

2015 Forest Management Plan

Colville Indian Reservation

A Forest Management Plan tiered to and in compliance with the Colville Tribes 2015 Integrated Resource Management Plan. This Forest Management Plan is intended to provide an implementation plan to the Forestry Program for the Tribes Preferred Alternative outlined in the IRMP.

COLVILLE INDIAN RESERVATION FOREST MANAGEMENT PLAN

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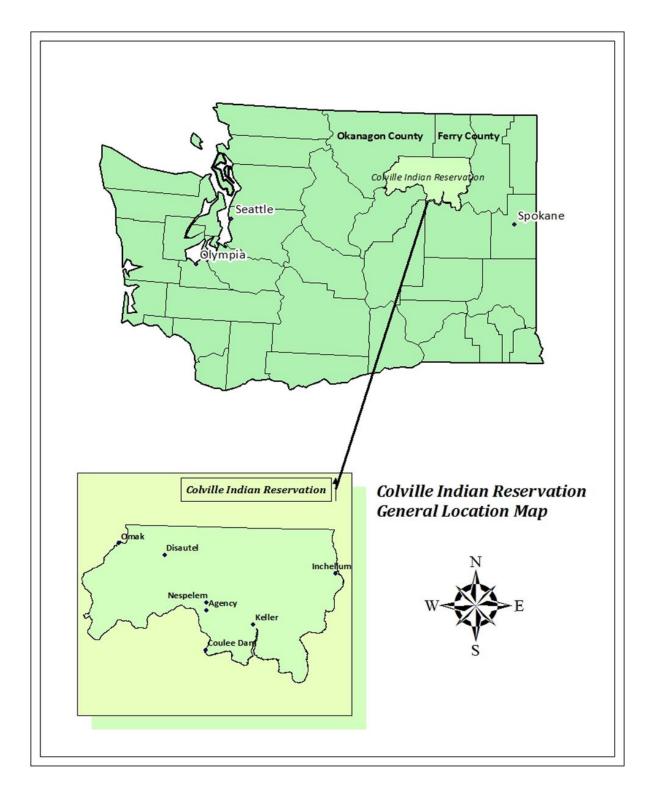


Figure 1. Vicinity Map of Colville Indian Reservation

INTRODUCTION

Forest Management Plans (FMPs) are required for all Indian forest lands in federal trust status, as outlined in the National Indian Forest Resources Management Act of 1990 (P.L. 101-630). The purpose of this Forest Management Plan is to provide a solid basis for management decisions and establish an administrative framework for implementing the Colville Tribes updated 2015 Integrated Resource Management Plan (IRMP). In 2014 the Tribe began the process of revising and updating the IRMP that was completed in 2000. Tribal Council passed a resolution stating their desire to update the existing IRMP with the Preferred Alternative being to continue on the same management path, with some updates and changes to further improve the document. This document will be in compliance with and provide an implementation plan for the Tribes Selected Alternative outlined in the IRMP.

Changes from Past Management Direction

The Tribes selected alternative in the 2015 IRMP was to continue with the management alternative that was outlined in the 2000 IRMP, which outlined a harvest level of 77.1 million board feet per year. This includes 64 mmbf of regeneration treatment and 13.1 mmbf of intermediate treatement. There is very little change in the overall management strategy under the new plan. There were some changes to the management plan intended to address ongoing issues and concerns that were not adequately addressed in the previous plan. Some examples are listed below:

- The addition of Management Emphasis Areas that are of special concern to different resource programs such as Fire Management, Fish and Wildlife Environmental Trust.
- Changes to over-story retention requirements
- Mapping and commercial cut-base acres.
- Updated Forest Inventory Analysis data.
- Updated timber harvest schedule, including some watersheds previously deferred from treatment.

This document will further outline these changes, and will provide management guidance to the Forestry Program so the IRMP can be properly implemented and other resource needs and concerns can be integrated into the planning process.

FOREST MANAGEMENT SETTING & HISTORY

This section will provide a relatively brief description of the forest management setting on the reservation. Several other documents and references provide a comprehensive description of the forest and its history. The 2015 Forest Inventory Analysis Report provided excellent forest trends data and inventory statistics. A document titled "Bitterroot and Precision Pine, a 1988 Forest History of the Colville Indian Reservation" provides a valuable historical assessment of natural resource management on the reservation.



The Colville Indian Reservation is situated along the southern edge of the forested region in northeastern Washington. The reservation is slightly less than 1.4 million acres, of which roughly 66% is forested. The reservation is bounded on the east and south by the Columbia River, on the west by the Okanogan River and on the north by the line separating townships 34 and 35 of the Willamette Meridian. Elevations range from 790 feet to 6,774 feet and averages about 3,000 feet. Precipitation averages from 10 to 25 inches annually and falls mostly in the winter.

The total productive trust forest acres are equal to 691,612 acres. Productive is locally and commonly defined as capable of sustaining an annual production of 20 cubic feet per acre of wood products, and administratively made available for timber harvest at any intensity level. Areas that are productive, but unavailable for logging were removed from the commercial cutbase. Most of the commercial acres removed include Riparian Management Zones as defined by the Colville Forest Practices Act. There is a minimum of 28,058 acres in this zone. There is also about 3,000 acres which is preserved for wildlife habitat mitigation, and 6,000 in major road right of way.

Table 1. Tribal and Allotment Commercial Forestlands Acreage.

	Acres
Total Productive Trust Forest Land	691,612
Road Right of Ways, Wildlife Habitat Miti and Riparian Management Zones	gation -31,194
Commercial Forest Land	660,418
Tribal Trust	634,629
Allotment	25,789

After removing the productive areas unavailable to harvesting, the Commercial Forest acres are estimated to be 660,418 acres. It is important to point out that areas considered inoperable and marginal in the 2000 IRMP are now included in the commercial forest acres. This includes helicopter ground and the Ponderosa Pine Plant Association Groups. See 2015 FIA Report for more information.

There are several milling facilities in the vicinity of the reservation. Two mills exist on the reservation at Omak. Omak Wood Products is a tribally owned mill that is leased to a private firm. The Tribes Enterprise has a lease agreement with Omak Wood Products and a timber supply agreement that



He describes this pine type as occurring on

predominantly southern exposures up to 3,500 feet in elevation. The second type, which he called mixedforest, occurred above 3,500 feet elevation, on all north exposures below that, and in the bottom of deep, narrow, sheltered valleys, such as the San Poil River and Hall and Barnabee Creeks. He describes this

requires them to provide 40 million board feet a year to the facility. The other mill at Omak, Colville Precision Pine, is currently closed, although the Tribe is currently pursuing options to re-open it.

Several other mills purchase timber from the tribe, including Vaagen Brothers mill in Colville, and Boise Cascade's two mills in Kettle Falls. The Tribe also sells timber on the export market and to various other mills throughout the region.

Historical Forest Conditions

Many elders say the forest is different today than it used to be. They picture the forest as having been open and park like, with big ponderosa pine trees and very little brush. They describe riding horseback through a forest unimpeded by thick vegetation. In 1904 a forester named Franklin Reed described two forest types on the reservation (Reed 1904):

"...a pure, open stand of bull pine (ponderosa) with a ground cover of bunch grass. The stand consist of 10 to 15 trees, 12 inches and over diameter breast-high, per acre..."

mixed



Historic Forest Condition

stand as:

"....a dense stand of red fir (Douglas-fir) and larch with a varying intermixture of yellow ponderosa and lodgepole pine. The stand is often so dense as to prevent the growth of grass, but where it is open enough the ground cover is usually pinegrass. The proportion of timber under 12 inches in diameter breast high is so high that the yield per acre is not heavy...."



Current Forest Condition



These early descriptions indicate that forest condition in the historical past may have been different than they are today. Historical conditions are likely to represent the forest as influenced by natural processes and thus may be indicative of the ecology of the forest. The influence of indigenous peoples may have been significant, and some would argue that natural processes had been altered by humans. The forest has evolved and changed with native peoples being a natural process within the ecosystem.

Current Forest Condition

Dense stands of smaller trees characterize today's forest. Fire sensitive species such as Douglas fir and subalpine fir are more common, often forming dense understories that compete strongly with the dominant overstory for limited resources. The change in species composition and structure over time has resulted in significant forest health concerns. Dwarf mistletoe, bark beetles, spruce budworm and other insects and pathogens are more likely to occur at epidemic levels today than in the historical past.

Native plants of the reservation are affected by disturbance from logging, wildfire, grazing, cultivation and the reservation's geographic location and distribution. The greatest degree of disturbance occurs in the Ponderosa pine and Douglas fir zones, where it has substantially changed the composition of native vegetation.

The vegetation of the reservation reflects the historic patterns of fires, which have burned through reservation forests for thousands of years. Historically, the frequency, intensity and extent of fires differed considerably across the reservation. The reservation is subject to considerable summer thunderstorm activity. Additionally, indigenous people have traditionally used fire to enhance the landscape for preferred plant species and game forage. These factors, in conjunction with rainfall patterns, created a historic pattern of frequent fires across the reservation.

Historical Role of Fire

Franklin Reed (1904) describes the historical role of fire on the Colville Indian Reservation:

"Fires have occurred in the timbered portion of the Reservation every summer ever since anything was known about the country. At one time or another, the whole area has been burned over. Once a forest fire gets burning no attempt is ever made to put it out unless it gets so near as to threaten destruction to buildings or fences."

He goes on to describe how the fire behaved in the two forest types described. In the bull pine type, which was open with an understory of grass, fires were typical ground fires carried by the grass. The mature trees survived but much of the regeneration was killed. Fir in the mixed type forest was much more destructive. The higher fuel loads resulted in hotter fires that often killed all standing timber over



several hundred acres. He observed lodgepole pine often regenerating in pure stands to the exclusion of other trees.

Much of the reservation forest was at one time described as having open and park like stands of ponderosa pine and western larch with grass growing in the understory (pictured on page 6). Fires burned frequently through these stands. These frequent fires influenced and shaped the species composition, structure and density of the forest stands. With the initiation of practices such as fire suppression, timber harvest and grazing, the open park like forest began to change to a multi-layered canopy Douglas-fir and grand fir dominated forest.

The absence of fire on the landscape has also contributed to the decline in forest health. In the 1920's, aggressive fire- fighting and fire suppression policies were put in place, removing fire from the ecosystem. The removal of fire caused a shift in species composition and the development of multilayered stand structures and increased stand densities. Species that would have burned during the frequent fires, such as Douglas-fir and other true firs, established in the understory. Because of the absence of fire the quantity of needle litter and dead woody fuels found on the forest floor has also increased over time. These changes have created a forest condition that is much more susceptible to catastrophic fire. When fire occurs there is an increased likelihood that they will burn with more intensity and thus be more destructive then would have occurred historically.

Previous Forest Management

Initial attempts at timber management on the Colville Reservation began early in the 20th century and included fire control policies intended to ensure the protection of forest resources and a sustained yield of forest products. By World War II, fire suppression had become very efficient and most ignitions were quickly extinguished.

Prior to the late 1920s, timber harvesting had been relatively insignificant. Harvest after that time gathered momentum, peaking in the 1970s when over 120 million board feet were harvested annually. During most of this time, trees were removed in a selective manner emphasizing trees with commercial value. The predominately even-aged structures were opened up largely by removal of seral trees.

The resulting combination of the two management strategies, fire exclusion and selective cutting changed the structure, composition and density of the forest. Fire, the primary force in the natural thinning of forest stands, tends to spare thick barked, fire resistant trees and opens the stand to pioneer species that thrive in direct sunlight. Additionally, the suppression of naturally recurring fires has resulted in the accumulation of fuels.



Selective tree harvesting disproportionately removed Ponderosa pine, opening forest canopies only enough to favor the establishment of either brush or shade tolerant tree species such as Douglas fir. The resulting forest structure was comprised of understories or multiple canopy stands. These multi-level stands support more trees than they did historically. The upper canopy levels are often made up of the remnants of the pre-management forest, largely Ponderosa pine and western larch. The lower levels are frequently made up of overly dense stands of shade tolerant tree species such as Douglas fir.

Historical photographs and narratives indicate vegetative changes with brush becoming a more dominant component. As a result, accumulated fuel levels are high. Historically, stands with this type of structure, composition and density were rare or temporary in nature.

In 1961, Harold Weaver reported that almost the entire forest had been burned at least one since 1910. The intensity of these fires had varied from light surface burns to stand-replacement crown fires.



Historic Salvage Operation

Particularly extreme fire years occurred between 1910 and 1931. These fires appear to correspond to a very large area now occupied by 60 to 80 year-old trees.

Given that forest structure, composition and density has changed, the natural equilibrium of insects and diseases has also changed. In the pre-fire suppression environment, pests existed in particular areas with occasional epidemic periods that remained localized and relatively short lived. Changes in the forest have created the potential for widespread epidemics of long duration.

Until the late 1960s, commercial harvest of every acre within a timber sale was the norm, with the anticipation that these areas would be on 20-year cutting cycles. There were no provisions for other timber management practices other than fire protection.

A major shift in timber management practices on the Colville Reservation began in the late 1970s. Timber marking guidelines were implemented to remove a certain percentage of the commercial volume. New management directives required the preparation of individual stand harvesting



prescriptions. Regeneration cuts were prescribed for areas with extensive insect or disease problems. Regeneration cuts were limited to 1/3 of a sale area and were not to exceed 40 acres in extent.

Site preparation and regeneration of specific conifer species such as Ponderosa pine began to occur. Rehabilitation activities were prescribed in areas lacking enough young trees to produce a commercial crop with sufficient volume per acre to make logging profitable. Thinning was prescribed for overstocked but otherwise relatively healthy stands. Additional management activities included prescribed burning, herbicide application, nursery operations, tree planting and pre-commercial thinning.

Current Forest Practices

Historically, timber revenues have funded tribal government operations. Tribal government services and employment are still funded by the sale of forest products (51% in 2007). Hunting for subsistence and sport is a major part of tribal life on the reservation. Numerous traditional and cultural activities take place across the forested landscape, including various ceremonial and gathering activities.

As foresters began to recognize the need to shift management away from selection harvesting in the 1970's and 1980's they began implementing regeneration harvesting on a relatively small scale across the reservation. Throughout the 1980's and 1990's regeneration harvesting (plantation forestry) became



Plantation

much more common. Eventually, the clearcut method of harvest came under scrutiny by the Tribal Membership. While it was very successful at establishing the desired tree species, it dramatically changed the landscape visually. A Tribal Resolution was eventually passed that required a minimum of 2 large trees per acre be left.

While developing the 2000 IRMP and performing public meetings, the team recognized the need to implement an even-aged strategy to improve forest health, but also realized that public perception required the retention of some large trees. They also recognized the need to incorporate other ecologically

important principles into the Forest Management Plan. These ideas were integrated into the IRMP, and led to a fundamental change in how Tribal forests are managed today. Many large diameter trees are left scattered across the site when implementing regeneration harvesting and growing new young trees. Not only is this visually appealing, but it also resembles what much of the reservation forest would have looked like historically, with open "park-like" stands of large diameter trees.



The management approach of leaving large trees and habitat patches has been the primary silvicultural strategy for regenerating the forest for the last 15 years. This strategy reduced the available harvest volume in order to balance the economic needs of the tribes' forest products industry and maintain a visually appealing landscape that would meet the Desired Future Conditions developed with input from the Tribal Membership for the IRMP. The Forestry Program spent the last 15 years trying to implement these relatively new ideas on a large scale across the forested landscape for the benefit of the Tribe.

In 2006, the Tribal Council passed a new Colville Forest Practices Act Code that established minimum standards for forest practices affecting Reservation resources. Although the original FPA from the 1980's was mainly applicable to non-trust lands within the reservation, they were adopted by the Forestry Branch. The Forestry Program has attempted to adopt best management practices that are above the minimum standards called for in the Colville Forest Practices Act.

The adoption of individual stand prescriptions changed logging practices. Formal logging plans are prepared for timber sales and determine the location of logging roads. New roads must avoid running along drainages. The Environmental Trust Department and the Fish & Wildlife Department have performed limited road abandonment in the past when grant funding was available. A forest roads program is now being developed by the Transportation Department.

While tractor skidding is still the most common harvest practice on slopes 35% and less, the use of cable logging and helicopter has become standard practice on steeper slopes. The use of forwarders has also become more common as smaller material has begun to be utilized commercially. In this system trees are felled and de-limbed at the stump, allowing forwarders are utilized to walk on top of the slash much while bringing logs to the roadside landing. This may help reduce soil compaction.

FOREST INVENTORY SUMMARY

As previously discussed, the combination of fire exclusion and selective cutting profoundly changed the structure, composition and density of the forest. Today many of the reservations' forest stands that were once dominated by ponderosa pine and western larch are now primarily composed of Douglas-fir and/or grand fir. Fire suppression removed the primary force in natural thinning of forest stands. It also removed a powerful natural force which selected in favor of seral species by favoring either thick barked fire resistant trees or shade intolerant pioneer species.

Stands now tend to be denser (carry more trees) than the historic stands and have a multi layered structure. Many of the large ponderosa and western larch trees are gone and the shift in species composition, structure and density makes these stands more susceptible to attack by insects and disease. In dense stands trees compete with each other for sun light, nutrients and water.



The following section is a summary of data from the 2015 Forest Inventory Analysis Report. This section will outline some trends in forest characteristics over time, and will provide a breakdown of the current statistics of the standing inventory, growth and mortality. For more detailed information on please refer to the 2015 FIA Report. The Resource Assessment developed for the IRMP also provides a more in-depth discussion of the forest condition.

Basal Area per Acre Trends

Figure 2 shows the basal area per acre by diameter class over time, taken from CFI data. No data was collected for trees less than 5 inches in diameter until 1985, so Figure 2 only includes trees above this diameter class. Basal per acre increased substantially from the 1950's through the 1970's, mostly due to fire suppression and selective harvest. Basal area has remained fairly stable since 2004.

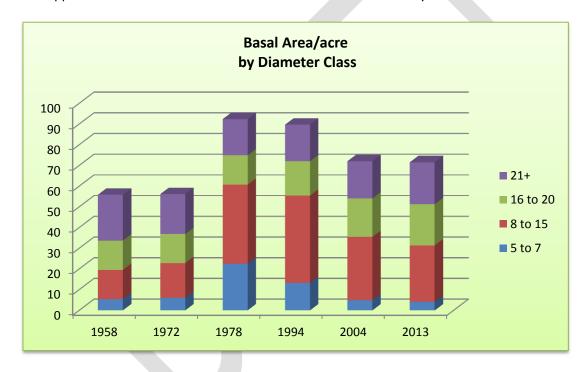


Figure 2. Basal Area per Acre Trends (5 inch trees & greater).

Standing Volume Trends

The standing inventory has remained roughly the same since 2004. Ponderosa pine and Douglas-fir make up the majority of the volume, with Douglas fir having a slightly higher volume. The standing volume increased from 5.7 to 5.8 billion board feet from 2004 to 2013. A reservation wide inventory table by diameter class can be found in the 2015 FIA Report.



Table 2. Basic Forest Inventory Data (2013 CFI Data).

Species	Basal Area per Acre	Net bf vol/ac	Total Net Thousand Board Feet
Ponderosa Pine	25.2	3,375.5	2,229,240,959
Douglas fir	33.3	3,535.4	2,334,841,797
Western Larch	5.2	695.2	459,122,594
Other Conifers (spruce, true fir, cedar, lodgepole)	7.7	1,178.5	778,302,613
TOTAL	71.4	8,784.6	5,801,507,963

One notable inventory trend is the steady increase in standing net volume per acre as seen in Figure 3. The standing volume per acre has been steadily increasing since 1985. This is because the harvest level has been less than the growth. Even with an increase in mortality during the 2004 and 2013 measurements, the total standing volume inventory is slightly higher than 2004, and almost higher than it has ever been.

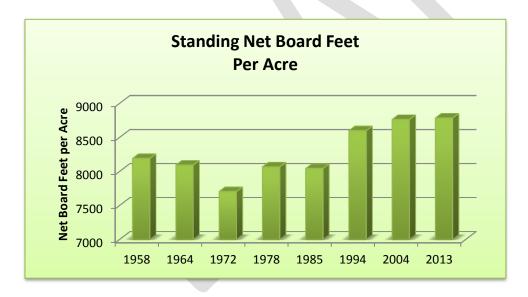


Figure 3. Standing Net Board Feet Trends.

Growth & Mortality

Table 2 shows the growth and mortality measured in the 2013 CFI. Note that the net growth is well above the AAC of 77.1 million board feet per year.



Table 3. Growth & Mortality (2013 CFI Data).

	Bd Ft/Per Acre/year	Total Million Board Feet/year
Gross Growth	260	171.7
Mortality	86.2	56.9
Net Growth	173.8	114.8

Table 3 and Figure 4 shows what each species contributes to the current mortality. It is obvious that Douglas-fir (DF) and other species (lodgepole pine, Engleman spruce, grand fir, and subalpine fir) are contributing a large percentage of the mortality, especially considering they make up a relatively small portion of the standing inventory. Table 3 also shows the mortality by diameter class. Note that most of the mortality is in the larger diameter classes.

Table 4. Annual Mortaltiy by Species and Diameter Class.

	Annual Morta	lity (MMB	F)		
Size Class	DF	PP	WL	Other	Total
21+	10.3	10.8	1.5	4.6	27.1
16-20	5.4	4.6	1.0	3.5	14.4
8-15	4.0	2.0	2.1	7.4	15.5
		0			_3.5
Total Mortality	19.7	17.3	4.6	15.4	56.9

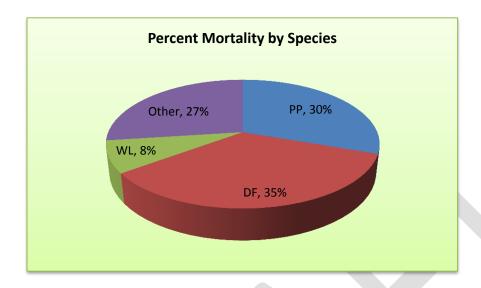


Figure 4. Percent Mortality by Species.

RESOURCE PROTECTION PROGRAM IMPLEMENTATION

Colville Tribal Code, Title 4 Natural Resources and the Environment, includes tribal laws and regulations pertaining to natural resource management on the Colville Indian Reservation. Chapters that specifically affect forestry operations include:

- Chapter 4-7 Forest Practices will also be a guiding document for forest management activities in this Forest Management Plan. This document is the Tribes Forest Practices code that outlines management requirements on all forested land within the reservation.
- Chapter 4-8 Water Quality Standards
- 4-9 Hydraulic Projects Permitting
- 4-10 Water Resources Use and Permitting
- 4-12 Forest Protection
- 4-19 Fire Management

The Timber Use Policy, 2015 through 2018, also guides forestry activities. This document outlines policies for the harvest of forest products that provides benefits to the timber owners and their forestlands. This document applies when values are relatively small and the use of contract sales is not



required or used. This is for projects accomplished through timber cutting permits or free use without a timbersale contract such, such as house logs, firewood, post and poles and other small projects.

Fire

Fire management on the Colville Indian Reservation is guided by the Wildland Fire Management Plan (2001) and the Colville Indian Reservation, and the Mount Tolman Wildfire Prevention Plan (2010 through 2015). This section will summarize the management policies outlined in these documents in relation to the Forest Management Plan. For more detailed information refer to respective documents.

Prevention

The Fire Prevention Strategy for the Colville Reservation is to reduce the number of person- caused fires and to reduce the damage caused by all fires.

The Wildfire Prevention Analysis and Plan identifies the Risks, Hazards and Values on the Colville Reservation. The Plan also identifies priority areas, specific action and responsibilities consistent with the Colville Reservation Integrated Resources Management Planning Goals.

Wildfire prevention activities generally fall within one of the four broad categories.

1. Education

Education is aimed at changing people's behavior by awareness and knowledge. This can be done through printed materials, mass media, one-on-one contacts or group presentations. Information can also be delivered through signs, displays, fairs, parades, etc.

2. Engineering

Engineering is an activity designed to shield an ignition source or remove the fuel that could ignite from a spark or firebrand. Fuel management and hazard reduction addressed in another section of this plan will also assist in attaining the objective of reduction of resource loss.

3. Enforcement

Enforcement is used to gain compliance with fire regulations and ordinances.

Administration

Administration includes those activities such as planning, budgeting, training, etc.



Fire (Burning) Permit System

Burning permits are required from March 1 through November 30.

Public Information and Education

As mentioned above Public Information and Education is accomplished using a variety of methods. This is the area of emphasis that can establish and maintain support for the Fire Management Program as a whole. By keeping the public informed of what and why you are doing something gains support for the entire program. Don't forget to say THANK YOU at the end of the season for the help provided in reducing the number of fires.

Closures/Restrictions

The Colville Reservation and woods closure restrictions will be incompliance with the Industrial Fire Precaution levels compiled from fire weather data gathered by the State of Washington, Department of Natural Resources Fire Weather Office.

The Mt. Tolman Fire Center will coordinate closure or control logging operations or other activities pertaining to weather zones within the Reservation boundaries. This coordination will be direct agency-district headquarters to assure maximum coordination of the effort.

At such time the fire precaution levels are activated, the requirements affect ALL Reservation programs. The fire dispatch will keep all personnel informed of the current precaution level in effect by two-way radio, signs, public information releases, and direct communications with program managers.

During periods of extreme fire danger, the public will be made aware of the situation through news release, by posting and distributing fire danger notices and some access road closures into high-hazard areas. At these times all unnecessary wood's activity should be curtailed. Closures/Restrictions are never desired, however, there are times when the fire danger warrants restricting the general public and members of the Colville Confederated Tribes.

Trespass and Arson Investigation

Current fire investigation is done by fire management personnel or qualified enforcement officers employed by the Tribe. This investigation determines cause.

Enforcement

Enforcement of laws and regulation is done through the Tribal Police.



Hazard Abatement

Hazard abatement relating to fuels management is a fire management task and is identified with responsibility assigned in the "Wildfire Prevention Analysis & Plan". The task is accomplished through cooperation with Timber, Range, Wildlife, Lands and other resource managers in accordance with the Plan for Integrated Resources Management Plan standards and guidelines. Also see Chapter IX "Fuel Management/Hazard Reduction Strategy" of this document for further discussion on this topic.

Timber sales can be planned in areas of high fuel hazard accomplishing the target for lumber and revenue while reducing the fuels. Range and Wildlife projects can be planned for those areas that have a high fire occurrence, reducing the fire hazard and improving the range conditions and wildlife habitat. Fuels in and around developed areas can be treated to reduce the risk to both the developments and also the surrounding lands.

Prevention Workload Analysis (PWA)

There is no need to develop a Prevention Workload Analysis within this plan as a detailed PWA was included in the "Wildfire Prevention Analysis & Plan". Based on the PWA there is a need for additional funds to accomplish the fire prevention tasks as outlined. The cost of prevention may need to be reviewed and increased in order to reduce the hazard in and around the increasing wildland/urban interface.

During the analysis period of 1991 - 2000 the Reservation had a total of 1,202 fires that burned 62,191 acres (ten year average of 120 fires burning 6,219acres annually). Total fires per year were highly variable ranging from 196 (1991) to 112 (1997).

An analysis of fire occurrence determined that the fire season (based on having a ten year average of one fire in a ten day period) runs from March 22 through October 27. Lightning is the predominant cause for the majority of fires (504) on the Reservation with 79.8% of the fires occurring between May and October. Table VII – 2 summarizes the causes of fire during the past ten-year period



Table 5. Fire Problem Identification - Colville Reservation

CAUSE	NUMBER OF FIRES IN	PERCENT OF TOTAL	AVERAGE FIRES PER
CAUSE	TEN YEARS	PERCEINT OF TOTAL	YEAR
Lightning	504	41.9%	50.4
Campfires	61	5.1%	6.1
Smoking	13	1.1%	1.3
Debris Burning	245	20.4%	24.5
Incendiary	36	3.0%	3.6
Equipment	93	7.7%	9.3
Children	79	6.6%	7.9
Miscellaneous	171	14.2%	17.1

Public Information and Education

Information

It is beneficial to the fire management program to keep the public well informed on the current events. Prior to fire season provide information regarding fire prevention, burning permits, potential fire danger, training, cooperator involvement, etc. During the fire season it may be necessary to inform the local residents of the current fire danger, current fire activity, any fire restrictions, road/trail closures, etc.

Prior to prescribed fire activity it is helpful to conduct public meetings to let the local residents know what is planned and why. On the day of ignition anyone within the immediate area should be contacted to make sure they are aware of the burn and that you are concerned for their safety.

At the end of each fire season put out a "Thank You" for their help for their help with the reduction in person caused fires and include what you did experience and what you did accomplish (i.e., how many fires on the Colville Reservation, number of firefighters you had to bring in, number of firefighters you sent some place to help others, amount of acres prescribed burned and for what reasons.).

Education

It is necessary to include an education effort as a part of the fire prevention program. Education may also be necessary if there is a planned fire prevention of fuel project that may have outspoken critics.

An integral part of public education is the dispersion of current fire danger information through signs illustrating current fire danger, press releases, and other public announcements. It is important that the residents are made aware of current fire danger levels, and if sighs are utilized they should be updated



on a regular basis. Signing during prescribed fires can be both a useful safety tool as well as an aid in educating the public on fire. Raising the public awareness on both the subjects of fire management and fire suppression may provide benefits in reducing arson caused fires and increased public cooperation with fire related law enforcement.

Public Safety Measures

Public safety concerns will be specifically addressed in each Wildland Fire Situation Analysis (WFSA) and each prescribed fire plan. The following public safety measures will be taken:

- Public safety messages should be developed as required and incorporated into the process of fire information dissemination.
- Trail and unimproved roads in the vicinity of wildfires and prescribed fires will be closed if potentially hazardous conditions are present.
- Traffic control measures, including smoke warning signs, flashing signal lights, traffic cones, and either fire or law enforcement personnel should be situated on roads where smoke intrusion incidents are anticipated to occur.
- Patrols will be assigned to keep spectators at a safe distance from prescribed fires.

Fire Critique

A fire critique should be accomplished and documented after each major wildland fire and after a multiple wildland fire event. The critique should identify what went right and what didn't. The critique should not fix blame but identify areas that can be improved upon through training, change in procedure, improved communication, etc. Special recognition should be given to those that put forward extra effort to accomplish their duties. Also any cooperators should be recognized. Any changes in procedure should be made immediately and broadcast to all those that may be involved. Training deficiency should be corrected as soon as required training is available.

Annual Summary Report

The FMO will be responsible for completing an annual Wildland Fire Summary Report. The report will contain the number of fires by type, acres burned by fuel type, cost summary, personnel utilized, hours of aircraft use, and fire effects.

Fire causes should be reviewed annually and appropriate revisions made to the Fire Prevention Plan directing action toward reducing the top three causes of unwanted wildfire.

Annual Fire Management Plan Review



The Fire Management Plan (WFMP) will be reviewed annually by the FMO and the AFMO. Necessary updates or changes will be accomplished prior to the next fire season. Any additions, deletions, or changes will be reviewed by the Natural Resources Director to determine if such alterations warrant revalidation of the plan by the Superintendent and the Regional FMO.

Preparedness

Preparedness activities are carried out prior to a fire occurrence to ensure that the appropriate response to that fire can be accomplished. Preparedness activities include: budget planning, equipment acquisition, equipment maintenance, equipment inventory, recruitment, and training, reviewing and revising, if needed, any cooperative agreements, and meeting with cooperators. The objective of the preparedness effort is to have a well-trained and well equipped fire management organization in place to manage all fire situations within the Colville Reservation.

Dispatch Hierarchy

The three-tier system consists of unit/local Zone and Geographical Area Coordination Center (GACC), and the National Interagency Fire Coordination center (NIFCC). The unit/local dispatch center can move any local fire suppression resources from areas adjacent to the unit in need. GAOCC supplies fire suppression resources from the defined geographic area and place orders to NIFCC at Boise, Idaho.

The Colville Reservation dispatch center is housed in the Mt. Tolman Fire Center Office. The dispatch office is equipped with radio/telephone voice communications and computer for electronic communications. The Fire Dispatch Office will be operational 7 days a week during normal fire season as defined in the Manning and Specific Action Guide.

It is absolutely necessary that the proper equipment and training be provided that allows dispatchers to recognize the fire potential and dispatch necessary resources to meet the suppression objectives. Equipment should include some means of recording requests and action on requests.

On large or complex incidents Expanded Dispatch will be activated. Expanded Dispatch functions are overhead/crews, aircraft, equipment/supplies, and intelligence. The volume of orders and complexity of the incident(s) determine the staffing levels and the degree of expertise required. A qualified/certified Supervisory Dispatcher will fill the Expanded Dispatch supervisor position. This position is responsible for filling and supervising the necessary positions based on the complexity of the situation.

A list of trainees for expanded dispatch is up-dated annually and maintained in the Fire Dispatch Office.



Weather Forecasts

Regular Forecasts: Weather observations will be entered into the computer system and a normal forecast retrieved about 1600 PDT during the low level service. During normal level service, one forecast will be pulled at 0830 PDT and the afternoon forecast at 1630 PDT. The Dispatch office will make these forecasts available to all fire management personnel via the established communications system.

Special Forecasts: Requests for spot forecasts will be handled at any time. Call forecasters at their home phones, outside of normal office hours. The Special Forecast Request Form, WA D-1 or (653-1) can be used to indicate the information required by the forecaster, particularly Items 1-12.

Mobile Unit Service: The Air Transportation Module Unit (ATMU) is available for dispatch to an actual or potential project fire. The Dispatch Office can make requests directly to the Fire Weather Office or one of the forecasters.

Local Weather Stations for Determining Fire Danger Indices

The Colville Reservation utilizes three forecast zones to determine fire danger and the Industrial Fire Precaution Levels.

Fire Danger on the Colville Reservation is based on the three Remote Automatic Weather Stations (RAWS) located on the Reservation. These stations include 452009 located at Nespelem, 452040 located at Kramer Ranch and 452510 located at Gold Mountain Lookout.

Industrial Fire Precaution Levels are provided for by part of two zones located on the Colville Reservation. They are Zone 684, basically the non-timbered area of the Reservation, and Zone 678 that encompasses all of the Reservation's timbered area. Zone 684 has two RAWS station, 542009 located at Nespelem and 452030 located at the North Cascades smoke Jumper Base located off-Reservation at Twisp, Washington. Zone 768. There are twp on-Reservation RAWS station at Gold Mountain Lookout (452510) and Kramer Ranch (452040) and five off-Reservation RAWS stations at Aeneas, Lookout (452001), First Butte (452006), Leecher Mountain (452020), Lost Lake (452029) and Douglas Ingram Ridge (452035).

Criteria and Action Guidelines

Pre-suppression

Manning and specific fire management pre-suppression action guides for the Colville Reservation are shown in Table VI -1



Table 6. Manning and Specific Action Guides for the Colville Reservation.

Action	action	fire incident level					
number	action	1	2	3	3H	4	5
1	Normal Operating Procedures	X	X				
2	Fire Management office will be open 7 days per week, from 073 to 1800 during normal fire season.			X	X	X	X
3	At least one of the following officers will work normal days off or remain on duty if the class occurs in the afternoon: FMO, AFMO Logistics, AFMO Operations, Lead Dispatcher, Dispatcher, Prevention Officer, Safety Officer.	Н	Н	H/L	0	X	X
4	All of the following will work on normal days off or remain on duty in the evenings if the class occurs in the afternoon: FMO, AFMO Logistics, AFMO Operations, Lead Dispatcher, Dispatcher, Prevention Officer, Safety Officer, all lookouts.	Н	Н	Н	L/M	Х	X
5	All of the following will work on normal days off or remain on duty in the evenings if the class occurs in the afternoon: a) Engine Crews, Equipment Operators. b) Qualified Natural Resources Department Personnel.	Н	Н	H/L	L/M L/M	X X	X X
6	Fire Management Staff will be maintained at full strength; leave will be limited only to sick or emergency leave. Other Natural Resources Department Personnel may be used to fill vacancies of normal Fire Management Staff.					0	X
7	The Fire Management Office will remain open 24 hours per day and staffed at the required level to meet situational needs.				L	0	X
8	Emergency Firefighters may be hired in an amount that the situation requires and stationed at strategic locations.				L	0	X
9	Agency Branch Chiefs may be alerted to possible immediate call				L	0	X

Action				fire incide	nt level		
number	action	1	2	3	3H	4	5
	for assistance.						
10	All Fire Management Staff will be at designated locations and on continuous communications.				L	О	X
11	Qualified Natural Resources Department staff will be at designated locations and on continuous communications.				L	O	X
12	Fire Management Dozers will be loaded on transport vehicles.			L	X	X	X
13	Fire Management Dozers will be stationed at designated locations.				L	0	X
14	Air patrol may be carried out on per-determined flight plans.			Y/L	Y/L	Y/L	X
15	Alert Branch of Forestry, Portland Area Office, neighbors, and air tanker bases of current conditions.					X	X
16	All contractors and cooperators will be informed of pending lightning storms and red flag warnings through communications with District Supervisors.					L	X
17	News media will be informed of current fire conditions.			L	L	0	X
18	During periods of extended drought, other measures that may be deemed by the FMO, Forest Manager and Superintendent to be advisable, needed or necessary to meet protection responsibilities may be implemented.					O	X
19	Determine the availability of Call when needed helicopters to supplement the contract helicopter.					О	X
20	Implement the Colville Reservation Closure Plan					0	X

X = Action without qualifications; O = Action to consider; V = Visibility 5 to 8 miles; Y = Visibility less than 5 miles.

Closure Plan

Closure of the Colville Indian Reservation is a rare occurrence. A Closure Plan will only be implemented as a part of a general area shutdown, in cooperation with adjoining agencies or as a result of a



L = Lightning occurring, predicted or has occurred in the past 2 days; M = Abnormal man caused; H = Holiday.

combination of occurrences such as extended periods of drought and abnormal man caused fire or extended periods of drought and visibility less than three miles at our lookouts. Action to be taken is shown in Table VI - 2.

Table 7. . Closure Plan Action Guidelines for the Colville Reservation.

Action	action	fire incident level						
number		1	2	3	3H	4	5	
1	Normal Operating Procedures	Х	Х					
2	Fire Management office will be open 7 days per week, from 073 to 1800 during normal fire season.			Х	Х	Х	Х	
3	At least one of the following officers will work normal days off or remain on duty if the class occurs in the afternoon: FMO, AFMO Logistics, AFMO Operations, Lead Dispatcher, Dispatcher, Prevention Officer, Safety Officer.	Н	Н	H/L	0	x	х	
4	All of the following will work on normal days off or remain on duty in the evenings if the class occurs in the afternoon: FMO, AFMO Logistics, AFMO Operations, Lead Dispatcher, Dispatcher, Prevention Officer, Safety Officer, all lookouts.	Н	Н	Н	L/M	X	X	
5	All of the following will work on normal days off or remain on duty in the evenings if the class occurs in the afternoon: a) Engine Crews, Equipment Operators. b) Qualified Natural Resources Department Personnel.	Н	Н	H/L	L/M L/M	x	x x	

Action	action	fire incident level						
number		1	2	3	3H	4	5	
6	Fire Management Staff will be maintained at full strength; leave will be limited only to sick or emergency leave. Other Natural Resources Department Personnel may be used to fill vacancies of normal Fire Management Staff.					0	х	
7	The Fire Management Office will remain open 24 hours per day and staffed at the required level to meet situational needs.				L	0	Х	
8	Emergency Firefighters may be hired in an amount that the situation requires and stationed at strategic locations.				L	0	х	
9	Agency Branch Chiefs may be alerted to possible immediate call for assistance.				L	0	Х	
10	All Fire Management Staff will be at designated locations and on continuous communications.				L	0	Х	
11	Qualified Natural Resources Department staff will be at designated locations and on continuous communications.				L	0	Х	
12	Fire Management Dozers will be loaded on transport vehicles.			L	Х	Х	х	
13	Fire Management Dozers will be stationed at designated locations.				L	0	х	



Action	action	fire incident level						
number		1	2	3	3H	4	5	
14	Air patrol may be carried out on per-determined flight plans.			Y/L	Y/L	Y/L	х	
15	Alert Branch of Forestry, Portland Area Office, neighbors, and air tanker bases of current conditions.					Х	х	
16	All contractors and cooperators will be informed of pending lightning storms and red flag warnings through communications with District Supervisors.					L	Х	
17	News media will be informed of current fire conditions.			L	L	0	х	
18	During periods of extended drought, other measures that may be deemed by the FMO, Forest Manager and Superintendent to be advisable, needed or necessary to meet protection responsibilities may be implemented.					0	Х	
19	Determine the availability of Call when needed helicopters to supplement the contract helicopter.					0	Х	
20	Implement the Colville Reservation Closure Plan					0	Х	

Action	action	fire incident level							
number		1	1 2	3	3H	4	5		
X = Action without qualifications; O = Action to consider; V = Visibility 5 to 8 miles; Y = Visibility less than 5 miles.									
L = Lightning occurring, predicted or has occurred in the past 2 days; M = Abnormal man caused; H = Holiday.									

Suppression

Mission Statement

Commensurate with the values at risk, wildfire losses will be held to a minimum through timely and appropriate suppression responses, the planned use of prescribed fire, cooperation with other protection agencies, and timely rehabilitation of burned-over land. Fire management activities including fire prevention, pre-suppression, suppression and rehabilitation will be planned, trained for, organized and executed to meet the tribes overall resource management objectives.

Fire management activities covered in 53 BIAM 8.1, past and future supplements to this chapter pertain to forest and range wildfire and prescribed fire activities only. Structural fire protection and responsibility can be found in 25 BIAM Supplement 19.

Policy

Each wildfire ignition requires an appropriate suppression response. The determination of this response shall be based upon fire management direction resulting from land and resource management objectives and cost efficiency.

Depending upon fire management direction, suppression response may range from direct control, minimizing acreage burned, to indirect methods. Monitoring may be appropriate when the fire will be self-contained within a defined perimeter.

Objectives

The objective of fire suppression is to suppress wildfires at minimum cost consistent with land and resource management objectives and fire management direction.

The Colville Agency's Dispatch Objectives are as follows:

 Provide immediate, effective and complete initial attack action on all fires within the Reservation protection boundaries and agreement areas.



- Provide a central point from which to monitor and deploy personnel, equipment and aircraft for the Reservation and adjacent agencies and the region.
- To monitor daily fire danger rating levels and staffing levels and to recommend extra precautions as necessary.
- The Colville Reservations normal fire season is based upon the 10-day occurrence level and begins on March 22 and ends on October 27. The Mt. Tolman Fire Center will be staffed seven days a week from June 1st through September 30 between the hours of 0730 and 1800. Staffing will be per the included schedule and the Specific Action and Preparedness Plan.

Administrative Procedures

Safety

To assure a minimum level of safety, the following safety standards will be incorporated into all phases of pre-suppression, suppression, and prescribed fire operations.

- Firefighter and public safety is the first priority in every fire management activity.
- All personnel who are dispatched to a fire and will perform fireline duty must have personnel
 protective equipment including flame resistant clothing, hardhat, 8" or taller leather boots,
 gloves, fire shelter, etc. (Refer to Fireline Handbook, NWCG Handbook 3, 410-1 Chapter 4).
 This includes fire rehabilitation team members.
- All red carded fireline personnel must attend an annual Fire Refresher session prior to a
 fireline assignment. This may consist of Standards for Survival, Look Up, Look Down, Look
 Around, or other approved training session designated by NWCG.
- All red carded personnel must complete the prescribed Work Capacity Test (Pack Test) at a level required in PMS 310-1 (January 2000) of Arduous, Moderate, or Light, depending on the position to be filled.
- Knowledge of the Ten Standard Orders and the Eighteen Situations that Shout Watch-out will be a requirement for all personnel, and each employee will become familiar with safe practices.
- Non-red carded personnel who initial attack a fire will be relieved at the earliest opportunity.
- Personnel who have been required to work extended shifts will not be permitted to drive home without first having adequate rest (2 to 1 work/rest ratio, provide 1 hour of sleep/rest



for every two hours of work/travel). The Colville Agency will provide/arrange for a driver to transport them. Resources returning home should be scheduled to arrive at their final destination NO LATER THAN 2200 HRS (refer to Northwest Mobilization Guide 22.2.1).

Dispatching

General Procedures

- The Mt. Tolman Fire Center Dispatch will provide dispatch services for all incidents 24 hours a day during fire season. A Dispatch Duty Officer will be available outside normal office hours as designated in the Northwest Mobilization Guide, Page 50-17.
- All requests for resources will be made through Mt. Tolman Fire Center Dispatch and documented on a resource order form. This includes initial attack resources and orders from neighboring forests and agencies, Northwest Coordination Center, and cooperators.
- The Mt. Tolman Fire Center Dispatch will be staffed while fire-fighting personnel are actively working on fire (s), including mop-up. While personnel are bedded down, or traveling from the incident, communications must be maintained by dispatch, a duty officer, or by cell phone (if an emergency arises, there is communications to obtain assistance).

Ordering Channels

The Mt. Tolman Fire Center Dispatch will utilize the closest available forces dispatch
procedures. Requests for resources not available on the Reservation will be placed with
neighboring units as follows: OKF, COF, SPA, YAA, NIA, CWICC, NES, TBR, and SPD. If resource
orders are not filled at this time, then resources will be requested through Northwest
Coordination Center and forwarded from there.

Detection

 All incidents/smoke reports will be reported to Mt. Tolman Fire Center Dispatch. Incidents or smoke reported after hours to qualified district personnel may be managed by these personnel. Mt. Tolman Fire Center Dispatch will be informed of the action taken as soon as possible.

Units should be prepared to report the following items when turning in a smoke report:

- Station/Unit reporting.
- Township, Range, Section of smoke.



- Location by landmark.
- Their present location and azimuth to smoke.
- Estimated size.
- Observed Fire Behavior or smoke characteristics.

PRIMARY LOOKOUTS

Omak Mountain	KOD 575
Offiak Mountain	100000

Whitmore Mountain KOD 576

Keller Butte KOD 577

Johnny George Mountain KOD 578

Gold Mountain KOD 579

Cody Butte KOD 580

Whitestone Mountain KOD 585

Initial Attack Dispatch Procedures

Mt. Tolman Fire Center Dispatch will dispatch those initial attack resources that are to respond to the incident. Give the location of the incident by legal description, geographical landmark; give the incident number, and the initial attack resource number, and any other known information about the incident. The Dispatcher and Duty Officer will determine Numbers and mixes of responding forces.

Each responding unit will give beginning mileage and ETA to the incident. The Mt. Tolman Fire Center Dispatch will record the arrival times of all responding units. The first unit arriving at the fire will give a brief status of the situation, confirm the legal location, and notify dispatch if additional resources will be needed or if the resources at the fire and/or en route will be adequate.

The first unit on the incident will perform the duties of ICT4 until notified otherwise. If the number of resources or the potential threat of this fire to escape is high, an ICT3 may be dispatched and designated at the time of dispatch and he/she will relieve the ICT4 upon arrival.

In the event the incident can be managed by the first arriving forces, who will notify dispatch and pass this information to all other units.



A qualified Fire Investigator will investigate all unknown caused fires and all human caused fires.

Contain/Control Fires: Some fires may be candidates for contain or confine fires, depending on location, fuel types, current and predicted weather, time of year and other factors. The determination for this type of action will be made by the IC in charge and concurred by the Fire Management Officer. Fires in contain/control status will be monitored daily, with weather observations taken between 1300 and 1600 hours each day until the fire is declared out. A specific containment area will be identified, as well as maximum weather conditions. If the fire exceeds those parameters, aggressive suppression action will be taken immediately.

Multiple Fire Situations

The Mt. Tolman Fire Center Dispatch will follow the closest and most adequate forces concept. Prepositioning of crews and equipment may be necessary so that problem fire areas can be met with immediate and effective deployment of personnel and equipment.

The Fire Management Officer will gather all available information on multiple starts, and if priority determinations are necessary, they will be made by the FMO utilizing the following: (1) Threat to human life, (2) Threat to resources/property.

Reciprocal Areas

Northeast Department of Natural Resources, Colville National Forest, and Okanogan National Forest.

Each agency will dispatch its own forces with communication coordination between agencies through the Dispatch offices. Reciprocal fire protection agreements will be followed.

Extended Attack Mobilization Strategy

When an incident has exceeded initial attack capabilities, the designated IC, FMO or AFMO, will prepare a Wildland Fire Situation analysis (WFSA). The EFSA is a management tool to aid line officers, FMOs and Incident Management Teams in analyzing the complexity of a given fire situation. The WFSA is used to develop alternative strategies for suppression of escaped fires and the evaluation of the net effect (cost plus damage) of each of those alternatives. The Superintendent or his designated official will be the approving authority for the document.

Off-Reservation Dispatch Procedures

All requests for overhead, crews, equipment, supplies and aircraft from the Colville Indian Reservation will be received by Mt. Tolman Fire Center Dispatch. Resource order forms will be completed on each request.



Mt. Tolman Fire Center Dispatch will attempt to fill all orders while considering the Reservations initial attack capability. The Dispatcher will assure that all employees' supervisors have been contacted and are agreeable to the dispatch.

Overhead Crews

Type II Crews

The Colville Indian Reservation will provide one Type II Crew when requested and if available. This crew will be trained, qualified and equipped for firefighting. The crew will consist of 18 to 20 people. This will include 1 – Crew Boss, 3 – Squad Bosses, two Class B fallers and two chainsaws unless traveling by aircraft. The total weight of the crew, including gear will not exceed 5200 lbs. (maximum of 45-lbs. Personal gear, 20 pounds of web gear, for a total not to exceed 65 lbs.) Each crew will be listed on a Passenger and Cargo Manifest (SF-245) and accurate personal and gear weights will be provided.

Each firefighter should have at a minimum:

- 1 Fire Shelter
- 2 Pairs of Nomex Pants
- 2 Nomex Shirts
- 1 Hard Hat
- 1 Headlight
- 2 Canteens
- Boots (leather lace up with a minimum of 8-inch top)
- Gloves
- First aid kit
- Spending Money
- Prescription or any necessary medication

Personnel should not be sent to an incident if they are not available for a minimum of 14 days (21 days to Alaska).

Crews will be assigned a number in sequential order of dispatch:



COA #1

COA #2

Incident Management Team

The Washington State Incident Management Team is the Colville Agencies home team and is comprised of personnel from various agencies throughout the state of Washington. The Okanogan NF will be the Host Dispatching organization. When the team has been ordered the Host Dispatch will contact each of the other agency's Dispatchers with the resource order information (Reference the Washington Incident Management Team Operation Plan).

Smokejumpers

All requests for Smokejumpers will be made through Mt. Tolman Fire Center Dispatch. Requests will be placed on the Resource Order Form. Pickup and delivery back to the home unit will be coordinated through dispatch.

Equipment and Supplies

Ordering Cache Equipment

Regional Cache: The Regional Cache at Redmond, Oregon, is intended to serve the satellite caches at Wenatchee and LaGrande in addition to serving the local needs of the Central and Western Oregon Forests directly. The Colville Agency will not order equipment and supplies directly from the Redmond Cache.

The Wenatchee Cache serves the Colville Agency. All orders for NFES cache items will be placed with Wenatchee Cache through Mt. Tolman Fire Center Dispatch. Orders that Wenatchee Cache cannot fill will be forwarded by Wenatchee Cache to Redmond Cache to be filled.

The Mt. Tolman Fire Center will manage and maintain a 200-person initial attack cache. This cache will be used to supply the Reservations initial attack forces. At the beginning of the season the Mt. Tolman Fire Cache should be stocked at the levels shown in Chapter 70 of the mobilization plan.

Return of Cache Items: All fire cache equipment, other than Mt. Tolman Fire Center cache items shall be returned to the Redmond Fire Cache for reconditioning. Shipment shall be by common carrier or Agency service truck, whichever is most convenient. Mt. Tolman Fire Center Dispatch will arrange transportation.



Mobile Cache Support Van

Requests for the Mobile Cache Support Van located at the Omak Tanker Base will be placed with Okanogan Dispatch through Mt. Tolman Fire Center Dispatch on the resource order form.

Vans dispatched to fires will be unloaded at fire camps and the empty vans returned to the nearest cache. The Incident Commander may request to keep the Units at fire camp with approval from the Regional Cache Manager at the Redmond Cache.

Aircraft

Aerial Detection

All aerial detection will be scheduled by the Mt. Tolman Fire Center Dispatch. All detection aircraft will check in with Mt. Tolman Fire Center Dispatch every 15 minutes. Any deviation from the flight plan will be communicated to Mt. Tolman Fire Center Dispatch.

Helicopters

All helicopter activities will be coordinated through Mt. Tolman Fire Center Dispatch. Helicopters will flight follow with Mt. Tolman Fire Center Dispatch and will check in every 15 minutes. During wildland and prescribed fire operations where operations personnel will have visibility of the helicopter at all times, flight following can be performed on site. A Helicopter Module consisting of 1 HEMG and 2 HECM will be available and used during any helicopter operations.

Other

All other fire related flights will be coordinated through Mt. Tolman Fire Center Dispatch. Only fully qualified and carded aircraft and pilots will be used and the HEMG or SEMG will be responsible for checking pilot and aircraft cards. The HEMG will complete a load calculation prior to each flight. All aircraft passengers will wear the personnel protective clothing required for the aircraft or flight. All air tanker requests will be made through Mt. Tolman Fire Center Dispatch. Mt. Tolman Fire Center Dispatch will receive daily, during fire season, from Whidbey Island, through Okanogan Dispatch a military usage schedule of the MOA's and Routes in the north central and northeast Washington area.

Reports

Daily Situation Reports

Daily, during fire season, the Mt. Tolman Fire Center Dispatch will report fire and resource status to the Northwest Coordination Center by 1700.



Smoke Management Report

The Mt. Tolman Fire Center will notify Olympia, Smoke Management of all burns completed and the estimated tonnage burned at the completion of each burn day.

Individual Fire Reports

Individual Fire Reports (DI-1202) for all statistical wildfires will be finalized by Mt. Tolman Fire Center Dispatch and entered into SACS system within 20 days of the fire's out date. All Field Fire reports should be in the Dispatch office within 4 days after the fire has been declared out.

Mapping of Incident Locations

Every effort will be made to utilize the Global Positioning System to provide accurate maps of fire locations and points of origin.

Precaution Levels

Daily Determination

Mt. Tolman Fire Center Dispatch will utilize WIMS/NFDRS and in cooperation with Northeast DNR, Okanogan National Forest and Colville National Forest will decide the appropriate Industrial Fire Precaution Level for each day.

Staffing Class

The daily Staffing Class will be directly from previous day's afternoon WIMS/NFSRS forecasts.

Adjective Class

The daily Adjective Class will be directly from previous day's afternoon WIMS/NFDRS forecasts.

Preparedness Levels

Preparedness Level 1: Normal Operating Procedure

Office Hours - 0730 to 1600 Monday through Friday. Normal staffing, Initial Attack response is provided by Fire Management and Prescribed Fire Personnel. Normal period of operation - October 1 through May 31 of each year.

Preparedness Level 2: Fire Season Operations Office Hours - 0730 to 1800 7 days per week. Additional seasonal staffing provided to man engines, lookouts and hea vy equipment as specified in the FMPA.Normal period of operation - June 1 through September 30 of each year.



Preparedness Level 3: Extended Operations

Office Hours - 24 hours per day, 7 days per week. All full time and seasonal staff will work 6 day, 12 hour per day schedule, forestry and other department staff will be brought on to assist in maintaining required staffing levels. This level is only implemented during incidents or periods of extreme fire danger or abnormal occurrence such as arson or red flag warnings for lightning.

Preparedness Level 4: Reservation Closure

Implement Reservation Closure Plan

Insects & Disease

Insects & diseases are major concern on the Colville Indian Reservation. The Forestry Program takes numerous steps to identify insect and disease outbreaks and proactively manage them on a case by case basis. The most recent CFI Report shows a yearly mortality of roughly 57 million board feet per year. This is largely due to insects and disease. Dwarf mistletoe is one of the most common diseases in the forest, infecting nearly 23% of the trees in the commercial cutbase. The Forestry Program will work closely with our partners at the Forest Service, State and other agencies to detect and manage these outbreaks. There are also a variety of funding sources that can be utilized to manage the numerous pests that are found throughout the region, and Forestry staff will routinely request funding to help deal with outbreaks as the occur.

Monitoring & Detection

The Forestry Program monitors for insect and disease outbreak yearly using a variety of methods:

- Annual aerial flights conducted by the Forest Service.
 Mapping data is provided to the Forestry Program highlighting areas affected by insects and diseases.
 This allows the program to prioritize field review of specific areas to determine if action is needed to control outbreaks or salvage dead trees.
- Most insect and disease outbreaks are quickly recognized by forestry staff because the Reservation is a working forest and employees are working across the landscape on a daily basis.
- Stand exams and silvicultural reviews for each project area are developed yearly as part of the IRMP Process.



Douglas-fir Beetle Trap



This process allows foresters to identify chronic forest health issues that are not necessarily epidemic outbreaks (i.e. dwarf mistletoe and root rot).

• The Forestry Program collaborates with the Forest Service and Washington State to set traps across the reservation for various insects to help monitor regional population levels.

Control

A variety of control methods are available for managing insects and diseases. The main strategy is to implement a long-term forest management plan that will maintain a healthy forest. There are specific control methods that can be used to deal with localized insect and disease issues. These methods will be prescribed on a site specific basis by a silviculturist. The Forestry Program will also continue to seek funding from various entities, such as the Forest Health Protection program, to monitoring and manage for insect and disease outbreaks as they occur.

The main strategies for dealing with insects and disease will include timber harvest methods and forest development act ivies. The silvicultural methods are:

- Sanitation thinning
- Precommercial and commercial thinning
- Improvement cutting
- Prescribed fir
- Regeneration harvesting with planting or natural regeneration.
- Planting disease resistant species
- Overstory removal
- Girdling

Insects & Diseases of Concern

Numerous insects and diseases exist on the reservation. The following section will provide a brief discussion of the ones that cause the most damage to timber resources on the Colville Reservation.

Root Diseases

Numerous root diseases exist on the reservation that cause mortality and rot within trees. The ones of highest concern include Armillaria (Armillaria ostoyae), and Laminated (Phellinus weirii), root rot. Detection of these diseases is critical when developing stand specific silvicultural prescriptions.

These root rots are found throughout the reservation forestland. Armillaria is more commonly found, but both can stress or kill trees. Douglas fir and other true firs are the most susceptible tree species to this disease. Treatment strategies would generally include changing the species composition to a more



resistant tree species such as western larch, ponderosa pine and possibly lodgepole pine. This would generally be accomplished with a harvest operation, and follow up site preparation and planting.

Annosus root disease is also found throughout the forest. Annosus spreads through root contact and aerial spores. Annosus S type generally damages true firs and Douglas fir. Annosus P type severely damages ponderosa pine. While this disease is not as damaging on the Colville Reservation other root rots, it still a problem on some sites. Generally, older stands at mid to high elevations where this disease exists will be managed to promote ponderosa pine and western larch.

Dwarf mistletoes



Dwarf mistletoe infected tree.

Dwarf mistletoe (Arceuthobium spp.) is the most common forest health issue on the reservation. Recent inventory data indicates nearly 23% of all trees on the reservation are infected with dwarf mistletoe. This species is host specific, and most tree species on the reservation can be infected. Damage from this species includes growth loss, deformed bole and branches, predisposal to insect attack and eventual mortality. The disease spreads rapidly in stands with a multi-layered canopy structure.

Stands that are highly infected should be regeneration harvested. The Tribes leave tree retention requirements

can be problematic when dealing with mistletoe, because leaving some mistletoe infected trees may be required. In this instance, non-host species should be planted under the leave trees.

Young stands should be weeded if infection is light, and infected over-story trees should be removed, girdled or felled to protect understory trees.

Bark Beetles

Mountain pine beetle (MPB) is a common insect that impacts mature and over mature lodgepole pine (LPP) and ponderosa pine on the reservation. There have been several large outbreaks in the past on the reservation and there is currently a large outbreak just north of the reservation boundary on Forest Service land. Generally, stands of LPP over 80 years old will be regeneration harvested and regenerated either naturally or with some planting. The Forestry program has already reorganized the timber sale harvest schedule to implement harvest





operations in projects with a high percentage of LPP to prevent outbreaks from coming across the reservation boundary.

Western pine beetle (Dendroctonus brevicomis) and pine engraver (Ips pini) also cause a lot of damage to ponderosa pine on the reservation. Western pine beetle attacks and kills mature ponderosa pine. Management of this insect generally involves thinning stands to a healthy density.

Ips beetle will often attack smaller ponderosa pine, especially where there is fresh slash from logging or blowdown. Management of this beetle includes thinning ponderosa pine stands to a healthy density, and managing slash loading to prevent Ips build up. Generally, thinning operations should occur from July through November to ensure that beetles do not build up in slash. Creating slash in the winter or early spring could help increase local beetle population, which will cause mortality to surrounding trees.

Douglas fir beetle (Dendroctonus pseudotsugae), fir engravers (Scolytis ventralis), and spruce beetle (Dendroctonus rutipennis) can also attack and kill Douglas fir and spruce. Douglas fir with heavy mistletoe or root rot infection is particularly susceptible to beetle attacks. Thinning or regeneration treatments with planting are the typical management strategies used to deal with these insects. Several large Douglas fir outbreaks have occurred regionally in due to blowdown events. In these instances, prompt salvage of blowdown should occur before beetle populations can build up. Pheromone options are also available to alleviate possible build-up of Douglas fir beetle in blowdown.

Defoliators

Many defoliating insects occur across the reservation. Western spruce budworm (Choristoneura occidentalis) commonly occurs in this region. It attacks, defoliates, and can kill Douglas fir and true firs. There have been several large outbreaks of this insect on the reservation the last 5 years. Management



Spruce Budworm

of this insect includes thinning, species conversion, and changing stand composition from a multilayered to a single layered canopy structure. There are also some pesticides available that can be used as a short term strategy to reduce defoliation.

Douglas fir tussock moth (Orgyia psuedotsuga) attacks Douglas fir and true firs. Several large outbreaks have occurred on the reservation in the past. They feed on the needles of trees.

Management of this disease includes thinning to a lower density

and reducing the amount of available host species. In some cases, regeneration treatment with planting may be necessary to change species composition to a host resistant species such as western larch or ponderosa pine. Changing stand structure from a multi-layered to a single structure canopy can be



Trespass

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

Timber Trespass

Timber trespass will include the theft of logs or trees from Reservation Trust Lands. It could also include 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 laws. The federal court system generally handles timber trespass cases involving more than 100,000 board feet. 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 have to 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 Program to monitor for potential trespass. 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 shall be immediately contacted.

Trespass investigations will be conducted by district staff. This will include establishing property lines, taking pictures, determining ownership, and passing on the information to the Forest Manager. It will be the Forest Managers decision to pursue trespass charges based on the evidence provided. A trespass report will be developed with a volume and value estimate. The final report will be passed on to the Forest Manager, Superintendent and the Northwest Regional Forester. A recommendation will be made to pursue legal action through the Regional Solicitors office.

Fire Trespass

Wildfires occurring within the bounds of the reservation will be investigated for a determination of cause. At the Forest Managers 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 the Fire Management Plan will be followed if trespass for wild-fire damage is warranted.



Emergency Rehabilitation

An interdisciplinary approach based on the Integrated Resources Management Plan 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:

- 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 a 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 will be used to develop the rehabilitation plan. Individual team member responsibilities and operational procedures are further discussed in the 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 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.

Planning, Coordination, and Communication

Project planning will be implemented through the Project Proposal Process (PPP) outlined in the Tribe's IRMP. This will consist of an interdisciplinary team, devoted to analyzing projects and managing the NEPA process. Project monitoring will generally be overseen by the Forestry Program, as they oversee implementation of most forestry related projects. See the IRMP and associated PPP Handbook for more information on the project planning process.



Insects & Disease

The agency will coordinate with regional insect and disease specialists from the U.S. Forest Service to develop appropriate silvicultural responses to site specific forest health issues. Biological Assessements will be requested for Forest Health projects from these specialists, and their input will be used for Environmental Assessments and funding requests. 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.

Organization & Funding

Forest Health

Forest Health projects will generally be funded on a project by project basis by the U.S. Forest Service program for insects and disease. Projects are reviewed by specialist then sent to the NWRO for funding consideration. Other funding sources such as the NRCS and Tribal dollars will also be used to fund forest health treatments when available. These projects will be developed by district silviculturists.

Fire

Steve Laramie will complete this section.

TIMBER MANAGEMENT PROGRAM IMPLEMENTATION PLAN

This Forest Management Plan is tiered to and in compliance with the 2015 Integrated Resource Management plan. This section of the Forest Management Plan provides an implementation plan for the goals and objectives outlined in the Tribes Preferred Alternative. Included is a harvest schedule outlining how the Annual Allowable Cut will be achieved throughout the life of the plan. This plan will also incorporate the needs of other resource management plans that relate to forest management. There are numerous management plans associated with the IRMP, such as the Fish & Wildlife Plan, Water & Soil Management Plan, Cultural Resource Management Plan and others that will need to be integrated into the Forest Management Plan.

IRMP Forestry Goals & Objectives

Overall Goal and Objective: Manage the Reservation forestlands with forest management practices that integrate protections for water quality and quantity, fish and wildlife, soils, vegetation, cultural resources, recreation and scenic beauty. Maintain a sustainable forest products industry to provide revenues for the Colville Tribes and economic benefits for the people of the Reservation.



Goal 1: Improve Forest Health

Objectives:

- Prioritize and treat stands that are potentially at risk or are currently affected by insects and disease.
- Implement thinning, manage stand structure, and shift species composition to make stands more resistant & resilient to insects and diseases
- Prioritize treatment of stands in the Douglas-fir and grand fir zones to restore historical ecological systems.
- Plant or naturally regenerate diseased stands to disease resistant species such as western larch and ponderosa pine.
- Utilize prescribe fire as a tool to manage fuels, improve vegetation health and plant community resilience.
- Develop science-based information and tools to enable the Tribe to plan for climate change.

Goal 2: Maintain a sustainable forest products industry to provide revenue for the Colville Tribes and economic benefits for the people of the Reservation.

Objectives:

- Maintain a Continuous Forest Inventory and conduct analysis to determine trends in forest growth, mortality, and standing volume to ensure that harvest levels are sustainable.
- Establish an Annual Allowable Cut based on long term, sustainable harvest levels.
- Provide timber volume in support of contractual obligations with tribal enterprises.
- Generate a consistent revenue stream to the Colville Tribes from timber harvesting.
- Ensure employment opportunities are compliant with colville Tribal Code Title 10, Employment and contracting for Tribal Employment Rights.

Goal 3: Harvest as much timber mortality as practical in a timely manner.

Objectives:

- Capture the value of dead, dying and damaged trees before they deteriorate.
- Ensure timely timber salvage by collaborating with other programs to expedite permitting.
- Incorporate snag and leave tree retention requirements into salvage operations.



Goal 4: Utilize logging systems that balance environmental protection with economic feasibility.

Objectives:

- Ensure harvest operations are compliant with Tribal Forest Practices Act code requirements for best management practices in timber harvesting and reforestation, road design and maintenance, vegetation management, and the protection of riparian zones and threatened and endangered species.
- Designate logging systems that will minimize damage to residual trees that will be maintained for the future stand.
- Prescribe the most appropriate logging system based on terrain and access, harvest treatment objectives, environmental impacts, economic feasibility and other resource concerns.

Goal 5: Develop a forest road system that is safe, minimizes environmental impacts, and facilitates harvest operations.

Objectives:

- In coordination with the Natural Resource Department, develop transportation plans for each
 project area, including areas not planned for harvest in the current timber sale and update the
 forest road system by identifying roads that are not viable and are not needed for future harvest
 operations.
- Develop and implement a road closure plan for each timber sale project.
- Design and maintain a forest road system to provide safe vehicle passage consist with Tribal Code requirements, such as rolling dips and other drainage features, properly sized culverts, and road watering to reduce dust and road surface displacement.
- Collaborate with CDOT, BIA Roads and Environmental Trust to upgrade all forest roads within the Lake Management Areas to meet management objectives and Tribal Codes.
- Implement Best Management Practices to prevent the spread of noxious weeds, such as grass seeding heavily disturbed landing and skid trails, herbicide spraying or mowing of known weed sites on logging roads, and washing logging equipment to prevent spread of weed seeds.

Goal 6: Promote ecological diversity and retain large diameter trees across the landscape.

Objectives:

- Leave an average of 4 large diameter (2 dominant, 2 co-dominants) trees per acre across the landscape.
- Provide a variety of age classes and structural diversity across the landscape.



- Maintain a diversity of tree species appropriate to individual sites.
- Move the Forest towards an historic ecological condition with a mosaic of forest life stages, including old growth and new growth tree stands and a diversity of native plant communities and wildlife habitat.
- Develop silvicultural prescriptions that support down woody debris and snag recruitment targets.
- Manage young trees through pre-commercial thinning to create healthy large diameter trees in the future.

Goal 7: Reduce the occurrence of destructive wildfire.

Objectives:

- Manage fuel loadings to reduce the potential for wildfires that result in severe resource damage.
- Prioritize and implement treatments designed to protect life and property from damaging wildfires.
- Reduce the occurrence of unwanted human caused fires
- Provide effective fire suppression response.
- Coordinate with other Land Operations Departments to protect or mitigate damage to resources during fire suppression activities if time and fire conditions permit.
- Collaborate with the Burn Area Emergency Response Team (BAER Team) to rehabilitate wildfire
 disturbed areas to minimize further damage or destruction to soil, water, forest, wildlife, roads,
 fauna and flora and cultural resources.

General Forest Management Objectives

The general silvicultural objective would involve management strategies developed in the IRMP that are designed to mimic natural ecological processes and meet species diversity, structural diversity, and landscape diversity objectives. Many of these objectives come from other documents such as the Fish & Wildlife Management Plan and Soil & Watershed Management Plan. At the planning level general harvest prescriptions will be described as either "regeneration" or "intermediate" systems.

The IRMP preferred alternative outlines an Annual Allowable Cut of 77.1 million board feet, with 64 million board feet of regeneration treatments, and 13.1 million board feet of intermediate treatments. This alternative emphasizes regeneration harvest treatments, but the PPP review process will be used on all proposed harvest units to determine the most appropriate silvicultural treatment. If a stand is in a condition where it can be carried to an older age (the stand is healthy and could respond to an intermediate harvest treatment), the 3P Project Team would recommend that an intermediate harvest



treatment be used rather than a regeneration harvest. The ratio of intermediate to regeneration harvest may vary among Watershed Management Units and deviate from the ratio or levels planned in the 2015 IMRP. Should there be a larger requirement for intermediate harvest acres where the volume per acre is less than for regeneration harvest, additional acreage within the WMU will be treated with an intermediate harvest to reach the proposed harvest volume levels proposed in the 2015 IRMP. Action to harvest these additional acres, however, must be agreed upon by an integrated resource management team.

Individual treatment prescriptions will be developed at the stand level, but many of the Desired Future Conditions (DFCs) must be achieved at the landscape level. The following section will outline the management strategies to be used at both levels to achieve the DFCs outlined in the 2015 IRMP.

Landscape Level Desired Future Conditions

Stands will be managed toward a mix of conditions and seral patterns at the landscape scale. Treatment unit shapes and sizes will be designed to mimic natural terrain and stand features observed on the Reservation. Stand fragmentation will be minimized and the highest level of interior habitat consistent with meeting overall resource objectives will be maintained, except for ponderosa pine associations where a mix of various sized seral

patches may be desired.

Desired Future Conditions based on Historic Range of Variability (HRV) were developed by Plant Association Group for the 2000 IRMP. These HRV tables can be found in the Appendix and provide a general goal of successional patterns by Plant Association Group that would achieve the DFC. These tables were developed for the 2000 IRMP, and provide guidance to the natural resource program on what the forest should look like to achieve DFC number 7 in the IRMP, "managed landscapes more closely resemble those



created by the activities of historic disturbance agents such as fire (natural and aboriginal ignitions), wind, insects, disease and animals". The tables are based on what is considered to be the Historical Range of Variability for the various stand types. Achieving these goals will likely take decades to accomplish, but the tables can help in the development of projects.



The forest landscape will be managed with a variety of patch sizes to create a complex forest landscape. Table 4 provides the recommended patch size variation by plant association group that will be targeted at the watershed level. Patch size refers to a single harvest unit. This table provides a general guideline that can help in the planning process. On the ground projects will be developed by an interdisciplinary team based on local conditions and resource needs.

Table 8. Recommended Patch Size by Plant Association Group.

PLANT ASSOCIATION GROUP	PATCH SIZE (ACRES)	PERCENT FORESTED AREA WITH LANDSCAPE UNIT
	10-60	35-45%
Ponderosa Pine and Douglas-fir	60-190	30-40%
	190-600	15-35%
	10-60	25-35%
Grand Fir	60-175	35-45%
	175-540	20-30%
	10-105	25-35%
Subalpine Fir and Lodgepole Pine	105-350	25-35%
	330-850	30-40%

Stand Level Desired Future Conditions

Forest stands on the Reservation will be managed so that over time, landscapes would tend toward a forest composed of stands containing a variety of structures containing trees of varying age and size with an assortment of canopy configurations. Desired Future Condition by Plant Association Group will be used as a guide towards achieving this objective. As stands age, within stand conditions will trend toward those characteristics of older forest types. Stands will be managed to provide for general connectivity where fine-grained patterns will be retained as much as possible within operational and logging practicality. Over time, the Reservation forestland will be managed for a balance of seral stages consistent with the DFC's outlined in the PAG tables found in the Appendix.



Silviculture Systems

This Forest Management Plan (FMP) requires the selection and use of a variety of silvicultural systems. A silvicultural system is a planned series of treatments for tending, harvesting and re-establishing a stand. A system is designed to move a stand from its current condition along a developmental path towards a desired or target stand condition. The target stand and the attributes of the path are defined by an array of management objectives.

The sivlicultural systems outlined in this FMP are designed to meet a wide range of management goals that include: timber production; creation or maintenance of wildlife habitat; maintenance of water yield and quality; restoration of forest condition (health); maintenance or restoration of riparian habitat; reclamation of roads and landings; management of right of way vegetation; and maintenance or enhancement of site productivity. The description of silvicultural systems, although discussed under the Forest Management Plan, should not be identified with any one-resource category.

Silvicultural System Design Requirements

Silvicultural systems as well as individual management actions on the Colville Indian Reservation will be designed to:

- Meet established land use objectives.
- Maintain the health and sustainability of the Reservation's forest ecosystem and its processes, or to restore forest condition (health) so that management objectives can be met.
- Incorporate current and developing knowledge of natural processes and the relationships between structures, landscape arrangements, and the maintenance of ecosystem function.
- Involve landscape level (watershed) analysis at a variety of spatial and temporal scales.
- Consider the elements of ecosystem and landscape function, composition and structure.

Silvicultural system design will vary from site to site across the Reservation and will be based on:

- Consideration of stand vigor, age, disease, live crown ration, structural/stage class and general stand conditions.
- The autecological and synecological requirements of major or indicator plant and animal species and species groups (plant associations or habitat types).
- Habitat requirements of rare or endangered species (aguatic and terrestrial).
- Economic feasibility



Soil, slope, aspect and other physical site conditions that influence restoration potential, natural
hazards, or otherwise influence the ability of prescribed treatments to meet target stand and
landscape objectives.

Silvicultural systems and activities should be based on the objectives of the Integrated Resource Management Plan (IRMP), ecological processes, site and stand characteristics and economic feasibility within a framework of landscape analysis. Best management practices (BMPs) for water and soil resources would be used in designing site –specific or project level silvicultural prescriptions consistent with the landscape level objectives of the IRMP.

Other resource concerns will also be incorporated into silvicultural prescriptions. An emphasis will be placed on meeting certain leave tree retention requirements that are outlined in the Soil and Watershed Management Plan and the Fish and Wildlife Management Plan. While it would be impossible to outline all of the resource objectives outlined in those documents, Table 9 summarizes retention requirements at the stand level for snags, down course woody debris, and green trees. For more information please refer to the management plans. In site specific situations where dwarf mistletoe will likely infect understory trees and no alternative species is available for retention, treatments may go under this green tree retention requirement. This will only occur after going through PPP process. In this situation, other treatments such as girdling to kill infected trees may also be utilized.





Table 9. Leave Tree and CWD Retention Requirements.

Forest Series	Snags/Acre	Logs/Acre	CWD/Acre	Green Trees/Acre (in areas where minimum snag retention guidelines are not met)
2 snags/acre >20" DBH, >40' tall, 3 snags/acre in nesting roosting an foraging areas, all		2 logs/acre >16"	5% ground cover in foraging, roosting, nesting areas	retain 2 green trees/acre as snag replacement trees.
Douglas Fir	snags >25"DBH 5 snags/acre >20" DBH, >12' tall; 3 snags/acre in nesting roosting and foraging areas, all snags >25"DBH	8 logs/acre >16" DBH, 40' long, including 2 > 24" DBH	5% ground cover in foraging, roosting, nesting areas	retain 2 green trees/acre as snag replacement trees.
Grand Fir	5 snags/acre >20" DBH, >12' tall; 3 snags/acre in nesting roosting and foraging areas, all snags >25"DBH	8 logs/acre >16" DBH, 40' long, including 2 > 24" DBH	5% ground cover in foraging, roosting, nesting areas	retain 2 green trees/acre as snag replacement trees.
Western Hemlock	5 snags/acre >20" DBH, >12' tall; 3 snags/acre in nesting roosting and foraging areas, all snags >25"DBH	8 logs/acre >16" DBH, 40' long, including 2 > 24" DBH	5% ground cover in foraging, roosting, nesting areas	retain 2 green trees/acre as snag replacement trees.
Western Redcedar	5 snags/acre >20" DBH, >12' tall; 3 snags/acre in nesting roosting and foraging areas, all snags >25"DBH	8 logs/acre >16" DBH, 40' long, including 2 > 24" DBH	5% ground cover in foraging, roosting, nesting areas	retain 2 green trees/acre as snag replacement trees.
Subalpine Forests	see lynx habitat requirements	see lynx habitat requirements		
Riparian- Dry Forests	2 >20" DBH	5 large logs/acre, > 20 in dia	5 tons CWD/acre	
Riparian- Moist Forests	2 >20" DBH	20 large logs/acre, > 20 in dia	20 tons CWD/acre	
Lakes and Ponds	2 >20" DBH			

IRMP Silviculture Systems

The IRMP Preferred Alternative plans for an Annual Allowable Cut of 77.1 million board feet per year; 64 million board feet of harvest from regeneration treatments and 13.1 million board feet from intermediate treatments. The following section will describe each of these treatment types, discuss the



criteria typically used to determine which prescription to utilize at the stand level, and provide discussion of how other resource concerns will be integrated into these silvicultural systems.

The intent of this section is to help natural resource managers understand the silvicultural goals of the IRMP and the criteria used to determine which treatment method is appropriate. It is not intended to replace individual prescriptions that are evaluated and developed at the stand level with input from an interdisciplinary team. Silvicultural prescriptions and marking guidelines will be developed for every stand in a project area (see Appendix for example silvicultural data sheets).

Regeneration Silvicultural Systems

Regeneration systems or methods are a cutting procedure by which a new age class is created. In this system, the existing stand is harvested and replaced with new trees either by planting or natural regeneration. On the Reservation, this usually includes the application of an even-aged management system such as a seed tree, shelterwood or regeneration with reserve trees prescription. The clearcut prescription also falls under this category, but is no longer used on the Reservation due to the leave tree requirements



Typical Regeneration Treatment (Seed Tree)

outlined in the IRMP. The IRMP directs that a minimum of 4 trees per acre (2 dominant and 2 codominant) be retained on all acres. These treatments are now called regeneration with reserve trees. The following is a brief summary of these regeneration treatment methods.

Seed Tree Method – the cutting of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in fully exposed microenvironment. After establishment of regeneration, over-story trees that are in excess of desired levels of wildlife trees and snags would be removed.

Shelterwood Method – the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment. This is similar to the Seed Tree treatment, but more trees are left to provide shade and a seed source. After establishment of regeneration, overstory trees that are in excess of desired levels of wildlife trees and snags would be removed.

Regeneration Reserve Tree Method – the numbers and types of leave trees are designed to meet other resource objectives than a Seed Tree or Shelterwood. As already discussed, retaining 4 trees per acre on all stands is required. Usually, these stands are severely diseased, or have a species composition that



does not allow for the application of the other regeneration treatment methods. These treatments would have been clearcuts in the past. Leave tree distribution will be dependent upon the existing stand structure and the management objectives requiring reserve trees. It is not necessary to have leave trees on every acre or uniformly distributed. Generally, these stands will be planted with seedlings to achieve desired species and stocking.

Reforestation Techniques

Reforestation is an important part of any regeneration treatment. The first step is to implement site



Excavator Site Preparation

preparation. Site preparation is defined as any hand or mechanized manipulation of a site, designed to enhance the success of establishing new seedlings. Site preparation will be applied to create microclimate conditions conducive to the establishment and growth of desired species by modifying the soil, litter and vegetation. This will usually include the removal of undesirable species (trees, brush and grass), stunted trees and suppressed trees.

When planting or naturally regenerating a stand, it is imperative to treat the understory vegetation, especially brush and grass, to prepare the site so new seedlings can establish. The two site preparation

methods commonly used on the reservation include mechanical and broadcast burning.

Mechanical site preparation includes using an excavator or dozer with a brush rake to prepare a site for planting or natural regeneration. The excavator can scarify the ground (scrape to expose mineral soil) and pull up brush and undesirable trees, and pile slash to prepare the site for seedling establishment. Piles are usually burned after the treatment. Mechanical site preparation will generally be used on slopes less than 35%. Excavators are very useful when pockets of existing regeneration need protecting. Dozers were historically used to pile logging slash, but



Broadcast Burn

excavators have become the common practice because they have less impact on the soil and are much more affective at accomplishing silvicultural objectives related to seedling establishment.



Broadcast burning is the other site preparation technique that is used extensively on the reservation. The method includes using fire to burn a stand preparing it for seedling regeneration. Usually a unit is slashed before burning. Slashing includes cutting down all brush and undesirable trees, which helps create a continuous fuel bed to carry a low ground fire through the stand. The burn helps eliminate logging slash and competing vegetation, and prepares the site for trees to be planted or natural regeneration to establish. Broadcast burning can be used on nearly any site, but is generally the preferred method on slopes over 35%.

Herbicides can also be useful in reducing competing vegetation for newly planted seedlings. On some sites, herbicides may be needed to establish new seedlings. Herbicides would only be used after review by resource managers and approval of the Tribal Council.



Western Larch Plantation

Natural regeneration may occur through seed dispersal from retained trees or trees in adjacent timber stands and sometimes significant quantities of advanced regeneration remain after harvest. In many cases planting will be necessary to achieve the desired stocking levels and species composition. Regeneration harvest units may also require actions in addition to conifer planting to secure regeneration. These actions may include protection from animal damage and control of unwanted competing vegetation. Currently, the Tribe has its own greenhouse, which grows seedlings for planting operations, and it is expected that a many treatment units will need to be planted. Stocking surveys will be done on

all regeneration treatments to ensure that tree establishment and desired stocking levels are achieved on all acres.

There are numerous factors to consider when determining which site preparation method to use. Site specific prescriptions will be developed in each project area with input from an interdisciplinary team.

Prioritizing Regeneration Treatments

There are numerous stand attributes that must be considered to determine if a regeneration treatment is the appropriate course of action. Generally, regeneration treatments are planned for stands 100 years and older (90 year for subalpine, grand fir and lodgepole pine). Stands less than 100 years old may also be regeneration harvested when they are severally diseased, understocked, or exhibit other characteristics that may prevent them from growing into an older age class. The following is the criteria that can be used to determine when and where to implement regeneration treatments:



- High levels of insects & diseases.
- Over rotation age (see AAC Section of this document)
- Low stocking
- Poor species composition
- Low stand vigor and small crown ratios
- Fish & Wildlife habitat concerns
- Other resource issues and concerns
- Economic concerns

Regeneration strategies will be planned to produce the highest probability of success at the lowest practical cost and will include provisions for species diversity and long-term site productivity. Practices will be strongly influenced by consideration of ecological site potential and the need to retain sufficient canopy to assure control of competing vegetation.

Intermediate Treatments

The 2015 IRMP outlines that a minimum of 13.1 mmbf should come from commercial intermediate silvicultural treatments. This volume could increase depending on the condition of each project area over the next 15 years. Each project area will be examined individually by a silviculturalist, and some watersheds may have more stands that are suitable to thinning than is found in other watersheds.

For the purposes of this Forest Management Plan, Intermediate Treatments are defined as all cultural treatments occurring in stands that are between regeneration periods. Intermediate treatments are performed in order to ensure the desired species composition; improve stem quality; or adjust stand density (spacing) to regulate growth in a developing stand. These treatments have the primary emphasis of correcting stand defects and increasing the volume and value of usable forest products. There is no intention of establishing regeneration through the application of an intermediate cut. Care must be taken during any intermediate cutting to protect the residual stand from injury.

These treatments could also include sanitizing to remove diseased trees and salvaging of mortality within a stand. Intermediate treatments can also be implemented to meet other resource needs such as Wildlife habitat management. Forest Development activities also fall into the intermediate treatment category because they are stand tending in nature and are utilized to improve forest health.

To the extent possible, intermediate treatments should be designed to retain or re-create forest ecosystems that resemble natural systems in composition, structure and in ecosystem function. Retained structural components include green trees, snags, and coarse woody debris that may be clumped or distributed in various ways across the landscape.



Commercial Intermediate Treatments

There are several commercial intermediate treatments utilized on the reservation. They are generally designed to improve forest health and increase tree growth. These commercial treatments involve some type of thinning treatment in merchantable stands of timber where surplus stocking allow for a commercial treatment. There are several intermediate treatment methods that can be used. The ones that are commonly applied on the reservation are outlined below:

- Commercial Thinning (Density Management)-Cuttings made in a stand between regeneration and final harvest to reduce stand density for the purpose of stimulating the growth of the remaining trees to increase the yield of desired products, enhance forest or recover potential mortality. Its primary focus is on growth redistribution.
- Improvement Cutting- This is a cutting made in a stand beyond the sapling stage for the primary
 purpose of improving composition and quality. Trees of undesirable species, form or condition
 are removed the main canopy. The need to improvement cutting often results from a lack of an
 earlier application of needed release cutting.
- Sanitation-Sanitation consists of the removal of trees to reduce the actual or anticipated spread
 of insects or disease. In many cases, economic return from the harvest is not a high priority. An
 example might be the removal of bark beetle infected trees before they infect surrounding
 trees, or the removal of all visible and suspected latent dwarf mistletoe in a stand.
- Salvage- This method is used to harvest dead, dying, or deteriorating trees to recover their value
 that would otherwise be lost. Economic return is a main objective of this treatment. If the
 disturbance is bad enough that most or all of the trees must be removed and planting is needed,
 it should be considered a regeneration treatment.

Intermediate Treatment Stand Priorities

The following list provides a basic outline for prioritizing stands for intermediate treatment:

- Stands with active epidemic levels of pests will be given the highest priority for treatment based on current losses and potential future losses. Treatments would be designed to salvage value while creating healthy, vigorous stands resistant to future catastrophic attack.
- Salvage operations will receive the next highest priority and will be conducted as rapidly as
 possible after mortality has occurred to minimize, if possible, health risks to surrounding stands
 and economic losses. Operations should be conducted as stand treatments designed to create
 healthy vigorous stands resistant to future health problems.
- Overstocked ponderosa pine stands will receive a high priority for commercial thinning.



• Young vigorous stands with healthy crown ratios, high stocking, low insect and disease levels and a good likelihood of growth response after thinning.

Species Composition

Tree species composition will managed across the forested landscape to meet the Desired Future Conditions outlined in Table 6. Early seral species such as ponderosa pine and western larch will generally be the preferred species to maintain and regenerate, but a small percentage of other species are desirable as well.

SERAL STAGE	EARLY SERAL SPECIES PP, LP, WL	OTHER SPECIES DF, GF, SAF, WRC
Early-Seral	>75%	< 25%
Mid-Seral	25 – 75 %	25-75%
Late-Seral	< 25%	>75%

Forest Development

Most of the Forest Development activities on the reservation fall into the Intermediate Treatment category. These activities are cultural treatments applied in stands that are between regeneration periods, but are generally too young for commercial removal of forest products. These treatments are to ensure the desired species composition; improve stem quality; or adjust tree density (spacing) to regulate growth in a developing stand and to sanitize or remove insect and disease infected trees. There numerous forest development treatments can be utilized but the ability to implement them depends on the availability of funding. This makes it difficult to determine how many acres



Pre-commercial Thinning

of activities will be implemented on the ground over the next 15 years.



The following is a list of some of the forest development treatments that are commonly implemented on the reservation.

- Pre-commercial Thinning- Cuttings made in a stand between regeneration and final harvest to reduce stand density for the purpose of stimulating the growth of the remaining trees to increase the yield of desired products, enhance forest health or recover potential mortality. Its primary focus is on growth redistribution. The goal of this treatment is similar to a commercial thinning, except it is done when the stand is much younger (10 to 20 years old) so no merchantable timber is removed. Spacing trees out appropriately is desirable to maximize growth and yield of forest products in the future. Individual prescriptions will be developed for each stand, and desired spacing will vary by site productivity and species (may vary anywhere from 12 to 18 feet spacing).
- Pruning- Artificial forest pruning is a silvicultural operation performed to improve wood quality
 or to remove dead or diseased limbs. It is labor intensive, costly, and requires a certain degree
 of judgment and skill. Pruning on the Reservation is only occasionally used, mostly to remove
 disease infected branches or for fuel reduction treatments to reduce the likelihood of a wildfire
 getting into the crown. It can also be used to increase wood quality, but is rarely done because
 of the very high expense.
- *Prescribed Burning* Burning can be used as a tool to reach many objectives. While it is often used as site preparation technique, it can also be used to thin out the forest, fuel reduction, manipulate vegetation, and treat diseases such dwarf mistletoe.
- Girdling- This is a common practice to eliminate dwarf mistletoe in infected stands, reducing or
 eliminating the spread of the disease. Infected trees, in areas where it is not economically
 feasible to have them harvested and removed, can be girdled to kill them. A ring of bark is
 removed around the tree, killing it. This also has the added benefit of producing wildlife trees
 for species that need snags.
- Weeding- a release treatment in stands not past the sapling stage that eliminates or suppresses undesirable vegetation regardless of crown position. This may include removing competing brush or diseased trees (similar to sanitation).

Silvicultural Guidelines by Plant Association Group

The regeneration and intermediate treatment discussion outlined above provides a framework for the overall management strategy that will be employed in this Forest Management Plan. Planning and implementation of specific projects will be strongly based on an understanding of the ecological relationships and limitation of the plnat communities proposed for management. The following prescription strategy by Plant Association Group (PAG) was developed by Boyce and Dumas in the 2000 IRMP. This section will provide a brief discussion of the management strategy and some stocking



guideline tables that can be used to develop prescriptions. Maps of each PAG can be found in the Appendix.

Table 11. Plant Association Groups

PLANT ASSOCIATION GROUP	ACRES
Ponderosa Pine (PP)	68,967
Douglas-fir Warm Dry (DFWD)	6,355
Douglas-fir Cool Dry (DFCD)	81,996
Douglas-fir Warm Moist (DFWM)	164,107
Douglas-fir Cool Moist (DFCM)	216,633
Grand Fir/Western Redcedar (GFRC)	50,422
Subalpine Fir (SAF)	71,938
Total Acres	660,418

Ponderosa Pine Series

Management of this series is greatly influenced by the driest and warmest conditions of any Reservation forest area. Brush and grass competition is a regeneration concern along with high seedling mortality due to low precipitation and high summer temperatures. This series includes the lowest productivity forestlands. Natural regeneration through seed tree or shelterwood regeneration harvests is favored. A group selection technique may be necessary to secure natural regeneration in the driest areas. Small clearcuts with artificial regeneration may be necessary to areas of disease or insect infestation, but are very limited. Ponderosa pine regenerates naturally in this PAG, although small areas may support Douglas-fir. Maintenance of the seral ponderosa one and stocking control are essential to the long-term health of this forest zone. Reintroduction of frequent, low intensity ground fires in a carefully controlled program is desirable. Planned rotation ages are usually 120 years, but may exceed 140 years in the driest areas.

Douglas-fir Series

This series encompasses the bulk of commercial forest land on the Reservation. Brush and grass competition is a regeneration concern, along with high seedling mortality due to low precipitation and late summer drought. Seed tree, shelterwood or clearcut harvesting methods are most commonly used for regeneration. Group selection may be used in warmer, drier areas to secure natural regeneration.



Ponderosa pine is favored for natural or artificial regeneration followed by western larch (cooler, more moist areas), Douglas-fir, and lodgepole pine. Species control entailing a shift to the more disease resistant seral species (ponderosa pine and western larch) plus stocking control are utilized in the recovery and maintenance of forest health in this series. Reintroduction of frequent, low intensity ground fires in a carefully controlled program is desirable on those areas not supporting lodgepole pine. Rotation ages vary from 80 years for lodgepole pine to 120 years for ponderosa pine and western larch.

Grand Fir Series

This series encompasses some of the most productive timber land on the Reservation. Brush invasion can be severe in formerly selectively logged areas and may require chemical herbicide treatments during regeneration. Seed tree, shelterwood, or clearcut methods are commonly used for regeneration harvests. Management for seral species and stocking control are critical and will be utilized in the recovery and maintaining of forest health. Western larch and ponderosa pine (warmer areas) are favored for natural or artificial regeneration, followed by Douglas-fir, lodgepole pine, and grand fir. Rotation ages vary from 80 years for lodgepole pine to 100 years for western larch and ponderosa pine.

Subalpine Fir Series

This is the coolest series with productivity variable due to temperature regimes and soil differences. Brush and pinegrass invasion can delay or prevent regeneration on previously logged areas. Herbicide use may be necessary during the regeneration phase to control competing vegetation. Currently, forest management practices on these sites include seed tree, shelterwood, or regeneration with reserve tree harvests. Creation or maintenance of seral species stands and stocking control is utilized to recapture and maintain a high state of forest health. Western larch is favored for natural or artificial regeneration, followed by Douglas-fir, Engelmann spruce (wetter soils) and lodgepole pine. Many of these sites will require planting due to the lack of adequate healthy seed trees to naturally regenerate to western larch and ponderosa pine. Planned rotation ages are generally 80 to 100 years.



Desired Stocking by PAG

Table 12. Desired Stocking Levels for DF PAGs.

SIZE	SERAL STAGE/STRUCTURAL CLASS					
CLASS	ES	EM	MS	MM	LS	LM
5						
(>20"dbh)	96 BAF	98 BAF	96 BAF	103 BAF	90 BAF	84 BAF
4						
(10-20" dbh)	67 BAF	72 BAF	78 BAF	80 BAF	76 BAF	70 BAF
3	28 BAF		20 BAF		23 BAF	
(5-10" dbh)	95 Tr/Acre		85 Tr/Acre		95 Tr/Acre	
2	180 Tr/Acre		180		180	
(1-5" dbh)	160 11/Acie		Tr/Acre		Tr/Acre	
1	500					
(<1" dbh)	Tr/Acre					

ES – Early Seral/Single Storied; EM – Early Seral/Multi-Storied; MS – Mid-Seral/Single Storied; MM – Mid-Seral/Multi-Storied; LS – Late Seral/Single Storied; LM – Late Seral/Multi-Storied.

Table 13. Desired Stocking Level for PP PAGs

SIZE	SERAL STAGE/STRUCTURAL CLASS					
CLASS	ES	EM	MS	MM	LS	LM
5						
(>20"dbh)	96 BAF	98 BAF	96 BAF	103 BAF	90 BAF	84 BAF
4						
(10-20" dbh)	67 BAF	72 BAF	78 BAF	80 BAF	76 BAF	70 BAF
3	28 BAF		20 BAF		23 BAF	
(5-10" dbh)	95 Tr/Acre		85 Tr/Acre		95 Tr/Acre	
2	180 Tr/Acre		180		180	
(1-5" dbh)	160 H/Acie		Tr/Acre		Tr/Acre	
1	500					
(<1" dbh)	Tr/Acre					

ES – Early Seral/Single Storied; EM – Early Seral/Multi-Storied; MS – Mid-Seral/Single Storied; MM – Mid-Seral/Multi-Storied; LS – Late Seral/Single Storied; LM – Late Seral/Multi-Storied.

SIZE	SERAL STAGE/STRUCTURAL CLASS					
CLASS	ES	EM	MS	MM	LS	LM
5						
(>20"dbh)	96 BAF	98 BAF	96 BAF	103 BAF	90 BAF	84 BAF
4						
(10-20" dbh)	67 BAF	72 BAF	78 BAF	80 BAF	76 BAF	70 BAF
3	28 BAF		20 BAF		23 BAF	
(5-10" dbh)	95 Tr/Acre		85 Tr/Acre		95 Tr/Acre	
2	180 Tr/Acre		180		180	
(1-5" dbh)	100 H/ACIE		Tr/Acre		Tr/Acre	
1	500					
(<1" dbh)	Tr/Acre					

Table 14. Desired Stocking Levels for GF & SF PAGs.

ES – Early Seral/Single Storied; EM – Early Seral/Multi-Storied; MS – Mid-Seral/Single Storied; MM – Mid-Seral/Multi-Storied; LS – Late Seral/Single Storied; LM – Late Seral/Multi-Storied.

Salvage of Mortality Volume

The 2015 FIA Report indicates that nearly 57 million board feet per year of mortality is occurring across the commercial forestlands on the Reservation. It will be the policy of the Forestry Program to salvage as much of this volume as possible before it deteriorates and loses value. Much of the mortality is scattered and would not be of commercial value, but areas that have enough mortality to harvest will be identified and made available for salvage on a yearly basis. Some of these areas may be handled with small permits while others can be modified into existing adjacent timbersale contracts.



Fire Salvage (Devils Elbow Fire)

Natural Area Management

Moses Mountain Natural Area

The Moses Mountain Natural Area will be managed so as to allow natural influences such as wind, precipitation, and fire to shape the landscape according to natural design. No silvicultural management activities will occur within the natural area. Suppression of wild fires will normally be restricted to the exterior boundaries. When there is imminent threat to Tribal resources outside the natural area or fire



hazard is extreme, suppression activities may be initiated at the discretion of the Fire Management Officer (Tribal Resolution 1992-289).

White Bark Pine Management

The Moses Mountain Natural Area contains the only population of white bark pine on the Colville Reservation. The nearest population of white bark pine to the Moses Mountain Natural Area is found on Bonaparte Mountain, making the genetics of the trees on Moses Mountain unique to the Colville Reservation. In the last several decades blister rust has devastated much of the white bark pine throughout its range and has also infected the Moses Mountain site. In recent years, white bark pine mortality from mountain pine beetle has also increased significantly in many regions, possibly due to climate change, and the tree is now under review to be listed as an endangered species. Currently there is no epidemic beetle outbreak in the Moses Mountain Natural Area, but the potential for on exists.

The Forestry Program has installed monitoring transects in the Moses Mountain Natural Area to track the level of blister rust infection and potential beetle outbreaks. Cones have also been collected to maintain a seed bank of the white bark pine found on Moses



Historic Moses Mountain lookout tower (white bark pine tree).

Mountain in case a large fire disturbance or insect outbreak damages the site. The Forestry Program will continue to monitor white bark pine and make recommendations to the Tribe on how to maintain this unique tree species on the Reservation.

Grizzly Mountain Wilderness Area

The Grizzly Mountain Wilderness Area will be managed so as to allow natural influences such as wind, precipitation, and fire to shape the landscape according to natural design. Forest management activities, however, may be initiated as necessary to prevent catastrophic losses of the wilderness resource from insects, diseases or fire and to prevent agents from causing unacceptable losses to adjacent lands outside of the Wilderness boundary (Tribal Resolution 1988-186).



There will be no temporary roads, no use of motor vehicles or motorized equipment, no landing of aircraft, no other form of mechanical transport, and no new structures installation except as necessary to meet minimum requirements for the administration of the area, including measures required in emergencies.

ANNUAL ALLOWABLE CUT POLICY

The 2015 IRMP administratively sets an indicated AAC of 77.1 million board feet per year, 64 mmbf from regeneration treatment and 13.1 mmbf from intermediate treatment. This is a total of 1,156 mmbf over 15 years. This is the same AAC outlined in the 2000 IRMP. This section of the Forest Management Plan is a summary of the 2015 Forest Inventory Analysis Report. It will discuss the sustainability of the chosen harvest level, and make recommendations on the management implications of harvesting 77.1 million board feet per year.

Sustained yield can be defined as the yield that a forest can produce continuously at a given intensity of management. This implies continuous production so planned as to achieve, at the earliest practical time, a balance between increment and cutting. In other words, it is prudent to cut only as much as the forest can grow, and long-term forest planning is needed to determine an appropriate harvest level.

Numerous methods exist for determining an Annual Allowable Cut and many factors are involved in the calculation. This section of the Forest Management Plan will discuss the Indicated Allowable Cut set by the 2015 IRMP, review the 2015 Forest Inventory Analysis AAC calculation, outline the rotation age and provide a discussion of the feasibility of implementing the Annual Allowable Cut outlined in the Tribes Preferred Alternative. The following is a summary of the results from the 2015 FIA Report. Please refer that document for a more in-depth discussion of the methods used for the AAC calculation.

Commercial Forestland

The total productive trust forest acres are equal to 691,612 acres. Productive is locally and commonly defined as capable of sustaining an annual production of 20 cubic feet per acre of wood products, and administratively made available for timber harvest at any intensity level. A soil resource survey was used to determine this productivity level. Areas of the forest located in flood plains and dominated by hardwood deciduous trees have been classed as woodland and are not represented in the commercial forestland delineation. Areas in streamside management zones as outlined in Chapter 4-7 Forest Practices Code are also removed from the commercial forestland. Those areas of timberland which fail to meet the productivity standard are also removed. Table 12 shows a breakdown of the available commercial forestlands.



Table 15. Tribal & Allotment Forestland Acres.

	Acres
Total Productive Trust Forest Land	691,612
Road Right of Ways, Wildlife Habitat Mitigation and Riparian Management Zones	-31,194
Commercial Forest Land	660,418
Tribal Trust	634,629
Allotment	25,789

After removing the productive areas unavailable to harvesting, the Commercial Forest acres are estimated to be 660,418 acres (see Commercial Forestland Map in Appendix). This commercial forestland delineation is maintained as a GIS layer titled TCV4. It is important to point out that areas considered inoperable and marginal in previous documents are now included in the commercial forest acres. Previously inoperable areas are considered to be operable by helicopter in this analysis. This area will require special considerations in growth and yield modeling due to the limited site preparation options available. Marginal areas in past reports exhibit low stocking levels and regeneration difficulty which will require much longer rotations than normal and much lower stock-ability assumptions in yield modeling.

Removal of Areas from Commercial Forest Land Base

The following guidelines will be utilized in making decisions concerning the appropriateness of forest management on Reservation lands.

- Low Productivity: If any area, that has not already been classified as other than commercial
 forest, is found to have a potential productivity of less than twenty (20) cubic feet per acre per
 year it will be removed from the commercial forestland base.
- Inability to insure regeneration: If a forested area cannot be cut without reducing its stocking level for unacceptable low levels and it cannot be regenerated within ten years due to any consideration, the area will be considered for removal from the commercial forestland base.
- Economic reasons: If any area does not allow for a positive economic return to the Tribes over the length of a normal managed rotation, the area will be considered for removal from the



commercial forestland base unless some other particular benefit satisfactory to the Tribes can be demonstrated.

Reserved for other reasons: If any areas is reserved from harvest for any reason and the basis of
the reason is not temporary in nature and no commitment to lifting the reserved with a
reasonable time has been made, the area will be considered for removal from the commercial
forestland base.

2015 AAC Calculation

The 2015 Forest Inventory Analysis analyzed the most recent CFI data to determine the following:

- An AAC using most recent CFI and Mapping Inventory Data.
- Number of decades 77.1 mmbf per year is sustainable.
- Recommendations on how to achieve 77.1 mmbf.

This analysis utilized BIA software called *HARVEST*, *Timber Harvest Scheduler for Even-aged Structure Forests* to model the AAC. *HARVEST* is a harvest scheduling simulator developed to assist BIA and Tribal foresters with determining the Annual Allowable Cut and harvest schedules for even-aged forests. It is designed to simulate final harvest and subsequent regeneration of an even-aged forest on a generally homogenous site. The model has numerous even-aged scheduling methods. The **Non Declining Even-Flow** method was used for this analysis to calculate the AAC. Even-flow harvest schedules calculate the maximum volume that can be harvested on a sustained basis over the analysis period (200 years for this project). Non-declining even flow schedules have constant or increasing harvest levels, but never decreasing levels. The HARVEST program will determine an AAC that ensures the harvestable volume is not exhausted at the end of the analysis period. For more information on the HARVEST program, refer to the Harvest Users Guide.

Methods and input variables used by HARVEST include:

- Acres and current volume yields in each 10 year age class by strata (PAG was use as strata for this exercise).
- Managed volume yields by age class for each strata (produced using FVS).
- Percent leave tree retention. This simulates tree retention requirements. A 10% volume reduction was used to approximate the retention requirements outlined in the IRMP.
- Minimum harvest age for a regeneration treatment (100 to120 years).
- Rotation Age as outlined in the 2000 IRMP (100 for Grand Fir and Subalpine Fir PAGs, 120 for all other strata).



The results of 2015 FIA Report analysis are shown in Table 12. It indicates that harvesting 77.1 million board feet per year is not sustainable in the long-term given the management direction outlined in the 2000 IRMP. The 2000 IRMP outlined a long rotation age of 100 to 120 years. The analysis indicates that an AAC of 66.4 mmbf with only 56.1 from regeneration treatments would be more reasonable at this rotation age. The analysis suggests that there will be a deficit in available timber volume in 90 to 110 years, depending on the Plant Association Group.

Table 16. Annual Allowable Cut Analysis

2015 CFI Analysis AAC (mmbf)				Current IRMP AAC 77.1 (mmbf)			
PAG	Regeneration	Intermediate	Total	Regeneration	Intermediate	Total	Years
			AAC			AAC	Sustainable*
DFCD	4.8	0.5	5.3	5.4	0.6	6.0	80 yrs
DFCM	20.3	4.0	24.3	22.6	5.0	27.6	110 yrs
DFWM/DFWD	9.7	2.9	12.6	10.8	3.6	14.4	100 yrs
SF	10.8	0.0	10.8	12.0	0.0	12.0	90 yrs
GF	10.5	1.0	11.5	13.2	1.3	14.5	90 yrs
PP	0.0	2.0	2.0	0.0	2.5	2.5	120 yrs+
TOTAL	56.1	10.4	66.5	64.0	13.1	77.1	

^{*} Years the regeneration treatment harvest can be sustained before timber is exhausted and younger stands must be harvested.

This does not mean that 77.1 mmbf per year is unsustainable. It means that 77.1 mmbf is not sustainable with a rotation age of 100 to 120 years. If the rotation age was dropped to 100 years for Douglas fir and 90 for subalpine fir and grand fir PAGs, 77.1 mmbf per year is likely sustainable. The other option would be to accept a shortfall of available harvest volume at some point in the future. Future generations would have less volume to harvest, and the Tribe would not have a non-declining even-flow Annual Allowable Cut.

The Table 14 provides a comparison of AAC by rotation age. Any AAC between these numbers could be considered sustainable for timber production with no other resource considerations.

Table 17. Comparison of 60 & 120 Year Rotation.

Plant Association Group	60 Year Rotation	120 Year Rotation*
DFWM	18.4	12.6
DFCM	37.8	24.3
DFCD	7.5	5.3
GF	14.4	11.5
SF	15.4	10.8
TOTAL	93.5	64.5

^{* 120} year rotation includes commercial thinning volume.



One of the reasons for having the longer rotation age outlined in the 2000 IRMP was to produce larger diameter trees in the future. Longer rotations allow trees a longer lifespan, thereby increasing the diameter. Culmination of Mean Annual Increment falls at the longer rotation age as well. CMAI is the age in the growth cycle of a stand at which the mean annual increment for volume is maximized. In other words, a well-managed forest will maximize volume production if harvested at the CMAI.

Decreasing the rotation age would decrease the number of large diameter trees grown in the future, and cause harvesting to occur before CMAI is attained. A rotation of 90 to 100 years is still a relatively long rotation age considering many private timber companies operate on a 60 to 80 year rotation. Also, there will be a lot more available thinning volume with a longer rotation in the future as planted stands reach merchantability. An AAC of 77.1 will also require harvesting a lot of acres. This could become an issue when developing landscape level projects (see Landscape Level DFC Section).

Lowering the rotation age will otherwise have very little immediate impact on current management strategies. The AAC calculation is a 150 year analysis, and harvest practices over the next 15 years will closely resemble what occurred the last 15 year even with a lower rotation age.

The 2015 IRMP reduced the leave tree requirements from the previous Forest Management Plan which will allow for a slightly higher harvest as well. For this Forest Management Plan, the Forestry Program will administratively set the rotation age as seen in Table 13, to achieve the Tribes AAC of 77.1 million board feet per year.

Table 18. Recommended Rotation Age for 2015 Forest Management Plan

PAG	ROTATION AGE
Douglas-fir	80 to 100 years
Subalpine fir and Grand FIR	90 to 100

Another option for increasing harvest levels would be to aggressively salvage dead trees. The 2015 FIA shows that nearly 57 million board feet per year of mortality is occurring. Capturing even a small portion of that mortality could increase harvest levels substantially.

Harvest Policy

This section will briefly detail timber sale objectives and those practices considered acceptable on the Reservation in order to comply with the Forest Management Plan and tribal ordinances and standards. This section will be an overview and will include 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 Colville Indian Reservation.

Sale Design

Timber sales will be designed to follow the timber sale schedule outlined in this document. Size, duration and value will vary by project. Tables 7 and 8 of this document provide guidance on patch size, unit design and leave tree requirements. Projects will be analyzed by an interdisciplinary team, which may require site specific design elements to address specific issues. Sale duration will not exceed 5 years, and will be incorporated into the individual timber sale contract to ensure adequate time for the purchaser to complete all necessary work.

Merchantability Standards/Utilization Standards

Trees that are designated for harvest will meet or exceed the following minimum specifications:

SPECIES AND PRODUCTS		PRODUCT SPECIFICATIONS					
	Length (feet)	Scaling Diameter (inches)	Net Scale Defect	Board Feet			
All species Sawlogs	8	6,0	Less than 33% Defect	10			
All Species Hewwood	12	4.0	Less than 33% Defect	10			

Wood logs are logs more defective then the net scale in percent of gross scale as set forth above (33% or greater defect) which are removed from the logging unit by the Purchaser, with the intent of manufacture or sale. Removal of these logs is at the discretion of the Officer-in-Charge of the contract. Any wood products remaining in the woods that meet these minimum specifications will be scaled as waste, and the purchaser will be billed accordingly.

Other wood products not meeting sawlog or cull log products specifications as set forth above (such as chipwood) which are removed from the logging unit by the Purchaser with the intent of manufacture for sale, shall be paid for on a gross tonnage basis, or equivalent method of measurement, as agreed to by all parties to the approved Resource Allocation Agreement between the Confederated Tribes of the Colville Reservation of Washington, Colville Tribal Federal Corporation, and the United States of



America. Removal of these products is at the Purchaser's option, subject to the approval of the Officer-in-Charge of each timber sale contract.

Scaling Methods

Scaling will be done in accordance with the USDA Forest Service National Log Scaling Handbook. FSH 2409.11, Amendment 6, to provide standard instructions for volume determination.

Market Area and Solicitation Methods

Most timber sales will be sold to CTSY. They have right of first refusal on the Annual Allowable Cut and timber sales will be sold to them in accordance with the Timber Allocation Agreement between the Confederated Tribes of the Colville Reservation of Washington, Colville Tribal Federal Corporation, and the United States of America.

In the event that CTSY refuses a timber sale, it will be sold on the open market in accordance with BIA requirements outlined in the Indian Affairs Manual Volume 3, Contracts and Sales of Forest Products. The market area for the Colville Reservation can be considered quite large, including most of eastern Washington, northern Idaho, and parts of western Washington. Generally, open market sales will be advertised in local newspapers located in Colville, Omak, Spokane and Seattle.

Road Construction & Maintenance

The Forestry Program will develop engineering plans for each project area in coordination with other tribal departments. This will include planning for new road construction, upgrades to existing infrastructure, and road closure plans. It will be the Forestry Programs responsibility to ensure that the plan is implemented on roads that are used as part of an active timber sale operation.

The following list outlines how the Forestry Programs will participate in managing roads:

- Forestry will assure all current timber sale roads, landings, and skid trails comply with BMP requirements of the Forest Practices, Hydraulic Project, and Hazardous Substance Control codes.
- Forestry will coordinate with other programs to design, reconstruct, maintain, and decommission roads to minimize or eliminate groundwater interception, prevent soil erosion, keep intercepted water within its natural drainages, and minimize delivery of runoff to surface waters.
- All new construction, reconstruction and all water drainage structures shall be in accordance
 with instructions issued by the Forestry Program. Maximum use of existing spur roads and
 landings shall be required.



- All erosion control will be constructed at the direction of the Forestry Program. This work will be completed before the road surface freezes, unless roads are scheduled for use during winter logging activities, as referenced in the approved Logging Operations Plan.
- Mounds of dirt and unburnable debris resulting from road construction, slash piling, or landing
 construction within approximately one hundred (100) feet of all roads (when visible from the
 road) shall be flattened as directed by the Forestry Program. Sides of borrow pits and quarries
 shall be sloped, trimmed, and seeded in accordance.
- Rolling dips will be constructed on critical segments of the road system for surface drainage.
 These dips will consist of slight out slopes at critical points in the road and should be built so
 that a log truck may safely pass through while loaded. This should be done in coordination with
 other natural resource departments.

Felling & Bucking Methods

There is no specific Tribal Policy specifying felling and bucking methods. There are two common methods of felling and bucking that occur on the Colville Indian Reservation. One system is called whole tree skidding, the other is called cut to length.

In whole tree skidding, the tree will be felled in the woods, usually with a feller buncher cutting head on an excavator, and the whole tree including the tops and branches will be skidded into the roadside landing. At the landing the tree will be de-limbed and bucked into the appropriate lengths. The logs will then be loaded on a truck and sent to the mill. This method generally creates large landings and slash piles because the branches and tops are piled at the landing.



In the cut to length system, the trees are felled, de-limbed, Cutting Operation

and bucked into logs of the desired length out in the woods at the stump, usually with some kind of processing head on an excavator or by hand with a chainsaw. The bucked logs are then skidded into the roadside landing and no further processing is needed. The logs are then loaded on the truck and sent to the mill. The branches and tops are left in the woods and generally do not end up at the landing.

Both of these methods can be used with tractor/rubber tire skidders or on a cable operation (see next section Yarding & Skidding). To use a forwarder, cut to length is required because it cannot haul the whole tree.

The Forestry Department will determine which system is most appropriate at the project level, and site specific harvest plans will be developed by the department and reviewed by an interdisciplinary team before the timber sale contract is finalized.



Yarding & Skidding Methods

A variety of yarding and skidding methods may be outlined in timber sale contracts. Ground based skidding systems, tractor or rubber tire, are the most common method of log skidding used on the

reservation. Forwarders are also commonly used. As a guideline for project planning, slopes 35% and less will be harvested with ground based systems, and slopes greater than 35% will be cable logging or helicopter systems. This is just a guideline. Local conditions and analysis at the project level will determine what harvest methods will be used. Logging plans should be developed on a project basis and take into account the local terrain. There will be some instances where tractor logging will occur on ground steeper than 35% and cable systems may be used on more gentle slopes due to a lack of adequate road systems or other resource issues. This should be well defined and worked out on a site by site basis during project planning.



Skidding Operation

Forestry and will ensure that the total (%) area impacted by detrimental soil disturbance (DSD) within each timber harvest block will not exceed 25%. This will include skid trails and forest roads.

Slash Disposal Standards

The Forestry Program will develop slash treatment plans and incorporate them into timber sale contracts. Slash shall mean limbs, tops, damaged young growth and other material resulting from logging, road construction or other operations of the Purchaser. Slash treatments may also include site preparation such as mechanical site preparation (see Regeneration Treatments section of this document). Slash Treatment Plans will be project specific and may vary greatly between projects.

There are also standard slash treatments that will apply to all timber sale contracts. They are as follows:

- The timber sale purchaser shall be required to lop and scatter and pile all slash compactly for burning unless otherwise specified in the contract. Slash piles shall be placed a sufficient distance from reserved trees and reproduction to prevent unnecessary damage in burning.
 Before pile burning shall occur, a pre-burn plan shall be approved by Fire Management and the Officer-in-Charge.
- All slash created in connection with road construction shall be piled during the construction
 phase in natural or cleared openings within or adjacent to the road right-of-ways, and stumps
 resulting from road clearing operations shall be piled and burned within the cleared portion of
 the right-of-way, unless otherwise directed by the Officer-in-Charge.



- The Purchaser shall fell all unmerchantable dead trees and designated live cull trees within the
 area of cutover which are 14 inches or more in diameter at breast height and 16 feet or more in
 total height. Cull tree felling shall be completed in each part of the sale are as soon as
 practicable after yarding or skidding and before the slash is burned, if burning is required. The
 Purchaser may be relieved of cull tree felling requirement on specifically designated areas by the
 Superintendent.
- A slash treatment plan "Exhibit E" will be included in each timber sale contract outlining silvicultural treatments that are required as compliance in the contract.

Payment Policies for Forest Products

Payments shall be submitted by the Purchaser using the **Trust Funds Receivable "Lockbox**", located in Farmington, MO., 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 Bureau of Indian Affairs.

FUELS MANAGEMENT

Harvest Areas

These treatments will generally be implemented to treat areas associated with timber harvest operations. This could include site preparation treatments to prepare for seedling establishment, or burning of slash and brush piles (see site preparation methods section of this document). Reducing natural, logging and thinning residue is presumed to be an effective means of limiting the damage potential of any subsequent wildfire, or at least making the wildfire easier to control.

Removal of the fine and intermediate size classes (elements less than one inch in diameter) from the fuel complex effectively eliminates any hazard. Fires start in the fine (less than ¼ inch in diameter) fuels; the rate at which a fire spreads is determined by the amount, continuity, and moisture content of fine and intermediate-sized fuels. A general guideline is to reduce the fuel loading to 15 tons/acre to meet this objective.

Areas treated by silvicultural practices will be treated to meet IRMP goals, objectives and management objectives. The selection of the fuel treatment methods will be determined on a project basis. Fuel treatments to be used include:

Indirect Methods - Those treatments that leave downed fuels to decompose naturally.



- 1. Indirect control lines have to be strategically located to assist suppression efforts and break fuel concentrations into manageable units. Methods and considerations include:
- 2. Fuel Break A technique that reduces or eliminates hazardous fuels and interrupts fuel bed continuity. Fuel breaks do not necessarily stop fast moving fires, but are designed to assist fire suppression tactics and provide access where resistance to control is high.
- 3. Fire Break A firebreak is a natural or artificial obstruction where all vegetation is removed to stop uncontrolled fires.

Firebreaks may require annual maintenance to control fine fuel buildup, e.g., grasses. A fuel break should be planned next to a firebreak when located in heavy fuels and timber.

Direct Methods - Those treatments that reduce the potential of destructive fires by removing hazards while providing for long-term productivity of the site (e.g., not removing all large woody material). These include:

- Broadcast Burning Applying fire to a designated unit of land where the fuel has not been piled or windrowed. Broadcast burning is used for fuel reduction, site preparation, and vegetation manipulation. Proper unit layout (size and shape), firing methods, and safety considerations are requirements of this kind of burning.
- 2. Underburning (or Understory Burning) Prescribe burning with a low fireline intensity fire under a timber canopy. Underburning is used primarily for fuel reduction, less so for site preparation, and vegetation manipulation where these objectives can be met with a low intensity fire. Proper firing methods and a very good knowledge of weather and fire behavior are requirements to prevent damage to the overstory.
- Jackpot Burning Prescribed burning to dispose of fuel concentrations where discontinuous
 fuels prevent a broadcast burn. This is typically in spring or fall when fine fuels will burn but
 large fuels will not. Although risk of fire escape is low, managers must continue to consider
 ignition and holding problems.
- 4. Pile and Burn Fuels are piled by mechanical means or by hand and then usually burned in the fall when fine fuels outside the piles are too moist to burn or covered with snow.
- 5. Yarding Un-merchantable Material (YUM)/Whole Tree Skidding Un-merchantable woody material is yarded to landings for further treatment or use as firewood by the public. Specifications usually refer to the minimum piece size to be yarded, e.g., 4x6, (4 inch small end diameter and 6 feet long).



Rearrangement - The alteration of the fuel bed without removing any of the forest residues from the site. The objective is to hasten the natural decomposition by increasing the bulk density of the fuel bed. This does not immediately reduce the fuel loading but does alter the packing ratio of the fuel bed.

- Lopping Branches are cut from felled trees and left in place or scattered. Reducing vertical fuel
 continuity is the main objective. This is most effective with light fuel loadings. Lopping branch
 wood to within 1 foot of the ground effectively reduces flame heights to one half if left
 untreated.
- 2. Chopping A machine mounted chopper (e.g., a rotary disc) is used to chop slash. This treatment basically breaks slash into smaller pieces and gets it closer to the ground to hasten decomposition and is most effective in light to medium fuel loading.
- 3. Crushing or Trampling Debris is crushed or trampled using heavy equipment. Terrain, reserve tree density, and fuel loading may limit these methods. Crushing is best done when slash has cured for at least one season. Note: Crushing or trampling is deemed unacceptable on the Colville Reservation due to soil compaction.

The selection of the fuel treatment methods will be determined on a project basis in order to meet the specific site preparation methods outlined in the silvicultural prescriptions for each area. Areas treated by silvicultural practices will be treated to meet IRMP goals, objectives and directions to meet the fuel management objectives.

Non-harvest Areas

Fire maintained the historic stocking levels on the Reservation where an estimated 37,000 burned annually. It would be difficult to achieve the historic fire role of fire in vegetation stocking control. However, using a combination of prescribed fire and vegetative treatments, the historic patterns created by natural fire can be emulated and the IRMP Desire Future Conditions (DFC) achieved.

Within each project designated for timber harvest, prescribed fire will also be proposed based on available funding levels. To achieve the planned prescribed fire treatment priorities outlined in the IRMP, some additional projects may be proposed outside the timber treatment areas as well. Priorities for treatments in non-harvest forested areas will be:

- 1. Prescribed fire to restore DFC in selected PAG's:
- 2. Prescribed fire to maintain (conserve) the DFC:
 - a. Treat in-growth and fuels buildup in previously commercially thinned areas.



- b. Stocking control and disease reduction in un-thinned areas.
- 3. Prescribed fire to meet other identified resource objectives.

Data Collection for Monitoring, Planning, Operational Activities, & Research

Data collection on the reservation forestlands occurs for a variety uses. Some data, such as CFI plots requires intensive measurements. Some data may be simply checking to ensure contract compliance. This section will outline some of the data collection that will occur, and what it will be used for.

Continuous Forest Inventory (CFI)

CFI plots have been measured on the Reservation since 1958. This data provides long-term monitoring of forest growth, mortality, standing inventory, tree per acre, and other important forest attributes. Maintenance of these plots will continue with this FMP, and data will be collected roughly every 10 years. This will be an important part of analyzing the effects of forest management activities over the long-term. See the 2014 FIA Report for more information about CFI data.

Stocking Surveys

Stocking surveys will be implemented for monitoring purposes on all regeneration units to ensure adequate reforestation is occurring. Surveys will be done in the 1st and 5th year after tree planting and in the 5th and 10th year for natural regeneration units. A district silviculturist will certify each unit for adequate stocking upon completion of surveys. If adequate stocking is not achieved, appropriate action can take place to ensure new trees are established.

Stand Exams

Stand exams will be done in each project area for planning purposes. Data will be used to develop silvicultural prescriptions. There will be varying levels of intensity for data collection depending on the availability of funding. Data will be stored in the FEM database (see Documentation section of this FMP).

Documentation, Monitoring & Records

The Forestry Program will maintain a variety of records, including the data listed above. Timber sale records will be maintained at the Main BIA Office. Records pertaining to silvicultural prescriptions will be maintained at the district offices. This section will outline some of the documentation and monitoring methods that will be used.



Timber Sale Compliance

Compliance forms are intended for monitoring and tracking operational activities. These compliance forms will be will be developed by the Timber Sale Officer and retained in the timber sale master file. They will include tracking of contract compliance to ensure that the requirements of timber sale contracts are being met. Yearly compliance forms will be developed, as well as weekly progress reports. Compliance completion will also be tracked by the FEM database (discussed below). This will include all silvicultural activities that are part of compliance, such as slashing and mechanical site preparation.

Log truck tickets will be used to track all logs hauled to the mill. Scale information will be entered in the Trust Asset Management System for tracking and billing purposes.

Silviculture Prescription Database (FEMs)

As a planning and monitoring tool, a database with silvicultural prescriptions and field examination memos will be maintained for every treatment unit on the reservation. This database will be maintained at the districts. All silvicultural prescription will be tracked with this system. An associated GIS layer will also be maintained, tracking each treatment block with a track identification number. Treatments for each block can tracked over time with the database and associated GIS layer. The forestry program is planning to update the silviculture tracking system with new methods that have more GIS capability. An example of the field form used for collecting data to enter into the tracking system is provided in the Appendix.

Planning, Coordination, and Communication

All project planning will be done in accordance with the IRMP, and the Project Proposal Handbook. This will include proposing projects through the Project Proposal Process (PPP) and working with an interdisciplinary team to ensure IMRP goals and objectives are being met. The NEPA process will also occur through the PPP process. Projects will go through environmental review, input will be taken by other resource specialists and the public, and a determination will be made on whether to proceed with a Categorical Exclusion or Environmental Assessment (see BIA NEPA Handbook for more information). All timber sale projects will be approved by Tribal Council Resolution before implementation.

The Forestry Program will work with other resource departments throughout the life of the project. Other specialists will be involved throughout the planning, implementation and monitoring phases of each project. All issues will be coordinated and communicated through the PPP team.

Organization & Funding

The Forestry Program is organized into 3 Districts. District organization charts are shown below. In recent years, there has been a significant drop in funding, and many positions are currently vacant. The

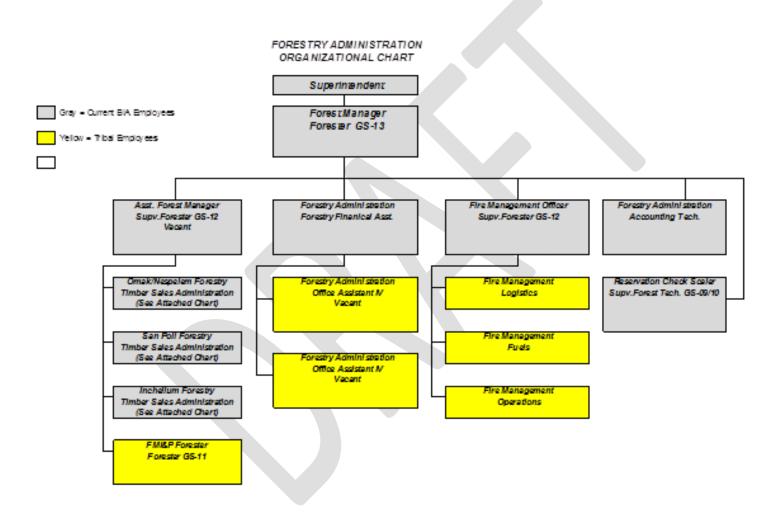


Colville Tribe and the BIA operate under a cooperative agreement, so some of the employees are Tribal and some are BIA, but they all work together under the same organization chart.

The decrease in harvest operations heavily impacted the Forest Management Deductions (FMD) account (10% monies) that is used to implement most forest development activities. This has had a huge effect on the forestry Programs ability to manage the forest. In the last 2 years the availability of other funding sources has allowed for an increase in planting and pre-commercial thinning. Harvest levels have also increased, creating more FMD money to implement management activities, but there is likely to be a shortfall of money to do all the work that is needed. FMD monies are expected to average \$900,000 per year under this FMP.



Organizational Charts

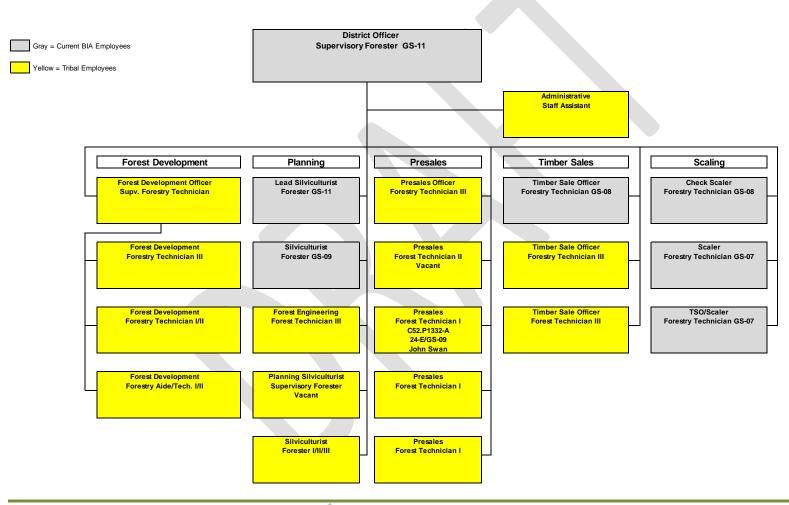


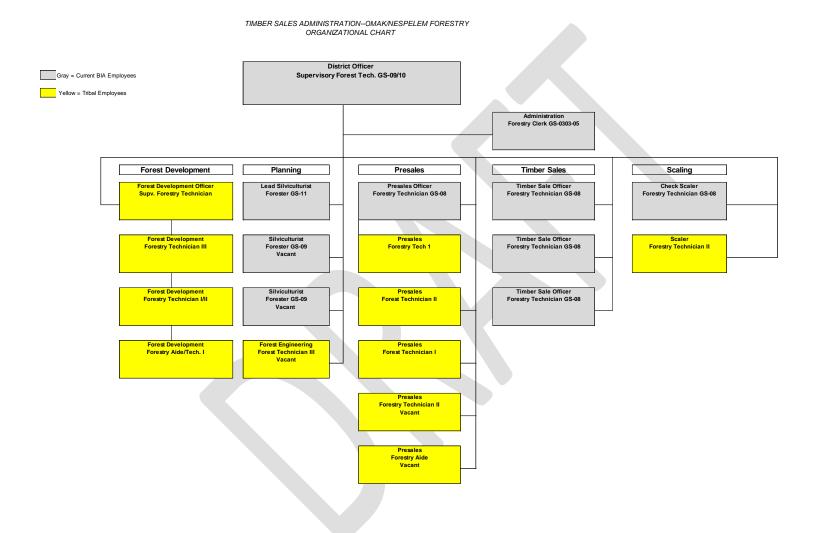
TIMBER SALES ADMINISTRATION-SAN POIL FORESTRY ORGANIZATIONAL CHART

District Officer Gray - Current BIA Employees Supervisory Forester GS-11 Vacant Yellow - Tribal Employees Administration Office Assistant IV Forest Development Planning Presales Timber Sales Lead SI Voulturist Presales Officer Timber Sale Officer Forest Development Officer Supv. Forestry Technician Forester G8-11 Forestry Technician G 8-08 Forestry Technician G 8-08 Timber Sale Officer Forestry Technician II Forester MIMIL Forest Technician II Forestry Technician G 8-07 Forest Development Forest Engineering Timber & le Officer Presales Forestry Teich nician I/II Forester G8-11 Forest Technician II Fore of Technician III

Forestry Technician I

TIMBER SALES ADMINISTRATION-INCHELIUM FORESTRY ORGANIZATIONAL CHART





SOCIAL & ECONOMIC BENEFIT ANALYSIS

The forest products industry and associated timber revenue has historically been economically important to the Colville Indian Reservation and surrounding communities. A large share of the tribal government is funded by timber revenue and that trend is expected to continue in the future. This section will provide a brief history of timber harvest revenues on the reservation, and provide an economic benefit analysis of the 2015 IRMP preferred alternative.

Historic Harvest Trends

In 1961, Thomas McAvoy reported that during the 41 years from 1919 through 1960, a total of 1.811 billion board feet of timber was harvested from the Colville Indian Reservation. The harvest averaged 43 million board feet annually. The management plan in 1962 called for an increase in the annual harvest to 120 million board feet per year. Annual harvest level has varied substantially since 1950, but has always been a large source of revenue for the Tribe. Figure 5 shows the actual harvest volume since 1950.

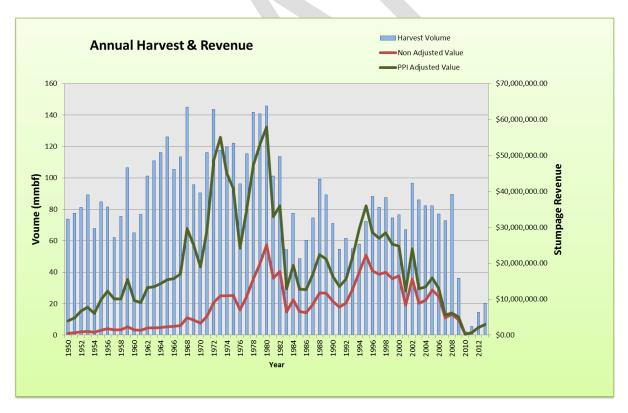


Figure 5. Annual Harvest & Revenue 1950 to 2013.



As seen in Table 15, the harvest of timber has provided a significant level of income to the Tribe (Table 14). Since 1980, nearly 2.3 billion board feet of timber has been harvested with total stumpage revenue to the Tribe of \$369 million dollars.

Table 19. Harvest Volume and Value, 1980 to Present.

Harvest Volume & Value, 1980 to 2013								
Average Annual Volume =	69.8 mmbf	Total Volume =	2.3 billion board feet					
Average Annual Stumpage Revenue =	\$10,8775,865	Total Revenue =	\$369,779,416					

It is also useful to compare what was planned for harvest in the 2000 IRMP to what was actually accomplished. The 2000 IRMP planned for 1,157 million board feet to be harvested during the period from 2000-2014. Total harvest at the end of 2014 was 874 million board feet, which is a 283 mmbf deficit from what was planned. This is largely related to market conditions deteriorating in 2008 and the subsequent closure of the Tribes mills in 2009.

Tribal Enterprises

In the 1970s and early 1980s, the Confederated Colville Tribes (CCT) attempted several business ventures that for one reason or another were not successful. These ventures include a molybdenum

mining operation, prefabricated log cabin production, a meat processing and packaging facility, and even a commercial greenhouse. It wasn't until 1973 when the CCT found success in the Colville Trading Post and the Omak sawmills in 1984. Also in 1984, the CCT initiated the Colville Tribal Enterprise Corporation (CTEC) to manage and oversee the CCT's blossoming enterprises and established businesses in construction, gaming, recreation and tourism, retail sales, and wood harvesting and processing.



Colville Precision Pine before closure.



Over the last decade, the CTFC/CTEC revenue base has changed dramatically (see Figure 6). The most notable changes are the result of the closure of the timber mills and forestry products businesses in Omak, as well as the decline in timber harvesting on the Reservation. In 2000, the forestry products division accounted for over 49%, or \$47.3 million, of the CTEC's revenue. By 2012, this revenue source had completely disappeared due to a drastic decline in market demand for timber products throughout the U.S., which is only now beginning to recover. Without the forest products division as a significant revenue generator, the CTFC's primary source of revenue shifted to the gaming division, which in 2012 comprised 62%, or \$52.0 million, of the CTFC's annual revenue of \$84.6 million. The veneer plant in Omak has re-opened under a lease agreement, and will provide a modest income to CTFC, but not at the levels achieved when the mill was managed by CTEC.

Revenue generated by the CTFC/CTEC has always been of considerable importance to the CCT as a whole because in any given year, 6-12% of the CTFC/CTEC's total revenue is transferred back to the CCT. Generally, this amounts to approximately \$10.0 million in annual income to the CCT. While the CTFC in absolute terms does not generate the same level of revenue the CTEC did in the past (i.e., \$96.2 million in 2000 and \$142.2 million in 2006, versus \$84.6 million in 2012), the CTFC has cut costs considerably so that a greater portion of its annual revenue (both as a percentage, and in absolute terms) is transferred to the CCT.

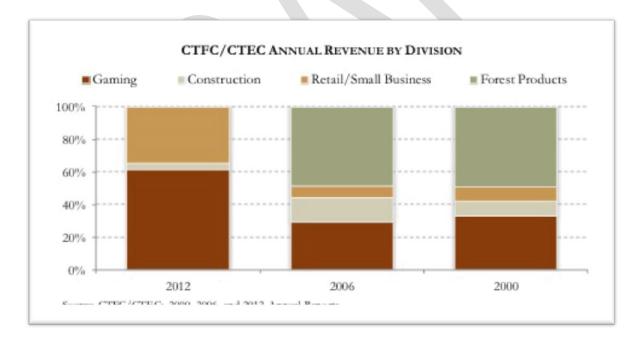


Figure 6. CTEC/CTFC Revenu by Division.



The Colville Tribal Federal Corporation (CTFC) is headquartered in Coulee Dam, Washington. Since its inception in 2009, it has grown to become one of the largest, most diverse Native American businesses in northeastern Washington. The company currently manages 13 enterprises that include gaming, recreation and tourism, retail, construction, and wood products. The CTFC was formed in 2009 to change the direction of the CCT's ailing business entities, which prior to 2009 were organized under the Colville Tribal Enterprise Corporation (CTEC). Reorganization under the CTFC meant scaling down the CCT's construction business; opening the Mill Bay Casino, Mill Bay Smoke Shop, 'Spelem Smokes, Omak Tribal Trails, Columbia River Distribution, and the Deep Water Amphitheatre; and reopening the Omak timber mill under a 25-year lease agreement with Wood Resources, LLC. In total, the CTFC's 13 businesses provide jobs to more than 400 employees on the Reservation. In 2012, the combined operating revenue from these businesses grossed \$84.6 million, up approximately 11.3% from 2011.

Economic Benefit of Planned Management

The 2015 IRMP Alternative will continue with the current harvest level of 77.1 million board feet per year. This means that revenues and economic impact will closely resemble the last 15 year planning period, assuming no large economic downturns as those that occurred in 2009-2011. The planned management will provide numerous economic benefits to the Tribe, including employment at Omak Wood Products, employment in logging and other forestry work, income in the form of stumpage payments, and money filtering into the local economy and businesses from payroll payments to employees.

Table 16 outlines the estimated revenue that will occur from Forest Management Activities over the 15 year planning period outlined in the IRMP. Gross stumpage revenue is the value of the Tribes timber before logging costs. The net stumpage expresses the actual value the Tribe will receive after logging costs are paid to get the timber to the mill. Net stumpage the Tribe will receive after logging costs over the 15 year planning period is estimated to be \$138,600,000. It is anticipated that there will be an additional \$8,910,000 dollars received by the tribe for the leasing the mill to Omak Wood Products over the next 15 years.



Table 20. Estimated Forest Management Revenues and Costs.

FOREST MANAGEMENT REVENUES & COSTS 15 Year Planning Period (2015 – 2030)								
Sources of Revenue & Cost Dollar Amount								
Gross Stumpage Revenue	\$415,800,000							
Logging Costs	\$277,200,000							
Net Stumpage Revenue	\$138,600,000							
Mill Lease Payment Revenue	\$8,910,000							
	TOTAL REVENUE \$147,510,000							

What is the Stumpage Revenue Spent On?

Stumpage revenues are placed directly into the Tribes General Fund, and can be used to fund numerous programs and Tribal activities. Historically, stumpage was the primary funding source for the Tribes General Fund. In Fiscal Year 2015 it is anticipated that the Tribe will receive \$9,000,000 in stumpage payments to the General Fund. This is the second highest revenue source for the General Fund, with Gaming Assessment money projected to provide slightly more at \$10,600,000.

These monies can be used for numerous activities. Several Tribal Programs are funded by the General Fund. The following is a short list of some of the programs funded in part through stumpage revenue that is in the General Fund:

- Per capita payments to the Tribal Membership
- IT Program
- Psychiatric and Behavioral Health Programs
- Veterans Programs
- Senior Heating Program
- Language Program
- Public Works
- Museum
- Cultural Resource Surveys



Forest Management Deductions (FMDs)

FMDs are another cost that will be removed from the net stumpage revenue. This is 10% of the net stumpage revenue (an estimated \$13,860,000 over 15 years), and is used for a variety of forest management purposes. Most of this work includes non-commercial forest development activities, including:

- Purchasing seedlings for planting.
- Site preparation/broadcast burning.
- Tree planting operations.
- Pre-commercial thinning young stands of trees.
- Purchasing supplies for timber sale and planting activities.

Employment Income & Payroll

There are numerous jobs that will be created by the harvesting of the forest products, FMD activities, and milling operations. A significant amount of money will be used for payroll, providing



Tribal Greenhouse Seedlings

income for Tribal Members. This will include payroll for employees to operate equipment, jobs at the mill, planning and implementation timber sale contracts, and perform planting, pre-commercial thinning and other forest development work.

Table 17 outlines the estimated number of jobs and associated payroll and income that are associated with logging, mill operations and forest development activities (FMD). These are estimates based on current operations, but illustrate the large amount of employment and income that are derived from forestry operations under the planned management strategy.



Table 21. Estimated Yearly Employment & Income.

	Full Time Er	mployment	Seasonal Er	Seasonal Employment		
	Tribal Member	Non Member	Tribal Member	Non Member	Total Employees	Annual Payroll
Logging Operations*	44	66	15	15	140	\$4,000,000
Truckers*	22	34			56	\$2,100,000
Colville Tribal Sort Yard	4	1	0	0	5	\$350,000
Milling Facilities (OWP)**	120	80			200	\$10,600,000
Tribal/BIA Forestry	59	7	4	0	70	\$1,500,000
Forest Development (FMD Expenditures)			28	12	40	\$250,000
Total	249	188	47	27	511	\$16,200,000

^{*} These are estimates from the Colville Tribal Sort Yard. Loggers are independent contractors, making it difficult to determine payroll and tribal member verses non-member employment.

There are numerous other funding sources that the Tribe can access to help manage their forest resources. Many of these funding sources are federal and State grants that can help stretch Tribal dollars farther and provide even more employment and income opportunities for the Tribal Membership. These monies and associated jobs are not represented in this analysis because are difficult to predict and may or may not be available every year. The Forest Program will pursue available funding whenever possible to implement forestry activities and provide more employment and income to Tribal Members.



^{**} Estimated from an average payroll for mill operation employees.



APPENDIX

Desired Future Condition Tables

Table 22. Ponderosa Pine Historic Range of Variability & Desired Future Conditions

CTDLICT	COND.1			STRUCTURA	I CTACE 2		
STRUCT.	COND.			STRUCTURA	L STAGE		
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	1309-6543 (1-5%)					
	DFC	3926-9160 (3-7%)					
2	HRV	1309-13086(1-10%)					
	DFC	7652-17012 (6-13%					
3	HRV	1309-13086(1-10%)					
	DFC	7652-17012 (6-13%					
4	HRV	26172-39258	6543-19629				
		(20-30%)	(5-15%)				
	DFC	26172-39258	13086-19629 (10-				
		(20-30%)	15%)				
5	HRV	45801-65430	6543-13086				
		(35-50%)	(5-10%)				
	DFC	32715-49726	3926-10469	_			
		(25-38%)	(3-8%)				

Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation.

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 23. Douglas-fir Warm Dry Historic Range of Variability & Desired Future Conditions.

STRUC	COND.			STRUCTURA	L STAGE ²		
T.	1	E-S	E-M	M-S	M-M	L-S	L-M
CLASS		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	309-1546 (1-5%)					
	DFC	928-2165 (3-7%)					
2	HRV	309-3093 (1-10%)				309-3093 (1-10%)	
	DFC	1856-4020 (6-13%)				309-3093 (1-10%)	
3	HRV	309-3093 (1-10%)				309-3093 (1-10%)	
	DFC	1856-4020 (6-13%)				309-3093 (1-10%)	
4	HRV	10824-15463	309-3093			309-3093 (1-10%)	309-3093 (1-10%)
		(35-50%)	(1-10%)				
	DFC	10824-13917	309-1546			309-1546 (1-5%)	309-1546 (1-5%)
		(35-45%)	(1-5%)				
5	HRV	7732-12370	309-3093			309-3093 (1-10%)	309-1546 (1-5%)
		(25-40%)	(1-10%)				
	DFC	4330-8969 (14-29%)	309-1237 (1-4%)			309-1237 (1-4%)	309-1237 (1-4%)

Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation;

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 24. Douglas-fir Warm Moist Historic Range of Variability, and Desired Future Condition.

STRUCT.	COND.1			STRUCTUR	AL STAGE ²		
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	2355-11773					
		(1-5%)					
	DFC	7064-16483					
		(3-7%)					
2	HRV	2355-23547				2355-11773	
		(1-10%)				(1-5%)	
	DFC	14128-30610				2355-11773	
		(6-13%)				(1-5%)	
3	HRV	2355-23547				2355-11773	
		(1-10%)				(1-5%)	
	DFC	14128-30610				2355-11773	
		(6-13%)				(1-5%)	
4	HRV	23547-58866	23547-47093			2355-23547	11773-35320
		(10-25%)	(10-20%)			(1-10%)	(5-15%)
	DFC	23547-47093	11773-35320			2355-11773	11773-23547
		(10-20%)	(5-15%)			(1-5%)	(5-10%)
5	HRV	82413-117733 (35-	11773-35320			2355-11773	11773-35320
		50%)	(5-15%)			(1-5%)	(5-15%)
	DFC	37674-61221	7064-30610			2355-9419	7064-21192
		(16-26%)	(3-13%)			(1-4%)	(3-9%)

¹ Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation.

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 25. Douglas-fir Cool Dry Historic Range of Variability, and Desired Future Condition.

STRUCT.	COND.1			STRUCTUR	AL STAGE ²		
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	2355-11773					
		(1-5%)					
	DFC	7064-16483					
		(3-7%)					
2	HRV	2355-23547				2355-11773	
		(1-10%)				(1-5%)	
	DFC	14128-30610				2355-11773	
		(6-13%)				(1-5%)	
3	HRV	2355-23547				2355-11773	
		(1-10%)				(1-5%)	
	DFC	14128-30610				2355-11773	
		(6-13%)				(1-5%)	
4	HRV	23547-58866	23547-47093			2355-23547	11773-35320
		(10-25%)	(10-20%)			(1-10%)	(5-15%)
	DFC	23547-47093	11773-35320			2355-11773	11773-23547
		(10-20%)	(5-15%)			(1-5%)	(5-10%)
5	HRV	82413-117733 (35-	11773-35320			2355-11773	11773-35320
		50%)	(5-15%)			(1-5%)	(5-15%)
	DFC	37674-61221	7064-30610			2355-9419	7064-21192
		(16-26%)	(3-13%)			(1-4%)	(3-9%)

¹ Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation.

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 26. Douglas-fir Cool Moist Historic Range of Variability, and Desired Future Condition.

	I	Г					
STRUCT.	COND. ¹			STRUCTUR			
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	2508-25075					
		(1-10%)					
	DFC	15045-27583					
		(6-11%)					
2	HRV	2508-25075				2508-12538	
		(1-10%)				(1-5%)	
	DFC	15045-27583				2508-12538	
		(6-11%)				(1-5%)	
3	HRV	2508-25075				2508-12538	
		(1-10%)				(1-5%)	
	DFC	15045-27583				2508-12538	
		(6-11%)				(1-5%)	
4	HRV	62688-100301 (25-	25075-50150			2508-25075	12538-25075
		40%)	(10-20%)			(1-10%)	(5-10%)
	DFC	50150-75226	12538-37613			2508-12538	2508-12538
		(20-30%)	(5-15%)			(1-5%)	(1-5%)
5	HRV	62688-100301 (25-	12538-37613			2508-12538	2508-12538
		40%)	(5-15%)			(1-5%)	(1-5%)
	DFC	27583-57673	2508-22568			2508-10030	2508-10030
		(11-23%)	(1-9%)			(1-4%)	(1-4%)

¹ Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation.

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 27. Grand Fir Historic Range of Variability and Desired Future Condition.

STRUCT.	COND.1	STRUCTURAL STAGE ²					
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	582-2912 (1-5%)					
	DFC	1747-6406					
		(3-11%)					
2	HRV	582-2912 (1-5%)		582-5824 (1-10%)		582-2912 (1-5%)	
	DFC	1747-6406		582-5824 (1-10%)		582-2912 (1-5%)	
		(3-11%)					
3	HRV	582-2912 (1-5%)		582-5824 (1-10%)		582-2912 (1-5%)	
	DFC	1747-6406		582-5824 (1-10%)		582-2912 (1-5%)	
		(3-11%)					
4	HRV	5824-11648	2912-8736	8736-17471	5824-11648	582-2912 (1-5%)	582-2912 (1-5%)
		(10-20%)	(5-15%)	(15-30%)	(10-20%)		
	DFC	5824-11648	2912-5824	4659-8736	2912-4659	582-2912 (1-5%)	582-2912 (1-5%)
		(10-20%)	(5-10%)	(8-15%)	(5-8%)		
5	HRV	5824-11648	582-5824 (1-10%)	5824-11648	2912-8736	582-2912 (1-5%)	582-2912 (1-5%)
		(10-20%)		(10-20%)	(5-15%)		
	DFC	3494-5824	582-2912 (1-5%)	3494-5824	2330-2912	582-1747 (1-3%)	582-1747 (1-3%)
		(6-10%)		(6-10%)	(4-5%)		

Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation.

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Table 28. Subalpine Fir Historic Range of Variability, and Desired Future Condition.

STRUCT	COND.1	STRUCTURAL STAGE ²					
	COND.						
CLASS		E-S	E-M	M-S	M-M	L-S	L-M
		Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040	Yr 2040
1	HRV	851-8513					
		(1-10%)					
	DFC	5108-9364					
		(6-11%)					
2	HRV	4257-8513		851-8513 (1-10%)		851-4257 (1-5%)	
		(5-10%)					
	DFC	5108-9364		851-8513 (1-10%)		851-4257 (1-5%)	
		(6-11%)					
3	HRV	4257-12770		851-8513 (1-10%)		851-4257 (1-5%)	
		(5-15%)					
	DFC	5108-9364		851-8513 (1-10%)		851-4257 (1-5%)	
		(6-11%)					
4	HRV	6810-21283	2554-10216	10216-23837	4257-12770	851-8513	2554-8513
		(8-25%)	(3-12%)	(12-28%)	(5-15%)	(1-10%)	(3-10%)
	DFC	6810-12770	2554-6810 (3-8%)	6810-15324	1703-5959	851-4257 (1-5%)	851-4257 (1-5%)
		(8-15%)		(8-18%)	(2-7%)		
5	HRV	6810-15324	1703-10216	4257-12770	4257-17026	851-4257 (1-5%)	851-8513
		(8-18%)	(2-12%)	(5-15%)	(5-20%)		(1-10%)
	DFC	1703-7662	851-5108 (1-6%)	1703-10216	1703-5108 (2-6%)	851-3405 (1-4%)	851-3405 (1-4%)
		(2-9%)		(2-12%)			

¹ Condition: HRV – Historic Range of Variability; DFC – Desired Future Conditions on Reservation;

² Structural Stage: E-S Early Seral; E-M Early Mature; M-S Mid-Seral; M-M Mid-Mature; L-S Late Seral; L-M Late Mature.

Harvest Schedule

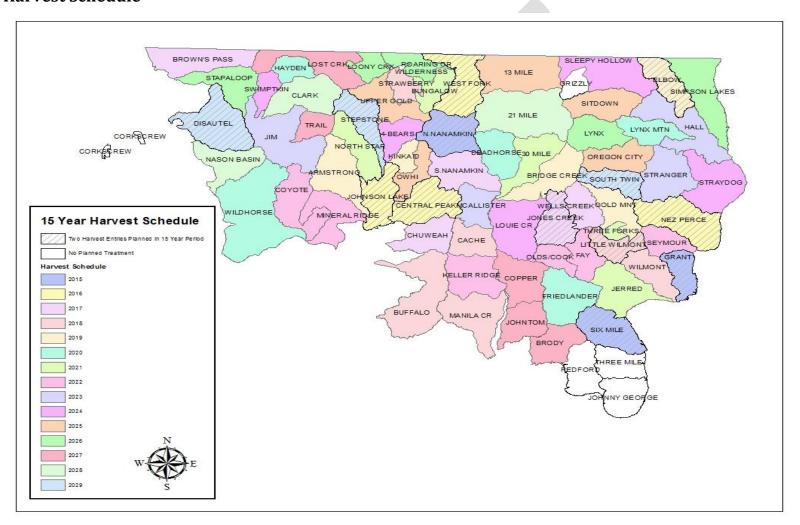


Table 29. Harvest Schedule 2015-2029

WMU's	SALE NAME	DISTRICT	VOLUME (mmbf)
	2015		
(09-03)	Stepstone	(O/N)	10.8
(13-11, 13-12, 13-14)	Disautel	(O/N)	17.2
(06-13, 06-14, 06-18)	North Nanamkin	(SP)	15.1
(04-09, 04-10, 05-01, 05-02, 05-09)	Six Mile	(INCH)	21.6
(03-03, 03-04, 03-06, 03-07)	Grant Canyon	(INCH)	8.6
	SUBTOTAL		73.3
	2016		
(10-02)	Central Peak	(O/N)	17.2
(09-11)	Johnson Lake	(O/N)	7.5
(06-15, 06-16, 06-17, 08-01, 08-05, 08-18)	West Fork	(SP)	12.9
(03-05, 03-01)	Nez Perce Creek	(INCH)	26.9
(02-05, 02-06)	South Twin	(INCH)	5.9
	SUBTOTAL	••••	70.6
	2017		
(10.03.10.05)	2017	(O (N)	16.3
(10-02, 10-05)	Chuweah	(O/N)	16.2
(13-01, 13-03, 13-04)	Browns Pass	(O/N)	8.6
(06-11, 06-12, 06-18)	South Nanamkin	(SP)	20.5
(04-15, 04-16, 04-17) (04-01, 04-02, 04-03)	Jones Creek	(INCH)	17.2
(04-01, 04-02, 04-03)	Wells Creek	(INCH)	17.2
	SUBTOTAL		79.8
	2018		
(08-07, 08-08)	Strawberry	(O/N)	10.8
(11-04, 11-05, 11-06, 11-07)	Buffalo Lake	(O/N)	8.6
(07-11, 07-22, 07-23)	Manila Creek	(SP)	0.0
(07-15, 07-16, 07-17, 07-24)	Cache Creek	(SP)	14.0
(03-09)	Wilmont Creek	(INCH)	17.2
(03-08, 03-10)	Little Wilmont Creek	(INCH)	18.3
	SUBTOTAL		69.0



WMU's	SALE NAME	DISTRICT	VOLUME (mmbf)
	2019		
(09-06, 09-07, 09-08, 09-09)	Armstrong	(O/N)	23.7
(09-02)	Kinkaid Creek	(O/N)	4.3
(06-09)	Bridge Creek	(SP)	21.6
(01-08, 01-09)	Elbow Lake	(INCH)	17.2
(03-08, 03-10)	Gold Mtn.	(INCH)	18.3
	SUBTOTAL		85.1
/	2020	(5.60)	
(14-06, 14-07, 14-08, 14-25)	Wildhorse	(O/N)	11.9
(12-06)	Haden Creek	(O/N)	10.8
(06-06, 06-07, 06-08, 06-18)	Deadhorse	(SP)	0.0
(04-11, 04-12)	Friedlander	(INCH)	18.3
(01-10, 01-17)	Lynx Mtn.	(INCH)	17.2
	SUBTOTAL	•••••	58.2
	2021		
(09-04, 09-05)	North Star	(O/N)	14.0
(08-02, 08-03)	Bungalow Mines	(O/N)	11.9
(06-08, 06-18)	30 Mile	(SP)	18.3
(03-11, 03-12)	Three Forks	(INCH)	6.5
(04-06, 04-07, 04-08)	Jerred Creek	(INCH)	18.3
	SUBTOTAL	••••	69.0
	2022		
(14.00)	2022	(O/N)	10.0
(14-09) (09-10, 14-24)	Coyote Creek Mineral Ridge	(O/N)	10.8
(09-10, 14-24)		(O/N)	14.0
	Keller Ridge	(SP)	16.2
(03-02)	Seymour	(INCH)	12.9
(04-04, 04-05)	Fay Creek	(INCH)	10.8
(04-13, 04-14)	Old-Cook	(INCH)	10.8
	SUBTOTAL		75.4
	JUDIUIAL	••••••	/5.4



WMU's	SALE NAME	DISTRICT	VOLUME (mmbf)
	2023		
(13-15)	Jim Creek	O/N	28.0
(02-03, 02-09)	Stranger Creek	Inch	15.1
(01-06, 01-07)	Hall Creek	Inch	17.2
(06-10, 06-18, 07-17, 07-18, 07-24)	Mcallister	SPF	10.3
	SUBTOTAL		70.7
	2024		
(09-01)	4-Bears	O/N	11.9
(13-07)	Swimptkin	O/N	9.7
(01-11, 01-13, 01-14, 01-18)	Sleepy Hollow	Inch	17.5
(02-01, 02-02, 02-04)	Stray Dog	Inch	24.1
(06-09, 06-18, 07-01, 07-02, 07-03)	Louie Creek	SPF	18.9
	SUBTOTAL		82.0
	2025		
(10-01, 10-06)	Owhi Creek	O/N	9.7
(08-04)	Upper Gold Creek	O/N	15.1
(02-07, 02-08)	Oregon City	Inch	18.0
(01-15, 01-16)	Sitdown	Inch	23.6
(06-01, 06-02, 06-03, 06-18)	13 Mile	SPF	7.0
	SUBTOTAL		73.4
	2026		
(13-05, 13-06)	Stapaloop	O/N	14.0
(12-01, 12-02)	Loony Creek	O/N	10.8
(01-01, 01-02, 01-03, 01-04, 01-05)	Simpson	Inch	20.2
(01-17)	Lynx	Inch	21.3
(08-01, 08-06, 08-09, 08-10)	Roaring Creek	SPF	12.6
	SUBTOTAL		78.9

WMU's	SALE NAME	DISTRICT	VOLUME (mmbf)
	2027		
(12-03, 12-07)	Lost Creek	O/N	16.2
(13-09)	Trail Creek	O/N	9.7
(05-17, 05-20, 05-21, 05-22)	Brody	Inch	19.4
(04-09, 04-10, 05-01, 05-02, 05-09)	Sixmile	Inch	22.2
(07-04, 07-06, 07-07, 07-08, 07-21, 07-24)	Copper Creek SPF		16.0
(07-09, 07-10, 07-19, 07-20)	John Tom	SPF	6.5
	SUBTOTAL		89.9
	2028		
(12-04, 12-05, 13-08)	Clark Creek	O/N	19.4
(14-03, 14-04, 14-05, 14-12)	Nason Creek O/N		5.4
(03-03, 03-04, 03-06, 03-07)	Grant Canyon Inch		11.9
(03-05, 03-01)	Nez Perce	Inch	29.7
(06-04, 06-05, 06-18)	21 Mile	SPF	30.2
	SUBTOTAL		96.6
	2029		
(09-03)	Stepstone	O/N	16.2
(13-11, 13-12, 13-14)	Disautel	O/N	8.6
(02-05, 02-06)	South Twin	Inch	16.8
(04-15, 04-16, 04-17)	Jones Creek	Inch	24.8
(06-13, 06-14, 06-18)	North Nanmkin	SPF	15.0
	SUBTOTAL		81.4
	15 Year Total=		1153.3

Best Management Practices

Best Management Practices (BMPs) are required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) on federally administered lands to reduce non-point source pollution to the maximum extent practicable. BMPs are considered the primary mechanisms to achieve Colville Indian Reservation water quality standards and will be adhered to under all resource management activities.

BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

Non-point sources of pollution result from natural causes, human actions, and the interactions between natural events and conditions associated with human use of the land and its resources. Non-point source pollution is caused by diffuse sources rather than a discharge at a specific single location. Such pollution results in alteration of the chemical, physical, and biological integrity of water. Erosion from forest harvest units or surface erosion from a road are examples of non-point sources.

BMPs are selected and implemented as necessary based on site-specific conditions to meet water quality, soil, or fish objectives for specific management actions. BMPs and IRMP Management Directions from this EIS ROD may be modified to meet site-specific situations. This Appendix does not provide an exhaustive list of BMPs. Additional non-point source control measures may be identified during watershed analysis or during the interdisciplinary process when evaluating site-specific management actions. Tribal Code Chapter 4-7 Forest Practices should be used in conjunction with these BMPs to meet management goals. Objectives identified in this BMP Appendix also include maintenance or improvement of soil productivity and fish habitat since they are closely tied to water quality. Implementation and effectiveness of BMPs need to be monitored to determine whether the practices are correctly designed and applied to achieve the objectives. BMPs would be adjusted as necessary to ensure objectives are met.

Review and update of this Appendix will be an ongoing process. Updates will be made as needed to conform to changes in Colville Confederated Tribes policy, direction or new information.

Harvest Operations, Site Preparation & Prescribed Fire BMPs

1. Retain course woody debris/ large woody debris densities that meet the following minimums to sustain soil/plant productivity, hydrologic functions, and habitat:



Dry ponderosa pine/Douglas-fir forest	5 – 10 tons/acre
Cool Douglas-fir forest	10 – 20 tons/acre
Cool lodgepole pine, lower subalpine fir forest	8 – 24 tons/acre

Course woody debris is defined as downed woody material ≥ 4 inches in diameter.

- 2. On whole tree skidding operations, slash should be dragged back out to the woods on sites that are not meeting woody residue targets.
- 3. In previously un-entered stands, use designated skid roads to limit soil compaction to less than 12 percent of the harvest area.
- 4. Minimize the width of skid roads.
- 5. For stands previously logged with tractors, utilize existing skid roads. Rip all skid roads used in the final harvest entry.
- 6. Rip skid roads discontinuously, preferably with winged ripper teeth when the soil is dry. Rips should be spaced no more than 36 inches apart and from 12 to 18 inches deep or to bedrock, whichever is shallower. Designated skid roads should be ripped if they will not be used again until the next rotation.

Construct adequate waterbars on skid roads, yarding corridors, and fire lines prior to fall rains/snowfall. Construct waterbars using the following techniques:

- a. Open the downslope end of the waterbar to allow free passage of water.
- b. Construct the waterbar so that it will not deposit water where it will cause erosion.
- c. Compact the waterbar berm to prevent water from breaching the berm.
- d. Skew waterbars no more than 30 degrees from perpendicular to the centerline of the road or trail.



Table 30. Waterbar spacing in Feet by Gradient and Erosion Class.

GRADIENT (%)	EROSI	ON CLASS/SPACING BY	FEET
OKADIENT (%)	High	Moderate	Low
2-5	200	300	400
6-10	150	200	300
11-15	100	150	200
16-20	75	100	150
21-35	50	75	100
36+	50	50	50

Spacing is determined by slope distance and is the maximum allowed for the grade.

The following guide lists the rock types according to erosion class:

High: granite, sandstone, andesite porphyry, glacial or alluvial deposits, soft matrix conglomerate,

Volcanic ash, pyroclastics.

Moderate: basalt, andesite, quartzite, hard matrix conglomerate, rhyolite.

Low: metasediments, metavolcanics, hard shale.

- 7. Avoid placement of skid roads through areas with high water tables.
- 8. Use appropriate seasonal restrictions that would result in no off-site damage for designated skid roads.
- 9. Allow logging on snow when snow depth is 18 inches or greater and negligible ground surface exposure occurs during the operation.
- 10. Construct waterbars on skid roads according to guidelines in following section.
- 11. When possible have coarse woody debris in variable size classes with at least half of the tonnage in 15-inch and greater diameter class, uniformly distributed throughout the area.
- 12. Avoid tractor/dozer piling slash on ash cap soils to minimize soil compaction. Excavator site preparation techniques shall be applied to reduce soil compaction.
- 13. Exposing mineral soil on not more than 35 percent of a forest regeneration site will be sufficient to encourage germination of seed and ensure successful natural regeneration providing the distribution of bare ground is uniform. No more than 50% of each practice or treatment area shall be scarified, including portions where detrimental soil conditions have been caused. Areas outside of the normal road prism including landings and skid trails shall be considered part of the practice or treatment area. Detrimental soil conditions include soil displacement, compaction, and fire damage.



- 14. To reduce the severity and extent of forest soil compaction that adversely affects site productivity, the following treatments and practices will be followed where applicable.
 - a. Minimizing skid trail length by careful planning;
 - b. Rehabilitate compacted soils by ripping and sub-soiling treatments where appropriate (i.e. temporary landings, abandoned roads and skid trails.
 - c. Winter log over snow and frozen ground;
 - d. Using low ground pressure equipment.
- 15. Minimize soil compaction by conducting ground-based harvest activities only on a seasonal basis when soils are dry (>15 bar tension) or are frozen and have a protective snow cover. Harvesting activities should only occur on ash-mantled soil (Andosols and Andic soil suborders) when the frozen surface is at least 4-6 inches thick and snow covering the frozen surface is at least 2.5 feet thick and accumulating. Use of certain types of mechanical harvesting, specifically whole tree yarding with feller-bunchers/rubber tire and tracked grapple skidders, should be required to adhere to this BMP.
- 16. Whole tree skidding methods will generally not be utilized in silvicultural prescriptions such as Commercial Thinning, Improvement Cuts and overstory removals where protection of leave trees and regeneration is a critical objective.
- 17. Landings, roads and skid trails should be located outside of riparian management zones whenever possible.
- 18. Detrimental soill conditions (DSD) shall not be caused on more than 25% of each practice or treatment area from the cumulative effects of forest practice operations and treatments.

Disturbance Type	Detrimental Threshold Value
Compaction	Change from natural bulk density detectable
	by penetrometer
Puddling	Ruts ≥ 6 inches deep
Displacement	Removal of \geq 1 inch of any surface horizon
	from a contiguous area greater than 100
	feet.
Surface erosion	Rills, gullies, pedestals, and soil deposition.
Severely burned soil	Physical and biological changes to the soil
	resulting from high-intensity burns of long
	duration as described in the Burned-Area
	Emergency Rehabilitation Handbook (FSH
	2509.13).



- 19. Ground-based skidding equipment will be restricted to sustained slopes less than 35 percent. Cable yarding will be used on all sustained slopes greater than 35 percent/
- 20. Cable yarding as a mitigation practice will be used on all ground, independent of slope, that includes soils of a fragile or highly compactable nature and soils that are shallow and poorly developed, especially on droughty sites. These are sites where designated skid trails or winter logging is not feasible. Cable yarding methods will also be used in areas of high groundwater or around streamside influence zones (riparian zones) where forest harvest is permitted.
- 21. Ground skidding or mechanical slash piling will not be use on harvest areas where the soils (wet or dry) have "severe" or "very severe" hazard ratings for compaction, puddling or displacement from ground skidding or slash piling activities.
- 22. Areas with soils having drainage or textural constraints will be avoided when conducting forestry-related or other activities involving ground-based operating equipment.
- 23. Minimize mineral soil surface displacement by reducing the number of excavated skid trails and matching the appropriate cable system to the terrain. Special soil protection precautions will be used in more sensitive areas where displacement may result in removal/loss of volcanic ash cap or exposure to unfavorable substrates (in shallow soils and some glacial soils, e.g.).
- 24. Mechanical slash piling when used will be restricted to slopes less than 35 percent. In high-density fuels area on sustained slopes over 35 percent, cable yarding of unmerchantable materials will be used to reduce wildfire risk. Blade-based site preparation methods and excessive scalping will not be used, particularly on sensitive soil areas.
- 25. Select prescribed burning techniques that burn woody material in place (i.e. broadcast burning).
- 26. Use cool, low intensity prescribed burning in the spring or early summer while the surface soil is moist. This will benefit soil fertility by maintaining soil nitrogen and organic matter levels and mineralizing elements held in various organic components. It will also reduce levels of some pathogenic organisms and enhance soil moisture replenishment by reducing thick duff or litter layers. Allow decomposition to occur for a minimum of one to two years between burns in moist, warm habitat types.



- 27. Where levels of downed wood of finer sizes present a high risk of consumption by wildfire, prescribed fire or other fuel reduction treatments will be used to reduce this risk and aid in the maintenance of soil productivity.
- 28. Use fire hazard reduction methods that limit the concentration and removal of large woody residue following intermediate harvest. Desired logs should represent an appropriate range of decomposition classes.
- 29. Generally, prescribed burning will only occur when the surface soils are moist and weather conditions permit smoke management objectives to be met.
- 30. Hot, intense, long duration prescribed fires will not be used for fuels treatments because of the following reasons. "Hot" fires generate excessive heat that can volatilize essential plant nutrients, consume soil organic matter and beneficial micro flora and fauna, and expose mineral soil. Additionally hot fires can cause surface hydrophobic conditions leading to increased surface soil erosion and gullying. Nutrient losses (esp. nitrogen) and disrupted nutrient cycling is most significant on high-elevation soils with volcanic ash surfaces, and hydrophobic occurrences are most common on coarser-grained granitic soils.

Road Maintenance and Construction BMPs

General BMPs

- 1. Minimize road use within a management unit by arranging timber harvest spatially and temporally.
- 2. Minimize road mileage and density through proper stand delineation, designated skid trails and abandonment of unnecessary existing roads.
- 3. Construct new roads only where the existing road system is a) currently producing or has the potential (if utilized again) to cause significant soil erosion and sedimentation into streams; b) inadequate to allow access to areas of sustained slope over 35 percent for cable yarding systems; c) inadequate to access commercial timber land with skid distances less than 1500 feet.
- 4. Road construction in historically unstable ground (evidence or records of past mass wasting or failure) and in areas where risk of groundwater interception is high, such as steep headwalls of headwaters, watershed bowls, or where groundwater or seepage water accumulates to produce ephemeral water tables will be avoided. Avoid headwalls, midslope locations on steep unstable



slopes, seeps, old landslides, slopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope.

- 5. Preventive measures after activity will include restoring vegetation to provide root cohesion and ground cover and to reduce soil moisture content, correctly abandoning road prisms, and possibly implementing deep-seated erosion control methods.
- 6. Shallow soils should not be used for landings or skid trails and should have equipment restrictions. If a skyline logging system requires the use of a shallow soil area, the affected area should be erosion-proofed through use of rock or other appropriate methods. Shallow soil areas are recognized as among the most fragile ecosystems, as damage to the soil and vegetation as a result of management activities is nearly impossible to mitigate.
- 7. The use of pioneering ground covering species will be encouraged to re-vegetate areas where soils have suffered an irreversible decline in site potential from land use activities, particularly a loss of ash mantle and exposure to unfavorable substrate (in shallow soils, some glacial soils).
- 8. Relocate or decommission roads in riparian areas and place future new roads outside of riparian areas.
- 9. Streambanks and riparian areas exposed (non-vegetated) by management activities, construction or natural impacts are to be re-vegetated immediately.

ROADS AND LANDINGS

Road Location

Practices:

- Locate roads on stable positions (e.g., ridges, natural benches and flatter transitional slopes near ridges and valley bottoms). Implement extra mitigation measures when crossing unstable areas as necessary.
- 2. Avoid headwalls, midslope locations on steep unstable slopes, seeps, old landslides, slopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope.
- 3. Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.



- 4. Locate roads on well-drained soil types. Roll the grade to avoid wet areas and provide drainage.
- 5. Locate stream-crossing sites where channels are well defined, unobstructed and straight.

Road Design

- 1. Base road design standards and design criteria on road management objectives such as traffic requirements of the proposed activity and the overall transportation plan, an economic analysis, safety requirements, resource objectives and the minimization of damage to the environment.
- 2. Consider future maintenance concerns and needs when designing roads.
- 3. Preferred road gradients are 2 to 10 percent with a maximum grade of 15 percent. Consider steeper grades in those situations where they will result in less environmental impact. Avoid grades less than 2 percent.
- 4. Road Surface Configurations:
 - a. Outsloping sloping the road prism to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low volume traffic and lower traffic speeds are anticipated. It is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is desired. Outsloping is not recommend on gradients greater than 8-10 percent.
 - b. Insloping sloping the road prism to the inside edge is an acceptable practice on roads with gradients more than 10 percent and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.
 - c. Crown and Ditch this configuration is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort area a consideration. Gradients may range from 2 to 15 percent as long as adequate drainage away from the road surface and ditch lines is maintained.
- 5. Minimize excavation through the following actions: use of balanced earthwork, narrow road width, and end-hauling where slopes are greater than 60 percent.
- 6. Locate waste areas suitable for depositing excess excavated material.
- 7. Surface roads if they will be subject to traffic during wet weather. The depth and gradation of surfacing will be determined by traffic type, frequency of use, weight of traffic, maintenance objectives, along with the stability and strength of the road foundation and surface materials.
- 8. Provide vegetative or artificial stabilization of cut and fill slopes in the design process. Avoid establishment of vegetation where it inhibits drainage from the road surface or where it restricts safety or maintenance.



9. Prior to completion of design drawings, field check the design to assure that it fits the terrain, drainage needs have been satisfied, and all critical slope conditions have been identified and adequate design solutions applied.

Surface Cross Drain Design

- 1. Design cross drains in ephemeral or intermittent channels to lie on solid ground rather than on fill material to avoid road failures.
- 2. Design placement of all surface cross drains to avoid discharge onto erodible (unprotected) slopes or directly into stream channels. Provide a buffer or sediment basin between the cross drain outlet and the stream channel.
- 3. Locate culverts or drainage dips in such a manner to avoid discharge onto unstable terrain such as headwalls, slumps, or block failure zones. Provide adequate spacing to avoid accumulation of water in ditches or surfaces through these areas.
- 4. Provide energy dissipaters (e.g., rock material) at cross drain outlets or drain dips where water is discharged onto loose material or erodible soil or steep slopes.
- 5. Place protective rock at culvert entrance to streamline water flow and reduce erosion.
- Use drainage dips in place of culverts on roads that have gradients less than 10 percent or where road management objectives result in blocking roads. Avoid drainage dips on road gradients greater than 10 percent.
- 7. Locate drainage dips where water might accumulate or where there is an outside berm that prevents drainage from the roadway.
- 8. When sediment is a problem, design cross drainage culverts or drainage dips immediately upgrade of stream crossings to prevent ditch sediment from entering the stream.
- 9. Rolling gradients are recommended in erodible and unstable soils to reduce surface water volume and velocities as well as culvert requirements.

Permanent Stream Crossing Design

1. Use pipe arch culverts on most fishery streams. Use bottomless arch culverts and bridges where gradients greater than 5 percent, stream discharge, and value of fishery resource dictate special engineering considerations necessary to ensure uninterrupted fish passage.



- 2. Use controlled blasting techniques that minimize the amount of material displaced from road location.
- 3. Construct embankments, including waste disposal sites, of appropriate materials (no slash or other organic materials) using one or more of the following methods:
 - a. Layer placement (tractor compaction)
 - b. Layer placement (roller compaction
 - c. Controlled compaction (85 to 95 percent maximum density)
- 4. Slash and organic material may remain under waste embankment areas outside the road prism and outside units planned for broadcast burning.
- 5. Avoid sidecasting where it will adversely affect water quality or weaken stabilized slopes.
- 6. Provide surface drainage prior to fall rains and snowfall.
- 7. Clear drainage ditches and natural watercourses of woody material deposited by construction or logging above culverts prior to fall rains and snowfall.

Temporary Stream Crossing Design

- 1. Evaluate the advantages and disadvantages of a temporary versus permanent crossing structure for access to the area during all seasons over the long-term in terms of economics, maintenance and resource requirements.
- 2. Design temporary structures such as prefabricated temporary timber bridges, multiple culverts with minimum fill height, cattleguard crossings, or log cribs to keep vehicles out of the stream.
- 3. Minimize the number of temporary crossings on a particular stream.
- 4. Avoid temporary stream crossings on fishery streams.

Low Water Ford Stream Crossing Design

- 1. To design low water fords that minimize disturbance of the stream and riparian environment.
- 2. Use only when site conditions make it impractical or uneconomical to utilize a permanent or temporary crossing structure.



Road Construction

- 1. Limit road construction to the dry season (generally between May 15 and October 15). When conditions permit operations outside of the dry season, keep erosion control measures current with ground disturbance to the extent that the affected area can be rapidly closed/blocked and weatherized if weather conditions warrant.
- 2. Mange road construction so that any construction can be completed and bare soil can be protected and established prior to fall rains and/or snowfall.
- 3. Confine preliminary equipment access (pioneer road) to within the roadway construction limits.
- 4. Construct pioneer road so as to prevent undercutting of the designated final cutslope and prevent avoidable deposition of materials outside the designated roadway limits. Conduce slope rounding at the first opportunity during construction to avoid excess amounts of soil being moved after excavation and embankment operations are completed.
- 5. Use controlled blasting techniques that minimize the amount of material displaced from road location.
- 6. Construct embankments, including waste disposal sites, of appropriate materials (no slash or other organic materials) using one or more of the following methods:
 - a. Layer placement (tractor compaction)
 - b. Layer placement (roller compaction
 - c. Controlled compaction (85 to 95 percent maximum density)
- 7. Slash and organic material may remain under waste embankment areas outside the road prism and outside units planned for broadcast burning.
- 8. Avoid sidecasting where it will adversely affect water quality or weaken stabilized slopes.
- 9. Provide surface drainage prior to fall rains and snowfall.
- 10. Clear drainage ditches and natural watercourses of woody material deposited by construction or logging above culverts prior to fall rains and snowfall.

Permanent Stream Crossing Construction

- 1. Confine culvert installation to the low flow period (generally July 15 to October 15) to minimize sedimentation and the adverse effects of sediment on aquatic life.
- 2. Divert the stream around the work area to minimize downstream sedimentation.



- 3. Install culverts as close to zero percent slope as possible on fishery streams, buy not in excess of 0.5 percent. Place culverts in the streambed at the existing slope gradient on larger non-fishery streams. Place energy dissipaters (e.g., large rock) at the outfall of culverts on small non-fishery streams to reduce water velocity and minimize scour at the outlet end.
- 4. Countersink culvert 6 to 8 inches below the streambed to minimize scouring at the outlet. Increase culvert diameters accordingly to offset the countersink.
- Limit activities of mechanized equipment in the stream channel to the area necessary for installation.
- 6. Place permanent stream crossing structures in fishery streams before heavy equipment moves beyond the crossing area. Where this is not feasible, install temporary crossings to minimize stream disturbance.
- 7. Place riprap on fills around culvert inlets and outlets.

Temporary Stream Crossing Construction

- 1. Where possible, limit the installation and removal of temporary crossing structures to only one time during the same year and within the prescribed work period. Installation and removal should occur during the low flow period (generally July 15 to October 15).
- Use backfill material that is as soil-free as practicable over temporary culverts. Whenever
 possible use washed river rock covered by pit run of one inch minus as a compacted running
 surface.
- 3. Spread and reshape clean fill material to the original lines of the streambed channel after a crossing is removed to ensure the stream remains in its channel during high flow.
- 4. Use log cribbing in tractor logging units when it is impractical to use a culvert and rock backfill material. Remove upon completion of logging the unit.
- 5. Limit activities of mechanized equipment in the stream channel to the area that is necessary for installation and removal operations.
- 6. Remove stream crossing drainage structures and in-channel fill material during low flow and prior to fall rains. Re-establish the natural drainage configuration upon completion of project.



Low-Water Ford Stream Crossing Construction

- 1. Restrict construction and use to low flow period (generally July 15 to October 15).
- 2. Use washed rock/gravel or concrete slab in the crossing.
- 3. Apply rock on road approaches within 150 feet of each side of the ford to prevent washing and softening of the road surface.

Landings

- 1. Locate landings at sites approved by interdisciplinary team.
- 2. Avoid placing landings adjacent to or in meadows or other wetland areas.
- 3. Clear or excavate landing to minimum size needed for safe and efficient operations.
- 4. Select landing locations considering the least amount of excavation, erosion potential, and where sidecast will not enter drainages or damage other sensitive areas.
- 5. Deposit excess excavated material on stable sites where there is no erosion potential
- 6. Where landings are compacted, rip with sub-soiler equipment for site restoration.
- 7. Restore landings to the natural configuration or shape to direct the runoff to pre-selected spots where water can be dispersed to natural, well-vegetated, gentle ground.

Road Erosion Control

- Apply protective measures to all areas of disturbed, erosion-prone, unprotected ground, including waste disposal sites prior to fall rains and/or snowfall. Protective measured may include water bars, water dips, grass seeding, planting deep-rooted vegetation, and/or mulching. Armor or buttress fill slopes and unstable areas with rock that meets construction specifications.
- 2. Use seasonal restrictions on natural surface roads.
- 3. Road Renovation/Improvement



Road Renovation and Improvement

- 1. Require roadside brushing be done in a manner that prevents disturbance to root systems (i.e., Improve flat gradients to a minimum of 2 percent or provide raised subgrade sections (turnpike) to avoid saturation of the road prism.
- 2. Reconstruct culvert catchbasins to specifications. Catchbasins in solid rock need not be reconstructed provided soil, rock or other debris does not restrict water flow.
- 3. Identify potential water problems caused by off-site disturbance and add necessary drainage facilities.
- 4. Identify ditch line and outlet erosion caused by excessive flows and add necessary drainage facilities and armoring.
- 5. Replace undersized culverts and repair damaged culverts and downspouts.
- 6. Add additional full-rounds, half-rounds, and energy dissipaters as needed.
- 7. Correct special drainage problems (e.g., high water table, seeps) that effect stability of subgrade through the use of perforated drains, geotextiles or drainage bays.
- 8. Eliminate undesirable berms that retard normal surface runoff.
- 9. Restore outslope or crown sections.
- 10. Avoid disturbing backslope while reconstructing ditches.
- 11. Surface inadequately surfaced roads that are to be left open to traffic during wet weather.
- 12. Avoid using excavators for brushing.

Road Maintenance

- 1. Provide basic custodial care to protect the road investment and to ensure minimal damage to adjacent land and resources.
- 2. Perform blading and shaping to conserve existing surface material, retain the original crowned or outsloped self-draining cross section, prevent or remove rutting berms (except those designed for slope protection) and other irregularities that retard normal surface runoff. Avoid wasting loose ditch or surface material over the shoulder where it can cause stream sedimentation or weaken slump prone areas. During maintenance, avoid undercutting backslopes.



- 3. Keep road inlet and outlet ditches, catchbasins, and culverts free of obstructions, particularly before and during winter rainfall/snowfall. However, keep routine machine cleaning of ditches to a minimum during the wet season.
- 4. Promptly remove slide materials when it is obstructing road surfaces and ditch line drainage. Save all soil or material useable for quarry reclamation and stockpile for future reclamation projects. Utilize remaining slide material for needed road improvement or place in a stable waste area. Avoid sidecasting of slide material where it can damage, overload, saturate embankments, or flow into downslope drainage channels. Re-establish vegetation in areas where more than 50 percent of vegetation has been destroyed due to sidecasting
- 5. Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Cut roadside vegetation rather than pulling it out and disturbing the soil.
- Remove snow on haul roads in a manner that will protect roads and adjacent resources.
 Remove or place snow berms to prevent water concentration on the roadway or on erodible sideslope soils.
- 7. Patrol areas subjected to road or watershed damage during periods of high runoff.

Dust Abatement

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

Road Access Restrictions

- Barricade or block roads using gates, guard rails, earth/log barricades, boulders, logging debris, or a combination of these methods. Avoid blocking roads that will need future maintenance (i.e. culvert cleaning, slide removal, etc.) with un-removable barricades. Use guardrails, gates, or other barricades capable of being opened for road needing future maintenance.
- 2. Provide maintenance of block roads in accordance with design criteria.
- 3. Install waterbars, cross drains, cross sloping, or drainage dips if not already on road to assure drainage.
- 4. Scarify, mulch, and/or seed for erosion control.



Road and Landing Decommissioning

- 1. Conduct interdisciplinary review before decommissioning roads to reduce road density and protect riparian habitat.
- 2. Rip temporary spur roads and landings by an approved method to remove ruts, berms, and ditches while leaving or replacing surface cross drain structures.
- 3. Return roads or landings not needed for future resource management to resource production by re-vegetating with native species. Apply mulch and fertilizer where appropriate.

Glossary

Allowable Cut- the volume of timber that may be harvested during a given period (usually a year) that is specified by a sustained yield forest plan.

Basal Area- the surface area occupied by tree stems at 4.5 feet above the ground (square feet).

Board Foot- Unit of wood volume 12x12x1 inches in size.

Buck – to saw felled trees into shorter lengths.

Codominant- a tree whose crown helps to form the general level of the main canopy in even-aged stands or, in uneven-aged stands, the main canopy of the tree's immediate neighbors, receiving full light from above and comparatively little from the sides.

Commercial Timberland- Coniferous forest considered to be available and accessible for silvicultural treatments under current management policies.

Culmination of Mean Annual Increment (CMAI)- the age in the growth cycle of a tree or stand at which the mean annual increment (MAI) for height, diameter, basal area, or volume is at a maximum –note at culmination, MAI equals the perodic annual increment (PAI).

Cull – logs that are rejected, parts of logs deducted in measurement, or the deduction made from gross timber volume because of defects – note in a standing tree, the cull expressed as a percent of the tree's gross volume is termed the cull factor.

Defect- Part of a tree containing rotten or other unuseable wood (or missing parts!).



Dominant- A tree whose crown extends above the general level of the main canopy of even-aged stands or, in uneven-aged stands, above the crowns of the tree's immediate neighbors and receiving full light from above and partial light from the sides.

Dwarf mistletoe- a parasitic flowering plant of the genus Arceuthobium. These plants develop extensive absorption systems in the host's xylem tissue and derive most of their water and nourishment from the host; the endophyitic system causes the formation of witches' brooms in some species; injury is caused by diversion of nutrients, growth reduction, and mortality. Dwarf mistletoe is the most important disease problem in western coniferous forests.

Economic Rotation Age- that age of rotation when the harvest of stumpage will generate the maximum revenue or economic yield. In an economically optimum forest rotation analysis, the decision regarding optimum rotation age is undertake by calculating the maximum net present value.

Evenaged aged stand- a stand of trees composed of a single age class in which the range of tree ages is usually + or -20 percent of rotation.

Evenflow Yield- a flow of goods or services from a forest that remains approximately constant in successive periods.

Felling – the cutting down of trees.

Forest Regulation- the technical (in contrast to the administrative and business) aspects of controlling stocking, harvest, growth, and yield to meet management objectives including sustained yield.

Gross Growth- All of the tree growth which occurred on an acre or other forest area.

Gross Volume- Volume of trees calculated using their diameter and height.

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.

Managed Yield Table- a yield table, usually developed from remeasured plot data, that accounts for the effects of differneces in stand origin, stand density, and effects of management treatments such as thinning and fertilization in addition to the variables site index and age.

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.

Mortality- Volume of trees which died without being harvested.



Net Growth- Gross growth minus the volume of trees which died without being harvested. (Note: when I say that growth is on a 'net volume basis', I mean that net volumes were used to calculate the growth).

Net Present Value- the residual when the present value of costs is deducted from the present value of benefits---note if the present value of costs exceeds the present value of benefits, the residual is shown as a negative number.

Net Volume - Volume of trees minus their defect.

Non- Declining Even Flow Sustained Yield- nondeclining yield. A flow of goods or services from a forest that does no decrease in successive periods.

Overstory Removal- the cutting of trees constituting an upper canopy layer to release trees or other vegetation in an understory.

Periodic Annual Increment (PAI)- the growth of a tree or stand observed over a specific time period divided by the length of the period.

Producer Price Index (PPI)- A family of indexes that measures the average change in selling prices received by domestic producers of goods and services over time. PPIs measure price change from the perspective of the seller.

Productive Timberland- Coniferous forest capable of producing enough wood volume annually to justify sustained timber management.

Regeneration Treatment- a cutting procedure by which a new age class is created; the major methods are clearcutting, seed tree, shelterwood, selection, and coppice.

Relative Density- The relationship between the stand density and the maximum density that could occur at the same average tree size. When relative density reaches 0.55, trees begin to die.

Rotation – in even-aged systems, the period between regeneration establishment and final cutting. Rotation Age is age at which final cutting occurs.

Scale – utilization to measure the weight or volume of a log, load of logs, or stacked fuelwood –note the person who measures is a scaler. Net scale has the defective, unusable portion of the log removed.

Selective Harvest- a cutting that removes only a portion of trees in a stand. Partial cutting, or selection method.

Shade Intolerant – having capacity to compete for survival under direct sunlight conditions.



Shade Tolerant – having the capacity to compete for survival under shaded conditions.

Skid – to haul a log from the stump to a collection point (landing) by a skidder.

Slashing – cutting back the less tough, competing vegetation, usually to prepare for planting or natural regeneration. Could include cutting brush and undesirable trees.

Stocking- silviculture; 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 value of timber as it stands uncut in terms of an amount per unit area, stumpage value.

Sustained Yield- the yield that a forest can produce continuously at a given intensity of management-note sustained yield management implies continuous production so planned as to achieve, at the earliest practical time, a balance between increment and cutting.

Uneven-aged Management- a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes.

Yarding – to convey logs or trees to a landing, particularly by cable, balloon, or helicopter logging systems.

Yield- The amount of wood that may be harvested from a particular type of forest stand by species, site, stocking, and management regime at various ages. Managed Yield is the Yield that will be obtained in the future from a managed stand that has been harvested and regenerated.

Yield Table- a table showing the expected timber yields by age of an even-aged stand, usually by site index classes, and typically including quadratic mean diameter (DBH), height, number of stems, basal area, and standing volume per unit area; yield tables may also include volume of thinnings, CAI, MAI and other data. For this document, yield table were produced using FVS.

Acronyms

BMPs- Best Management Practices

CMAI – Culmination of Mean Annual Increment

CTFC – Colville Tribal Federal Corporation

CFI- Continuous Forest Inventory

DFC – Desired future condition



DSD – Detrimental soil Disturbance

EA – Environmental Assessment

FEM- Field Examination Memo. A silvicultural prescription.

FIA – Forest Inventory Analysis

FMD – Forest Management Deductions

HRV – Historical Range of Variability

MMBF- Million board feet

NEPA- National Environmental Protection Act

PAG – Plant Association Group

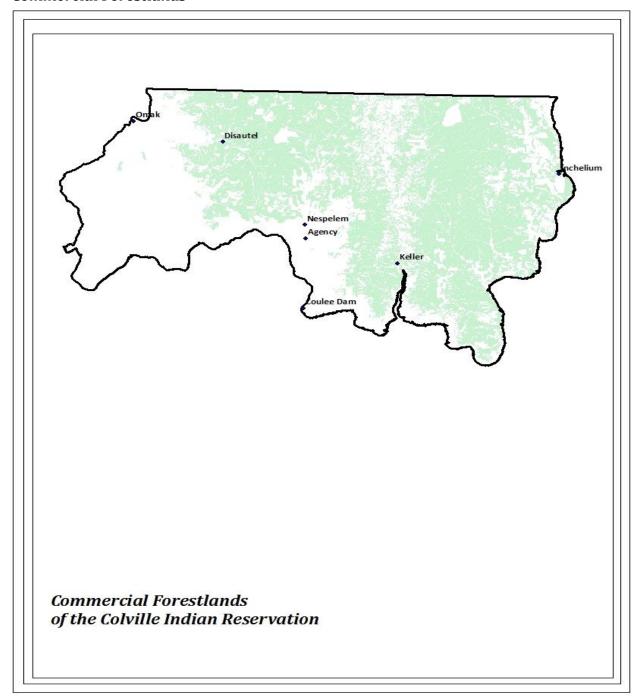
PPI – Producer Price Index

WMU- Watershed Management Unit

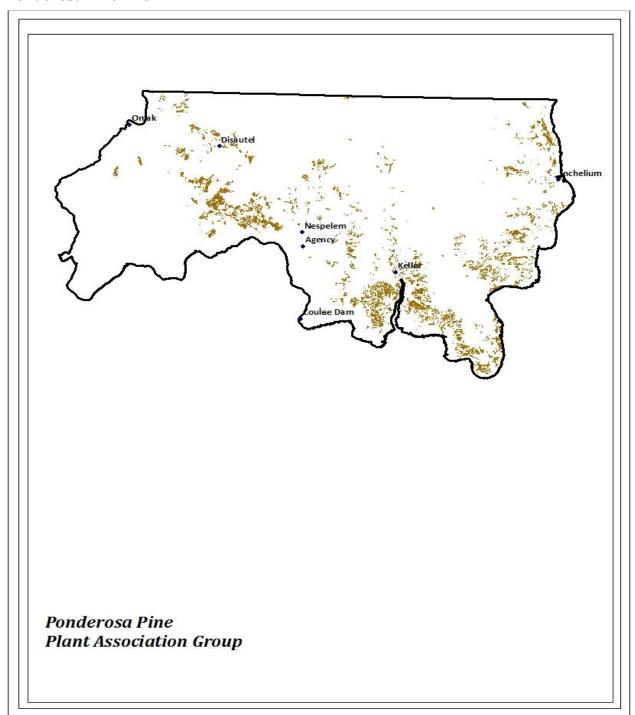


Maps

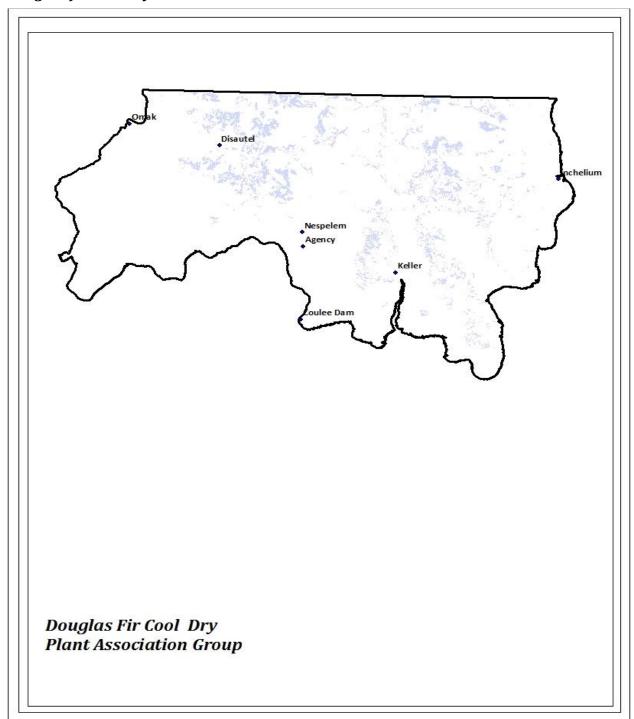
Commercial Forestlands



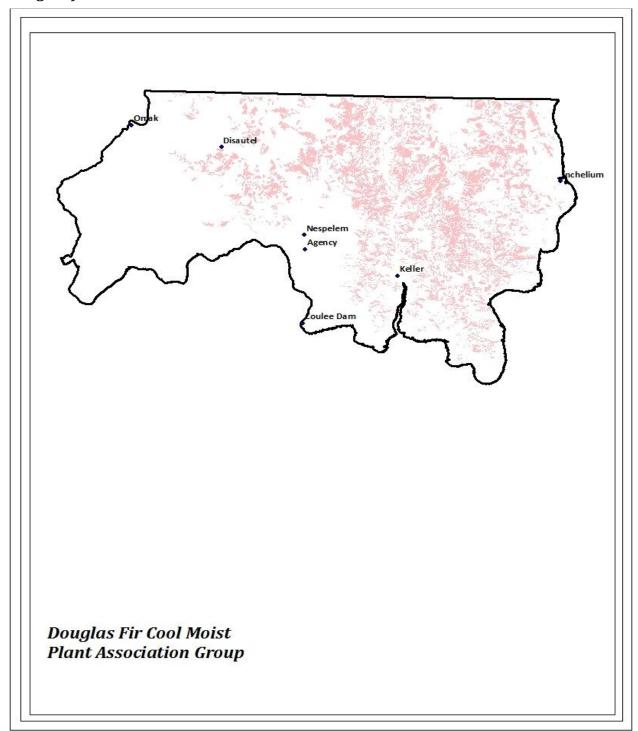
Ponderosa Pine PAG



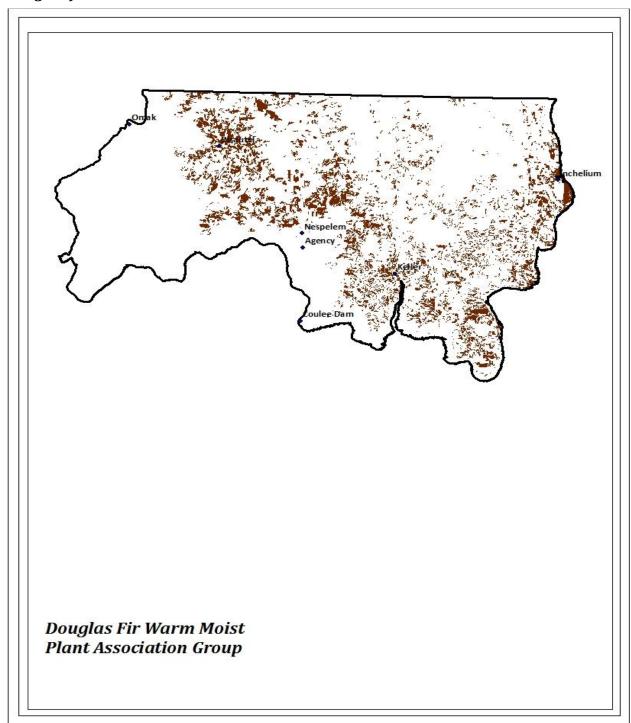
Douglas-fir Cool Dry PAG



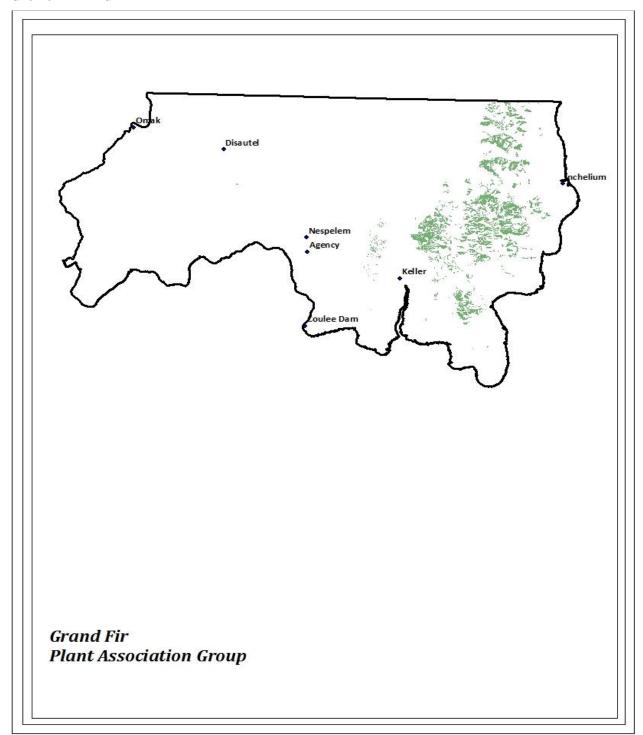
Douglas-fir Cool Moist PAG



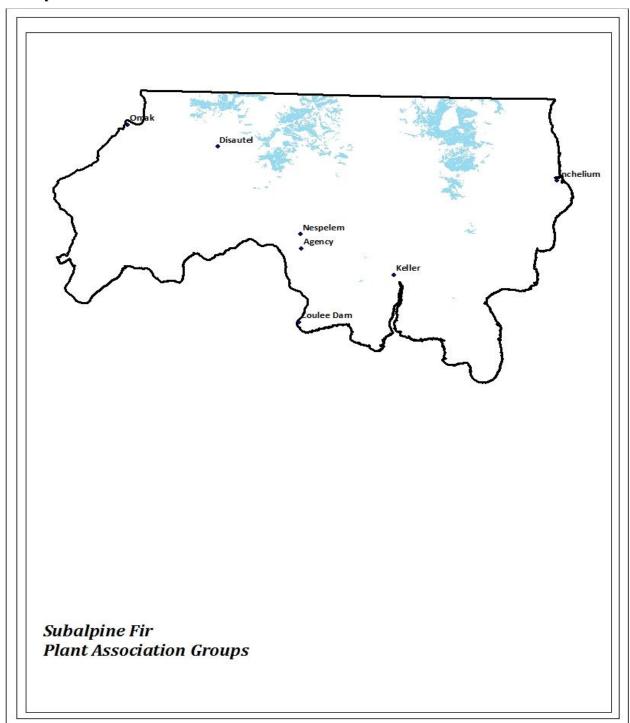
Douglas-fir Warm Moist PAG



Grand Fir PAG



Subalpine Fir PAGs



Ribbon & Paint Policy

1. Tags:

- a. Yellow = Leave Tree Mark:
- b. **Blue** = Cut Tree Mark
- c. **Pink** = Road Information
- d. **White** = Fire Management/Forest Development Activities

2. Flagging:

- a. Pink & Black Stripe = Treatment Unit Boundary
- b. **Red & Black Stripe** = Treatment Unit Boundary for Fire Management
- c. Orange = Property Lines
- d. Blue with Orange = Corners (Property)
- e. Pink = Roads
- f. Blue & White Stripe = Fire
- g. Yellow = Cruising/Stand Exams
- h. Yellow & White Stripe = Cruising/Stand Exams (Until used up)
- i. Orange & White Stripe = Waste Location
- j. Printed (i.e. "SMZ", Skid Trails etc.) = Use as indicated
- k. Other = Use when needed, but not for any of the above identified purposes, memo to the District Officer informing of the change and the use.

3. Paint:

- a. Yellow = Leave Tree
- b. Blue = Cut Tree
- c. Glo Green = Mill Scaling (Aerosol)OND Forest Development also uses the Aerosal Green paint for boundaries and block numbers for planting blocks (per Darrel Dick).



- d. Orange = Waste (Aerosol)
- e. Orange = Stand Boundaries. (3 strips around tree)
- f. Other = Special Projects (this will include Red, White, etc.), same as 2.(k) above.

4. Layout Procedures:

All unit boundaries shall be clearly marked using ribbon, tags, diamonds, and paint. Clearly marked shall mean using sufficient quantities to be visible between each other.



Example Silvicultural Data Input Form

	OBSERVER'S INITIALS: J K DATE:
	UNIT NAME:COMPARTMENT #:STAND #:ALLOTMENT #: TOWNSHIP: / RANGE: / SECTION: / / ACRES:
	CUT BASE ACRES: TREATED ACRES:
	MIDPOINT ELEVATION: ELEVATION RANGE:
	SLOPE: SLOPE RANGE: ASPECT: (VR = VARIABLE) JUXTAPOSITION: 1: TOE SLOPE 4: FULL SLOPE 2: MID SLOPE 5: RIDGE TOP 3: UPPER SLOPE 6: SOTTOM
	O "IIIIIIIIII" SOIL MAPPING UNIT #:// PRIMARY/SECONDARY/ETC., BASED ON % OF AREA
	HABITAT TYPE: PONDEROSA PINE 11: PROJAGSP 11: PROJAGSP 11: PROJAGSP 12: PROJECTION TO THE
e.	TIMBER SPECIES IN STAND / SIZE CLASS (RANGE) / AGE (RANGE) / BASAL AREA FT ² (USE CODES BELOW)
	SPECIES OF SEEDLINGS & SAPLINGS < 5" IN STAND / TREES PER ACRE
	AVERAGE HAWKSWORTH MISTLETOE RATING / SPECIES / CANOPY POSITION / % > 4.9" INFECTED 1: PIPO 2: PSME 3: LAOC 4: ABGR 5: PIEN 6: PICO 7: ABLAZ 8: THPL 9: PIMO 10: POTRZ 11: TSHE 12: POTR CANOPY POSITIONS - 1: DOMINANT/CODOMINANT 2: INTERMEDIATE 3: UNDERSTORY
	& STAND DESCRIPTION MEMO:
1	



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LOGGING SYSTEMS: [1: TRACTOR	· _] [] [] [CODE - ACRES] · 2: MECHANIZED 3: CABLE 4: OTHER	
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52: IRREGULAR SHELTERWOOD 53: SINGLE THEE 54: GROUP SELECTION	BASAL AREA: PERCENTAGE: MAXIMUM SIZE: CUT ÆETWEEN GROUPS?	
	S: INTERMEDIATE TREATMENT 70 SERIES: REGENERATION CUT	
61:PRECOMMERCIAL THIN 64:2ND COMMERCI 62:WEED/RELEASE CUT 65:OVERSTORY REI	AL THIN 67:SANITATION 71:CLEARCUT 74:REHABILITATION MOVAL 68:SALVAGE 72:SEEDTREE 75:SEEDTREE 75:SEEDT	
63:1ST COMMERCIAL THIN 66:IMPROVEMENT	CUT 69:PRESCRIBED FIRE 73:SHELTERWOOD 76:SHELTERWOOD / OVERSTORY REMOVAL	NOT SUM
FIRST ENTRY CULTURAL TREATMENT	S: 80 SERIES: SLASH TREATMENT 90 SERIES: SITE PREP 78 RESERVE 7	REE
81: PILE AND BURN 84: CRUSH 82: PRESCRIBED BURN 85: SLASH WHIPS	91: BROADCAST BURN 94: CRUSH AND BURN 97: SPOT HERBICIDE	
83: LOP AND SCATTER 86: OTHER (UP TO 20 C	92: PILE AND BURN 95: CRUSH 98: BROADCAST HERBICIDE 99: OTHER (UP TO 20 °)	
GRAPPLE PILE OTHER:	ACRES OF PLANTING: (FILL OUT PLANTING FORM)	
TARGET STAND: AT DATE OF FIRST ENTRY		
'		
/ - / - /		
SPECIES OF SEEDLINGS & SAPLINGS	< 5" / TREES PER ACRE	
MAX. HAWKSWORTH RATING LEAVE	TREE / SPECIES / CANOPY POSITION / HIGHEST CROWN POSITION	
	PICO 7: ABLA2 8: THPL 9: PIMO 10: POTR2 11: TSHE 12: POTR	
SIZE CLASS DBH - 2: 5"- 9.9" 3: 10"- 1 CANOPY POSITIONS ARE - 1: DOMINANT/CO	9.9" 4: > 20"	
CROWN POSITIONS ARE - 1: TOP THIRD	2: MIDDLE THIRD 3: BOTTOM THIRD	
FIRST ENTRY VOLUMES	Ø PRESCRIPTION MEMO:	-
MBF PER ACRE MBF PER ACRE CUT PIPO: PIPO: .		
PSME/ PSME/		
LAOC: LAOC: OTHER:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
TOTAL: TOTAL:		
PRIORITY TO IMPLEMENT PRESCRIPTION	DN: 1: EXTREME 2: VERY HIGH 3: HIGH 4: MODERATE 5: LOW	
DATE OF SECOND ENTRY / TREATMEN		



