intolerant, shade-tolerant species that are typically characterized by low crown bases, heat-trapping crowns, and thin bark (Hessburg et al. 2005).

Currently, many dry forest patches have missed multiple fire cycles which has resulted not only in compositional changes, but also structural changes and changes related to the distribution and accumulation of fuels (Johnston et al. 2018). As smaller diameter, fire intolerant species have become a greater component of dry forests and live and dead fuels have accumulated in the absence of fire, forests have become less resistant and resilient to wildfire (Johnston et al. 2018). Consequently, contemporary fires tend to be much larger and much more severe as compared to historical fires that burned in dry forest types.

Fire exclusion is the practice of extinguishing fires as soon as they start. This was the perspective of the US Government when it first started managing forestlands and implemented vigorously after the widespread and severe wildfires in 1910. As a result, forests did not burn often enough which has led to the accumulation of wildland fuels and has increased the risk for severe wildfires.

Dry forest patches on the Reservation exhibit some of these changes which, in summary, may display some of the following characteristics or traits to varying degrees (Hessburg et al. 2005):

1. Elevated fuel loadings and increased connectivity of high fuel loading.
2. Increased potential for running crowning fires.
3. Increased vulnerability to many insect and disease disturbances of fire-intolerant tree species.
4. Increased likelihood of severe fire behavior in forest stands or patches with respect to flame length, rate of spread, and fireline intensity.
5. Increased contagion or spatial aggregation of vulnerability to severe fire and insect and disease disturbances.

1.3.2 Insect Outbreaks

Dry forests on the Reservation have changed in terms of both species composition and stand structure due to industrial-era timber harvest practices and fire suppression. As stands have become increasingly more crowded with shade-tolerant species they have become less resilient to changes in environmental conditions and reduced vigor has made them more susceptible to disturbance. Such changes have made forestlands on the Reservation more susceptible to large and severe wildfires and more susceptible to insect outbreaks. However, some species, specifically those associated with historic dry forest conditions, have demonstrated higher levels of resilience to insect attacks. Relative to other species, ponderosa pine mortality resulting from insect outbreaks tends to be less dramatic as many ponderosas often survive, including those in larger diameter classes (Hansen 2014). Impacts from severe outbreaks tend to be variable, with more recent studies suggesting that rates of mortality range anywhere from approximately 20 to 50% with some outbreaks resulting in higher levels of mortality in larger diameter classes (Hansen 2014).

Insect outbreaks are a natural part of forest ecosystems and may play a role in reducing wildfire risk. Recent studies indicate that insect outbreaks do not necessarily increase the severity of subsequent wildfires (Meigs et al. 2016) but may instead dampen wildfire severity by altering forest structure and composition (Raffa et al 2008, Flower et al 2014, Meigs et al 2015 as cited in Meigs et al. 2016). Although forests on the Reservation may be more susceptible to large insect outbreaks and higher levels of insect-caused mortality, the impacts from such outbreaks would not necessarily increase the severity of post-outbreak wildfire.

In addition to stand structure and composition, climate change is also expected to influence the frequency and severity of insect outbreaks. Changes in environmental conditions resulting from climate change are expected to have the greatest impacts at the margins of tree ranges as sub-optimal growing conditions and reduced vigor could be conducive to insect outbreaks if conditions are appropriate (Liebhold and Bentz 2011). On the Reservation, this may have implications for the shade-tolerant species that have become a greater component of Tribal forestlands. Many stands are currently overcrowded due to infilling with small diameter, shade-tolerant species. Because of the increase in stand water use, when compared to historic conditions, these stands will be more susceptible to drought stress which will intensify as climate continues to change (Waring and Pitman 1985, McDowell et al. 2008, McDowell and Allen 2015 as cited in Johnston et al. 2018). In addition to wildfire, prolonged drought stress reduces tree vigor and increases the likelihood of mortality caused by insect outbreaks.

Climate change is an abnormal shift in weather conditions that disrupts natural processes. These patterns may be caused by increased human activity and the use of fossil fuels. With extreme climate variations, conditions are expected to be increasingly warmer and drier, which further affects the way that forests grow and how vulnerable they are to disturbances such as wildfire and insect outbreaks.

1.3.3 Forest Management

Since the 1870's and 1880's, the Palouse Prairie, which is adjacent to the Reservation, has been altered extensively by human activity (Morgan et al. 2020). Consequently, the landscape has changed from a mix of prairie, pine savanna, and mixed conifer forests to a landcover mix that is predominantly agriculture with isolated patches of prairie and forests. The forests have largely become more crowded and are composed of more shade-tolerant species than they were historically, while pine savannas have mostly disappeared (Morgan et al. 2020). Similar changes in the fractionation and composition of Palouse Prairie forests have also occurred on the Reservation. Restoration of these forest types, through forest management, has become a priority for the Nez Perce Tribe.

Human activity has led to significant changes to the Camas Prairie and surrounding areas. Much of the prairie has been converted to agriculture and many of the pine forests that grew adjacent to the prairie have departed from historic conditions due to fire exclusion practices. Without fire many of the pine forests now include more trees and undesirable tree species. In some cases, forestlands have expanded (naturally or with afforestation practices) and now grow where prairie lands were once located.

Tribal forest lands have been managed for timber products since the turn of the 20th century (Babcock, 1991). In general, all Tribal commercial forest lands show evidence of past logging, making second growth stands the most prevalent stand type across the Reservation. Consequently, no pure old growth remains as all commercial forestland has been altered. However, there are remnants of old trees (legacy trees) scattered across the reservation in the Talmaks, Cold Springs, Winchester, and Five Mile areas and various Individual Allotments still feature large sized trees originating from the 18th century or earlier (Figure 1-4).

"Second growth" describes forests that have regenerated after a single or series of disturbances causing widespread mortality of the trees that were there originally. Such events can be natural (e.g., wildfire, strong wind, volcanic eruptions, etc.) or related to human activity.

Recent forest management activities on Tribal forest lands have largely concerned the implementation of seed-tree and shelterwood regeneration harvests within second growth stands. These silvicultural methods aim to promote insect, disease, and wildfire resilient forests with the retention of large legacy trees through time.

1.4 MANAGEMENT HISTORY

The characteristics of the forest resource on the reservation have changed dramatically since the Reservation was established in 1863. Land use change, past timber harvesting, and forest protection practices are some of the factors that have influenced the current condition of the forest resource and have compromised ecosystem function and adaptive capacity. The Nez Perce Tribe has been actively purchasing forest lands within and adjacent to the 1863 reservation since 1986. These lands are often in poor condition due to stewardship objectives that correspond to economic benefits versus a holistic ecosystem health approach. Restoration efforts are costly and will take generations to realize a healthy and resilient landscape.

1.4.1 Land Use

In the early 1900's most of the forest lands within the reservation boundaries were cleared for dry land agricultural purposes which is currently the dominant land use. The most productive soils have been dedicated to agriculture, which generally yields the highest economic return.

Forestry is the predominant land use on tribal lands, accounting for 56,595 acres comprised of Tribal Trust (23,253 acres) and Tribal Fee (33,342) lands. In comparison, there are approximately 5,230 acres of forested allotments, an ownership type where agriculture is the dominant land use (Table 1-1).

Figure 1-4) A group of legacy trees in the Talmaks area of the Nez Perce Reservation.

The BIA Land Operations Program converted tribal forests occurring on the more productive soils to agricultural use. This program ended in the late 1970's when an economic analysis at that time indicated the income from stumpage plus the cost of land conversion from forest to agriculture exceeded the net present value (NPV) from agriculture. The economic analysis was based on optimistic timber yield projections and the assumption that all timber production would be available for harvest.

Table 1-1) Forested and agricultural acreage by landownership type (2021).

Land Ownership Type	Forested Acreage	Agricultural Acreage
Tribal Trust Lands	23,253	7,000
Tribal Fee Lands	33,342	5,200
Allotments	5,230	25,275
Total	**61,824**	**37,475**

There are approximately 61,824 acres of Tribal forestland. Currently, Tribal forestland is highly fragmented and consists of over 330 areas (tracts), of contiguous forested land located throughout and adjacent to the reservation that range in size from less than 1 acre to up to 5,946 acres (Figure 1-5). As compared to a single, contiguous area, this ownership pattern is inefficient to construct a conservation-based plan that satisfies desired ecosystem function and adaptive capacity objectives.

"Forest fragmentation" describes large, expansive areas of native forestland that have been disrupted into smaller patches of forest. This occurs when sections of forest are transformed into other uses such as agriculture, transportation, or development. Large, continuous forestlands have desired qualities, such as healthier wildlife and fisheries habitat compared to smaller forest patches that are homogenized and unsuitable for diverse wildlife populations. In addition, access and trespass management, property boundary maintenance and road networks are more difficult and costly to manage on fragmented ownerships.

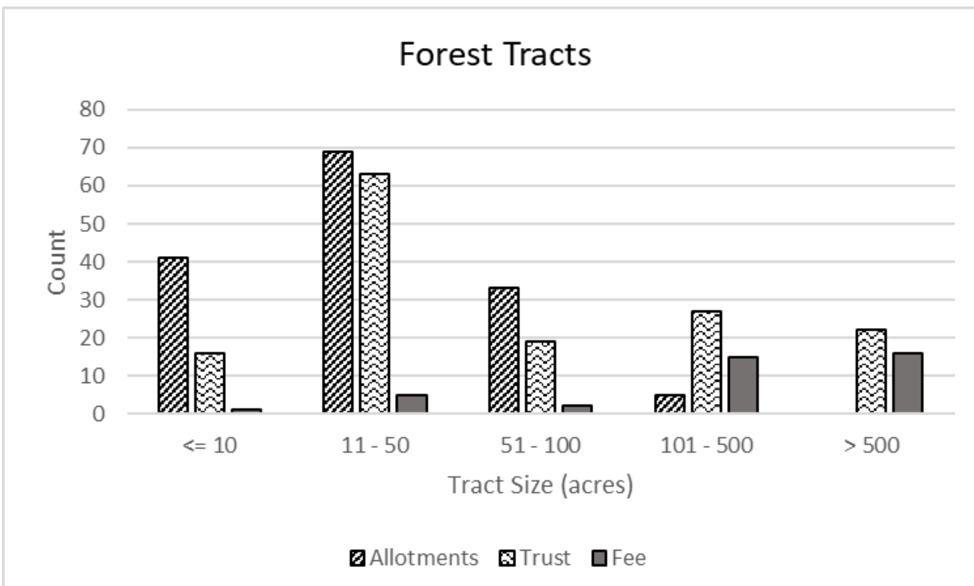


Figure 1-5) The distribution of forested tracts, by size class and count, that have been delineated on the Nez Perce Reservation (FPS, 2022).

Additional effort is required for holistic management objectives including property boundary location and maintenance, in securing temporary crossing permits to access Tribal land, and develop collaborative agreements to support desired landscape or watershed level objectives.

1.4.2 Historical Timber Harvest

Timber harvest levels by 10-year periods are shown in Figure 1-6. Timber harvest records are absent prior to 1919 although, a government sawmill located at Spalding was in operation in 1863 (Babcock et. al., 1991) indicating that timber harvest likely occurred prior to 1919 on tribal lands. The uneven harvest volume pattern displayed in Figure 1-6 is the combined result of BIA and Tribal leadership incorporating mixed forest management strategies over time to meet a combination of economic and silvicultural objectives. The initial harvest of old growth stands around the turn of the century transitioned to timber harvest within the remaining scattered old growth stands with increased timber harvesting in the second growth stands as they become mature and/or require restoration strategies. The acquisition of 23,698 acres of forest lands in the 1980's, which more than doubled the forest land base, resulted in an increase in the projected sustainable harvest level. The AAC for the 1986-1995 Forest Management Plan, which included both tribal trust and fee lands, was 8.4 MMBF based on the inclusion of fee lands.

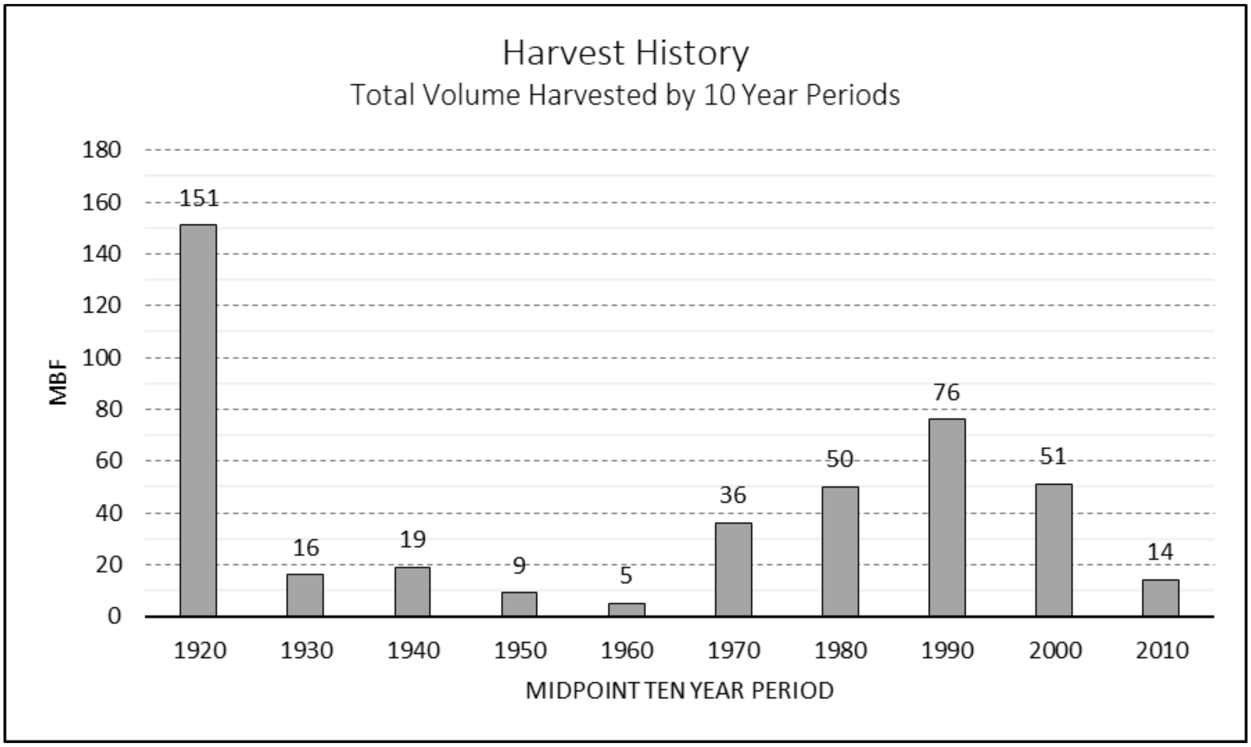


Figure 1-6) Harvest Volume by Decade (Note: this information was derived from BIA annual reports that have varying merch specifications and utilization standards as well as a significant increase in the land base in the 1980's).

Tribal forest management goals have changed dramatically during the past century. Initially the tribe was reluctant to harvest timber but was persuaded by the BIA to harvest a significant portion of the old growth in the early part of the 20th century. In the late 1950's, the tribe sued the BIA claiming not enough timber was being harvested to realize the economic potential of the forest resource (Babcock et al. 1991). Litigation was determined to be unfounded by an independent study with Duck Creek Associates, 1981.

Forest treatment objectives have changed over time. In response to economic recessions in 2001, 2008, and 2020 and a shrinking workforce, silvicultural prescriptions aimed at maintaining or improving forest health transitioned away from a "traditional" timber sale model to one of "stewardship", utilizing fuels treatments to address insect and disease issues and mitigate wildfire severity (Figure 1-7).

Forest management strategies on Tribal lands prioritize the ecological health and diversity of forestlands through attaining 'Desired Future Conditions' (DFCs). Forest management activities focus on returning forestlands, which were once harvested primarily for economic benefit, to healthy conditions that are resilient to climate and human stressors.

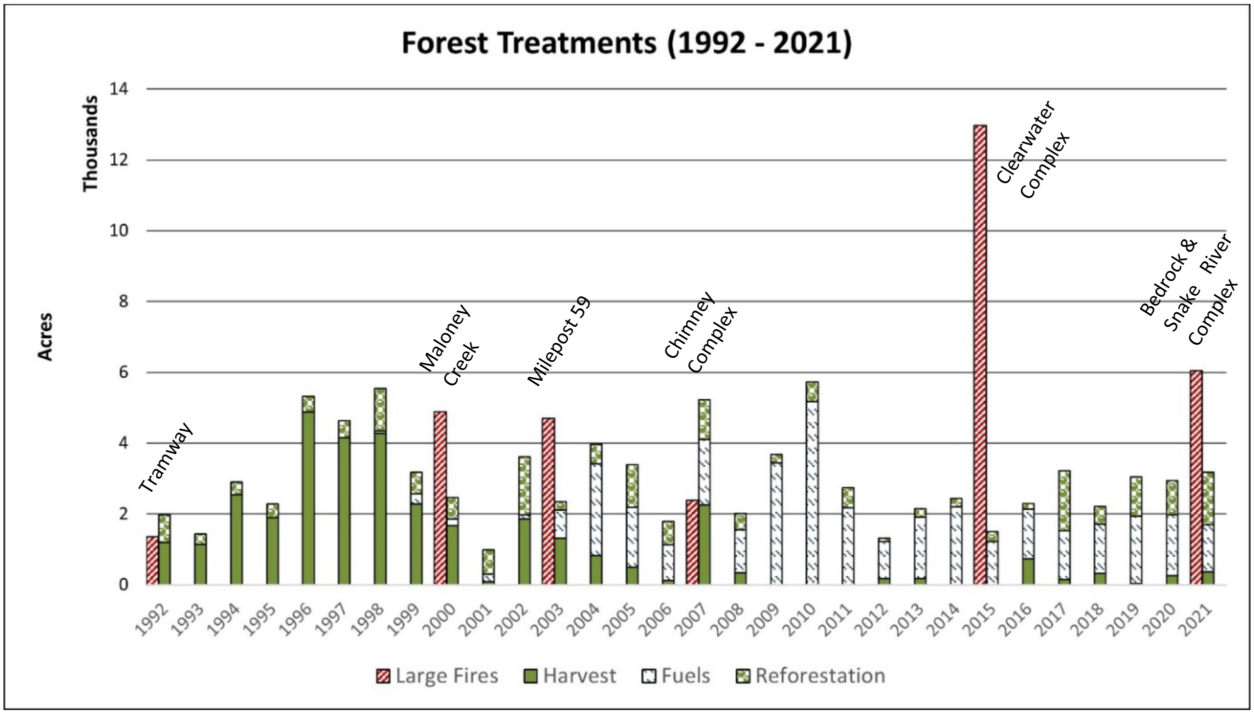


Figure 1-7) Trend in forest treatments by acres from 1992 to 2021.

1.4.3 Past Timber Management Practices

1.4.3.1 Trust Lands

Timber harvesting practices have evolved over time. Initial harvests in the late 1800's and early 1900's removed the high value yellow pine, leaving a scattered overstory of smaller old growth ponderosa pine and Douglas-fir, along with some younger aged trees. Following extensive harvesting just after the turn of the 20th century, second growth stands became established. The initial harvests had reduced canopy cover sufficiently to allow even-aged stands of ponderosa pine and Douglas-fir establishment over large areas. Subsequent, sporadic harvests through the late 1970's were primarily selective harvests where old-growth remnants and dominant and co-dominant second growth trees were removed. Trees selected for harvest were determined by individual tree risk assessments. This selective management strategy along with fire exclusion practices resulted in increased shade-tolerant Douglas-fir & grand fir regeneration establishment in the understory, and a decrease in ponderosa pine trees. This was observed in both trees per acre (TPA) and volume by species in the 2013-2015 NPT Forest Inventory Analysis report (Cronce and DeGroot 2019), and in the current TPA by species composition, size class, and MG shown in Figure 1-8, Figure 1-9, and Figure 1-10.

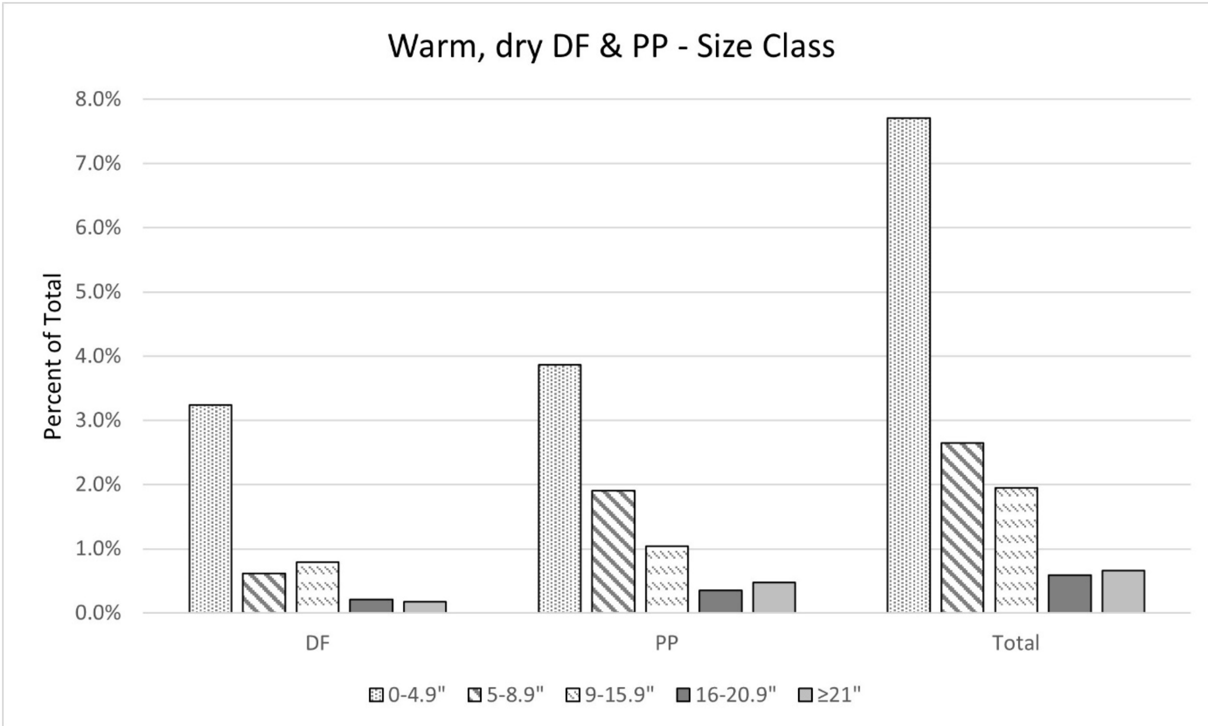


Figure 1-8) Percentage of trees on commercial forestland classified as warm, dry Douglas-fir and ponderosa pine by species and diameter class (FPS, 2022).

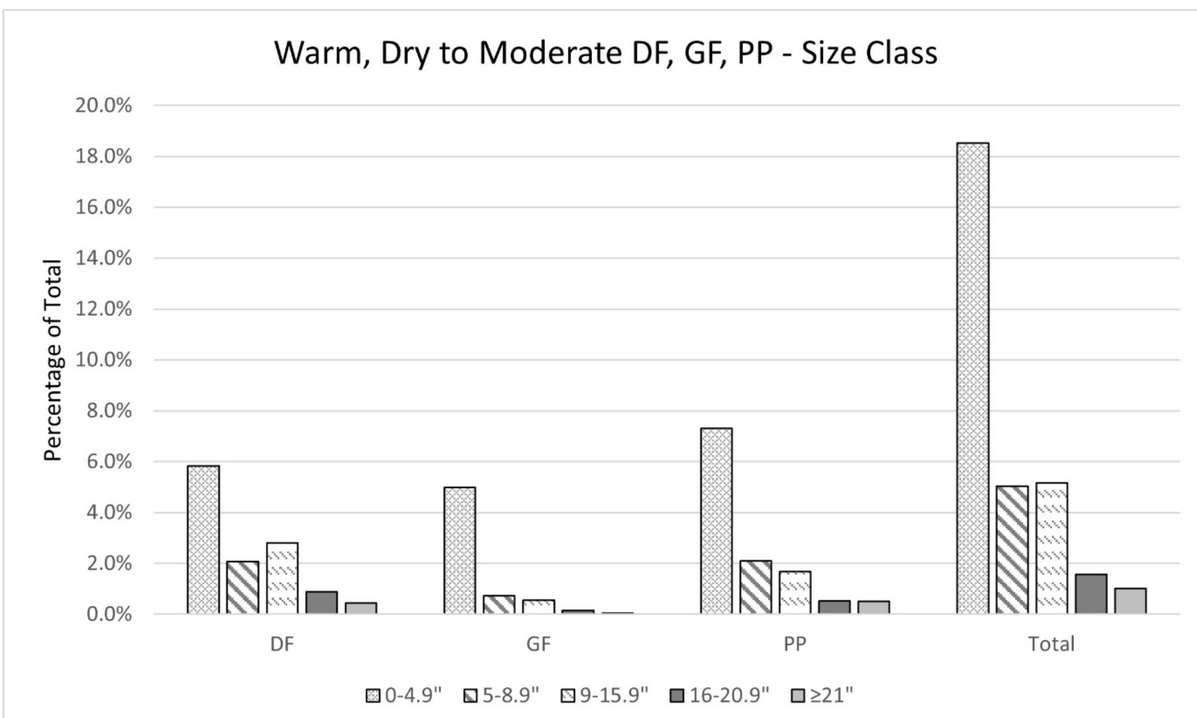


Figure 1-9) Percentage of trees on commercial forestland classified as warm, dry to moderate Douglas-fir, grand fir, and ponderosa pine by species and diameter class (FPS, 2022).

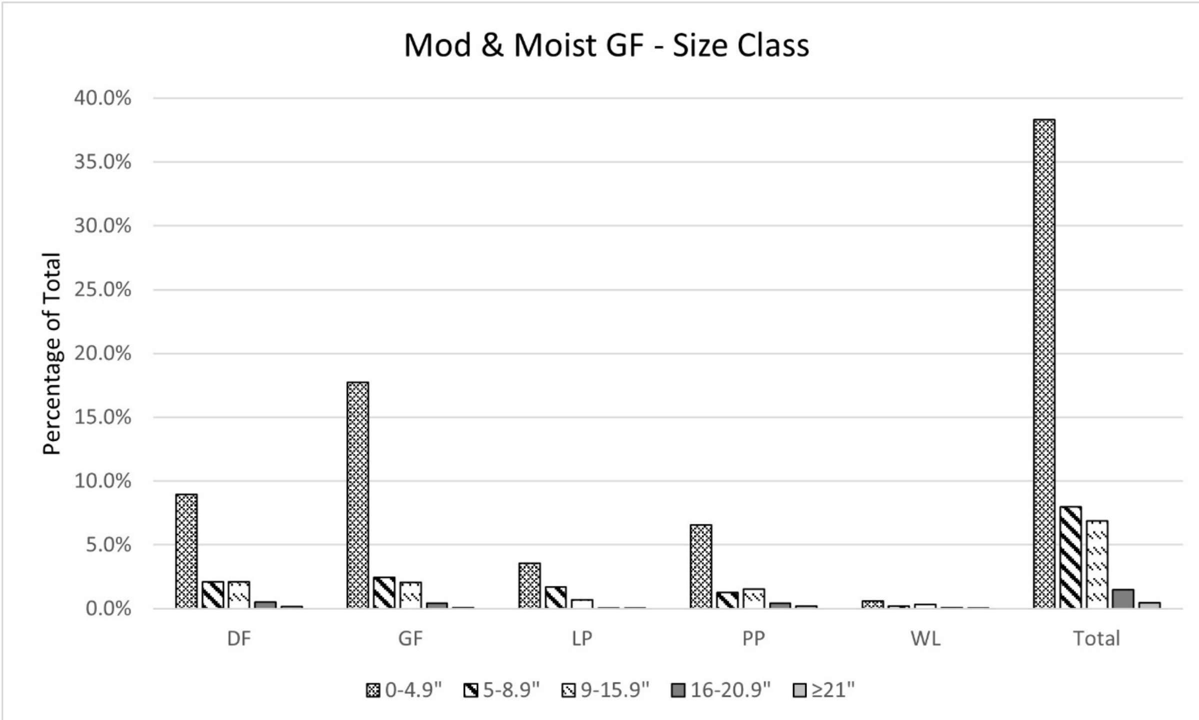


Figure 1-10) Percentage of trees on commercial forestland classified as moderate and moist grand fir by species and diameter class (FPS, 2022).

Many of the second growth stands that were initiated in the early 1900's have matured and are being replaced through regeneration harvests. Silvicultural methods initiated since the 1980's were primarily even-aged systems. Stands are regenerated by opening the overstory sufficiently to allow for the establishment of ponderosa pine. The primary objective of these harvest treatments has been to regenerate the next timber stands with early seral species, such as ponderosa pine and western larch, that are more resilient to hotter and drier conditions as well as other impacts from climate change.

Tree species are often categorized and described by how well they grow in shady conditions. This is important as seedlings often begin growing in the forest understory. The "early seral" structural stage is the initial phase after a disturbance where early seral species initially thrive due to shade-intolerant characteristics. These species, which include ponderosa pine and western larch, grow well in open areas.

Historically, forests on the reservation are assumed to have been open stands dominated by ponderosa pine, Douglas-fir, and larch in some areas. Grand fir cover types were confined to north slopes and other cool moist sites. Removal of the higher value, overstory trees and fire suppression were standard forestry practices. As a result of these practices, stands became crowded with younger Douglas-fir and grand fir second growth.

The first tree planting on the reservation occurred in 1976 to rehabilitate the Lookout Reserve from the Cottonwood Creek wildfire burning 6,393 acres. The first silvicultural prescriptions were written and implemented in 1983 for the Alpine/Five-Mile timber sale. These treatments were diverse depending on site conditions where the BIA prescribed a clearcut treatment to the Douglas-fir and grand fir stands and planted ponderosa pine to mitigate heavy root disease infections and growth issues stemming from a shallow soil hardpan (18 inches from surface). A pure ponderosa pine stand was prescribed a group selection cut to encourage natural regeneration. Douglas-fir stands without root disease issues were prescribed a shelterwood harvest to encourage natural regeneration. A 38-acre ponderosa pine stand with a small mixture of Douglas-fir was prescribed a seed tree method to promote ponderosa pine regeneration.

Tribal forest lands have historically been grazed. Most of the tribal units have been fenced, areas have been seeded to various grasses, and water sources developed for livestock. In 1982, a ten-year grazing moratorium was imposed on all tribal lands (Resolution 82-11) with the intent to develop range inventories and grazing management plans. Grazing is once again occurring on forest lands as these inventories and plans are developed by individual Tribal Units (TU). Grazing leases are currently issued and monitored by the Nez Perce Tribe’s Land Services division of the Natural Resources Department.

1.4.3.2 Purchase Lands

Past management history of acquired forest lands, prior to acquisition, is not as well documented, but forest inventories at the time of acquisition as well as current forest conditions are a good indicator of past management practices. In general, the dominant and co-dominant components of the second growth timber stands had been harvested prior to acquisition, leaving intermediate and suppressed trees with some vigorous regeneration in areas. The regeneration component was primarily established by natural seeding; therefore, trees tend to be more shade-tolerant species or lodgepole pine. Harvest treatments applied by the tribe after acquisition were primarily commercial or sanitation thinning which removed diseased, deformed, and trees of poor vigor. Ponderosa pine, Douglas-fir and Western Larch were favored as leave trees. These restoration treatments were employed to remove undesirable trees which resulted in stands with low residual stocking.

2 FOREST INVENTORY

A diverse mosaic of forest types is found on and adjacent to the Nez Perce Reservation resulting from the geomorphic combinations of slope, elevation, aspect, soils, and anthropogenic land use practices. Forest types range from warm-dry, open stands found on low elevation sites to moderate to moist forest types at mid to higher elevations. Ponderosa pine (PP) is the predominant species found on warm-dry sites. Douglas-fir (DF) and grand fir (GF) are the most frequently occurring species in the mixed conifer stands found at higher elevations. Other commercial tree species include western larch (WL), lodgepole pine (LP), western red cedar (RC), Engelmann spruce (ES), subalpine fir (AF), western white pine (WP), and Pacific yew (PY). Desired forest conditions corresponding to the historic range of variation (HRV) and projected future range of variation (FRV) suggest forest stands with a healthy component of early seral species (e.g., ponderosa pine and western larch) promote landscape wide resilience to noxious and invasive weed infestations, reduced insect and disease severity and spread, and impacts from adverse climate conditions (e.g., drought and wildfire).

2.1 FOREST LAND BASE

2.1.1 Forest Area

The Tribal Forest land base, which the Forest Management Plan addresses, includes 61,824 acres under management as of 2023. This figure changes as new forested lands are purchased, fee lands are converted to trust, and existing forest inventories are updated (Table 2-1). This plan covers all forest lands in tribal and allotted trust or fee simple status assigned to the Forestry & Fire Management division. Forestlands in fee status that have been assigned to the Wildlife division (e.g., Dworshak Mitigation, Precious Lands, etc.) are not included within this planning effort. Allotments are included under the FMP umbrella; however, if a Tribal Owner or majority owners wish to implement a different strategy that is not congruent with the preferred alternative of the IRMP or FMP EA, an individual management plan will need to be drafted and approved following BIA NEPA procedures.

Timber harvests primarily occur on commercial forestlands. Commercial forest acres comprise the timber base are used to determine the annual allowable cut. The Forest Management Plan does not include any scheduled harvests on non-commercial forestland. Timber management would only be conducted on non-commercial forestland for purposes related to enhancing ecosystem function.

Table 2-1) Tribal Forest Land Base (acres).

Category	Allotments	Tribal Trust	Tribal Purchase (Fee)	Total Tribal
Commercial Forest	3,774	18,880	25,724	48,378
Marginal Forest	987	3,549	5,348	9,885
Non-Commercial Forest	2,269	469	823	3,561
Totals	**5,230**	**23,253**	**33,342**	**61,824**

The Tribe's forest lands account for 8.5% of the total Reservation land area. Reservation forest lands are highly fragmented and occur on the majority of the 482 tribal parcels. These parcels range in size from 1 to 7,970 acres and are located throughout and adjacent to the Reservation (Figure 2-1).

Nez Perce Tribal Forest Lands (2023)

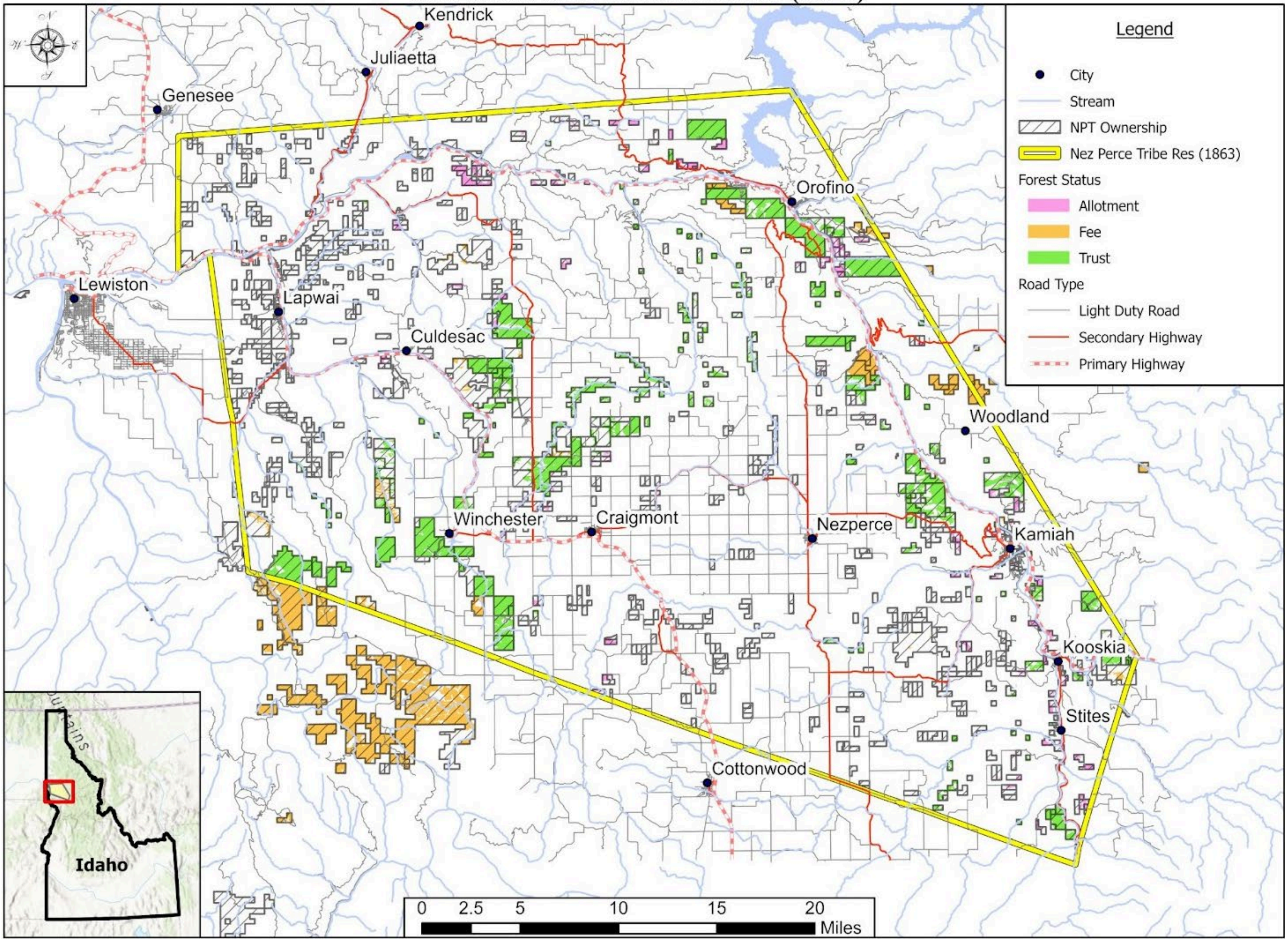


Figure 2-1) Ownership status of Nez Perce Tribal forest lands.

2.1.2 Forest Habitat Types

Forest land classification is used to assess the productivity of the resource and provide a basis for determining which vegetation management practices to apply. The classification used is "Forest Habitat Types of Northern Idaho, a Second Approximation" (Cooper et. al., 1991). This system is based on the habitat type concept of Daubenmire, which indicates potential climax natural vegetation. Forest habitat types vary from ponderosa pine / Idaho fescue (*Festuca idahoensis*) on drier sites to western redcedar / queencup beadlily (*Clintonia uniflora*) on wetter sites. The most commonly occurring habitat types on commercial and marginal forest lands are in the grand fir (47%) and Douglas-fir (46%) series. The ponderosa pine and western red cedar series occur on 6% and 1% of commercial and marginal forest lands, respectively. Acres by habitat type series are shown in Figure 2-2.

Forest habitat types are an important way of generalizing which vegetative cover and desired tree species will grow. Certain species are often found growing together; these species groupings make up the forest habitat and understory cover types that are used to guide forest management.

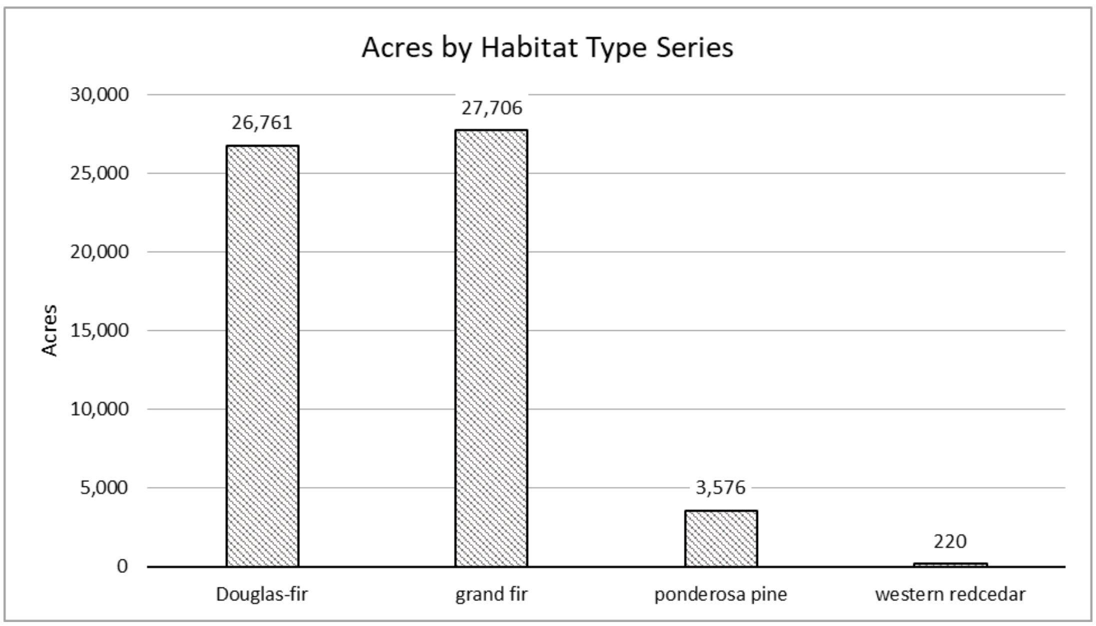


Figure 2-2) Area by Habitat Type Series. Acreage totals include commercial and marginal forest land.

2.1.3 Forest Cover Types

Tribal commercial forestlands can be further described and categorized by cover type, a classification system of the current vegetation. The forest cover types included in this section are species composition, size class, and density. The values that are presented were calculated from stand level data, but only the totals, which represent all commercial forestlands, are presented.

Forest cover types describe the tree species found across forestlands. Different species are better suited to certain site conditions, so they are often found growing in specific places across the landscape. To help guide future management activities, the trees within a defined area (forest stand) are described by species, size, and quantity.

Species composition

Ponderosa pine and Douglas-fir are the most extensive species cover types, occupying 39% of the area, followed by mixed conifer, 19%; grand fir, 6.8%; and lodgepole pine, 2.2%. Acres by species cover type are shown in Figure 2-3. It should be noted that cover types are named after a specific tree species if that species comprises over 50% of the basal area (BA) of a stand. Where no one species makes up over 50% of the BA, the stand is classified as mixed conifer.

Stands of trees are usually made up of multiple tree species, but species composition describes the most common tree species found within a stand. In this case, it is the species that makes up at least half of the basal area trees within a stand based on basal area by species. Within Tribal forestlands, ponderosa pine and Douglas-fir cover types are the most common. Mixed species stands, without a single majority species, are the third most common cover type.

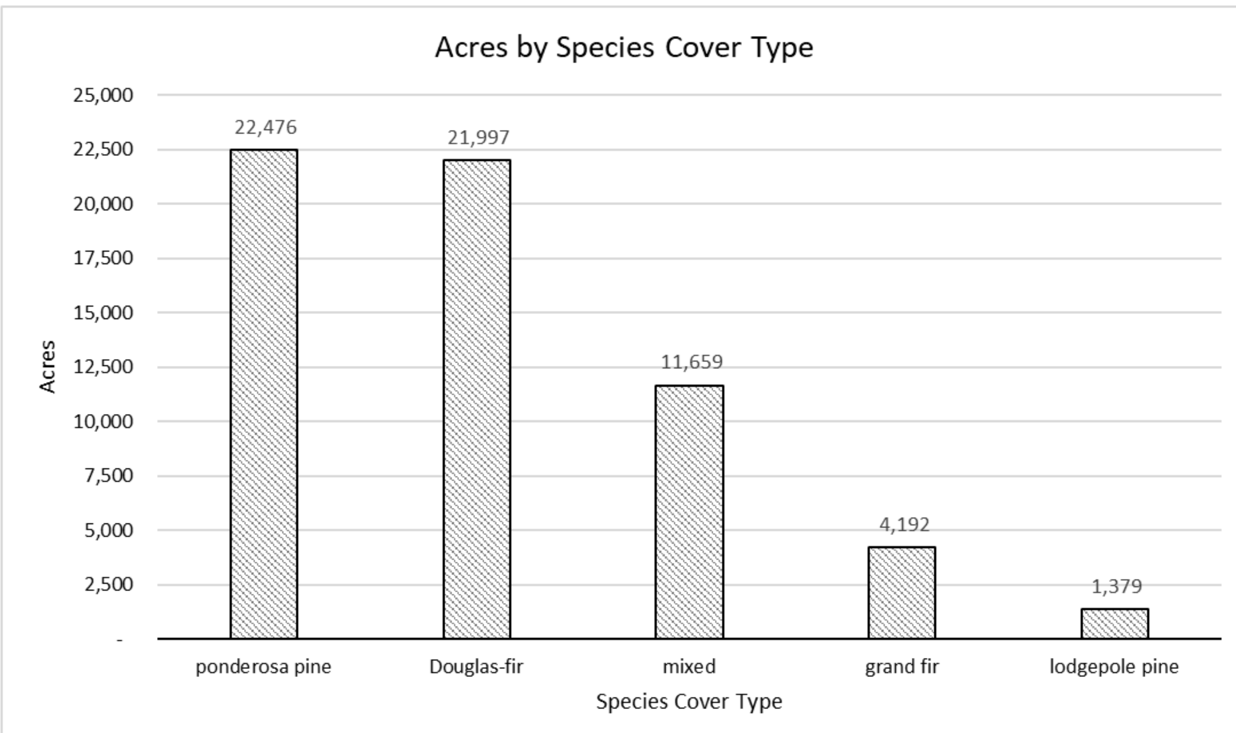


Figure 2-3) Acres by Species Cover Type.

Species cover type is further broken down by dominant cover type, Forest/Fire Management Group (MG), and ownership type in Table 2-2. Ponderosa pine is the dominant cover type for the warm, dry Douglas-fir and ponderosa pine MG at 68%; Douglas-fir is the dominant cover type for the warm, dry to moderate Douglas-fir, grand fir, ponderosa pine MG at 56%; and mixed conifer is the dominant cover type of the moderate & moist grand fir MG at 40%. Red cedar, white pine, and western larch cover types are also dominant in some areas, but their coverage is a minor component of Tribal Forestlands.

Table 2-2) Species Cover Type by Forest/Fire Management Group (Habitat Group) & Ownership Type (acres).

		Dominant Cover Type								
Habitat Group	**Own Type**	**PP**	**DF**	**mixed**	**GF**	**LP**	**RC**	**WP**	**WL**	**Total**
warm, dry DF & PP	Allotment	2,918	274	-	-	-	14	-	-	3,206
	Fee	416	332	-	99	-	-	-	-	847
	Trust	5,655	3,327	186		-	-	-	-	9,168
Sub-Total		8,990	3,933	186	99	-	14	-	-	13,221
warm, dry to moderate DF, GF, PP	Allotment	1,436	424	95		-		-	-	1,954
	Fee	684	2,861	925	219	-		-	-	4,690
	Trust	6,349	11,537	1,573	175	-	29	-	-	19,664
Sub-Total		8,469	14,822	2,593	395	-	29	-	-	26,308
moderate & moist GF	Allotment	48	14	-	7	-	-	-	-	69
	Fee	3,761	2,420	7,104	3,053	1,379	-	-	-	17,716
	Trust	1,208	809	1,777	638	-	44	18	16	4,510
Sub-Total		5,017	3,242	8,881	3,698	1,379	44	18	16	22,295
All-Groups		22,476	21,997	11,659	4,192	1,379	87	18	16	61,824

<u>*Size Class*</u>

Across all habitat types, the 5 to 8.9" diameter class represents the greatest area at 31,799 acres (51.4% of the total area) (Figure 2-4). The next largest size classes, in terms of area representation, are 9 to 15.9" (18,140 acres; 29.3% of the total area), 0 to 4.9" (9,501 acres;15.3% of the total area), 16 to 20.9" (1,659 acres; 2.7% of the total area); and ≥ 21" (725 acres; 1.2% of the total area). It should be noted that the classification label indicates the size class with the greatest BA in a stand rather than the size class with the greatest number of stems. Therefore, multi-storied and two-storied stands, such as seed trees and shelterwoods, are most often labeled by the size class of the overstory.

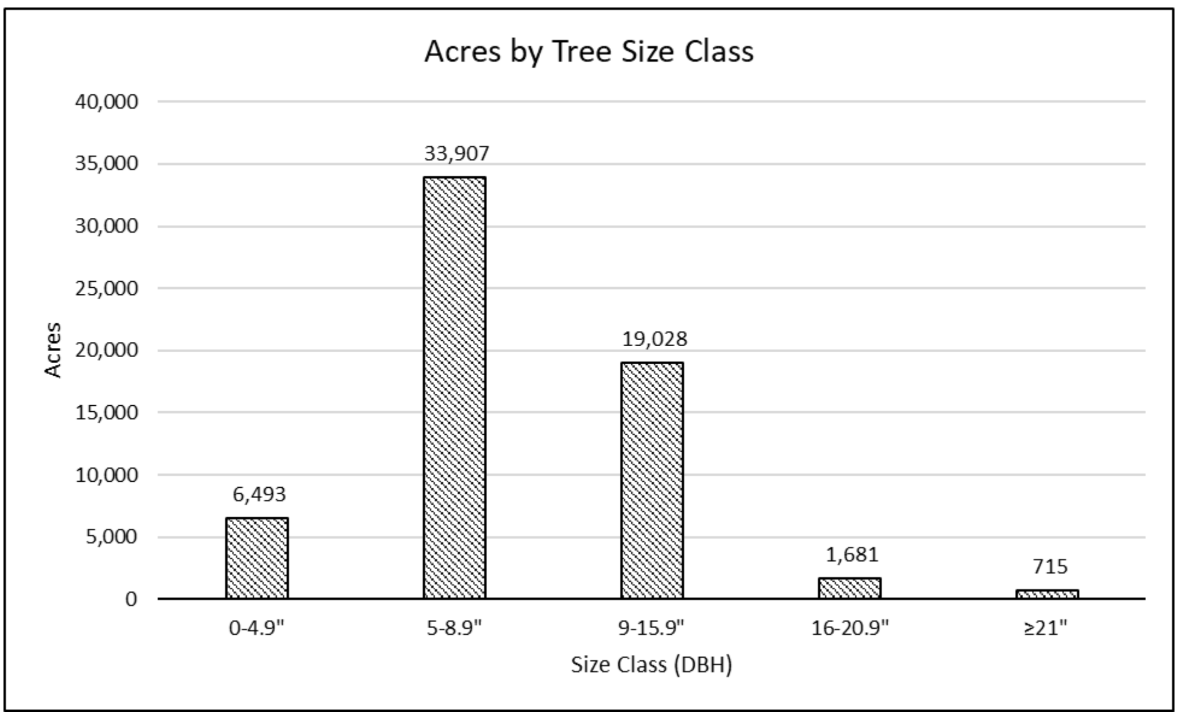


Figure 2-4) Area by Tree Size Class (FPS, 2022).

Size Class examines all the trees in a stand or forest based on diameter measured at breast height (DBH). Trees are then sorted into different size ranges or classes based on DBH. The number of trees in each size range can then be used to describe how a forest or stand is growing and to inform future management decisions directed towards desired conditions.

Diameter class distribution varies between habitat types (Table 2-3). The 5 to 8.9” diameter class represents the greatest area (5,967 acres; 45.1% of total habitat area) of that which is classified as the warm, dry DF and PP habitat type; the 5 to 8.9” diameter class covers the greatest area (12,943 acres; 49.2% of total habitat area) of the warm, dry to moderate DF, GF, PP habitat type; and the 9 to 15.9” diameter class represents the greatest area (12,855 acres; 57.7% of total habitat area) of that which is classified as moderate and moist GF.

Table 2-3) Diameter Size Class by Forest/Fire Management Group (Habitat Group) & Ownership Type (acres) (FSP, 2022).

		Size Class (DBH)					
Habitat Group	**Own Type**	**0-4.9"**	**5-8.9"**	**9-15.9"**	**16-20.9"**	**≥21"**	**Total**
warm, dry DF & PP	Allotment	371	1,053	1,129	345	308	3,206
	Fee	99	498	228	22	-	847
	Trust	1,095	4,416	3,096	489	72	9,168
Sub-Total		1,564	5,967	4,453	857	380	13,221
warm, dry to moderate DF, GF, PP	Allotment	201	490	894	232	136	1,954
	Fee	670	2,975	991	53	-	4,690
	Trust	2,641	9,477	6,843	504	198	19,664
Sub-Total		3,513	12,943	8,728	789	334	26,308
moderate & moist GF	Allotment	-	45	10	14	-	69
	Fee	4,363	-	9,051	4,302	-	17,716
	Trust	-	60	3,793	646	11	4,510
Sub-Total		4,363	105	12,855	4,961	11	22,295
All Groups		9,441	19,015	26,037	6,607	725	61,824

<u>Density</u>

Tree density diagrams comparing tree size (QMD) and number of trees per acre (TPA) in relationship to a desired reference level provides insight to current vs. desired density conditions. Powell (2024) provides ideal density metrics for the northeastern Oregon and southeastern Washington region which mimics the forest conditions of the Nez Perce Tribe’s land holdings. Gingrich charts are used to determine the lower and upper density ranges for a desired density level. The upper density (management zone) indicates a need or trigger for density treatment. While the lower density (management zone) indicates a need for possible forest development strategies.

An example Gingrich chart is included in Figure 2-5. The example chart is for an uneven aged desired future condition with ponderosa pine as the preferred early seral species within an ABGR/LIBO habitat. The markers represent forest stands by dominant species cover type. Several forest stands are above the desired density levels. The maximum density threshold is where trees are overcrowded, and growth becomes stagnant and stressed and future mortality is likely.

Tree measurements, including diameter and height, and frequency can be paired together to determine if trees have enough room to grow. Trees grow slowly and remain smaller when there are too many trees growing on a site. Certain tools, like the Gingrich chart included in Figure 2 5, are used to determine the ideal number of trees to maintain on a site given their size. The goal of attaining desired forest conditions is to ensure that a forest or stand is supporting the desired species, size (quadratic mean diameter – QMD and Basal Area - BA), and frequency (trees per acre – TPA), while also ensuring that each tree has enough room to grow. Ideally, the individual forest stand's basal area (which is related to tree diameter) and trees per acre displayed on the Gingrich chart, fall between the red and green lines (upper management zone – UMZ and lower management zone – LMZ).

For Tribal forestlands, some areas are "overstocked" in that they have too many trees that do not have enough room to grow adequately. Other areas are "understocked" in that they could support more trees, and all trees would still have enough room to grow. In addition, this chart indicates whether the tree species may or may not be ideal compared to the defined desired conditions for a defined habitat type.

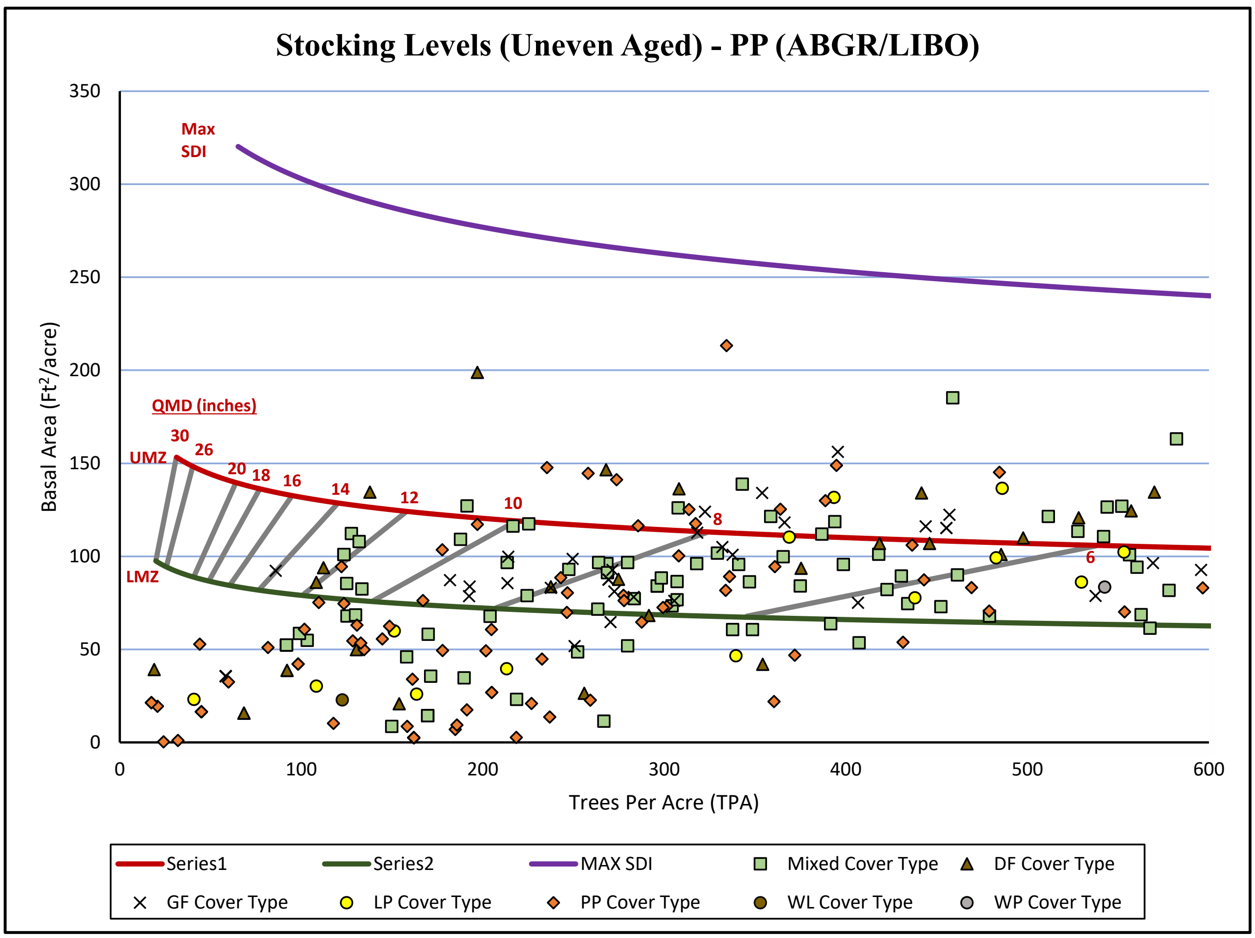


Figure 2-5) Example of a Gingrich chart for an uneven aged stand with ponderosa pine as the preferred seral species within ABGR/LIBO habitat.

Forestland acres have been summarized by MG, ownership, habitat type, dominant cover species, and density measure (ideal, over, or under stocked) in in Table 2-4. This information, in conjunction with GIS maps, can be used to determine areas "in need" of treatment and, ultimately, achieve desired future conditions. As of 2022, Tribal Trust lands are primarily overstocked (54.9%) with the desired seral species (PP); Allotments are understocked (53.3%); and Tribal fee lands are overstocked (53.2%) with the incorrect cover species. Below is a summary of stocking by MG:

- _Warm, dry Douglas-fir, ponderosa pine:_ Of the total area represented by this MG, approximately 43% (5,500 acres) is overstocked. This includes 49% (4,513 acres) of trust lands, 23% (725 acres) of allotments, and 47% (395 acres) of fee land.
- _Warm, dry to moderate Douglas-fir, grand fir, ponderosa pine:_ Of the total area represented by this MG, approximately 45% (11,734 acres) is overstocked. This includes 52% (9,934 acres) of trust lands, 24% (471 acres) of allotments, and 28% (1,329 acres) of fee land.
- _Moderate and moist grand fir:_ Of the total area represented by this MG, approximately 64% (14,284 acres) is overstocked. This includes 80% (3,602 acres) of trust lands, 67% (46 acres) of allotments, and 60% (10,636 acres) of fee land.

Table 2-4) NPT Stand Exam Data 2022 – Stocking Levels (acres) (FPS, 2022).

Mgmt Group	Cover Type	Trust			Allotments			Fee			Total
		Over	Ideal	Under	Over	Ideal	Under	Over	Ideal	Under	
warm,dry Douglas-fir, ponderosa pine	mixed conifers	89	21	76	-	-	-	-	-	-	186
	Douglas-Fir	1,743	593	991	230	22	36	182	-	150	3,947
	grand fir	-	-	-	-	-	-	99	-	-	99
	ponderosa pine	2,681	1,236	1,738	495	546	1,877	115	17	285	8,989
	All Species	**4,512**	**1,849**	**2,806**	**725**	**568**	**1,913**	**395**	**17**	**435**	**13,221**
warm, dry to moderate DF, GF, PP	mixed conifers	1,124	352	85	34		60	493	299	134	2,582
	Douglas-Fir	5,850	1,434	4,300	196	138	111	626	401	1,833	14,889
	grand fir	140	35		-	-	-	112	44	63	395
	ponderosa pine	2,830	1,223	2,290	240	494	681	98	274	312	8,442
	All Species	**9,944**	**3,044**	**6,675**	**471**	**631**	**852**	**1,329**	**1,018**	**2,342**	**26,308**
moderate and moist grand fir	mixed conifers	1,456	233	88	-	-	-	5,796	671	647	8,891
	Douglas-Fir	748	23	81	-	-	14	412	135	1,881	3,295
	grand fir	496	43	99	-	-	7	2,530	171	341	3,687
	lodgepole pine	-	-	-	-	-	-	766	180	424	1,370
	ponderosa pine	884	212	112	46	-	2	1,133	608	2,020	5,018
	western larch	-	-	16	-	-	-	-	-	-	16
	western white pine	18	-	-	-	-	-	-	-	-	18
	All Species	**3,602**	**512**	**397**	**46**	**-**	**23**	**10,636**	**1,766**	**5,314**	**22,296**
All Groups	mixed conifers	2,669	606	250	34	-	60	6,288	970	781	11,659
	Douglas-Fir	8,341	2,050	5,373	426	160	161	1,220	537	3,865	22,132
	grand fir	636	78	99	-	-	7	2,741	215	404	4,181
	lodgepole pine	-	-	-	-	-	-	766	180	424	1,370
	ponderosa pine	6,395	2,671	4,141	781	1,040	2,560	1,345	899	2,617	22,449
	western larch	-	-	16	-	-	-	-	-	-	16
	western white pine	18	-	-	-	-	-	-	-	-	18
	All Species	**18,058**	**5,405**	**9,878**	**1,242**	**1,199**	**2,789**	**12,361**	**2,801**	**8,091**	**61,824**

2.2 TIMBER VOLUME

2.2.1 Timber Volume by Species

In 2022 there was approximately 487 MMBF of timber on 58,263 acres of commercial and marginal forest land, which is an average of 7.9 MBF/Ac based on FPS stand based data. Douglas-fir accounts for 40.3% (196.3 MMBF) of the volume, followed by ponderosa pine, 40.0% (195.2 MMBF); and grand fir, 13.8% (67.5 MMBF) (Figure 2-6). Other species make up 6% (28.0 MMBF) of the total volume.

One board foot is the equivalent of a piece of wood measuring 12 inches long by 12 inches wide by 1 inch thick. A board foot is a measure used to express the total volume of boards/lumber that can be milled from a tree which is calculated from tree measurements (which often include diameter and height or length if the tree has been cut). Volume calculated from individual trees can then be used to estimate the volume of timber in a stand or in a forest. One thousand board feet is expressed as MBF while one million board feet is expressed as MMBF. This measure provides an indication of the monetary value available to offset the cost of implementing forest management activities required to achieve the desired conditions. Although quite variable, one load of logs on a log truck is approximately 4 MBF.

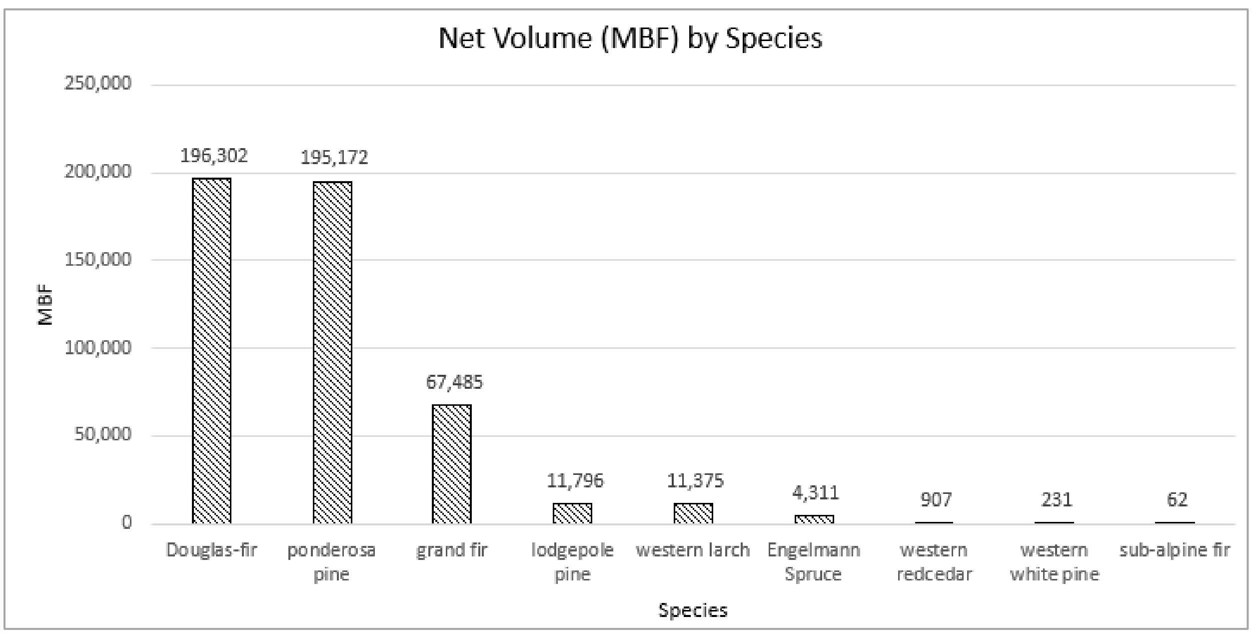


Figure 2-6) Volume (MBF) by species on commercial and marginal forest lands (FPS, 2022).

The warm, dry to moderate DF, GF, PP MG accounts for 43% of the total volume followed by the moderate & moist GF (35%) and warm, dry DF & PP (22%) MGs (Table 2-5). Approximately 59% of the total volume is on Tribal Trust lands, 32% is on Tribal Fee lands, and 9% is on Allotments (Table 2-5).

Table 2-5) Timber Volume (Net MBF) by Forest/Fire Management Group (Habitat Group) and Ownership Type (FPS, 2022).

		Timber Species								
Habitat Group	**Own Type**	**DF**	**ES**	**GF**	**LP**	**PP**	**RC**	**WL**	**WP**	**Total**
warm, dry DF & PP	Allotment	3,534	3	144	10	21,425	-	18	1	25,134
	Fee	2,433	71	779	12	1,974	45	55	-	5,369
	Trust	27,686	18	1,459	151	44,261	261	267	52	74,155
Sub-Total		33,653	93	2,382	172	67,660	307	339	52	104,658
warm, dry to moderate DF, GF, PP	Allotment	4,748	2	260	13	11,766	2	108	1	16,899
	Fee	15,170	112	3,986	235	8,070	7	671	1	28,253
	Trust	87,098	421	11,904	350	64,970	415	1,461	56	166,675
Sub-Total		107,016	535	16,150	598	84,806	423	2,241	58	211,827
moderate & moist GF	Allotment	276	1	72	1	247	-	1	-	598
	Fee	36,459	2,954	39,444	10,791	26,124	17	6,227	8	122,025
	Trust	18,897	728	9,438	233	16,335	159	2,567	113	48,471
Sub-Total		55,633	3,683	48,953	11,025	42,706	177	8,796	121	171,093
All Groups		196,302	4,311	67,485	11,796	195,172	907	11,375	231	487,579

Although Allotments represent a smaller portion of the total standing volume, Allotments have more volume per acre than Tribal Fee (Table 2-6). This relationship is due to fee lands being harvested for value (high grading) prior to Tribal purchase. Tribal Allotments have not been included in a harvest schedule due to varying forest management objectives by the individual Allotment owners.

Table 2-6) Timber Volume (Net MBF/Acre) by Forest/Fire Management Group (Habitat Group) and Ownership Type & Land Type (FPS, 2022).

	Own Type			
Habitat Group	**Allotment**	**Fee**	**Trust**	**Total**
warm, dry DF & PP	7.8	-	8.1	7.9
ırm, dry to moderate DF, GF, PP	8.6	6.0	8.5	8.1
moderate & moist GF	8.7	6.9	10.7	7.7
All Groups	8.2	6.7	8.7	7.9

2.2.2 Stocking Levels

Stocking levels can be measured with various metrics. The most common relationship is to compare stand-level basal area per acre (BAA) to trees per acre (TPA). Basal area (BA) is the '*cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area.'* Trees per acre is simply the number of trees within one acre. These two measures combined with quadratic mean diameter (QMD – '*the diameter at breast height outside bark of the tree of average basal area*') determine the current stand-level stocking as being under, over, or ideally stocked. Trees require growing space; however, too much growing space will cause trees to have increased branching and undesirable bole form for desired timber products. Conversely, high density will cause stagnate growth and stressed conditions with increased susceptibility to insect and disease infestations as trees compete for water, sunlight, and mineral nutrients. Overstocked stands typically have increased wildland fire intensities due to ground fires easily transitioning to stand destroying crown fires. Powell's (2024) suggested stocking levels provide correlation between BAA and TPA along with Stand Density Index (SDI – *'expresses relative stand density in terms of the relationship of a number of trees to stand QMD').* SDI is more responsive to site utilization and growing-space occupancy than BA; however, BA is a density measure that is more commonly understood by field foresters and landowners.

Stocking level refers to the number and size of trees growing in a specified area. This value helps forest managers understand if a stand can support more trees, and more should be added, or if it has too many trees and some need to be removed dependent on defined desired conditions for that forest stand. If trees have too much space because a site is "understocked", they typically grow additional branches and lose economic value; however, these trees may improve wildlife habitat. Trees that are "overstocked" (sites with too many trees), grow slowly and the crowding of trees presents a wildfire hazard.

Reviewing stocking level metrics across all forested stands (broad level view) by MG and land type results in a generalized review of forest size and density. Allotments have larger sized trees with lower densities primarily in the 'warm, dry to moderate DF, GF, PP' MG. Fee lands have smaller sized trees with higher densities in the 'moderate & moist GF' MG. Trust lands are moderately stocked in all MGs (Table 2-7).

Table 2-7) NPT Stand Exam Data 2022 – Stocking Levels (acres) (FPS, 2022).

	Own Type											
	Allotment			Fee			Trust			All Own Types		
Habitat Group	**QDBH**	**TPA**	**BAA**	**QDBH**	**TPA**	**BAA**	**QDBH**	**TPA**	**BAA**	**QDBH**	**TPA**	**BAA**
arm, dry DF & PP	14.5	124.3	70.0	10.2	172.3	66.2	11.0	188.8	77.2	**11.8**	**172.3**	**74.8**
warm, dry to moderate DF, GF, PP	14.2	113.1	67.4	9.1	220.9	67.1	10.7	195.0	81.7	**10.7**	**193.5**	**77.9**
derate & moist GF	10.0	296.6	89.9	6.6	400.3	85.7	8.0	364.7	99.5	**6.9**	**392.6**	**88.5**
All Habitat Groups	**14.3**	**122.4**	**65.1**	**7.2**	**356.8**	**86.9**	**10.4**	**218.3**	**81.6**	**9.5**	**264.3**	**81.3**

Forest managers evaluate stocking levels by different stand attributes or characteristics. For example, in this document the number of trees per acre of forestland is evaluated by species and size (diameter), land type (ownership), and habitat type. This helps forest managers understand "where the volume is"; which species, size class, land type, and habitat type have the most volume or health concerns? Forest management practices are then used to improve forest conditions based on management goals defined for each land and habitat type.

Trees per Acre by Species and Size Class

The average density is 266 trees per acre. Douglas-fir is the most prevalent tree species by frequency of occurrence (30.9%), followed by Grand fir (30.1%); and ponderosa pine (29.8%). Other tree species make up 9.2% of the average number of trees per acre. The greatest number of tree seedlings are GF, followed by DF, PP, and LP. The average number of trees per acre by species and size class is shown in Figure 2-7.

Looking at trees per acre by size class provides insight as to the current species and size structure of all Tribal Lands combined. A desired uneven-aged management strategy is to maintain a reverse 'J-shaped' TPA configuration that portrays a 1.3 ratio or 30% increase from the largest size class to the next 2" diameter size. This classic distribution indicates sufficient tree numbers that will grow into the next size class to maintain the uneven-aged structure. Density and stand grouping configurations (e.g., size and shape) should be considered to ensure the preferred species cover types.

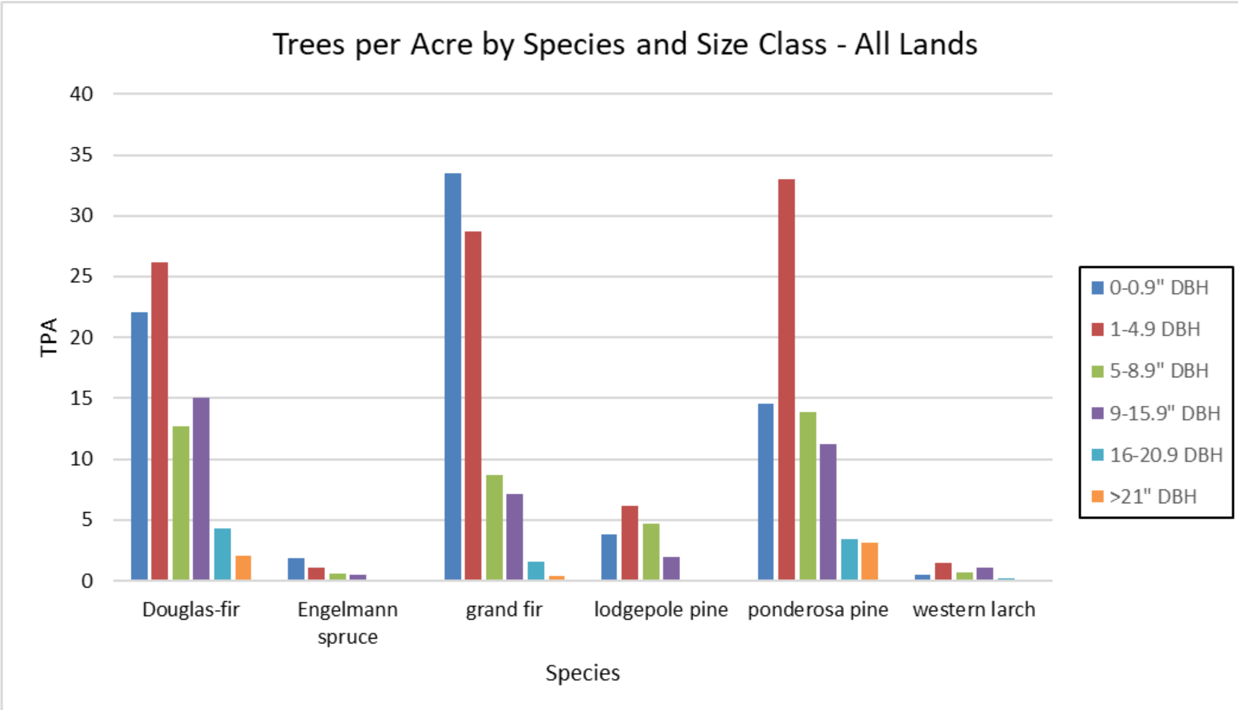


Figure 2-7) Average Trees per Acre by Species and Size Class – All Lands (FPS, 2022).

Trees per Acre by Land Type

This section provides an overview of trees per acre by species, size class, and land type. As stated in section 3.2.2 (*Stocking Levels*) and displayed in Table 2-5, trees on Tribal Trust lands (Figure 2-8) account for approximately 59% of the total volume (on 33,342 acres) while trees on Tribal Fee lands (Figure 2-9) and trees on Allotments (Figure 2-10) account for approximately 32% (on 23,253 acres) and 9% (on 5,229 acres) of the total volume, respectively. It was also noted that Allotments have more volume per acre than Tribal Fee (Table 2-6).

Trust lands are moderately stocked in all MGs and, across all trust lands, stands are primarily composed of Douglas-fir (133.7 MMBF), ponderosa pine (125.6 MMBF), and grand fir (22.8.5 MMBF) (Figure 2-8). The quadratic mean diameter for trees (QMD) on trust lands is 10.4 inches.

Figure 2-8) Trees per Acre by Species, Size Class, and Trust Land Type (FPS, 2022).

Fee lands have smaller sized trees with higher densities in the 'moderate & moist GF' MG. Stands across all fee lands are primarily composed of Douglas-fir (54.1 MMBF), grand fir (44.2 MMBF), ponderosa pine (36.2 MMBF), and lodgepole pine (11.0 MMBF) (Figure 2-9). The QMD for trees on fee lands is 7.2 inches.

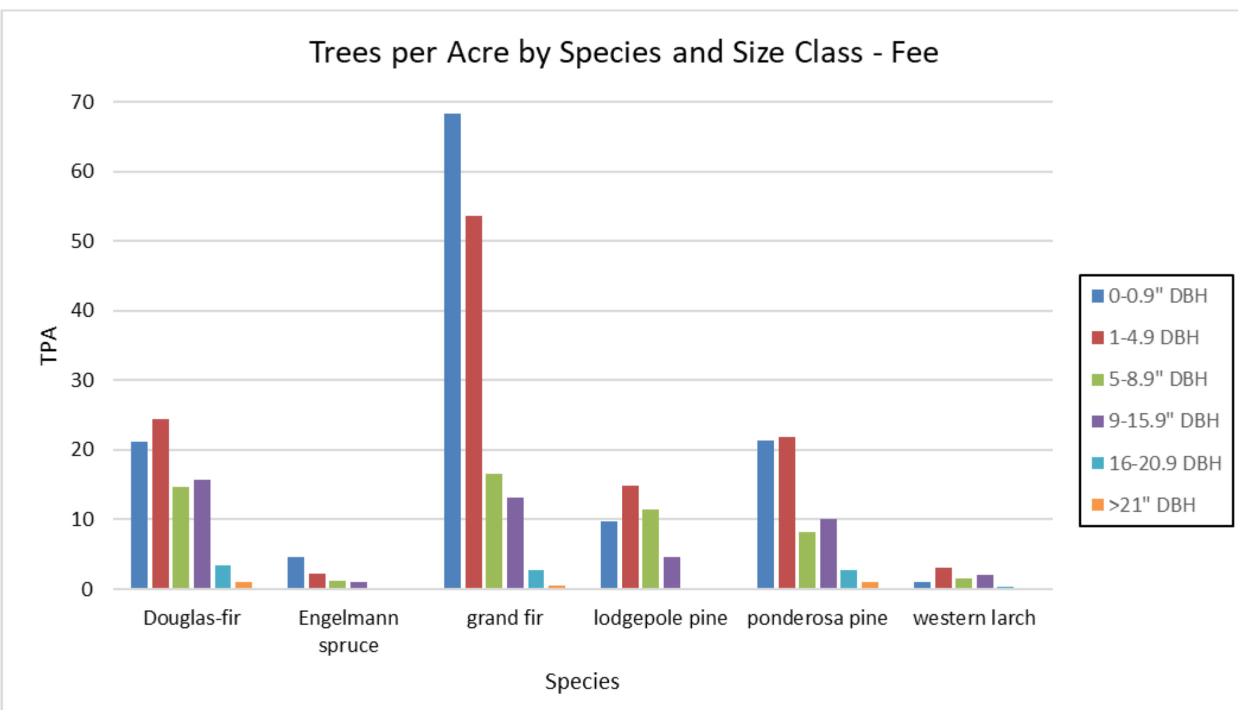


Figure 2-9) Trees per Acre by Species, Size Class, and Fee Land Type (FPS, 2022).

Allotments have larger sized trees with lower densities primarily in the ‘warm, dry to moderate DF, GF, PP’ MG. Stands across all allotments are primarily composed of ponderosa pine (33.4 MMBF) and Douglas-fir (8.6 MMBF) (Figure 2-10). The QMD for trees on allotments is 14.3 inches.

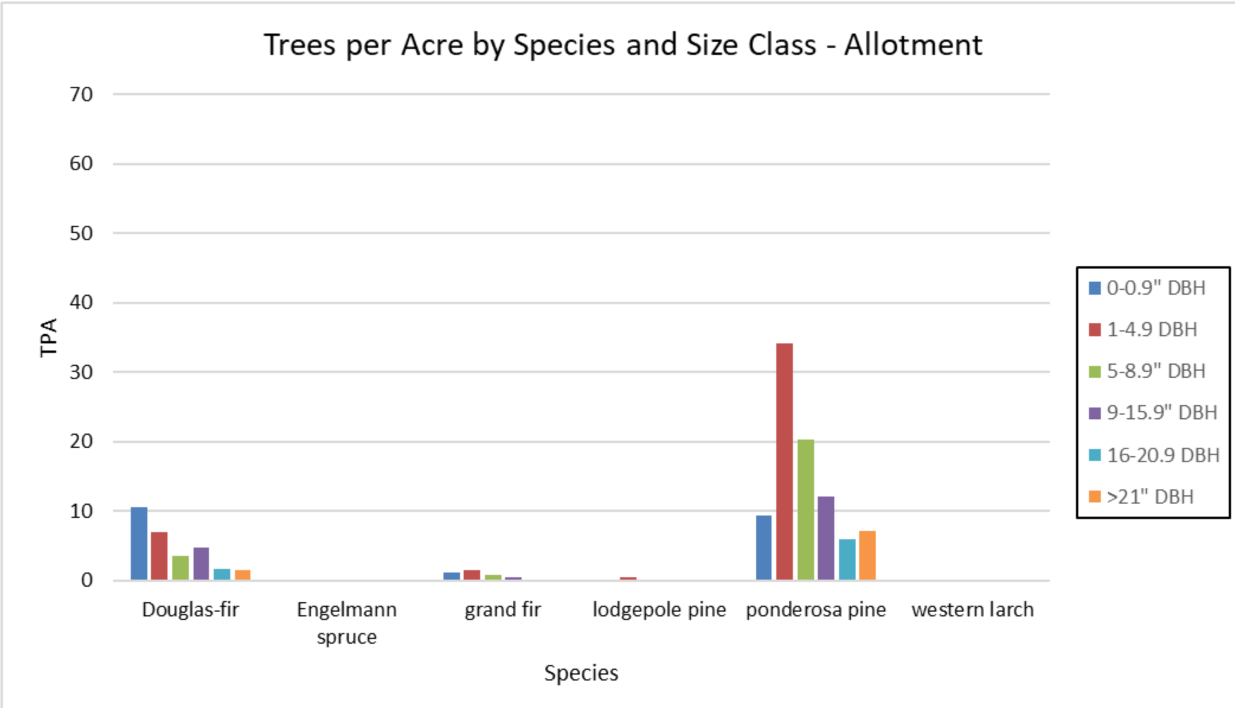


Figure 2-10) Trees per Acre by Species, Size Class, and Allotment Land Type (FPS, 2022).

<u>Trees per Acre by Habitat Type</u>

This section provides an overview of trees per acre by species, size class, and habitat type. As stated in section 3.2.1 (*Timber Volume by Species*), trees in the warm dry to moderate DF, GF, PP MG (Figure 2-11) account for 43% of the total volume and 26,308 acres of forestland followed by trees in the moderate & moist GF MG (Figure 2-12; 35% of total volume; 22,295 acres) and trees in the warm, dry DF & PP MG (Figure 2-13; 22% of total volume; 13,221 acres).

Species associated with the warm, dry DF and PP habitat type primarily include ponderosa pine (67.7 MMBF), Douglas-fir (33.7 MMBF), and grand fir (2.4 MMBF) (Figure 2-11). The QMD for all stands classified as warm, dry DF and PP is 11.8 inches.

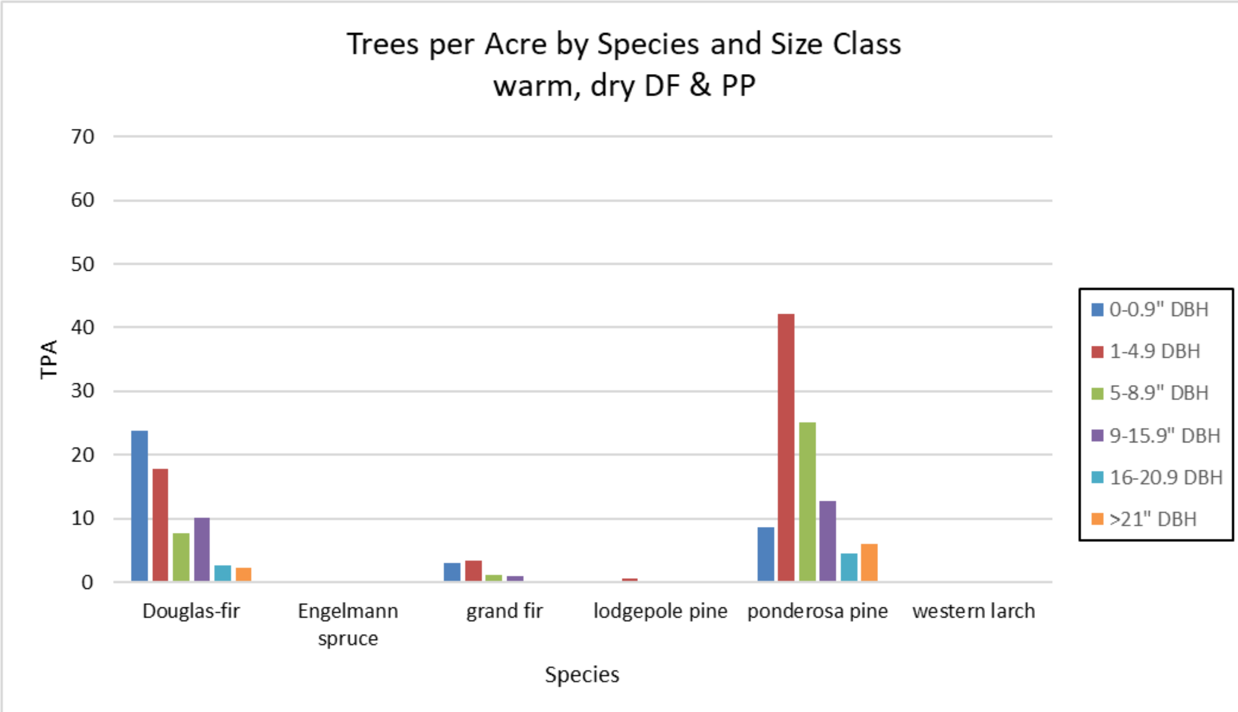


Figure 2-11) Trees per acre by species and size class for the warm, dry DF and PP habitat type (FPS, 2022).

Species associated with the warm, dry to moderate DF, GF, and PP habitat type primarily include Douglas-fir (107.0 MMBF), ponderosa pine (84.8 MMBF), and grand fir (16.2 MMBF). The QMD for all stands classified as warm, dry to moderate DF, GF, PP is 10.7 inches.

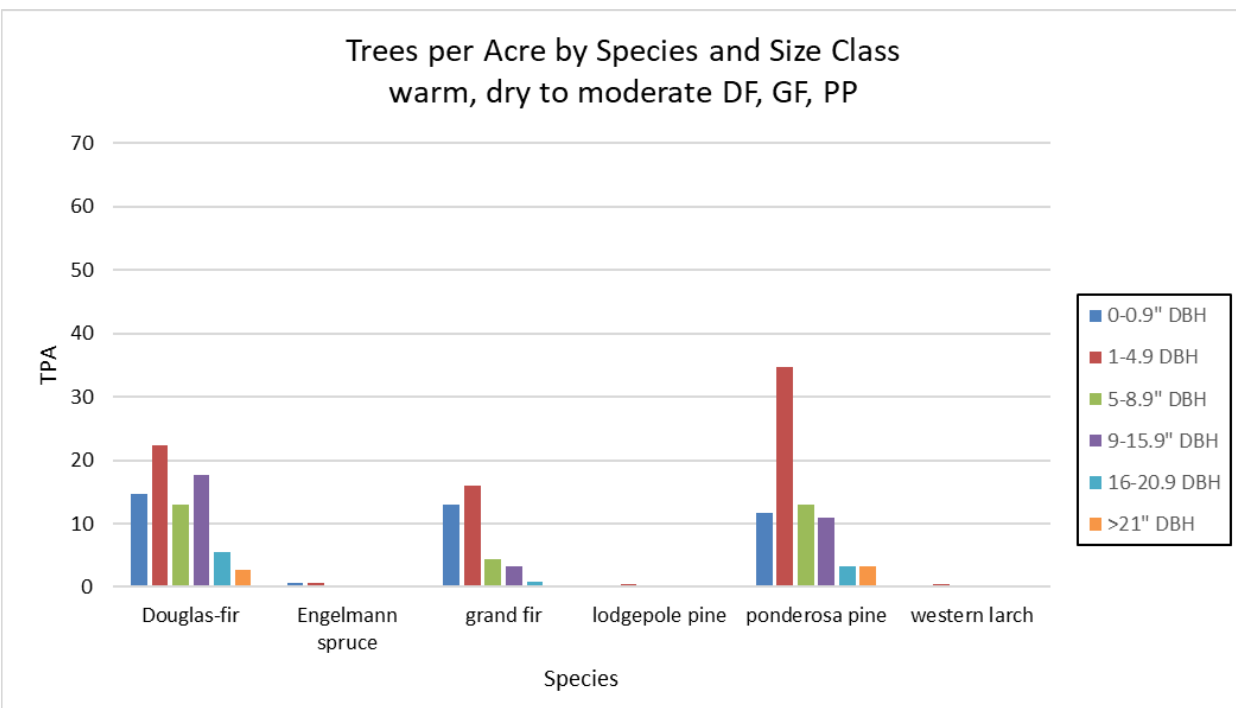


Figure 2-12) Trees per acre by species and size class for the warm, dry to moderate DF, GF, PP habitat type (FPS, 2022).

Species associated with the moderate & moist GF habitat type primarily include Douglas-fir (55.6 MMBF), grand fir (49.0 MMBF), ponderosa pine (42.7 MMBF), lodgepole pine (11.0 MMBF), western larch (8.8 MMBF), and Engelmann spruce (3.7 MMBF) (Figure 2-13). The QMD for all stands classified as moderate and moist GF is 6.9 inches.

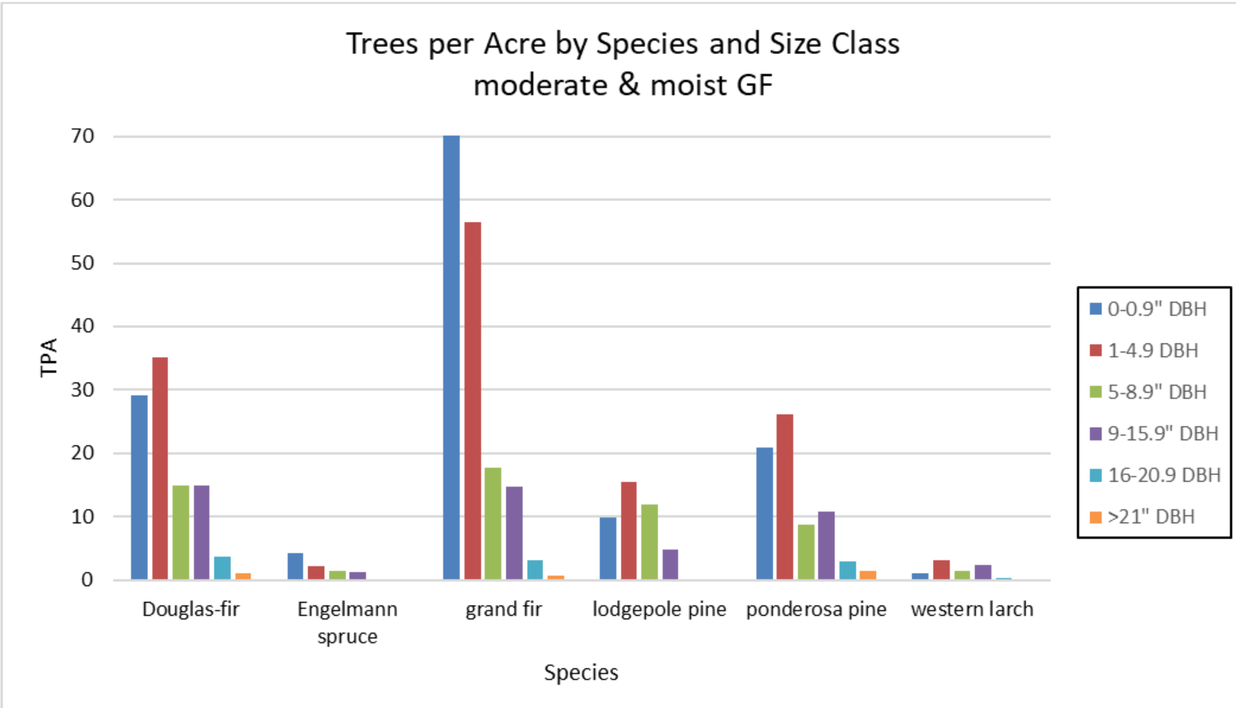


Figure 2-13) Trees per acre by species and size class for the moderate and moist GF habitat type (FPS, 2022).

2.2.3 Area & Volume Trends

Over the 1995 to 2022 period the commercial forest land base (tribal trust and fee lands) increased from 43,119 acres (i.e., 21,255 ac. Tribal Trust; 21,864 ac. Fee) to 48,378 acres (Table 2.1), a 10.9% increase in area. During the same period, the total standing inventory (net volume) increased from 272 MMBF (i.e., Tribal Trust = 216 MMBF; Fee = 56 MMBF) to 445 MMBF (i.e., Tribal Trust = 289 MMBF; Fee = 156 MMBF), a 64% increase in net volume. The average timber volume per acre is now 7.9 MBF/Ac as compared to 6.3 MBF/Ac (net volume) in 1995 (Tribal Trust and Fee). The 1995 FMP excluded Allotments; however, Allotments include an estimated 43 MMBF (net volume) or 8.1 MBF/Ac.

2.3 Forest Growth

2.3.1 Measured Growth

Over the past several decades commercial forest growth rates have fluctuated based on human and environmental factors. Permanent growth plots (CFI Inventory) were established on tribal trust and allotted lands in 1975, and provide measures of stocking, growth, harvest and mortality. The 317 original CFI plots represent approximately 25,360 acres based on a sampling rate of 1 plot / 80 acres. From 1975 to 2003 commercial forestlands exhibited a trend of decreasing growth rates that were likely attributed to past timber harvesting, wildfire, economic conditions, hazardous fuels reduction (HFR), declining levels of growing stock, and varying climate conditions. However, the rate of growth increased for the period

2003 to 2013 which was likely attributed to reduced harvest levels, a wetter 10-year period, and improved growing conditions from past management strategies. Accretion rates (volume which accrues during a specified period ≥ 5.0” DBH) follow the same trend as growth. Ingrowth (net volume of trees that were less than the measurement size 5.0” DBH at the start of the growth measurement period but which have grown to a size equal to or above that minimum limit during the review period) decreased until the 1993-2003 period and then fell again during the 2003-2013 period. Table 2-8 includes growth rates (board feet per acre per year) for different periods between 1975 and 2013.

Table 2-8) Gross board feet/acre/year growth (CFI, 2014, n=317).

Inventory Year	Gross Growth		Board-ft/ac/yr		Percent of Increment	
	(bf/ac/yr)	% of stock	Accretion	Ingrowth	Accretion	Ingrowth
1975-1985	296.96	3.00%	251.09	45.87	84.55%	15.45%
1985-1993	269.56	2.94%	237.21	32.35	88.00%	12.00%
1993-2003	255.89	2.77%	216.30	39.59	84.53%	15.47%
2003-2013	329.20	2.81%	292.98	36.22	89.00%	11.00%

Harvesting, with respect to board feet per acre, decreased 82.1% and mortality decreased by 20.8% when comparing measures from 2003 and 2013 (Table 2-9 and Table 2-10).

Table 2-9) Gross board feet/acre/year harvest (CFI, 2014, n=317).

Inventory Year	Board-foot harvest			Bd Ft % defect
	(bf/ac/yr.)	% of stock	% of growth	
1975-1985	187.09	0.006%	63.0%	4.4%
1985-1993	278.72	0.011%	103.4%	4.8%
1993-2003	196.96	0.008%	77.0%	4.6%
2003-2013	35.21	0.001%	10.7%	13.8%

Table 2-10) Gross board feet/acre/year mortality (CFI, 2014, n=317).

Inventory Year	Board-foot mortality			Bd Ft % defect
	(bf/ac/yr)	% of stock	% of growth	
1975-1985	30.98	0.313%	10.4%	4.4%
1985-1993	76.31	0.831%	28.3%	4.8%
1993-2003	54.2	0.587%	21.2%	4.6%
2003-2013	42.89	0.366%	13.0%	13.8%

Trends for gross growth, mortality, and harvest for select periods between 1975 and 2013 are displayed in Figure 2-14. This figure depicts a decrease in harvest volume and mortality, as described above, between the end of the 1993-2003 period and the end of the 2003-2013 period.

In general, forest growth is a measure of how much volume, or "new wood", each tree added during the last growing season. Growth rate refers to the amount of volume each tree adds from growing season to growing season. Growth rates can increase or decrease depending on growing conditions (environmental factors), effects from past forest management, current forest management, and natural mortality (death) of trees. Changes in forest growth by period are displayed in Figure 2-14. The green bars indicate new volume added from tree growth; the gray bars show volume that was removed through timber harvest; the red bars show volume lost due to tree mortality.

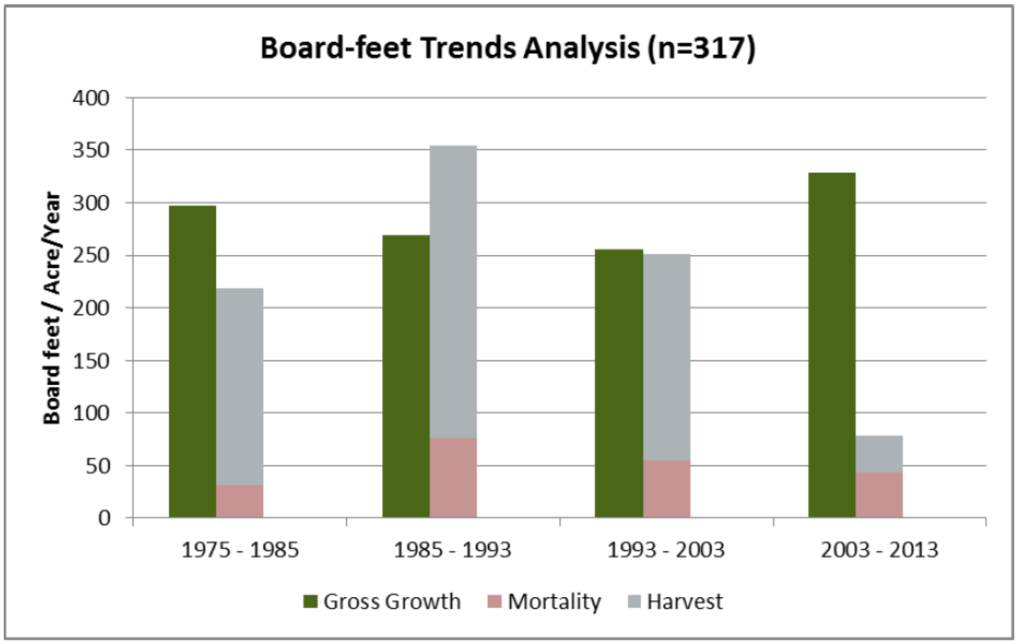


Figure 2-14) Growth, mortality, and harvesting trends in board feet/acre/year (CFI, 2014).

2.3.2 Estimated Growth

Although the last CFI measurement was completed in 2014, it is estimated that the growth rate has decreased since then as the current estimated rate has been calculated to be 144 bf/ac/year given an average stocking level of 8.1 MBF/ac. As this is a substantial decrease from the previous calculated rates of growth, it should be noted that at least some of the difference is likely attributed to changes made to the sampling design (e.g., sampling all tree heights >5" DBH verses a subsample of heights) and other means used to determine growth rate as well as harvesting trends.

3 FOREST MANAGEMENT PROGRAM IMPLEMENTATION

This Forest Management Plan is tiered to and in compliance with the Nez Perce Tribe's IRMP preferred alternative 'Resource Conservation Emphasis'. This section of the Forest Management Plan provides an implementation strategy for the goals and objectives outlined with the Tribe's preferred forest management alternative "Alternative D – Forest Health & Resilience". The harvest schedule (Section 3.4 – Harvest Schedule) outlines how the Annual Allowable Cut will be achieved throughout the life of this 15-year plan. The fuels treatment plan details a proposed schedule to ensure acres are treated mimicking natural fire disturbance intervals. This plan will also synthesize desired future conditions (DFC) of other resource management plans that relate to forest management. Numerous management planning efforts are associated with the IRMP, such as Fisheries, Wildlife, Water, Soil, Air, Cultural Resources, and other natural resource disciplines that will be integrated into forest-level management activities through project-level planning.

3.1 HISTORIC RANGE OF VARIABILITY

Historic range of variability (HRV), also called natural range of variation and historical range and variability, describes the variation in ecosystem and landscape characteristics prior to European settlement in North America (Keane and Loehman, 2020). This concept has been used to identify baseline ecological conditions of Nez Perce Tribal forestlands and inform decision making processes related to the direction of Tribal forest management.

3.1.1 Application of Concept

HRV serves as a benchmark that can provide an ecological reference against which contemporary conditions can be evaluated to determine status, trend, and magnitude of departure from historic conditions (Keane and Loehman, 2020). These departures can then be used to (1) prioritize areas for possible treatment, (2) design feasible treatments for restoration, (3) develop monitoring plans to evaluate treatment results, and (4) identify drivers of change associated with ecosystem transitions (Aplet et al. 2000; Andersen et al. 2009; Alagona et al. 2012; Dickinson 2014 as cited in Keane and Loehman, 2019).

3.1.2 Limitations

Describing the Historic Range of Variability (HRV) of ecosystem conditions is a valuable approach for understanding natural ecological dynamics. However, the HRV concept is associated with limitations that should be considered when used to inform management decisions.

- **Incomplete or Uncertain Historical Data:**
  - *Sparse records:* For many ecosystems, especially those not studied until recently, there are limited or no reliable long-term data (e.g., old-growth forests, grasslands).
  - *Biases in sources:* Historical accounts (e.g., journals, photos, early scientific reports) may reflect subjective observations or specific locations rather than broad trends.
  - *Proxy limitations:* Paleoecological proxies (like pollen records or charcoal in sediments) provide indirect data that can be hard to interpret or may lack fine spatial/temporal resolution.

- **Temporal Constraints:** HRV is typically based on pre-industrial or pre-European settlement conditions, often a narrow time frame (e.g., the last few centuries). These past conditions may not capture longer-term variability (e.g., over millennia) or rare but important disturbance events like megafires or floods.
- **Changing Baselines:** What is considered “natural” or “historic” often depends on the choice of baseline, which can be arbitrary or socially/politically motivated. This can lead to shifting baselines syndrome, where each generation assumes the degraded state they observe is "normal."
- **Human Influence Was Never Absent:** Indigenous and local peoples have interacted with, shaped, and managed ecosystems for thousands of years. HRV approaches sometimes overlook or underplay pre-colonial anthropogenic influences, leading to a false dichotomy between "natural" and "human-modified" systems.
- **Climate and Environmental Change:** Contemporary and future conditions (e.g., under climate change) may no longer allow ecosystems to return to historic states. HRV may thus be less relevant or even misleading in guiding management under novel or rapidly shifting conditions.
- **Spatial Variability and Scale:** Ecosystems vary across landscape gradients (elevation, soil, moisture, etc.), making it difficult to define a single HRV for a whole region. HRV defined at one scale (e.g., site-level) may not apply at broader or finer scales.
- **Management and Restoration Challenges:** Using HRV as a benchmark can constrain adaptive management, especially in areas where ecosystems have been heavily altered (e.g., urban or agricultural lands). Restoration to HRV may be economically or ecologically infeasible and may conflict with other goals (e.g., biodiversity conservation, fire safety).

Additional information about HRV, including limitations, can be found in publications such as: *Historical range and variation (HRV)* (Keane and Loehman, 2020) and *The use of historical range and variability (HRV) in landscape management* (Keane et al. 2009).

3.2 Desired Future Conditions

The Nez Perce Tribe’s IRMP details a comprehensive vision statement along with landscape level desired future conditions (DFCs). Natural resource management divisions within both the Department of Natural Resources and Department of Fisheries will reference this document to develop resource specific implementation plans designed to attain both the vision and DFCs of the Nez Perce.

Desired Future Conditions, commonly abbreviated as DFCs, detail how forestlands should look based on the values and goals of the landowner. They describe a range of forest characteristics that include forest health, plant and tree species, tree spacing and size, wildland fuels, wildlife habitat, and more. DFCs serve as a guide for forest management implementation strategies that are used to achieve these preferred conditions.

3.2.1 Forestlands

Section 3.1.8 of the IRMP (Desired Future Conditions – Forests) defines the desired future condition for Nez Perce Tribe forestlands as:

> *“Most forests on the Reservation are healthy and function within their historic and predicted future natural range of variability. Opportunities for traditional cultural practices associated with forests, like hunting, gathering, and firewood cutting, are common. Management of the Tribe’s forests emphasizes*

activities to diversify species composition, age class distribution, stocking, structure, wildfire regimes, rates of disease, resiliency to disturbances (including climate change), and other forest attributes within their historic and predicted future natural ranges of variability as well as the health of forest-associated resources. The protection and restoration of degraded forest species and conditions, including in areas previously converted to non-forest cover types, are high priorities. Some commercial resource use and landscape development occurs, but such activities are generally restricted when necessary to restore and perpetuate the Tribe's Forest resources."

The IRMP preferred alternative emphasizes "Resource Conservation Emphasis" which is described as:

"… the Tribe's resource management strategy would be to emphasize natural and cultural resource conservation and enhancement to provide opportunities for traditional cultural practices and the exercise of Treaty-reserved rights. On an overall basis, commercial use of the Tribe's resources and landscape development would not outweigh the Tribe's efforts to conserve and enhance its natural and cultural resources to promote opportunities for traditional cultural practices and the exercise of Treaty-reserved rights. This emphasis is intended to be strategic in nature and provide for limited commercial resource uses and landscape development as important secondary management goals."

The Forestry & Fire Management division's landscape-level desired future condition for the Nez Perce Tribe forestlands are to return the forested landscape to a healthy, resilient, and adaptive state that complements both historic and anticipated future conditions necessary for ecological conservation, health, and longevity.

Landscape Level DFC:

At the landscape level, early seral and shade intolerant species dominate (e.g., ponderosa pine, lodgepole pine, western larch), mid to late seral species are present to a lesser degree (e.g., Douglas-fir, western white pine) and all structural stages are represented ranging from young to old while favoring multi-cohort conditions. Stand densities are variable with properly stocked stands in the majority. Proper species composition, structure and density promote healthy forests that are resilient and less susceptible to insects, disease, catastrophic wildland fire, climate change, etc. and allows for the re-introduction of fire to the landscape to mimic its historical role in the ecosystem. Snags and coarse woody debris are present in sufficient quantities along with riparian protection from sedimentation, bank failure, and solar radiation to provide desired ecosystem functions.

Attaining the landscape level DFC will involve stand level management and monitoring individually defined DFCs within three (3) plant associations or MGs defined by Smith and Fischer (1997) as warm, dry Douglas-fir, ponderosa pine; warm, dry to moderate Douglas-fir, grand fir, and ponderosa pine mix; and moderate and moist grand fir).

Each plant association has associated forest stand level DFCs:

Warm, Dry DF & PP DFC:

Ponderosa pine (PP) is both the early seral and climax tree species in this MG. The structure is variable but is uneven aged with an open, park-like appearance. Individual trees, small clusters, and larger groups (all variable in size, numbers per group and number of groups) are interspersed with small brush pockets and numerous openings on the drier sites (PIPO / FEID). The occurrence and size of these brush pockets increase on the mesic sites (PIPO / SYAL). Large diameter trees are present; occasional areas of even-aged structure are present. Canopy cover is typically less than 30% and rarely 50% (Cooper, 1991).

Frequent, non-lethal, low intensity, low severity under burns occurs and consume most of the fuel and prune trees. Widely scattered large logs and concentrations of small fuels are located around individual trees. Large diameter snags are common relative to the stocking level.

Warm, Dry to Moderate DF, GF, PP DFC:

Ponderosa pine (PP) is the predominant early seral species in this MG on all habitat types and western larch may be a minor early seral component on the mesic habitat type in this MG. Douglas-fir (DF) is the climax species on the PSME habitat types and overall is a minor component. The structure is variable but is commonly uneven-aged and open. Even aged structure does exist because of disturbance or treatment of insect and disease (root rot) issues. Individual trees, small clusters, and larger groups (all variable in size, numbers per group and number of groups) of trees are interspersed with small openings and brush pockets which vary in both density and height of the brush. Large diameter trees are common and denser stand conditions exist in some locations such as (but not limited to) north facing slopes and draw bottoms. Old growth conditions which include old trees, snags (small & large as well as hard & soft), coarse woody debris and high structural diversity; occur throughout the MG and landscape but occupy a small percentage of the area.

Frequent low intensity surface and mixed severity burns occur and consume and maintain the undergrowth and shade tolerant tree species (DF), density and structure which aide in creating conditions that are resilient to the frequency, extent, and severity of disturbances and to climate variability.

Moderate and Moist GF DFC:

Ponderosa pine and western larch are the dominant early seral species with the ponderosa pine in greater abundance than the western larch which is limited to the mesic habitat types. Western larch can be a major component where fire has had a major influence on stand development (Cooper, 1991). Lodgepole pine and Engelmann spruce are also present on the colder sites in the MG. Douglas-fir is a minor mid seral species on sites with no evidence of root disease, which is a major influence / concern in this MG. Grand fir is a climax species and overall is a minor component on most sites, typically located on protected, northerly aspects.

Structure is highly variable with both even-aged and uneven-aged stands. Multi cohort stands with open parklike conditions will require frequent tending activities such as timber harvest, Rx fire or mechanical treatments to remove / reduce biomass and shade tolerant tree species. Typically, these stands are near the breaks of large river canyons where historically, large, frequent, low intensity fires had more of an influence on stand development. Even-aged, single stratum stands also exist in many sizes and locations to reflect historical disturbance regimes due to infrequent stand replacement fires, insect and disease outbreaks, wind events, etc. Density and productivity are also highly variable with individual trees, small clusters, and larger groups (all variable in size, numbers per group and number of groups) of trees are interspersed with small openings and brush pockets which vary in both density and height of the brush. Large diameter trees are common and denser stand conditions exist in some locations such as (but not limited to) north facing slopes and draw bottoms. Old growth conditions which include old trees, snags (small & large as well as hard & soft), coarse woody debris and high structural diversity; occur throughout the MG and landscape but occupy a small percentage of the area and is slightly more common than the other two MGs.

Each plant association group promotes ponderosa pine as a common and desired early-seral species. Ponderosa pine has a wide 'ecological amplitude' in which it occupies a diversity of niches extending from very dry habitats to more mesic settings corresponding to elevation, aspect, geology, and soil type. Ponderosa pine is also more resistant to root disease than other mid and late seral species. Insects (e.g., western pine and mountain pine beetles) can be an issue if stocking guidelines are not adhered to in supporting ponderosa pine resiliency to insect infestations.

Each MG has defined and measurable metrics that articulate desired forest characteristics based on the preferred management alternative. Metrics or defined characteristics may include:

1. forest structure (vertical and horizontal),
2. tree size class distributions (diameters),
3. tree species composition,
4. preferred forest understory composition and density,
5. surface fuel loadings,
6. riparian corridor protection and enhancement,
7. forest soil protection and enhancement,
8. protection of all identified culturally significant plants and artifacts.

3.2.2 Riparian Forests

Riparian areas are herein defined as "…the three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at a variable width." (Ilhardt et al. 1999). The following desired future conditions apply to those riparian areas occurring within or adjacent to areas categorized as forestland based on NRCS soil survey maps (Figure 3-1). The following desired future conditions and associated attributes are intended to be bound by, or consistent with, their historical and predicted future ranges of variability.

Riparian DFC-01 – General. Riparian areas contain and support physical, chemical, and biological conditions and processes as well as a natural assemblage of native flora and fauna. Riparian areas are resilient to disturbances (including a changing climate), provide critical ecosystem services associated with water cycles and landscape function, and sustain opportunities for traditional cultural practices and the exercise of treaty-reserved rights.

Riparian DFC-02 – Water Quality and Quantity. Riparian areas facilitate the movement and transformation [filtering] of water from upland areas to aquatic ecosystems. Water originating from or influenced by riparian areas is characterized by levels of seasonal flow, temperatures, nutrients, contaminants, sediments, and other water quality attributes consistent with physical processes and supportive of traditional cultural practices.

Nez Perce Reservation - Soils

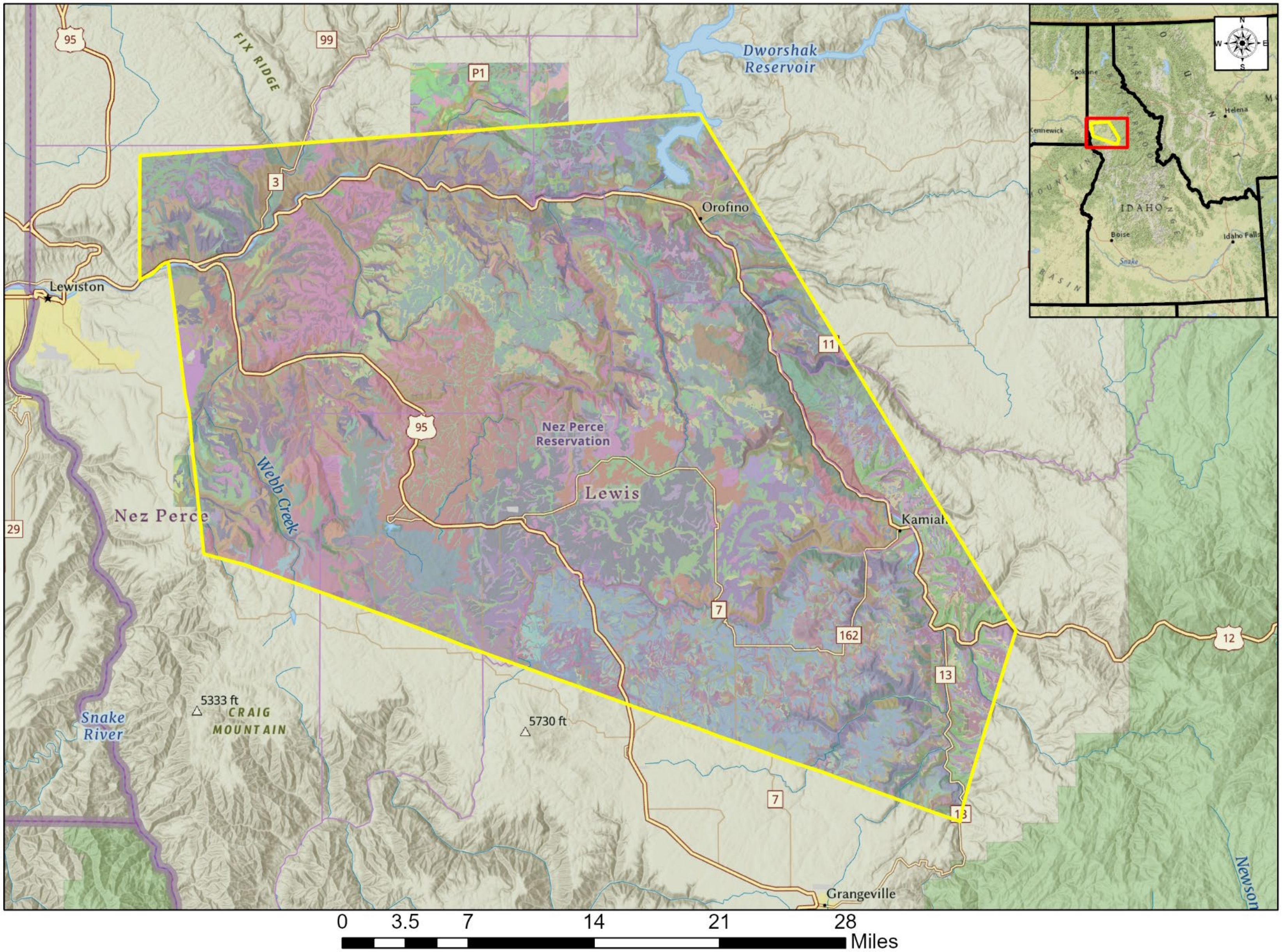


Figure 3-1) Example of an NRCS Soil Survey map for the Nez Perce Reservation. Project specific maps would depict soil series on a finer scale and include more specific information.

Riparian DFC-03 – Aquatic Ecosystem Structure and Function. Riparian areas contribute to aquatic ecological conditions capable of supporting self-sustaining populations of native species and diverse plant, invertebrate, and vertebrate aquatic species. Aquatic plant, fish, and wildlife communities within riparian areas exhibit patterns of species diversity, composition, age structure, and spatial heterogeneity, as well as the functional relationships among species, consistent with historical range of variability. Nutrients, large woody debris, and fine particulate organic matter are supplied by riparian areas in amounts and distributions sufficient to sustain physical complexity and stability. Aquatic habitats are key contributors to the recovery of fish and other aquatic species of critical conservation concern. Aquatic disturbances within riparian areas are typically driven by natural processes such as: low- to mixed- burn severity wildfires; and functional spring flooding and wind events that restore desired coarse woody debris deposits.

Riparian DFC-04 – Terrestrial Ecosystem Structure and Function. Riparian areas support self-sustaining populations of native terrestrial plant and wildlife species. Terrestrial plant and wildlife communities within riparian areas exhibit patterns of species diversity, composition, age structure, and spatial heterogeneity, as well as the functional relationships among species, consistent with natural processes. Terrestrial conditions within riparian areas support patterns of slope stability, soil health, production and transfer of nutrients and organic matter (including large wood) to aquatic ecosystems, solar shading, channel migration, and other biophysical processes consistent with historical conditions. Riparian areas provide habitat for riparian-dependent terrestrial wildlife species as well as corridors for the movement of wildlife across the landscape. Terrestrial habitats are key contributors to the recovery of plant and wildlife species of critical conservation concern. Terrestrial disturbances within riparian areas are driven primarily by processes such as windthrow, insect and disease agents, wildfire, flooding, and restoration treatments.

Riparian DFC-05 – Management. Management activities in riparian areas facilitate progress toward achieving and sustaining desired future conditions over the long term. The recovery of plant, fish, and wildlife species of critical conservation concern is not jeopardized by management activities in these areas.

Riparian DFC-06 – Infrastructure. The transportation system and other forms of human infrastructure have minimal impacts on aquatic and terrestrial conditions within riparian areas. Sediment delivery to streams, hydrologic connectivity of roads to streams, contamination risks, impacts to floodplains, and impairment of fish and wildlife movements due to the maintenance or development of infrastructure are rare.

3.2.3 Wildland Fuels

The desired future conditions for wildland fire control and prevention concern the use of site-specific silvicultural systems along with fire suppression or non-suppression tactics; hazardous fuel treatment methods as defined in the Nez Perce Hazardous Fuels Treatment Monitoring Plan; and post-fire restoration and rehabilitation treatments that achieve Nez Perce forest land DFCs. Each forest stand will be managed to achieve these DFCs and forest management will be amended to accommodate other natural resource attributes or characteristics defined by the Interdisciplinary team, NPTEC, allotment owners (on individually owned parcels), IRMP, and through public comment by the Nez Perce enrollment. DFCs for fuels loading by forest MG can be found in section 3.2.1 Forest/Fire Management Groups. In addition, BMP's and DFC's for dead and down woody material by MG (DDWD/Coarse Woody Debris) can be found in section 9.7 of the appendices "Course Woody Material and Snag Management". Fire risk rating maps are used to prioritize treatments (County Wildfire Mitigation Plans).

3.3 SILVICULTURAL APPROACH

The implementation of ecologically appropriate silvicultural systems will be guided by a combination of the latest science and Tribal cultural values which have been used to develop DFCs for Tribal forestlands. The restoration of historic forest conditions is further supported by climate adaptation plans and the latest science which concludes that historic forest conditions would be most resilient to a changing climate. In support of these conclusions, Tribal forest management will promote and prioritize early seral species, density management, and the ecological role of low intensity fires on a fractured forest landscape.

In general, silvicultural systems are a means by which stands are regenerated. Depending on the number of cohorts or age groups involved in the system, these systems are categorized as either even-aged, two-aged, or uneven aged. Each of these systems consist of a combination of complimentary regeneration and harvest methods that are best suited for stand conditions and management objectives. These systems are listed and defined in section 3.3.3 Silvicultural Treatments as well as in the Silvicultural Activities outline (external document).

Tirbal forestlands display varying levels of departure from DFCs which will require the Tribe to assess each stand individually and prescribe appropriate management actions, referred to as a prescription (Rx), that emphasize historic conditions and resiliency on a landscape level. Each stand will have a detailed prescription that includes a combination of even-aged, two-aged, and uneven aged silvicultural systems. Collectively, the implementation of prescriptions, at the stand level, will produce a multi-aged landscape across Trust and Fee lands. This concept is further outlined in the Silvicultural Systems Continuum table (external document).

Intermediate silvicultural treatments will be needed over time to maintain or alter stand development. The timing and type of treatments will be based on conditions such as the progression of successional stages, stand growth, changes in wildfire risk, insect outbreaks, disturbances, etc.

Silviculture is the practice or actions that control the way trees and forests grow. A silvicultural system is a collection of different forest management practices that are used together to influence the growth of a forest. Depending on the existing characteristics of a forest (tree species, stocking levels, site conditions, etc.), a silvicultural system is selected by forest managers based on how well it would help them achieve DFCs as well as other forest and interdisciplinary management goals.

Preferred Alternative

The preferred forest management alternative encompasses silvicultural systems (treatments) to effectively manage towards DFCs. Each forest stand will be managed to achieve DFCs, and management will be amended to accommodate other natural resource attributes or characteristics defined by the Interdisciplinary team, NPTEC, allotment owners (on individually owned parcels), and through public comment by the Nez Perce enrollment.

Silvicultural prescriptions are designed to accommodate stand level DFCs for each of the three (3) forest management zones. As stated previously, management techniques will vary on a project-by-project basis to ensure the most appropriate technique is used to reach the DFC of each stand. Prescriptions will utilize both even aged and multi-cohort management strategies which would be prescribed based on the tree growth potential within each management zone and any topographic and/or ecosystem conditions where species composition, structural conditions, and health require special consideration. Both project and landscape level forest planning should be reviewed on an annual basis and compared to DFCs. Depending on MGs, treatment schedules should be implemented every 10-20 years. Treatments may include HFR, pre-commercial and commercial thinning, or treatments that migrate the forest to a desired and suitable condition that is reviewed by the project's Interdisciplinary Team and approved by NPTEC.

Silvicultural Systems

The silvicultural system for the preferred alternative is based on a melding of even-aged and multi-aged strategies that sustain an increased level of resistance to high-severity wildfire; insect and pathogen outbreaks; and drought while generating both ecological, intrinsic, and monetary values. The initial focus is to restore forests that have uncharacteristic density, species composition, wildfire risk, and wildfire suppression directives. Even-aged plantations established due to wildfire, insect or disease infestation, afforestation objectives, natural or planted trees within a shelterwood/seed tree silvicultural regime; or related to prior land management objectives that were economic centric (e.g., high graded fee lands) will require several silvicultural treatments that migrate the stand from homogenous, even-aged conditions towards a heterogeneous, fire-resistant, and fire-resilient structure. Active management strategies will then focus on multi-aged treatments for long term management and maintenance of forest health typical of low-severity fire disturbance patterns within a dry mixed conifer forest. Such management strategies will aim to achieve stand-level objectives that are succinct with DFCs portrayed by the preferred successional stage of each MG **(green text and green circles in Figure 3-3 through Figure 3-6)**.

Forest succession is the gradual change in the species and stand density that make up a stand of trees. Trees that are intolerant of shade grow best in full sunlight. These species, such as ponderosa pine, often form the earliest version of a stand. As time passes and trees grow larger the forest floor receives less sunlight and becomes increasingly shaded. Species that are more tolerant of shade, such Douglas-fir or grand fir, grow better in a shaded understory than species that are shade intolerant. As large shade intolerant tree species begin to die, the shade tolerant tree species growing in the understory take their place. Over time, shade tolerant species make up more of the large overstory trees. This means the stand is entering the next successional stage or sere of development (early, mid, or late seral stage). There can be numerous developmental stages and forest stands can move between earlier stages and later stages due to the occurrence of or absence of disturbance events (such as wildfire and timber harvest).

3.3.1 Forest/Fire Management Groups

The MGs have been defined for Nez Perce forestlands to provide guidance with implementation objectives and strategies outlined in this document. The MG design is a composite of plant associations of equal or similar productivity or species characteristics ranging from dry to mesic site conditions. MGs are based on the fire regime groups defined by Smith & Fischer (1997) as well as the habitat groups, those described by Cooper (1991), on which the fire regime groups are based. Desired future conditions (DFCs) for each MG (section 3.2) describe how the composition and structure of the forested landscape are to be managed towards a balance of historic and expected future conditions that are both sustainable and adaptive. Such conditions would promote healthy forest ecosystems and promote resistance and resilience of Tribal forests to disturbance. The Nez Perce Tribe's forests have been grouped into three (3) distinct MGs: 1) warm, dry Douglas-fir and ponderosa pine mix (MG 1); 2) warm, dry to moderate Douglas-fir, grand fir mix (MG 2); and 3) moderate and moist grand fir (MG 7). Each MG is divided further by plant associations (Table 3-1).

Individual forest stands across Tribal forest lands have been placed into different groups (MG) based on certain similarities that they share. One important similarity concerns the plant species found within each stand. Since different plants grow better in certain conditions, it is expected that characteristics of a stand, such as soil moisture and even fire behavior, can be assumed based on the plants that grow there. These plant groupings have been used to define MGs. If a stand is assigned to a MG, which are listed in

Table 3-1, it will be managed in a manner that is similar to other stands in the group progressing towards desired conditions.

Table 3-1) Smith and Fisher (1997) forest/fire management groups identified on Nez Perce Tribal forestlands.

Mgmt Group	Description	Plant Association	ADP Code	Abbreviation
1	warm, dry DF, PP	ponderosa pine/Idaho fescue	140	PIPO/FEID
		ponderosa pine/common snowberry	170	PIPO/SYAL
		Douglas-fir/white spiraea	340	PSME/SPBE
		Douglas-fir/common snowberry	310	PSME/SYAL
2	warm, dry to moderate DF, GF, PP	ponderosa pine/ninebark	190	PIPO/PHMA
		Douglas-fir/dwarf huckleberry	250	PSME/VACA
		Douglas-fir/ninebark	260	PSME/PHMA
		grand fir/white spiraea	505	ABGR/SPBE
		grand fir/ninebark	506	ABGR/PHMA
7	moderate and moist GF	grand fir/twinflower	520	ABGR/LIBO
		grand fir/queencup beadlily	590	ABGR/CLUN
		western redcedar/queencup beadlily	530	THPL/CLUN

The current distribution of MGs across Tribal ownership is detailed in Table 3-2 and the distribution of MGs across the Reservation is depicted in Figure 3-2. Overall, MG 2 is the most prominent MG as it constitutes just over half (51%) of all Tribal forestlands. When viewed by ownership, the distribution of MGs varies. Allotments are primarily associated with MG 1 and MG 2 while Fee and Trust lands are associated with MG 7 and MG 2, respectively.

Table 3-2) NPT – Smith & Fischer forest/fire management groups (acres) (FPS,2022).

Forest/Fire Management Group (Smith & Fischer, 1997)		NPT Ownership Status			Total Acres	Percent of Total
		Allotment	Fee	Trust		
1	Warm, Dry DF, PP	3,206	847	9168	13,221	20%
2	Warm, Dry to Moderate DF, GF, PP	1,954	4,690	19,664	26,308	51%
7	Moderate and Moist GF	69	17,716	4,510	22,295	29%
-	**Total Acres**	**5,229**	**23,253**	**33,342**	**61,824**	**100%**

Fire Ecology Habitat Groups (Smith & Fischer, 1997)

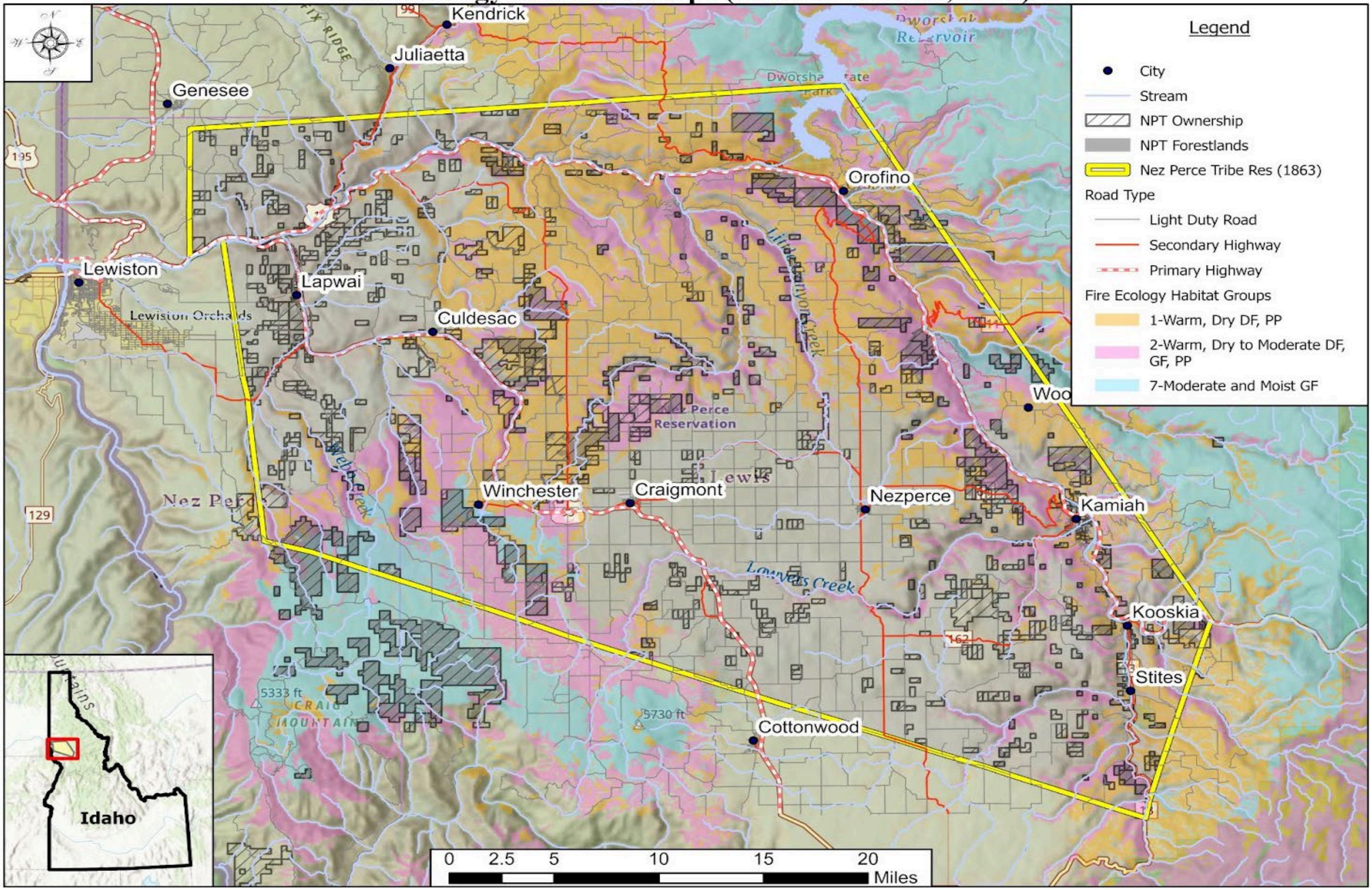


Figure 3-2) Map of Forest/Fire Management Groups on Nez Perce Tribal lands.

3.3.1.1 Forest/Fire Management Group 1

Warm, Dry Douglas-fir and Ponderosa Pine Habitat Types (Smith & Fischer, 1997)

The 'warm, dry Douglas-fir and ponderosa pine' MG is the driest forested zone on the reservation and spans approximately 20% of the NPT's commercial forestland. There are four (4) veg associations within this MG:

- *Pinus ponderosa/Festuca idahoensis* (PIPO/FEID); ponderosa pine/Idaho fescue
- *Pinus ponderosa/Symphoricarpos albus* (PIPO/SYAL); ponderosa pine/common snowberry
- *Pseudotsuga menziesii/Spiraea betulifoia* (PSME/SPBE); Douglas-fir/white spiraea
- *Pseudotsuga menziesii/Symphoricarpos albus* (PSME/SYAL); Douglas-fir/common snowberry

Vegetation: The warmest and driest forest habitat types are typically found on lower elevations and on southern or western slopes. Tree growth and regeneration are hindered by reduced soil moisture. Mature ponderosa pine or Douglas-fir with canopy cover less than 30% are indicative. Grasses and low shrubs dominate the understory.

Fuels: Typical historical surface fuel loadings (tons per acre): litter - 0.6; duff - 2.3; herbs - 0.2; shrubs - 0.4; and tree regeneration - 0.2. Woody fuels less than 3 inches in diameter often average less than 1 ton per acre and rarely exceeds 5 tons.

Role of Fire: Prior to the 20th century, MG-1 sites were characterized by frequent underburns that removed most tree regeneration, thinned young stands, and perpetuated open stands dominated by ponderosa pine. Fire return intervals averaged between 2 to 20 years with rare evidence of stand-replacing fire. Research by Davis et.al., 1980 indicate three main functions of low-severity fires within dry forests:

1. Maintain grasslands,
2. Maintain open forest structure,
3. Enhance tree regeneration, especially early seral ponderosa pine.

Forest Succession and Management: Pre-settlement, forests were typically open and dominated by large ponderosa pine with occasional patches of lower-level shrubs. A combination of prescribed fire and thinning is recommended for restoring ponderosa pine dominance and maintaining vigorous, open ponderosa pine growth. At maturity, which is typically when trees reach their full height and begin reproducing, these forests become susceptible to root disease, dwarf mistletoe, and pine beetle infestations. The desired condition of an open, mature ponderosa pine dominated stand **(Successional Pathway 1: D2; Figure 3-3)** improves forest resiliency to stressors such as wildfire, insect and disease, and invasive plant species while maintaining ecosystem function and historical condition.

3.3.1.2 Forest/Fire Management Group 2

Warm, Dry to Moderate Douglas-fir, Grand Fir, and Ponderosa Pine Habitat Types (Smith & Fischer, 1997)

The 'warm, dry to moderate Douglas-fir, grand fir, ponderosa pine mix' MG is a transition zone between the warm dry Douglas-fir and ponderosa pine and the moderate and moist grand fir MG. This MG encompasses 51% of Tribal Forest landholdings. There are five (5) veg associations within this MG:

- *Abies grandis/Physocarpus malvaceus* (ABGR/PHMA); grand fir/ninebark
- *Abies grandis/Spiraea betulifolia* (ABGR/SPBE); grand fir/white spiraea

- *Pinus ponderosa/Physocarpus malvaceus* (PIPO/PHMA); ponderosa pine/ninebark
- *Pseudotsuga menziesii Physocarpus malvaceus* (PSME/PHMA); Douglas-fir/ninebark
- *Pseudotsuga menziesii/Vaccinium caespitosum* (PSME/VACA); Douglas-fir/dwarf huckleberry

Vegetation: This MG consists of warm habitat types in the Douglas-fir, ponderosa pine, and grand fir series that can support a dense layer of tall shrubs or a dense sward of grass types. The overstory of mature forests is somewhat open, although canopy cover often exceeds 50%. Dense Douglas-fir or grand fir regeneration often develops in the understory. Ponderosa pine dominates early post-fire succession accompanied by Douglas-fir. Western larch is codominant when moisture conditions are high. Grand fir is a minor component in early seral stands but may eventually dominate in the ABGR/PHMA type.

Fuels: Forests in this MG tend to be more productive and have higher loading of downed woody fuels when compared to MG-1. Typical historical surface fuel loadings (tons per acre) are consistent with MG-1: litter - 0.6; duff - 2.3; herbs - 0.2; shrubs - 0.4; and tree regeneration - 0.2 which represent open pine stands. Dense regeneration increases fuel loadings, as do natural thinning, snow breakage, blowdown, and insect and disease mortality. The soil's duff layer can become relatively deep during forest succession.

Role of Fire: Prior to the 20th century, MG-2 sites were burned frequently by low- or mixed-severity fire; occasional stand-replacing fire occurred as well. Where fires occurred at relatively short intervals (7 - 25 years), they were mostly nonlethal, but patches of stand replacement also occurred. Fire severity tended to be greater where fire-free intervals were longer. These longer fire-free intervals favor Douglas-fir and grand fir regeneration.

Frequent low- and mixed-severity fires influence stand structure and species composition. Ponderosa pine reproduces well in fire-created openings if seed is available, and moisture is plentiful. Douglas-fir and western larch may also reproduce well, depending on moisture conditions. Underburning will thin regeneration, removing Douglas-fir and grand fir and reducing ladder fuels. Mountain pine beetle is uncommon in open stands of ponderosa pine, and root disease centers are small because grand fir and Douglas-fir are reduced by fire. Historically, fires were infrequent in some MG-2 stands and stand-replacing fires occurred at least occasionally. Twentieth century fire exclusion has not produced completely divergent conditions as the primary change within this MG is the geographic extent and continuity of these conditions.

Forest Succession and Management: Forest development after fire largely depends on site conditions. The warmest sites (PIPO/PHMA) are dominated either by ponderosa pine alone or by ponderosa pine and Douglas-fir ('dry-phase'; pathway 2.1). Where conditions are cooler and more mesic (PSME/PHMA), western larch is an important seral species ('moist phase'; pathway 2.2).

<u>Pathway 2.1</u>: Prior to fire exclusion, forest sites typically burned frequently by low-severity fire, which maintained a high, open canopy **(Successional Pathway 2.1: D2; Figure 3-4)**. Ponderosa pine and Douglas-fir regeneration is episodic dependent on site conditions. Frequent, low-severity burns perpetuate ponderosa pine dominance and often favor ponderosa pine regeneration.

<u>Pathway 2.2</u>: Prior to the pre-settlement era, most stands in this pathway underburned frequently enough to maintain an open structure dominated by ponderosa pine and western larch **(Successional Pathway 2.2: D2-D3; Figure 3-5)**. Occasional stand replacement occurred, often in patches within nonlethal burns. Frequent low-severity fire can maintain this open structure, dominated by ponderosa pine and western larch, for centuries. Mature Douglas-fir withstands low-severity fire, so mature stands often contain all

three species. Ponderosa pine and western larch regenerate well in severely burned patches, near edges, and under an open canopy, while Douglas-fir regenerates under greater cover. Succession may be entirely dominated by Douglas-fir.

Fire can be used in MG-2 stands to enhance forage, maintain open forest structure, reduce fuel continuity, and enhance tree regeneration. Combinations of prescribed fire with thinning or understory removal have been recommended for restoring ponderosa pine. Fire generally enhances forage production and quality. In general, open stands contain more desired shade intolerant species than shade tolerant trees within respective closed stands. In early successional stages, MG-2 stands produce high volumes of winter forage for elk and deer, and berries for bears, grouse, and other small animals. Where dense regeneration occurs, mechanical thinning or partial/group cutting is usually recommended in combination with underburning.

Severe fire behavior should be avoided to protect the soil's reservoir of decaying wood. Graham and others (1994) recommended leaving 7 to 14 tons per acre of woody debris larger than 3 inches in diameter after harvesting in ABGR/SPBE and PSME/PHMA forested stands.

3.3.1.3 Forest/Fire Management Group 7

Moderate and Moist Grand Fir Habitat Types (Smith & Fischer, 1997)

The 'moderate and moist grand fir' MG is predominantly located on higher elevations in the Craig Mountain and Winchester areas and northeastern aspects within the Gilbert Grade and Cavendish reserves near Orofino, Idaho. This plant association spans 29% of the Tribe's forest landholdings. This veg association includes three (3) habitat types:

- *Abies grandis/Clintonia uniflora* (ABGR/CLUN)*; grand fir/queencup beadlily
- *Abies grandis/Linnaea borealis* (ABGR/LIBO)*; grand fir/twinflower
- *Thuja plicata/Clintonia uniflora* (THPL/CLUN); western redcedar/queencup beadlily

*Where ABGR/CLUN-PHMA and ABGR/LIBO-LIBO phases occur adjacent to warm, dry habitat types, their ecology resembles that of the Warm, Dry Douglas-fir and ponderosa pine MG.

Vegetation: Within the Nez Perce Tribe's Forest land holdings, these habitat types occur across the elevational range, from valley bottoms to elevations as high as 5,400 feet. Fire regimes and successional patterns are diverse. Grand fir is the climax species, co-dominating on some sites with subalpine fir occurring within forest pockets. Douglas-fir is a common early to mid-seral species, and where Engelmann spruce occurs occasionally. The presence of lodgepole pine, western larch, western white pine, and western redcedar depends on moderate moisture conditions and favorable fire history. Ponderosa pine is an important early seral tree. Numerous shrub species occur and often dominate succession for many years. Mild environmental conditions have shaped plant communities that are rich and productive, but also highly sensitive to disturbance.

Fuels: Forests are productive and tend to produce heavy fuels. Downed woody fuels primarily result from accumulated deadfall and natural thinning, but grand fir also produces a relatively heavy load of twigs and small branch wood. Large, severe fires can occur during droughts, killing most trees in mature stands. Fuels dry slowly in Grand Fir Mosaic stands which occasionally interrupt the spread of large fires.

Typical historical surface fuel loadings for MG-7 (tons per acre): Duff: 30-59 tons per acre; Downed woody fuels: 24.4 tons per acre.

Role of Fire: This MG ranges from infrequent severe burns (>25-year intervals), that are followed by persistent shrub fields, to areas in the Grand Fir Mosaic, where evidence of historic fire is rare. Low- and mixed-severity fires increase structural complexity within stands and heterogeneity across the landscape. Low-severity fires often damage the boles of Engelmann spruce, fir, western white pine, and lodgepole pine. Species with thicker bark such as mature Douglas-fir, western larch, and ponderosa pine, are preferred.

Forest Succession and Management: Successional pathways vary. Douglas-fir, the most common early seral species, occurs in a mixture that may include ponderosa pine, western larch, western white pine, lodgepole pine, and Engelmann spruce. Grand fir may also occur early in succession (Pathway 7).

Pathway 7: Succession is dominated by Douglas-fir and other species. High-severity wildfire may result in quick establishment of forbs and grassy species (Successional Pathway 7: A) with shrubs dominating within 8 to 10 years. Ponderosa pine is common on warm sites, especially those with a history of low-severity fire. Western white pine was a common seral species prior to the introduction of white pine blister rust. Lodgepole pine and Engelmann spruce are favored by cool conditions. Grand fir may establish along with other shade-intolerant species; but in this pathway, they do not dominate until late succession. As stands mature without fire **(Successional Pathway 7: D2; Figure 3-6)**, all trees develop some fire resistance. Low-severity fires remove most of the Engelmann spruce and grand fir **(Successional Pathway 7: D3; Figure 3-6)**. Mature western larch can withstand severe fire, as can some Douglas-fir and ponderosa pine; therefore, clusters of relict trees often occur on sites sheltered from extreme fire behavior by topographic features (Successional Pathway 7: D1). Low-severity fire during the mature phase favors Douglas-fir, western larch, and ponderosa pine **(Successional Pathway 7: E3; Figure 3-6)**. Without disturbance, species dominance gradually shifts from Douglas-fir and other seral species to grand fir (Successional Pathway 7: F).

Fuels reduction and maintenance is recommended to reduce episodes of severe, stand replacing wildfire. Careful use of prescribed fire will reduce dangerous fuel loadings and fuel continuity, enhance wildlife habitat, and favor seral species during tree regeneration. Mechanical thinning and mastication are other management strategies that may be employed to reduce heavy surface fuels. Seed tree and shelterwood treatments, with planting, will produce increased regeneration success. Restoration treatments may be required on sites that are no longer adequately stocked with trees.

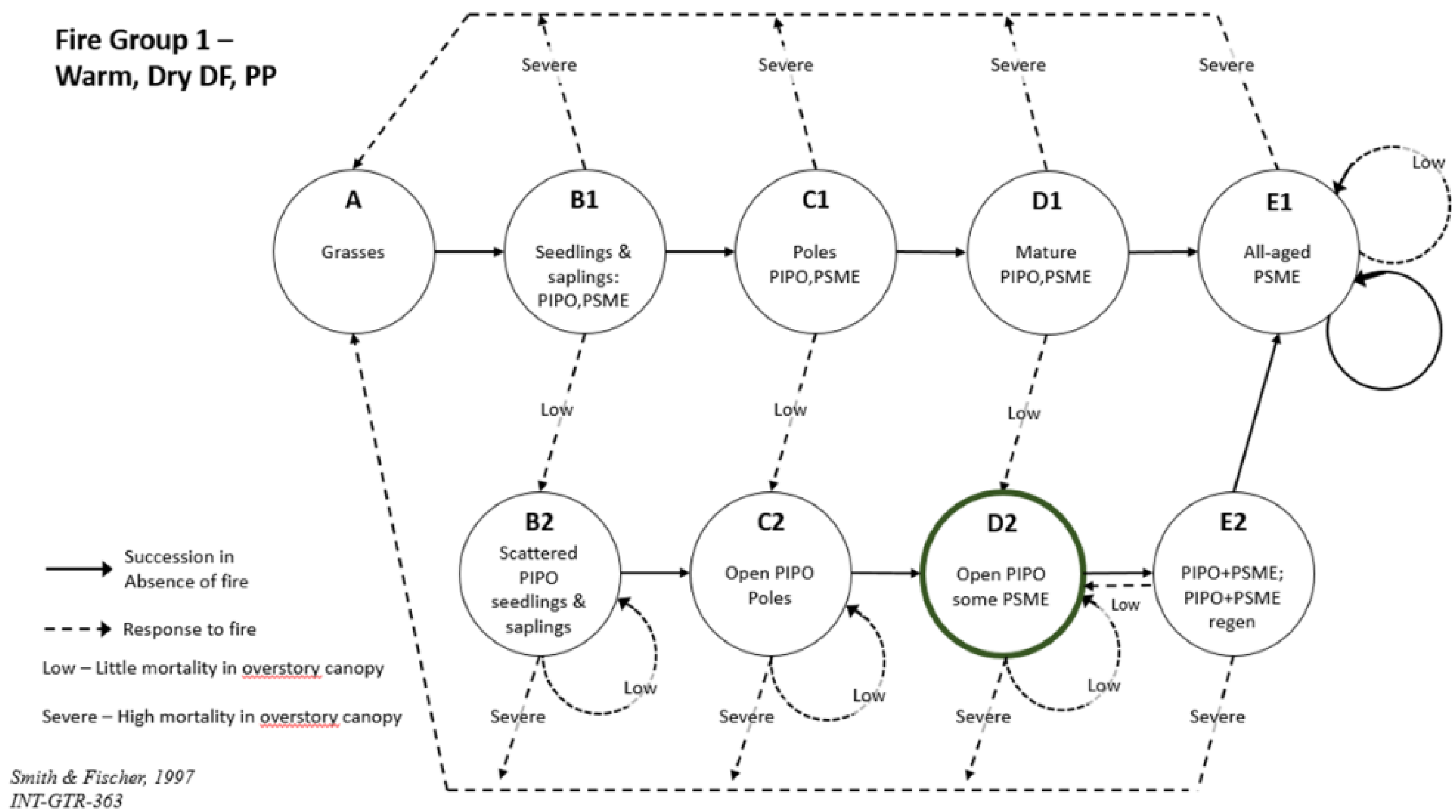


Figure 3-3) Forest/Fire Management Group 1 successional pathway with emphasis on condition D2.

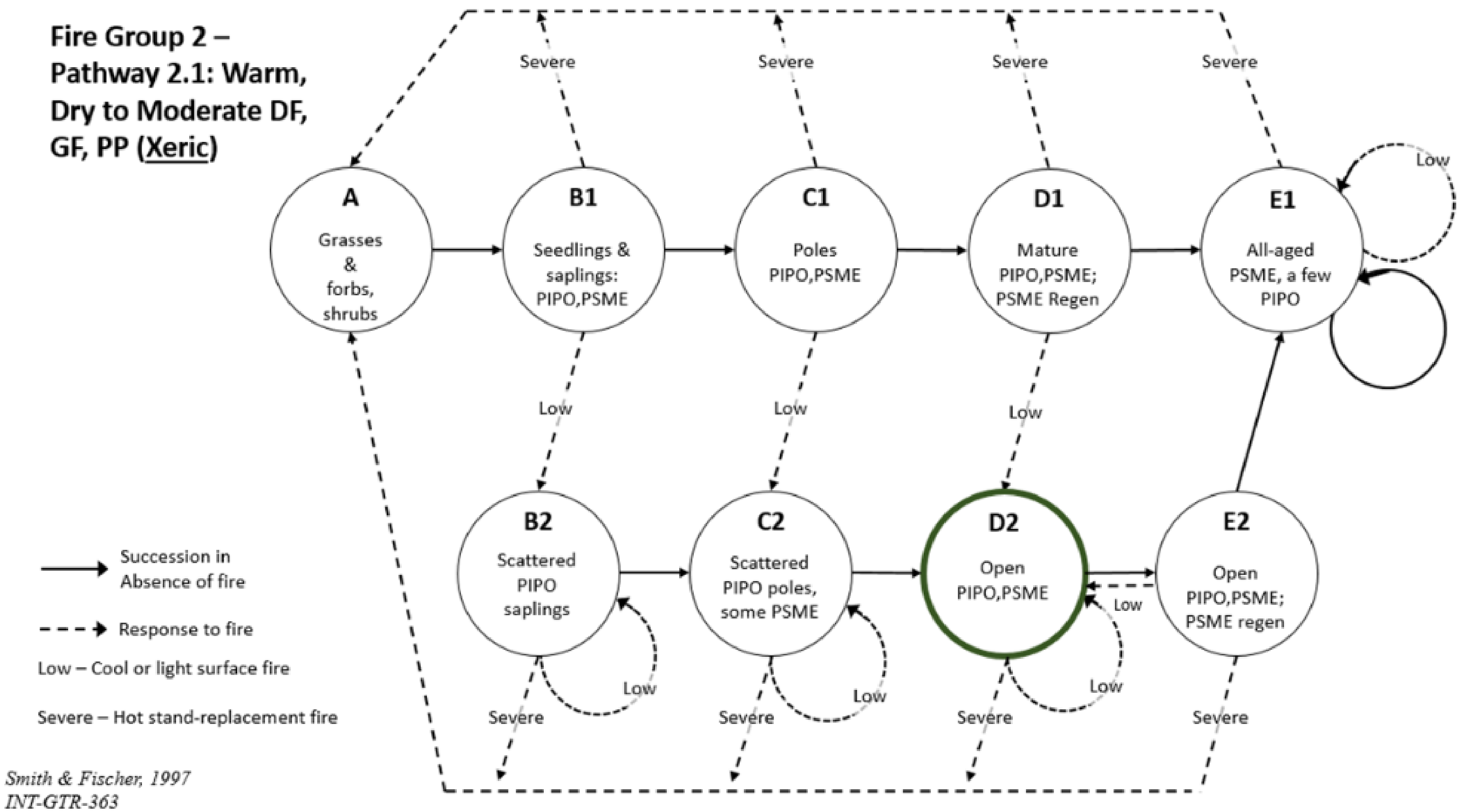


Figure 3-4) Forest/Fire Management Group 2 successional pathway 2.1 with emphasis on condition D2.

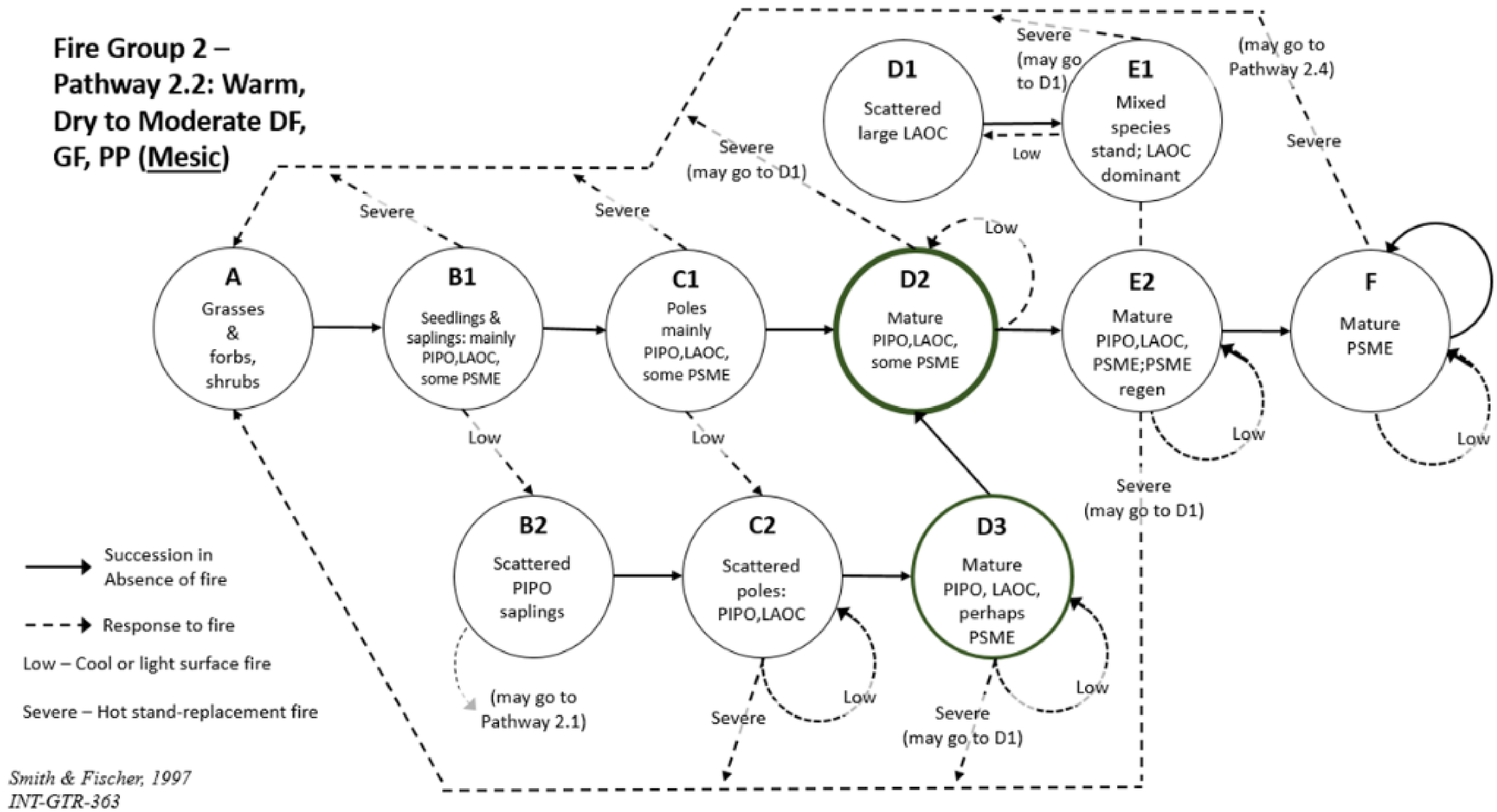


Figure 3-5) Forest/Fire Management Group 2 successional pathway 2.2 with emphasis on condition D2.

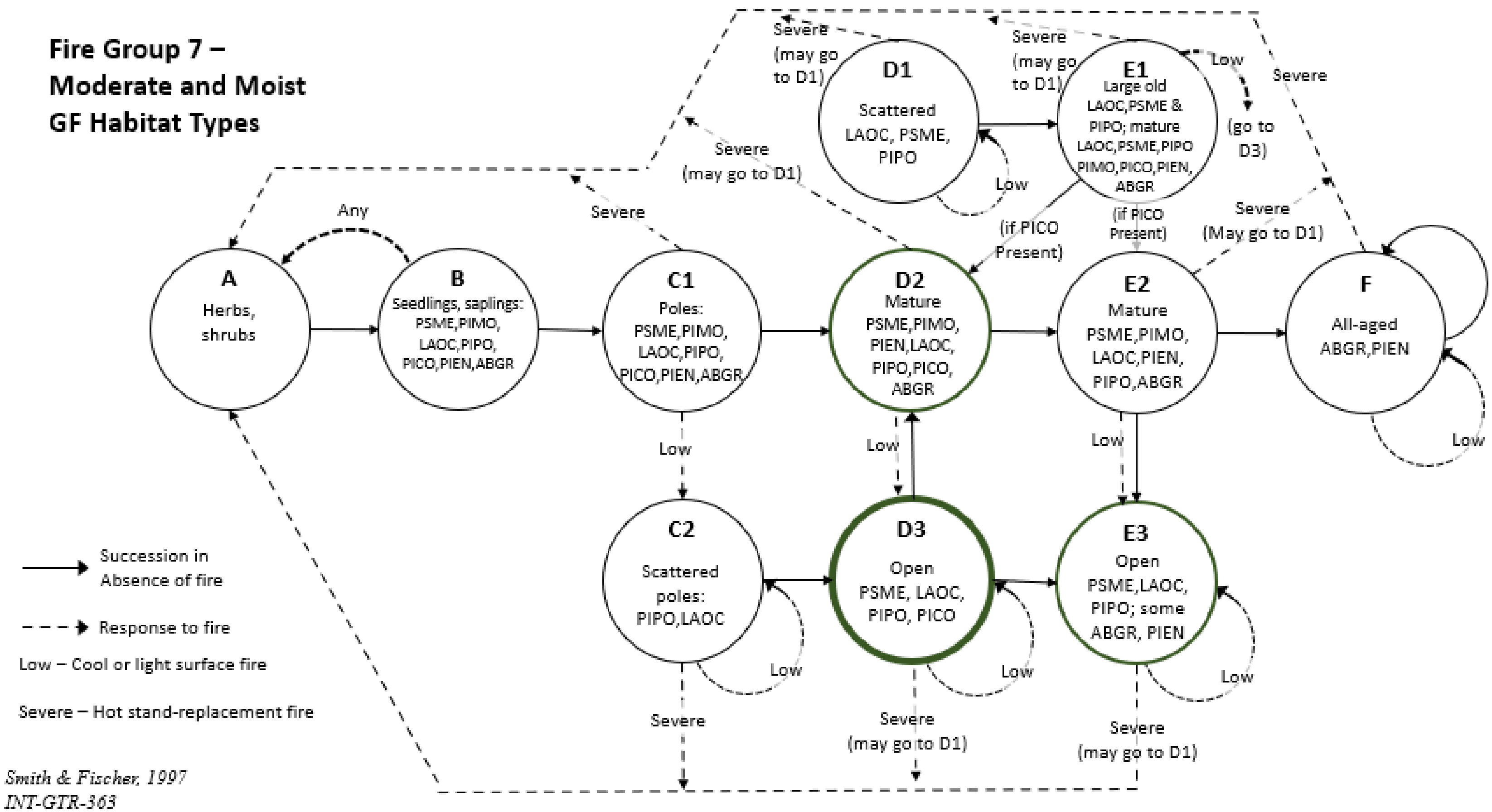


Figure 3-6) Forest/Fire Management Group 7 successional pathway with emphasis on conditions D2, D3, and E3.

3.3.2 Management Zone Thresholds

Management trigger points would be guided by recommendations made in *Suggested Stocking Levels for Upland Forests of Northeastern Oregon and Southeastern Washington* (Powell 2024). To accommodate variability across sites, management trigger points can be adjusted within a range of values constrained by upper and lower management zone limits. The upper management zone is at the lower limit of the self-thinning zone which is the density at which mortality begins to occur because of competition. The upper management zone is ~69% of full stocking while the lower limit is ~45% of full stocking.

The management thresholds, both at the upper and lower limits, are variable as they are dependent on habitat type, desired species mix, site conditions, and management objectives. Because of these factors, the target density of managed forests within each zone will be considered independently. As silvicultural prescriptions are tailored to each site it is expected that the resulting stand densities, post-management, within each zone will be highly variable. The management zones for each MG are detailed in the following sub-sections. It should be noted that the thinning guidelines (bold text) are generalized recommendations that were developed to simplify the harvest schedule model. In practice, forest treatments on the Reservation will be guided by the parameters in the appropriate table for each project area.

3.3.2.1 Forest/Fire Management Group 1 – Warm, Dry

Thin from below when the existing stand density reaches ***100 square feet per acre (BA) down to 60 square feet per acre (BA)***. Actual stand prescriptions (Rx's) may vary based on the values in Table 3-3. Desired future conditions for this zone include open stands that are predominantly ponderosa pine and, where conditions are suitable, some Douglas-fir. Ponderosa pine would be favored within this zone as it is the driest zone on the Reservation. Douglas-fir would be maintained as a component of stands within this zone, but only as long as site conditions are conducive to the growth and vigor of individual trees.

Table 3-3) Upper and lower management zone thresholds for Forest/Fire Management Group 1 – Warm, dry Douglas-fir, ponderosa pine (Powell 2024). All values are based on a QMD = 10.0".

Habitat Type	Tree Species	Mgmt. Zone	TPA			BAA		
			EA	IS	UA	EA	IS	UA
Ponderosa pine / Idaho fescue (PIPO/FEID)	Ponderosa Pine	LMZ	89	84	78	49	46	42
		UMZ	140	132	122	76	72	67
Ponderosa pine / common snowberry (PIPO/SYAL)	Ponderosa Pine	LMZ	105	99	92	57	54	50
		UMZ	166	156	144	90	85	79
Douglas-fir/white spiraea (PSME/SPBE)	Ponderosa Pine	LMZ	154	145	134	84	79	73
		UMZ	243	228	211	132	125	115
	Douglas-fir	LMZ	162	153	141	89	83	77
		UMZ	255	240	222	139	131	121
Douglas-fir / common snowberry (PSME/SYAL)	Ponderosa Pine	LMZ	102	96	88	55	52	48
		UMZ	160	150	139	87	82	76
	Douglas-fir	LMZ	136	128	118	74	70	64
		UMZ	213	201	186	116	110	101
	Western Larch	LMZ	111	104	96	60	57	53
		UMZ	174	164	151	95	89	83

EA **Even aged:** Showing the trees/acre, or basal area/acre, associated with an even-aged stand structure.
IS **Irregular Structure:** Even-aged SDIs were reduced by 7% for an irregular stand structure.
UA **Uneven Aged:** Even-aged SDIs were reduced by 13% for an uneven-aged stand structure (from Long 1995).
ES **Equilateral Spacing:** The spacing, in feet, that the trees per acre associated with an even-aged stand structure (EA columns) would have when spaced equilaterally apart; also referred to as triangular spacing.

3.3.2.2 Forest/Fire Management Group 2 – Warm, Moderate

Thin from below when the existing stand density reaches ***110 square feet per acre (BA) down to 70 square feet per acre (BA)***. Actual stand prescriptions (Rx's) may vary based on the values in Table 3-4. This MG is primarily a transitional zone between MG-1 and MG-7. The desired future conditions within the more xeric habitat types in this zone (pathway 2.1) are open, mature, and vigorous stands of ponderosa pine and Douglas-fir. The more mesic habitat types (pathway 2.2) would feature stands that are primarily composed of mature ponderosa pine and western larch. These stands may also include Douglas-fir on sites with suitable growing conditions.

Table 3-4) Upper and lower management zone thresholds for Forest/Fire Management Group 2 – Warm, dry to moderate Douglas-fir, grand fir, ponderosa pine (Powell 2024). All values are based on a QMD = 10.0".

Habitat Type	Tree Species	Mgmt. Zone	TPA			BAA		
			EA	IS	UA	EA	IS	UA
Ponderosa pine / ninebark (PIPO/PHMA)	Follow guidelines for Douglas-fir / ninebark (PSME/PHMA)							
Douglas-fir / dwarf huckleberry (PSME/VACA)	Ponderosa Pine	LMZ	84	79	73	46	43	40
		UMZ	133	125	115	72	68	63
	Douglas-fir	LMZ	80	75	70	44	41	38
		UMZ	126	119	110	69	65	60
Douglas-fir / ninebark (PSME/PHMA)	Ponderosa Pine	LMZ	102	96	88	55	52	48
		UMZ	160	150	139	87	82	76
	Douglas-fir	LMZ	136	128	118	74	70	64
		UMZ	213	201	186	116	110	101
	Western Larch	LMZ	111	104	96	60	57	53
		UMZ	174	164	151	95	89	83
Grand fir / white spiraea (ABGR/SPBE)	Ponderosa Pine	LMZ	160	150	139	87	82	76
		UMZ	251	236	218	137	129	119
	Douglas-fir	LMZ	166	157	145	91	85	79
		UMZ	261	246	227	142	134	124
	Grand fir	LMZ	155	146	135	85	80	74
		UMZ	244	229	212	133	125	116
Grand fir / ninebark (ABGR/PHMA)	Follow guidelines for Douglas-fir / ninebark (PSME/PHMA)							

EA **Even aged:** Showing the trees/acre, or basal area/acre, associated with an even-aged stand structure.
IS **Irregular Structure:** Even-aged SDIs were reduced by 6% for an irregular stand structure.
UA **Uneven Aged:** Even-aged SDIs were reduced by 13% for an uneven-aged stand structure (from Long 1995).
ES **Equilateral Spacing:** The spacing, in feet, that the trees per acre associated with an even-aged stand structure (EA) would have when spaced equilaterally apart; also referred to as triangular spacing.

3.3.2.3 Forest/Fire Management Group 7 – Moist

Thin from below when the existing stand density reaches ***140 square feet per acre (BA) down to 80 square feet per acre***. Actual stand prescriptions (Rx's) may vary based on the values in Table 3-5. This MG includes the moist sites on the Reservation. Desired future conditions for this MG include open and mature stands of ponderosa pine, western larch, and Douglas-fire with minor components of Engelmann Spruce, lodgepole pine, western white pine (white pine blister rust resistant variant), and grand fir. The horizontal structure of stands within this zone would be maintained as single trees and/or tree clusters with gaps of varying sizes. The increased species richness of some sites would support wildlife and culturally significant plants. This MG would encompass a suite of silvicultural regimes that would largely be dictated by topography and ecosystem drivers related to tree vigor and forest health.

Table 3-5) Upper and lower management zone thresholds for Forest/Fire Management Group 7 – Moderate and moist grand fir (Powell 2024). All values are based on a QMD = 10.0".

Habitat Type	Tree Species	Mgmt. Zone	TPA			BAA		
			EA	IS	UA	EA	IS	UA
Grand fir / twin flower (ABGR/LIBO)	Ponderosa Pine	LMZ	160	150	139	87	82	76
		UMZ	251	236	218	137	129	119
	Douglas-fir	LMZ	166	157	145	91	85	79
		UMZ	261	246	227	142	134	124
	Western Larch	LMZ	180	169	156	98	92	85
		UMZ	282	266	246	154	145	134
	Lodgepole Pine	LMZ	133	125	116	73	68	63
		UMZ	209	197	182	114	107	99
	Engelmann Spruce	LMZ	175	164	152	95	90	83
		UMZ	274	258	239	150	141	130
	Grand Fir	LMZ	45	231	213	134	126	116
		UMZ	385	362	335	210	198	183
	Subalpine Fir	LMZ	163	153	142	89	84	77
		UMZ	256	241	223	139	131	121
Grand fir / queencup beadlily (ABGR/CLUN)	Ponderosa Pine	LMZ	160	150	139	87	82	76
		UMZ	251	236	218	137	129	119
	Douglas-fir	LMZ	166	157	145	91	85	79
		UMZ	261	246	227	142	134	124
	Western Larch	LMZ	159	150	139	87	82	76
		UMZ	250	236	218	136	129	119
	Lodgepole Pine	LMZ	150	141	130	82	77	71
		UMZ	235	222	205	128	121	112
	Engelmann Spruce	LMZ	205	193	179	112	105	97
		UMZ	322	303	281	176	166	153
	Grand Fir	LMZ	163	153	142	89	84	77
		UMZ	256	241	223	139	131	121
Western redcedar / queencup beadlily (THPL/CLUN)	Follow guidelines for grand fir/twin flower (ABGR/LIBO)							

EA **Even aged:** Showing the trees/acre, or basal area/acre, associated with an even-aged stand structure.
IS **Irregular Structure:** Even-aged SDIs were reduced by 6% for an irregular stand structure.
UA **Uneven Aged:** Even-aged SDIs were reduced by 13% for an uneven-aged stand structure (from Long 1995).
ES **Equilateral Spacing:** The spacing, in feet, that the trees per acre associated with an even-aged stand structure (EA) would have when spaced equilaterally apart; also referred to as triangular spacing.

3.3.3 Silvicultural Treatments

The silvicultural treatments described in this section may be implemented to achieve one or multiple objectives related to forest management. Objectives may be related to timber harvesting, reforestation, site preparation, and/or fuels management.

3.3.3.1 Timber Harvesting

Pre-Commercial Thinning (PCT): The removal of young trees or small trees that are of inadequate size for commercial harvest reduces wildfire risk by eliminating or redistributing available fuels and reduces tree competition for moisture and light. PCT disrupts the continuity of fuels, both vertically and horizontally, which reduces the risk of rolling crown fires, and it improves growing conditions for residual trees as there is less competition for resources. This technique would help to promote desired future conditions as undesirable species, trees of poor vigor, and overstocked conditions would all be addressed.

Silvicultural treatments are different forest management activities that can be used to achieve DFC and other management goals. Treatments can include different types of timber harvest, fuels reductions, tree planting, forest development activities, insect & disease treatments, prescribed fire, etc.

Commercial Thinning: Commercial timber harvesting involves the removal of economically mature timber from forestlands (Figure 3-7; top left photo). The removal of overstory trees would immediately increase spacing between residual trees. This would not only increase spacing between individual crowns and reduce the likelihood of a rolling crown fire, but it would also improve conditions for future growing stock. Improved growing conditions would be associated with increased tree vigor and increased stand resistance and resilience to future wildfires and insect and disease pathogens.

Commercial thinning may be conducted using a variety of different methods. Some examples include thin from below, thin from above, through a diameter range, sanitation, by species, mechanical (spacing), crop tree release, etc. Implementation may involve manual and/or mechanical harvest practices and include the use of chemical applications and/or prescribed fire.

3.3.3.2 Slash Management

Depending on the method, slash abatement will be a necessary component of any thinning operation. The following are examples of harvest and slash abatement strategies that are often used for Tribal timber harvests:

Lop and Scatter: This method is limited in application to harvests with low to moderate removal volumes and may be combined with other slash management strategies on areas with high removal volumes. Contractors are required to limb and top the trees where they fall in the woods. The residual slash is then sawed into short lengths and scattered on the ground. The effect of this technique is to eliminate ladder fuels and to disperse heavy concentrations of fuels. The “lop and scatter” method also provides positive benefits to long-term soil productivity and small mammal habitat. This method may be used with commercial harvest or PCT.

Whole-Tree Harvesting: Whole-tree harvest prescriptions are often associated with mechanized harvesting systems. Most of the slash generated on the site is brought to log landings to be piled and burned. Because little or no slash is left behind in the woods, whole tree harvests are not as constrained by removal volumes. Whole-tree harvests are generally prescribed for regeneration harvests on sites where some form of mechanical scarification follows harvest operations.

Mastication: Mastication involves the use of machinery (e.g., skid-steers or excavators with drum- or rotor-type heads) to reduce hazardous fuels, particularly slash produced during timber harvest operations (Figure 3-7; top right photo). Mastication does not reduce the total volume of surface fuels, but it reduces the size and depth of fuels. Mastication is often coupled with prescribed burning to reduce surface fuels post-treatment. This technique may be prescribed as a means of post-harvest slash treatment or to reduce/eliminate brush or small trees in specific areas; thereby, promoting wildfire resiliency and healthy forest conditions as defined by desired future conditions.

Figure 3-7) Examples of silvicultural treatments conducted on the Nez Perce Reservation. Top left: Commercial thinning. Top right: Mastication of logging slash. Bottom left: Prescribed burning as an intermediate treatment. Bottom right: Pile burning.

Prescribed Fire: Prescribed fire has been a land management tool used by indigenous people for millennia to provide 'life-supporting resources, food and medicine security, protect lifeways, sacred places, and deeply held traditions, and to increase personal safety' (Hessburg et.al., 2021). However, adverse climate conditions and growing urbanization have increased implementation risks. Prescribed burns are currently employed on regeneration harvests or for hazardous fuels mitigation and are most effective on harvests with high removal volumes (Figure 3-7; bottom left photo). Trees are limbed and topped where they fall in the woods. The purpose of leaving the slash behind in the woods is to provide fuel for the prescribed burn, nutrient recycling, and to meet dead, down woody debris objectives. The amount of residual slash left on site after the fire is dependent on the objective and effectiveness of the burn.

Pile Burning: The piling and burning of logging slash is a common practice that is associated with most types of timber harvest operations, including commercial thinning and PCT (Figure 3-7; bottom right photo). Pile burning is often necessary to satisfy standards for slash abatement, particularly for systems such as whole-tree harvests which produce large slash piles as trees are limbed at the log landing. Even when most of the slash is left in the woods, as is the case with harvests that utilize the "lop and scatter" method, typically some woody debris, including log ends and limbs, will need to be piled and burned.

3.3.3.3 Regeneration Silvicultural Treatments

There are several regeneration treatment methods available to promote or maintain a healthy forested ecosystem and achieve defined DFCs. These methods are further outlined in the Silvicultural Systems Continuum table (external document) while more common treatment types are described as follows:

Even Aged

- *Clearcuts:* A regeneration method in which all overstory trees are removed and the next cohort of trees regenerates in open conditions. Regeneration can occur naturally from seed dropped during harvest of overstory trees, dormant seed in the forest floor (seed bank), seed rain from adjacent stands, or artificial regeneration.
- *Seed Tree:* The seed tree method is an even-aged management strategy that retains good seed-producing trees of desired species that are shade-intolerant and are scattered over the area to ensure establishment of adequate regeneration over a period. Seed tree cuts may be planted as a supplement to ensure adequate stocking numbers, species composition, genetic diversity, etc. into the future.
- *Shelterwood:* The shelterwood method is designed to enable regeneration establishment under the shade of crop trees (Figure 3-8). The shelterwood method requires at least two entries conducted near the end of rotation. In the first entry, the seed cut, the stand is opened by harvesting trees to the degree needed for successful regeneration of desired species. The second entry, the removal cut, releases the successfully established regeneration from overstory suppression. The removal cut often must be done in two stages to reduce damage to the reproduction. In some situations, it is advisable to remove the overstory through several removal cut entries primarily to permit adjustment of understory trees to increased light and temperature regimes. Despite the multiple entries, shelterwood systems are considered even aged. Legacy trees may be retained as mature or old growth to provide a desired function or ecological service. If regeneration is not adequate after 5 years, underplanting is often necessary as a supplement just like a Seed tree.

Two-Aged

- The following silvicultural treatments are defined in detail above under the Even Aged heading. However, as two-aged treatments they differ from even aged treatments as legacy trees are maintained on site. Two-aged treatments promote an overstory and regenerating understory to promote forest diversity and wildlife habitat. Refer to section 9.7 (Dead & Down Woody Material & Snag Management) for guidelines on legacy tree retention.
  - *Clearcuts with Legacy*
  - *Seed Tree with Legacy*
  - *Shelterwood with Legacy*

Multi-Aged

- *Free Thin:* Also known as free selection, is a form of uneven-aged management that recognizes the forest and each stand as a mosaic of conditions and tree groupings and applies the desired forest treatment objectives appropriately to each encountered condition and grouping. The free thin method takes full advantage of the variability of the forest but requires a very well-trained forester to apply the treatment on the ground. This method is applicable in all situations where uneven-aged management is intended, and irregularly structured stands are desired.
- *Group Selection:* The group selection method is also a form of uneven-aged management and is a modification of the single tree selection method. The group selection strategy involves the harvest of tree groups to enable establishment and growth of shade intolerant tree species. The opening size should be sufficiently large to allow substantial sunlight to the forest floor, while remaining small enough to retain microsite protection by the surrounding trees.
- *Variable Density Thinning (VDT):* VDT methods are used to increase forest structural heterogeneity within structurally simple stands (e.g., even-aged, single species) to match the species and structural complexity of a mature stand or preferred reference condition defined by DFCs. VDT techniques introduce small-scale canopy disturbances and competition-based mortality in mature stands by varying residual tree density across the stand area. There are three primary density or patch types: un-thinned areas (skips), openings or gaps, and thinned areas. A fourth type may include a heavy thin (e.g., gaps with retention of legacy trees). The size and proportion for each canopy patch type is dependent on the forest type, treatment objectives, and current conditions. An example of a VDT treatment is the Individual, Clumps, and Openings (ICO) method. ICO creates highly variable, fine scale mosaic patterns commonly found in frequent fire sculpted forest types. DFCs define the preferred reference condition (typically based on Historic Reference Conditions and adapted to expected Future Reference Conditions based on climate changing impacts). These preferred conditions are then conceptualized and formatted to widely spaced individual trees, tree clumps of varied sizes, and openings.
- *Variable Retention Harvest (VRH):* Legacy retention or management is often implemented using the VRH method. VRH is described by the Society of American Foresters (SAF) as *'a practice typically applied in final regeneration harvests involving the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the preharvest stand to achieve various ecological objectives … major variables are types, densities, and spatial arrangements of retained structures' (Deal, 2018).* This type of treatment is like 'Irregular shelterwood.'

Figure 3-8) Example of residual overstory trees in a shelterwood system.

3.3.3.4 Intermediate Silvicultural Treatments

Once the regeneration phase is completed and DFCs are achieved, additional treatments are used to maintain the development of desired regeneration and enhance the growth, quality, and health of crop trees. These ongoing treatments are referred to as intermediate, tending, maintenance, or stand improvement treatments. These treatments include the following:

- *Release Treatments:* A treatment that focuses on reducing or eliminating competing or less desirable species such as an overabundant influx of shade tolerant trees or thick grasses or shrubs preventing regeneration growth of desired tree species. These treatments control the forest successional patterns after harvest disturbance and can be conducted manually or mechanically and involve the use of chemicals/herbicides and/or prescribed fire.
- *Mastication:* This treatment can be used to manage brush, shrubs, and other understory vegetation independently of a timber sale or pre-commercial thin. This would most likely be done to control competing vegetation or as a maintenance for a HFR treatment. Refer to section 3.3.3 Silvicultural Treatments for more information about mastication.
- *Thinning Treatments:* As the stand grows, adequate growing space is reduced. To maintain stand vigor and reduce risk related to wildfire and insects and disease, a series of timed thinning treatments are implemented to increase vigor and better-form larger trees. These treatments typically target smaller and poorer-formed individuals for removal (e.g., pre-commercial thinning; Figure 3-9). Thinning intensity and frequency of thinning entries are based on regional, species- or forest type-specific stocking guides or density management diagrams such as Gingrich diagrams.
- *Pruning:* Pruning increases wood quality and potential sawtimber value by removing lateral branches from the lower crown (Figure 3-9). Pruning activities may be performed on the more productive sites to increase wood quality and reduce bole taper. Pruning is also done to reduce

or eliminate ladder fuels and reduce the risk for crown fires (ladder fuels facilitate the movement of surface fires into the crowns of individual trees and, potentially, through the canopy of a stand). Stands should be healthy and vigorous, with only the best trees, exhibiting a full, healthy crown, good diameter growth, and no defects, being pruned. A cost benefit analysis will be completed to determine the number of trees per acre to prune. Research data suggests 100 – 110 TPA are optimum (Hanley et.al., 1995).

- *Salvage Cutting:* This treatment is typically used to begin rehabilitation activities in an area after a high severity fire or large insect infestation. Merchantable dead or dying trees are harvested for value. Some trees may be retained as wildlife snags and future dead, down, woody debris. The income generated from this type of treatment is placed back into the land through reforestation activities and soil stabilization techniques.
- *Sanitation Treatments:* This treatment is used to mitigate ongoing insect and disease issues in an attempt at preventing spread. Potential host trees or infested individuals are removed to protect and enhance stand health and vitality. Some trees may be left as wildlife snags if deemed a non-hazard to the nearby trees.
- *Fertilization:* Forest fertilization can increase tree growth rates and decrease the incidence of disease. Fertilizers have seldom been applied to tribal forest lands, but there is potential for application. Identification of the limiting nutrients on a site is necessary to determine application rates. Tree response to fertilization is determined through growth studies. The Inland Empire Tree Improvement Cooperative, administered by the University of Idaho, maintains study plots on tribal lands and is a source for growth response and changes to the rate of mortality resulting from fertilization.
- *Overstory Removal / Overstory Reduction (OSR):* An OSR removes older trees that are dominating and, possibly, hindering growth in a regenerated stand. A prior shelterwood treatment will consist of overstory trees that will eventually serve the purpose of regenerating the next stand. These overstory trees will eventually compete with the future, younger stand for limited site resources. An OSR is scheduled when the understory is fully stocked with healthy trees of a desirable species composition. When the continued presence of the overstory adversely affects the understory through shading, competition for moisture, mistletoe infection, etc., an overstory removal treatment is considered as an intermediate treatment strategy.

  An overstory reduction is used in those situations where the benefits of leaving remnant trees from the previous stand out-weigh the value of removing all the overstory trees. The resulting benefits include creating greater structural diversity which improves the aesthetic and wildlife habitat value as well as maintaining a potential seed source in the event of a wildfire.

3.4 Harvest Schedule

Harvest schedules developed around the preferred alternative, Alternative D – Forest Health & Resilience (4.8 MMBF/Year; 23% of forest growth), for Nez Perce Tribe forestlands is available as a stand-alone document that combines both Tribal Trust lands and allotments and a separate harvest schedule was created for Tribal Fee lands. The most current versions of the harvest schedules are maintained and updated by the Nez Perce Tribe Forestry and Fire Management Division (Nez Perce Tribe Harvest Schedule (2023-2033) document (2025)). This scheduling document is updated periodically to include new forest land acquisitions, current forest inventories, and economic fluctuations.

Figure 3-9) Example of a pre-commercial thin with pruning in a stand of ponderosa pine (Pinus ponderosa). Suppressed trees, trees with poor form, or trees of low vigor were selected for removal while those that were retained were pruned. Slash produced from the operation was later treated with a prescribed burn which is picture in Figure 3-12.

3.5 HARVEST POLICY

This section will briefly detail timber sale objectives and those practices that are compatible with the Forest Management Plan, BIA regulations (*53 IAM Handbooks part 3 – Timber Sales, part 4 – Timber cutting permits, and part 11 – Forest Management Deductions*) and tribal ordinances and policies. This section is an overview and includes some of the contract requirements, harvest methods, and other important operational considerations that will be incorporated into each timber sale contract. Many of the following sections can be found in the standard provisions of all timber sale contracts on the Nez Perce Indian Reservation.

Any contractors engaged in mechanical operations- forestry or fuels- will be certified/current on the Idaho Pro Logger accreditation. As of 2007, wood cannot be sold to a SFI for FSC certified mill if it was not harvested by a logger that has been through the accredited program. The program name varies between states, but the curriculum is the same which makes certifications reciprocal from state to state. In general, the program consists of an 8-hour course that covers basic BMPs and basic silviculture. The course must be completed annually and costs $45 per participant. Currently, certification is required by Idaho Forest Group, Bennett Lumber, Clearwater Paper, and Empire Lumber.

The harvest policy dictates implementation rules that must be followed when timber is harvested from Tribal forestlands. It covers both documentation requirements, such as timber sale contracts and permits, and harvest operation procedures which include the selection of trees for removal or retention, how those trees are marked, and the harvest methods by which they are cut and removed.

3.5.1 Designating Trees for Treatment

- Before timber is offered for sale, it must be designated in compliance with the silvicultural prescription and environmental documentation for the timber sale or stewardship project.
- Cut trees may only be designated, including marking, by Nez Perce Tribal personnel or persons under contract with the Nez Perce Tribe who have no personal interest in the purchase or harvest of the products designated, and are not directly or indirectly employed by the Purchaser of the products. An exception to this policy is when a Purchaser is authorized to designate cut trees (marked or unmarked with paint) as an operational convenience in units utilizing designation by prescription (DxP).
- Sale preparation personnel must use written guides when designating timber, and a consistent tree marking paint color scheme when individually marking trees (ITM) as "cut or leave" with paint.
- All designation of trees containing commercial or non-commercial products to be removed from the sale or treatment area must be designated by:
    - Area;
    - Individually marking (ITM) each cut or leave tree with paint;
    - Description (DxD);
    - Prescription (DxP); or
    - a combination of the methods above.
- The Contracting Officer must be consulted during timber sale preparation by the sale administrator who is responsible for monitoring project compliance.
    - The Timber Sale Contracting Officer is responsible for developing and executing the contract(s) for the sale of timber and other forest products, ensuring the contracts are consistent with applicable plans and standards, and administering the contract throughout its duration. The sale administrator would function under the Timber Sale Contracting Officer and manage and ensure regulatory compliance with the timber sale

contracts or timber cutting permits, including inspecting operations, report findings, and recommending contract/permit closure.

- In the past, the Timber Sale Forester or Allotment Forester has been tasked with both roles for their respective land ownership type (e.g., Tribal Trust vs. Allotments). In the 1990s, there was a separate position tasked with Sale Administration that reported to the Timber Sale Forester.

Designation by Description (DxD). Trees are designated to be cut by describing measurable characteristics of individual trees and/or their juxtaposition to each other. Examples of descriptions include spacing, species, diameter, damage class, or a combination of two of these factors. Determining whether the correct trees are cut is done at the individual tree level. When trees are designated by the description, it is possible to look at individual stumps to determine if a tree was authorized to be cut or not.

Designation by Prescription (DxP). Trees are designated by describing the desired condition of the residual stand following harvest. The purchaser has discretion within the guidelines of the prescription, as described in the contract provisions, in selecting which trees to cut and which trees to leave. Determining whether the correct trees are cut or left is done at the cutting unit level. Examples include verifying whether a certain residual BA was left in the unit or measuring crown closure throughout the stand. Simple examples of criteria used in a DxP prescription include "leave 60 to 80 sq. ft. of basal area" in the ponderosa pine stand, or "leave two crowns touching" throughout an even-aged mixed conifer stand.

Individual Tree Marking (ITM). Trees are designated by paint mark(s) located at eye level on the tree bole and on the stump at ground level. Eye level marks (diagonal or horizontal bands for leave or cut trees) must be positioned so that the purchaser has a 360-degree view of the painted tree.

Treatment Boundary. Treatment boundary must be identified by either paint or ribbon that clearly marks the treatment outer boundary area as defined in the silvicultural prescription guidelines.

3.5.2 Logging Methods

The logging methods employed on the Nez Perce Reservation are separated into three general categories: ground-based yarding, skyline yarding, and aerial yarding.

Ground-based Yarding Systems

On level ground and slopes of up to 45 percent, when conditions are appropriate, ground-based yarding systems are the preferred method for harvesting timber (refer to section 9.1 for timber harvesting BMPs). These systems are less expensive and require less skill to operate than other methods. Most of the timber sale units on the Nez Perce Reservation are harvested with ground-based yarding systems (Figure 3-10). Because logs are yarded with machinery operating directly on the ground, the potential for adverse site impacts with ground-based yarding is the highest of the logging methods. However, skilled operators and good planning will result in minimizing site impacts. Examples of equipment used with these ground-based yarding systems include crawler tractors, rubber-tired skidders equipped with either winch line or a grapple, track mounted excavators used for "shovel logging," mechanized feller-bunchers, swing-boom de-limbers, and other suspended load systems to reduce soil compaction and disturbance.

Figure 3-10) Examples of ground-based logging systems. Top left: Forwarder transferring logs to a log truck and pup trailer. Top right: Tracked dangle-head processor harvesting timber. Bottom left: Wheeled grapple skidder moving logs to the landing where they will be prepared for hauling. Bottom right: Tracked dangle-head processor delimbing, cutting, and piling logs at the landing.

Cable Yarding Systems

Cable yarding systems are characterized by stationary machines which support two or more drums of skyline cable and an upright boom or tower (Figure 3-11). The yarder is typically stationed at the top of a slope with the tag end of a skyline cable secured at the bottom of the unit. The skyline provides vertical lift to a mainline, which functions as an elevated winch line. These systems are more expensive than ground-based systems and require a higher degree of skill to operate. They are typically used in harvest units that are accessible by road on slopes more than forty percent. Potential impacts to the site are less than those with ground-based yarding but may become severe if used without care.

Tethered logging is a combination of ground-based and cable yarding systems where cable winch systems are attached to ground-based harvesters, feller bunchers, forwarders, loaders, and skidders to stabilize and assist equipment operation on slopes greater than 35% while minimizing impacts to the forest soils.

Figure 3-11) Yarder operating on Tribal forest lands.

Aerial Yarding Systems

Helicopters are occasionally employed to remove timber from steep, inaccessible areas. Helicopters utilized for logging come in a variety of sizes depending on the size of timber, the size of the job, and the yarding requirements. Helicopters capable of yarding payloads of 8,000 to 12,000 pounds are most common in this area. Yarding distances are under one mile but maybe as long as two miles. Harvesting timber with helicopters is extremely expensive and requires a high degree of specialized skill. Site impacts resulting from helicopter yarding are almost negligible.

3.5.3 Slash and Hazardous Fuels Management Strategies

Various management techniques may be used to address slash and hazardous fuels on Tribal forestlands. In addition to mechanical treatments, prescribed fire would also be incorporated into silvicultural prescriptions to not only mitigate the accumulation of hazardous fuels but also achieve and maintain DFCs (section 3.2). To date, the slash abatement techniques that have often been employed during Tribal timber harvest operations include “lop and scatter”, whole tree harvesting, prescribed fire (Figure 3-12), hand piling, chipping, mastication/mowing, browsing, and piling & burning. Refer to the Nez Perce Tribe’s Hazardous Fuels Treatment Monitoring Plan for detailed and current information. The selection of slash abatement strategies has largely been dependent on the volume of slash produced during harvest operations, silvicultural objectives, forest product markets, and other resource objectives.

Tree tops, branches, and other leftover debris from forest management activities, which is referred to as “slash”, poses a wildfire and insect infestation hazard if not managed properly. Depending on the amount of slash produced, additional action must usually be taken to reduce the amount of slash remaining on a site. This is done by either chopping or crushing slash with a machine (mechanical treatment) or it is burned either in piles (pile burning) or where it lays on the site (broadcast burning).

Figure 3-12) Example of a prescribed burn used to treat slash from a pre-commercial thin with pruning. Refer to Figure 3-9 to see photos of the site prior to being burned.

Under the selected alternative, the most appropriate slash/fuels mitigation techniques will be prescribed as needed and will be defined within project-level silvicultural prescriptions.

3.5.4 Non-Commercial Free-Use

Firewood cutting applications were required on Tribal properties within the 1999 plan. Currently, a Nez Perce Tribal member is required to display his/her Tribal ID card when harvesting firewood. A permitting process was employed in the past for monitoring purposes; however, the NPTEC removed this requirement. Without a permitting process or mandatory harvest reporting, tracking free use harvesting by the tribal public is unfeasible. In addition, Tribal members can harvest corral poles, teepee poles, posts, and Christmas trees without a permit (Tribal Code: Section 4.90.037, Code [4-3-77]).

3.6 Forest Development

Forest Development addresses the improvement of forest resources through reforestation and timber stand improvement activities. Included in this are silvicultural treatments applied to establish, promote, enhance, and maintain optimum growth on selected trees to produce perpetual yields of desired forest products under the principles of sustained yield forest management.

The above definition shall serve as a guide for planning and implementation of all Forest Development activities performed on lands held in trust and in accordance with tribal goals, 25 CFR and 53 BIAM 5-H, Release 150 (dated: 12/15/2006).

Most Forest Development projects are seasonal in nature to take advantage of the appropriate weather conditions for the given project. To accomplish this, annual work plans must be made well in advance and depend on biological and weather conditions, as well as funding. Advanced planning is complicated by an ever-shifting economy where supplies and the contractor pool may render the project non-viable thereby hampering a programmatic planning effort.

Forest development concerns practices that promote and direct the growth of trees. This includes establishing seedlings in a location where trees were harvested or lost due to wildfire, insects and disease, storms or strong wind, or other types of events that result in tree mortality. It also includes planting trees in non-forested areas which is referred to as "afforestation." New trees can either seed in naturally from trees that remain on a site or, if needed, they can be planted using seedlings grown in a greenhouse.

3.6.1 Reforestation & Afforestation

The code of federal regulations 163.12 (a) states: "*Harvesting timber on commercial forest land will not be permitted unless provisions for natural and/or artificial reforestation of acceptable tree species is included in harvest plans."* The general preference is to select treatments favoring natural regeneration if desired species, genetic stock, and densities matching ecological succession patterns can be achieved within an acceptable period. The primary advantage of natural regeneration is the avoidance of planting costs. Since clearcuts are generally not prescribed due to the desire to leave residual trees in the overstory, a seed source is always present after the regeneration harvest. The disadvantages of natural regeneration are the inability to predict when and how many trees will become established, the time delay in getting seedlings established, the uneven distribution of the regeneration, seed predation of rodents, adequate precipitation and timing, adverse impacts from seedbed preparation and the invasion of noxious weeds. Tree planting offers greater control over timing of regeneration, species composition, tree spacing, and genetic traits (Figure 3-13).

Figure 3-13) Example of afforestation (conversion of a field into forestland) by means of planting.

Shade intolerant early seral species are favored over the shade tolerant climax species (Figure 3-14). Where feasible, a mix of early to mid-seral species may be established to provide species diversity, thereby increasing the resiliency of the stand to catastrophic losses from insect and disease as well as enhancing wildlife cover. Habitat type and site index determinations are a measure of site productivity, which aid in the determination of the stocking levels prescribed for the stand.

Historical records indicate that pre-settlement forests were largely made up of shade intolerant species such as ponderosa pine and western larch. If stands of shade intolerant species do not become too crowded with trees or do not feature too many trees of shade tolerant species (such as grand fir), they are more resilient (durable) when exposed to wildfire, insect outbreaks, and the impacts of climate change. The establishment, maintenance, and perpetuation of these species is a priority of Tribal forest management.

Stocking guidelines set baseline minimum levels for lands to be considered forested, and may be increased (not decreased) within the silvicultural prescription or reforestation strategy to better reflect the goals and objectives for the habitat type and/or management area.

Figure 3-14) Afforestation site several years after planting. Planting efforts focused on the establishment of shade intolerant early seral species.

For both Trust and Fee lands, pre- and post-treatment stocking levels (TPA) will be calculated and incorporated into project-level silvicultural prescriptions. The determination of desired stocking levels, post-treatment, will be based on a desired diameter (QMD) and the anticipated or average mortality rate for the habitat type and MG associated with each stand (Powell 2024). When accounting for rate of mortality, the desired stocking levels calculated for past treatments ranged from 300 to 360 TPA for all three MGs. In general, MGs at lower elevations (MG 1) tend to have higher rates of mortality than those at higher elevations (MG 7). The final calculated stand density for a prescription will be adjusted, as needed, to account for other factors related to forest management which include, but are not limited to, available funding, tree seed availability, landscape conditions, wood quality and tree form, and risk related to wildland fire and fuels. Forest treatments can be certified once it is determined that minimum stocking levels have been met for the desired species, as dictated by MG and habitat type, five (5) years after a silvicultural prescription has been fully implemented.

- MG 1 (low elevation) – generally 150 – 200 tpa of the desired species per habitat type.
- MG 2 (mid-elevation) – generally 200 – 250 tpa of the desired species per habitat type.
- MG 7 (high elevation) – generally ≥ 250 tpa of the desired species per habitat type.

“Free to grow” certification will also weigh other forest management priorities/factors defined in the approved project-level silvicultural prescription.

Reforestation minimum standards are exempt for portions of the proposed treatment area that are:

- Identified (mapped) as noncommercial forest lands.
- Land converted to another use type other than commercial forest. This may include lands converted to or are existing roadways.
- A forest practice which will result in ten (10) acres or less below stocking levels (e.g., Individual, Groups, and Openings (ICO), Group Selection, Variable Density Thinning, etc.).

Reforestation projects shall have documented silvicultural prescriptions, environmental/cultural clearance, and tribal approval. These required documents are developed on a project level basis or as part of the larger planning document (e.g., Timber Sale Plan). The following elements will be addressed within the reforestation silvicultural prescription:

- Reforestation goal with clearly defined indicators that are measurable.
- Species preference based on ecological succession, tolerances, and management considerations.
- Type of planting stock, method of planting to be used, and number of trees to plant.
- Seed source / Seed Lot numbers.
- Site preparation requirements including fuels treatment.
- Initial stocking requirements that consider early mortality expectations.
- Seedling protection requirements regarding both animals and physical environment.
- Seedling growing space requirements considering both understory and overstory vegetation layers.
- Potential fire, insect, disease, and weather-related hazards.
- Performance measurement.
- Responsibilities.
- Schedule of and requirements for follow-up activities.
- Contingency plan if reforestation is not a success.

3.6.1.1 Site Preparations

Site preparation for reforestation/afforestation treatment is the process of treating the land area to improve planting conditions, encourage germination of seed or growth of seedlings, and promote survival of the desired species. The method, intensity and timing of the site preparation is site specific. Type and intensity of site preparation varies according to site, species, ground cover, and soil type. Preparing the site for forest regeneration efforts may include one or more methods. Additionally, practices associated with site preparation involve effective HFR treatments. The treatment of hazardous fuels is often a secondary benefit of site preparation.

Mechanical

Mechanical site preparation involves the use of mechanized equipment to reduce slash, control unwanted vegetation or prepare a seedbed for natural regeneration. Different types of soil scarification practices can be used for seedbed preparation by exposing mineral soil. Mechanical site preparation is limited to slopes less than forty-five percent (45%). Soil moisture conditions must be dry enough or frozen to avoid significant soil compaction.

Mechanical site preparation may be prescribed on units with a large sod or herbaceous shrub component in the understory that would not burn without extensive slashing, or in units with a large grass component which is difficult to burn prior to seed fall (August – September, depending on site and elevation) due to unsafe burning conditions. Mechanical soil scarification that has been performed in the past to regenerate ponderosa pine has had poor results. Timing of treatments with sporadic seed crops and an increase in invasive weeds limits success.

Mechanical methods used to prepare a site for regeneration are also effective at treating hazardous fuels. One method includes the use of mastication to alter the distribution fuels (e.g., woody debris; logging slash; competition from brush/shrubs and other types of vegetation) that are a wildfire hazard.

<u>Herbicide</u>

Herbicide applications can be used to control unwanted vegetation competing with tree seedlings. Herbicides are applied in spot applications over planted seedlings where dense grass, forbs, vines, woody shrub species, noxious/invasive weeds and undesirable tree species occur throughout the site (Figure 3-15). The recommended spot size varies from three (3) feet to five (5) feet in diameter. An average spot size of four (4) ft. in diameter with a tree spacing of 11 x 11 (360 tpa) treats 10.4% of the ground and will greatly improve the survival rate of the planted seedlings. The type of herbicide used is determined by the tree species planted, vegetation to be controlled, application window, soil type, and physical site conditions. In all instances, the manufacturer's label instructions of the selected herbicide and Environmental Protection Agency standards are strictly enforced. In addition, all applicable labels and material safety data sheets must be on hand when applying herbicides.

Figure 3-15) Example of a spot herbicide application. Herbicide is manually applied to the space immediately around a seedling to eliminate competing vegetation.

Broadcast application of herbicides is not a common forest management practice on the Nez Perce reservation. Any broadcast application of herbicides for the purpose of site preparation, release treatments, HFR maintenance treatments, or resource protection not addressed by the Categorical Exclusions section of the 53 BIAM and Federal Register notification pertaining to Tribal Trust lands will be addressed with an Environmental Assessment (EA). Herbicide applications on all Tribal lands (e.g., federal trust and fee simple status) will adhere to the U.S. Environmental Protection Agency's (EPA) Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Prescribed Fire

Where and when conditions allow, fire is the primary means of site preparation for both natural and artificial regeneration and it is also an effective means of conducting HFR treatments. Fire application when administered under safe conditions is an economic and ecologically sound practice on most sites, either alone or in conjunction with some other mechanical or chemical method. Prescribed fire is primarily used when spring conditions are ideal. The estimated cost for broadcast burning is ~ $250/ac.

Manual Site Preparation

Manual site preparation involves the use of hand tools to create suitable planting conditions. Scalping is removing the sod layer to mineral soil typically eighteen (18) to twenty-four (24) inches wide leaving a root-free zone, free of competing vegetation. Since spot application of herbicides has become more common, larger scalp sizes are used less frequently. Timely reforestation efforts after other silvicultural treatments or timber sales minimize sod accumulation and are not commonly prescribed. Manual or mechanized herbaceous shrub cutting or mulching is an alternative to other forms of site preparation and has negligible effects on the soil surface. This method is a labor intensive and costly alternative and recommended for use on shrubs which do not sprout vigorously, and in those areas where there are only a few scattered tall shrubs.

3.6.1.2 Seed and Seedling Acquisition

The acquisition of seed for growing seedlings is accomplished through the collection of cones within the species-specific seed zone where the trees will be planted (Figure 3-16). Cone collection activities occur during years of adequate cone crop of desired species from mid-August at lower elevations to early September at higher elevations. Cones are collected from phenotypically superior trees. Aerial collections and squirrel cache collections are discouraged and not recommended. Aerial collections are costly and cones in a squirrel cache have unknown parent-tree phenotypes and have a higher risk of seed fungus. Planted trees are typically (1-0) containerized seedlings; however, larger seedlings may be used but are often not as economical due to increased costs associated with purchasing and planting. Local, recent and ongoing trials have shown larger plug sizes to have minimal increases in survival. However, larger plug sized seedlings should be considered for harsh, dry sites where a more developed root system may increase chances of survival.

Figure 3-16) Cone collection and pruning using bucket trucks. Seed is eventually removed from the cones and used to grow seedlings for future planting operations.

3.6.1.3 Tree Planting

The physical planting of trees is a laborious process that requires an organized approach. A hole is typically dug with a hodad or similar tool. The seedling is positioned into a hole formed by a planting tool (e.g. hodad) so that the root system is vertical and positioned to a depth that corresponds to the tree's root collar mark. Soil is then pushed back to fill the hole and lightly packed to reduce large air pockets. The planting operation should be monitored by a survey crew to assess planting quality and spacing. Corrective action for poor planting should ensue immediately after determining inadequate planting.

3.6.1.4 Seedling Protection

Seedling protection measures are often prescribed to protect planted trees from either climatic conditions or depredation, usually for 1-3 years.

Shade Cards

Low grade cedar shakes, manufactured wire/mesh shade cards, or micro siting (depending on site conditions) are used occasionally to provide shade on harsh, dry sites with southern and westerly aspects. These shade cards are placed on the southwest side of the seedling to protect the root collar from solar radiation.

Protection Tubes

Biodegradable plastic seedling protection tubes, supported with bamboo stakes positioned on two sides provide protection from big game browsing damage. High risk, low elevation winter range areas within the reservation are treated because of the larger ungulate populations. Higher elevation areas off the reservation (Tribal Fee lands) generally have lower ungulate populations and higher snow accumulations which often create problems with seedling protection tubes.

Figure 3-17) A fawn taking cover next to a newly planted seedling protected by a biodegradable tube supported by bamboo sticks. The protective tube prevents damage from animal browse that often results in the removal/consumption of the terminal bud.

Big Game Repellent

Foraging deer and elk can severely hinder regeneration of newly stocked trees. Big game repellents are socially acceptable nonlethal tools to reduce ungulate damage. Several varieties of repellent are used to repel ungulate populations. Depending on the site, big game repellents (BGR) are used alone or if needed, in combination with seedling protection tubes.

Cattle Grazing Moratorium

Forestry program coordinates closely with the Lands Services Program (which administers cattle grazing leases) on the timing of tree planting and expiring cattle leases. Typically – a 5-year grazing moratorium is recommended and approved by the NPTEC to reduce damage by cattle and aid in seedling vigor and survival.

Inadvertent grazing and trampling can cause significant damage especially with seedling protection tubing and subsequently deform seedling growth or reduce seedling survival.

Certification Standards

Tree planting, seedling protection, BGR and herbicide application surveys are administered during the planting season to ensure contract compliance (e.g., poor root establishment due to 'J-rooting'). Regeneration surveys are implemented during years one (1), three (3), and five (5) to track growth, damage, and survival. A planted stand is certified or no longer requires additional reforestation support or protection measures when most of the stand area has become established within a desired range of stocking or Trees Per Acre (TPA) and is free to grow (refer to section 3.6.1 for DFC stocking guidelines by MG). It is considered established when mortality resulting from stand establishment factors (e.g., wildlife browse, drought, etc.) are no longer a threat. "Free to grow" is accomplished when trees reach the dominant to co-dominant vertical position in relation to the competing vegetation.

Survival Transects

Another monitoring system that is utilized to track individual tree survival over a 3–5-year timeframe. Individual seedlings are measured and marked within a rectangular, straight-line area (the transect). These trees are usually marked or staked within a 66 ft. (1 chain) area for a specified length in various locations pertaining to site characteristics: aspects, slope, soil, habitat type, etc. The intent is to monitor the seedlings response to various conditions to understand mortality cause.

3.7 Forest Roads and Soils

3.7.1 Road Density

Average forest road density across Nez Perce Tribe forestlands is approximately 5.5 linear miles of road per square mile of forestland (Table 3-6). When viewed by ownership type, SRBA properties and allotments have the lowest road densities at 1.3 and 3.3 miles of road per square mile, respectively. Trust properties are just under the average at 5.3 miles per square mile while Fee lands have the highest road density at 8.1 miles per square mile. As stated earlier, Fee lands were acquired by the Tribe more recently and have been subjected to management practices that do not align with the values and standards set by the Tribe. Along with other objectives related to the rehabilitation of Fee lands, reducing road density across Fee lands is another management priority for the Tribe.

Road density refers to the total length of all roads located within a certain area. Forest road systems are important as they provide access to the interior of Tribal forestlands. However, forest roads fragment larger tracts of forestland, use space that may otherwise be forested, are a source of pollution for nearby waterways (pollution is primarily in the form of sediment that wash off roads because of rain or snowmelt), and support vehicle traffic that is disruptive to wildlife. The Tribe aims to limit road systems to only those that are necessary for primary access and long-term forest management objectives.

Table 3-6) Road density by ownership across Nez Perce Tribe forestlands.

Ownership Type	Total Area (mi^2)	Total Road Length (mi)	Road Density (linear mi/mi^2)
Allotment	8.17	22.4	2.7
Fee	36.33	304.0	8.3
Trust	52.09	276.5	5.3
Total	**96.59**	**602.9**	**16.3**

3.7.2 Hazard of Erosion and Suitability

A major consideration in determining the susceptibility of soil to erosion is texture. Silt and fine sands are the most erodible soil separates. Soils that contain between 40-60% silt have the highest potential for erosion. The most common surface soil texture on the Reservation is classed as silt loam. Silt loams contain approximately 30% sand and 70% silt sized particles. On slopes between 15 and 35% silt loams are classified as having a moderate erosion hazard and a severe erosion hazard on slopes of 35% or greater.

Soils are made up of particles that vary in size, shape, and material. These are referred to as physical properties (soils also have chemical properties). There are various types of soils found across Tribal forestlands with different physical properties. Some soils are more likely to be washed away and eroded than others which results in water pollution when those particles enter nearby waterways (referred to as "sedimentation"). Tribal forest management operations minimize the number of forest roads in service and monitor areas where erosion and sedimentation may occur. Native grass seed mix and water bars are used to assist with road stabilization and sedimentation concerns.

Soil data for the Reservation was obtained through the USDA Web Soil Survey. According to 2019 data, soil erosion hazards on the Reservation range from slight to severe. Approximately 68% of all commercial forestland acreage features soil types that are moderately (38%) to severely (32%) susceptible to erosion (Table 3-7; Figure 3-18). Such hazards can become an issue when forest management operations disturb or expose soil through excavation or the clearing of vegetation, especially on uneven terrain with slopes of 35% or greater. When harvesting in areas classified as moderate or severe, measures should be taken to limit the potential for erosion. Such measures would be identified during a project-level review by an interdisciplinary team.

Table 3-7) Summary of off-road soil erosion hazard potential across Tribal forestlands.

Forestland Off-Road Erosion Hazard					
Land Status	Slight	Moderate	Severe	Not Rated	Total Acres
Allotments	1,656	2,630	825	131	5,242
Fee	9,262	8,263	5,737		23,263
Trust	8,212	11,667	13,076	535	33,490
Total Acres	19,130	22,560	19,638	666	61,995

Slight: Erosion is unlikely under ordinary climatic conditions.

Moderate: Some erosion is likely and erosion-control measures may be needed.

Severe: Erosion is very likely and erosion-control measures, including revegetation of bare areas, are advised.

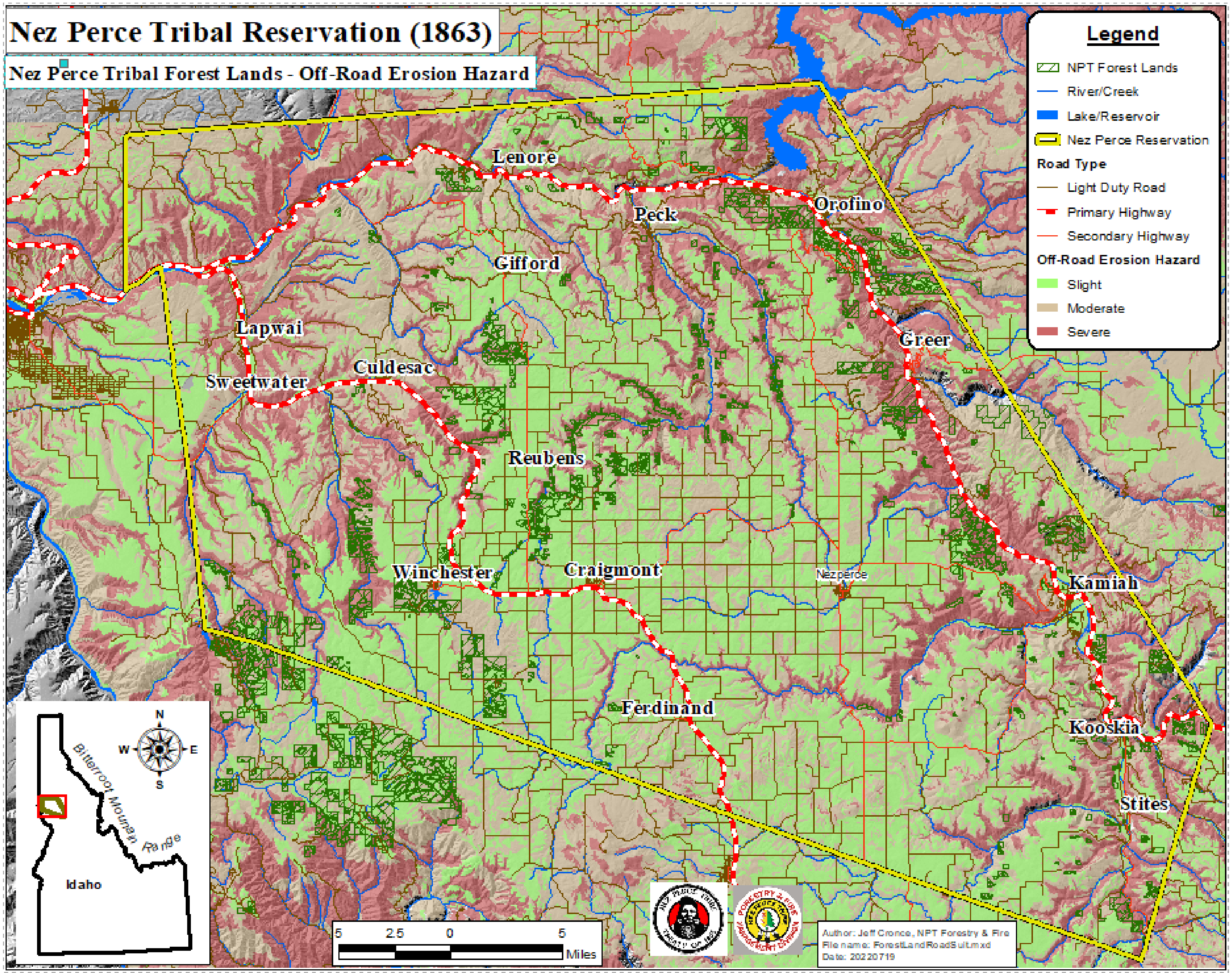


Figure 3-18) Summary of off-road soil erosion hazard potential across Tribal forestlands.

The construction of forest roads is one common practice associated with forest management that disturbs and exposes soil to factors that contribute to erosion. Erosion and sedimentation continue to be factors once road construction is complete, and roads are open for use. Levels of erosion and sedimentation would increase with an increase in road density.

The potential for roads on the Reservation to be a source of erosion is very high as approximately 71% of all forest land is classed as having a severe erosion hazard when soils are disturbed and exposed for the purposes of road construction (Table 3-8; Figure 3-19). Erosion hazards associated with forest roads are expected to be the most substantial in areas with steeper slopes and higher road densities. As summarized in Table 3-6, forest roads are expected to present the greatest risk for erosion on Fee lands as they have the highest road density at 8.3 linear miles per square mile. Overall, most roads across Tribal forestlands are likely to require some level of erosion control as a part of regular road maintenance (Figure 3-20).

Erosion is also mitigated through the decommissioning of roads. This is determined at the project level and is dictated by input from the Tribe and Tribal members and the availability of funding.

Refer to section 8.1.1 for more information, including methods and definitions, about forestland road and off-road erosion hazards.

Table 3-8) Summary of soil erosion hazard potential for natural surface roads on Tribal forestlands.

Forestland Road Erosion Hazard					
Land Status	Slight	Moderate	Severe	Not Rated	Total Acres
Allotments	211	1,030	3,870	131	5,242
Fee	805	8,372	14,086		23,263
Trust	873	5,643	26,438	535	33,490
Total Acres	1,889	15,044	44,395	666	61,995

Slight: Little or no erosion is likely.
Moderate: Some erosion is likely; roads or trails may require occasional maintenance and simple erosion-control measures are needed.
Severe: significant erosion is expected; roads or trails require frequent maintenance and costly erosion-control measures are needed.

3.7.3 Fragile Soils

Soils across the Reservation are classified as either slightly fragile, moderately fragile, or fragile. Slightly fragile soils represent nearly 65% of the total analysis area while moderately fragile and fragile soils account for approximately 35% and 0.2% of the total area, respectively (Table 3-9). The distribution of soils, as they are classified in the Fragile Soil Index, is depicted in Figure 3-21.

Refer to section 9.3.7.3 Fragile Soils for definitions and additional information about fragile soil index classifications.

Table 3-9) Fragile soil index classifications identified on the Nez Perce Reservation.

Fragile Soil Index Classification	**Acres**	**% Coverage**
Fragile	128	0.2%
Moderate Fragile	21,429	34.8%
Slight Fragile	39,740	64.6%
Grand Total	**61,522**	**100.0%**

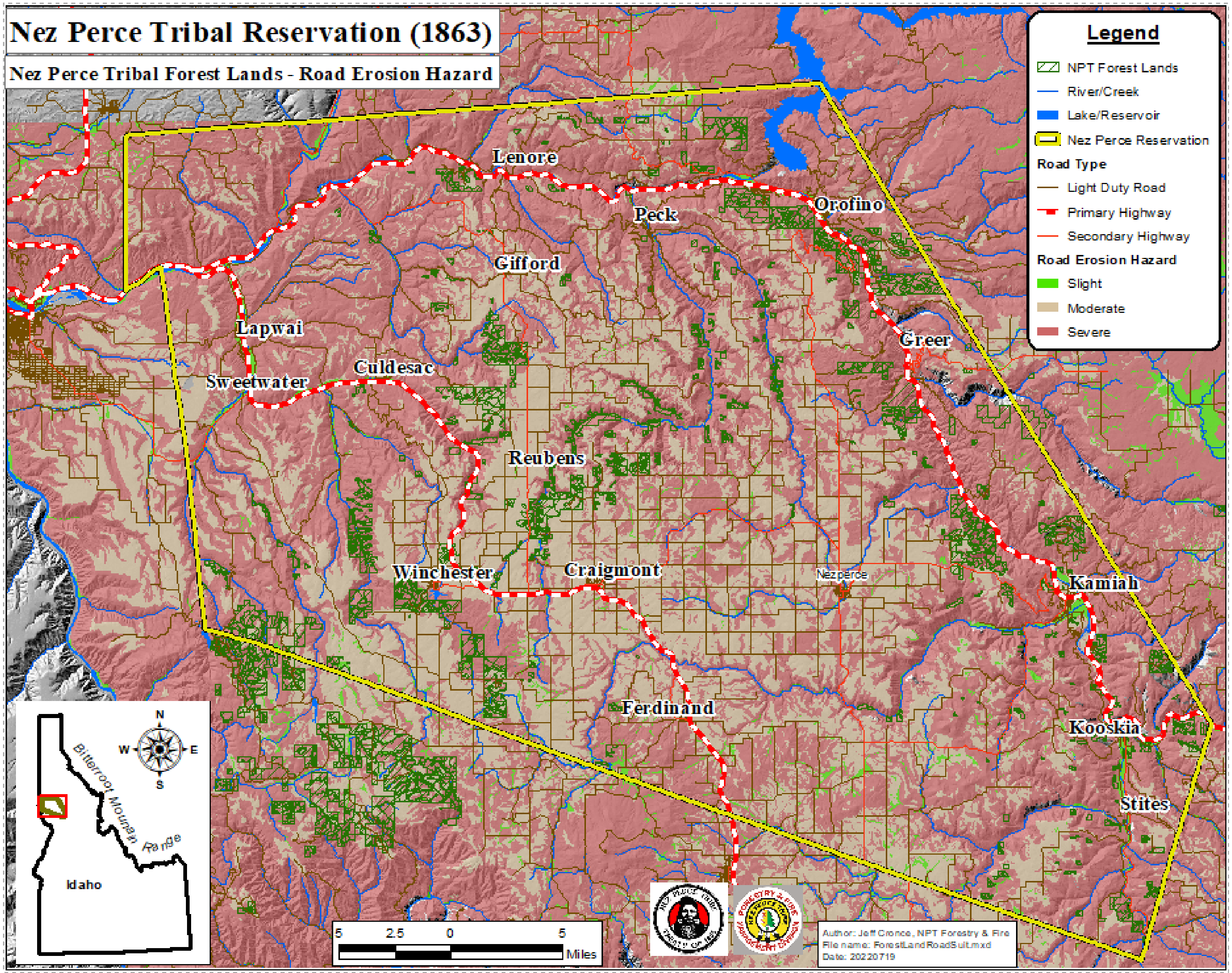


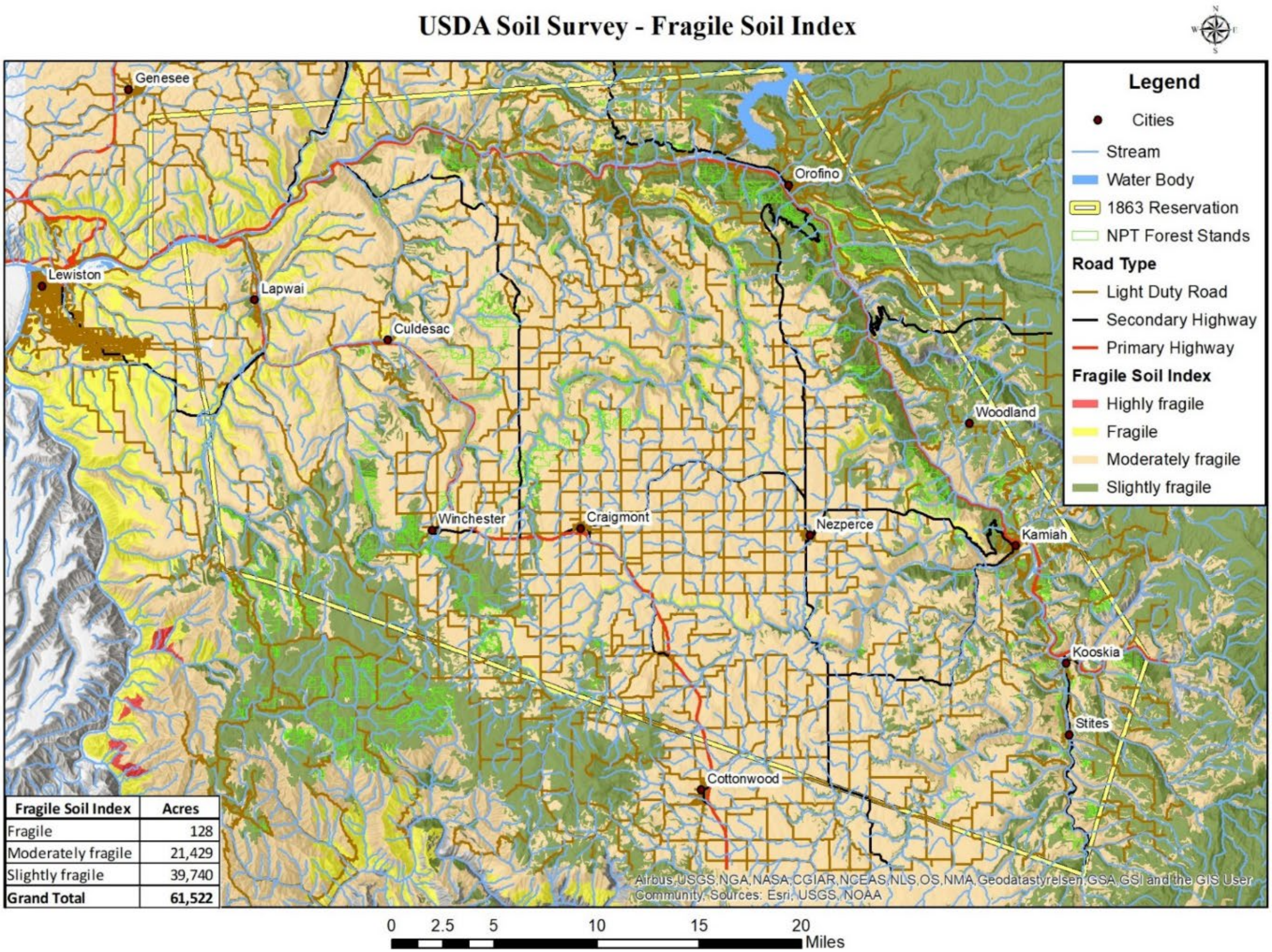
Figure 3-19) Summary of soil erosion hazard potential for natural surface roads on Tribal forestlands.

Figure 3-20) Road improvements which include the installation of culverts to improve water passage.

3.7.4 Ash Cap Soils

Ash-cap soils tend to be associated with higher levels of site productivity as well as unique plant communities. It is thought that the ability of ash-cap soils to hold and retain higher levels of moisture, relative to soils derived from other parent materials, is the reason for higher levels of productivity (Brown and Lowenstein 1978; Mital 1995 as cited in Garrison-Johnston et al. 1998). When undisturbed, ash-cap soils are stable and resistant to erosion because they contain numerous stable aggregates and are associated with high infiltration rates (Dahlgren et al. 2004; Nanzyo et al. 1993 as cited in Gier et al. 2018). However, ash-cap soils can be highly susceptible to water and wind erosion when they are disturbed which has implications for any ground-disturbing activities associated with forest management operations (Arnalds et al. 2001; Kimble et al. 2000 as cited in Gier et al. 2018).

Refer to section 9.3.7.2 Ash Cap Soils for references to publications that offer additional information about the distribution and properties of ash cap soils.



Fragile Soil Index	Acres
Fragile	128
Moderately fragile	21,429
Slightly fragile	39,740
Grand Total	**61,522**

Figure 3-21) Distribution of Fragile Soil Index classifications across the Nez Perce Reservation.

3.8 INSECT & DISEASE

Native insects and diseases have always been present in endemic populations on the Nez Perce Reservation as an integral component of a healthy ecosystem. Introduced insects and diseases such as balsam wooly adelgid and white pine blister rust have caused significant mortality in native tree species, reducing white pine populations and causing abnormal mortality in true firs. Susceptibility to insects and disease increases with increasing levels of stress. These stresses can be caused by a variety of factors and usually result from a combination of several factors. Examples of factors which frequently predispose trees to critical stress levels on the Nez Perce Reservation include extreme weather conditions, fire, overstocking, old age, mechanical injury, and poor genetics.

Small scale insect attacks or infestations on a tree are normal and are referred to as "endemic". Insects often attack or infest trees that are in poor health because they are stressed by climate conditions (such as drought) or they have been damaged by weather events or by a machine during timber harvests. When trees are stressed or damaged on a large scale insect attacks or infestations can become an "epidemic" which means that insect populations and their impacts on trees are occurring on a level that is much higher than what is typical. Through forest management the Tribe aims to limit impacts from insect and/or disease epidemics.

Insects and diseases are very efficient in taking advantage of trees which are subjected to excessive levels of stress, which can result in the populations of insects and diseases expanding to epidemic levels. At epidemic levels, significant economic, aesthetic, and ecological damage may occur. Generally, where a significant amount of timber is damaged, these trees are salvaged through logging operations that aim to achieve two goals: capturing the remaining value in the timber and reducing the threat of further damage.

3.8.1 Monitoring

Incidental field observations made by Forestry personnel in connection with their daily assignments represent the most effective detection system in place on the Nez Perce Reservation. Field observations are reported promptly and result in early evaluation of the situation.

3.8.2 Detection

An aerial survey of the Nez Perce Reservation is made annually in conjunction with surrounding public properties. The survey is conducted by an Insect and Disease Cooperative comprised of trained personnel from the U.S. Forest Service and the Idaho Department of Lands. Any insect and disease infestations which are visible from the air are mapped and labeled with the name of the damaging agent and its degree of severity. Maps are then forwarded to the Nez Perce Tribal Forestry Program where significant problem areas are confirmed on the ground.

3.8.3 Control

Control of insects and diseases is accomplished through a combination of prevention and suppression. The primary strategy for minimizing losses is by managing for silvicultural systems which promote tree vigor and favorable genetic characteristics, enhance natural resistance mechanisms, and develop stand structures and species compositions that maintain forest health.

The suppression strategy involves sanitation and salvage logging techniques which remove infected trees or groups of trees. These techniques are enlisted in conjunction with most timber harvests as a matter of practice and are included in the marking guidelines. Individual trees or groups of trees which are infected with insects or diseases, or which are genetically inferior, are marked for removal. In situations involving epidemic outbreaks, small sales or permits are prepared specifically to address the threat of further damage and to capture the remaining value in the timber.

NOTE: The following excerpt from *Root Diseases in the Inland NW* (FS R1-09-05) offers a word of caution regarding species composition and the spread of root disease post-harvest:

Douglas-fir, grand fir and/or subalpine fir should be less than 30% of the residual stand after a harvest to minimize losses from root disease. Mixed species stands are nearly always more resilient than single species stands. Disease intensification after harvesting occurs due to the rapid colonization of the stumps and roots after infected trees are harvested.

3.9 Trespass

Trespass, as defined in 25 CFR 163.29, "...means the removal of forest products from, or damaging forest products on, Indian forest land, except when authorized by law and applicable federal or tribal regulations. Trespass can include any damage to forest resources on Indian forest land resulting from activities under contracts or permits or from fire." Trespass, for the purposes of this plan does not include "the act of entering upon the property of another without permission."

All trespass situations, especially incidents involving timber, fire and pesticide will be aggressively pursued to a satisfactory resolution. Procedures for reporting, determining value, demanding payment, and involving legal counsel are detailed in 25 CFR 163.29, 53 BIAM Supplement 7, and Tribal Policy.

Bureau of Indian Affairs will pursue monetary damages for the benefit of the Tribe or Allotment owners when trust forest resources are damaged by wildfire or when timber trespass occurs. If trespass does occur, it will be the policy of the Natural Resources Department to maximize monetary recovery for all damages and timber value.

3.9.1 Fire Trespass

Wildland fires occurring within the bounds of the reservation will be investigated for a determination of cause. At the Natural Resource Manager's discretion, an appraisal will be developed for fires to determine damage caused by fire-fighting operations, cost to contain the fire, rehabilitation costs, and damages to resources. The policies and procedures outlined in Tribal Code 6-5: 'Forest Protection Fire Ordinance' and other applicable rules within the Idaho Administration Procedures Act (IDAPA) (e.g., IDAPA 20.04.01 Rules Pertaining to Forest Fire Protection) will be followed if trespass for wildland fire damage is warranted.

3.9.2 Timber Trespass

Timber trespass includes the theft of logs or trees from forestlands. It also includes the wanton destruction of any trees belonging to the Tribe or individual Tribal Members. Timber trespass will be handled according to the appropriate regulations in 25 CFR Part163 and 53 IAM Chapter 7, Trespass, as well as tribal code (e.g., NPT 4-3-77). Prosecution through the tribal court system will be the primary means for adjudicating Tribal Member trespass cases involving less than 100,000 board feet of timber. For non-tribal member cases, tribal courts must exercise concurrent jurisdiction with the United States Courts. In these cases, the BIA will pursue trespass against the offenders. It will be the responsibility of the Forestry and Fire Management Division, Nez Perce Tribe Fisheries Enforcement and Nez Perce Tribal

Police Department to monitor for potential trespassing. This will include regularly checking property lines where timber harvest is occurring, watching for suspicious log loads leaving the reservation on trucks and working closely with adjacent landowners to ensure property lines are well established. If the case involves a loaded log truck or firewood, the police (Nez Perce Tribal Police and the County Police Department) shall be immediately contacted. Trespass investigations will be conducted by Forestry staff. This will include establishing property lines, taking pictures, determining ownership, and passing on the information to the Natural Resource Manager. It will be the Natural Resources Manager's decision to pursue trespass charges based on the evidence provided. A trespass report will be developed with a volume and value estimate. For trespass on trust lands, the final report will be passed on to the Natural Resource Manager, Superintendent, and the Northwest Regional BIA Forester. A recommendation will be made to pursue legal action through the Regional Solicitors' office.

3.10 FOREST INVENTORY STANDARDS

The Nez Perce Tribe Forest Management Program adheres to the forest inventory standards outlined in Indian Affairs Manual 53, Chapter 8 'Forest Inventory and Monitoring'.

Data collected through forest inventory methods are essential to the Secretary's monitoring of federal trust obligations. Sufficient forest inventory information must be collected to provide accurate and current estimates of stocking and growth on the commercial forest landholdings and for each major forest type or unit where forest landholdings have been subdivided into MGs. These estimates will be used for determination and regulation of allowable cuts and for other land use planning objectives. This section will outline some of the data collection occurring on commercial landholdings.

Tree species, diameter, and height are just a few examples of the types of data that are collected periodically from forest stands across Tribal ownerships. This information helps forest managers understand how forests are growing and if they resemble the DFCs defined by the Tribe. If they do not yet resemble DFCs then it may be decided that management is necessary to change how a stand of trees is developing. Forest inventory standards ensure that all necessary information is being collected as accurately as is practical. Forest management decisions depend on the accuracy of field data collections.

3.10.1 Planning Inventory and Trust Monitoring

3.10.1.1 Continuous Forest Inventory

The planning inventory provides accountability and justification for active forest management on tribal forests and the scientific basis for long-term planning corresponding to defined DFCs. Harvest schedules are used to plan forest treatment strategies and provide a transparent 15-year planning schedule that is reviewed and updated annually. The Continuous Forest Inventory (CFI) project consists of permanent fixed-area plots established on a systematic grid across tribal timberlands. These plots are typically resampled every 10 years. There are currently over 528 one-fifth acre plots established on Tribal commercial forests (CFI, 2015). Each plot represents an 80-acre grid. The required statistical accuracy for inventory reporting is:

- Timberland: ≤ 5% for Basal Area (BA)
- Commercial Timberland: ≤ 5% for primary unit of volume

- Stratified: Required to report for primary unit of volume per stratum; Standard Error (SE) Accuracy is region discretion

Quality control measures are performed on 10% of the total CFI plots. CFI data and corresponding analysis is approved by the BIA Regional Office and archived in the Central Office within the Forest Inventory Planning (FIP) technical branch.

3.10.1.2 Stand Exam Inventory

A stand exam inventory is employed to collect site-specific forest data and other information for silvicultural and other forest management purposes with a minimum target of 5% Standard Error to 1 standard deviation for primary unit of volume. Stands are treated as Silvicultural units, which are operational units. Stands are the basic sampling unit in the stand-level inventory. The site-specific information collected includes site productivity attributes along with a complete stand table, which is a listing of tree frequency by species and diameter class. Stand exam data is processed, stored, and reviewed in the FBRI FPS database structure. Database backups occur annually and are stored off-site.

3.10.2 Timber Product Sales

A forest inventory related to timber sales is designed to accurately estimate the volume of timber products. The cruise design will vary depending upon product values, extent of the resource, harvest policy, etc. This assessment must be performed within 2 years of advertisement of predetermined volume sale and within 5 years of advertisement of estimated volume sales. Accuracy of this inventory is detailed in Table 3-10.

Table 3-10) Estimated sale stumpage value ranges and associated sampling error.

Est. Sale Stumpage Value	Sampling Error (Volume)	
	Est. Volume Sale	Predetermined Volume Sale
< $15,000	≤ 35%	≤ 25%
> $15,000 - ≤ $100,000	≤ 30%	≤ 20%
> $100,000 - ≤ $250,000	≤ 25%	≤ 15%
> $250,000	≤ 20%	≤ 10%

3.10.3 Trespass Inventory

If unauthorized use of or damage to timber resources is reported, the extent and value of lost resources will be assessed to determine total compensation. A trespass inventory must be performed promptly upon detection and the sampling design and sampling error adjustments are to be approved by the BIA regional director. Sampling requirements and guidelines are detailed in the following chapters of the Indian Affairs Forest Trespass Handbook (53 IAM 7-H):

- Chapter 5: The Trespass Report provides data collection and reporting requirements.
- Chapter 10: Records Management provides record retention guidelines.

3.10.4 Other Inventory (Realty Cruise, Other Products)

Other timber-related inventories such as a realty cruise and other products require approved design standards from the BIA Regional Director.

3.10.5 Forest Inventory for Research (Stocking Studies)

The Nez Perce Tribe is a willing partner with research institutions such as: University of Idaho, Inland Growth and Yield Cooperative, Northwest Tree Improvement Cooperative, and others to enhance the best available science related to forest management principles and decision support tool development. Research inventories must employ applicable and approved scientifically based procedures and detailed record retention of research methods and results as defined in the Title 25 Chapter 1 Subchapter H Part 163.37 Forest Management Research. Section 1.7F of the 53 IAM chapter 8 manual outlines the BIA's policy regarding this law on tribal trust and allotted lands.

3.11 Carbon Sequestration

The Nez Perce Tribe will follow the direction of the Nez Perce Tribe Executive Council and the U.S. Dept. of Interior (DOI), Bureau of Indian Affairs (BIA) Carbon Sequestration Agreement Policy that will not restrict the Tribe's use of a specific parcel of forestland but only requires enhanced land management strategies in line with defined DFCs and will not encumber trust lands as defined in U.S. Code 25 § 81.

Refer to section 10.4 – *Climate Change and Forest Carbon* for more information about the integration of carbon sequestration into Tribal forest management planning.

3.12 Forestry and Wildfire Documentation, Monitoring, & Records

3.12.1 Forestry

The Northwest Regional Office Division of Forestry requires annual planning and reporting documents that are typically due at the end of each fiscal year.

- Forest Health Protection Reports:
    - Forest Health Protection Accomplishment & Expenditure Report
    - Forest Health Protection Management Project Proposals for the next FY
- Forest Management Inventory and Planning Reports:
    - FMIP Catalog of Forest Acres Update
    - FMIP Accomplishment Report
    - FMIP Project Funding Request for next FY
- Forest Development Reports:
    - Forest Development Program/Activities Accomplishment Report
    - Backlog Acres Update
    - Forest Development Programs Planned Projects/Activities Report for next FY
- Report of Timber Cut & Acres Harvested:
    - Report of Timber Cut (ROTC)
- Timber Harvest Initiative Reports:
    - Timber Harvest Initiative Accomplishment Report
    - Timber Harvest Initiative Funding Request for next FY
- Tribal Priority Allocation Reports:
    - Tribal Priority Allocation Add-on Funding Accomplishment Report
    - Tribal Priority Allocation Add-on Funding Request for next FY
- Forest Management Deduction (FMD) Reports

- FMD Expenditure Plan for next FY
- FMD Actual Expenditure Report
- General Council Report
- 638 contracting reports (quarterly and annual reports)
- IA Performance Management System (IA-PMS) Reports

Each 15-year management cycle, the BIA requires the following updated reports/plans:

- Forest Inventory Analysis Report
- Forest History Report
- Forest Management Plan Environmental Assessment
- Forest Management Plan

3.12.2 Wildfire

This section is a direct excerpt from the BIA Wildfire Prevention Program (WFPP) Handbook (90 IAM 5-H), section 4.3 – Required Reporting.

The Annual Accomplishment Report is required for all funded programs. The report should be prepared by BIA agency/Tribal wildfire prevention staff, with assistance from the FMO or wildland fire staff. This report accounts for implementation of WFPP targets. It is critical since it measures how well the program that is funded is being implemented.

This annual report is now submitted using Wildfire Prevention Spatial Assessment Planning Strategies (WPSAPS). Accomplishments are reported online using its Accomplishment Reporting module. It is strongly recommended that program personnel enter their accomplishments on a quarterly or monthly basis.

The annual report for the previous FY is due by November 15 to the assigned Regional WUI/Wildfire Prevention Specialist. After the Regional WUI/Wildfire Prevention Specialist reviews the reports and obtains any corrections, all reports must be forwarded in electronic format to the Deputy, Fire Use and Fuels at NIFC by December 1.

The following requirements apply:

- Accomplishment reports will be completed for BIA agency/Tribal wildfire prevention programs on an annual basis using WPSAPS. Every reported accomplishment must be supported by the documentation described in the BIA Wildfire Prevention Accomplishment Reporting Technical Guide. The most current version of the BIA Wildfire Prevention Accomplishment Reporting Technical Guide can be found online at: https://www.bia.gov/bia/ots/dwfm/resource-library.
- Failure to submit an annual report by the deadline will result in withheld funding until the report is submitted.
- Failure to submit the report by the end of the 30-day probation period will result in a program review prior to funding being restored.
- Programs that miss the deadline for two consecutive years will be unfunded.

3.13 Planning, Coordination, and Communication

Coordination between the resource management programs relative to all resources of value (e.g., timber, wildlife, water, range, archeology/historical, etc.) and programs under the jurisdiction of other tribal organizations and Agencies is essential. All forest management project planning will involve IDT review to ensure compliance with the IRMP and BIA NEPA process. Support from other resource specialists and the tribal public will be evaluated and documented. All timber sales and other forest product sales will be approved by the Nez Perce Tribe's Executive Committee by resolution and by the BIA signature authority. All contracts between the Tribe and a contractor shall be reviewed by the Office of Legal Council (OLC). Non-construction, professional services agreements between the Tribe and contractor are exempt from TERO regulations and policies.

Maintaining an adaptive management framework to maintain planning efficacy requires recurring program reviews that may initiate a formal revision to the management plan. Key revision triggers include mandated deadlines, new monitoring information, significant changes in environmental conditions, and shifts in social, economic, or legal requirements.

Legal and regulatory requirements

- **Mandatory timeline:** *'An FMP may remain "current" unless it is determined by either a mandatory periodic formal review process or contemporary finding(s) or event(s) the plan no longer represents tribal goals or forest management policy, or the state or condition of forest/timber resources.'* 53 IAM 2.4.A (2009) and 25 C.F.R. §163.11 (2025)
- **New planning rule:** Modifications to the Code of Federal Regulations, Indian Affairs Manual (IAM), Integrated Resource Management (IRMP), or Nez Perce Tribal Code can require new plan development or revision to comply with the updated regulations.

Monitoring and evaluation results

- **Indicated need for change:** The Nez Perce Tribe's IRMP (2023) recommends an annual review process to ensure programmatic administrative consistency with the guidance of the IRMP. The BIA requires annual assessments to ensure compliance with trust responsibilities defined in the Tribe's 638 contract. A review of the forest management plan's monitoring and evaluation can trigger a plan revision if the review determines that goals are not being achieved. If immediate and significant changes are needed that cannot be handled with a plan amendment, a full revision is necessary that may require a partial or full review of the IRMP and associated resource-specific management plans.
- **New scientific information:** The availability of new peer-reviewed scientific data or best management practices pertinent to the Inland Northwest can warrant a plan revision. This ensures the management plan incorporates the most current knowledge for maintaining healthy ecosystems.

Changes in conditions

- **Ecological changes:** Major shifts in environmental conditions can trigger a revision. This includes adapting to climate change, addressing worsening fire seasons, and responding to outbreaks of pests and diseases that affect forest health.
- **Socioeconomic changes:** Revisions can be triggered by changes in public expectations, local economic conditions, or how communities use and depend on forest resources. For example, growing demand for recreation or changing needs for timber can initiate a revision.
- **Land status:** Significant changes in land status (e.g., fee to trust), ownership, or the designation of special areas can necessitate a plan revision.

Policy and management decisions

- **Broad policy changes:** New policies at the national, regional, local, or Tribal level can affect forest and fire management and may require a revised plan to align with updated objectives, such as those related to watershed protection or native species diversity.
- **Adaptive management feedback:** In an adaptive management framework, feedback loops are built into the planning process. When monitoring shows that certain actions are not achieving their desired outcomes, or if new information indicates a better approach, a revision may be triggered to mitigate or enhance the current planning strategy.

Forest management planning tiers with the Integrated Resource Management Plan (IRMP) for which provides interdisciplinary guidance, holistic land management considerations, and synergy towards a common land management goal. In addition, an Interdisciplinary (ID) Team is assembled to review project-level land management planning efforts to determine compliance with the IRMP and subsequent implementation plans such as the Forest Management Plan (FMP). This planning effort assures the Tribal agency leads (Nez Perce Tribal Executive Committee) that project-level planning and implementation strategies are in compliance to defined Tribal values and organizational desired landscape conditions.

3.14 Forestry & Fire Program Organization & Funding

3.14.1 Organization

The organization of forestry and wildland fire personnel is depicted in Figure 3-22.

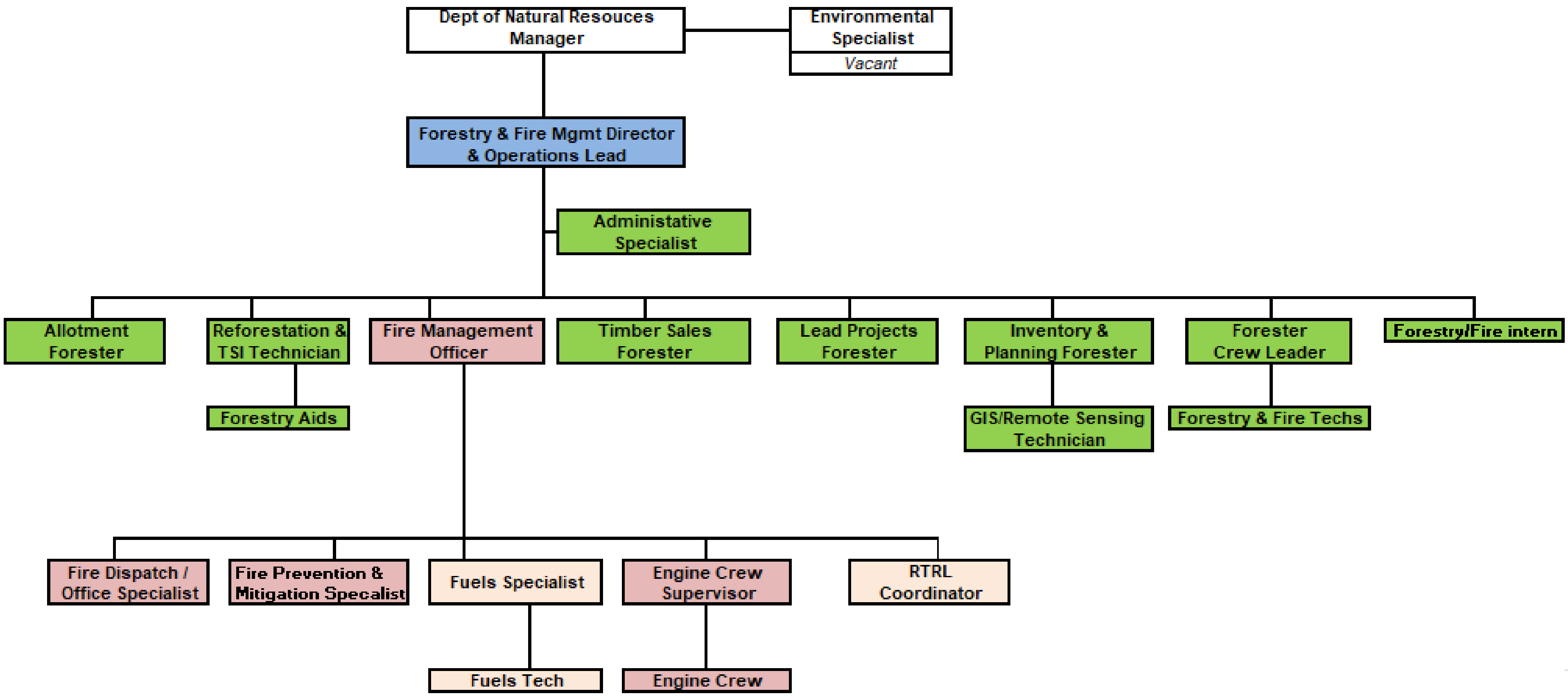


Figure 3-22) DNR/Forestry, Fire, & Fuels Ops Management Program Organizational Chart.

3.14.2 Funding

3.14.2.1 Forest Development

Forest Development activities are funded annually from the following sources:

- *Forest Development add-on Funds:* Funding levels vary annually based on Congressional actions, land in the commercial forest base, acres in need of treatment, planned activity reports, and on-the-ground accomplishments. Funding amounts over the last five-year period for contract work have averaged approximately $549,000; annual amounts are as follows:

Table 3-11) Annual funding received through add-on funds for the period 2020 to 2024.

Fiscal Year	Total Funding	Fiscal Year	Total Funding
2024	$437,582	2021	$929,000
2023	$493,000	2020	$440,000
2022	$445,000		

- *Timber Harvest Initiative:* THI funding used to support FMP activities has averaged $271,072 over the past 5 years (FY2020-2024). This BIA funding is used to support various timber management activities such as forest inventory, timber sale preparation, and contract administration.
- *Tribal Priority Allocation (TPA) base funding (638 Contract):* The Tribe receives funding from the BIA to support Forest Management on Trust lands. Funding issued to the Tribe from this source has averaged $467,810 over the past 5 years (FY2020-2024).

Other recent sources of funding include:

- FMIP: $767,844 (total for 2020-2024)
- NRCS EQIP: $1,057,501 (total received over the last 5 years)
- NRCS CSP: $1,664,372 (total received over the last 5 years)
- RTRL: $20,000 (total received in 2025 start-up funds)

Additional funding sources may include:

- Cost Share Programs
- Stumpage Deductions
- Ten Percent (10%) Funds
- Year-end BIA appropriations.
- Any additional sources that may become available.

Reforestation

For the period 2019 to 2025, reforestation costs ranged from $200,335 (2022) to $695,849 (2021) and averaged approximately $335,750 annually. Approximate reforestation costs and totals by year and activity are presented in Table 3-12.

Table 3-12) Summary of reforestation activities by year and total cost or total quantity.

Year	2019*	2020	2021	2022	2023	2024	2025†
Planting Including Seedlings	$94,196	$57,015	$248,750	$52,644	$49,302	$111,184	$108,141
Seedling Protection Installation	$84,428	$47,174	$111,808	$27,187	$40,329	$28,728	$42,350
Spot Herb. Application	$37,329	$24,319	$97,035	$17,107	$16,747	$46,354	$31,538
Seedling Protection Supplies	$36,275	$12,142	$67,498	$24,254	$27,503	$19,398	$30,286
Shade Carding	$12,749	$0	$0	$1,902	$1,050	$46,103	$22,752
Plantskydd Dipping (Spring)	$0	$0	$23,645	$4,397	$0	$9,283	$2,893
Plantskydd Application (Fall)	$29,873	$59,967	$75,702	$43,850	$32,508	$61,052	$52,000
Seedling Protection Maintenance	$81,275	$11,399	$48,828	$28,504	$43,054	$9,210	$19,778
Rodenticide Application (voles)	$6,728	$6,142	$22,583	$490	$0	$1,515	$0
Approx. Total Reforestation Related Costs	**$382,853**	**$218,158**	**$695,849**	**$200,335**	**$210,493**	**$332,827**	**$309,738**
Total Seedlings Planted	**231,178**	**108,768**	**390,200**	**63,211**	**69,163**	**133,229**	**91,922**
Approx. Acres Planted	**1,069**	**550**	**1,449**	**279**	**227**	**518**	**533**

***** The Tribe received approximately 50,000 trees from the state which included planting and herbicide application. Protection for the seedings was provided by the Tribe.

† All PP with herb. Not all trees with seedling protection.

Payment Policies for Forest Products:

Timber sale payments shall be submitted by the Purchaser using the Trust Funds Receivable “Lockbox” with procedures and instructions furnished separately by the Bureau of Indian Affairs. Payments and deposits are due on the date specified in the written request(s) from the BIA.

3.14.2.2 Wildland Fire

Fire Suppression

As of FY2023, fire preparedness funding received annually through the Tribe’s TPA contract averaged roughly $130,000 over the two decades. While minor increases in funding for fire suppression have occurred over the last decade, funding has largely been outpaced by the need for wildfire support due to warmer, drier conditions which have created more volatile wildfire seasons.

With recent funding increases being insufficient to support the needs of the Tribal fire program, funding is regularly sought through other sources, such as the co-op agreement, to support fire suppression efforts, both on and off Reservation, led by other agencies. The Tribe is reimbursed by the BIA once fire assignments are completed. A summary of funding totals received by the Tribe for fire suppression efforts for the period 2019 to 2024 is included in Table 3-13.

Table 3-13) Annual funding received for fire suppression for the years 2019 to 2024.

Fiscal Year	Total Funding	Fiscal Year	Total Funding
2024	$589,005.94	2021	$299,137.25
2023	$324,148.53	2020	$195,833.41
2022	$321,815.63	2019	Approx. $200,000

Hazardous Fuels Abatement

As displayed in Table 3-14, funding for fuels abatement on the Reservation has fluctuated over the last decade (2015 to 2024). The lowest amount received was $543,454.00 (year 2015) while the highest amount received was $1,382,008.40 (year 2023). During that period, an average of $865,158.45 was received annually for fuels abatement projects. The effectiveness of funding is dependent on the type of treatment needed and the cost. Treatment types by year of implementation and by cost per acre are summarized in Table 3-15.

Table 3-14) Annual funding for hazardous fuels abatement projects for the years 2015 to 2024.

Fiscal Year	Total Funding	Fiscal Year	Total Funding
2024	$1,133,520.78	2019	$804,096.00
2023	$1,382,008.40	2018	$1,043,058.00
2022	$1,091,426.00	2017	$566,993.00
2021	$909,701.00	2016	$733,617.00
2020	$443,710.34	2015	$543,454.00

Table 3-15) Fuel treatment types by year of implementation and cost per acre.

Year	Fuel Treatment	Cost
2019	Light PCT & Lopping	$150/Ac
	Moderate PCT & Handpile Windrows	$620/Ac
	Moderate PCT	$480/Ac
	Light PCT, Masticate Brush & Thinning Slash	$600/Ac
2020	Light PCT & Lopping	$180/Ac
	Moderate PCT & Lopping	$520/Ac
	Light PCT, Lopping, & Pruning	$414/Ac
	Brush Mastication	$550/Ac
2021	Light PCT, Lopping, & Pruning	$430/Ac
	Light PCT & Lopping	$210 - $265/Ac
	Moderate PCT	$360/Ac

Year	Fuel Treatment	Cost
	Masticate PCT windrows	$414/Ac
2022	Heavy PCT & Mastication	$1,085 - $1,182/Ac
	Heavy PCT & Mastication	$2,500/Fecon/Day
	Moderate PCT, Masticate Brush & Thinning Slash	$650 - $800/Ac
	Masticate PCT slash	$600/Ac
2023	Heavy PCT & windrow slash	$950/Ac
	Moderate PCT & handpile slash	$570 - $610/Ac
	Moderate PCT & lopping	$550/Ac
	Moderate PCT, Masticate Brush & Thinning Slash	$800 - $1,200/Ac
	Brush Mastication	$700/Ac
2024	Heavy PCT & Mastication	$1,050 - $1,550/Ac
	Brush Mastication	$600 - $800/Ac

Post Fire Recovery

Recent funding totals issued for post-fire recovery efforts on the Nez Perce Reservation are as follows:

- 2024 – BAER Emergency Stabilization: $211,571 (Gwen Fire)
- 2025 – BAR: $546,703 (Gwen Fire)

3.14.2.3 Forest Health, Insects, & Disease

The Forestry & Fire Management Division will coordinate with regional insect and disease specialists from the Forest Service Forest Health Program (FHP)[1] to develop appropriate silvicultural responses to site specific forest health issues. Biological Assessments will be requested for Forest Health projects from these specialists and their input will be used for Environmental Assessments. BIA Handbooks and relevant Tribal Codes will be incorporated into forest health projects, and IRMP goals and objectives will be considered when developing strategies for managing various insects and diseases.

3.14.2.4 Carbon Sequestration

The Tribe actively reviews Carbon Sequestration Funding sources such as the Reforestation Carbon Development program through the Oregon Climate Trust. A proposal is currently being reviewed and is dependent on recent changes made during the Trump administration's (2025 to 2029) ongoing funding cuts. This 40-year afforestation agreement could provide the NPT with approximately $2 to $2.2 million total revenue associated with afforestation on low productive agricultural lands (approx. 3,081 proposed acres).

[1] Forest Service Forest Health Program. Available online at: https://www.fs.usda.gov/science-technology/forest-health-protection

4 ALLOWABLE CUT

In general, the allowable cut is the amount of wood that may be harvested over a period of time to maintain sustained production (Forest Management and Planning 2017). As summarized by William Leak (2011), "regulation of allowable-cut is an essential requirement for placing a forest property under sustainable management. It provides for a continued supply of timber and a steady stream of income. It also ensures the maintenance of any wildlife habitat conditions created by timber management, such as early-successional habitat."

"Allowable cut" specifies how much timber (volume in board feet) can be cut over a given period. The "annual allowable cut" (AAC) dictates how much timber, on overage, can be cut each year over a given period (in some years more timber may be cut and in other years less timber may be cut as long as the average over the planning period matches the AAC that was selected). Depending on management priorities, the AAC can be increased or decreased during the next forest management plan's revision or during a catastrophic event such as a large wildfire to support salvage and restoration efforts.

Regulated Allowable Cut (RAC): the calculated sustainable yield for the future forest after the DFCs are attained, and a consistent harvest level is needed to maintain the forest.

Indicated Allowable Cut (IAC): the planned harvest levels during a conversion period, which is from present to the time when all forest lands fall within the DFCs. Slow, moderate, or fast pace of treatments will influence the length of the conversion period, as will the length of time required to attain desirable species composition and grow large trees throughout the forest.

Annual Allowable Cut (AAC): the target harvest level scheduled during the FMP period that has been determined to meet management goals and objectives set to attain future DFCs. It is determined by the calculation of the Indicated Annual Cut (IAC) as defined by the Tribe's preferred management alternative documented in an approved Forest Management Plan (FMP). The cumulative AAC, or portion thereof, can be harvested any time during the planning period, but cannot be exceeded or carried as surplus volume to the next planning period. Harvesting the AAC over the planning period is critical for achieving the DFC's at the desired rate.

5 FIRE MANAGEMENT AND RESOURCE PROTECTION

The purpose of this chapter is to implement decisions made in the Forest Management Plan (FMP) as they relate to wildland fire on the Nez Perce Reservation. It is not a decision-making tool, but an implementation guide.

Fire management and resource protection refers to the use of prescribed fire and control of wildland fires on the Reservation. Planning, firefighter training, equipment and vehicles, and coordination with other organizations and agencies with firefighting capabilities are a few of the items that are included in fire management and resource protection.

The Fire Management Program encompasses the following programs:

- Preparedness
- Suppression
  - BAR
- Severity
- Fire Prevention
- Community Assistance
- BAER
- Supplemental Requests
- Rural Fire Assistance
- Fuels Management
  - Wildland Urban Interface (WUI)
  - Non-WUI / Hazardous Fuels Reduction (HFR)
  - Fuels Monitoring
  - Prescribed Burning

This fire management portion of the FMP sets forth the program and guidance to manage wildland and prescribed fires safely and efficiently within the context of the approved FMP for the Nez Perce Tribe. The FMP incorporates (by reference) existing interagency plans and assessments and considers the best available science to assess and plan on a landscape scale. It is a tool for fire managers to use in planning and directing wildland fire activities consistent with the goals and objectives identified in the FMP; it provides the context for understanding strategic decisions, selecting appropriate fire management responses, and implementing the supportive tactical actions appropriate for specific lands and identified areas. The FMP is supplemented by operational plans that describe fire preparedness and prevention, preplanned dispatch, prescribed fire, fuel treatments, Burned Area Emergency Response (BAER), Burn Area Rehabilitation (BAR), and cooperative agreements.

This chapter satisfies the requirement that a plan be developed for all areas subject to wildland fires and complies with the following Department of Interior (DOI) federal policy and direction: Federal Wildland Fire Management Policy and Program Review, the Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide.

Cooperators play a vital role in fire management on the Nez Perce Reservation. These programs and resources complement and augment those of the tribe; input and advice provide an additional forum for considering both public and other agency concerns and accounting for them, and participation enhances the efficiency and effectiveness of fire management on the Nez Perce Reservation. Interagency and cooperative agreements are currently in place and include those with the Idaho Department of Lands, Nez Perce County, Bureau of Land Management, Forest Service – Northen Region 1 and Intermountain Region 4Clearwater/Nez Perce National Forests, National Park Service, Bureau of Indian Affairs – Northwest

Region, United States Fish and Wildlife Service – Pacific Region, and Clearwater- Potlatch Timber Protection Association.

The Nez Perce 1863 Reservation is under fire management and protection by three (3) local agencies: Idaho Department of Lands (IDL), the Clearwater-Potlatch Timber Protection Association (CPTPA), and the Nez Perce Tribe (NPT) on 770,318 total acres.

The Nez Perce Tribe fire program utilizes Interagency Dispatch Centers for all fire dispatching needs, which includes all fires and prescribed burns both local and off district. Interagency partners include the USFS, IDL, BLM and CPTPA as defined in the 'Idaho Master Cooperative Wildland Fire Management and Stafford Act Response Agreement' and associated 'Local Operating Plans' (LOP). The North Idaho Fire Zone has also created a charter which combines wildland fire fighting resources for the purpose of working together and sharing resources throughout the Idaho Panhandle. The Nez Perce Tribe is a member of this charter.

State, local, and federal agencies participate jointly to complete the development of community wildfire protection plans and multi-hazard mitigation plans. The Nez Perce Tribal Forestry & Fire Management Division participates in the Idaho Lands Resource Coordinating Council (ILRCC) which supports a framework for an organized and coordinated approach to implementing the National Fire Plan. The group provides oversight and prioritization on a statewide scale with emphasis on a collaborative approach at the state and local levels for activities such as hazardous fuels treatment, equipment purchases, training, homeowner education, community wildland fire mitigation planning, and other activities. Cooperatively planning future hazardous fuels projects is essential in meeting the intent of the National Fire Plan and the needs of the local communities.

County Wildland Fire Mitigation Plan updates have been completed for all counties within the Nez Perce Reservation.

Clearwater County, ID
Multi-Hazard Mitigation Plan (October 2017)
Community Wildfire Protection Plan (May 2023)
Idaho County, ID
Multi-Hazard Mitigation Plan (September 2022)
Community Wildfire Protection Plan (August 2022)
Lewis County, ID
Multi-Jurisdictional Hazard Mitigation Plan (July 2020)
Wildland Fire and Flood Assessment – Final Report (2010)
Nez Perce County, ID
All Hazard Mitigation Plan (January 2020)

5.1 WILDLAND FIRE

The 2001 Federal Wildland Fire Management Policy (FWFMP) provides direction for federal fire management agencies. The Nez Perce Tribe, through its contract with the BIA, shall follow these federal rules. In summary, federal fire management activities and programs are to provide for firefighter and public safety, protect and enhance land management objectives and human welfare, integrate programs and disciplines, require interagency collaboration, emphasize the natural ecological role of fire, and contribute to ecosystem sustainability (FWFMP 2001).

Fire Goals

- Reduce the risk of damaging wildfires, the threat to people and communities, and the cost to federal and tribal funds.
    - Prevent the occurrence of wildfires.
    - Reduce or eliminate fire caused by human activity and decrease the danger of wildfire in the urban/wildland interface.
    - Provide and disseminate fire prevention literature to reduce or eliminate industrial fires.
    - Provide reference for the community not normally engaged in wildfire protection or fire suppression.
    - Develop adequate fire safety practices in land development, range management, slash disposal, industrial operations, and cultural fire use.
    - Ensure the efficient and effective suppression management of wildfires.
    - Respond appropriately based on the initial wildfire report and associated ground fuel and weather conditions.
    - Develop a strategy to confine, contain, and control a wildfire based on fuel and weather conditions and values at risk that will meet the tribal objectives established in the forest management plan.
    - All fire management activities will be conducted within safety parameters to protect firefighters and the public.
- Support forest management goals using prescribed fire where appropriate.
    - Aid in the development of prescriptions where fire is a potential tool for managing multiple forest resources.
    - Efficiently and effectively implement burning prescriptions.

Additional fire management goals are:

- to maintain sufficient initial attack resources that are pertinent to firefighter safety, public safety, and resource protection for values at risk,
- integrate wildland fire management decisions and natural resource management decisions,
- plan fire management to include fire prevention, preparedness, suppression, fire use, and emergency rehabilitation to meet tribal resource management objectives, and
- return fire, as a fundamental ecological and natural process, into landscape level management.

Other policies, land management planning documents, fuels manuals and documents pertaining to Rx fire, and partnerships are listed below. Refer to the Fire Response Plan Master Agreement for the Nez Perce Tribe Response Area for more information about the coordination of Initial Attack Operations and duty officer responsibilities for the current fire season.

- Indian Affairs Manual 90 IAM Wildland Fire Management
- Nez Perce Tribal Code 6-5 ‘Forest Protection Fire Ordinance’
- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment -10-Year Comprehensive Strategy Implementation Plan
- Wildland Fire and Aviation Program Management and Operations Guide (Red Book)
- The Wildland and Prescribed Fire Management Policy – Implementation Procedures Reference Guide
- The Master Cooperative Wildland Fire Management and Stafford Act Response Agreement
- North Central Idaho Fire Danger Operating Plan
- Interagency Prescribed Fire Planning and Implementation Reference Guide
- Interagency Prescribed Fire – Planning and Implementation Procedures Guide
- Bureau of Indian Affairs Fuels Management Program – Supplement to the Interagency Prescribed Fire Planning & Implementation Procedures Reference Guide
- Local Operating Plan, with IDL, CPTPA, Clearwater and Nez Perce National Forests, BLM, BIA
- Fuels Management Handbook, Bureau of Indian Affairs
- Bureau of Indian Affairs Fuels Management Program, Business Rules Handbook
- Nez Perce Indian Reservation Fuels & Prevention Management Plan
- Nez Perce Tribe Hazardous Fuel Treatment Monitoring Plan
- Bureau of Indian Affairs Northwest Region Programmatic Monitoring Plan
- Cooperative Agreement between the BIA NWRO and the Nez Perce Tribe
- USDA and DOI Burned Area Emergency Rehabilitation Handbook
- Idaho Administrative Procedures Act

Below is an overview of wildland firefighting procedures used by and resources available to the Tribe. Refer to the *Nez Perce Tribe Wildfire Prevention Plan* for more information.

5.1.1 Prevention

The *Nez Perce Tribe Wildfire Prevention Plan* details the prevention, mitigation, and education strategy for fire prevention activities conducted by the Nez Perce Tribe. It contains fire history information, management objectives, an analysis and description of the area of interest, copies of current fire prevention agreements, general guidelines for time spent on program activities, budgetary information, and program reporting requirements.

5.1.2 Pre-suppression

5.1.2.1 Initial Attack Equipment

The standard equipment used in agreement with the BIA is 2 type 6 engines (Figure 5-1). This is the minimum that the Nez Perce Tribe will have available for fire suppression. In recent years, NPT has been working to build up its firefighting capacity and has added several items. In addition to the minimum, the NPT has added several more engines, a water tender, logging equipment, and some heavy equipment. All equipment available for fire is listed with the Interagency Dispatch Center and available for use by all NPT interagency partners. Multiple aircraft are also available for use through the Interagency Dispatch Center.

Figure 5-1) DOI Type-6 fire engine deployed on a prescribed burn.

5.1.2.2 Cooperators

- Idaho Department of Lands (IDL)
    - Craig Mountain District – Craigmont, Idaho
    - Maggie Creek District – Kamiah, Idaho
    - Ponderosa District – Deary, Idaho
- Clearwater - Potlatch Timber Protective Association (CPTPA)
- US Forest Service
- Volunteer/Rural Fire Departments (VFD/RFD)

5.1.2.3 Aircraft

Various types of aircraft, capable of fire suppression, are available through dispatch services. Including but not limited to; Single Engine Airtankers (SEATs), air attack airplane, helicopter, and heavy retardant tankers (Figure 5-2).

Figure 5-2) Photos depicting the use of aircraft to combat the 2024 Gwen Fire.

5.1.2.4 Initial Attack (IA)

Initial attack is an aggressive suppression action consistent with firefighter and public safety and commensurate with values at risk.

Initial attack forces consist of the first suppression personnel to arrive at a fire, plus reinforcements arriving during the first operational period. A qualified individual on scene will be identified as the Incident Commander (IC). All requirements dictated by the Red Book will be adhered to including but not limited to having the IC focused on the management of the fire with no collateral duties. The name of the designated IC will be communicated to the Duty Officer (DO) and Dispatch. The resources currently assigned, and those in-bound to the incident will also be notified as to the identity of the IC and checked in and briefed prior to fire duty assignment.

The IC is responsible for ensuring that all resources assigned to the incident have been briefed and that all principles of “Lookouts, Communications, Escape Routes, and Safety Zones” (LCES) and 10 Standard Fire Orders have been implemented prior to the initiation of any actions. In the event the fire complexity increases to a level exceeding the qualifications and capabilities of the Initial Attack IC, the current IC will notify the DO that a higher qualified IC is required. The decision to transition to an IC with higher qualifications may be made by the current IC or the DO. The outgoing IC will make recommendations for additional resources and overhead and brief the newly assigned IC in a systematic transition.

Dispatch, the Duty Officer, and all incoming and assigned resources will be notified of a change in Incident Commander and the specific time the transition will occur. When transitioning from a local incident to an Incident Management Team, if possible, the outgoing IC should be present at the Team in-briefing.

5.1.2.5 Social and Political Concerns

Where possible, local businesses, resources, and assets will be utilized in support of fire management actions on the Nez Perce Reservation. The intent is to involve the local communities economically, politically, and socially in fire management.

5.1.2.6 Training and Qualifications

BIA policy (Red Book) sets training, qualification, and fitness requirements for all wildland firefighters and prescribed fire positions. All personnel involved in fire management functions will be provided with the training required to meet qualification standards for the duties they are expected to perform (Figure 5-3). Interagency training opportunities will be utilized whenever possible and include the following:

- All fire training is requested through the training officer or the Fire Management Officer (FMO).
- The training is approved by the FMO.
- Upon completion of the training, a copy of the Certificate of Completion will be kept in the employee's personnel file and recorded in Incident Qualifications and Certification System (IQCS).

<u>*Annual Refresher Training*</u>

All personnel involved in Fire Management activities are required to participate in fire management refresher training annually to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Watchout Situations, and Common Denominators. Wildland Fire Safety Training Annual Refresher (WFSTAR will be utilized for this training. **Fire shelter use and deployment must** be included as part of the annual refresher.

Figure 5-3) Wildland firefighters conducting a prescribed burn with drip torches in grassy fuels. This is just one of the duties that is regularly performed by trained and qualified wildland firefighters.

Physical Fitness

All personnel involved in fire management activities will meet the fitness standards required in the Red Book. At this point in time, firefighters participating in wildfire suppression must achieve and maintain an **Arduous** fitness rating. The National Wildfire Coordinating Group defines arduous fitness rating as "the scale in which minimum fitness standards are evaluated for wildland firefighters to safely perform their duties to mitigate potential illness and/or injuries". A trained and qualified American Red Cross First Responder (or equivalent) that can recognize symptoms of physical distress and perform the appropriate first aid procedures must be on site during the test. All staff must be cleared through the Medical Standards Program each year prior to taking the arduous fitness test.

Physical Examinations

As required by the Medical Standards Program, a baseline physical exam is required for each wildland firefighter that will be performing arduous duty. Each subsequent year a self-certification exam must be taken and every third year a periodic physical exam.

5.1.3 Suppression

5.1.3.1 Initial Attack Mobilization Strategy

Upon receiving notification of wildfire, the dispatcher in charge refers to the run cards and sends appropriate initial attack (IA) resources to the incident. The dispatcher then consults with the FMO or duty officer and sends additional resources if necessary. The first person in charge on the scene is the Incident Commander (IC). The IC assesses the situation and orders any additional resources if needed. From the IC's report, the Duty Officer (DO) initiates the mobilization of additional resources, working with the dispatch center. When the complexity warrants, the FMO or another more experienced IC relieves the IA IC to further develop the plan of attack and to direct fire suppression personnel as needed on scene. Cooperating Volunteer Fire Department's (VFD's) will be summoned at the discretion of the IC, DO, or local dispatcher.

Dispatch Hierarchy - When needed, all requests for support and supplies outside of the Agency are requested through the Interagency Dispatch Center. Guidelines for initial attack based on fire danger conditions are listed on Run Cards. Estimates of what resources to expect at various fire danger levels are as follows:

1. **Low:** One fully staffed engine with an Incident Command Type 5 (ICT5) will be dispatched. VFD will be retained or released at IC discretion. The DO will also be notified.
2. **Moderate:** Two fully staffed engines will be dispatched to the incident with an ICT5. VFD will be retained or released at IC discretion. An ICT4 and air resources will be considered and ordered if deemed necessary. The DO will also be notified.
3. **High/Extreme:** Three fully staffed engines will be dispatched to the incident with an ICT4, if possible. The DO will be notified and asked if a helicopter or dozer should be sent. The IC on scene can request a more qualified IC and/or additional air support. VFD will be retained or released at IC discretion. DO may also respond, if determined necessary.

5.1.3.2 Extended Attack Mobilization Strategy

For fires up to 1,000 acres (size class A-E)

If the initial attack crews cannot successfully control the fire, the IC will engage in extended attack. Additional resources will be ordered through the Interagency Dispatch Center only on approval by the FMO or Duty Officer. The Tribal DO will notify the BIA Superintendent and the Regional DO when wildfires occur on the Reservation larger than 100 acres in timber and 300 acres in rangeland. Extended attack wildfires may have a Wildland Fire Decision Support System (WFDSS) written to assist fire managers and analysts in making strategic and tactical decisions for large fire incidents.

5.1.3.3 Mobilizing Tribal Resources for off Reservation Assignments

Requests for Tribal resources are ordered through the Interagency Dispatch Center. When requests for fire suppression personnel or crews are received from dispatch, the request is directed to the FMO, DO, or Nez Perce Tribe's Fire Management office. The DO will make the final decision to send any resources off district.

5.1.4 Post-Fire Recovery

This section is a direct excerpt of the U.S. Department of the Interior Indian Affairs Post-Wildfire Recovery website[2]. Refer to the website to see this information in its original format.

Areas affected by severe wildfires can present other hazards long after the fire has been extinguished. Areas that have been severely burned and have lost most or all vegetative cover can produce flooding and landslides. Soils can be damaged by intense heat produced by severe wildfires and, as a result, they tend to shed water as opposed to absorb water. With enough rain or snowmelt, the water runoff can cause flooding, soil erosion, and slope failure. However, the risk of such hazards can be reduced through site rehabilitation. One of the most common forms of rehabilitation is the planting and seeding of vegetation which absorbs water and holds soil together and mitigates the establishment and spread of invasive plant, especially on areas that are sloped.

5.1.4.1 Burned Area Emergency Rehabilitation (BAER)

When a wildland fire incident occurs in Indian Country where the values at risk have been determined to be significant, DWFM's PWR program provides wildfire recovery guidance in the form of a Burned Area Emergency Response (BAER) assessment. This assessment evaluates the impacts of the wildfire and recommends post-fire emergency stabilization (ES) and burned area rehabilitation (BAR) measures, which are discussed in the next section, to protect public safety, prevent further degradation of the landscape and to mitigate post-fire damages to cultural resources (Figure 5-4). To facilitate this rapid assessment process, a designated BAER team, consisting of wildfire recovery specialists, plans and carries out the first steps to help the landscape recover from fire. The BAER team would be led by the Forestry & Fire Management Director, or another staff member, and include experts such as botanists, hydrologists, soil scientists, geologists, wildlife biologists, and cultural resource specialists.

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[2] U.S. Department of the Interior. Indian Affairs. *Post-Wildfire Recovery*. https://www.bia.gov/service/post-wildfire-recovery.

Figure 5-4) Example of a wildfire burn scar in which post-fire rehabilitation activities were planned and implemented.

The BAER team begins as soon as conditions are safe, and usually before the fire is fully contained. Their assessment usually takes 7 to 14 days to complete, depending on the size of the fire. The local agency or landholder implements the recommended plan with support and funding from the PWR Program. Treatments and actions are implemented to prevent or minimize additional post-fire effects like flash flooding.

Some examples of BAER strategies that fall under the category of ES and BAR include:

- seeding severely burned areas with quick-growing or native species of plants and/or mulching with certified weed free straw or wood chips to protect high value resources
- installing debris flow treatments to protect downstream resources and values
- modifying or removing culverts to allow drainage to flow freely
- constructing drainage dips or emergency spillways to keep roads and bridges from washing out during floods
- install warning signs
- implement early detection and rapid response treatment to minimize the spread of noxious weeds into native plant communities
- install erosion control measures at critical cultural sites

Actions related to fuels management and reforestation are primarily addressed through restoration efforts (below). However, fuels management may also be employed within the BAER process for reforestation support or to reduce reburn risk due to fuel buildup.

BAER assessment plans are a cooperative effort between federal agencies such as the Bureau of Indian Affairs, U.S. Forest Service, Natural Resources Conservation Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. Geological Survey, Tribal, state, and local forestry and emergency management departments.

5.1.4.2 Post-Wildfire Rehabilitation

Post-wildfire recovery is the spectrum of human-led efforts to repair and restore property and natural resources after a fire. Although natural recovery is preferable, some wildfire incidents cause damage that require special efforts to mitigate. Some examples of such damage include loss of vegetation that would lead to soil erosion, water runoff that creates flood threats, or the movement of sediments that can endanger homes or water reservoirs vital to wildlife and human communities.

The Bureau of Indian Affairs (BIA) Division of Wildland Fire Management (DWFM) Post-Wildfire Recovery (PWR) Program consists of four main areas that, together, present a holistic approach to post-wildfire recovery: Fire Suppression Repair, Emergency Stabilization (ES), Burned Area Rehabilitation (BAR), and Restoration.

Table 5-1) Post-Wildfire Recovery Program Areas.

Post-Wildfire Recovery Area	Fire Suppression Repair	Emergency Stabilization (ES)	Burned Area Rehabilitation (BAR)	Restoration
Primary Objective	Repair impacts due to firefighting actions	Minimize post-fire threats to life or property	Non-emergency repair/restoration of damage caused by fire	Return to resilient landscape
Urgency	Before incident closeout	Within 1 year plus 21 days of fire start	Within 5 years	5 plus years
Delegation of Authority	Incident Commander	Agency Administrator	Agency Administrator	Agency Administrator
Funding Source	Fire operations (suppression)	PWR Program - Fire operations (ES)	PWR Program - Rehab Account (annual appropriation)	Program Funds

<u>Fire Suppression Repair</u>

Fire Suppression Repair, also known as Suppression Repair, is the work done to repair or minimize the fire impacts to resources, lands, and facilities resulting from firefighting activities. This phase usually begins before the fire is contained. Resource Advisors, known as READs and REAFs (fireline qualified) are assigned to assist with identifying and evaluating potential impacts on natural, cultural, and other resources. READs work on small local responses or with Incident Management Teams (IMTs) to develop practical strategies and tactics that meet agency administrators' or incident objectives.

For every wildfire incident, READs develop a fire suppression repair plan that addresses damage such as:

- Construction of firelines, strips of land cleared of burnable material

- Impact to the land caused by establishing bases for firefighting operations, such as helicopter operations areas and firefighting crew camps
- Incidental damage to roads and historic trails
- Release of fire retardants near waterways

Emergency Stabilization

ES allocates funding to address imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on federal lands. When possible, emergency stabilization strategies are implemented before the first major post-fire storm event, since post-fire rain and flash flooding can worsen the impacts of wildfire or create new impacts. Fires result in loss of vegetation, exposure of soil to erosion, and increased water runoff that may lead to flooding, increased sediment, debris flow, and damage to critical natural and cultural resources.

BAER actions such as: seeding, mulching, installation of erosion and water run-off control structures, temporary barriers to protect recovering areas, and installation of warning signs may be implemented. Other BAER ES-related measures may also replace safety related facilities; remove safety hazards; prevent permanent loss of habitat for threatened and endangered species; and prevent the spread of noxious weeds and protect critical cultural resources.

Burned Area Rehabilitation (BAR)

BAR aims to reduce the risk of permanent resource damage and promote long-term restoration of the fire impacted landscape. BAR strategies span up to five years after the original fire incident. This phase utilizes non-emergency actions to improve fire-damaged lands that are unlikely to recover naturally and to repair or replace facilities damaged by fire that are not critical to life and safety.

Some typical BAR treatments are:

- Reforestation and cultural planting (Figure 5-5)
- Acquiring seeds for revegetation
- Performing surveys to determine the effectiveness of treatment plans
- Cultural resource clearance survey(s) to determine that treatments will not negatively impact cultural resources
- Repairing minor facilities such as water troughs
- Identifying Continuous Forest Inventory (CFI) plots, land used to monitor forest regrowth
- Treating noxious weed infestations
- Replacing burned fences and road and information signs
- Sign replacements such as road hazard signage, informational signs, etc.

BAR funding is allocated to each bureau at the beginning of the fiscal year or following Congressional appropriations.

Restoration

Restoration is a long-term process that focuses on ecological recovery of watersheds, habitats and biomes. Depending on the land and location, restoration can take anywhere from a few years to decades. These strategic efforts are not funded by the post wildfire recovery program and are usually the responsibility of the local agency/unit and may include salvaging the remaining usable timber, reforestation, fuels treatments, reestablishing native plant populations, restoring habitats, and treating invasive plants. These strategies work towards not only the restoration of natural areas, but also towards increasing their resilience to future wildfire events.

Figure 5-5) Rehabilitation of a wildfire burn scar by means of planting.

5.1.4.3 Fire Rehabilitation Mobilization Strategy

Site specific burned area rehabilitation plans will be completed as needed. The size, intensity, and complexity of the fire will determine the scope of the project. As the rehabilitation project becomes more complex, additional resource personnel may be required to complete and implement a BAER plan. The three tiers of project complexity are determined as follows:

A. Wildland Fire Resource Advisor - Consists of the Tribal FMO or Natural Resource professional with documented assistance from sources within or outside of the Agency.
B. Local BAER Team - The local BAER Team will develop and implement the BAER plan for local fires of moderate intensity when emergency rehabilitation is needed.
C. DOI National BAER Team - Developing a BAER plan for large, intense fires often exceeds the expertise and manpower of the resource professionals at the Tribe. In these cases, a DOI National BAER Team will be ordered.

The Nez Perce Tribe will consider ordering a National BAER Team when any of the following circumstances apply:

- The fire exceeds 500 acres.
- The fire is complex in terms of potential resource damage, or
- The fire has required the mobilization of a type 2 or type 1 Incident Management Team.

The National Team will be ordered through the Interagency Dispatch Center. Local contacts for the Nez Perce Tribe are as follows:

- *Natural Resources Manager: 208-843-7400*
- *Forestry & Fire Management Director: 208-843-7328*
- *Fire Management Officer: 208-843-2827*

5.1.4.4 Emergency Rehabilitation

An interdisciplinary and interagency approach based on the Integrated Resources Management Plan's (IRMP) preferred management alternative will be utilized when developing the Burned Area Emergency Rehabilitation (BAER) Plan. It is the primary responsibility of the Agency Administrator or Wildland Fire Resource Advisor to determine the best method of preparing a BAER plan. There are three methods to be considered:

1. **Wildland Fire Resource Advisor:** If the fire is small and/or lacks complexity, the plan can be developed by the Wildland Fire Resource Advisor, with documented consultation from sources within or outside the agency.
2. **Local BAER Team:** If the affected unit supports a staff that is of sufficient size and has a majority of the disciplines required for developing the plan, a team of qualified BAER specialists can be pre-identified and mobilized within the unit or from adjacent units/agencies. This could involve several Tribal specialists.
3. **DOI National BAER Team:** Anytime a fire exceeds 500 acres in size and is otherwise complex in terms of resource damage or requires a Type II or Type I Incident Management Team (IMT), the Wildland Fire Resource Advisor and/or Agency Administrator should consider a resource order for a DOI BAER team. Orders for a team are placed through normal dispatch channels and as specified in the National Mobilization Guide.

The staffing of the BAER team's technical expertise may vary according to the complexity of the burned area resources involved and the values at risk. An interdisciplinary team format will be used to develop the rehabilitation plan. Individual team member responsibilities and operational procedures are further discussed in the USDA and DOI *Burned Area Emergency Rehabilitation Handbook*.

The BAER Team will work within the Incident Command structure, as part of the Planning Section. The IC and his or her staff should facilitate the accomplishment of short-term rehabilitation measures identified by the BAER Team and whatever Emergency Fire Rehabilitation (EFR) treatments that can be accomplished prior to demobilization. It is usually possible for the Team to direct and complete all short-term rehabilitation while assigned to the incident. Long-term EFR rehabilitation may be initiated by the Team and completed by resource specialists on the affected unit.

5.1.4.5 Funding

Independent studies show that wildfire rehabilitation costs are at least equal to suppression costs but can be as much as three times the total cost of suppression. Funding received from the DOI for recovery efforts is often well below what is required to properly rehabilitate areas affected by wildfire. Factors that are often excluded from consideration include, but are not limited to, the loss of older regeneration, loss of legacy trees, impacts to cultural sites, damage to wildlife and fish habitats, and additional sale preparation and administration costs. Failure to address such issues slows and extends the recovery process and it increases the likelihood of secondary impacts. For instance, the DOI's allocation of BIA rehabilitation funding for damage resulting from the 2015 fire season was not sufficient for fire rehabilitation and recovery needs. Consequently, the inability to properly rehabilitate burned areas resulted in significant road damage and a loss of transportation infrastructure over time.

For more information on this topic refer to the publication *Improving Efficiency, Equity and Effectiveness of Wildfire Impacts on Tribal Trust Resources*[3].

5.2 FUELS DOCUMENTATION, MONITORING & RECORDS

Monitoring is an integral component to any fuels treatment program since it provides a method by which changes in condition and progress towards meeting management goals and objectives can be evaluated. In this case, where many of the treatments will be undertaken as part of a collaborative cost-share agreement, it can be particularly important to show that all phases of the project have been implemented and that the work is being maintained. In general, homes will be evaluated immediately (within 1 month) following the implementation of defensible space treatment to quantify the reduction of fire risk. This new risk assessment will then be the level at which future evaluations are conducted in determining if the treatments are being maintained.

Project monitoring is used to determine if wildland fuel reduction efforts are effective. Projects that are meeting expected outcomes will eventually require follow up maintenance as hazardous fuels accumulate, and additional protection measures are required and approved by the Tribal agency. Such decisions or concerns are identified when project locations are revisited by forest management personnel or Interdisciplinary Teams.

The monitoring for all other fuels reduction activities will be conducted at two main levels. There will be a landscape-scale inventory that is compiled using stand exam data and GIS layers that will be periodically updated and assessed to quantify changes across the landscape that have resulted from hazardous fuel reduction projects and to monitor trends. The second level of monitoring will be conducted at the project level to determine if specific project objectives are being met and how often treatments need to be maintained (Figure 5-6). The following section is a paraphrased excerpt from the Nez Perce Indian Reservation Fuels Monitoring Plan. Refer to the original document for more information about fuels monitoring procedures.

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[3] Intertribal Timber Council. *Improving Efficiency, Equity and Effectiveness of Wildfire Impacts on Tribal Trust Resources*. Vincent Corrao, Northwest Management, Inc; Jim Erickson, Erickson & Associates LLC; Jim Durglo, Wildland Fire Technical Specialist, ITC Contractor. April 2018. Available online at: https://www.itcnet.org/file_download/bdfadede-72ed-46a3-b9ca-9ad37f45aeb5

	Pre-Treatment Conditions	Post Treatment Conditions
North		
East		
South		
West		

Figure 5-6) Example of fuel monitoring plots that are revisited and photo-documented at regular intervals to ensure that fuel management strategies are effective and to prescribe additional treatments if necessary. Photos are from Lookout-23 Plot #2.

For the purposes of the NPT, monitoring will be conducted at two main levels to determine how effective fuels reduction projects are and how long the treatments last.

The first level of monitoring will be mid-scale monitoring that is conducted to satisfy the requirements of the NFP. It will include an assessment of landscape-level FRCC and Fire Behavior Classification Rating as they relate to pre-identified values at risk, which will be based on the calibrated outputs of the LANDFIRE Project. The primary objective, since the monitoring is broader in scale and less time intensive than project level monitoring, is to assist with prioritization and to determine the duration of treatment effectiveness. Particularly in the instances where project funding is limited and concerns are minimal, this type of monitoring will provide all the necessary information needed to establish project maintenance cycles. The secondary objective for this type of monitoring is to re-evaluate the indicators following project implementation to monitor trends and quantify changes.

The second level of monitoring will be conducted at the project level to determine if specific project objectives are being met. It will vary by project based on these objectives as well as the critical thresholds associated with each area. In some instances, this type of monitoring will be used to verify the duration of reduced fire risk that has resulted from each treatment.

The intent is to collect a combination of both mid-scale and project level monitoring parameters. This should allow the Tribe to meet the requirements of the NFP, reveal which treatments are most effective, and provide enough general reservation-wide data to assist with the planning and prioritization of future treatments. However, it is also important that monitoring plans accommodate fluctuations in annual funding. It has been recognized that increases in funding will result in a higher incidence of project level monitoring while decreases will result in less project level monitoring and more mid-scale monitoring. At either level, individual plot sampling quality will remain constant with the hiring of a permanent professional level employee as well as having a well-defined sampling design and field methods.

Overall, mid-scale monitoring is more general, better suited for looking at large areas, and is somewhat qualitative and subjective (particularly in cases where the data has not been ground-truthed) while project level monitoring is more quantitative and repeatable.

In addition to simply conducting monitoring to determine if project objectives are being met, another key component is to ensure that the information gathered is incorporated into future management strategies by way of an adaptive management approach. Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs (BIA 2006). It can also help to identify problems early, so that cost-effective solutions can be found while they are still available.

Data summary reports generated by the FEAT/FIREMON Integrated (FFI) software are useful for summaries of each plot and for totals across all plots in a project. Collected data may be analyzed with different fire behavior models, such as Behave Plus and FLAMMAP.

The collected raw data and maps will be stored on paper copies and several computers with appropriate backup procedures to ensure that the data is not lost or destroyed. The raw data will also be combined with the data analysis and summarized into a yearly report.

5.2.1 National Fire Plan Operations & Reporting System (NFPORS)

The Tribe reports accomplishments related to BAER projects through the National Fire Plan Operations & Reporting System (NFPORS). The following description of NFPORS is a direct excerpt from the Wildland Fire Application Information Portal[4] website:

The National Fire Plan Operations and Reporting System (NFPORS) is an inter-departmental, inter-agency data management and reporting system developed, operated, and maintained by the Department of the Interior (DOI) collaboratively with the Department of Agriculture (USDA). NFPORS is the DOI authoritative system of record for accomplishments in fuels, restoration & rehabilitation, and community assistance. NFPORS supports reporting at field, regional, and national levels.

NFPORS assists field personnel in reporting work conducted under the program areas originally described in the 2001 National Fire Plan. The system provides authoritative data across DOI wildland fire management agencies for Hazardous Fuels Reduction, Post Wildfire Recovery (including both Emergency Stabilization and Burned Area Rehabilitation), and Community Assistance activities. The application is only available to approved individuals working with the federal agencies.

5.2.2 Interior Fuels and Post-fire Reporting System (IFPRS)

The Tribe uses the Interior Fuels and Post-fire Reporting System (IFPRS) to report mechanical treatments related to wildland fuel mitigation efforts. The Interior Fuels and Post-fire Reporting System (IFPRS) is a comprehensive tool used by agencies within the U.S. Department of the Interior (DOI) for tracking and reporting wildfire-related activities, particularly those related to fuel management, wildfire response, and post-fire recovery efforts. The system supports decision-making and provides data to improve management and reporting of fuels treatments, wildfire incidents, and rehabilitation efforts. It is also used for reporting to regulatory agencies, as well as to meet reporting requirements for federal funding, grants, and performance evaluations.

5.3 Fuels Planning, Coordination, and Communication

The Nez Perce Tribal Forest and Fire Management Division will be responsible for implementing this plan by either completing the actions described within the plan, or by overseeing the completion of these actions. All actions will be conducted in-house, including the provision of training and supplies. The monitoring personnel will develop maps, implement field procedures, compile, and analyze the field data, and develop an annual year-end monitoring summary report. Other miscellaneous responsibilities will be assigned by position for example, the Fuels Specialist will be responsible for scheduling the fuels reduction projects eligible for monitoring and the Inventory Forester will maintain the records of the raw data and will determine the yearly subset of data that will be remeasured.

All the information gathered from this FFI project will be available to the BIA Northwest Regional Office and other Northwest tribes that would beneficially use the data for making fuels treatment and management decisions.

[4] https://www.wildfire.gov/application/nfpors

5.4 FUELS MANAGEMENT

The purpose of fuels management on Nez Perce Tribal forestlands is to reduce hazardous fuels and risks to tribal culture, wildlife & fisheries, and human communities while promoting a healthy, fire and pathogen resilient landscape thereby restoring fire-adapted ecosystems.

5.4.1 Guidance

The Nez Perce Tribe performs and administers fuels management services on Tribal forestlands in accordance with the BIA Fuels Management Program Business Rules Handbook 2008. The Handbook serves as a foundational document that informs Tribal and BIA efforts to reduce wildfire risk through the implementation and management of the BIA Fuels Management Program. Furthermore, the Handbook promotes a focused approach to reducing hazardous fuels on Tribal lands through the following:

- Standardization of fuels management practices across BIA regions.
- Compliance with federal policies.
- Transparency and consistency in the planning, execution, and reporting of fuels treatments.

Refer to the BIA Fuels Management Program Business Rules Handbook 2008 for more information about the business rules and administrative procedures for the BIA Hazardous Fuels Management Program.

5.4.2 Implementation

The implementation of fuels management services is addressed throughout this plan. Many of the strategies and practices associated with fuels management are also used to achieve other objectives related to forest management. Although fuels management may be the primary purpose of some forest management projects, it is also often a byproduct of other projects such as timber harvests, pre-commercial thinning, release treatments, and more. Refer to the following sections for information about fuels management and implementation:

- 3.3.3 – Silvicultural Treatments
    - 3.3.3.2 – Intermediate Silvicultural Methods
- 3.5.3 – Slash & Hazardous Fuel Management Strategies
- 3.6.1.1 Site Preparation
    - Herbicides
- 5.1 Wildland Fire
    - 5.1.4.1 BAER (ES & BAR)

Prescribed burning is a method that is often used, either independently or in conjunction with other methods, to conduct HFR treatments. Prior to the implementation of a prescribed fire, a plan must be developed and approved by the appropriate authority. Prescribed burn plans are approved by the BIA Superintendent for Tribal Trust and Allotment lands while burn plans for Tribal Fee lands are approved by the Natural Resource Manager.

5.4.3 Monitoring

To satisfy HFR treatment monitoring requirements set by the BIA, a Tribe must follow specific guidelines that ensure accountability, effectiveness, and compliance with federal standards. These requirements are primarily outlined in the BIA Fuels Management Program guidance, including the 2008 Business Rules Handbook and subsequent updates.

The most current process for monitoring and reporting the effectiveness of HFR treatments is outlined in the June 5, 2013 memorandum titled *Bureau of Indian Affairs Flues Treatment Effectiveness Final Guidance.*[5] To satisfy monitoring requirements, the Nez Perce Tribe uses photo plots to document pre and post treatment conditions which are then stored and tracked in the FEAT-FIREMON Integrated software utility (FFI).

[5] U.S. Department of the Interior. Bureau of Indian Affairs. National Interagency Fire Center. Bureau of Indian Affairs Fuels Treatment Effectiveness Final Guidance. June 5, 2013. Accessed online at: https://www.bia.gov/sites/default/files/dup/assets/public/pdf/idc1-024510.pdf

6 SOCIAL/ECONOMIC BENEFITS ANALYSIS

The management of Tribal forestlands provides cultural, environmental, and economic benefits to the Nez Perce Tribe. Through forest management, the Tribe can further its treaty, religious, subsistence, and cultural interests, support ecosystem resilience, protect forestlands from the threats of uncontrolled wildfire, diseases, and invasive and noxious species, and create stable employment opportunities for tribal members.

Although other goals and values may be of higher priority, it is important to understand how forest management affects the Tribe economically. This concerns different economic aspects such as income and costs to the Tribe and the creation of jobs for Tribal members.

6.1 ECONOMIC OVERVIEW

Employment and the creation of jobs is an important aspect of forest management on the Reservation. As described below, there is a need for local employment opportunities for Tribal members. The natural resources sector has served as an avenue for the Tribe to create opportunities for employment and, potentially, career pathways for Tribal members.

Employment

The following is a modified excerpt from the ArcGIS StoryMap titled The Nez Perce Today. Refer to the StoryMap to see the excerpt in its original format[6].

The Nez Perce per capita and median household income is higher than that of other tribes but much lower than the U.S. in total. Additionally, the unemployment numbers show that the Nez Perce have a substantially lower unemployment rate than other tribes in the U.S. but still a higher rate than the U.S. in general (Nez Perce Reservation Demographics). The sustainability and success of Nez Perce Tribal industries is one reason the Nez Perce have a higher rate of employment. Nearly 200 people are employed working with endangered fisheries (Fisheries Resource Management). The tribe also owns and operates the Clearwater Casino and Lodge in Lewiston, ID and It Se-Ye-Ye Casino in Kamiah, ID which are the top three regional employers in North Idaho for tribal members and non-members. The Tribe also operates multiple gas stations in the state of Idaho and a golf course in Washington. The data (Nez Perce Reservation Demographics) in Table 6-1 shows the disparity between the Nez Perce from the U.S. as well as the Nez Perce from other tribes.

Table 6-1) Nez Perce Tribe income and employment statistics.

Population	Per Capita Income		Poverty Rate		Civilian Unemployment
	AIANa*	All	AIANa*	All	
Nez Perce Reservation	$13,074	$20,893	30.00%	16.20%	7.27%
United States	$17,903	$30,088	26.80%	14.60%	6.55%
All Reservations	$11,391	$18,662	-	-	12.60%

*AIANa=are people who identify as American Indians or Alaska Natives alone.

[6] The Nez Perce Today. Chris Carmody. 4 May 2022. https://storymaps.arcgis.com/stories/ebacff4313a147229d0ff1a0ace471d6

Household Income

The median household income on the Reservation is $41,423, compared to $57,652 for U.S. overall (US Census Bureau, 2010). Similarly, per capita income on the Reservation is $20,893 and $30,088 in the U.S (Table 6-1) ($21,338 and $31,177, respectively; US Census Bureau, 2010). Based on a survey of enrolled Tribal members in early 2014, the median household income of enrolled Nez Perce members, both on and off the Reservation, was approximately $15,500 (Nez Perce Tribal Labor Force Working Group, 2012). A relatively low proportion of household earnings within the Reservation comes from labor (6.0% compared to 77.7% nationally; (US Census Bureau, 2010)). Instead, Reservation household earnings disproportionately come from Social Security (46.2% compared to 30.6% nationally), retirement income (25.1% compared to 18.4% nationally), Supplemental Security Income (7.9% compared to 5.4% nationally), and cash public assistance (4.6% compared to 2.6% nationally). These data are consistent with the relatively older age distribution of the Reservation population.

6.2 Program Funding

Employment opportunities for trust services are supported by funding from the **BIA**. BIA and Tribal forestry programs are funded through annual appropriations and are primarily used to support staff that conduct forest land management activities. The emphasis for this program is the preparation and administration of forest product sales, and the management and technical oversight of those activities.

The **NRCS** supports non-industrial private forest (NIPF) landowners through voluntary programs such as the Environmental Quality Incentive Program (EQIP) and Conservation Stewardship Program (CSP) that have funded various projects on tribal forest lands. This funding provides for conservation practices such as fire rehabilitation, pre-commercial thinning, and reforestation on degraded lands. These funds also provide annual opportunities for local contractors and support both trust and fee land management.

The Tribe collects a 10% management fee, referred to as **forest management deductions (FMD)**, on timber sales. This deduction fee applies only to Trust and Fee lands. Revenue generated from management activities on Allotment lands goes to the Allottees. In the past, deduction fees have not been collected on allotments due to Tribal decision to use all revenue from timber sales/treatments for Forest Development or other needs related to Tribal forests.

The **Forestry Projects** funds also support a labor-intensive program employing full-time and seasonal positions that perform on-the-ground activities designed to meet forest management objectives through direct service or contracts. Forestry Projects include programs critical to sustainable Indian forest management, such as Forest Development; Forest Management Inventory and Planning; Woodland Management; and the Timber Harvest Initiative.

Good Neighbor Authority (GNA) enables cooperative agreements between federal agencies and non-federal partners, including Tribes, to carry out land management activities on National Forest System or BLM-managed lands. Under GNA, Tribes are able to plan and implement projects like forest thinning, prescribed burning, watershed restoration, or road maintenance; perform commercial timber sales or service contracts on behalf of the federal agency; and retain revenues from timber sales (in some cases) to reinvest in additional restoration work.

Stumpage Deductions are incorporated in for road maintenance, reforestation, cultural surveys, and TERO fees, and other project costs. These deductions lower the overall income to the Tribe and may result in a financial break-even or a deficit outcome if not supported by other funding opportunities (e.g., NRCS Environmental Quality Incentives Program (EQIP) or Conservation Stewardship Program (CSP), BIA supplemental funds, etc.). Lower net avg log prices reflect an increase in stumpage deductions.

The **Reserved Treaty Rights Lands (RTRL)** program's Wildland fire appropriations funding provides technical and financial assistance to Tribal Nations in protecting and managing off-reservation lands, where they have reserved treaty rights with the federal government, that are at high risk from wildfire. RTRL funds can be used on both trust and fee lands to support Tribal forest management initiatives related to forest health and wildfire risk reduction, cultural resource and traditional plant protection, climate resilience projects, collaborative projects, and capacity building.

Carbon offset projects are initiatives that reduce, remove, or avoid greenhouse gas (GHG) emissions and generate carbon credits that can be sold in voluntary or compliance carbon markets. For Tribes, carbon offset projects, especially those tied to forest management, can be a significant, long-term funding source for forestry and land stewardship programs. Projects can include improved forest management (IFM), avoided conversion, and reforestation or afforestation. Carbon offsets are funded by carbon emitters.

The **forest products industry** is another avenue for employment. The generation of forest products promotes self-sustaining communities, healthy and resilient Indian forest resources, and serves as a means of stable employment for Tribal members. Forestry staff perform program oversight and administrative functions that support management priorities identified in Tribal Forest Management Plans and ensure compliance with applicable laws and regulations.

6.3 Timber Income

The preferred alternative, Alternative D (Forest Health & Resilience), is expected to be implemented at a financial deficit. Income for the first planning period is projected to be just over $15.4 million while total income for the 100-year modeling period is expected to be $334.6 million. As costs are expected to exceed income, forest management is expected to occur at a deficit of $4.4 million for the first planning period and a deficit of just over $22.7 million over the 100-year modeling period. However, the Tribe utilizes various sources of soft funding to support and offset the cost of forest management activities. Sources of funding that could be pursued include Forest Development, FMI&P, Carbon, cost-share like EQIP, CSP, GNA, Timber Harvest Initiative, etc.

Refer to the harvest schedule (section 3.4) for more information about project income from the preferred management alternative.

Income generated through forest management on Nez Perce Tribe forestlands between 1986 and 2020 is summarized is Table 6-2.

Table 6-2) Summary of Tribal timber harvest volume and revenue by year.

Year	Plan AAC (MBF)	Volume Cut (MBF)	Avg Price/MBF	Annual Income
1986	8,400	5,127	$55	$281,985
1987	8,400	8,075	$61	$492,575
1988	8,400	9,479	$42	$398,118

Year	Plan AAC (MBF)	Volume Cut (MBF)	Avg Price/MBF	Annual Income
1989	8,400	6,295	$51	$321,045
1990	8,400	8,504	$53	$450,712
1991	8,400	9,253	$55	$508,915
1992	8,400	9,305	$67	$623,435
1993	8,400	9,162	$78	$714,636
1994	8,400	3,882	$179	$694,878
1995	8,400	5,436	$147	$799,092
1996	8,400	8,174	$146	$1,193,404
1997	8,400	11,246	$179	$2,013,034
1998	8,400	6,270	$174	$1,090,980
1999	4,300	2,310	$190	$438,900
2000	4,300	5,386	$126	$678,636
2001	4,300	7,866	$93	$731,538
2002	4,300	1,306	$125	$163,250
2003	4,300	942	$115	$108,330
2004	4,300	2,135	$179	$382,165
2005	4,300	3,159	$147	$464,373
2006	4,300	3,973	$122	$484,706
2007	4,300	1,532	$160	$245,120
2008	4,300	2,009	$133	$267,197
2009	4,300	731	$63	$46,053
2010	4,300			
2011	4,300			
2012	4,300	83	$39	$3,200
2013	4,300	467	$38	$17,765
2014	4,300	32	$850	$27,192
2015	4,300			
2016	4,300	3,230	$44	$141,926
2017	4,300	548	$29	$15,996
2018	4,300	1,100	$38	$41,998
2019	4,300	90	$490	$44,100
2020	4,300	342	$43	$14,600

6.4 Cost of Management

Management of Nez Perce forestlands is projected to occur at a cost of $19.8 million over the first 10 years of the modeling period and at a cost of $375.8 million over the course of the 100-year harvest schedule (Nez Perce Tribe Harvest Schedule (2023-2033) document (2025); section 3.3 Harvest Schedule). Although the preferred alternative is not expected to generate revenue, it would still create employment opportunities for Tribal members and support the ecological and cultural forest management objectives identified by the Tribe. Future costs associated with wildland fire fighting and post-fire recovery, treatment of noxious weeds and protection of culturally sensitive plants, protection and identification of cultural sites, issues with pests and pathogens, and the impacts of climate change are expected to be reduced because of the mitigative effects associated with the preferred management alternative. Additional costs associated with Tribal forest management include the following:

- **Cultural Surveys:** Harvest Schedule cost estimates do not include costs associated with cultural surveys. Cultural surveys are required prior to all land management activities or activities that have the potential to disturb or damage culturally relevant artifacts. These surveys are considered current for up to 10 years, after which a new survey will be required. The average cost to conduct cultural surveys is $82/ac.

- **TERO Fees:** Contracts in the sum of $15,000 or more require TERO fees at a rate of 3.5% of the total award amount. TERO fees apply to construction contracts not awarded to "Certified Indian Businesses" (CIB).
- **Forest Development:** Planting is a key part of the Tribe's strategy for forest development. From 2019 to 2025 planting costs ranged from $200,335 to $695,849 and averaged a total of $335,750 annually. As of 2025, individual 8.0 cubic inch tree seedlings are 69.5¢ each.

6.5 NEZ PERCE TRIBAL BENEFITS

Forest management practices can hold significant cultural benefits for the Nez Perce Tribe. Integrating tribal cultural values into forest management practices not only preserves cultural heritage but also promotes sustainable stewardship of natural resources for future generations. Cultural benefits of forest management can include, but are not limited to, the following:

- <u>Preservation of Traditional Practices:</u> The Nez Perce Tribe has deep cultural ties to the land and forests. Proper forest management ensures traditional practices such as hunting, gathering of medicinal plants, and ceremonies continue to be viable for future generations.
- <u>Protection of Sacred Sites:</u> Forest management can include strategies to protect and preserve sacred sites and culturally significant landscapes within tribal territories. It can also be a source of funds for cultural surveys and helps deter trespass.
- <u>Sustainable Resource Use:</u> Traditional forest management practices often emphasize sustainable harvesting of resources such as timber, plants, and wildlife, ensuring that these resources remain available for cultural and economic purposes. Forest access is maintained as investments, through forest management, are made in forest road systems.
- <u>Promotion of Tribal Sovereignty:</u> Forest management allows the Nez Perce Tribe to exercise its sovereignty over its lands, making decisions that align with cultural values and long-term goals.
- <u>Community Engagement and Education:</u> Engaging tribal members in forest and fire management activities can provide opportunities for education and skill-building related to traditional ecological knowledge, forestry practices, and conservation.
- <u>Economic Opportunities:</u> Employment opportunities are created through sustainable forestry practices, contributing to economic self-sufficiency and the well-being of tribal communities. The Nez Perce Tribe's Title 9 'Indian Preference in Employment and Contracting' ordinance "ensures economic opportunities for employment and for contracting within lands subject to the jurisdiction of the Nez Perce Tribe are provided to members of the Nez Perce Tribe and other Native Americans and to businesses owned by members of the Nez Perce Tribe or other Native Americans". A list of 'Certified Indian Businesses (CIBs) is maintained by the Nez Perce Tribe's TERO (Tribal Employment Rights Ordinance) office. This list is available online at:
    - https://nezperce.org/government/commissions/cib/
- <u>Climate Change Resilience:</u> Traditional forest management practices often incorporate knowledge of ecological resilience and adaptation, which can help mitigate the impacts of climate change on Tribal lands and resources.

6.6 NON-NEZ PERCE TRIBAL BENEFITS

Tribal forest management can be mutually beneficial for non-Tribal members and surrounding communities. Tribal forest management promotes sustainable land use, fosters collaboration, supports local economies, and preserves cultural and ecological diversity for the benefit of all communities, including non-Tribal members.

Nez Perce Tribal forest management can bring several benefits to non-Tribal members and surrounding communities. Some of these benefits include:

- Conservation and Biodiversity: Nez Perce Tribal forest management prioritizes sustainable practices that conserve biodiversity and protect ecosystems. Healthy forests managed by the Tribe can provide ecological benefits such as clean water, air quality improvement, and habitat preservation, which benefit all nearby communities.
- Economic Contributions: Tribal forest management activities contribute to the local economy through job creation, procurement of goods and services, and revenue generation. Economic activity associated with forest management stimulates growth in nearby towns and regions.
- Collaboration and Partnerships: Tribal forest management often involves collaboration with neighboring communities, government agencies, and non-profit organizations. These partnerships can lead to shared knowledge, resources, and cooperative efforts in conservation and land management practices.
- Research and Innovation: Tribal forest management practices may incorporate traditional ecological knowledge and innovative approaches to forestry that can inform broader conservation and sustainable management strategies. Non-Tribal entities can benefit from these insights and techniques.
- Cultural Understanding and Exchange: Engaging with Tribal forest management practices can foster cultural understanding and appreciation among non-Tribal members. This exchange of knowledge and respect for indigenous perspectives on land stewardship can enrich community relationships and environmental stewardship efforts.
- Climate Change Mitigation: The Nez Perce Tribe integrates climate resilience strategies into forest management practices, which can contribute to broader regional and global efforts to mitigate climate change impacts. Healthy forests managed sustainably by the Tribe sequester carbon and mitigate the effects of climate change on a larger scale.

6.7 REGIONAL ECONOMIC IMPACTS

Tribal forest management plays a role in regional economic development by creating jobs, generating revenue, supporting local businesses, and improving infrastructure while promoting sustainable land stewardship and cultural preservation on forestlands within the treaty territory (map) where federal land managers are responsible for managing treaty resources. These economic impacts underscore the importance of collaboration and partnership between tribes, neighboring communities, and stakeholders to maximize mutual benefits and sustainable outcomes.

Nez Perce Tribe forest management has regional economic impacts that extend beyond the boundaries of tribal lands. Some of these impacts include:

- Job Creation: Tribal forest management operations create employment opportunities both directly within the tribe and indirectly through contractors, suppliers, and service providers. Jobs include forestry technicians, wildlife biologists, loggers, equipment operators, administrative staff and contractors and support agreements related to reforestation, wildland fuels reduction, wildland fire suppression. These jobs contribute to local employment levels and income generation (Figure 6-1).
- Revenue Generation: Tribal forest management generates revenue through sustainable timber harvesting. This revenue is often reinvested in tribal communities through infrastructure projects, social programs, education, and healthcare, benefiting not only tribal members but also neighboring communities.
- Support for Local Businesses: Forest management activities require goods and services such as equipment, transportation, fuel, and supplies, which are often sourced locally. This supports local businesses and suppliers, stimulating economic activity in surrounding rural areas.
- Infrastructure Development: Increased economic activity from tribal forest management stimulates demand for infrastructure improvements and developments such as forest roads, utilities, and housing. These improvements benefit both tribal and non-tribal residents by enhancing overall community infrastructure.
- Tourism and Recreation: Well-managed tribal forests attract visitors interested in ecotourism, outdoor recreation activities (e.g., hiking, fishing, hunting), and cultural tourism. This can create opportunities for local businesses, including hotels, restaurants, and guides, to cater to tourists and visitors. Though non-tribal visitors are not allowed on tribal lands without specific permits, desirable landscape views are valued by tourists.
- Environmental Services: Tribal forest management practices that prioritize conservation and sustainable land use contribute to ecosystem services such as water filtration, soil stabilization, and biodiversity conservation. These services benefit regional communities by enhancing environmental quality and resilience to natural disasters.
- Wildland Fire: Wildfires and mitigation efforts contribute to the local economy through the creation of temporary employment opportunities and new spending.
  - Suppression: Between 2003 and 2015 a total of $20.1 million was spent suppressing the Clearwater, Fisher, and Municipal/Hill fires[7]. It is common for substantial portions of funding to be spent locally on supplies, services, and access to additional resources.
  - Fuels Treatments: Between 2003 and 2015 a total of nearly 1.8 million was spent on 65 fuels treatment projects that covered 10,198 acres[7]. Funding for such projects is used to support a workforce which may consist of Tribal members and often contributes to the local economy through the purchase of supplies, food, lodging, equipment, and other resources.
  - Rehabilitation: Projects related to post-fire rehabilitation are also associated with new spending as rehabilitation funds often come from sources such as the BIA and NRCS. However, there are examples of incidents where inadequate funding has limited post-fire recovery efforts. Consequently, risk of additional resource damage increases, and Tribal

[7] Bureau of Indian Affairs – Branch of Wildland Fire Management. *Fuels Treatment Assessments: Northwest Region*. 2015. Available online at: https://www.bia.gov/sites/default/files/dup/assets/public/pdf/idc2-051015.pdf

resources often become strained when resource damage is not addressed properly, and recovery efforts are prolonged.

Figure 6-1) Timber harvests create job opportunities for both Tribal and non-Tribal members and entities. Logs harvested from Tribal forestlands are loaded on to trucks and sent to local mills for processing.

6.8 SOCIAL / ECONOMIC TRENDS

Funding: Income from timber harvesting has been declining, but the need for investments in the promotion of fire resilient forests and the reduction of risk related to destructive wildfires has been increasing. Funding from the '638 contract' with the BIA has remained static for several decades regardless of 'Fee to Trust' land title transitions (i.e., increased trust management acres). Funding for fire preparedness has been stagnant, but funding for fire prevention fuels treatments has been increasing.

Management Priorities: Over the last planning cycle, the focus of Tribal forest management has enhanced stewardship and ecological conservation objectives. Tribal forestlands are managed in a way that emphasizes ecological function, cultural values, and promotes resiliency, particularly as the effects of climate change have a greater impact on forest resources. This trend is supported by the findings of the 2023 Indian Forest Management Assessment Team (IFMAT) report[8].

Climate Change: The James A. & Louise McClure Center for Public Policy Research at the University of Idaho produced a report titled *Idaho Climate-Economy Impacts Assessment* (Hicke and Latta 2021) which forecasts the future ecologic and economic health of Idaho forests as related to climate change. The following is a general overview of the findings in the report:

> Idaho's forests are expansive and provide numerous services, including those related to ecosystem function, habitat, timber and forest products, recreation and other uses, and carbon sequestration. These services are expected to be affected by climate change as the distribution of vegetation changes across elevations, aspects, and habitat types in response to increased temperatures, reduced summer precipitation and greater annual precipitation.
>
> The effects of climate change have served as a catalyst for major disturbances across Idaho forests which include substantial tree mortality because of wildfire, pests, and pathogens. Warmer, drier conditions are conducive to catastrophic wildfires and bark beetle outbreaks which are expected to increase in severity and/or frequency as the impacts of climate change become more substantial. Although it is unknown as to how different tree species will respond to climate change, any reduction in vigor could result in additional mortality.
>
> Disturbances that result in reduced vigor and widespread mortality of trees will impact the ecological, cultural, and economical services that forests provide. The quality of recreation and tourism opportunities may be reduced or lost, efforts to sequester carbon may be reversed as wildfire risk increases, the sustainability of the Tribal Forest products industry may be reduced, and ecological function may be reduced or lost.

In addition, tribal first foods (i.e., salmon, berries, bulbs, roots, etc.) are likely to be negatively affected by warmer, drier, and turbulent conditions (Lynn, K. et al., 2013).

Through forest management and forest resource planning, the effects of climate change can be mitigated. It will be important for the Tribe to continue monitoring efforts and to recognize opportunities to protect forest resources as climate change presents unprecedented challenges and uncertainty around the outlook of the health and function of Tribal forestlands.

[8] The Fourth Indian Forest Management Assessment Team for the Intertribal Timber Council. *Assessment of Indian Forests and Forest Management in the United States.* 2023. Available online at: https://online.flippingbook.com/view/719646412/314/

7 ENVIRONMENTAL ASSESSMENT

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9 APPENDIX A: BMPS FOR RESOURCES

Best Management Practices (BMPs) will be revised through an iterative process of monitoring and alteration with current and acceptable practices used to protect water quality and promote soil conservation during forest management activities. These conservation guidelines are not, however, intended to be all inclusive nor replace site-specific project planning, which may require varying or additional conservation practices. BMPs for each of the following areas of practice are detailed below. All practices will be conducted in full compliance with EPA guidelines and applicable Tribal code.

9.1 TIMBER HARVESTING

The BMP's included in this section are guidelines to support and enhance forest health associated ecosystem services on all Tribal forestlands (e.g., fee, trust, and allotments).

01. Purpose. Forest management of desired species composition and forest structure provide pathogen and climate related resilience. This transgenerational stewardship provides the Nez Perce Tribal people with desired cultural services (e.g., subsistence, firewood, wildlife, recreation, etc.). During forest project-level operations there will be a temporary disturbance to the forest environment. These guidelines will support the productivity of the forest land, minimize soil and debris entering streams, and enhance wildlife and fish habitat.

02. Quality of Residual Stocking. Reforestation is required if tree stocking levels of acceptable trees fall below minimums as determined in section 3.6.1 'Reforestation & Afforestation'.

03. Soil Protection. For each forest treatment, the project administrator should select the treatment method and type of equipment adapted to the given slope, landscape and soil properties to minimize soil erosion.

   a. An operation that uses ground-based equipment must not be employed if it will cause rutting, deep soil disturbance, or accelerated erosion. On slopes exceeding forty-five percent (45%) gradient and which are immediately adjacent to a perennial or intermittent stream channel, ground-based equipment, except for traction-assisted harvesting equipment, must not be used without formal approval by Tribal Council and BIA superintendent (trust and allotment landholdings); or Tribal Council (fee landholdings). Where slopes exceed forty-five percent (45%) gradient, the project administrator, must notify Tribal Council and BIA superintendent (trust or allotment landholdings) or Tribal Council (fee landholdings) of these steep slopes prior to project operation and follow IDT approved mitigation strategies regarding soil erosion & stabilization applicable to the ecoregion.
   b. The grade of constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils is limited to a maximum of thirty percent (30%).
   c. In accordance with appropriate silvicultural prescriptions, keep skid trails to the minimum feasible width and number. Limit tractors (e.g., wheel-based systems) used for skidding to that size appropriate for the job.
   d. Uphill cable yarding or tethered systems is preferred on steep slopes >45%. When downhill yarding, take reasonable care to lift the leading end of the log to minimize downhill movement of slash and soils.

04. Location of Landings, Skid Trails, and Fire Trails. Locate landings, skid trails, and fire trails on stable areas to prevent the risk of material entering streams.

a. Locate all new or reconstructed landings, skid trails, and fire trails on stable areas outside all Riparian Management Zones (RMZs). Locate fire and skid trails where sidecasting is held to a minimum. Prevent damage to cultural resources. Avoid excessive excavation and filling.
b. Landing size is limited to that necessary for safe economical operation.
c. To prevent landslides, fill material used in landing construction must be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, stabilize landings by seeding (w/ desired native grass mix), compacting, riprapping, benching, mulching or other suitable means.

05. Drainage Systems. Provide and maintain a drainage system for each landing, skid trail or fire trail that will control the dispersal of surface water to minimize erosion.

a. Stabilize skid trails and fire trails whenever they are subject to erosion, by water-barring, cross-draining, out-sloping, scarifying, seeding or other suitable means. Keep this work current to prevent erosion prior to seasonal runoff.
b. Reshape landings as needed to facilitate drainage prior to seasonal runoff. Stabilize all landings by establishing ground cover or other means within one (1) year after project completion.

06. Treatment of Waste Materials. Leave or place all debris, overburden, and other waste material associated with harvesting in a way that prevents entry into streams.

a. Fell, buck, and limb trees, whenever possible, so that the tree or any tree parts fall away from streams. Continuously remove slash or other debris that enters streams due to project operations whenever there is a potential for stream blockage or if the stream has the ability for transporting such debris. Place removed material outside the RMZ distance and above the ordinary high-water mark or otherwise treat as approved by Tribal Council and BIA for trust and allotment forest landholdings, or Tribal Council exclusively pertaining to fee forest landholdings.
b. Deposit waste material from construction or maintenance of landings, skid trails, and fire trails in geologically stable locations outside of the defined RMZ.

07. Stream Protection. During and after forest practice operations, protect stream beds and streamside vegetation to provide the most natural condition possible to maintain water quality and aquatic habitat. The RMZ is defined as "…*the three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the water, laterally into the terrestrial ecosystem, and along the water course at a variable width." (Ilhardt et al. 1999).* RMZ boundary dimensions are defined within the 'Water & Riparian Areas' section below.

a. Lakes require an approved site-specific riparian management prescription prior to conducting forest practices within the RMZ.
b. Prior to conducting forest practice operations that cross streams using ground-based equipment, install temporary or permanent structures adequate to carry stream flow; skidding or forwarding directly in or through streams or fords is not permitted. Minimize the number of stream crossings and make direct approaches to minimize ground disturbance in the RMZ. Remove all temporary crossings immediately after use and, where applicable, crossdrain the approaches.

c. Operation of ground-based equipment is not allowed directly within the RMZ except at approved approaches to stream crossings or for approved riparian area treatments.
d. When cable yarding or tethered systems is necessary, across or inside the RMZ, it must be done in a way that minimizes stream bank vegetation and channel disturbance.
e. Provide for Down and Dead Woody Material (DDWM), shading, soil stabilization, wildlife cover and water filtering effects of vegetation along streams.
    i. Leave shrubs, grasses, and rocks wherever they afford shade over a stream or maintain the integrity of the soil near a stream unless the vegetation is identified as a noxious and invasive species. All trees immediately adjacent to streams will not be harvested.
    ii. During harvesting, carefully remove timber from the RMZ in such a way that DDWM, shading and filtering effects are maintained and protected.
    iii. To obtain approval for forest management implementation strategies within the RMZ, the project administrator must develop a site-specific riparian management prescription and submit it to the IDT for approval. The prescription should consider stream characteristics and the need for DDWM, stream shade wildlife cover, and other desired characteristics of a healthy and functional RMZ.
f. Limit direct ignition of prescribed burns outside of RMZ, so a backing (cooler) fire will more likely occur within the RMZ.
    i. Hand piles must be located outside the RMZ area.
    ii. No mechanical piling of slash or natural forest fuels is allowed in an RMZ (an exception is filter windrows for erosion control which must not be ignited).

08. Maintenance of Productivity and Related Values. Design harvesting practices to assure desired forest growth and harvesting of forest tree species through suitable economic means in concert with soil, air, water, and wildlife resource conservation.
a. Where major scenic attractions, highways, recreation areas or other high use areas are located within or traverse forest land, give special consideration to scenic values by prompt cleanup and regeneration.
b. Give special consideration to preserving any critical aquatic or wildlife habitat, including snags, especially within the RMZ. Wherever practical, preserve native and culturally significant fruit, nut, and berry producing trees and shrubs.
c. Avoid conducting operations along or through bogs, swamps, wet meadows, springs, seeps, wet draws or other locations where the presence of water is indicated by associated vegetation. Protect soil and vegetation from disturbance which would cause adverse effects on water quality, quantity and wildlife and aquatic habitat.

9.2 Forest Roads

Any road construction, reconstruction, maintenance, and abandonment activities required to complete project level forest management activities will comply with the following guidance defined in this section. Currently, forest roads on the Reservation are maintained and managed using funding from the BIA, Tribal organization, or other sources to achieve forest management objectives.

Road Specifications and Plans

Road specifications and plans shall be consistent with good safety practices. Plan each road to the minimum use standards adapted to the terrain and soil materials to minimize disturbances and damage to forest productivity, water quality, fish, and wildlife habitat.

- Plan transportation networks to avoid road construction within the RMZ, except at approaches to stream crossings. Leave or reestablish areas of vegetation between roads and streams.
- Roads shall be no wider than necessary to safely accommodate the anticipated use. Minimize cut and fill volumes by aligning the road to fit the natural terrain features as closely as possible. Adequately compact fill material. Dispose of excess material on geologically stable sites.
- Plan roads to drain naturally by out-sloping or in-sloping with cross-drainage and by grade changes where possible. Plan dips, water bars, cross-drainage, or subsurface drainage on roads when necessary.
- Relief culverts and roadside ditches shall be planned whenever natural drainage would not protect the running surface, cut slopes, or fill slopes. Plan culvert installations to prevent erosion of the fill by properly sizing, bedding, and compacting. Plan drainage structures to achieve minimum direct discharge of sediment into streams.
- The following rule applies to installations of new culverts and re-installations during road reconstructions or reinstallations caused by flood or other catastrophic events (Figure 9-1). Culverts used for temporary crossings are exempt from the fifty (50) year design (sub-bullet #2 below), but they must be removed immediately after they are no longer needed and before the spring run-off period.
    - Culvert installations on fish bearing streams must provide for fish passage.
    - Design culverts for stream crossing to carry the fifty (50) year peak flow using engineering methods acceptable to the Tribal organization or determine culvert size by using the culvert sizing table below (Table 9-1). The minimum size culvert required for stream crossings shall not be less than eighteen (18) inches in diameter.
    - Relief culverts, and those used for seeps, springs, wet areas, and draws shall not be less than twelve (12) inches in diameter for permanent installations.

Figure 9-1) Example of a newly installed culvert on Tribal forestlands.

- On existing roads that are not reconstructed or damaged by catastrophic events, replace or provide mitigation for culverts that do not provide for fish passage on fish bearing streams or cannot carry the fifty (50) year peak flow.
- Stream crossings, including fords, shall be minimum in number and planned and installed in compliance with IDT review, and with culvert sizing requirements listed in Table 9-1. Fords are an acceptable stream crossing structure on small, shallow streams, with flat, less than four percent (4%) gradients. Fords should cross the stream at right angles. Approaches shall be adequately cross-drained and rocked for at least seventy-five (75) feet. Fording streams with active salmonid spawning and egg incubation within or upstream from the project area is not allowed.
- Avoid reconstruction of existing roads located in stream protection zones, except for approaches to stream crossings, unless it will result in the least long-term impact on site productivity, water quality, and fish and wildlife habitat. Reconstruction of existing roads in stream protection zones will require a variance from the IDT. Reusing existing roads in stream protection zones for hauling fully suspended logs, where no reconstruction will occur, does not require a variance.

Table 9-1) Culvert sizing table. It was developed to carry the fifty (50) year peak flow at a headwater-to-diameter ratio. Culverts larger than one hundred twenty (120) inches must be designed; consider alternative structures.

Watershed Area (acres)	Required Culvert Diameter (inches)	Culvert Capacity (cubic feet/sec)
less than 32	18	6
33 -74	24	12
75 - 141	30	20
142 - 240	36	32
241 - 366	42	46
367 - 546	48	65
547 - 787	54	89
788 - 1,027	60	112
1,028 - 1,354	66	142
1,355 - 1,736	72	176
1,737 - 2,731	84	260
2,732 - 4,111	96	370
4,112 - 5,830	108	500
5,831 - 8,256	120	675

Road Construction

Construct or reconstruct roads in a manner to prevent debris, overburden, and other material from entering streams (Figure 9-2).

- Roads shall be constructed in compliance with the planning guidelines of the 'Roads Specifications and Plans' section listed above.
- Clear all debris generated during construction or maintenance which potentially interferes with drainage or water quality. Deposit excess material and slash on geologically stable sites outside the riparian management zone.

- Where exposed material (road, surface, cut slopes or fill slopes, borrow pits, waste piles, etc.) is potentially erodible, and where sediments would enter streams, stabilize prior to fall or spring runoff by seedling, compacting, rocking, riprapping, benching, mulching or other suitable means.
- In the construction of road fills, compact the material to reduce the entry of water, minimize erosion, and settling of fill material. Minimize the amount of snow, ice, or frozen soil buried in embankments. No significant amount of woody material shall be incorporated into fills. Available slash and debris may be utilized as a filter windrow along the toe of the fill.
- During and following operations on out-sloped roads, retain out-slope drainage and remove berms on the outside edge except those intentionally constructed for protection of road grade fills.
- Provide for drainage of quarries to prevent sediment from entering streams.
- Construct cross drains and relief culverts to minimize erosion of embankments. Installation of erosion control devices should be concurrent with road construction. Use riprap, vegetative matter, downspouts and similar devices to minimize erosion of the fill. Install drainage structures or cross drain incomplete roads which are subject to erosion prior to fall or spring runoff. Install relief culverts with a minimum grade of one percent (1%).
- Earthwork or material hauling shall be postponed during wet periods if, as a result, erodible material would enter streams.
- Cut slopes shall be reconstructed to minimize sloughing of material into road surfaces or ditch lines. Remove or stabilize material subject to sloughing concurrent with the construction operation.
- Roads constructed on slopes greater than sixty percent (60%) in unstable or erodible soils shall be full benched without fill slope disposal. At stream and draw crossings keep fills to a minimum.

Figure 9-2) Example of forest road improvements which include the installation of culverts.

Road Maintenance

Conduct regular preventive maintenance operations to minimize disturbance and damage to forest productivity, water quality, and fish and wildlife habitat.

- Place all debris or slides, and other erosion sources causing stream sedimentation to minimize sediment delivery.

- Repair slumps, slides, and other erosion sources causing stream sedimentation to minimize sediment delivery.
- Active roads. An active road is a forest road being used for hauling forest products, rock, and other road building materials. The following maintenance shall be conducted on such roads.
    - Culverts and ditches shall be kept functional.
    - During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or cross-ditched, and berms removed from the outside edge except those intentionally constructed for protection of fills.
    - The road surface shall be maintained as necessary to minimize erosion of the subgrade and to provide proper drainage.
    - Hauling shall be postponed during wet periods if necessary to minimize sediment delivery to streams.
    - If road surface stabilizing materials are used, apply them in such a manner as to prevent their entry into streams.
- Incidental Haul Road. An incidental haul road is a multi-use road (residential traffic; its primary purpose is other than forest practices) that has log-haul during active harvest activities. Active road maintenance requirements apply. Once active road maintenance is completed no other maintenance is required.
- Inactive roads. An inactive road is a forest road (primary purpose is for forest practices) no longer used for commercial hauling but maintained for access (e.g., for fire control, forest management activities, recreational use, and occasional or incidental use for minor forest products harvesting). The following maintenance shall be conducted on inactive roads:
    - Following termination of active use, ditches and culverts shall be cleared and the road surface shall be crowned, out-sloped or in-sloped, water barred, or otherwise left in a condition to minimize erosion. Drainage structures shall be maintained thereafter as needed.
    - The roads may be permanently or seasonally blocked to vehicular traffic.
- Long-term Inactive Roads. A long-term inactive road is not intended to be used again soon but will likely be used again at some point in the future. No subsequent maintenance or a long-term inactive road is required after the following procedures are completed:
    - The road is left in a condition suitable to control erosion by out-sloping, water barring, seeding, or other suitable methods.
    - The road is blocked to vehicular traffic.
    - The Tribe may require the removal of bridges, culverts, ditches, and unstable fills. Any bridges or culverts left in place shall be maintained by the Tribal organization (trust and fee) or individual allotees (allotments).
- Permanently Abandoned Roads. Permanently abandoned roads are not intended to be used again. All drainage structures must be removed, and roadway is fully decommissioned so that erosion and land sliding are minimized. "Fully decommissioned" is an extensive process involving the physical removal of road features and restoration of the land to a pre-road condition.
    - Drainage structures shall be removed, and stream gradients restored to their natural slope.
    - The road prism shall be treated to break up compacted areas.

- Fill slopes of roads within stream protection zones shall be pulled back to a stable configuration unless long-term stability has already been achieved.
- Unstable sidehill fills shall be pulled back to a stable configuration.
- Ditch line erosion shall be controlled by cross-ditching, out sloping, or regrading to eliminate ditches.
- All bare earth areas created by regrading, ripping, and drainage removal shall be stabilized by approved native grass mix, mulching (woody material, up to 50% cover), armoring, or other suitable means.
- Reconstruct any stream channels by removing, establishing grade control, clump planting of existing native shrubs/trees, planting of native grasses, shrubs, and trees.
- Revegetation of decommissioned roads with native grass mix and shrubs.

Dust Abatement

- Use dust palliatives or surface stabilizers to reduce surfacing material loss and buildup of fine sediments that may wash off into watercourses.
- Closely control applications of dust palliatives and surface stabilizers, equipment cleanup, disposal of excess material to prevent contamination or damage to water resource values.

Winter Operations

Due to the risk of erosion and damage from roads and constructed skid trails that is inherent with winter logging, the following, at minimum, shall apply:

- Roads to be used for winter operations must have adequate surface and crossing drainage installed prior to winter operations. Drain winter roads by installing rolling dips, drivable cross ditches, open top culverts, out-sloping, or by other suitable means.
- During winter operations, roads will be maintained as needed to keep the road surface drained during thaws or break up. This may include active maintenance of existing drainage structures, opening of drainage holes in snow berms and installation of additional cross drainage on road surfaces by ripping, placement of native material, or other suitable means.

Noxious & Invasive Weed Management - Roadside

A noxious weed is a plant identified as injurious to public health, agriculture, recreation, wildlife or property. An invasive weed is a plant that is both non-native and naturalized in an area. Invasive plant spread can disrupt native plant communities or ecosystems. The Idaho noxious weeds listing (3/15/2022) is located within the Idaho Administration Code IDAPA 02.06.09 section 220. Forest road construction and maintenance activities along with forest management practices require weed mitigation strategies that address the following:

- Weed risk assessment identifying existing plant populations within the project area and potential for spread.
- Reduce the potential for noxious or invasive seed transport.
    - Equipment and vehicles must be free of mud, dirt, and plant parts prior to entering Tribal lands. Cleaning must occur off Tribal lands. This requirement will not apply to service or work vehicles that remain on the identified arterial roadway, traveling frequently in and out of the project area.

- Reestablish native vegetation on bare ground due to construction or reconstruction activity (e.g., landings, skid trails, burned piles) to minimize weed establishment and spread.
    - Revegetate all disturbed soil, excluding the primary travel way on surface roads, in a manner that optimizes native plant establishment.
    - Use NPT Land Service division guidelines for native grass mixture and application rates.
    - Monitor and evaluate success of revegetation for a minimum period of one (1) year after the project completion date. If weed establishment is evident, immediate mitigation measures must be followed as defined in the project-level planning document for which may include prescribed fire, safe & appropriate herbicide application, and/or biocontrol release.
- Full inspection of gravel and fill material source locations during road construction and maintenance operations to ensure weed free applications.
- Roadside sediment control measures must be certified weed-free or weed-seed-free.
- Retain roadside shade to suppress weeds. Consider minimizing the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance, particularly on southerly aspects.
- Consider temporary or permanent road closures upon project completion to promote native plant establishment and prevent non-native weed introduction from public use.

Road and Landing (Full) Decommissioning

- Conduct IDT review before fully decommissioning roads to reduce road density and protect riparian habitat.
- Rip temporary spur roads and landings by an approved method to remove ruts, berms, and ditches while leaving or replacing surface cross drain structures.
- Return roads or landings not needed for future resource management to resource production by soil decompaction and re-vegetating with native species.

In addition, the following guidelines will be monitored:

1. Whenever feasible, existing roads shall be used as a priority over constructing new roads.
2. All right-of-way timber must be felled and decked prior to road construction. Slash and pulled stumps created during road construction shall be windrowed along the toe of the fill. On level terrain, slash and pulled stumps resulting from road construction shall be piled and burned.
3. Roads shall be constructed with a twelve (12) to fourteen (14) foot running surface.
4. On slopes of 60% and greater, roads must be constructed with a full bench running surface.
5. Roads shall be built with grades of less than twelve percent (12%), unless using an existing road or under extenuating circumstances.
6. On roads steeper than twelve percent (12%), road rock the entire section with pit run rock (3/4" to 6" minus) to a minimum depth of six (6) inches. The rock must be compacted with a crawler tractor to provide a smooth-running surface.
7. All cut slopes shall be constructed with a ¾H:1V angle of repose for Type A soils; 1H:1V angle of repose for Type B soils; and 1 ½H:1V angle of repose for Type C soils (H=horizontal; V=Vertical).
    - Type A soils – are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot or greater. Ex: clay; silty clay; sandy clay; clay loam; and, in some cases, silty clay loam and sandy clay loam.

- Type B soils – are cohesive soils with an unconfined compressive strength greater than 0.5 tons per square foot but less than 1.5 tons per square foot. Ex: angular gravel; silt; silt loam; previously disturbed soils unless classified as Type C; soils that meet the unconfined compressive strength or cementation requirements of Type A soils but are fissured or subject to vibration; dry unstable rock; and layered systems sloping into the trench at a slope less than 4H:1V (only if the material would be classified as a Type B soil).
- Type C soils – are cohesive soils with an unconfined compressive strength of 0.5 tons per square feet or less. Ex: granular soils such as gravel, sand and loamy sand, dip into the excavation or have a slope of four - horizontal to one - vertical (4H:1V) or greater.

8. Culverts must be long enough to extend beyond the fill slope. The inlet of each culvert must be surrounded by a head wall constructed with rocks. Culverts must be buried at a minimum depth of twelve (12) inches or half their diameter below the running surface of the road, whichever is greater.
9. On creek crossings constructed on fish-bearing streams, open bottomed culverts or bridges shall be used.
10. At the completion of logging activities, all dirt surfaced roads within the sale area shall be surface bladed, out sloped, water barred and have ditches and culverts cleaned before the equipment leaves the site.
11. All roads must have functional surface erosion control structures (e.g., water bars, rolling dips) in place September 15 - April 15, unless actively in use. Erosion control structures shall be to the same specifications as required on roads at the completion of logging activities.
12. Water bars shall be constructed at an angle of approximately thirty (30) degrees to the downhill side. Water bars shall be cut into the soil at least eight (8) inches and create a berm of at least twelve (12) inches and not greater than eighteen (18) inches in height above the road surface. The resulting cross ditch must be left open on the downhill side to permit water to drain off the road surface. Runoff shall be dissipated by rocks, slash, vegetation, or less erodible material.
13. The number and spacing of water bars shall be in accordance with road grade and the erosion potential of the soil (Table 9-2). Roads and skid trails with two to five percent (2-5%) grades usually do not concentrate surface runoff.
14. At the completion of logging, all roads, road edges, landings, skyline corridors, skid trails, and any other disturbed areas shall be seeded with a native grass seed mixture. The application shall be at a uniform rate of twenty (20) pounds per acre and shall be comprised of a mixture recommended by the Nez Perce Tribe's Land Services division.

Table 9-2) Recommended water bar spacing on logging roads (feet) (IDL 2009).

Grade of Road	Unstable Soils: High Erosion Hazard	Stable Soils: Low Erosion Hazard
2%	135 feet	170 feet
5%	100 feet	140 feet
10%	80 feet	115 feet
15%	60 feet	90 feet
20%	45 feet	60 feet
25+ %	30 feet	40 feet

9.3 Soil Protection and Management Guidelines

Although some sections have been modified, the information in this section is mostly a direct excerpt from the publication *Best Management Practices for Maintaining Soil Productivity in the Douglas-fir Region* (Angima and Terry, 2011). Refer to the publication for more information about soil BMPs and to view the information in this section in its original format.

9.3.1 Managing Risk to Soils

The information in this section is from *Chapter 1: Understanding and Managing Risk* by Richard E. Miller and Thomas A. Terry.

Best management practices (BMPs) should be designed to manage the anticipated risk from a proposed activity at a specific site. BMP prescriptions should be site specific (considering site conditions and potential hazards and consequences), be cost effective, have a low probability of causing a decrease in soil productive capacity or other detrimental impacts, and have a high likelihood of meeting specified management objectives. The following steps have been identified as those that are important for managing risk:

1. Assess potential hazards and consequences (e.g., what risks would be associated with utilization intensity of harvested material on a low-productivity site where soil nutrients are limited?).
2. Consider trade-offs among multiple risks (e.g., the tradeoff between fire hazards and soil productivity; BMPs may need to be modified for different locations as it may be desirable to increase biomass utilization near homes and/or roads and limit use where possible to maintain soil productivity).
3. Mitigate where appropriate to avoid or reduce unacceptable risk.
4. Balance potential risks and costs of mitigation (e.g., why use a helicopter to log gentle slopes with well-drained soils?).
5. Design and implement site-specific BMPs.

9.3.2 Management of Soil Erosion

The information in this section is from *Chapter 3: Soil Survey Information for Forestland Managers/ Management of Soil Erosion* by Steve Campbell.

There are multiple variables that influence the vulnerability of soil to erosions hazards. These include the physical and chemical properties of the affected soils and the characteristics of the surrounding environment (e.g., topography and slope).

Soil Properties that Affect Erosion Hazard:

- **Soil texture** is the proportion of sand, silt, and clay in a soil and is a strong indicator of erodibility, with silty soils often being more susceptible to erosion than sandy soils. Some resources, such as soil surveys, show the distribution of different soil types (soil series) across a landscape. Such information includes the properties of a soil series as well as the associated topography and slope which allow for the identification of management units that are most hazardous for erosions.
- **Soil structure** is the aggregation of soil particles into structural units. Usually, granular structures allow for ease of water movement, whereas blocky and platy structures impede water movement and accelerate erosion.
- **Organic matter** binds soil particles together, reducing the erosion hazard. The higher the organic matter content, the lower the erosion hazard.

- **Permeability** is the rate at which water moves through the soil profile. The faster the permeability, the less the erosion hazard.
- **Steeper and longer slopes** present a greater erosion hazard.

Practices to Reduce Erosion on Forestlands:

Mitigation measures can be used to reduce erosion risk on sites that feature soil erosion hazards. Several practices can be used for erosion control, either individually or in combination depending on soils, slope, rainfall, organic matter content, and stage of forest growth. The most common practices include:

1. Maintaining road culverts and ditches and using water bars or rolling dips;
2. Leaving slash and surface duff on site to reduce soil exposure, which is consistent with fire management and reforestation objectives designed to protect the soil surface from rainfall impact and runoff and minimize soil compaction and displacement during harvesting;
3. Tilling soils to improve water infiltration on skid trails and landings; and
4. Seeding noninvasive grasses on exposed soils in critical areas.

9.3.3 Mass-Wasting Potential

The information in this section is from *Chapter 4: Managing Mass-Wasting Risk When Conducting Forest Practices* by Jeffrey D. Grizzel.

Mass wasting, sometimes called mass movement, landsliding, or mass erosion, is defined as the downslope movement of soil, regolith, and rock under the force of gravity. When the driving forces acting on a slope exceed the resisting (or stabilizing) forces, mass wasting or slope movement occur.

Mitigating the effects of forest practices on mass-wasting (landslide) potential begins with an analysis of the risks present within the affected area. Analyzing mass-wasting risk involves three steps that should be conducted in advance of initiating any forest practices activities:

1. **Review available data and information to establish a preliminary hazard and consequence rating.** In this step, aerial photos, topographic maps, geologic maps, soil maps, landslide and hazard-zone mapping, pertinent published reports, LiDAR data*, and GIS-based digital elevation models should be reviewed. The objective is to use this data and information to identify and map:
    a. Portions of the affected area with a moderate to very high landslide potential; and
    b. Downslope or downstream resources that could be impacted by a landslide originating from the affected area.
2. **Validate the preliminary hazard and consequence ratings by conducting a field review of the affected area.** Do the site conditions reflect the preliminary hazard and consequence ratings? If not, where do adjustments need to be made? Are all downslope and downstream resources that could be impacted by a landslide accounted for? If not, supplement the original mapping.
3. **Assign a final mass-wasting risk rating for the site.** The development and implementation of mitigation measures aimed at reducing the potential for the proposed forest practices to trigger mass wasting should be considered if it is determined that risk associated with the action is anything higher than "low."

*LiDAR data was collected in 2021 within NPT forest land holdings within the 1863 reservation area.

9.3.4 Soil Disturbance Classification System

The information from this section is from *Chapter 5: Managing Soil Disturbance* by Ronald L. Heninger, William Scott, Alex Dobkowski, and Thomas A. Terry.

Soil disturbance classification systems are useful tools for describing different types of soil disturbance that could occur during ground-based equipment operations. For example, a soil disturbance classification developed and used by Weyerhaeuser Company (Scott 2007) describes a continuum of increasing levels of soil disturbance caused by machinery traffic: undisturbed condition (Class 0), topsoil compaction (Class 1), topsoil churned with forest floor and puddling (high plasticity and low permeability) with subsoil being compacted (Class 2), topsoil partly removed and mixed with subsoil (Class 3), and topsoil being displaced, and subsoil puddled (Class 4). When disturbed, soils that are poorly drained or have a high-water table can disrupt internal drainage and cause soils to become saturated (Class 5)—this can occur with any of the soil disturbance classes. Best management practices (BMPs) are designed to minimize Class 2 and avoid Class 3, 4, and 5 disturbances. Class 1 soil disturbance generally is considered a negligible risk for causing detrimental soil disturbance, and it represents the target BMP condition where ground-based equipment traffic occurs.

Soil disturbance Class 1: As machinery travels across the ground, topsoil is compacted, but there is no churning or puddling. Compaction reduces the flow of water and air through the topsoil. Macropores and channels (e.g., old roots, animal burrows, and worm holes) are reduced, and their continuity is disrupted. The fine roots are largely undisturbed and in place. The subsoil may or may not be affected depending on the depth of topsoil. This level of light compaction would generally have a negligible detrimental impact on seedling growth and can have early positive impacts on soils with low bulk density or coarse texture.

Soil disturbance Class 2: Continued use of the skid trail by machinery results in increased and deeper compaction and mixing or churning of the forest floor with the soil surface. The forest floor and some light slash are stirred into the soil. The machine tracks or tires stir, puddle, and severely alter the structure of the topsoil. Macropore space and large channels are compressed and reduced and become discontinuous. Depth of churning and debris mixing is confined to the surface topsoil. The subsoil can be compacted depending on the depth of topsoil but is not churned. This type of disturbance may or may not be detrimental. Soils with high clay content and low organic matter and those that experience summer drought are most likely to restrict seedling growth until the roots grow out of the compacted zone.

Soil disturbance Class 3: As traffic continues, some of the topsoil is removed (displaced inside berms), and the rest is mixed or churned with the subsoil. The subsoil is compacted to a greater depth. Forest floor and slash are often mixed into the soil. Macropore space is severely reduced to the depth of churning and puddling. This type of disturbance should be avoided as much as possible.

Soil disturbance Class 4: As traffic continues, the topsoil is completely removed (displaced inside berms or bladed away) or completely mixed with the subsoil. Subsoil is compacted or puddled. Organic debris is often incorporated into the soil. Excessive blading, heavy traffic, dragging logs, and turning machines are common causes. Avoid removing topsoil as it is generally porous and higher in organic and nutrient content than subsoil. Trees planted where topsoil has been removed will generally have reduced growth potential.

Soil disturbance Class 5: Any disturbance that disrupts internal water movement and forces water to the surface or causes the soil to be saturated with free water on the surface or in the rooting depth for longer than 10 days, particularly in the winter dormant period, is disturbance Class 5. When disturbed, soils that are poorly drained or have a high-water table can become saturated. Ten days is sufficient time to cause seedling mortality of Douglas-fir and western hemlock when the rooting zone soil is saturated. Soil disturbances ranging from Class 1 to 4 can often cause saturated soil conditions on:

- Toe-slope positions or concave areas that often accumulate excess water from surrounding areas;
- Soils with clay-textured subsoils—commonly known as an argillic B horizon—that drain slowly, have massive structure, or both; and
- Coarse-textured soil with "cemented" subsoils, which are mostly formed by glaciers in very few places.

9.3.5 Soil Operability Ratings

The information from this section is from *Chapter 5: Managing Soil Disturbance* by Ronald L. Heninger, William Scott, Alex Dobkowski, and Thomas A. Terry.

Soil operability ratings classify the susceptibility of individual soils to compaction and puddling based on physical properties of the soil and how quickly the soil can be changed to a Class 3, 4, or 5 disturbances with likely negative consequences for tree growth.

The soil operability risk rating system provides a tool to help (1) assign appropriate harvest systems that fit physical soil characteristics or properties and (2) schedule harvest operations on higher-risk soils during more favorable times of the year when soils or conditions are drier. This rating system suggests the best time of the year for operating on a given soil with ground-based machines and is influenced by the following factors:

- **Topsoil depth:** Soil operability risk increases with decreasing topsoil depth. Shallow topsoils are more susceptible to losses in productivity than deeper topsoils. (Very deep topsoil = low risk; Shallow topsoil [≤10-inch depth] = very high risk)
- **Moisture and permeability:** Soil operability risk increases with increased soil moisture. Wetter soils are more easily puddled or compacted than drier soils. (Rapid permeability = low risk; Very slow permeability = very high risk, potential for saturation)
- **Texture and structure:** Soil operability risk decreases as soil texture gets coarser. Clayey soils are more susceptible to compaction and puddling than sandier soils. Soils that have an impermeable horizon and massive structure are subject to saturation with compaction. (Sandy texture = low risk; Clayey texture = high to very high risk; Cemented till or massive clay = very high risk, potential for saturation)
- **Depth to water table:** Soil operability risk increases as the depth to water table decreases. Shallow depth to water table is riskier than deeper depth to water table. (Deep depth to water table = low risk; Shallow depth to water table = very high risk, potential for saturation)

Operability rating is a relative scale with five classes: Low, Moderate, High, Very High, and Potential for Saturation. These ratings can be used to develop a soil database spreadsheet based on USDA-NRCS model soil descriptions. For example, a soil database can be developed that assigns a soil operability risk rating to a soil based on certain characteristics. When applying model soil descriptions to operability ratings it is best to verify the conditions in the field and adjust the rating depending on those field conditions. Sometimes the ratings are adjusted to lower or higher ratings:

- **Low-risk soil operability ratings:** Low-risk soils are characterized as having deep topsoils, coarse texture, and rapid permeability.
- **High-risk soil operability ratings:** High-risk soils are characterized as having moderately deep topsoil, clayey texture, and slow permeability.
- **Very-high-risk soil operability ratings:** Very-high-risk soils are characterized as having shallow topsoil (≤10 inches), clayey texture, and very slow permeability.

- **Saturation-risk soil operability ratings:** Saturation-risk soils are generally poorly drained and have a high-water table within 4 feet of the surface. Key indicators are water loving plants such as ash, sedges, rushes, and skunk cabbage.

The major limiting factors for each soil operability risk rating are as follows:

- **Low risk:** short-term rainfall event restrictions (hours).
- **Moderate risk:** intermediate-term rainfall event restrictions (days).
- **High risk:** moderate-to-slow internal movement of water and air; longer-term rainfall event restrictions (seasonal).
- **Very high risk (very susceptible):** shallow topsoil, clay subsoil, and slow infiltration; longer-term, seasonal rainfall event restrictions.
- **Saturation risk (extremely susceptible):** shallow topsoil or depth of rooting zone due to heavy clay texture or impervious layer within 24 inches of surface, or massive structure and high-water table.

By following operator BMPs, ground-harvest operations can be conducted somewhat outside of the recommended window with limited soil disturbance. However, there is a greater risk of unacceptable soil disturbance. Therefore, situations should be avoided where risk is high because of site conditions and time of year. Areas with higher-risk soil should be scheduled during the driest time of the year. Extra precautions should be taken when operations occur during higher-risk conditions. For example, place slash on designated skid trails, avoid trafficking in wet areas, use equipment that lifts rather than skids logs, use low-ground-pressure equipment, or avoid ground-based operations and cable yard.

9.3.6 Best Management Practices

This section includes a summary of Best Management Practices (BMPs) that, when implemented properly, can help to reduce impacts to soil resources from forest management practices.

9.3.6.1 Harvesting-Related BMPs

The information in this section is from *Chapter 5: Managing Soil Disturbance* by Ronald L. Heninger, William Scott, Alex Dobkowski, and Thomas A. Terry.

In general, BMPs are defined as practices, usually a combination of practices, that have been determined, based on current knowledge and technological, economic, and institutional considerations, to be the most effective and practicable means of achieving production and environmental quality goals (Dobkowski and Heninger 2002). BMPs provide a cost-effective means of achieving soil management strategies and standards; they are a prudent approach to resource management based on state-of-the-art knowledge. BMPs evolve as more scientific and operational knowledge is gained. In forestland management, there are BMPs for all phases of harvesting—planning, engineering and setting layout, yarding-equipment recommendations, felling and cutting operations, and soil auditing.

Good communication between the IDT, harvest manager, and equipment operators is essential for implementing ground-based harvesting BMPs:

- Hold a preharvest meeting with the IDT, field staff, and contract crew(s) for each setting to develop a strategy to manage the amount of soil disturbance.
- Identify potential variation in soil conditions within the setting.
- Identify draws, seeps, slopes, and other areas that may need special attention.

- Train operators to distinguish topsoil from subsoil. Use a road cut bank or dig a small soil pit to visually examine these soil layers (horizons) and their color.
- Decide on a wet-weather contingency plan and the severity and levels of soil disturbance that are not to be exceeded.

Suggested BMPs for consideration during the harvest-planning phase:

- Soils can be classified into a soil operability risk rating that shows increasing vulnerability to traffic-related disturbance that may later cause erosion and sedimentation concerns as well as seedling growth reductions. The types of equipment to use and the timing of ground-based harvesting operations depend on the soil operability risk rating.
- Plan to log the most sensitive soils during the driest time of year using the most appropriate harvesting equipment. Avoid sensitive areas as much as possible.

Suggested BMPs for felling and cutting:

- Coordinate falling and bucking to facilitate shovel yarding.
- Use directional falling methods that fall trees into the unit and away from riparian buffers and sensitive areas (wet or shallow soils, steep draws, etc.).
- Leave tree-length logs to allow equipment to operate without being too close to riparian buffers or sensitive areas.

Suggested BMPs for yarding:

- Use shovel yarding when the majority of the project area is less than 25% slope.
- Limit long-distance yarding using tracked and rubber-tired skidders except where it is not feasible to build a road (rubber-tired skidders generally cause more disturbance than shovel yarders).
- Adhere to the following guidelines when using skidders:
    - Use only on deep soils during the driest part of the year (topsoil depth >15 inches) unless soil disturbance is limited to predominantly Class 1 (after Scott 2007) or soils have coarse texture or significant rock content with good drainage.
    - Operate on ground with slopes less than 15%.
    - Use engineered skid trails with directional falling to the trails.
    - Pre-bunch logs.
    - Do not displace or remove topsoil from the skid trails with a push blade.

Prepare dirt spurs (temporary access roads) prior to logging and use them under the following conditions:

- Yarding distances are greater than 500 feet (150 m).
- There is a need to get the operation off the main logging road system.
- Use of a planned dirt spur will lessen the number of logging trails or allow sensitive areas to be harvested with minimal disturbance.

If dirt spurs are used:

- First log out the spur.
- Make the spur as narrow as possible.
- Limit the amount of topsoil removal when removing stumps.
- Windrow topsoil along the edge of the spur so that it can be used when the road is rehabilitated.
- Do not operate on dirt spurs during wet weather.
- Rehabilitate all dirt spurs (via cultivation, topsoil replacement, or woody debris replacement); water-bar the spur if water runoff and erosion are potential issues.

The greatest level of soil disturbance from shovel yarding is likely to occur along roadsides. Use extreme care when entering and exiting the setting with equipment to avoid detrimental soil disturbance.

Suggested BMPs for entering the unit with harvesting equipment:

- Use natural breaks in the topography to enter a setting (avoid wet areas and culvert basins).
- If using shovel logging, use the shovel's boom to assist turning on the road to enter a setting.
- Use the machinery arm to lift the front of the machine, walk into the unit, and avoid turning track on cut bank.
- "Quarter the shovel" off the road into the setting.
- Use brush and low-grade logs to bridge ditches. After use, remove this material.
- Minimize the number of entries and exits (e.g., fuel equipment before daily entries into cutblock).

It is very important to maintain a systematic logging pattern to minimize the number of trails. Take note of the following:

- Keep logging trails as straight as possible.
- Minimize the area disturbed by yarding.
- Plan shovel trails to parallel but not cross suspected shallow subsurface water flow.
- Place tops and limbs on traffic lanes and walk on harvest residuals before significant soil disturbance occurs, particularly on more sensitive soils.
- If equipment causes soil and mud to ooze up through the slash while trafficking, it may cause a problem for site preparation and plantation establishment, so monitor this carefully. Buried slash can impede planting, and the puddled soil and slash may impede drainage, causing saturated conditions.

9.3.6.2 Biomass Retention and Removal BMPs

The information in this section is from *Chapter 6: Maintaining Adequate Nutrient Supply—Principles, Decision-Support Tools, and Best Management Practices* by Robert B. Harrison, Douglas A. Maguire, and Deborah Page-Dumroese.

Best management practices (BMPs) implemented for biomass retention and removal during harvest and site preparation depend on trade-offs among several risk factors, including potential adverse effects of wildfire, erosion, and invasive weeds, and the implications for planting quality. Nutrient limitations or shifts in nutrient availability that may affect long term productivity should also be considered. Key BMPs include the following:

- Take extra precaution during harvest activities in or around ecologically sensitive areas, riparian zones, and areas characterized by organic or shallow soils with low nutrient pools. Intensive biomass harvesting should not be conducted in these areas.
- Conservation of large woody debris is important from a wildlife and biotic diversity perspective and must be considered when retention guidelines are specified during harvest (Bull 2002). Retain all large legacy wood that exists on the forest floor and large standing snags where it is safe to do so. Wildlife reserve trees or green recruitment trees should also be identified and left in areas where they will not become a safety hazard. These trees will produce large woody debris with time. Large woody debris (>7 inches [18 cm] in diameter) functions as habitat for a variety of organisms (e.g., fungi, mosses, insects, and amphibians). Retention of both large and fine woody debris can protect a site from erosion, soil compaction and rutting, and surface runoff. DDWD, legacy trees, and snag retention guidelines are detailed in the 'Dead & Down Woody Material & Snag Management' section below.

- Removing only logs (bole-only harvest) presents a relatively low risk of loss in productivity, whereas whole-tree yarding may create a greater risk depending on how much of the nutrient pool is removed relative to the total pool before harvest. Fox (2000) emphasized that productivity losses caused by nutrient losses in harvested material are likely to be highly dependent on specific site characteristics, particularly available nutrients. Evans (1999) concluded from a review of the available literature that removing less than 10% of the nutrient pool presented a low risk of productivity losses on many soils.
- Retain at least 30% of the fine woody debris on slopes conducive to ground-based harvesting and 50% or more on steeper slopes.
- When removing logging residuals for biomass harvest or fuel reduction, or when piling slash to create planting spaces, it is best to wait until the residuals dry so that needles and fine branches can fall off and remain distributed as uniformly as possible across the site. Slash piles created for site preparation should be small and located such that the site can be planted in a manner that maintains the desired spatial distribution of planted trees.
- Some displacement of the forest floor to create planting spots can improve planting quality and subsequent root growth (increased soil temperatures in the spring), but too much mineral soil exposure (displacement) can reduce water available to seedlings because of increased weed competition and increased evaporation from the surface soil. Logging slash removal or slash piling that exposes mineral soil can significantly increase invasive weeds such as Scotch broom (Harrington and Schoenholtz 2010). High levels of competing vegetation can reduce planted seedling survival and early growth.

9.3.7 Supplemental Information

9.3.7.1 Hazard of Erosion and Suitability

The following is an excerpt from the National Forestry Manual, produced by the United States Department of Agriculture, Natural Resources Conservation Service[9]. This information is to be used in conjunction with Table 3-7 and Table 3-8 in section 0 Hazard of Erosions and Suitability.

The paragraphs that follow indicate the soil properties considered in rating the soils for aspects of forest management. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Ratings in the column "hazard of off-road or off-trail erosion" are based on slope and on soil erosion factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75% of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

[9] http://soils.usda.gov/technical/nfmanual/
https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17896.wba

Ratings in the column "hazard of erosion on roads and trails" are based on the soil erosion factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance; and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column "suitability for roads (natural surface)" are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use. "Well suited" indicates that the soil has features that are favorable for the specified use and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Moderately suited" indicates that the soil has features that are moderately favorable for the specified use. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. The criteria for slope were modified for Idaho, Oregon, and Washington as follows: slope of less than 8%, "well suited"; slope of 8 to 25%, "moderately suited"; and slope of more than 25%, "poorly suited."

9.3.7.2 Ash-Cap Soils

For more information about the distribution and properties of ash-cap soils refer to the following publications:

- *Soil Disturbance Recovery on the Kootenai National Forest, Montana* (Gier et al. 2018)
- *Volcanic-Ash-Derived Forest Soils of the Inland Northwest: Properties and Implications for Management and Restoration* (Page-Dumroese et al. 2007)

A large portion of the Pacific Northwest, including northern Idaho, was covered by a layer of ash and pumice that fell on the region approximately 7,700 years ago during the eruption of Mt. Mazama (Figure 9-3). The tephra that was deposited by the eruption became a new parent material and has since become a prominent component of soils throughout the region. Soils formed in volcanic ash, known as Andisols, have unique biological, physical, and chemical properties that are attributed to the presence of volcanic ash. Such properties have influenced the composition of plant communities, as well as forest productivity, in the Pacific Northwest.

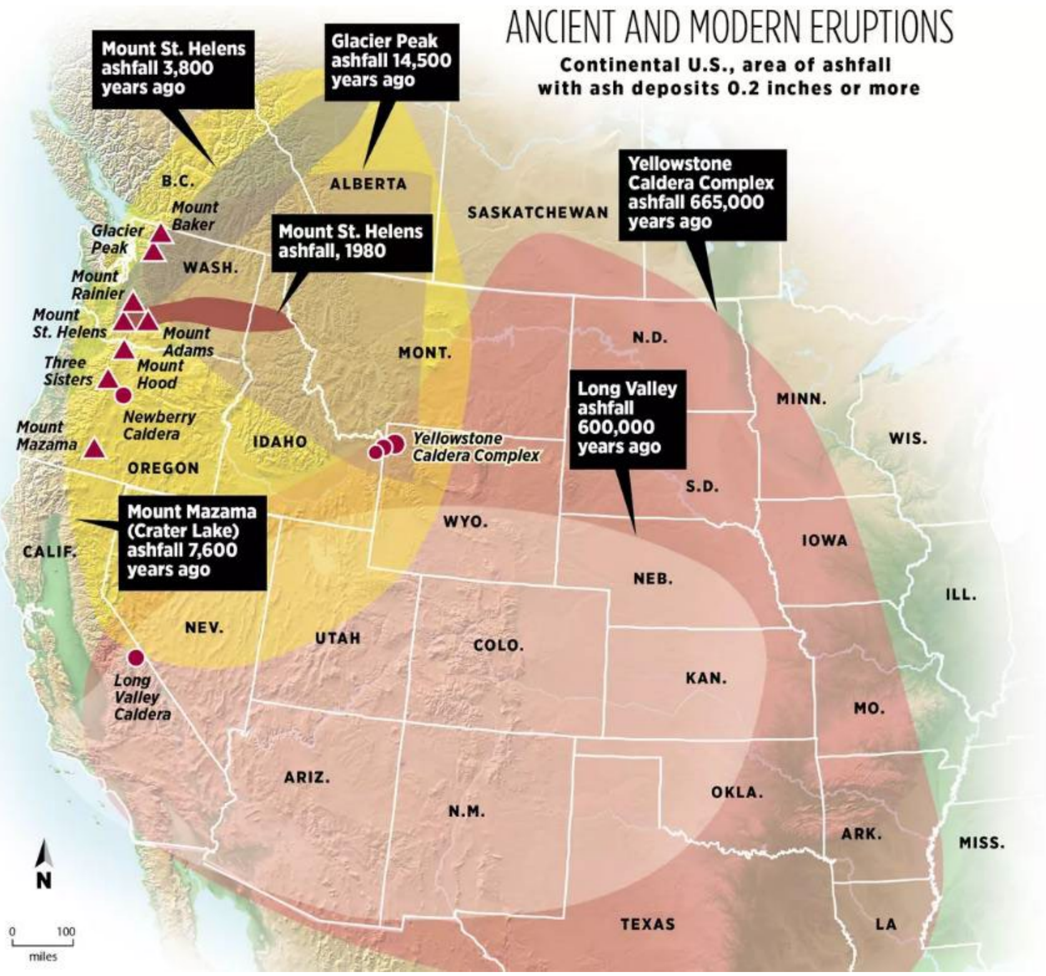


Figure 9-3) Historic Eruptions with ≥0.2" ashfall deposit.

9.3.7.3 Fragile Soils

The following information is a direct excerpt from USDA Natural Resource Conservation Service (NRCS) documentation that details the Fragile Soil Index.

Soils can be rated based on their susceptibility to degradation in the "Fragile Soil Index" interpretation. Fragile soils are those that are most vulnerable to degradation. In other words, they can be easily degraded – they have a low resistance to degradation processes. They tend to be highly susceptible to erosion and can have a low capacity to recover after degradation has occurred (low resilience). Fragile soils are generally characterized by a low content of organic matter, low aggregate stability, and weak soil structure. They are generally located on sloping ground, have sparse plant cover, and tend to be in arid or semiarid regions. The index can be used for conservation and watershed planning to assist in identifying soils and areas highly vulnerable to degradation.

Depending on inherent soil characteristics and the climate, soils can vary from highly resistant, or stable, to vulnerable and extremely sensitive to degradation. Under stress, fragile soils can degrade to a new altered state, which may be less favorable or unfavorable for plant growth and less capable of performing soil functions. To assess the fragility of the soil, indicators of vulnerability to degradation processes are used. They include organic matter, soil structure, rooting depth, vegetative cover, slope, and aridity.

The organic matter content indicates the capacity of the soil to resist and/or recover from degradation processes. Organic matter improves the soil pore structure, increases water infiltration, and reduces soil compaction and soil erosion. Soil structure indicates the capacity of the soil to resist degradation from accelerated water erosion (by increasing the amount of infiltration). Pore structure is the most important aspect of soil structure as pores provide habitat for organisms. Shallow soils are more vulnerable to degradation processes because they have limited rooting depth and have a reduced amount of material from which to form new soil. As erosion removes the upper soil profile, productivity will decline if the subsoil is limiting crop growth. Vegetative cover is very important as bare mineral soil is most vulnerable to the processes of soil erosion, both by wind and water. Slope (a measure of the steepness or the degree of inclination) indicates the degree of vulnerability to erosion and mass movement. Aridity is defined by the shortage of moisture. Lack of water is a main factor limiting biological processes and the ability of the soil to resist and/or recover from degradation.

Soils are placed into interpretive classes based on their index rating, which ranges from 0 to 1. An index rating of 1 is the most fragile, while a rating of zero is the least fragile. Interpretative classes are as follows:

- **Not Fragile:** *Index rating less than or equal to 0.009*
    - This soil has a very high potential to resist degradation and be highly resilient. They are highly structured with an organic matter content greater than 5.7%, are nearly level, are deep or very deep, have greater than 85% vegetative cover, and are in a climate that is wet or very wet.
- **Slightly Fragile:** *Index rating less than 0.009 and less than or equal to 0.209 – These soils have a high potential to resist degradation and be resilient. They are:*
    - Poorly structured to weakly structured soils that have an extremely low to moderate content of organic matter, are very deep, have high vegetative cover, occur on nearly level ground, and are in wet or very wet climates;
    - Highly structured soils that have a very high content of organic matter, are very shallow to moderately deep, have high vegetative cover, occur on nearly level ground, and are in wet or very wet climates;
    - Highly structured soils that have a very high content of organic matter, are very deep, have low to moderately high vegetative cover, occur on nearly level ground, and are in wet or very wet climates;
    - Highly structured soils that have a very high content of organic matter, are very deep, have high vegetative cover; are on slopes greater than 3%, and are in wet or very wet climates; or
    - Highly structured soils that have a very high content of organic matter, are very deep, have high vegetative cover; occur on nearly level ground, and in semi-dry to mildly wet climates;
- **Moderately Fragile:** *Index rating greater than 0.209 and less than or equal to 0.409 – These soils have a moderate potential to resist degradation and be moderately resilient. They are:*
    - Highly structured soils that have a very high content of organic matter, are very shallow, have high vegetative cover, occur in nearly level to moderately sloping areas, and are in semi-dry climates;
    - Poorly structured soils that have an extremely low content of organic matter, are deep, have low vegetative cover, occur in nearly level areas, and are in wet or very wet climates;

    - Poorly structured soils that have an extremely low content of organic matter, occur on gentle to very steep slopes, have high vegetative cover, and are in wet or very wet climates;
    - Weakly structured soils that have a very low content of organic matter, are deep, occur in nearly level to gently sloping areas, have high vegetative cover, and are in semi-dry climates; or
    - Weakly structured soils that have a very low content of organic matter, are very shallow to very deep, occur in nearly level to strongly sloping areas, have high vegetative cover, and are in mildly wet climates.
- **Fragile:** *Index rating greater than 0.409 and less than or equal to 0.609) – These soils have a low potential to resist degradation and low resilience. They are:*
    - Well-structured soils that have a low content of organic matter, are shallow to very deep, have moderate to moderately high vegetative cover, occur on steep slopes, and are in dry climates;
    - Well-structured soils that have a low content of organic matter, are shallow to very deep, have a low vegetative cover, occur in nearly level to gently sloping areas, and are in dry climates;
    - Well-structured soils that have a low content of organic matter, are deep, have low vegetative cover, occur on nearly level to very steep slopes, and are in a semi-dry climate;
    - Moderately structured soils that have a very low content of organic matter, are deep, have moderately high vegetative cover, occur on moderately steep to very steep slopes, and are in semi-dry climates; or
    - Weakly structured soils that have a low content of organic matter, occur on moderately steep to very steep slopes, have low vegetative cover, and are in wet or very wet climates.
- **Very Fragile:** *Index rating greater than 0.609 and less than or equal to 0.809) – These soils have a very low potential to resist degradation and very low resilience. They are:*
    - Weakly structured soils that have an extremely low content of organic matter, are deep, have low vegetative cover, occur on nearly level to very steep slopes, and are in dry climates;
    - Weakly structured soils that have an extremely low content of organic matter, are shallow to very deep, have low vegetative cover, occur on nearly level to very steep slopes, and are in very dry climates; or
    - Poorly structured soils that have an extremely low content of organic matter, are very shallow, have no vegetative cover, occur on steep slopes, and are in mildly wet to wet climates.
- **Extremely Fragile:** *Index rating greater than 0.809 and less than or equal to 1.0) – These soils can have no potential to resist degradation and no resilience. They are:*
    - Poorly structured soils that have an extremely low content of organic matter, are very shallow, have low vegetative cover, occur on very steep slopes, and are in dry or very dry climates;
    - Weakly structured soils that have a very low content of organic matter, are nearly level to very deep, have low vegetative cover, occur on very steep slopes, and are in dry climates; or
    - Very shallow soils on steep slopes.

The interpretive rating is based on soils that occur in the dominant land use for the map unit component and may not represent soils that occur in site-specific land uses.

9.4 Noxious Weeds

The following recommended practices for monitoring and managing noxious weeds can be accessed in their original format on the Forest* A *Syst website (link no. 1). Additional recommendations can be found in the USDA Forest Service Guide to Noxious Weed Prevention Practices handbook (link no. 2):

1) https://www.forestasyst.org/invasive_species.cfm
2) https://www.fs.usda.gov/database/feis/pdfs/weeds/GuidetoNoxWeedPrevPractices.pdf

9.4.1 Early Detection Through Monitoring

- Monitor disturbed habitats for newly established invasive plants.
- Sites to monitor include food plots, cut-over lands, roadsides, stream sides, recently flooded areas, storm damaged areas, internal roads and trails, firebreaks, burned areas rights-of-way, and fencerows.
- Mark known infestations on a map and flag them in field for easy re-location.
- Search the surrounding areas for any “satellite” infestations and mark them as well.

9.4.2 Best Management Practices for Activities Involving Soil Disturbance

- Before starting ground-disturbing activities, inventory invasive plant infestations both on-site and in the adjacent area (fencerows, RMZs, Right-of-ways, etc.).
- Begin activities in uninfested areas before operating in infested areas.
- Use uninfested areas for staging, parking and cleaning equipment. Avoid or minimize all types of travel through infested areas or restrict to those periods when spread of seed or plant reproductive parts are least likely.
- Minimize soil disturbance and retain desirable vegetation in and around the area to the maximum extent possible.
- When possible, to suppress growth of invasive plants and prevent their establishment, retain relatively closed canopies.
- Do not blade roads or pull ditches where new invaders are found, if possible.
- When it is necessary to conduct soil work in infested roadsides or ditches, schedule activity when seeds or propagules are least likely to be viable and to be spread.
- Quarantine soil from infested area to prevent off-site spread.
- Monitor disturbed areas for at least three growing seasons following completion of activities. Provide for follow-up treatments based on inspection results.

9.4.3 Best Management Practices Involving Off-site Material and Equipment

- Invasive plants can be introduced and spread by moving infested equipment, sand, gravel, borrow, fill and other off-site material.
- Determine the need and identify sites where equipment can be cleaned. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from project equipment before moving it into a project area and clean all equipment before leaving the project site, if operating in infested areas.

- Inspect material sources at site of origin to ensure that they are free of invasive plant material before use and transport. Treat infested sources for eradication, and strip and stockpile contaminated material before any use.
- Inspect and document the area where material from treated infested sources is used annually for at least three years after project completion to ensure that any invasive plants transported to the site are promptly detected and controlled.
- Maintain stockpiled, uninfested material in a weed-free condition.
- Incorporate invasive plant prevention into road work layout, design, and decisions.
- Minimize roadside sources of seed that could be transported to other areas.
- Periodically inspect system roads and rights-of-way for invasion. Inventory and mark infestations and schedule them for treatment.
- If possible, work in infested areas should be limited to efforts aimed at eliminating invasive plants.
- Perform road maintenance such as road grading, brushing, and ditch cleaning from uninfested to infested areas to help prevent moving seeds and plant material from infested areas into adjacent uninfested areas.
- Clean road graders and other equipment immediately after operating in infested areas. Clean all dirt and plant parts from the top and underside of mower decks.

9.4.4 Best Management Practices for Revegetation

- Revegetate all disturbed soil, except on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent establishment of invasive plants.
- When revegetating areas that were previously dominated by invasive plants, try to achieve at least 90% control of the invasive before attempting restoration.
- Use local seeding guidelines and approved native mixes but realize that many species previously recommended for this purpose are now presenting invasive problems. Revegetation may include planting, seeding, fertilization, and mulching.
- Monitor and evaluate success of revegetation in relation to project plan.

9.4.5 Best Management Practices for Prescribed Burns

Carefully plan all prescribed burns and identify and map invasives found in the burn tract. Determine the interactions between the invasives and the planned burn.

- Before conducting a prescribed burn, a burn permit must be obtained, and a prescriptive burn plan must be written and signed. Qualified burn bosses and wildland firefighters must also be available to conduct the burn.
- Avoid intense burns that may expose mineral soil. Prescribed broadcast burns should aim to burn the flammable forest litter later, but not burn hot into the duff layer.
- Use natural or existing barriers (e.g., roads, streams, lakes), where possible, in conjunction with machine lines and hand lines. Wet lines may also be an option in areas where erosion is a concern, but such control methods should be considered carefully due to concerns related to liability, the wildland urban interface, and checkerboard ownership.
- Check fire plows and tractors before use and clean as necessary prevent introduction of invasives.

- Plow fire lines in areas where invasives are not present before plowing in areas infested with invasives to prevent spread. Clean equipment before leaving site.
- Scout in the growing season following the burn for new invasives in the burned stand and breaks.
- Use mowing or other practices that do not expose soil as alternatives to blading or disking for maintaining fuel breaks.

9.5 Cultural Resources

Cultural resource inventories are conducted on ground disturbing forest management activities in compliance with the National Historic Preservation Act, Section 106. The goal is to identify and delineate areas of cultural and archeological importance. Once identified, sites are protected based on determinations of cultural significance and National Register of Historic Places eligibility.

Cultural surveys are conducted when required by the Nez Perce Tribe's Tribal Historic Preservation Officer(s) (THPO) or the State Historic Preservation Office (SHPO). Surveys are performed in accordance with accepted archeological practices as defined in 36 CFR part 800, section 110 guidelines, and the Secretary of the Interior's Standards and Guidelines.

Culturally sensitive buildings, plant species, cultural trees (peel trees) will be protected following defined guidelines provided by the NPT Cultural Resource Program and Wildlife divisions during the IDT project-level review.

9.6 Water and Riparian Areas

For the protection of water resources and riparian areas, forest management practices will comply with guidelines included in this section.

<u>Riparian Forest Zone (NPT Fisheries Watershed 2022)</u>

Perennial and intermittent streams:

- 150-foot buffer for side slope of less than 60% slope*
- 300-foot buffer for side slope greater than 60% slope*

*These recommendations are horizontal distances and are delineated perpendicular from the ordinary high watermark.

Wetlands:

"Wetlands" do not include areas of temporary standing water that have resulted from snow melt or heavy rains, areas that are not considered lentic or lotic riparian-wetlands, or areas that do not exhibit hydric soil characteristics.

- Minimum 100-foot buffer*

*This buffer distance is based on the Washington Department of Fish and Wildlife document: Riparian Ecosystems, Volume 2: Management Recommendations, 2020. This document recommends a minimum of 100 feet, as this provides the width necessary to meet a 95% pollution removal target for most pollutants (page 11).

Riparian Forest Silvicultural Treatments:

- Silvicultural treatments will:
  - Only take place to promote and enhance the desired ecological components of the riparian ecosystem.
  - Take a precautionary approach that prioritizes aquatic riparian concerns above other considerations.
  - Be reviewed by an interdisciplinary team that includes designated representatives from Fisheries, Wildlife, Water Resources, Cultural Resources, Air Quality, and members from other relevant divisions within the Natural Resources Department.
    - All interdisciplinary team concerns must be mitigated with best available science methodologies.
    - If a consensus agreement cannot be obtained by the technical interdisciplinary team, the Natural Resources Manager will be briefed.
    - The Natural Resources Manager will determine the best course of action with a full briefing to the Natural Resources sub-committee regarding the indecision and recommended action.

Riparian Forest - Ecological Silviculture Development Guidelines

As presented in Palik et al., 2021 publication titled: 'Ecological Silviculture: Foundations and Applications', forest management within the riparian forest area will link the following functional guidelines:

- Define restoration or maintenance strategies that promote or sustain riparian forest resiliency (i.e., vertical, and horizontal structural conditions at both the project scale and forest wide scale).
- Define functional objectives that sustain or restore land-to-water attributes such as material uptake and interception, organic matter flux, shading and bank stability, and desired habitat conditions.
- Recognize riparian forests as ecotones of physical, compositional, and functional variations. Review baseline riparian boundary delineations to determine the probability of riparian functional gradients mapped from high to low significance from the waterway's high watermark towards the upland forested zone.
- Incorporate spatially variable silvicultural treatments within the riparian forested area such as variable retention harvest (VRH) and variable density thinning (VDT) that parallel natural complexity and diversity to achieve desired future conditions.
- Define future silvicultural treatment scheduling based on ecological cues relative to forest development that has the added benefit of better sustaining functional connections between forest and water over time such as melding forest health objectives with stream restoration efforts; thereby, reducing cumulative effects of both land and water restoration coupled with forest resiliency management objectives.

9.6.1 Supplemental Information

Riparian Vegetation: Streamside vegetation is critical to fish habitat within the reservation as most reservation streams are located at low elevations and subject to extremely high summer temperatures. Riparian vegetation provides shade to help buffer summer water temperatures while also providing resistance to bank erosion and filtration of fine sediment and pollutants. Vegetation which overhangs the wetted channel provides a source of food from falling terrestrial insects, forage for aquatic invertebrates, and important cover from predators. Intact riparian corridors slow overland flow from high spring runoff events, minimizing flood energies and retaining floodplain moisture for increased groundwater recharge throughout summer baseflow periods. Riparian vegetation is also critically important in providing large woody debris to stream channels. Large woody debris provides extremely valuable salmonid cover and habitat for invertebrate prey species while contributing to channel roughness and the formation of complex microhabitats. The need for intact riparian corridors is not limited to fish-bearing streams, it is also important on the myriad of minor, non-fish bearing streams located within the reservation's headwaters as benefits are provided in a cumulative fashion to fish bearing reaches downstream.

9.7 DEAD & DOWN WOODY MATERIAL & SNAG MANAGEMENT

Dead and Down Woody Material (DDWM)

Down Woody Debris (DDWD) is defined as woody remains of trees and vegetation scattered on the forest floor. Decaying wood on the forest floor provide an important physical, chemical, and biological component of the forest biota through soil stability, nutrient cycling, microbial habitat, nitrogen fixing, fungal distribution, stream stability, fire potential, and wildlife habitat. However, excessive accumulation of woody debris can be detrimental when considering high severity fire impacts to the forest and riparian areas. It is important to monitor DDWD loadings to initiate ongoing management strategies that realize and maintain forest-wide DFCs. The following table provides minimum project-level, fuel loading DFCs for areas outside the riparian or stream management zone (Schnepf et al. 2009; Graham et al. 1994; Brown et al. 2003; Powell 2014; Organic Debris Workshop 2003; Smith and Fischer 1997). DDWD for SMZs will be determined prior to implementation based on IDT's and NPTEC's approval to manage within this zone while maintaining SMZ protection guidelines.

DDWM Classes

Decay classes are a qualitative measure used to categorize physical appearance and structural integrity of individual dead & woody pieces (USDA 2007, Woundenberg et al. 2010). Dead & Down decay classes are defined (Harmon et. al., 2011) and depicted (Table 9-3) below:

- *Class 1:* Sound, freshly fallen, intact logs with no rot, no conks present indicating a lack of decay, original color of wood, no invading roots, fine twigs attached with tight bark.
- *Class 2:* Sound log sapwood partly soft but cannot be pulled apart by hand, original color of wood, no invading roots, many fine twigs are gone and remaining fine twigs have peeling bark.
- *Class 3:* Heartwood is still sound with piece supporting its own weight, sapwood can be pulled apart by hand or is missing, wood color is reddish-brown or original color, root may be invading sapwood, only branch stubs are remaining which cannot be pulled out of log.
- *Class 4:* Heartwood is rotten with piece unable to support own weight, rotten portions of piece are soft and/or blocky in appearance, a metal pin can be pushed into heartwood, wood color is reddish or light brown, invading roots may be found throughout the log, branch stubs can be pulled out.
- *Class 5:* There is no remaining structural integrity to the piece with a lack of circular shape as rot spreads out across ground, rotten texture is soft and can become powder when dry, wood color

is red brown to deep brown, invading roots are present throughout, branch stubs and pitch pockets have usually rotten down.

Table 9-3) CWD Class descriptions (Timber Management Data Handbook, FSH 2409.21h R1 Chapter 400).

Class Code	Bark	Texture	Twigs	Shape	Wood Color	Portion of log on ground
1	Intact	Intact	Present	Round	Original	None, elevated on supporting points
2	Intact	Intact to soft	Absent	Round	Original	Parts touch, still elevated, sagging slightly
3	Trace	Hard large pieces	Absent	Round	Original to faded	Bole on ground
4	Absent	Soft blocky pieces	Absent	Round to oval	Light brown to faded brown	Partially below ground
5	Absent	Soft, powdery	Absent	Oval	Faded light yellow or gray	Mostly below ground

The scope for DDWD accretion is to focus desired detritus targets within the 1-3 classification, collectively, since classes 4 and 5 begin to decay into the upper organic soil layer. In addition to the defined target values (Table 9-4), the following additional guidelines are also prevalent to project-level implementations:

- Minimum DDWD targets exclude standing snags.
- Guidelines should be considered adaptable and should be reviewed and revised as new information becomes available through monitoring and updates to best available science. Such changes should be approved by the project-level IDT.
- DDWD project-level guidelines, within this section, exclude stream management zones.
- DDWD created from project-level implementation should be distributed evenly across the project area.
- Standing snags (dead or alive) will not be felled to fulfill defined DDWD guidelines.
- Target values must be achieved after implementation of the final harvest treatment (i.e., broadcast burning).
- Target values must be left in place within the treatment area but have less than 2 feet in depth to facilitate wildlife movement and promote low-severity wildfires.

Table 9-4) DDWD – Coarse Woody Debris >3" (tons/acre) project-level goals.

Source	Fire Group	Habitat	Habitat Title	Total (tons/acre) (CWD >3")
Smith & Fischer, 1997 (Fire GRP) Brown et.al., 2003 (CWD)	Warm, Dry DF & PP (Fire GRP 1)	PIPO/FEID	ponderosa pine / Idaho fescue	4 tons/ac
		PIPO/SYAL	ponderosa pine / common snowberry	
		PSME/SYAL	Douglas-fir / common snowberry	
	Warm, Dry to Moderate DF, GF, & PP (Fire GRP 2)	ABGR/PHMA	grand fir / ninebark	5 tons/ac
		PIPO/PHMA	ponderosa pine / ninebark	
		PSME/PHMA	Douglas-fir / ninebark	
		PSME/VACA	Douglas-fir / dwarf huckleberry	
	Moderate and Moist GF (Fire GRP 7)	ABGR/CLUN	grand fir / queencup beadlily	7 tons/ac
		ABGR/LIBO	grand fir / twinflower	
		THPL/CLUN	western recedar/queencup beadlily	

Smith, J., & Fischer, W., 1997. *Fire Ecology of the Forest Habitat Types of Northern Idaho.*
Brown, J., Reinhardt, E., & Kramer, K., 2003. *Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest*.
Schneph, C., Graham, R.T., Kegley, S., Jain, T.B., 2009. Managing Organic Debris for Forest Health
Graham, R., Harvey, A.E., Jurgensen, M.F., Jain, T.B., Tonn, J.R., Page-Dumroese, D.S., 1994. Managing Coarse Woody Debris in Forests of the Rocky Mountains.

Snag Management

A snag is defined as a standing, dead or dying tree that provides a source for wildlife nesting, denning, nurseries, storage areas, foraging, or roosting. Therefore, snag retention has an unmeasurable intrinsic value to '…*sustaining the biodiversity and productivity of the forest ecosystem, maintaining appropriate sizes, amounts, and conditions of snags, logs, and other CWD – and restoring this material where it is currently deficient – is a common goal in ecological forest management'* (Franklin et al., 2018).

A snag is dimensionally at least ten (10) inches in diameter at breast height and at least ten (10) feet in vertical height; however, snags fifteen (15) inches in diameter at breast height and greater are more desired due to size and vertical longevity. Snag guidelines for the Nez Perce Reservation are an attempt at maintaining, through time, the minimum target density that provide adequate habitat for the full complement of native dependent species found on the Reservation. With existing interior forest roads and tribal member requirements for firewood (typically Douglas-fir), snags on the forest landscape are low in numbers on a per acre basis (Table 9-5).

Table 9-5) Standing Dead Snags (TPA) – CFI 2013.

	Diameter Groups			Total
Species	10-14.9"	15"-19.9"	20"+	
ponderosa pine	0.23	0.13	0.18	0.54
Douglas-fir	0.59	0.50	0.41	1.50
grand fir	0.64	0.34	0.09	1.07
western larch	0.01	0.01	0.00	0.02
lodgepole pine	0.01	0.00	0.00	0.01
Total	1.48	0.98	0.67	3.14

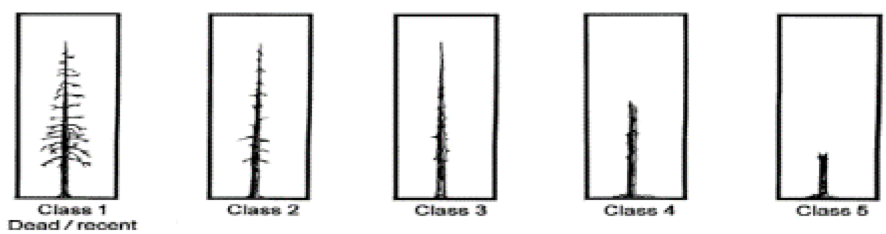
Snags classes are defined and depicted (Table 9-6) below:

- *Class 1:* All limbs and branches are present; the top of the crown is still present; all bark remains; sapwood is intact, with minimal decay; heartwood is sound and hard.
- *Class 2:* There are few limbs and no fine branches; the top may be broken; a variable amount of bark remains; sapwood is sloughing with advanced decay; heartwood is sound at base but beginning to decay in the outer part of the upper bole.
- *Class 3:* Only limb stubs exist; the top is broken; a variable amount of bark remains; sapwood is sloughing; heartwood has advanced decay in upper bole and is beginning at the base.
- *Class 4:* Few or no limb stubs remain: the top is broken; a variable amount of bark remains; sapwood is sloughing; heartwood has advanced decay at the base and is sloughing in the upper bole.
- *Class 5:* No evidence of branches remains; the top is broken; < 20 % of the bark remains; sapwood is gone; heartwood is sloughing throughout.

Table 9-6) Snag Class descriptions (Timber Management Data Handbook, FSH 2409.21h R1 Chapter 400).

SNAG DECAY Classes:

Code	Bark	Heartwood Decay	Sapwood Decay	Limbs	Top Breakage	Bole Form	Time Since Death
1	Tight, intact	Minor	None to incipient	Mostly Present	May be present	Intact	1-5 years
2	50% loose or missing	None to advanced	None to incipient	Small limbs missing	May be present	Intact	> 5 years
3	75% missing	Incipient to advanced	None to 25%	Few remain	Approx. ⅓	Mostly intact	> 5 years
4	75% missing	Incipient to advanced	25% +	Few remain	Approx. ⅓ to ½	Losing Form, soft	> 5 years
5	75%+ missing	Advanced to crumbly	50% + advanced	Absent	Approx. ½ +	Form mostly lost	> 5 years



The following general guidelines for snag retention (classes 1-4 collectively) during project level implementation are:

- Existing snags within the proposed treatment area should be calculated within the treatment unit (only).
- Verify the quality, amount, and distribution of snags within the project area boundaries during project planning.
- Except for salvage treatments, retain all existing standing snags ≥ 10” DBH paired with stocking densities defined in Table 9-7 and without violating OSHA’s ‘Safe and Healthful Working

Conditions for Contractors' or safety to Tribal employees and contractors during project implementation.

- Consider composition, size, structure, distribution, and species when selecting snags to retain to maintain or increase a diverse composition of wildlife species and ecological site conditions. Preferred species are in descending priority: hardwood species, ponderosa pine, western larch, western redcedar, Douglas-fir, subalpine fir, Engelmann spruce, grand fir.
- Snags should be broadly distributed across the treatment area and occur in multiple clumps as well as individually dispersed to provide for horizontal heterogeneity.
- Select culls, broken and spike top, dying trees, and trees showing signs of wildlife use as top priority for retention.
- Leave all snags in riparian management zones.
- Retain the largest snags in each diameter class as a priority. Larger diameter and taller snags are preferred. Retain as many snags >20" DBH as possible. Snags 10"-15" DBH should be >15 feet tall, snags >15" DBH should be >30 feet in height.
- Retaining snags with bark vs. snags without bark as a priority.
- Retaining snags with limbs vs. without limbs as a priority.
- Retain trees dead or alive with signs of wildlife use (i.e., nesting, denning, nurseries, storage areas, foraging, or roosting).
- Areas inaccessible to firewood harvesters and non-commercial forest lands where fire is the primary disturbance mechanism should be prioritized for snag retention.

Snag retention effectiveness should be monitored through forest inventories (e.g., stand exams or continuous forest inventory) at planned intervals and should be revised, as necessary.

Snag Management Monitoring

These snag management guidelines will be most useful in providing wildlife habitat if applied through a feedback loop process of implementation, monitoring, and revision. Snag habitat, associated wildlife populations, and the effectiveness of implementing these guidelines should be monitored on an annual basis by wildlife biologist. Guidelines should be reviewed and revised, as necessary.

Green Tree Retention Guidelines

Retaining class 1 snags that are evenly distributed on the Nez Perce Tribe's Forest lands has been a concern to the wildlife biologists since current snag densities are lower than desired. During the last Continuous Forest Inventory (CFI) where 528 plots were sampled in 2013, the standing dead snags across fee and trust lands was determined to be 3.14 trees per acre. Tribal members are free to cut down dead, standing trees for firewood on Tribal lands with few restrictions. Western larch and live trees are prohibited from firewood harvesting as stated in Tribal Code 4.90.037. Class 1 snags are typically harvested along or adjacent to forest access roads by Tribal members for firewood or due to safety concerns during project operations. To assist with desired project-level, snag retention counts, the following supplemental guidelines are provided:

- Retained green trees should be broadly distributed across landscapes and occur in clumps as well as individually dispersed to provide for horizontal heterogeneity.
- During regeneration treatments, if the number of existing standing snags per acre is less than in the snag retention guidelines, calculate the difference needed to reach the numbers in the snag

retention table for that size class and retain that number of supplemental green trees per acre within each diameter class.

- Where green tree availability is insufficient to meet the specified retention levels within a given size class, retain the largest available trees in the next-smaller size class.
- When selecting green trees for snag recruitment, consider retaining a diverse composition, structure, distribution, and size class of tree species and those with deformed, damaged, or broken tops, sloughing bark, and mechanical wounds.
- Green trees retained as seed trees may be counted toward snag retention guidelines. Identified seed trees **will not** be harvested in future silvicultural treatments and will be preserved for wildlife purposes in perpetuity (Legacy Trees).
- Designated green (live) 'Legacy Trees' will be stem mapped as to location, species, diameter, and height. This information will be transferred to the DNR wildlife division for further long-term monitoring.
- Supplemental retention should occur where needed (i.e., within 20-acre analysis windows characterized by deficits of existing snags) rather than flexibly within and across regeneration treatment units.

Snag retention guidelines compiled from Bollenbacher et.al (2009) are included in Table 9-7.

Table 9-7) Snag retention (snags/acre) project-level goals based on mean values for late-seral conditions as described by Bollenbacher et.al (2009).

Source	Fire Group	Habitat	Habitat Title	Mean Snags/Acre (≤ 20 acre blocks)		
				15"-19.9" DBH	≥ 20"DBH	Total
Smith & Fischer, 1997 (Fire GRP) Bollenbacher et.al., 2009 (snags)	Warm, Dry DF & PP (Fire GRP 1)	PIPO/FEID	ponderosa pine / Idaho fescue	2.0	2.2	4.2
		PIPO/SYAL	ponderosa pine / common snowberry			
		PSME/SYAL	Douglas-fir / common snowberry			
	Warm, Dry to Moderate DF, GF, & PP (Fire GRP 2)	ABGR/PHMA	grand fir / ninebark	2.0	2.2	4.2
		PIPO/PHMA	ponderosa pine / ninebark			
		PSME/PHMA	Douglas-fir / ninebark			
		PSME/VACA	Douglas-fir / dwarf huckleberry			
	Moderate and Moist GF (Fire GRP 7)	ABGR/CLUN	grand fir / queencup beadlily	3.8	5.1	8.9
		ABGR/LIBO	grand fir / twinflower			
		THPL/CLUN	western redcedar / queencup beadlily			

Smith, J., & Fischer, W., 1997. *Fire Ecology of the Forest Habitat Types of Northern Idaho.*
Bollenbacher, B., Bush, R., & Lundberg, R. 2009. Estimates of Snag Densities for Northern Idaho Forests in the Northern Region.

FMP guidelines may be modified to realize defined DFCs (e.g., elimination of seed sources of late-seral species as a climate adaptation strategy) through project-level collaboration (i.e., Interdisciplinary Team review for which includes the NPT Wildlife Division) that incorporate peer-reviewed, scientific advancements.

9.7.1 Supplemental Information

9.7.1.1 Forest Structure and Wildlife

Vegetative structure is an important component of wildlife habitat in forested environments. Structure includes both the vertical and horizontal distribution of vegetation from the stand to landscape levels. Variability in forest structure (i.e., structural diversity) promotes habitat heterogeneity which is often found to be positively correlated with animal species diversity (Tews et al. 2003).

Structural diversity increases as the variability of both living and nonliving ecosystem components increases. Tree and plant species, condition, size, form, distribution, orientation, etc. all contribute to structural diversity in a forest. Many elements of structural diversity, such as rotting logs and snags, provide hiding places for wildlife and attract insects and fungi which serve as food for wildlife. These elements make a very large contribution to the species richness and ecology of an area.

- **Vertical structure** describes the distribution of vegetation from the ground up to the top of the canopy. Vertical structure is important because in a forest with well-developed strata, a diverse array of plants and animals can coexist. Maintaining vertical structure guarantees that a large variety of plants and wildlife will be present and can thrive. Overall, a diverse forested ecosystem with species richness and complexity will buffer the ecosystem against environmental stresses and disasters, making it more stable and resilient.
- **Horizontal structure** refers to the distribution and spacing of vegetation. At the stand level, horizontal structure would refer to tree spacing and distribution. Stands may be composed of trees that are more evenly spaced and provide more uniform cover or trees may be unevenly spaced and occur in clusters with larger gaps between groupings. At the landscape level, transitions between distinct stand types constitute horizontal structure. This can include a transition in species composition, average tree size, age class, spacing, etc. Although the vertical structure of even aged stands is often limited in complexity, it can become increasingly variable at the landscape level as horizontal structure becomes more complex. Even when species composition is uniform, stands differing in age can increase the horizontal structure and, therefore, vertical structure of even-aged stands at the landscape level (Culbert et al. 2013).

Another aspect important to wildlife habitat is forest succession. As a forest changes through succession, its structure also changes. More species can coexist in a forest with multiple layers than in a forest where all the trees are the same height. Vertical diversity is greatest in forests composed of trees of all sizes. Within similar forests, vertical diversity is greater in areas with fewer deer. Large deer and ungulate populations often browse and remove the lower stratum of vegetation. This can result in a “bottom up” effect on the overall health of the ecosystem.

9.7.1.2 Forest Strata and Wildlife

Wildlife utilizes forested ecosystems differently due to the different strata or, what is commonly referred to as, layers in a forest. A forest contains five types of strata: emergent, canopy, midstory, understory and ground. Each layer offers a unique set of habitat features. Wildlife species have adapted to these layers and are dependent upon the different vegetation and features each strata provides. Many wildlife species, particularly birds, divide their habitat vertically. For example, ovenbirds, tanagers, and chickadees are all found in mature forests, but ovenbirds feed mostly on the ground, tanagers prefer the canopy top, and chickadees like intermediate heights.

<u>Upper and Middle Strata</u>

The canopy (upper) is home to a diverse group of birds, insects, and arboreal mammals. The canopy contains larger mature limbs which often produce the highest yield of cones and fruits, providing an abundant, stable source of food for wildlife. The branches and needles are inhabited by insects and their predators, including fly-catching birds, arboreal mammals, and conifer squirrels.

The canopy is utilized by migrating species as a source of shelter throughout the year. The dense, year-round canopy provides thermal cover for overwintering chickadees or Stellar’s jays. It also provides shade for larger, heat sensitive species such as deer, bear, and elk in the warmer months. The canopy provides roosting and nesting habitat for wildlife like owls, larger predatory birds, and mature forest nesting birds such as woodpeckers, warblers, tanagers, and others.

Below the canopy is the midstory strata (middle). The midstory layer can be described as the layer of trees in between the smallest and tallest trees. In this layer trees are often in different successional stages. Having an uneven aged forest yields greater diversity of flora and fauna in an ecosystem. The midstory is inhabited by smaller, nut and insect eating birds such as chickadees, nuthatches, creepers, kinglets, and others. Similar species that utilize the canopy can also be found here, primarily to nest, as many bird species build their nests 5-15 ft off the ground. The midstory contains forest regeneration (saplings) which is critical habitat for many forested bird species along with snags, and other suitable habitat trees. The midstory provides ample nesting and foraging conditions for species like wood thrush, nuthatch, veery, and others.

Wildlife Habitat Trees

Habitat trees have been defined as "standing live or dead trees providing ecological niches (microhabitats) such as cavities, bark pockets, large dead branches, epiphytes, cracks, sap runs, or trunk rot" (Bütler et al. 2013). Habitat trees are of ecological importance as they provide shelter from predators, nesting habitat for cavity nesting bird species, habitat and forage for reptiles, insects, and arachnids, etc. Furthermore, as the tree decays, and insects inhabit the tree, an increase in forage opportunities occurs for birds and arboreal mammals.

These microhabitats are used by numerous animals, plants, and fungi as a place to live, forage, and breed. For example, vascular plants, mosses, lichen, and fungi utilize the tree as a source of nutrients. Birds may use the branches to roost, nest, sing, or hunt.

On living trees, cavities may be formed naturally, such as when a large branch breaks and the exposed wood begins to rot, or they may be excavated by primary cavity nesters such as pileated woodpeckers or northern flickers. Bark pockets may be associated with a particular tree species that has naturally peeling bark, or they may occur on a dead tree on which the bark has begun to slough off as part of the decay process. Overall, standing dead trees, also known as snags, and dying trees are thought to benefit hundreds of species.

Snags

Snags provide essential habitat for many wildlife species. Snags support insect populations which provide a food source and suitable nest sites for many cavity-dependent bird species. They also provide perch sites for non-cavity nesting birds such as raptors, as well as denning and resting sites for mammals such as marten, raccoons, red squirrels, and bats.

Many species of birds are dependent on snags for nesting, roosting, and foraging sites. Densities of cavity-nesting birds are known to increase with increasing snag density. Snag dependent birds include primary excavators, those that excavate their own cavities, such as woodpeckers and most nuthatches, and secondary cavity nesters, those that use naturally occurring cavities or cavities excavated by primary excavators. Examples of secondary cavity nesters include bluebirds, most owls, and some ducks, swallows, and swifts.

Snag dependent cavity nesting birds select snags according to their stage of decomposition, diameter, height, and tree species and utilize cavities based on opening diameter, cavity size, and the degree to which it provides protection from weather and predators. Snags provide important wildlife habitat at all stages of decomposition as different species of birds have adapted preferences for differing decay classes. Younger snags, called hard snags, are composed of sound outer wood, and may still retain loosely attached bark. Older snags, called soft snags, are composed of soft decayed wood. Some primary excavators such as the Black-backed, Three-toed, and Pileated woodpeckers, and the sapsuckers prefer hard snags for excavating nest sites. Hard snags still retaining bark are important for such species as the brown creeper which nest and roost under loose bark. Other excavators such as flickers and hairy and Lewis' woodpeckers excavate nest sites predominantly in soft snags in the later stages of decomposition. Soft snags are also important for feeding sites for many species of birds.

Cavity nesting birds tend to prefer clumps of larger diameter snags in a stand for nesting. In general, larger birds tend to prefer larger diameter and taller snags for nest sites. It is important to note that most cavity nesters that prefer smaller diameter snags will use larger diameter snags, however the reverse for species preferring large diameter snags is not true. Therefore, larger snags provide habitat for more species of cavity nesters than do smaller diameter snags.

Studies show cavity nesting birds prefer specific species of trees for nest sites. Some research suggests that additional 'redundant' snags may be necessary. Woodpeckers may use 1 to 3 snags each year, but for every snag used, there were 15 unused snags. Whether these 'extra' snags play a specific ecological role is unclear. For species of trees present on the Reservation, the order from most to least preferred are hardwood species, ponderosa pine, western larch, western red cedar, Douglas-fir, subalpine fir, Engelmann spruce, and grand fir.

<u>Lower Strata</u>

The understory contains the highest diversity of plant species in the forest ecosystem. It is made up of plants such as small trees, shrubs, herbs, grasses, mosses, and lichens. This high level of plant species diversity in the understory is responsible for an increased diversity of fauna species. The understory also contains down dead woody material and leaf litter which are of ecological importance to not only wildlife but also overall forest health. These materials decompose, providing vital nutrients back into the soil and overall ecosystem.

The understory can provide an abundant amount of cover, habitat, and forage for species like deer, squirrels, frogs, salamanders, insects, birds, etc. An understory which is dense and lush provides habitat corridors or highways that wildlife use to escape predators, travel faster, or hunt. Bird species like grouse and other ground nesting species build their nests among the tall grass. Frogs and other reptiles hide in leaf litter to avoid predation and regulate body temperature.

If the understory were removed from a forested ecosystem, it would reduce the diversity of flora and fauna, disrupt the balance between predator and prey species, and ultimately collapse the system in its entirety, such as occurs in areas of high severity wildfire.

Down Dead Woody Material

Dead and down woody material (DDWM) on the forest floor provides important habitat for many species of plants, fungi, and wildlife (vertebrates and invertebrates). DDWM ensures short to medium-term wildlife habitat. Size classes greater than 15 inches in diameter provide greater benefits than smaller materials for wildlife. Additionally, logs and larger diameter coarse woody debris are more important as wildlife habitat since they persist longer on the forest floor and provide a variety of important habitats throughout their decay process.

Wildlife use downed logs for a variety of reasons including cover, foraging, and denning. In general, early use is external and use in later stages of decomposition is internal. Logs decaying on the forest floor provide habitats for a variety of wildlife species through all decay classes. Larger logs can provide hiding cover for bears, elk, and deer. Root wads and branches are used as perching, grooming, and feeding sites by forest dwelling birds. Logs that are supported off the ground by remaining branches provide cover and denning sites for hares and rabbits as well as cover, nesting, and courtship habitat for forest grouse. Hollows in logs can also be used for cover and denning by a variety of other mammals such as skunks, woodrats, and raccoons as well as for nesting by wrens and bluebirds. Downed logs are also used as runways and feeding sites by many species of small mammals such as chipmunks and squirrels.

As downed logs start to "settle" into the forest floor, particularly larger diameter logs, they provide habitat for fungi, ectomycorrhiza, and plants that support small mammals such as mice, voles, and shrews which in turn provide an important prey base for foraging small forest carnivores, such as coyotes, weasels, and American marten, and birds of prey, such as owls and sharp-shinned hawks. In addition, DDWM provides important thermal cover during winter months and natal den sites for small forest carnivores.

As the wood becomes softer, it provides an increasingly important habitat for small mammals, reptiles, and amphibians that burrow in and around the decaying wood. Use by plants and animals increases as logs decay. Older decaying logs also provide important foraging sites for cavity nesting birds such as the pileated woodpecker.

Timber harvesting can create large amounts of woody debris. Methods used for slash disposal and site preparation are the overriding factors determining the character, density, and distribution of DDWM and consequently also heavily influences the wildlife species composition capable of using managed forest habitats. Though maintenance of DDWM can conserve long term site productivity, DDWM cannot replace mineral soil lost due to logging practices. Logging practices that incorporate proper management of DDWM can increase soil organic matter, reduce levels of soil compaction and reduce mineral soil loss from erosion.

9.8 Climate Change

This section includes general actionable items that may be considered when implementing forest management strategies. These items are only recommendations, but their utilization may help Tribal forestlands become better adapted to a changing climate.

Refer to section 10 (Appendix C: Climate Change Impacts & Adaptation) for supplemental information about the impacts of climate change and an example of a framework for the implementation of climate change mitigation strategies.

Considerations for Reforestation and Timber Stand Improvement with Climate Change

The following activities/practices can be considered in reforestation to prepare forest stands for a warmer climate:

- For each species, conduct a brief review of the scientific literature to determine if there are new genetic considerations about the species of interest. For instance, there are varieties (or haplotypes) of ponderosa pine and Douglas-fir that are common in different portions of the U.S. with traits adapted to local climates (for PP see: Shinneman et al. 2016 and Willyard et al. 2021 for DF see: Rehfeldt et al 2014).
- If possible, identify areas that may have plant material from a similar lineage to reduce any maladaptation or issues when breeding with local varieties. For example, ponderosa from central and western Montana and western Nevada and eastward differs genetically from those historically grown on the Nez Perce Tribe reservation and westward.
- Establish trial plots of plant material from other regions (and/or varieties) prior to large-scale reforestation projects to test the viability of these materials locally.
- Plant a mix of species versus a single species.
- Choose planting materials that are tolerant of or resist local pests and disease.
- Refer to species guides in soil surveys.
- Use the planting guidelines for the next drier plant association.
- Include large openings in plantings to meet other resource needs as noted in the IRMP.
- Maintain variability in species and tree architecture in some locations.
- Adjust the timing of planting to maximize soil moisture for new seedlings.
- Remove competing vegetation and control ungulate browsing to facilitate seedling establishment.

Climate Adaptation Strategies and Tactics for Forest Management

General tactics for addressing the impacts of climate change through forest management planning and the implementation of forest management practices are outlined in Table 9-8.

Table 9-8) General tactics for addressing the impacts of climate change through forest management planning and the implementation of forest management practices.

	Climate Change Sensitivity	Strategies	Tactics	Silvicultural Phase
1A	*Climate change will lead to increased opportunity for invasive species establishment*	Maintain integrity of native plant populations and prevent invasive species invasions.	Prevent invasive plant introductions during projects (e.g., consider native and climate-adapted species for post-disturbance planting)	Establishment/Regeneration
2A	*Climate change will increase the potential for mortality events and regeneration failures.*	Mitigate consequences of large disturbances by planning ahead.	Maintain a tree seed inventory with high-quality seed for a range of species, particularly species and genotypes that may do well in the future under hotter and drier conditions.	Intermediate/Improvement; Replacement/Final Harvest
2B		Use assisted population expansion (assisted migration) where appropriate.	Relax seed zone guidelines to include genotypes from warmer locations; use a variety of genotypes rather than just one.	Establishment/Regeneration
2C		Adapt silvicultural treatments and practices in response to changes in forest growth	Regularly update net forest growth and annual allowable cut estimates based on monitoring data and modeling of how growth of different forest types is affected by climate change.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
3A	*Climate change will increase forest drought stress and decrease forest productivity at lower elevations.*	Increase drought resilience in forests.	Increase the amount of thinning and possibly alter thinning prescriptions (e.g., reduce forest density more than in the past).	Intermediate/Improvement
3B		Maintain and enhance forest productivity regardless of tree species; focus on functional ecosystems and processes.	Manage species densities to maintain tree vigor and growth potential.	Intermediate/Improvement; Replacement/Final Harvest
4A	*Increased warming, drought, and wildfire will reduce tree vigor and increase susceptibility to some insects and pathogens, with increased potential for large outbreaks.*	Increase resilience of forest stands to disturbance by increasing tree vigor.	Thin to decrease stand density and increase tree vigor and resistance against insects and pathogens. Reduce density of post-disturbance planted stands.	Intermediate/Improvement Establishment/Regeneration; Intermediate/Improvement
4B		Promote diversity of forest age and size classes.	Diversify large contiguous areas of single age and size classes.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
4C		Reduce dominance of root disease-sensitive species (e.g., Douglas-fir and grand fir) on sites prone to root disease.	Thin species susceptible to root disease where less susceptible species (e.g., ponderosa pine) are abundant.	Intermediate/Improvement
5A	*Increased temperatures and lower snowpack will result in more fire (larger aerial extent and more high-severity*	Plan and prepare for greater area burned.	Plan post-fire response for large areas. Consider planting fire-tolerant tree species following fire in areas with increasing fire frequency.	Establishment/Regeneration; Replacement/Final Harvest

	patches) and more area in recently burned or early successional stages.			
5B			Support management efforts (Good Neighbor Authority, fuel treatments, and others) for fire risk reduction on federal lands.	
5C			Develop plans to prioritize and conduct salvage logging after fire and other disturbances.	
5D		Increase resilience of existing vegetation by reducing hazardous fuels and maintaining low densities.	Use prescribed fire and/or mechanical treatments to maintain structure and promote fire-tolerant conifer species.	Establishment/Regeneration; Intermediate/Improvement
5E			Conduct thinning treatments (pre-commercial and commercial).	Intermediate/Improvement
5F			Install strategic fuel breaks, particularly around high-value stands.	
6A	*Disturbances will alter ecosystem structure, species distribution, and species abundance across large landscapes.*	Maintain and restore species and age class diversity.	Identify and map high-risk areas (drought, fire, insects, disease) across large landscapes to help set priorities for treatments.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
6B		Create landscape patterns that are resilient to expected disturbance regimes.	Manage for diversity of structure and patch size with prescribed fire and mechanical treatments.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
7A	*Climate change will likely result in increased tree mortality and loss of site conditions that support vulnerable species.*	Promote resilience in areas with vulnerable species and increase resistance to mountain pine beetle.	Strategically use anti-aggregation pheromones to reduce mountain pine beetle damage on susceptible tree species.	Establishment/Regeneration; Intermediate/Improvement;
8A	*Climate change will lead to loss of large ponderosa pine individuals in ponderosa pine forests through increased risk of stand-replacing wildfire and mortality from drought.*	Decrease density within stands and increase structural diversity across the landscape.	Promote age-class and structural diversity across the landscape, through regeneration harvest, thinning, prescribed fire, and wildfire use.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
9A	*Shifts in the hydrologic regime will occur with climate change; anticipated changes include lower summer flows and higher winter flows.*	Maintain and promote riparian processes and functions.	Manage upland vegetation in areas where it influences riparian function and process (e.g., with thinning and prescribed fire).	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest
10A	*Climate change may increase disturbance interactions, in some cases compounding disturbance effects.*	Increase post-disturbance planning, management, and treatment implementation.	Create a strategy and develop criteria to prioritize areas that are more likely to recover after disturbance (e.g., critical habitats, population served by disturbed habitat). Promote species and genotypes that are resistant and resilient to disturbance.	Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest Establishment/Regeneration; Intermediate/Improvement; Replacement/Final Harvest

10 APPENDIX B: CLIMATE CHANGE IMPACTS & ADAPTATION

10.1 CLIMATE CHANGE OVERVIEW

Global temperatures are rising due to increased greenhouse gas emissions emitted by human activities. In Idaho, temperatures have risen almost 2 °F since the beginning of the 20th century. With warmer temperatures, the growing season has increased 3.9 days per decade from 1975 to 2010. Higher temperatures have resulted in more warm nights with minimum temperatures at 65 ˚F or higher, and fewer very cold nights with minimum temperatures of 0 ˚F or lower. Snowpack accumulation in the mountains is the state's major source of water, and it has generally declined since the mid-20th century. Higher temperatures have led to more rain than snow at middle and lower elevations.

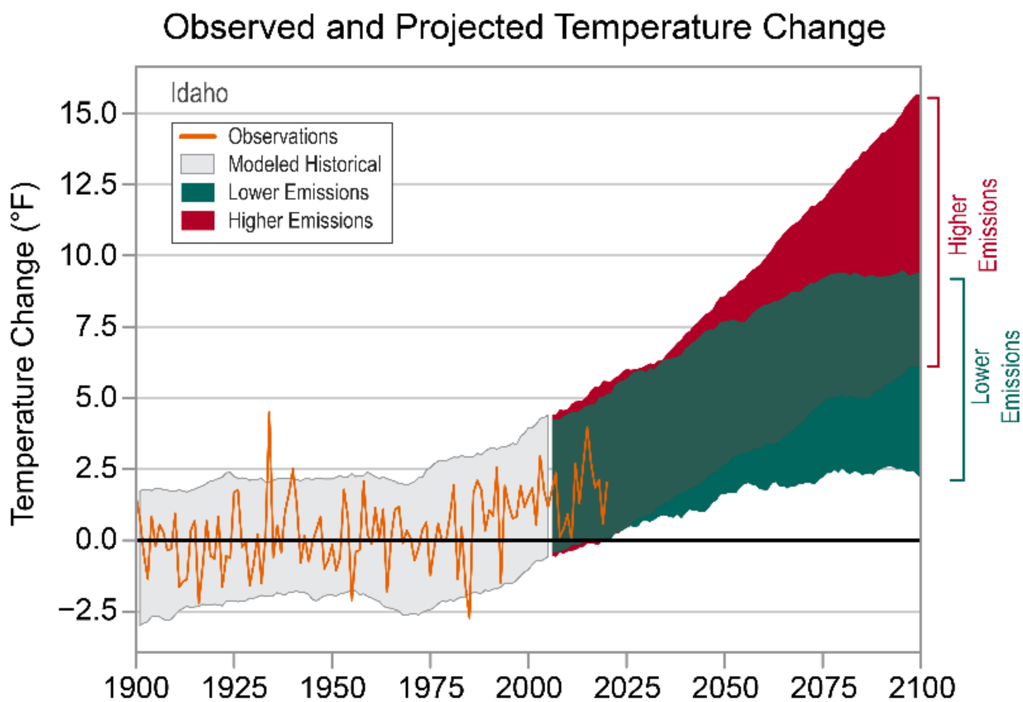


Figure 10-1) Representative Concentration Pathway 8.5

By mid-century, temperatures are projected to increase across Idaho. For the Nez Perce Reservation, the historical annual average temperature was 47.8˚F. For a high greenhouse gas emissions scenario (Figure 10-1), global climate models project average annual temperatures to increase by 2.9 ˚F in 2010–2039, 6.0 ˚F in 2040–2069, and 9.6 ˚F in 2070–2099. Higher temperatures will result in more heat waves, and more precipitation falling as rain rather than snow. Higher spring temperatures will result in earlier snow melt, reducing water availability in the dry summer months. On the Nez Perce Reservation, snow on the first of April was historically 0.2 inches of snow water equivalent. Increases in temperatures are projected to result in no snow or snow water equivalent on 1 April for all future climate periods.

Future precipitation projections are more uncertain than those for temperatures. For Idaho, the period of record for total annual precipitation is characterized by high interannual variability and no overall pattern. For Idaho, climate models project increases in winter and spring precipitation and decreases in summer precipitation over this century. For the Nez Perce Reservation, total annual precipitation is projected to increase slightly from historical levels (+0.4–1.9 inches). However, even with more precipitation, water stress will increase because higher temperatures will dry soils and plants will require more water. Extreme precipitation events are projected to be more frequent, and combined with higher winter and spring precipitation, will increase flood risk.

10.2 Climate Change Impacts on Forest Ecosystems

Climate change has the potential to significantly alter the structure, function, and use of forest ecosystems (Thiffault et al. 2021). Warmer and drier conditions are expected to influence soil moisture, which will alter the abundance, growth, and distribution of various tree, shrub, and grass species. For example, drier conditions will be stressful to less drought-tolerant trees like grand fir, and favor species that are more drought tolerant, such as ponderosa pine (Halofsky et al. 2018). Climate change is also expected to increase the frequency and extent of wildfire and insect outbreaks, with disturbances driving changes in vegetation (Halofsky et al. 2018). Climate change impacts to forest systems also have social, cultural, and economic effects. Therefore, adapting to the projected effects of climate change needs to occur in the context of environmental, social, cultural, and economic values and goals.

10.2.1 Disturbance

10.2.1.1 Insects and Disease

Climate change is expected to increase the effects of some insects and diseases in forests and reduce the effects of others. However, each species of insects and pathogens will be affected differently by climatic changes and host responses. There is some uncertainty about how some species will respond to climate change, and there may be some surprises in terms of which insect and pathogen species cause widespread mortality in the future. For example, flatheaded fir borer was historically a secondary mortality agent in Douglas-fir in southwestern Oregon, but it has become a primary mortality agent across large areas with drought in southwestern Oregon over the last decade.

Temperature is a major driver of physiological processes in insects, and most insect species will be affected in some way by climate change. Enhanced winter survival and shortened generation times due to warming may facilitate larger populations of some insects, particularly those with multiple generations per year. Trees that are stressed by drought are often more susceptible to insects. Cambium feeders, such as bark beetles, are associated with prolonged droughts, in which tree defenses are compromised. Stressed trees are also likely to be more susceptible to wood borers and defoliators.

The effects of weather and climate on fungal pathogens differ by species, with the spread of some pathogens facilitated by drought and others by wet periods. Forests with low vigor and physiologically stressed trees (e.g., dense stands) are often more susceptible to fungal pathogens. The most substantial effect of climate change related to forest diseases will likely involve changes in the interactions of pathogenic fungi with trees stressed by drought and other environmental factors. For example, drought-stressed trees have increased vulnerability to Armillaria root disease infections. See below and Table 1 for additional information on which insects and pathogens may affect tree species on the Nez Perce Reservation with climate change.

10.2.1.2 Wildfire

A long period of warm, dry weather is needed to make fuels dry enough to be flammable if an ignition occurs. In central Idaho, fuel dryness and flammability peak between July and September in a typical year. Lightning strikes during periods of convective storminess also peak during this time, as does recreational activity, another source of ignitions.

Annual area burned by wildfire in the western United States, including Idaho, has increased significantly over the past 30 years (with high interannual variability), although fire frequency has not increased. Droughts are projected to increase in future decades as summers get hotter and drier, driving lower fuel moisture and longer periods during which wildfires can occur. This will increase the frequency and extent of fires compared to the 20th century. A major effect of climate change on fire will be the increase in fire danger over the course of the summer, including an extension of the fire season into early and late summer. In the area of the Nez Perce Reservation, the annual number of “very high” fire danger days (based on 100-hour fuels) is projected to increase as much as 20 days by the middle of the 21st century. This will affect ecological conditions, management, fire preparedness, and fire suppression.

Historical fire exclusion reduced area burned in lower-elevation dry forests prior to around 1990, in many cases leading to dense stands and elevated surface fuel loading and ladder fuels. As a result, high-intensity crown fires have become more common in Western dry forests. As noted above, a warmer climate is expected to facilitate more wildfires, and this will in turn lead to high-severity fires in locations with elevated fuel loading. In addition, riparian areas that have rarely experienced wildfire in the past may be more susceptible to fire if a warmer climate reduces fuel moisture in riparian areas, and fire spreads from adjacent upland forests.

Interactions among wildfire, insect outbreaks, and other disturbances are expected to become significant drivers of ecosystem change in a warmer climate. Reburns are likely to occur more frequently, which would make tree regeneration—both natural seeding and planting of nursery stock— more challenging. Hotter, drier sites (e.g., south aspects) and lower elevational treeline will likely have the highest risk for regeneration failures.

10.2.2 Species-Specific Information

The information included in this section is summarized in Table 10-1 (at the end of the section).

10.2.2.1 Low-elevation Conifers

Douglas-fir (papas/páaps)

In the Northern Rockies, on low-elevation dry sites, Douglas-fir is often associated with ponderosa pine and juniper, with greater dominance of Douglas-fir on wetter sites (e.g., north and east aspects, drainages). In more montane, moist sites, Douglas-fir can be associated with western larch, western white pine, grand fir, and western redcedar. As a moderately shade-tolerant species (more than ponderosa pine, lodgepole pine, and western larch), Douglas-fir often establishes after a disturbance; early-seral, shade-intolerant ponderosa pine can provide canopy cover to facilitate Douglas-fir survival. Fire exclusion and logging have, in some cases, resulted in stands where Douglas-fir is now dominant in areas where wildfire was formerly frequent, also increasing stand density and fuel loading.

Older Douglas-fir have a moderately high ability to survive fire due to their thick bark and deep roots, but they are not as fire resistant as ponderosa pine and western larch; young Douglas-fir are less likely to survive fire. Sites with frequent, low-intensity fire tend to limit Douglas-fir growth and establishment, favoring species like ponderosa pine and western larch. High-density stands contribute to the risk of high-severity fire and insect outbreaks because of reduced tree vigor.

Moisture and temperature are limiting factors for survival and growth of Douglas-fir. As a “drought tolerator,” Douglas-fir can withstand drier conditions than most competitors (except ponderosa pine) but is susceptible to xylem cavitation at extremely low levels of moisture availability. Projected increases in temperature, drought, and wildfire frequency may present challenges for Douglas-fir in some locations, particularly for regeneration of seedlings at low elevations and areas with high heat load. Vapor pressure deficit (VPD) and climate water deficit (DEF) are sensitive to temperature change. Higher temperatures during the growing season without increased precipitation or soil moisture reserves will increase VPD and DEF, reducing the growth of Douglas-fir.

Grand fir (pítxpitx)

Grand fir grows in a variety of locations, including stream bottoms, valleys, and mountain slopes, and grows best in mineral-rich soils. It is well established in most grand fir habitat types on the Nez Perce Reservation. As a shade-tolerant tree, it can become dominant over time. Grand fir has low drought tolerance, so soil moisture is a limiting factor, and it has low frost tolerance. Fire exclusion in some locations has resulted in dense stands where grand fir has been able to thrive under shaded conditions.

Susceptibility of grand fir to fire depends on its root depth and bark thickness. It is more fire resistant than subalpine fir and Engelmann spruce, but less resistant than ponderosa pine, western larch, and Douglas-fir. Higher temperature and longer growing seasons may be favorable for grand fir on some mesic sites. However, increased drought stress and fire frequency will likely reduce the abundance of grand fir on the Nez Perce Reservation and more broadly across the Pacific Northwest.

Pacific yew (támqay)

Although limited in abundance and distribution on the Nez Perce Reservation, Pacific yew is still an important species to the *Nimiipuu.* Traditionally an “understory specialist,” yew is shade tolerant and is predominantly found as a smaller, shrubby tree underneath closed canopies of mixed conifer forest. As a shade-tolerant species, yew does not do well in direct light and suffers when canopies are opened (e.g., following timber harvest). It requires high soil moisture in addition to shaded conditions for successful seed establishment.

Various biochemical compounds in the needles and bark provides yew with resistance to most insects. However, because Pacific yew has low fire resistance and low drought tolerance, this species will be increasingly vulnerable in a warmer climate, especially in dense stands.

Ponderosa pine (láqa/ láaqa)

Ponderosa pine is a shade intolerant species and establishes well in open, post-disturbance sites. Ponderosa pine is more fire tolerant than any other western conifer species except western larch. Historically, ponderosa pine thrived with relatively frequent, low-intensity fires, resulting in large, mostly pure stands. Frequent fires prevented establishment of competing species, including regenerating ponderosa pine. Logging and fire exclusion have led to in-growth of shade-tolerant species in the understory of ponderosa pine forests and accumulation of dead and downed woody material (high surface and ladder fuels). Dense stands often have low vigor and are more susceptible to crown fires that can kill mature ponderosa pines, reducing seed availability for regeneration.

Soil moisture is the primary limiting factor for ponderosa pine growth. However, as "drought avoiders," they can close their stomata during periods of limited moisture availability to avoid water loss and xylem cavitation. This allows ponderosa pine to tolerate drier soils at lower elevations and on south and west aspects.

Regeneration success of ponderosa pine seedlings is limited by soil moisture and temperature; young seedlings are particularly susceptible to low temperatures and frost damage. However, once seedlings are >110 days old, they can withstand higher temperatures than associated species, thus being reasonably tolerant of a warmer climate. Microsite conditions such as soil texture influence local soil moisture, plant competition, and seedbed conditions.

Ponderosa pine will likely be able to withstand higher temperatures and drier soils (longer periods of drought) with moderate difficulty in a changing climate. However, increased wildfire severity and competition from in-growth of other tree species will continue to be stressors where fire has not occurred for several decades.

Western larch (kimíle)

Western larch is moderately shade tolerant and typically found on mesic sites. With thick bark and high crowns, it is the most fire-resistant tree species in the West. Seedlings regenerate well in post-disturbance sites with an open, high-light environment. However, high temperature and low soil moisture on exposed sites can reduce seedling survival, especially on south and west aspects.

Limiting factors to growth of western larch include low soil moisture at lower elevations and low temperature at higher elevations. Early season survival of seedlings is affected by cold temperatures and frost periods; mid- to late-season survival can be affected by drought. Western larch has low to moderate tolerance to drought and low water-use efficiency, making it particularly susceptible to long-term drought and low precipitation. Although larch can survive mixed-severity and even high-severity fires, drought susceptibility and moisture sensitivity may limit establishment and growth in the future.

Western redcedar (talátat)

Western redcedar grows predominantly on sites with adequate year-round soil moisture. In more inland ranges, it grows along rivers and in ravines where its roots have access to moisture. Even on sites where moisture is available, redcedar is potentially susceptible to freezing temperatures and frost damage. It is highly shade tolerant and has low drought tolerance. Partial shade is best for seedling establishment; vegetative propagation of branches sometimes occurs in partially shaded, moist sites.

With projected warmer temperatures, the productivity of western redcedar on mesic sites may increase; however, increasing droughts will be unfavorable for western redcedar, and its distribution may contract to sites with adequate moisture and warm temperatures. Redcedar has moderate fire tolerance. The impacts of fire in the future are uncertain, as redcedar may survive low-intensity fires, but high-intensity fires may cause significant mortality and kill potential seed sources, especially where fuel loading is high.

Western white pine (séysey)

Western white pine is limited by soil moisture at lower elevations and temperature at higher elevations. It grows in diverse soil types, and is most commonly found on moist creek bottoms, benches, and north aspects. White pine seeds require 20 to 120 days of cold, moist conditions to germinate, and germination length varies depending on shade and sunlight on different aspects. Seedlings are highly sensitive to drought. Once established, white pine grows best in full sunlight. White pine establishes well after fire and can tolerate relatively high temperatures, a benefit in the future.

Western white pine is severely affected by white pine blister rust, which has decimated current populations and may limit future populations. Without enough rust-resistant individuals, the success of wine pine in the future will most likely require intensive restoration and management efforts. Armillaria root rot and annosus root disease are observed on Nez Perce forest lands and are the primary root diseases of western white pine. Trees that have been weakened by blister rust are particularly susceptible to insects. The combined effects of more frequent fire, low resistance to blister rust, higher insect activity, and the rate at which succession occurs to more shade-tolerant stands may limit the future success of western white pine in the absence of significant management efforts.

10.2.2.2 Mid-high Elevation Conifers

Engelmann spruce (heslíps)

Engelmann spruce is shade tolerant and normally grows in high-elevation, cold forests that have short, cool summers. It is very cold tolerant and can be found in lower elevation frost pockets. It is drought intolerant, with high temperatures and drought being primary contributors to seed and seedling mortality within their first five years of establishment. If Engelmann spruce survives its first five years, the best conditions for continued growth are adequate soil moisture, some shade, and cool temperatures.

Engelmann spruce is susceptible to fire and windthrow. Increased fire frequency may result in fire mortality and damaged trees that are susceptible to insects. However, spruce may also regenerate successfully by dispersing seeds on post-fire sites that have exposed mineral soil.

Significant spruce mortality events have been recorded over the last few decades, most likely linked to drought and high temperatures. However, Engelmann spruce adapts well in different microsites and can survive in wet soils. This may allow it to persist in sites where high snowpack previously prevented conifer regeneration, but in a warmer climate, will transition to subalpine wet meadow or seasonal wetlands.

Lodgepole pine (qalámqalam)

Lodgepole pine grows in a variety of site conditions, including shallow and relatively infertile soils, but grows particularly well on moist soils on gentle slopes and in basins. Lodgepole pine is resistant to frost injury, surviving in frost pockets where other species cannot, and they have relatively high drought tolerance. Lodgepole pine requires less water than some of its associates like subalpine fir, but more water than Douglas-fir and ponderosa pine. Lodgepole pine is moderately shade tolerant, establishing best in post-fire sites where its seeds can take advantage of full sunlight. Lodgepole pine regeneration is facilitated by serotinous cones (in most populations in Idaho and western Montana), high quantity and viability of seeds, and the ability to withstand a range of microsite and soil conditions.

Wildfire helps reduce competing vegetation, providing a viable seedbed for lodgepole pine (whether from serotinous cones or windblown) to establish in high-light conditions. Lodgepole pine communities appear to have a mixed-severity fire regime, so there is a strong likelihood that the species is better adapted to future fire conditions than its associates and will recruit well in post-fire sites. However, repetitive fires (within 10 years of each other) can prevent seedlings from becoming reproductively mature while also killing mature seed sources.

Mountain pine beetle can cause significant damage and mortality to lodgepole pine, and beetle populations often expand greatly during drought periods. Warmer, drier summers may also contribute to succession of more xeric species like ponderosa pine, especially at lower elevation and on south aspects. In general, lodgepole pine may expand and contract in its range in response to climatic variability and change, but the continued presence of fire on the landscape will generally support its survival.

Subalpine fir (patóysiwey)

Subalpine fir grows in the coolest and wettest forest areas of the northwestern United States. Mild summers, cold winters, and deep winter snowpack are more important than precipitation for determining where the species will grow. Therefore, it typically grows at high elevations and can be found at treeline or in lower drainages.

Subalpine fir is frost tolerant and drought intolerant, with drought limiting seedling establishment. As a shade-tolerant species, subalpine fir establishes best in partial shade but can grow in a variety of light conditions. The species can persist in shaded conditions in relatively dense mixed stands, eventually becoming the climax species. However, subalpine fir is highly susceptible to fire damage and is generally killed where fires occur; post-fire regeneration is slow depending on distance from seed source.

In recent decades, a combination of dense stands and severe drought has increased susceptibility to insect and disease damage and mortality, particularly in high-elevation stands. These low-vigor stands are vulnerable to high mortality from wildfire, which could also eliminate seed sources across large areas.

Subalpine fir may compete well against associated shade-tolerant species, and growth may increase at higher elevations due to a longer growing season (less snowpack). However, seedling establishment may be a deciding factor for subalpine fir success in the future, as seedlings require long periods of high soil moisture for germination, conditions that may occur less frequently in the future.

Table 10-1) Summary of species-specific vulnerabilities and management considerations for the Nez Perce Tribe forests.

Species	Low Soil Moisture & Drought Tolerance	Shade Tolerance	Fire Tolerance	Insects	Disease	Management Considerations
Low-elevation conifers						
Douglas-fir	Moderate to high	Moderate	Moderate	Western-spruce budworm, Douglas-fir tussock moth, Douglas-fir bark beetle, and flatheaded fir borer.	Armillaria root rot, annosus root disease, and red ring rot.	Mature trees have greater fire tolerance than seedlings; Douglas-fir does not do well in areas of frequent low-intensity fire. Moisture and temperature are limiting factors for growth.
Grand fir	Low	High	Moderate (Susceptibility depends on its root depth and bark thickness)	Western spruce budworm, Douglas-fir tussock moth, western balsam bark beetle, and fir engraver.	Armillaria root rot and annosus root disease.	Moisture is a limiting factor, and grand fir has low frost tolerance. Higher temperatures and longer growing seasons may be favorable to grand fir on mesic sites. However, increased fire frequency and drought will likely reduce the abundance of grand fir on drier sites.
Pacific yew	Low to Moderate	High	Low	Due to various biochemical compounds in the needles and bark, pacific yew does not appear to be particularly susceptible to insects; however, continued monitoring for future insect susceptibility may be beneficial	Pacific yew does not appear to be very susceptible to diseases compared to other associate species. However, continued monitoring for future susceptibilities may be beneficial.	Pacific yew relies on higher levels of soil moisture in addition to shaded conditions for successful seed establishment.
Ponderosa pine	Moderate to high	Low	High	Mountain pine beetle, western pine beetle, and western pine shoot borer.	Dwarf mistletoe is often found on ponderosa pine, but is rarely fatal.	Ponderosa pine establishes well on post-disturbance sites. Soil moisture and temperature are primary limiting factors for seedling establishment and survival. Young seedlings (<36 days old) are susceptible to low temperatures and frost damage. Seedlings >110 days old can withstand higher temperatures than associated species, thus being reasonably tolerant of a warmer climate.
Western larch	Low to Moderate	Moderate	High	Larch casebearer, western spruce budworm.	Western dwarf mistletoe, needlecast, red ring rot, and brown trunk rot.	Seedlings regenerate well in post-disturbance, high-light sites. However, high temperatures and low soil moisture will likely reduce seedling survival (especially on south and west aspects).
Western redcedar	Low	High	Moderate	Heartwood decay from fungi is often inevitable.	Laminated root rot, honey fungus, and stringy butt rot.	Redcedar grows predominantly on sites with adequate year-round soil moisture; temperature and moisture are limiting factors. Partial shade is best for seedling establishment.

Western white pine	Low to Moderate	Moderate	Moderate-high	Mountain pine beetle and other beetles are the most harmful insects on western white pine, often attacking trees that have been weakened by blister rust.	White pine blister rust, Armillaria root rot and annosus root disease.	White pine is limited by soil moisture at lower elevations and temperature at higher elevations. Seeds require 20 to 120 days of cold, moist conditions to germinate, and germination length varies depending on shade and sunlight on different aspects. Seedlings are highly sensitive to drought. Establishes well after fire and can tolerate relatively high temperatures. Without enough rust-resistant individuals, success of western wine pine in the future will most likely require intensive restoration and management efforts.
Mid-high elevation conifers						
Engelmann spruce	Low to Moderate	High	Low	Spruce beetle and western spruce budworm.	Engelmann spruce can suffer from blight and other diseases, but it is not as common as insect mortality.	Engelmann spruce has high frost tolerance, often grows in high-elevation sites, and can be found in low-elevation frost pockets. High temperatures and drought are main contributors to seed and seedling mortality within the first five years of establishment. It adapts well in different microsites and can survive in wet soils.
Lodgepole pine	Moderate to High	Low to Moderate	High	Mountain pine beetle.	Lodgepole pine can suffer from root disease, but it is not as common as insect mortality.	There is a strong likelihood lodgepole pine is well adapted to future fire conditions and will recruit well in post-fire sites. However, too frequent, and repetitive fires can prevent seedlings from becoming reproductively mature. It has a strong ability to regenerate due to serotinous cones, viability and quantity of seeds, and ability to withstand a range of microsite and soil conditions.
Subalpine fir	Low	Moderate to High	Low	Western spruce budworm and western balsam bark beetle.	Fir broom rust and wood-rotting fungi.	Drought is primary factor limiting growth. It grows in a variety of light conditions, but best in partial shade. Post-fire regeneration is slow depending on distance from seed source. Subalpine fir is not likely to respond well to hotter and drier future conditions, yet its shade-tolerance and competitive nature may help it compete and survive. Seedling establishment may be a deciding factor for subalpine fir success in the future, as seedlings require long periods of high moisture for germination.

10.3 Climate Change Adaptation

Climate change adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which is intended to moderate harm or exploit beneficial opportunities. Adaptation is often referred to as “preparedness,” and is based on scientifically supported strategies and tactics that promote sustainable resource management. Adaptation addresses specific aspects of the sensitivity of resources to an altered climate.

The term **mitigation** refers to management options that store carbon within a forest and reduce greenhouse gas emissions into the atmosphere. Adaptation and mitigation are generally distinct concepts, although they can overlap in some cases (e.g., forest regeneration ensures resilience while also storing more carbon than non-forest vegetation).

Tree species and forest stands vary in their ability to withstand or adapt to climate change impacts and new growth conditions, such as increased temperature, reduced water availability, and altered disturbance regimes. Although individual species can adapt to climate change through phenotypic plasticity, genetic diversity, and gene flow within and between tree populations, forest managers can also implement adaptive silvicultural practices to promote species- and stand-level adaptation. Forest managers on the Nez Perce Reservation are considering how to adapt to present and future climate conditions in ways that continue to promote and balance *Nimiipuu* forest management objectives and values and support the desired future conditions for forests outlined in the IRMP.

Specific adaptation options for forest lands on the Nez Perce Reservation will depend on the multiple objectives of the *Nimiipuu* for forest ecosystems, values, and use. The Nez Perce IRMP provides general principles for all types of planning and natural resource management on the Nez Perce Reservation. Two approaches are considered in this planning process and are intended to be balanced in resource management and community development:

1. Commercial use of the Tribe's resources and landscape development for economic and social benefit.
2. Stewardship of the Tribe's resources to sustain and enhance opportunities for traditional cultural practices and the exercise of Treaty-reserved rights.

According to *Nimiipuu* oral history, we are in a time where the Second People (European settlers and their descendants) have disregarded *tamáalwit* (Natural Law of the Land), and it is the responsibility of the *Nimiipuu* to uphold *tamáalwit* and speak for all *wiweet’espeme* (beings from the land). This disregard of *tamáalwit* by the Second People has contributed to the exacerbation and negative impacts of climate change. To uphold and affirm *tamáalwit* is to also balance commercial, sustainability, and cultural values and interests; in other words, to balance the two primary philosophical approaches that underpin the Nez Perce integrated planning approach.

10.3.1 Forest Management and Climate Change Adaptation Framework

When adapting forest management to climate change, several factors—species and stand vulnerability, adaptive capacity, forest values, and management objectives—need to be considered simultaneously. A modified silvicultural perspective is needed to respond to new and changing climatic and environmental conditions. Silviculture will continue to be the “science of observing forest condition and anticipating its development to apply tending and regeneration treatments adapted to a multiplicity of desired outcomes in rapidly changing realities” (Achim et al. 2021, p.149). This perspective embraces adaptive management by including a new challenge for forest managers: How can silvicultural practices be revised in response to projected climatic variability and change to reduce potential negative impacts, transition forests to new climatic conditions, and ensure long-term sustainability?

The adaptive forest management framework for the *Nimiipuu* (Figure 10-2) takes the form of an **Adaptive Forest Management Cycle**, and draws on existing forest management concepts such as 1) understanding forest vulnerability, 2) triaging and determining forest adaptation priorities through risk management, and 3) the concept of resistance, resilience, and transition (RRT).

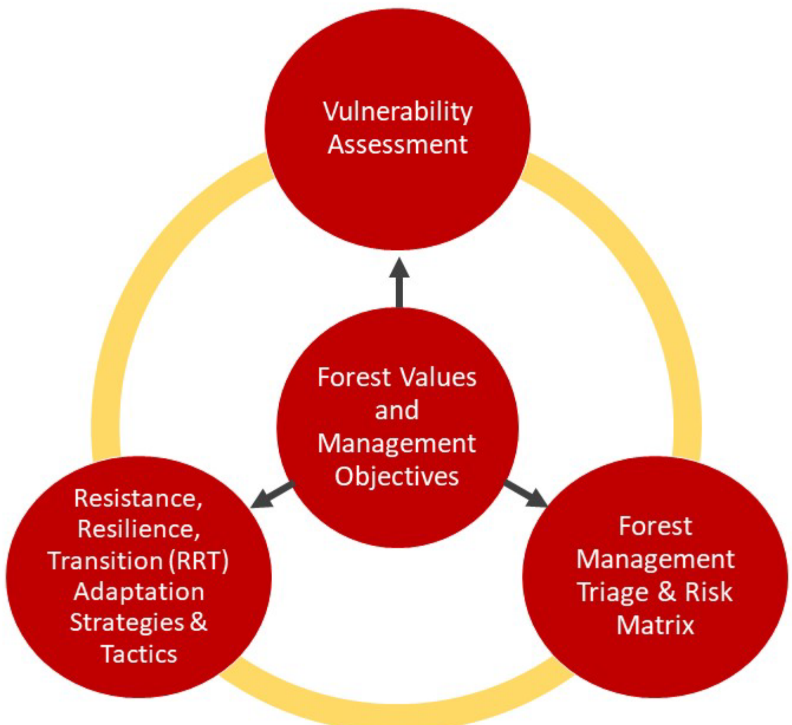


Figure 10-2: Cyclical Forest Management Adaptation Framework for Climate Change. Vulnerability assessments for species and forest stands are completed first, informing the management triage to determine priorities. The RRT framework is then used as a lens through which to evaluate those priorities and determine specific adatation strategies and tactics. Nimiipuu forest values and holistic objecives are considered at every stage.

10.3.1.1 Part 1: Vulnerability Assessment

Understanding forest vulnerability to climate change (Figure 10-3) requires knowledge of: 1) the degree of exposure to climate change factors (e.g., increases in temperature, decreased summer precipitation); 2) the sensitivity of species or systems to these climate change factors; and 3) the ability of a species or system to withstand or adapt to new growth conditions and stressors.

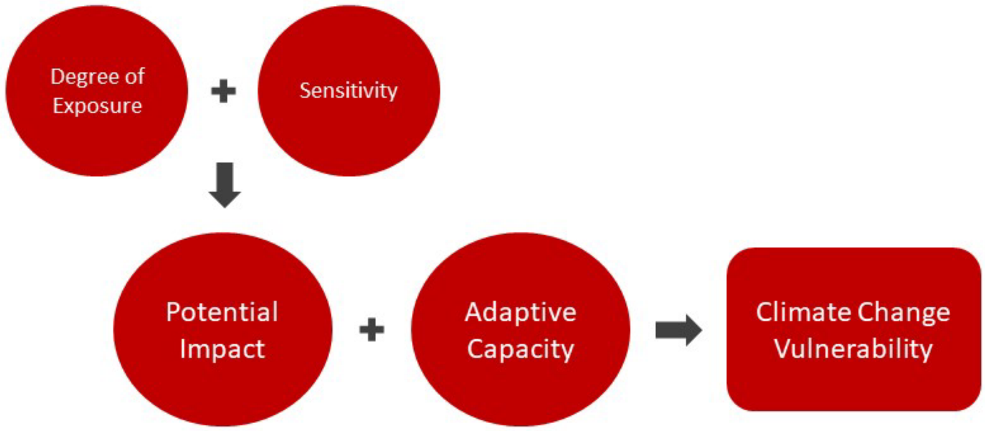


Figure 10-3: Adapted from Glick et al. (2011). Framework to assess vulnerability of a forest stand or species to climate change. Degree of exposure plus sensitivity equals the potential impact. Combining impact with adaptive capacity results in overall climate change vulnerability.

10.3.1.2 Part 2: Forest Management Triage and Diagnosis

The level of overall vulnerability can then be used in a Forest Management Triage and Diagnosis Matrix (Figure 10-4). Taking into consideration a stand's risk and capacity to adapt to climate change stressors, the matrix determines stand-scale adaptation classes and priorities, further informing the prescription of silvicultural treatments and adaptation strategy decisions.

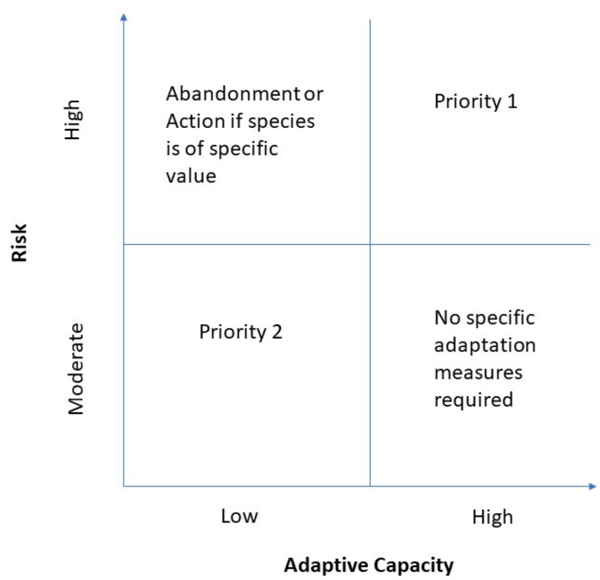


Figure 10-4: Adapted from Thiffault et al. (2021). Forest management triage matrix based on level of risk and adaptive capacity of forest stands to climate change conditions in order to determine adaptation classes and priorities.

Stands can be categorized as:

1) **High risk and low adaptive capacity** – Depending on the value of the species or stand, this scenario may warrant significant action if the species or system is of high value, or abandonment

may be considered if the species is of lesser value. Transition may be appropriate here. Value may include a combination of commercial, cultural, and ecological factors.

2) **High risk and high adaptive capacity (Priority 1)** – Stands in this scenario would be made first priority for silvicultural treatments and adaptive tactics, as they are highly vulnerable but have a higher likelihood of thriving with adaptive support.
3) **Moderate risk and low adaptive capacity (Priority 2)** – Stands in this scenario would be of second priority for silvicultural treatments and adaptive tactics, since their level of risk is lower, but they would require more significant intervention to adapt successfully to climate stressors.
4) **Moderate risk and high adaptive capacity** – Stands in this scenario may not need adaptation tactics or treatments for the time being, because the species or stand should be able to adapt on their own without substantial intervention.

10.3.1.3 Part 3: Resistance, Resilience, Transition (RRT) and Adaptation Options

The resistance, resilience, transition (RRT) framework can be used as a framework for considering adaptation strategies (overarching) and tactics (on the ground) at various spatial scales. Originally described in Millar et al. (2007), the RRT framework is a commonly used adaptation framework that has been applied on national forests and other public lands throughout the United States. These terms are defined as follows:

- **Resistance** options forestall undesirable effects of climate change and protect valued resources. The objective is little or no change from current or historical conditions.
- **Resilience** options improve the capacity of forest systems to return to desired conditions after disturbance. Some change in species, structure, and function is tolerated.
- **Transition** options intentionally facilitate modification of ecosystems from current/historical conditions to new conditions to accommodate long-term climate trends. Significant changes (e.g., species) are promoted to ensure functionality.

These terms represent a continuum of options, with considerable overlap in management actions across the categories. Differentiating among the three terms focuses primarily on (1) characteristics and functions of forests in their current condition (including values at risk), and (2) how desired future conditions can be achieved through appropriate planning and management activities.

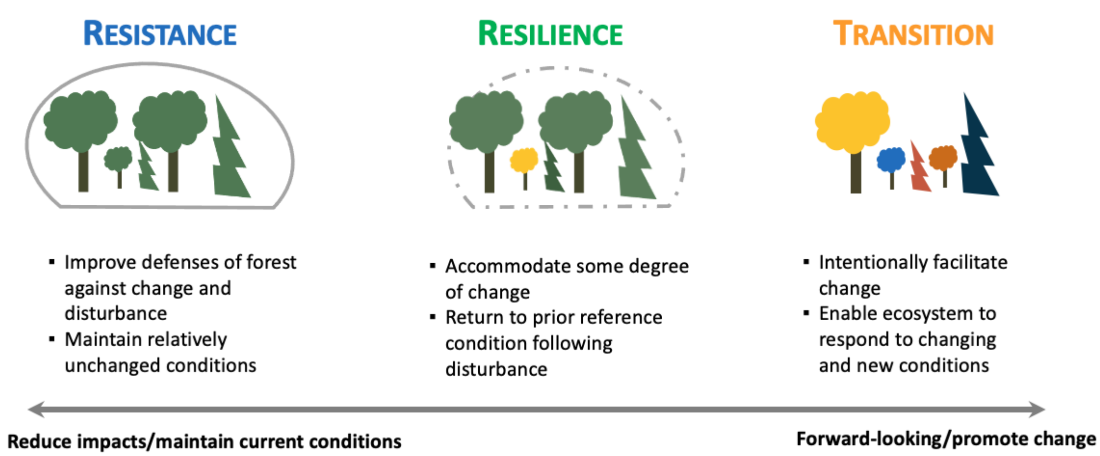


Figure 10-5: Spectrum of adaptation decision-making strategies based on the RRT framework

When using the RRT framework, the starting point is defining goals for the management of a specific stand or landscape, including a statement of desired conditions. From these goals and desired conditions, objectives and evaluation criteria can provide baselines on which outcomes of management actions can be measured. RRT provides a context for specifying general strategies compatible with projections of climate change effects for a given location. RRT can also be useful when considering other stressors, including wildfire, insect outbreaks, and pathogens, all of which may be affected by climatic variability and change. Examples of RRT are listed below.

Table 10-2: Examples of how to apply RRT to forest management actions.

	Examples of management actions
Resistance	• Remove/reduce invasive plant species that compete with tree regeneration and increase fire hazard. • Plant tree seedlings on sites that may not regenerate under warmer and drier conditions. • Maintain the habitat conditions (refugia) required for endangered species to ensure that those species are not extirpated.
Resilience	• Maintain mature, seed-bearing trees throughout all landscapes. • Implement periodic thinning and fuel treatments to reduce the risk of high-intensity wildfire. • Increase spatial heterogeneity by diversifying forest structure, stand densities, and stand ages. • Promote tree species that tolerate drought and periodic wildfire. • Allow managed wildfires to burn in stands that have fire-resistant trees and low fuel loading.
Transition	• Use assisted population expansion* to diversify the genotypes of nursery stock used in regeneration. [10] • Use assisted species expansion* to move a species a small distance beyond its current distribution (typically farther north or uphill). • Eliminate some species from use in planting if those species are unlikely to regenerate and grow well in a warmer, drier climate. • Extend rotation ages to accommodate slower growth.

* A form of assisted migration.

RRT is used to evaluate different adaptation options based on management priorities. The terms resistance, resilience, and transition are not always mutually exclusive. There may be overlap among these goals, and they may change over time with changing climatic conditions and forest management objectives. An *adaptation tactic* is a specific action that supports *adaptation strategies* (higher order adaptation approaches) and is implemented on the ground (e.g., reducing stem density and surface fuels

[10] *A note on reforestation and timber stand improvement: Recent temperature increases have resulted in reduced soil moisture and limited natural regeneration success in some locations. The Nez Perce Tribe already replants most harvested acres to support ponderosa pine and (in some locations) western larch and Douglas-fir stocking. Tribal ownerships such as the Tramway Reserve have received multiple replants due to dry conditions and multiple wildland fires . Planting with materials adapted to current and future climate will support successful reforestation. Using an online tool to visualize climate information, such as the Seedlot Selection Tool, is a first step in choosing appropriate planting materials. The Seedlot Selection Tool shows climate variables for current and projected future climates that are important to conifer growth and survival. This climate information, together with expert forester knowledge, is essential to find areas from which to collect seed that match current and future climates for reforestation projects. Considerations for reforestation and timber stand improvement can be found in section 9.8.*

in a mixed-conifer forest). Throughout the entire Adaptive Forest Management Cycle, *Nimiipuu* forest values and holistic management objectives should align with the IRMP goals and desired future conditions for forests.

Example adaptation strategies and tactics can be found in section 9.8. Managers should consider that although global climate models are useful for capturing large-scale projections and trends, they do not always consider fine-scale factors such as microsite conditions and species-specific vulnerabilities and adaptive capacities. Thus, it is important to consider microsite conditions and how individual species may fare in these microsites when applying adaptation tactics.

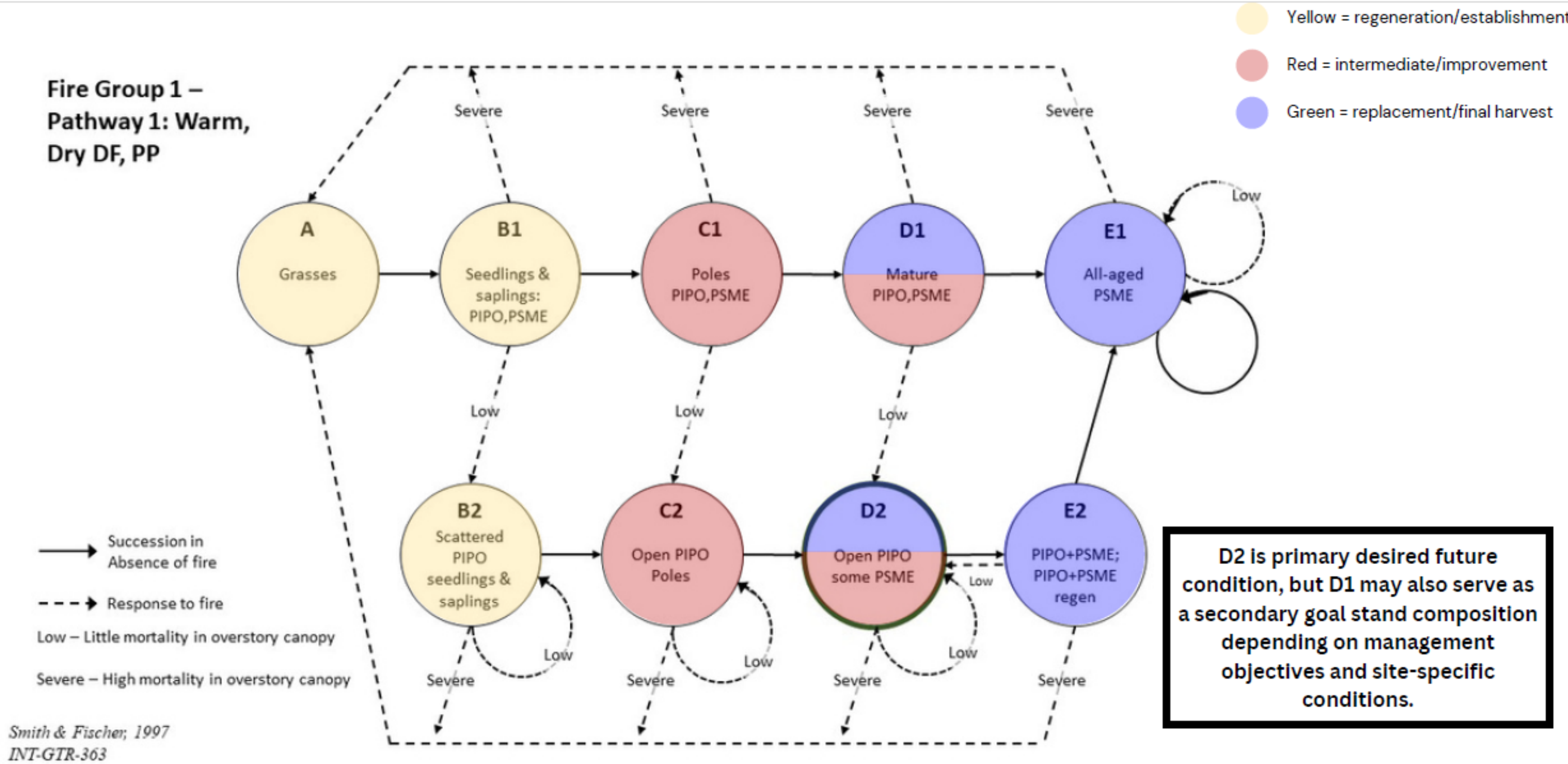
10.3.2 Smith & Fischer Forest/Fire Management Group Succession Pathways

These succession pathways were adated from Smith & Fischer, 1997. Silviculatural phases, shaded circles, and climate change adaptiona tactics were added and not in original publication.

The pathways serve as examples of how climate change adaptation tactics can be considered at different points along a forest's successional pathway or silvicultural phase. These particular examples assume a management objective of reducing fire risk and increasing forest resilience to fire and related climate impacts. As such, each pathway includes climate adaptionat tactics relevant to this example management objective.

These forest management climate change adaptation resources are prepared for the Nez Perce Tribe's Forestry Department by the USDA NOrthest Climate Hub.

- MG 1: Pathway 1, Warm, Dry Douglas-fir, Ponderosa Pine.
- MG 2: Pathway 2.2, Warm, Dry to Moderate Douglas-fir, Grand Fir, Ponderosa Pine (Mesic). In this particular MG pathway, ponderosa pine, western larch, and Douglas-fir are dominant seral species. Grand fir may be present in stands without frequent fire (e.g., D2) and may eventually dominate F.
- MG 7: Pathway 7.1, Moderate and Moist Grand Fir Habitat Types. In this particular MG pathway, succession may be dominated by Douglas-fir and other seral species.



When to Consider Climate Change Adaptation Interventions Along Forest Succession Pathway

Early Succession - Establishment

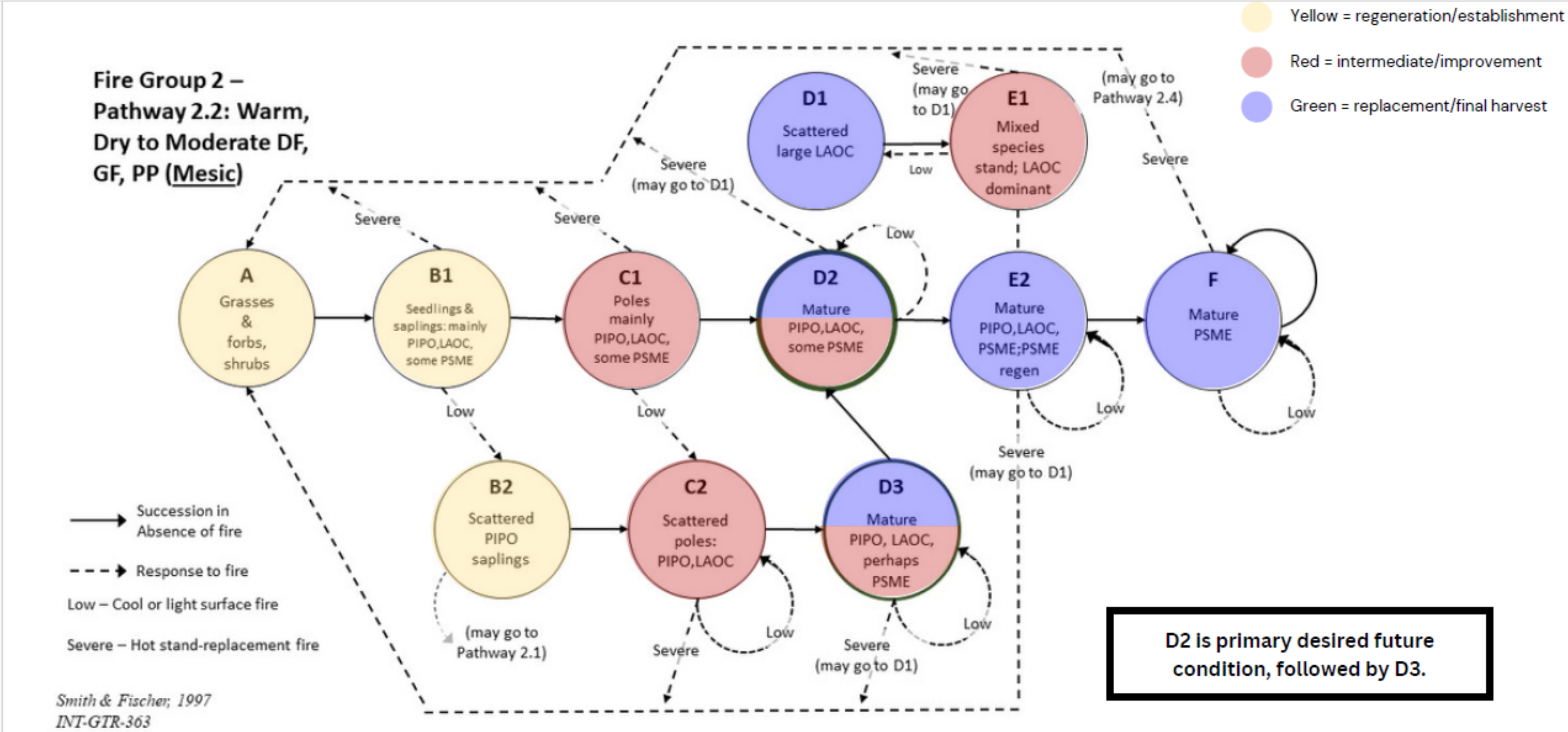
-(A) Plant fire-tolerant and drought-tolerant species
-(A) Acquire seeds from different provenances (future climate-adapted)
-(A) Control planting density
-Allow wildfire
-(A) Conduct salvage logging post-disturbance
-(A, B1, B2) Encourage forage for wild game while encouraging sapling survival
-Proactively coordinate with neighboring jurisdictions on fire response and post-fire decisions based on location and potential severity

Mid Succession - Intermediate

-(C1, C2, D1, D2) Light thinning and cultural burning as needed with low mortality to manage fuel loads and encourage fire- and drought-tolerant species, age-class and structural variability, but moving towards low-density stand
-(C1, C2, D1, D2) Encourage forage for wild game, while encouraging individual tree growth
-Identify potential future fuel break locations, create where needed
-Monitor for density, fire, insects and disease
-Encourage large PIPO, PSME

Late Succession - Replacement

-(D1, D2, E2) Thinning and cultural burning with low mortality to retain large, vigorous fire- and drought-tolerant individuals (i.e., PIPO, some PSME), at lower density and manage fuels
-(E1) Consider heavy thin and cultural burn
-(D1, D2, E2) Maintain some age-class and structural variability
-(D1, D2, E2) Maintain wild game habitat and forage
-Manage fuel break locations
-Monitor for density, fire, insects and disease
-Protect large PIPO, PSME



When to Consider Climate Change Adaptation Interventions Along Forest Succession Pathway

Early Succession - Establishment

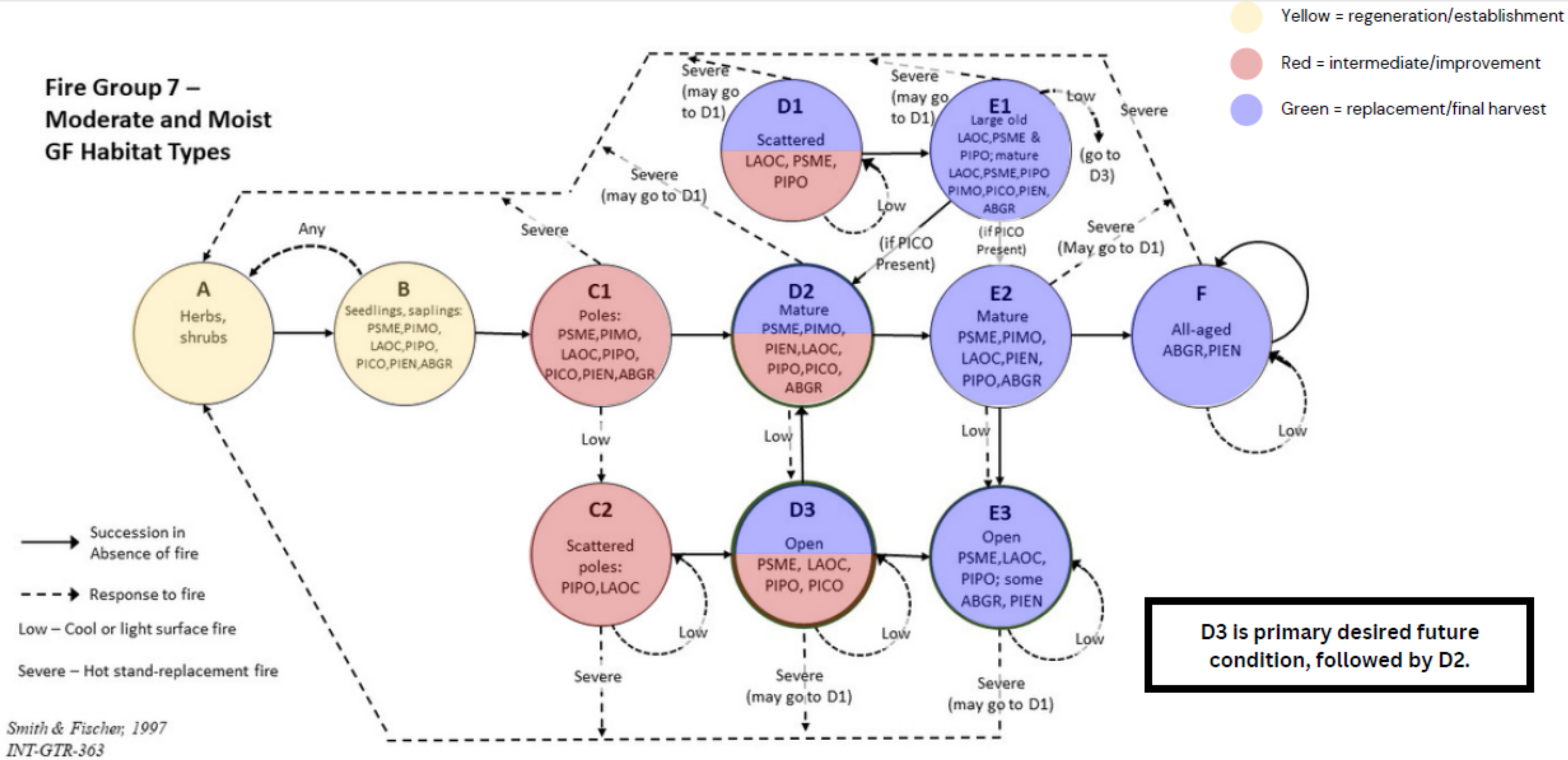
-(A) Plant fire-tolerant and drought-tolerant species (PIPO, LAOC, PSME)
-(A) Acquire seeds from different provenances (future climate-adapted) if desired
-(A) Control planting density
-(A) Conduct salvage logging post-disturbance
-(A, B1, B2) Encourage forage for wild game while encouraging sapling survival
-Proactively coordinate with neighboring jurisdictions on fire response and post-fire decisions based on location and potential severity

Mid Succession - Intermediate

-(C1, C2, D2, D3, E1) Thinning and cultural burning with low mortality to manage fuel loads and encourage fire- and drought-tolerant species, age-class and structural variability, but moving towards low-density stand (goal D1, D2, or D3)
-(C1, C2, D1, D2, E1) Encourage forage for wild game, while encouraging individual tree growth
-(C1, C2, D2, D3) Maintain some age-class and structural variability
-Identify potential future fuel break locations, create where needed
-Monitor for density, fire, insects and disease

Late Succession - Replacement

-(D1, D2, D3, E2) Thinning and cultural burning with low mortality to retain large, vigorous fire- and drought-tolerant individuals (i.e., PIPO, some PSME), at lower density and manage fuels (goal D2 and D3)
-(E1, F) Consider heavy thin and cultural burn depending on goal composition (D1, D2, or D3)
-(D1, D2, E2) Maintain some age-class and structural variability
-(D1, D2, E2) Maintain wild game habitat and forage
-Manage fuel break locations
-Monitor for density, fire, insects and disease



When to Consider Climate Change Adaptation Interventions Along Forest Succession Pathway

Early Succession - Establishment

-(A) Plant fire-tolerant and drought-tolerant species (PIPO, LAOC)
-(A) Acquire seeds from different provenances (future climate-adapted) if desired
-(A) Control planting density
-(A) Conduct salvage logging post-disturbance
-(A, B) Encourage forage for wild game while encouraging sapling survival
-Proactively coordinate with neighboring jurisdictions on fire response and post-fire decisions based on location and potential severity

Mid Succession - Intermediate

-(C1, C2, D2, D3) Thinning and cultural burning with low mortality to manage fuel loads and encourage fire- and drought-tolerant species, age-class and structural variability, but moving towards low-density stand DFCs (goal D2, D3)
-(C1, C2) may be left undisturbed to promote succession to D2 and D3 respectively.
-(C1, C2, D1, D2, D3, E1) Encourage forage for wild game, while encouraging individual tree growth
-(C1, C2, D2, D3) Maintain some age-class and structural variability
-Identify potential future fuel break locations, create where needed
-Monitor for density, fire, insects and disease

Late Succession - Replacement

-(D2, D3, E1,) Thinning and cultural burning with low mortality to retain large, vigorous fire- and drought-tolerant individuals (i.e., PIPO, LAOC, PSME), at lower density and manage fuels (goals D2 and D3)
-(D1) Consider mostly undisturbed for transition to E1 and then DFCs (D2, D3)
-(E2, E3, F) Consider heavy thin and cultural burn for later transition to desired stand composition (e.g. results in D1 to move to D2 or D3)
-(D1, D2, E2) Maintain some age-class and structural variability
-(D1, D2, E2) Maintain wild game habitat and forage
-Manage fuel break locations
-Monitor for density, fire, insects and disease

10.4 CLIMATE CHANGE AND FOREST CARBON

10.4.1 Role in the FMP and Desired Future Condition

Forests capture carbon dioxide (greenhouse gas) from the atmosphere and transform it into biomass through photosynthesis. This captured or sequestered carbon can take the form of biomass, deadwood, litter, and soil decomposition matter. Forests are considered carbon sinks where a negative source of carbon dioxide occurs in the atmosphere via absorption and storing (Pan, 2011). A carbon source is equivalent to a positive source of carbon dioxide to the atmosphere (e.g., automobile, industrial processing plants, forest fires, respiration, etc.). To offset carbon emissions, carbon markets were created to provide an efficient, market-based solution to allocating the costs of greenhouse gas reduction. Organizations that invest in carbon removals can make money by quantifying and verifying those reductions, creating "carbon credits" and then selling those credits to other companies who are unable to make the necessary or desired reductions.

The Nez Perce Tribe recognizes the importance of managing carbon in forests and entered into an agreement with the Chicago Climate Exchange for specific reforestation and afforestation projects. These projects were completed and the agreement expired in 2011. Future agreements regarding carbon storage and sequestration will be considered as long as these agreements satisfy the needs of the Tribe (e.g., IRMP preferred alternative and Forest Management desired future conditions).

Forests are dynamic systems that naturally undergo ebbs and flows in carbon storage and emissions as trees establish and grow, die with age or disturbances, and re-establish and regrow. Carbon can also be transferred and stored outside of the forest ecosystem in the form of wood products (Gustavsson et al., 2006; Skog et al., 2014). Many management activities initially remove carbon from the forest ecosystem, but they can also result in long-term maintenance or increases in forest carbon uptake and storage by improving forest health and resilience to various stressors (McKinley et al., 2011).

10.4.2 Status Of Carbon in Forest Planning

The health and resilience of the forest carbon resource is an important value of the Tribe's forest, linked to the resilience of other values. Forest carbon also offers a potential long-term source of revenue compatible with the Tribe's vision for its forests. Carbon stocking and trends can be determined and reported within the Forest Inventory and Analysis report published every ten years. Expanding the FIA report to include forest carbon metrics will stimulate future agreements that could have implications for forest management, resilience building, and the ability to meet Tribal goals for the forest.

The Nez Perce Tribe's Forest Management Plan considers carbon agreements as a mitigation measure for climate adaptation planning and will seek the required approvals prior to entering into carbon agreements from the Nez Perce Tribe's Executive Committee, BIA, and Office of the Solicitor if required when these plans benefit the Nez Perce Tribe and the forested ecosystems in which they manage.

10.4.3 Relevant Laws, Regulations, and Policy

Refer to National Policy Memorandum 47 Amendment 2 issued by the Office of Trust Services Division of Forestry and Wildland Fire Management (NPM-TRUS-47 A2; effective October 29, 2024 and expires October 29, 2025) for the most recent updates on the carbon sequestration agreement policy.

There are no Federal requirements or guidance for integrating forest carbon stewardship with other goals and objectives in forest planning. The BIA has not developed guidelines or technical assistance to support carbon stewardship and monitoring—in or out of carbon market arrangements—or sponsored programs to enhance understanding and estimation of carbon responses to forest disturbances, practices, and investments. The DOI has issued and subsequently clarified its policies on tribal participation in carbon markets participation, stating that carbon is not a trust asset because it is not harvested or removed from the land.

The Bureau of Indian Affairs (BIA) does not consider carbon as a trust asset because carbon is neither "harvested" nor "extracted;" therefore, carbon is not considered a "forest product." The BIA will review carbon agreements for the '...purpose of determining whether the agreement is subject to Secretarial approval under 25 U.S.C. § 81'. An agreement that does not restrict a Tribe's use of a specific land parcel but only requires land management in such a way to earn carbon credits does not require recordation as it does not encumber Indian lands within the meaning of Section 81. Timber resources cannot be encumbered if there is a desire to transition the land from fee to trust status. The BIA's involvement with carbon agreements is to review the proposed agreement to ensure that Tribal trust lands are not being encumbered for a period of seven (7) or more years or gives exclusive or proprietary control to a third party. Tribal Allotments are not allowed to be included in carbon sequestration agreements unless reviewed and approved by the BIA and the Office of the Solicitor and the allotment is included within the Tribe's approved resource management plan (e.g., Integrated Resource Management Plan, Forest Management Plan, Range Management Plan).

However, the absence of policy does not mean that the NPT cannot benefit from integrating forest carbon stewardship into its plan of sustainable forest management. The tribe has an opportunity to define forest carbon as a key asset with sensitivity to forest health issues and climate impacts, as well as management choices and strategies.

New policies for decarbonization, such as advancing renewable energy and pricing carbon through market-based mechanisms, have created opportunities for Tribes. Some have developed climate action plans that combine adaptation, GHG reduction, and forest carbon sequestration) at the tribe level or in collaboration with other tribes or non-tribal partners. New roles for forestry programs in these larger climate response efforts are now being defined for forest-owning tribes throughout Indian Country.

10.4.4 Interactions between wildfire and carbon emissions

The dominant historical fire regime within forested vegetation in the Inland Empire can be characterized as a variable or mixed-severity fire regime (Brown, 2000; Kilgore, 1981; Zack & Morgan, 1994) while that of the Nez Perce Reservation would most likely correspond to low intensity, non-lethal surface fires (Hessburg et al. 2021; Graham et al. 2005).

Of all the potential disturbances on the landscape, wildfires have the greatest potential to cause short-term reductions in carbon sequestration by removing vegetation and causing carbon emissions. However, fire is also a primary mechanism for restoring and maintaining native vegetation with conditions consistent with the natural range of variation, thereby contributing to carbon sequestration potential over the long term. Plan components for fire and fuels management help ensure the long-term sustainability of vegetation communities, allowing for fire to play its natural role on the landscape.

10.4.5 Management effects on carbon

The Tribal forests will be maintained and managed as forests for the many ecosystem services they provide, including carbon uptake and storage. All action alternatives provide desired conditions for terrestrial ecosystems into the future and in turn change the balance of carbon stocks, rates of carbon uptake, and flows of other ecosystem services. Positive outcomes of long-term forest carbon stewardship built into plan alternatives supported by a growing body of science as is currently implemented include:

- Manipulating the forest to provide for new young-forest conditions to support wildlife habitat. This can decrease carbon stocks, but compared with older stands, doing so promotes relatively high rates of carbon uptake over time as forests regrow (Pregitzer & Euskirchen, 2004).
- Enhancing or accelerating the development of old-growth conditions to support higher carbon stocks in mature forests compared with younger stands (Harmon, Ferrell, & Franklin, 1990).
- Decreasing forest densities and fuel conditions to reduce the risk of large, stand-replacing disturbance from wildfire. Although this initially reduces carbon stocks, it can lower risk for high pulses of carbon emissions in the future (Wiedinmyer & Hurteau, 2010).
- Ensuring successful reforestation after harvest or mortality-inducing disturbances to ensure continued carbon uptake and storage (Intergovernmental Panel on Climate Change, 2014).
- Promoting desired composition, structure, function, and ecological integrity patterns, which will support long-term carbon uptake and storage in the face of changing environmental conditions (Millar et al., 2007).
- Using harvested wood for renewable products to store carbon over the long term and substitute for energy-intensive materials or fuels, reducing net carbon emissions into the atmosphere (Gustavsson et al., 2006; Lippke et al., 2011).

Active management of forests is compatible with the objectives of climate change mitigation (Hurteau, Koch, & Hungate, 2008; North & Hurteau, 2011; Reinhardt & Holsinger, 2010; Ruddell, Walsh, & Kanakasabai, 2006; Ryan et al., 2010; Schaedel et al., 2017; Wiedinmyer & Hurteau, 2010). Desired conditions for vegetation, and the standards and guidelines that help achieve them, can maintain and facilitate vegetation conditions that accommodate gradual changes related to climate, and tend to return toward a prior condition after disturbance (i.e., resilience). Management tools available to achieve these desired conditions include prescribed fire, timber harvest, DDWM/slash management, planting, and thinning in young forests.

10.5 Additional Resources

Further resources and tools for climate change and adaptation are listed below.

- USDA Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains Assessment Report (Part 1)
- USDA Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains Assessment Report (Part 2)
- Blue Mountains Climate Change Vulnerability Assessment
- National Climate Assessment 4
- Adaptation Partners Climate Change Adaptation Library for the Western United States Online Database
- US Drought Monitor
- Seedlot Selection Tool
- University of Oregon Climate Toolbox
- Pacific Northwest Tribal Climate Change Network
- Assisted Migration/Climate Change Resource Center
- Tribal Climate Adaptation Menu*

*While this was created with Tribes out of the Great Lakes Region, some of the information and concepts may still be relevant.

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11 APPENDIX C: ENVIRONMENTAL DECISION

The 59 IAM 3-H NEPA Guidebook (2012) is the BIA's official guidebook for implementing NEPA across Tribal and individual Indian trust and restricted lands. The guidebook addresses Tribal trust and allotments under the context of broader NEPA implementation, consultation, and land-action discussions.

The following sections are a modified excerpt from the guidebook and provide a general overview of applications of the guidebook, resources that are available for guidance on NEPA compliance, and a list of authorities and guidance for complying with NEPA.

11.1 GENERAL

This document provides guidance to Indian Affairs (IA) to help comply with NEPA, the Council on Environmental Quality's (CEQ) NEPA regulations (40 CFR Parts 1500–1508) and the Department of the Interior (DOI) NEPA regulations (43CFR Part 46).

Because the majority of activities on Indian trust lands include Federal funding or approval through the BIA, the responsibility for complying with NEPA generally falls to the BIA. However, NEPA applies to every office and program within IA, and compliance lies with the office with the direct responsibility to fund, develop or approve a proposal or action. Although the guidance throughout the guidebook is directed to the BIA, the instructions are valid for all programs and all references to BIA should be understood as applying to all IA offices and programs. Expertise in NEPA compliance can be found at BIA Regional Offices and when other offices have questions regarding NEPA, they should contact the BIA Regional Office NEPA Coordinators for advice. The responsibilities of IA officials for administering compliance with NEPA may be found in the Departmental Manual (DM) at 516 DM 10 and in the Indian Affairs Manual (IAM) at 59 IAM 3 (See Appendices 15 and 16 in the guidebook).

The 59 IAM 3-H NEPA Guidebook (2012) is strictly advisory. It does not create policy, add to, delete from nor otherwise modify any legal requirement. The procedures described in the guidebook are intended to aid IA officials in the internal administration of the agency, and are subject to re-interpretation, revision, or suspension by IA as circumstances may require.

11.2 AUTHORITIES AND GUIDANCE

Appendices 12 through 16 of the 59 IAM 3-H NEPA Guidebook (2012) include the following relevant directives and guidance for complying with NEPA:

- National Environmental Policy Act of 1969 (42 U.S.C 4321-4347).
- Council on Environmental Quality Regulations (40 CFR Parts 1500-1508).
- The Department of Interior Regulations (43 CFR Part 46). This codifies portions of Chapters 1-6 of Part 516 of the Departmental Manual.
- Departmental Manual Part 516. Chapter 10 of the manual (516 DM 10) is specific to the BIA's management of the NEPA process. The DOI, through the Office of Environmental Policy and Compliance (OEPC), also continuously updates a series of environmental statement, review, and compliance memoranda.
- 59 IAM Chapter 3: The IA Manual further defines NEPA policy, authority and responsibility of staff.

12 APPENDIX D: ACRONYMS

Abbreviation	Defined
AAC	Annual Allowable Cut
BA	Basal Area
BAA	Basal Area per Acre
BAER	Burned Area Emergency Rehabilitation
BAR	Burned Area Rehabilitation
BIA	Bureau of Indian Affairs
BIAM	Bureau of Indian Affairs Manual
BLM	Bureau of Land Management
BMP	Best Management Practice
CFI	Continuous Forest Inventory
CFR	Code of Federal Regulations
CPTPA	Clearwater-Potlatch Timber Protection Association
DDWM	Dead & Down Woody Material
DFC	Desired Future Condition
DNR	Department of Natural Resources
DO	Duty Officer
DOI	Department of the Interior
DWFM	Division of Wildland Fire Management
EA	Environmental Assessment
EFR	Emergency Fire Rehabilitation
EPA	Environmental Protection Agency
ES	Emergency Stabilization
FBRI	Forest Biometrics Research Institute
FD&TSI	Forest Development & Timber Stand Improvement
FFI	FEAT/FIREMON Integrated (FFI)
FIP	Forest Inventory Planning
FMI&P	Forest Management Inventory & Planning
FMD	Forest Management Deductions
FMO	Fire Management Officer
FMP	Forest Management Plan
FMU	Fire Management Unit
FONSI	Finding of No Significant Impact
FPS	Forest Projection System TM
FRV	Future Range of Variability
FWA	Fire Workload Areas
FWFMP	Federal Wildland Fire Management Policy
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HRV	Historic Range of Variability
IA	Initial Attack
IA-PMS	Indian Affairs Performance Management System
IC	Incident Commander
ICO	Individual Clumps and Openings

ICT	Incident Command Type
IDAPA	Idaho Administration Procedures Act
IDL	Idaho Department of Lands
IDT	(or ID Team) Inter-Disciplinary Team
IMT	Incident Management Team
IQCS	Incident Qualifications and Certification System
IRMP	Integrated Resource Management Plan
LCES	Lookouts, Communication, Escape Routes, Safety Zone
LiDAR	Light Detection and Ranging
MBF	1,000 Board Feet
MG	Forest/Fire Management Group
MMBF	1,000,000 Board Feet
MPB	Mountain Pine Beetle
NEPA	National Environmental Policy Act
NIA	North Idaho Agency
NIFC	National Interagency Fire Center
NPT	Nez Perce Tribe
NPTEC	Nez Perce Tribal Executive Committee
NPV	Net Present Value
NRCS	Natural Resource Conservation Service
NWRO	Northwest Regional Office
OSR	Over-story Removal
P&TSI	Presales & Timber Sale Administration
PCT	Pre-Commercial Thin
PWR	Post-Wildfire Recovery
QMD	Quadratic Mean Diameter
READ	Resource Advisor
RFD	Rural Fire Department
ROTC	Report of Timber Cut
SAF	Society of American Foresters
SDI	Stand Density Index
SEAT	Single Engine Airtanker
SHPO	State Historic Preservation Office
SMZ	Streamside Management Zone
THPO	Tribal Historic Preservation Officer
TSA	Timber Sale Administrator
TSI	Timber Stand Improvement
TU	Tribal Unit
USDA	United States Department of Agriculture
USFS	United States Forest Service
VDT	Variable Density Thinning
VFD	Volunteer Fire Department
VRH	Variable Retention Harvest
WFDSS	Wildland Fire Decision Support System
WFPP	Wildfire Prevention Program
WPSAPS	Wildfire Prevention Spatial Assessment and Planning Strategies
WUI	Wildland Urban Interface

13 APPENDIX E: DEFINITIONS

Accretion rates: Volume which accrues during a specified period (≥ 5.0” DBH).

Allotments: Parcels of land, as small as 5 acres, that were created from the divisions of Tribal lands under the General Allotment Act of 1887. These parcels were “allotted” to individual Tribal members. Such allotted trust land is different from unallotted tribal trust land.

Allowable Cut: the maximum harvest level allowed during a planning period as per management goals and objectives.

Basal Area: The cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area.

Best Management Practices: A practice or usually a combination of practices that are determined by a state or a designated planning agency to be the most effective and practicable means (including technological, economical, and institutional considerations) of controlling point and nonpoint source pollutants at levels compatible with environmental quality goals.

Board Foot: A unit of quantity for lumber equal to the volume of a board 12 × 12 × 1 inches.

Buck: The process of cutting a tree into usable lengths.

Codominant: Trees with crowns at the general level of the crown canopy. Crowns receive full light from above but little direct sunlight penetrates to their sides. Usually they have medium-sized crowns and are somewhat crowded from the sides. In stagnated stands, codominant trees have small-sized crowns and are crowded on the sides.

Commercial Thinning: Thinning when trees are large enough to be sold for a product; revenue generated is potentially sufficient to offset treatment costs.

Commercial Forestland: Land declared suitable for producing timber crops and not withdrawn from timber production by statute or administrative regulation -note the minimum level of productivity is often set at 20 ft3/ac/year.

Cull: Nonmerchantable, live, standing trees greater than 20 feet tall.

Defect: Any physical characteristic that limits the use of a tree for an intended product and reduces its potential value.

Dominant: A tree whose crown extends above the general level of the main canopy of even-aged stands or above the crowns of the tree’s immediate neighbors and receiving full light from above and partial light from the sides in uneven-aged stands.

Dwarf Mistletoes: Small leafless flowering parasitic plants that infect western larch, Douglas-fir, ponderosa pine and lodgepole pine in Idaho. They survive by extracting water and nutrients from their hosts. Dwarf mistletoe infections can be identified by the presence of clusters of yellow to green colored shoots 1-4 in. long, swellings on branches or trunk, and abnormal clustering of branches, twigs and foliage called witches brooms. Severe infections can produce large brooms that significantly alter crown shapes and result in growth loss proportional to the amount of infection. Mortality is rare but severe infections can kill trees.

Ecoregions: Areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

Even-Aged Management: A harvest system that regenerates and maintains even-aged stands; includes clearcut, seed tree and shelterwood systems.

Fee Land: Fee land is under complete control of its owner, which can be an individual or an entity such as a tribe, who holds the title to it. Fee simple ownership is the highest form of property possession. The owner can use the land for any legal purpose.

Felling: the process of cutting down of trees.

Ingrowth: Net volume of trees that were less than the merchantable size 5.0" DBH at the start of the growth measurement period but which have grown to a size equal to or above that minimum limit during the review period.

Intermediate: A tree whose crown extends into the lower portion of the main canopy of even-aged stands or into the lower portion of the canopy formed by the tree's immediate neighbors, but shorter in height than the codominants and receiving little direct light from above and none from the sides in uneven-aged stands.

Intermediate Treatment: Any treatment or tending designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest.

Mean Annual Increment (MAI): The total increment of a tree or stand (standing crop plus thinnings) up to a given age divided by that age -note the MAI for a whole rotation is termed the final MAI.

Merchantable: Of trees, crops, or stands having the size, quality, and condition, suitable, for marketing under a given economic condition, even if not immediately accessible for logging.

Mortality: Tree mortality refers to the death of forest trees and provides a measure of forest health.

Net Present Value: The difference between the present value of all future income and the present value of all costs, at a given discount rate (i.e., how much a forestry investment will return). A positive NPV indicates that an investment will return more money than another investment at a chosen interest rate. Negative NPVs indicate that an investment is not financially practical.

Net Volume: This is the total net merchantable volume for each species that was sampled in the cruise plots. The term 'merchantable' describes the volume that is reduced to account for decay, waste and breakage.

Overstory: The live crown top is above the middle of the overstory canopy zone.

Overstory Removal: The removal of trees constituting an upper canopy layer to release trees or other vegetation in an understory. Specifically, the final harvest in a shelterwood regeneration sequence.

Quadratic Mean Diameter (QMD): The diameter at breast height outside bark of the tree of average basal area.

Regeneration Treatment: A harvest technique by which a new age class is created; the major methods are clearcutting, seed tree, shelterwood, selection, and coppice.

Rotation: The number of years required to establish and grow trees to a specified size, age, product or condition of maturity.

Scale: Measuring the usable wood volume in a log or standing tree using fundamental rules.

Second Growth: A generalized term describing a forest that originates on a site of a previous stand that was removed by cutting, fire or other cause.

Selection Harvesting: Harvesting individual trees or small groups (group selection) of trees at intervals based primarily on their vigor and age. Trees are removed across all age classes. Selection harvesting perpetuates an uneven-aged stand, often composed of shade-tolerant species.

Shade Tolerance: A tree's capacity to develop and grow in the shade of, and in competition with, other trees. Examples of shade-tolerant species in the eastern US include American beech, sugar maple and dogwood.

Shelterwood system: An even-aged silvicultural system similar to the seed tree system, except that more trees are left to "shelter" the site until new trees are established.

Skidding: hauling a log from the stump to a collection point (landing) using a tractor.

Slash: 1) Any vegetative residue 3 inches in diameter or smaller resulting from a forest practice or the clearing of land. 2) All brush, severed limbs, poles, tops and/or other organic waste material generated by harvest, other types of land clearing or storm damage.

Snag: A standing dead tree, generally considered nonmerchantable, without leaves and finer limbs, that is retained in a forest for wildlife and/or aesthetic values.

Stewardship (Forest): a general approach to forest management that meets the needs of current owners but doesn't detract from or degrade the use by future generations. Forest stewardship is based on conservation principles that ensure protection of all forest resources including wildlife, timber, soil, water recreational opportunities and natural beauty. Forest stewards actively manage their land on a long-term basis by following management objectives that are based on multiple resources, are economically viable and conserve natural resources.

Stocking: An indication of growing-space occupancy relative to a preestablished standard – note common indices of stocking are based on percent occupancy, basal area, relative density, stand density index, and crown competition factor.

Stumpage: The monetary value of a tree or group of trees while in the woods uncut (standing on the stump).

Succession: The shift in forest species composition over time.

Sustained Yield: Management of forests to produce a relatively continuous flow of timber or revenue.

Trees Per Acre: The number of trees within one acre. This is usually reported as the average number of trees within each acre within a stand.

Trust Lands: Those lands where the title is held in trust by the United States for the benefit of American Indian tribes or for the benefit of individual American Indians.

Understory: The live crown top is at or below the middle of the overstory canopy zone.

Uneven-aged Management: A harvest system designed to maintain a variety of tree ages and diameters within a stand by frequently harvesting small volumes.

Vigor: The health and resilience of a tree, reflected in the capacity of the whole tree to grow. The term is often used as a description of overall condition on a qualitative scale from 'high' to 'low'.

Yarding: A system that uses cables to transport material from the woods to the landing. Material may be fully or partially suspended for all or a portion of the yarding distance. The cables are strung in corridors through the stand. No yarding equipment other than the cables and a carriage are operated within the stand itself.

14 APPENDIX F: AUTHORITIES

The governing authorities responsible for forest activities on Tribal Trust lands are the Nez Perce Tribe and the Department of Interior's Bureau of Indian affairs through the following guidance documents:

- 25 CFR Part 163 – General Forestry Regulations
- 43 CFR Part 46 – Implementation of the National Environmental Policy Act of 1969
- 53 IAM 2-H: Indian Forest Management Handbook – Forest Management Planning
- 53 IAM 3-H: Indian Forest Management Handbook – Contract Sales of Forest Products
- 53 IAM 4-H: Indian Forest Management Handbook – Permit Sales of Forest Products
- 53 IAM 5H: Indian Forest Management Handbook – Forest Development
- 53 IAM 7H: Indian Forest Management Handbook – Forest Trespass
- 53 IAM 9H: Silviculture
- 53 IAM 11H: Indian Forest Management Handbook – Forest Management Deductions
- 59 IAM 3-H: National Environmental Policy Act Guidebook
- 80 IAM 1.4C (2)a-H: Fuels Management Program Planning and Implementation Guide
- 90 IAM 5-H: Wildfire Prevention Program Handbook
- 90 IAM 6-H: Wildfire Origin and Cause Investigation Handbook
- Fee-to-Trust Handbook
- Department of the Interior National Interagency Burned Area Emergency Response Team Standard Operations Guide
- National Indian Forest Resources Management Act
- Nez Perce Tribe's Forest Management Plan

The governing authorities responsible for forest management activities on Tribal Fee lands are the Nez Perce Tribe and other applicable state agencies through the following guidance documents:

- Nez Perce Tribe's Forest Management Plan
- Nez Perce Tribal Code
- Idaho Forest Practices Act Title 38, Chapter 13, Idaho Code
- Idaho Administrative Procedures Act (IDAPA) 20

Lest acts or codes, regarding Tribal forest management activities, are determined exempt on Tribal lands by the Nez Perce Tribe's Office of Legal Counsel (OLC) or Nez Perce Tribal Code.