

Quinault Indian Reservation

Forest Management Plan Environmental Assessment

April 2017



Quinault Indian Nation
Taholah, WA 98587

Bureau of Indian Affairs
Taholah Agency
Taholah, WA 98587



Finding of No Significant Impact

Forest Management Plan

Quinault Indian Reservation, Grays Harbor County, Washington

Based on the attached final Environmental Assessment's (EA) Alternative 3.0 for the proposed Quinault Indian Reservation Forest Management Plan (QIR FMP), we have determined that by implementation of the agency proposed action and environmental mitigation measures as specified in the EA, the proposed FMP will have no significant impact on the quality of the human environment. In accordance with Section 102 (2) (c) of the National Environmental Policy Act of 1969, as amended, an Environmental Impact Statement will not be required.

This determination is supported by the following:

1. The document was developed using an interdisciplinary team approach. In addition, there was a public comment period during the development of the draft EA and comments were incorporated into the final EA. (*QIR EA Section 1.5*)
2. The EA discloses the environmental consequences of the proposed action and four potentially viable alternatives, one which includes the "no action" alternative, as described in Chapter 2 of the EA.
3. Protective measures will be levied to protect air (Clean Air Act as amended 42 USC 7401 et seq.), noise, and water quality (Clean Water Act of 1977, 33 U.S.C. 1251 et seq.), as outlined in the Forest Management Plan (*QIR FMP Chapter 8, section 8.1 and 8.2*).
4. The proposed action will not jeopardize threatened and endangered species (Threatened and Endangered Species Act of 1983, as amended, 16 U.S.C. 1531 et seq.) On May 9, 2014, a formal Section 7 consultation was requested by the Superintendent of the BIA – Taholah Agency. The USFWS issued a Biological Opinion, outlining the FMP's effects on bull trout, marbled murrelet, northern spotted owl, and designated critical habitat for bull trout, northern spotted owl, and marbled murrelet. On September 27, 2016, the USFWS was issued an updated BA and draft FMP, and on January 27, 2017 a memo was issued on the QIR FMP. The USFWS's Opinion was that the cumulative effects are not likely to jeopardize the continued existence of the species consulted, nor likely to destroy or adversely modify designated critical habitat. A complete record of this consultation is on file at the Washington Fish and Wildlife Office in Lacey, Washington. (*QIR EA Section 3.4*).
5. There are no adverse effects on historic properties (National Historic Preservation Act, as amended 16 U.S.C. 470) for the purpose of 36 CFR 800.9 (b) by preserving archeological value through conduct of appropriate research in accordance with applicable standards and guidelines. The Tribe will coordinate with the BIA Archeologist on consultation with the SHPO on a project-by-project basis. Should undiscovered archeological remains be encountered during project ground-disturbing activities, work will stop in the area of discovery and the stipulations 36 CFR 800.11 be followed. A Quinault Cultural Resource Representative was consulted on effects to historic properties (National Historic Preservation Act, as amended 16 U.S.C. 470) for the purpose of 36 CFR 800.9 (b). (*QIR EA Section 3.5*)
6. The proposed action will not affect public health or safety.

7. The proposed action will not cause a significant effect to energy resources (Energy Policy Act of 2005), water resources, wetlands (E.O. 11990), or flood plains (E.O. 11988).
8. The cumulative effects to the environment are mitigated to avoid or minimize effects of implementation of the proposed project (*QIR EA Chapter 3 and EA Appendix A*).
9. The proposed action will improve the economic and social conditions of the effected Indian community (*QIR EA Section 3.1*).
10. The proposed action will not affect unique characteristics of the geographic area such as the proximity to park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
11. The proposed action will not produce highly controversial effects on the quality of the human environment.
12. The proposed action will not have highly uncertain effects on the human environment or involve unique or unknown risks.
13. The proposed action will not establish a precedent for future actions with significant effects or represent a decision in principle about a consideration.
14. There will be no disproportionately high and adverse human health or environmental effects on minority or low-income communities (Environmental Justice E.O. 12898; Title VI of the Civil Rights Act of 1964).
15. The proposed action will not affect American Indian Religious Freedom (Public Law No. 95-341).
16. The proposed action will not contribute to the disposal of solid or hazardous waste (Resource Conservation and Recovery Act of 1976).
17. The proposed action will not threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment.



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Superintendent
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Date

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Acronyms and Abbreviations

7DADM	7-day average daily maximum
AAC	Annual Allowable Cut
BIA	Bureau of Indian Affairs
CMZ	Channel Migration Zone
CFI	Continuous Forest Inventory
DBH	Diameter at breast height
EA	Environmental Assessment
ESA	Endangered Species Act
GIS	Geographic Information Systems
FMP	Forest Management Plan
MMbf	million board feet
NEPA	National Environmental Policy Act
QIN	Quinault Indian Nation
QIR	Quinault Indian Reservation
RFMC	Riparian Forest Management Corridors
USFWS	United States Fish and Wildlife Service



Chapter 1. Purpose and Need

Chapter 1 establishes the purpose, need, and scope of the Environmental Assessment (EA). Chapter 1 and Chapter 2 (Alternatives Including the Proposed Action) together function as an executive summary for the entire EA and can be read independently from Chapter 3, which provides background resource information and a detailed impact analysis.

Chapter 1 contains the following subsections:

1.1 Proposed Action

1.2 Need for a Forest Management Plan and Environmental Assessment

1.3 Objectives of the Forest Management Plan

1.4 Laws and/or Regulations

1.5 Decision

1.6 Public Outreach Process

1.7 Key Issues

1.8 Permits, Licensing, and Consultation Requirements



1.1 Purpose and Need for Action

The Quinault Indian Nation (QIN) proposes to update the Forest Management Plan (FMP) to assure that the written objectives of the Tribe and their forest marketing programs are met, generating adequate revenue for the Tribe, and that the land is managed for continuous productivity on a sustained-yield basis, consistent with the Secretary of the Interior's trust responsibility. The FMP is a requirement under federal law as part of the trust responsibility belonging to the Secretary of the Interior. The National Indian Forest Resources Management Act of 1990 mandates that all management activities on Indian trust forest lands be consistent with an approved Forest Management Plan (53 IAMN 2-H). In 25 CFR 163.11(a), it states 'An appropriate forest management plan shall be prepared and revised as needed for all Indian forest lands.'

The proposed action is for the Bureau of Indian Affairs (BIA) to approve an FMP to be used by the BIA and the QIN that will direct their management of the forest resources for the next ten years on the Quinault Indian Reservation (QIR). It takes many years for changes in management techniques to make noticeable changes to the resources, thus in this document, there are references to timeline projections for up to 100 years. These are used to illustrate the predicted long-term effects of the management action discussed.

Because the FMP is required under federal law, it is considered a federal action, and as such, it must comply with the National Environmental Policy Act (NEPA). NEPA is a process developed to assist in decision making and ensuring that environmental information is considered. To meet the NEPA requirements, an EA must be conducted. Its primary purpose is to determine whether or not the proposed action would have any significant impacts to the human environment. It is also used to facilitate an informed management decision. If at the end of the upcoming ten-year planning period, the FMP review process identifies new changes that are needed for the following planning period, the NEPA process will have to be utilized again.

Figure 1-1 Location of the QIR.



Reservation Description

The QIR encompasses approximately 207,000 acres. Approximately 25,000 acres are privately owned, fee patent properties managed by the property owners. Because of self-governance, the QIN has the responsibility for all management, except harvest and reality, on 110,000 acres of trust land owned by individual Indians. Harvest and reality on trust land is managed by the BIA. The remaining 67,000 acres of QIR land are owned and managed by the QIN.

The QIR is located on the southwest side of the Olympic Peninsula of Washington (Figure 1.1). The reservation borders the Pacific Ocean on the west and the lower ridges of the Olympic Mountains and Lake Quinault on the east. The western portion is low elevation and relatively flat; it slowly increases in elevation as you move northeasterly, eventually ascending to the steep, higher elevations of the northeast corner. Several major rivers cross the reservation including the main stem of the Quinault River, the lower Queets River, Salmon River, Raft River, and the Moclips River.

The QIR is comprised of temperate rainforest and receives about 80 inches of precipitation along the coast and up to 150 inches in the mountainous regions of the northeast. It is generally cloudy and cool year-round with average temperatures ranging from 42° F in the winter to 60° F in the summer.

Timber Resource Description.

Western hemlock, western redcedar, and Douglas-fir are the predominant conifer species found throughout the reservation. Other conifer species include Sitka spruce, lodgepole pine, western white pine, Pacific silver fir, Douglas-fir (found predominantly in plantations), and Alaska yellow cedar. Red alder, black cottonwood, and big leaf maple are the predominant commercial hardwood species found on the reservation.

The current timber type and age distribution is a result of harvest operations dating back to the 1920s. Even-aged management has been the primary timber harvest strategy practiced on the QIR. Under this approach, old growth stands have been harvested and converted to plantations of one or more coniferous species. As a result, most of the high quality old growth stands have been harvested leaving stands of second and third growth plantations in their place.

The amount of forestland available for active forest management has been reduced over the years as the awareness for the need to protect other resources has increased. Protection of these resources continues to evolve as our understanding of their function and value increases. Table 1.1 outlines the current breakdown of QIN and BIA managed lands by land status classification.

Table 1-1 All trust and QIN fee acres by current land status classification.

LAND CLASSIFICATION	ACRES
Conservation Easement Areas & Preserves	4,079
Prairies & Non-Forested Wetlands	2,948
Rivers and Stream (including buffers)	25,296
Coast and Lake Quinault (including buffers)	3,876
Roads	6,116
Forestland Available for Harvest Management	141,247
TOTAL	183, 897

The QIN has used a stand-based forest inventory system since 1992. Through the use of aerial photo interpretation in conjunction with field verification, and the use of historical management information, the forest is broken into identifiable timber stand types based on stand attributes such as species, size class or age, and stocking density. Updating stand information is an ongoing process done regularly through exams to either capture changes resulting from management activities or on a scheduled basis to update old or low quality stand information. The inventory provides valuable information and is the primary tool used to assess the current condition of the forest and assist in evaluating and making forest management decision such as the Annual Allowable Cut (AAC). The BIA also maintains a Continuous Forest Inventory (CFI) system on the QIR which establishes permanent plots across the forest landscape that are measured periodically (approximately every ten years). The information generated from this system is used by QIN to help identify trends related to stand growth and development.

Table 1-2 provides insight into the current size structure of the forest potentially available for future harvest under current Forest Management Plan (FMP) guidelines. Stands have been grouped according to average diameter at breast height (dbh). The number of acres, thousand board feet volume, and thousand board feet per acre has been delineated for each size group.

Table 1-2. Acres and Volume by Size Class.

SIZE GROUPS	AVERAGE STAND DBH (inches)	Acres	Total Net MBF	Average MBF/Acre
Seedling/Sapling	0-5	43,990	0	0
Pole	5.1-10	40,566	51,031	1.3
Small Sawlog	10.1-15	48,088	465,429	9.7
Large Sawlog	15.1 +	34,661	1,049,843	30.3
	Totals	167,226	1,566,303	



1.2 Objectives of the Forest Management Plan

The primary objectives of the Forest Management Plan were adapted from the QIN Ecosystem Management Policy, adopted in 1995, and were used as a guide in the development and evaluation of the EA management alternatives.

To ensure sustainable utilization and enhancement of timber for the long-term economic benefit of landowners.

Indicators:

- 1) Number of harvestable acres
- 2) Timber volume per year (in million board feet - MMbf)
- 3) Employment Opportunity (related to timber harvest and forest management)

To improve and maintain habitat that will sustain harvestable numbers of fish and wildlife species important to the Quinault people.

Indicators:

- (1) Stream temperature
- (2) Sedimentation
- (3) Land in conservation status
- (4) Clear-cut size
- (5) Road density

To protect, preserve, and enhance cultural and archaeological resources.

Indicators:

- (1) Archaeological and cultural sites
- (2) Conservation areas containing cultural resources



1.3 Laws and/or Regulations

The alternatives developed through the EA process for the FMP must comply with Federal and Tribal laws, regulations, and policies.

Federal laws and regulations

(1) 25 Code of Federal Regulations Part 163 (regulates forest management activities on Indian trust land)

(2) Endangered Species Act of 1973 (ESA USFWS/NMFS) 16 USC 1531 et seq.

(3) Clean Water Act of 1972

Section 106 Clean Water Act—Tribal Water Pollution Control

Section 319 Clean Water Act—Tribal Nonpoint Source Management Program

(4) Bald and Gold Eagle Protection Act USFWS 16USC 668-668c

(5) Essential Fish Habitat; Magnuson Stevenson Act

(6) National Historic Preservation Act 16USC 470f

(7) Migratory Bird Act USFWS 16 USC 701 et seq.

(8) Marine Mammal Protection Act NMFS/USFWS 16USC 701

(9) Clean Air Act of 1970

National Ambient Air Quality Standards

Federal Air Rules for Reservations

Tribal laws, regulations, and policies.

(1) Title 61 of the Quinault Tribal Code of Laws (QIN Natural Resource Management Act, approved October 23, 1995)

(2) QIN Forest Practice Regulations of 1979

(3) QIN Ecosystem Management Policy of 1995



1.4 Decision

The primary decision made using the EA is the selection of a management alternative for the update of the FMP. The chosen alternative will guide the development of detailed forest management guidelines which will comprise the updated FMP. All forest resource management on the QIR for the next ten years will be based on the alternative selection that is made through the EA.



1.5 Public Outreach Process

Outreach is the process of determining the range of concerns, issues, and objectives to be addressed in development of the FMP. The QIN and the BIA initiated the current FMP update process in 2009 by implementing a public outreach process. The outreach process has spanned a period of four years. Over this period of time, there has been a great deal of effort made to solicit issues, concerns, and ideas regarding the FMP from multiple groups such as Quinault Division of Natural Resources (QDNR) staff, QIR landowners and stakeholders of any kind, and tribal leadership. The information collected as a result of this process has been used in the development of the management alternatives as described in this document. **Table 1-3** summarizes the activities and groups involved in the outreach process.

Table 1-3. Summary of Public Outreach process.

Activity	Associated Group	Time Frame
FMP review and feedback	QDNR technical staff	October, 2009
3,000 questionnaires mailed out	QIR stakeholders	December, 2011
FMP presentation at monthly meeting	Allottees Association and Affiliated Tribes of the Quinault Reservation (AA & AT)	June, 2012
FMP Presentation at annual meeting	AA & AT	July, 2012
FMP Review and development of EA alternatives	QDNR technical staff	October, 2012
Advertised public meetings in Queets, Aberdeen & Taholah to review preliminary alternatives and solicit feedback	Public Invited	March, 2013
Presentation of EA alternatives	QIN Business Committee	May, 2013
Presentation of revised EA Alternative 3	QIN Business Committee	May, 2013
Presentation of revised EA Alternative 3.1	QIN Business Committee	January, 2014
Draft EA out for Public Comment	Public Invited	October, 2015
Presentation of EA Alternative 3.0	QIN Business Committee	January, 2016
Approval of final EA and FONSI	BIA Superintendent	February, 2017



1.7 Key Issues

In the NEPA process, an 'issue' is an impact (or perceived effect, risk, or hazard) on physical, biological, social, or economic resources. For this EA, are five key issues identified through the public outreach process that will be used to evaluate the management alternatives. Each key issue has indicators that were identified; the indicators were used to help quantify the effects of the management alternatives on the resources.

Key Issue 1—Effects on Timber

The forest of the QIR provides many important resources; one of the important resources the QIN forest provides is vital income that is generated for individual trust allotment owners, the QIN, and the local community in general. Income is generated not only through timber harvest revenue, but also in the form of employment through the multitude of activities associated with the management and harvesting of timber. The FMP guidelines under which the forest is managed directly influences the amount of land available for active forest management and the potential yield of timber volume from that land. The impact of which Alternative is chosen directly affects the level of management activity and employment opportunity required for harvest; ultimately the forest management impacts potential timber volume available for harvest which equates to revenue for the landowner.

Indicators:

- (1) Number of Harvestable Acres
- (2) Timber Volume per Acre (in million board feet - MMbf)
- (3) Employment Opportunities (related to timber harvest and forest management)

Key Issue 2—Effects on Water Quality

Water quality affects many of the resources and human uses within the watersheds located in the QIR. Riparian trees regulate key aquatic ecosystem processes, such as inputs of light, organic matter, and nutrients that can be altered dramatically when these trees are harvested. Salmonids and other native aquatic organisms require clean, cool, well-oxygenated water for survival supported by healthy riparian areas, connected floodplains, and wetlands. Furthermore, channel migration zones support and maintain healthy stream channels and water quality. Forest harvest can increase sediment delivery to streams, covering stream substrates and negatively affecting stream organisms. Because timber management practices can increase sedimentation in streams and a lack of quantitative data for water quality on the QIR, sedimentation was used as an indicator for water quality.

Indicator:

- (1) Sedimentation

Key Issue 3—Effects on Fisheries

Pacific salmon stocks produced from waters of the QIR support valuable tribal commercial, sport, and subsistence fisheries. Fish species of importance on the reservation include Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye (Blueback) salmon (*O. nerka*), chum salmon (*O. keta*), steelhead trout (*O. mykiss*), cutthroat trout (*O. clarkii*), eulachon (*Theleichthys pacificus*), Pacific lamprey (*Lampetra tridentata*), and white sturgeon (*Acipenser transmontanus*). The reservation also contains bull trout which is currently listed as threatened under the Endangered Species Act (ESA), which is also considered a fish species of importance. Optimal temperatures for salmonids range from 12 ° C to 14 ° C; past timber management practices have negatively impacted stream temperatures, fish habitat, and subsequently fisheries. Because salmonids are important both culturally and economically, stream temperature, estimated by percent shade cover to streams, was used as an indicator to evaluate the effects of each alternative on fish habitat.

Indicator:

- (1) Stream Temperature

Key Issue 4—Effects on Wildlife

Wildlife habitat on the QIR encompasses multiple mosaics of forest, riparian, and prairie habitats. Interspersed throughout the reservation, these habitats provide suitable cover and forage for species of birds, mammals, amphibians, reptiles, and mollusks. The most sought after species on the QIR are Roosevelt elk and black-tailed deer; these species provide valuable subsistence harvest opportunities to the community. In addition to the two game species, multiple predators such as black bear, bobcat, coyote, and cougar all reside on the QIR. Black bear populations are managed through a guided black bear hunt. This guided hunt is utilized for two reasons; first, to control the bear population and thereby reduce damage to young tree plantations, and second, to provide economic benefit to guides and the local community. The QIR does not specifically manage for bears and cougars but both of these species benefit from the management of elk and deer populations. For this reason, bears and cougars were not included in this analysis. Furthermore, for this analysis, management of elk on the Reservation is considered to be representative of the management of deer as well.

The QIR provides habitat for two species listed as threatened under the Endangered Species Act: marbled murrelet and northern spotted owl. The American bald eagle was delisted in August of 2007 and is now protected under the Bald and Golden Eagle Protection Act.

Indicators:

- (1) Acres of Land in Conservation Status
- (2) Clear-cut Size (acres)
- (3) Road Density (miles per square mile)

Key Issue 5—Effects on Cultural Resources

Proposed forest management activities, including timber harvest and associated road construction, could impact cultural resources and may restrict traditional cultural activities. Cultural sites on the QIR include villages, burial grounds, fishing camps, sites for gathering medicinal plants and plant materials for making cultural products, prairies, and other culturally important locations. Many of these sites are unidentified because a complete survey of sites on the reservation has not been completed. Villages include both established residential areas and temporary camps that were historically used for traditional fishing, hunting, berry picking, and herbal gathering. Other culturally important sites include groves where cedars were both historically and currently felled for canoe building and landmarks related to legendary, religious, or traditional events. Some of these sites remain in use today, so their value is not limited to their prehistoric or historic conditions and artifacts.

Indicators:

- (1) Archaeological and Cultural Sites
- (2) Conservation Areas Containing Cultural Resources (acres)



1.8 Permits, Licensing, and Consultation Requirements

Because of the presence of federally listed threatened and endangered species on the QIR, consultation with the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration Fisheries department (NOAA Fisheries) is required before the selected alternative can be implemented.



Chapter 2. Alternatives

The purpose of this chapter is to describe three forest management alternatives as well as the “No Action” alternative which represents current management, and to compare them in terms of environmental impacts and achievement of objectives.

Also included is a description of the anticipated 100-year future condition that would result from each alternative, were it selected, and a summary of the alternatives’ potential impacts.

This chapter contains the following subsections:

2.1 The Process Used to Develop Alternatives

2.2 Criteria Common to All Alternatives

2.3 Overview of the Alternatives

2.4 Description of Alternatives

2.5 Summary of Consequences



2.1 The Process Used to Develop Alternatives

Prior to developing the alternatives, issues and concerns were identified by reviewing current practices and existing conditions. This process also included a public outreach process that gathered input from landowners, the Quinault Indian Nation (QIN) Business Committee, and others with a vested interest in how natural resources are managed on the Reservation. QIN and Bureau of Indian Affairs (BIA) staff members then developed four alternatives to address input from the public outreach process. The developed alternatives varied in the areas of riparian and wetland management, leave tree requirements, rotation age, and contiguous clear-cut harvest unit size. Each of these management scenarios also differs in the volume of timber available for future harvest, subsequently affecting the amount of revenue generated to the landowner, impacts to water quality, fish habitat, riparian functions, wildlife habitat, cultural resources, and visual appearance across the overall landscape.

For an alternative to be considered reasonable it must satisfy the objectives set forth and it must be technically and economically feasible.

The objectives set forth are:

- 1) To ensure sustainable utilization and enhancement of timber for the long-term economic benefit of landowners,
- 2) To improve and maintain habitat that will sustain harvestable numbers of fish and wildlife species important to the Quinault people, and
- 3) To protect, preserve, and enhance cultural and archaeological resources.

The alternatives to be analyzed in this EA are:

Alternative 1: No-Action. This alternative reflects no change in the current management practices under which the Reservation forestland is managed.

Alternative 2: Fish, Wildlife, and Cultural Resources. This alternative emphasizes greater protections for fish, wildlife, and cultural resources while still providing for sustainable yield timber harvest and economic return to the landowner.

Preferred Alternative 3: Modified No-Action. This alternative proposes similar management practices to the No-Action alternative, but offers slightly increased protections for fish and wildlife.

Alternative 3.1: Riparian Forest Management Corridors (RFMCs). This alternative emphasizes active management using specific management prescriptions to improve riparian forest conditions along rivers, streams, and wetlands to enhance ecological and geomorphic functions over the long-term.



2.2 Management and Mitigation Measures

In evaluating the proposed alternatives, the assumption is made that many resource management standards are common to all alternatives and therefore are not included in the comparison of the alternatives. There are measures or techniques to reduce or prevent negative impacts to the environment in both the planning and implementation of project activities and are intended to be utilized on every timber sale, where applicable. These include standards such as the interdisciplinary team (ID) functions, fire management, forest regeneration, management of forested wetlands, seeps and springs, road construction, and the application of forest chemicals. A description of these management and mitigation measures can be found in Appendix A.



2.3 Overview of the Alternatives

This section illustrates the management practices and highlights the differences of each alternative. Alternative 1, the No-Action alternative, will be described first and illustrates the current condition of forest management practices.

Harvest Unit Planning and Design.

The way in which harvest units are planned and designed differs between alternatives in rotation age at which harvest occurs, the size and design of harvest units, and the requirements for green-up of adjacent stands. Refer to **Table 2-1** for comparison.

Table 2-1. Comparison of Harvest Unit Planning and Design.

Management Practice	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Preferred Alternative 3: Modified No-Action	Alternative 3.1: RFMCs
Rotation Age	50-year	Conifers: 70-year; Hardwoods: 35-year	Conifers: 40-year; Hardwoods: 35-year	Conifers: 40-year; Hardwoods: 35-year
Size	≤240 acres	≤80 acres	Same as Alternative 1.	Same as Alternative 1.
Green-up Requirements	Adjacent clear-cuts will be separated by at least 300 feet to prevent more than 240 acres of contiguous clear-cut. At least 90% of the unit's perimeter is in stands of trees that have survived for a minimum of five growing seasons or have reached an average height of four feet.	If more than 400 feet of a proposed harvest unit is within 300 feet of an existing clear-cut then: (1) Thirty percent or more of the stand adjacent to the proposed unit perimeter is 30 years of age or more and the remainder of the proposed perimeter is adjacent to fully stocked stands with a height of 4.5 feet or greater; or (2) Sixty percent or more of the stand adjacent to the proposed unit perimeter is 15 years of age or more and the remainder of the proposed perimeter is adjacent to fully stocked stands with a height of 4.5 feet or greater. (3) At least 90% of the unit's perimeter is in stands of trees that have survived for a minimum of five growing seasons or have reached an average height of four feet.	Same as Alternative 2.	Same as Alternative 2.

Under Alternative 1: No-Action, stands would continue to be managed on a 50-year rotation with timber harvests not exceeding 240 contiguous clear-cut harvest unit acres. In order to not exceed 240 acres, units at risk of this must be separated by at least 300 feet of vegetation at a height of at least 4.5 feet. At least 90 percent of the harvest unit's perimeter is in stands of trees that have survived for a minimum of five growing seasons and have reached an average height of four feet.

Under Alternative 2: Fish, Wildlife, and Cultural Resources, differs from current management in rotation age and size of clear-cut harvest unit. Conifer stands would be harvested on a 70-year rotation and hardwood stands on a 35-year rotation. Harvest units would not exceed 80 acres of contiguous clear-cut harvest unit, which is greatly reduced from the current 240 acres or the proposed size allowed under the other alternatives.

Under both Alternative 3: Modified No-Action and Alternative 3.1: RFMC, stands would be harvested on a 40-year rotation for conifers and a 35-year rotation for hardwoods. Green-up adjacency requirements would be the same as Alternative 2; clear-cut size would be the same as Alternative 1.

Wildlife Reserve Trees, Snags, and Cultural and/or Legacy Trees.

The management of wildlife reserve trees, snags, and cultural and/or legacy trees differs between alternatives. Refer to **Table 2-2** for comparison of wildlife reserve areas and **Table 2-3** for comparison of cultural leave areas.

Under Alternative 1: No-Action, a minimum of three green trees and two snags would continue to be retained for every acre of clear-cut harvest unit that is greater than 1000 feet from a leave area. All remnant old growth snags with minimal merchantable value would continue to be retained when not in conflict with harvest operations. If available and conditions do not pose a safety issue, two to four green trees or snags would continue to be retained per acre and clumped where possible. There are no requirements for cultural leave areas or legacy trees under this current management plan.

Table 2-2 Comparison of Reserve Areas.

Management Practices	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Preferred Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Wildlife Reserve Areas and Snag Retention	A minimum of three green trees and two snags will be retained for every acre of a harvest that is greater than 1000 feet from a leave area.^{1/2} All remnant old growth snags with minimal merchantable value will be retained when not in conflict with harvest operations.	Three to five Type 1 wildlife reserve trees will be retained per acre for every acre of harvest that is greater than 800 feet from a leave area.³	A minimum of two green trees and two snags will be retained for each acre of harvest unit that is greater than 800 feet from a leave area. These trees will be clumped at the designation of biologist.^{1/2} All remnant old growth snags will be retained when not in danger to harvest or salvage operations.	Same as Alternative 3.

¹ Every effort will be made to include an even mix of Class 1 through Class 5 snags and Type 1 through Type 4 wildlife trees.

²Snags will be greater than 12 inches in diameter and six feet in height, or the next largest size available. Stumps will be excluded.

³Leave trees will be dominant/co-dominant trees representative of the stand.

Under Alternative 2: Fish, Wildlife, and Cultural resources, the number of wildlife reserve trees would be increased to three to five with a diameter breast height of at least 24" or the next largest available size class will be retained per acre. Since patches have the potential to provide a greater variety of microclimates than single tree retention does, efforts should be made to group leave trees. The location of grouped patches will be based on availability. Leave trees will provide for snag dependent wildlife species over the long term and aid in the visual appearance of big trees across the landscape. The wildlife biologist may determine, through the ID team process that fewer trees may be left due to adequate protection by other leave tree requirements. Other differences in management practices under this alternative would include maintaining or emphasizing cultural resources by retaining cedar stands, restricting harvest in critical elk calving areas, commercially thinning areas of cultural value, and retaining legacy trees across the landscape.

Table 2-3. Comparison of Cultural Leave Areas.

Management Practices	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Preferred Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Cultural Areas and Legacy Trees	N/A	No harvest will occur in areas identified as critical elk calving areas by the wildlife biologist. Cedar stands or patches will be identified and managed for late successional development for future cultural uses. In areas with a site index less than 100, harvest will be restricted to commercial thinning across all size classes. Patches of trees will be retained for multiple rotations to provide for the visual appearance of big trees, or 'legacy trees', across the landscape and support for organisms that require older forest components. A buffer strip of 150 feet would be applied on each side of all paved roads measured from the outermost edge of the ditch.	Where available on QIN owned lands, legacy trees will be retained per timber sale. When legacy trees do not currently exist on QIN owned lands, potential legacy trees will be retained per timber sale. Across the unit, a minimum of 0.5 legacy trees will be left per acre, or trees with the potential to be recruited as legacy trees will be chosen.	Same as Alternative 3.

Under Alternative 3: Modified No-Action and Alternative 3.1: RFMCs, the requirements for leaving wildlife reserve trees would be reduced from current management practices by 200 feet and the number of green trees required to be retained would be reduced from three to two trees per acre. Two snags per acre would be retained where available. Silvicultural and harvest prescriptions would consider cultural resources and where available, legacy trees would be retained.

Riparian Protections and Floodplain Management

Harvest operations within the hydrologic floodplain and management of riparian areas are where the most difference lies between alternatives. Under all alternatives, harvest operations occurring within the hydrologic floodplain will be completed between June 1st and September 30th. Refer to **Table 2-4** for comparison of management within riparian zones and operations within the hydrologic floodplain. Refer to **Table 2-5** for comparison on road related activities within riparian and/or floodplain areas.

Figure 2-1: An example of floodplain harvest restrictions on a Type D Stream and a Named Type H stream of the Preferred Alternative 3.0 See Table 2-4 for a more detailed description of management practices. See **Appendix E** for further illustrations of riparian protections.

Alternative 3: Modified No-Action

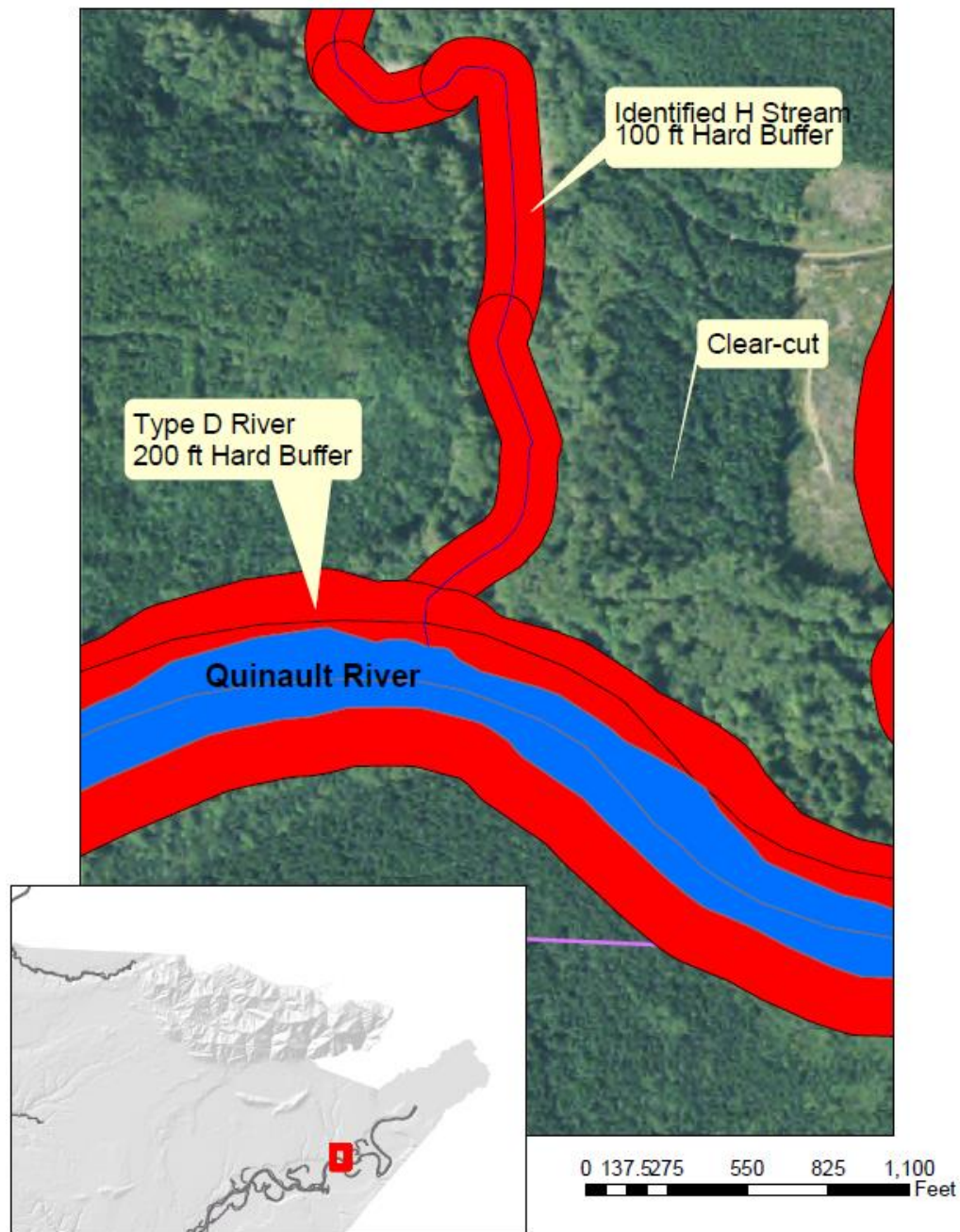


Table 2-4. Comparison of Riparian Protections and Floodplain Harvest (buffer widths in feet).

Management Practices		Alternative 1: No-Action ¹			Alternative 2: Fish, Wildlife, and Cultural Resources ²	Alternative 3: Modified No-Action ¹	Alternative 3.1: Riparian Forest Management Corridors (RFMCs) ¹
		1	2 ³	3			
Riparian Protections							
Type D		100-200 ⁴	50/150 ⁴ 50/75	25 ⁴	300 ⁵	200	CMZ + 100 (50/150) ⁶
Type H		60-80 ^{7/8}	50/75	25	≥8 feet wide: 300 ⁵	80-100 ⁹	CMZ + 80 (50/150) ⁶
					<8 feet wide: 150		
Type O	Perennial	50 ¹⁰	N/A	N/A	75	50 ¹⁰	50 ¹¹
	Intermittent	30 ¹²	N/A	N/A	75	30 ¹²	30 ¹²
Floodplain Harvest							
Regeneration Status		50% of the acreage of each river mile can be in regeneration status			N/A	N/A	N/A
Conifer Harvest	Individual	Retain all individuals and groupings < 1 acre			None	Retain all individuals and groupings < 1 acre	<u>Core Zone:</u> No Harvest
	Patch	Retain 20 dominant/co-dominant conifers per acre where patches greater than 1 acre of ≥ 70% conifer exist			None	Retain 30 dominant/co-dominant conifers per acre where patches greater than 1 acre of ≥ 50% conifer exist	<u>Variable Shade Retention Zone:</u> Retain 2/3 acreage of conifer stand + 30 TPA <u>Outer Zone:</u> Retain 30 TPA
Downed Wood		No removal of 24 inches in diameter or greater			Same as Alternative 1	Same as Alternative 1	No removal with exception of blowdown within 24 months of occurrence
Reforestation		Reforest with 30 % conifer and 70% alder ¹³			Reforest with 70% spruce and 30% alder Mandatory conifer release until stand has reached free-to-grow status	Reforest with 30% conifer and 70% alder ¹³	Reforest with a mix of conifer and alder depending on species availability and site-specific conditions

¹Buffer widths are measured horizontally from the ordinary high water mark (OHWM)

²Measured from bankfull width

³No-entry buffer width/thinned buffer width; harvest from below may occur within the thinned buffer portion of the RMZ when conifer trees greater than or equal to 8-inch diameter at breast height comprise greater than 70% of the stems in the zone with no more than 40% of the stems within the available area being harvested

⁴Depending on presence of repeated channel movement area (RCMA)

⁵Alder may be removed from the outer 200 feet

⁶Core zone (limited-entry buffer)/variable shade retention zone (limited-entry buffer)

⁷Depending on site index

⁸On streams with NW-SE orientation, buffer width may be 60-80 (depending on site index) on windward side of stream and 25 on lee ward side

⁹Named catchments will receive a no-entry buffer of 100 feet

¹⁰Buffer extends first 300-500 feet (depending on length) upstream of junction with Type D or H

¹¹Buffer extends first 300-500 feet (depending on length) upstream measured from buffered edge of Type D or H

¹²Equipment limitation zone

¹³Depending on availability and site-specific conditions

Table 2-5. Roads in Riparian or Floodplain Areas.

Management Practices	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Road Material	No restrictions	Dirt spurs only in hydrologic floodplain Gravel from weed-free pits or washed before use	Gravel pit use in pits with invasive species will be coordinated with the invasive species program to develop a treatment/use plan.	Same as Alternative 3
Road Construction	Avoid roads within 300 feet of streams	No parallel roads will be constructed within 400 feet of type D streams and within 300 feet of all others	Same as Alternative 1	Except for crossings, new stream-adjacent roads will not be located within 300' of the ordinary high water mark of any typed water body unless otherwise approved by the ID team
Stream Crossings	Culverts meet fish passage	Permanent roads require bridge or open bottom structure	Permanent stream crossings will provide for fish passage at all life stages	Same as Alternative 3
Road Use	Roads will remain until stands have reached free-to-grow status (5-7 years)	New roads constructed in the floodplain will be decommissioned post-harvest	Same as Alternative 1	Same as Alternative 1

Alternative 1: No-Action differs from the rest of the alternatives in that under current management and if continued, only 50 percent of the acreage of each river mile could be in regeneration status. The remaining 50 percent would not be available for harvest until it has reached an 8 inch diameter at breast height. Under Alternative 1: No-Action and Alternative 3: Modified No-Action, several options for riparian protections exist:

The first option consists of no-entry buffers dependent upon stream type, site index, and seasonality. Alternative 1: No-Action and Alternative 3: Modified No-Action differs in management practices under this first option in two ways:

- 1) Alternative 1: No-Action manages type D streams based on the presence or absence of a repeated channel movement area (RCMA) whereas Alternative 3: Modified No-Action assigns the same no-entry buffer to all type D streams regardless of the presence of the repeated channel movement area, and

2) Alternative 1: No-Action manages type H streams based on the site index of the riparian area; sites with an index of 110 or greater would continue to receive an 80 foot no-entry buffer and those sites with an index of less than 110 would continue to receive a 60 foot no-entry buffer. Under Alternative 3: Modified No-Action, named type H streams would receive a 100 foot no-entry buffer and the remainder of the type H streams would receive an 80 foot no-entry buffer regardless of site index.

The second option exists only under Alternative 1: No-Action. This option consists of a 50 foot no-entry buffer bordered by a thinned buffer which may be implemented when conifer trees greater than or equal to 8-inch diameter at breast height comprise 70 percent or more of the stems in the riparian area. No more than 40 percent of the stems within the area would be harvested from below.

The third option exists under Alternative 1: No-Action and consists of a restoration harvest which would be implemented in areas where conifer stands are capable of growing and have historically existed, primarily in areas of mixed conifer/hardwood and hardwood dominated riparian stands. A no-entry buffer of 25 feet would be applied to the stream and restoration harvest would occur outside of this area, ranging from a minimum of 100 feet to a maximum of 700 contiguous feet where shade would be reduced. Restoration harvest sites would be separated by a no-harvest zone measuring no less than twice the length of the harvested area. Restoration harvest would be restricted from the RCMA. Harvest of conifers would occur from below.

Management of type O streams would be the same under both Alternative 1: No-Action and Alternative 3: Modified No-Action.

The definition of a conifer patch under each alternative differs slightly and would impact the amount of conifer that can be harvested within the hydrologic floodplain.

Under Alternative 2: Fish, Wildlife, and Cultural Resources, riparian protections would be managed using no-entry buffer widths depending on stream type, with the exception of type D and type H streams greater than 8 feet wide where alder could be removed from the outer 200 feet of the protection area. Buffer widths would be measured horizontally from bankfull width, which differs from the rest of the alternatives where buffer widths are measured from the ordinary high water mark. This alternative also differs from the other alternatives in the management of type O streams, which would receive a 75 foot no-entry buffer regardless of seasonal flow. Harvest within the hydrologic floodplain would only apply to red alder; as all conifers, cottonwood, and big leaf maple would be retained. Road construction including stream

crossing installation and removal would be most restrictive under this alternative. Reforestation would also have stricter requirements under this alternative.

Under Alternative 3.1: RFMCs, riparian areas are managed based on RFMCs, which is the channel migration zone (CMZ) plus 100 feet on type D streams and the CMZ plus 80 feet on type H streams. Within the RFMC, three zones would exist:

The core zone would be a 50 foot limited-entry buffer applied to all perennial streams measured horizontally from the ordinary high water mark.

The variable shade retention zone is a 150 foot limited-entry buffer measured horizontally from the edge of the core zone. This zone applies to type D and H streams. Within the variable shade retention zone, management activities are determined on a site-specific basis to retain shade and improve riparian functions:

(1) In hardwood dominated stands (stands with a basal area comprised of at least 50 percent hardwood), hardwoods may be removed from two-thirds of the acreage of the hardwood stand only if conifers can be established based on soils, site index, the presence of conifer stumps, and understory vegetation type. The ID team will determine where alder removal can occur. All conifer, big leaf maple, and cottonwood will be retained.

(2) In conifer dominated stands (stands with a basal area comprised of at least 50 percent conifer), one-third of the proposed acreage may be removed as long as 30 dominant/co-dominant conifers are left per acre. If 30 dominant/co-dominant trees do not exist, the 30 largest trees will be retained. The ID team will determine if leave trees should be evenly dispersed or grouped. Harvest of the remaining two-thirds of the conifer dominated stand will not be permitted. Cottonwood and big leaf maple will be retained.

The outer zone is measured from the edge of the variable shade retention zone and extends to the outer edge of the RFMC (the CMZ plus 80 or 100 feet depending on the type of the stream). Management activities within this zone are limited to retaining conifer at 30 dominant/co-dominant trees per acre and retaining all cottonwood and big leaf maple. If 30 dominant/co-dominant trees do not exist, the 30 largest dominant/co-dominant trees will be retained.

Areas that have been identified on type D and H streams as experiencing active channel migration have been labeled as potential avulsion and/or erosion zones. In these sensitive areas, no more than 50 percent of the basal area will be harvested from below regardless of stand type. In addition, cottonwood will be retained at 60 trees per acre (where available), conifer will be retained at 30 dominant/co-dominant trees per acre,

and all big leaf maple will be retained. If 30 dominant/co-dominant conifer do not exist, the 30 largest trees will be retained.

Type O streams would be managed in the same fashion as they would be under Alternative 1: No-Action and Alternative 3: Modified No-Action except the buffer width would be measured from the edge of the RFMC of the type D or H rather than the stream junction.

Wetland Protections

Management of wetlands differs between alternatives. Refer to Table 2-6 for comparison. Buffers will be measured from the non-forested edge.

Table 2-6. Comparison of Wetland Protections (feet).

Management Practices	Alternative 1: No-Action ¹	Alternative 2: Fish, Wildlife, and Cultural Resources ^{2/3}	Preferred Alternative 3: Modified No-Action ^{2/3}	Alternative 3.1: Riparian Forest Management Corridors (RFMCs) ^{2/3}
Non-forested Wetlands	≥ 5 acres: 100 0.5-5 acres: 66 0.25-0.5 acres: 40 Bogs > 0.5 acres: 66	100	≥ 5 acres: 70 1-5 acres: 50 0.5- <1 acre: 30	Same as Alternative 3.
Named Prairies⁴	N/A	200	Same as Alternative 2.	Same as Alternative 2.
Manmade Wetlands	Wetlands that have existed for more than 5 years will be evaluated by the ID team.	100	Evaluated by the ID team.	Same as Alternative 3.

¹Actively managed buffers.

²No-entry buffers measured horizontally from the non-forested edge.

³Wetlands associated with a fish-bearing stream will receive the same buffer applied to the stream.

⁴Five named prairies exist on the QIR- Chow Chow, Baker, Moses, Moclips, and O'Took.

Under Alternative 1: No-Action, non-forested wetlands would continue to be managed using a wetland management zone (WMZ) determined by the size of the wetland. A minimum of 75 trees per acre of the WMZ greater than eight inches diameter at breast height would be retained, 25 of which would be greater than 12 inches diameter at breast height, and five of which would be greater than 20 inches diameter at breast height, where they exist. The minimum width listed in the table above is an equipment limitation zone. Partial cutting or removal of groups of trees would be acceptable as long as the maximum width openings created would not exceed 100 feet and openings would be at least 200 feet apart. Named prairies are not addressed under this alternative but are addressed under the remaining alternatives.

Under Alternative 2: Fish, Wildlife, and Cultural Resources, the biggest difference from current management practices is that all wetlands, regardless of size, would receive a no-entry buffer of 100 feet instead of a managed buffer. Those wetlands associated with a fish-bearing stream would receive the buffer applied to the stream. Named prairies would receive a no-entry buffer of 200 feet.

Under Alternative 3: Modified No-Action and Alternative 3.1: RFMCs, wetlands would receive a no-entry buffer depending on size which differs from the actively managed buffers under Alternative 1: No-Action. Wetlands associated with a fish-bearing stream would receive the buffer applied to the stream.



Bog Laurel found growing in the Moclips Prairie. *Photo courtesy of Caroline Martorano.*

Unstable Slopes.

The management of unstable slopes differs slightly between alternatives. Refer to Table 2.7 for comparisons.

Table 2-7 Comparison of Unstable Slopes Management.

Management Practices	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, Cultural Resources	Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Unstable Slopes	Managed to prevent or avoid an increase or acceleration of the naturally occurring rate of landslides due to harvesting	No harvest will occur on slopes greater than 70 percent with the potential to deliver sediment to streams.	Same as Alternative 1.	No harvest within these features as determined by the ID team: -Inner gorges, convergent headwalls, and bedrock hollow steeper than 35 degrees (70 percent); -Toes of deep-seated landslides with slopes steeper than 22 degrees (65 percent); -Groundwater recharge areas for glacial deep-seated landslides; -Outer edge of a meander bend along a valley wall or high terrace of an unconfined meandering stream; or -Areas that have the potential to threaten public safety, deliver sediment to a public resource, or threaten capital improvement.

Under Alternative 1: No-Action and Alternative 3: Modified No-Action, unstable slopes would be managed to prevent or avoid an increase of the naturally occurring rate of landslides. The intent is to retain the natural landslide frequency on the landscape.

Under Alternative 2: Fish, Wildlife, and Cultural Resources, no harvest would occur on slopes greater than 70 percent with the potential to deliver sediment to streams. This alternative provides more definition for determining unstable slopes than Alternative 1 or Alternative 3 provide.

Under Alternative 3.1: RFMCs, specific definitions exist for identifying and protecting unstable slopes.

Cedar Salvage.

Cedar salvage harvest and operations differ slightly between alternatives. Refer to Table 2-8 for comparison. Yarding methods will be the same across all alternatives and would occur by helicopter or hand packing, with a shovel being approved if yarding is done in conjunction with green timber yarding and no additional passes would be made. Heavy equipment would be approved for use on landings and along roadsides no more than 30 feet from the surfaced road. No salvage will occur within the defined channel of any stream.

Table 2-8 Comparison of Cedar Salvage.

Management Practices	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Cedar Salvage				
Buffer Widths	No salvage will occur within the no-entry portion of any RMZ or on thinned stands, within 50 feet of the OHWM. Buffer widths may be reduced to 25 feet on small type H and O streams. ¹	Same as green tree timber harvest.	No salvage within the no-entry buffer width of any Type D, H, or buffered O stream or within 25 feet of the defined channel of any non-buffered portion of a type O.	A limited-entry buffer of 50 feet will be applied to all Type D, H, and O streams that would receive a buffer under green tree harvest rules. ¹
Floodplain	No salvage of downed wood with a diameter of 24 inches or greater within the floodplain.	Same as Alternative 1.	Same as Alternative 1.	No removal of downed wood from the floodplain.

¹Salvage may occur down to the ordinary high water mark for streams that would not receive a buffer under green tree harvest rules.

Under Alternative 1: No-Action, no salvage would occur within the no-entry portion of any RMZ or on thinned stands, within 50 feet of the ordinary high water mark. Buffer widths may be reduced to 25 feet on small type H and O streams. Salvage could occur down to the ordinary high water mark of type O streams that would not receive a buffer under green tree harvest rules. No salvage would occur of downed wood with a diameter of 24 inches or greater within the floodplain.

Under Alternative 2: Fish, Wildlife, and Cultural Resources, salvage would differ from Alternative 1: No-Action current management in that sales would be planned in coordination with green timber harvest, would occur within the same cutting block as green tree harvest, and must be completed prior to planting.

Under Alternative 3: Modified No-Action, cedar salvage buffer widths differ from current management practices in that salvage would not occur within 25 feet within the ordinary high water mark of non-buffered type O streams.

Under Alternative 3.1: RFMCs, a limited-entry buffer of 50 feet would be applied to all streams that would receive a buffer under green tree harvest rules. Salvage could occur up to the ordinary high water mark of type O streams that would not receive buffer under green tree harvest rules. No downed wood could be removed from the floodplain.



2.4 Description of Alternatives

Alternative 1: No-Action (Current Forest Management Practices)

This alternative reflects no change in the current management practices under which the Reservation forestland is managed. It emphasizes the production of timber on a sustained yield basis that maximizes revenue to the landowners through clear-cut harvesting of timber stands in the 50-year old age class. This alternative promotes timber harvest while providing consideration to other resources. It was developed to balance the economic interests of the landowner, cultural needs, and to meet the requirements for fish protection under the Endangered Species Act. The riparian strategy was designed to restore a major portion of the historical stream-adjacent large woody debris recruitment. It would be expected to provide adequate shade and will maintain high recruitment of nutrient leaf litter from the riparian management zones for fish-bearing streams.

Primary goals of Alternative 1 are to:

- (1) Maintain the flow of forest products on the QIR;
- (2) Maintain habitat for aquatic and riparian-dependent species;
- (3) Provide compliance with the Endangered Species Act; and
- (4) Meet water quality standards consistent with the Clean Water Act.

100-year Description of Alternative 1:

The landscape outside of the riparian zones would be managed on a 50-year rotation. Type D streams would have 100 feet of riparian area over 150 years old. The vistas from the rivers would be of the adjacent commercial forestlands filtered through 100 to 200 foot riparian buffers. The riparian zones would contain trees of approximately 150 years of age, depending on species succession; these zones would be on a trajectory toward providing levels of large woody debris similar to old-growth forests. Large trees in the riparian zone may slow channel migration due to increased root strength, while providing potential obstructions for side channel



As many coastal streams in this area, Camp Creek has a tea color as much of it drains from swampy lands. Photo courtesy of L. Workman.

development through avulsion if they have recruited to the channel. Although the riparian strategy is designed to retain a major portion of the historically recruited stream-adjacent woody debris, it is likely that the large woody debris volume would be consistent with current frequency, possibly with increased volume due to larger trees in the riparian areas. Much of the existing large woody debris (LWD) would be replaced during the 100-year evaluation period by trees in the riparian management zones. Smaller streams, however, may display a trend of increasing wood within the 100-year

time frame.

There would be lower sediment levels and an overall improvement in water quality following harvest operations due to stream buffer protections on fish-bearing streams. Stream temperatures on smaller streams would likely improve from the increase in stream bank vegetation. Floodplain areas that have been forested for over 100 years would be amidst conversion from predominantly hardwood stands with a conifer understory to mixed hardwood/conifer stands with more conifers continuing to grow through the hardwood canopy. Hardwood stands with little to no conifer component would produce widely scattered large hardwoods with an extensive brush understory.

Alternative 2: Fish, Wildlife, and Cultural Resources

This alternative retains trees along all water courses in order to allow for a natural recovery of fish and riparian habitat while providing a network of corridors for seasonal migration and movement between habitats. This alternative also focuses on supporting traditional values and cultural uses, including fishing, hunting, and the availability of medicinal plants and materials for making cultural products. The management of the forest to emphasize the production of special forest products would benefit the local public's ability to earn a living from resources other than timber. Under this alternative, the number of harvestable acres is the lowest; however it offers the most protection for fish, wildlife, and cultural resources.

Primary goals of Alternative 2 are to:

- (1) Provide compliance with the Endangered Species Act;
- (2) Meet water quality standards consistent with the Clean Water Act;
- (3) Enhance fish and wildlife habitat;
- (4) Manage the forest for cultural values;
- (5) Provide a flow of forest products for landowner revenue and employment; and

(6) Create the visual appearance of big trees across the landscape.

100-year Description of Alternative 2:

The landscape under this alternative will differ from that of Alternative 1: No-Action in many ways, primarily in the riparian areas and the size of commercial clear-cut harvest units. Streams will have larger riparian zones and clear-cut harvest size will be much smaller. Vistas from the rivers would be of large trees with little evidence of harvest operations in conifer dominated stands. However, this would not be the case in hardwood dominated stands where older hardwoods have died off and few conifers exist to replace them.

Although this riparian strategy is designed to retain 100 percent of the historically recruited woody debris, it is likely that the large woody debris volume would be consistent with current levels over the 100-year evaluation period. Riparian zones would contain trees of approximately 150 years of age and depending on species succession, these zones may be on trajectory toward providing levels of large woody debris similar to old-growth forests. The larger trees in the riparian zone may provide increased bank stability, thereby reducing erosion and slowing channel migration. Recruitment of these trees to the stream over time will result in the creation of off-channel fish habitat and pool formation; however, conditions over the 100-year evaluation period are likely to be consistent with current conditions in regard to fish habitat, continuing to display impairments. There would be lower sediment levels and an overall improvement in water quality following harvest operations due to stream buffer protections on fish-bearing streams and improved road management standards.

Preferred Alternative 3: Modified No-Action

This alternative continues to provide revenue to the landowners through sustained yield timber harvest on a 40-year rotation but increases protection for fish and wildlife in riparian areas, wetlands, and prairies, addressing concerns identified through the public outreach process. This alternative provides for larger riparian and wetland buffer widths to improve habitat for fish and wildlife. It also provides for more leave tree retention and improves green up requirements to benefit upland species.

Primary goals of Alternative 3 are to:

- (1) Provide a flow of forest products on the QIR;
- (2) Provide an economic return to the landowner;
- (3) Maintain or enhance habitat for aquatic and riparian-dependent species; and
- (4) Maintain water quality for fish and wildlife.

100-year Description of Alternative 3:

The vistas from the rivers would be of the adjacent commercial forestlands filtered through the 100 to 200 foot buffers. Although the riparian strategy is designed to retain a major portion of the historically recruited stream-adjacent woody debris, it is likely that the large woody debris volume would be consistent with current frequency, possibly with increased volume due to larger trees in the riparian areas. Much of the existing LWD would be replaced during the 100-year evaluation period by trees in the riparian management zones. Smaller streams, however, may display a trend of increasing wood within the 100-year time frame. The riparian zones would contain trees of approximately 150 years of age, depending on species succession; these zones may be on a trajectory toward providing levels of large woody debris similar to old-growth forests. Large trees in the riparian zone may slow channel migration due to increased root strength, while providing potential obstructions for side channel development through avulsion if they have recruited to the channel.

There would be lower sediment levels and an overall improvement in water quality following harvest operations due to stream buffer protections on fish-bearing streams. Stream temperatures on smaller streams would likely improve from the increase in stream bank vegetation. Floodplain areas that have been forested for over 100 years would be amidst conversion from predominantly hardwood stands with a conifer understory to mixed hardwood/conifer stands with more conifers continuing to grow through the hardwood canopy. Hardwood stands with little to no conifer component would produce widely scattered large hardwoods with an extensive brush understory.

Alternative 3.1: Riparian Forest Management Corridors (RFMCs)

This alternative focuses on actively managing riparian zones within floodplains and channel migration zones to reestablish conifer in riparian areas in order to improve ecological, geomorphic, and floodplain processes; improve wildlife habitat; and improve fish habitat while providing economic return to the landowner. This alternative retains trees to maintain forest structure within floodplains and channel migration zones. This alternative provides for a mosaic of variously aged forest patches within the corridors that provide seasonal migration and refuge between habitats. This alternative provides for traditional values and cultural uses, including fishing, hunting, and gathering.

Primary goals of Alternative 3.1 are to:

- (1) Restore or improve riparian area conditions to support fish and wildlife habitat;
- (2) Maintain water quality for fish and wildlife;
- (3) Provide a flow of forest products on the QIR; and
- (4) Provide an economic return to the landowner.

100-year Description of Alternative 3.1:

The riparian forests on the QIR would contain a complex mosaic of aquatic and terrestrial habitats existing within various stages of successional development. Channel migration zones and floodplains of fish-bearing streams will contain scattered or clumped residual conifer trees that are over 150 years old and a second conifer component of trees over 50 years old or older where hardwood stands have been converted to conifer/hardwood stands. The floodplains will contain scattered or clumped stands of hardwood trees that are over 80 years old. The vistas from the river would include large trees with scattered evidence of active management operations on adjacent commercial forestlands.

After two rotations, mature conifer trees should comprise a significant component of the riparian areas resulting in increased shade to surface waters. Under this alternative, geomorphic and floodplain processes would be improved thereby increasing large woody debris recruitment potential and improving fish habitat.

Riparian forest characteristics are trending toward sustainable maintenance or restoration of 'normative' processes and functions characteristic of an actively managed coastal riparian ecosystem (Liss 2006). This normative ecosystem supports production of natural resources (timber, fish, wildlife, plants) of value to users of those resources produced from riparian areas on the QIR. The riparian forest corridors on the QIR will contain diverse, functioning salmon and wildlife habitats sustained in a healthy normative ecosystem supported by both naturally occurring and anthropogenically managed physical, biological, and ecological processes. The riparian forest corridors contain abundant, contiguous aquatic and riparian habitats utilized by diverse, species-rich biological communities that support and service the cultural and economic value-based needs of the QIN and other stakeholders.



2.5 Summary of Consequences

Table 2-9 summarizes the potential impacts associated with the proposed management guidelines described in the four alternatives. See the preceding section (Sections 2.3 and 2.4) for detailed descriptions of the various guidelines and management actions.

Table 3-1. Summary of Estimated Impacts of Forest Management Alternatives for the 10-year Planning Period (2015-2025)

Resource	Indicators	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Timber Base	Number of Harvestable Acres	1,500 acres/year	1,000 acres/year	1,450 acres/year	1,350 acres/year
	Timber Volume per Year	50 MMbf/year	32.5 MMbf/year	48 MMbf/year	44.5 MMbf/year
	Employment Opportunity	10,500 workdays per year	7,000 workdays per year	10,150 workdays per year	9,450 workdays per year
Water Quality	Risk of Sedimentation	No change from current conditions would result in risk of sedimentation to increase	Stream adjacent buffer widths would increase by 25-150% on type H streams and by 100% on type O streams and current road density would not increase which would result in reduced risk of sedimentation	Stream adjacent buffer widths would increase by 100% on type D streams and by at least 25% on type H streams and current road density would not increase which would result in slightly reduced risk of sedimentation	Stream adjacent buffer widths would decrease by 50% on type D streams and by 16-37% on type H streams and road density would increase which would result in increased risk of sedimentation
Fisheries	Stream Temperature	17,232 stream adjacent riparian acres providing shade to 73% of total stream miles on QIR The current riparian buffers were designed to retain shade to the stream and should result in little to no post-harvest increases in stream temperatures.	42,702 stream adjacent riparian acres providing shade to 100% of total stream miles on QIR With the wider riparian buffers, stream temperatures should remain unchanged following timber harvest, thus is a slight improvement compared to Alternative 1.	19,889 stream adjacent riparian acres providing shade to 73% of total stream miles on QIR With the wider riparian buffers, stream temperatures will be similar to or slightly improved compared to Alternative 1.	8,738 stream adjacent riparian acres and 16,052 acres of actively managed floodplain forest providing shade to 73% of total stream miles on QIR The management in the buffers will be designed to retain current shading to the stream channel, thus this alternative is expected to be similar to Alternative 1.
Wildlife	Acreage in Conservation Status	21,646 acres	47,116 acres	24,303 acres	29,203 acres
	Clear-cut harvest Size	240 acres	80 acres	240 acres	240 acres
	Road Density	Increasing from 2.86 miles per square mile over the next 10-year planning period	Will likely remain at 2.86 miles per square mile over the next 10-year planning period	Increasing from 2.86 miles per square mile over the next 10-year planning period	Increasing from 2.86 miles per square mile over the next 10-year planning period; especially in the floodplain
Cultural Resources	Known and Unknown Archaeological and/or Cultural Sites	No additional acres in protection	26,983 additional acres in protection	3,601 additional acres in protection	8,501 additional acres in protection
	Conservation Areas Containing Cultural Resources	25,010 acres	51,993 acres	28,611 acres	33,511 acres



Chapter 3. Affected Environment and Environmental Consequences

The purpose of this chapter is to summarize the current condition of relevant forest resource components of the existing Quinault Indian Reservation (QIR) environment, and to disclose the environmental consequences (also referred to as impacts or effects) of the various alternatives for managing these forest resources based on specific measurable indicators (categories of data). As such, this chapter is the scientific and analytic core of the Environmental Assessment for the following key environmental issues:

3.1 Timber Base

3.2 Water Quality

3.3 Fisheries

3.4 Wildlife

3.5 Cultural Resources



Red alder forest with a scattered conifer forest. *Photo courtesy of L. Workman.*

Table 3-1. Summary of Estimated Impacts of Forest Management Alternatives for the 10-year Planning Period (2015-2025)

Resource	Indicators	Alternative 1: No-Action	Alternative 2: Fish, Wildlife, and Cultural Resources	Alternative 3: Modified No-Action	Alternative 3.1: Riparian Forest Management Corridors (RFMCs)
Timber Base	Number of Harvestable Acres	1,500 acres/year	1,000 acres/year	1,450 acres/year	1,350 acres/year
	Timber Volume per Year	50 MMbf/year	32.5 MMbf/year	48 MMbf/year	44.5 MMbf/year
	Employment Opportunity	10,500 workdays per year	7,000 workdays per year	10,150 workdays per year	9,450 workdays per year
Water Quality	Risk of Sedimentation	No change from current conditions would result in risk of sedimentation to increase	Stream adjacent buffer widths would increase by 25-150% on type H streams and by 100% on type O streams and current road density would not increase which would result in reduced risk of sedimentation	Stream adjacent buffer widths would increase by 100% on type D streams and by at least 25% on type H streams and current road density would not increase which would result in slightly reduced risk of sedimentation	Stream adjacent buffer widths would decrease by 50% on type D streams and by 16-37% on type H streams and road density would increase which would result in increased risk of sedimentation
Fisheries	Stream Temperature	17,232 stream adjacent riparian acres providing shade to 73% of total stream miles on QIR The current riparian buffers were designed to retain shade to the stream and should result in little to no post-harvest increases in stream temperatures.	42,702 stream adjacent riparian acres providing shade to 100% of total stream miles on QIR With the wider riparian buffers, stream temperatures should remain unchanged following timber harvest, thus is a slight improvement compared to Alternative 1.	19,889 stream adjacent riparian acres providing shade to 73% of total stream miles on QIR With the wider riparian buffers, stream temperatures will be similar to or slightly improved compared to Alternative 1.	8,738 stream adjacent riparian acres and 16,052 acres of actively managed floodplain forest providing shade to 73% of total stream miles on QIR The management in the buffers will be designed to retain current shading to the stream channel, thus this alternative is expected to be similar to Alternative 1.
Wildlife	Acreage in Conservation Status	21,646 acres	47,116 acres	24,303 acres	29,203 acres
	Clear-cut Size	240 acres	80 acres	240 acres	240 acres
	Road Density	Increasing from 2.86 miles per square mile over the next 10-year planning period	Will likely remain at 2.86 miles per square mile over the next 10-year planning period	Increasing from 2.86 miles per square mile over the next 10-year planning period	Increasing from 2.86 miles per square mile over the next 10-year planning period; especially in the floodplain
Cultural Resources	Known and Unknown Archaeological and/or Cultural Sites	No additional acres in protection	26,983 additional acres in protection	3,601 additional acres in protection	8,501 additional acres in protection
	Conservation Areas Containing Cultural Resources	25,010 acres	51,993 acres	28,611 acres	33,511 acres



3.1 Timber Base

The forest management standards or guidelines that have the greatest impact on the timber base are those outlining resource protection requirements, silvicultural or stand development practices, and the legacy of past management.

Resource protection requirements have a large impact on the timber base by directly influencing the amount of land that will be restricted from management activities, specifically timber harvest. Such requirements can be highly variable between alternatives depending upon the protection emphasis placed on specific resources in each alternative.

Silvicultural or stand development practices, such as site preparation, regeneration, vegetation control, pre-commercial thinning, fertilization and animal control, can have significant impacts on factors such as stand establishment, stand health, log quality, and growth. If applied appropriately, investment in these practices can yield a net positive return to the landowner at harvest by increasing timber volume per acre, improving stand quality, and shortening rotation length.

Today's timber harvest levels are affected by the current management standards employed and the legacy of prior management practices. Sustained yield harvest management is desirable because it allows for a predictable, continuous flow of revenue over a given time frame, as well as stable management needs, and subsequently stable employment. This is a benefit to the local community by providing stable jobs and ensuring that a skilled workforce will be maintained. A more variable harvest level approach that attempts to maximize financial return would create a more cyclic condition that would lead to unstable employment. This would have a destabilizing effect on the local economy by making it more difficult for the area to maintain a skilled workforce.

What is the current condition of the timber base?

The current condition and recent trends of the timber base as measured by three indicators describe the current and future condition of timber and timber based opportunities on the QIR.

The indicators that will be used to describe the current condition and evaluate alternatives with regards to the Timber Base will be:

1. Number of harvestable acres
2. Timber volume per acre
3. Employment opportunities related to timber harvest and forest management

Number of Harvestable Acres

The current number of acres available for future timber harvest is an estimate derived through a process utilizing Geographic Information Systems (GIS). The total land area of the QIN is approximately 207,000 acres. Using GIS, this total acreage is adjusted by removing non-tribal fee patent lands and other identified non-forested areas such as roads, bodies of water, and villages. Restricted areas or protection buffers are also removed; these include areas that have actually been identified on the ground and are restricted from harvest, and areas projected to become protected based on the proposed FMP guidelines. Currently, the number of acres available for future timber harvest is 141,247 acres.

Timber Volume per Year

The second indicator for the timber base is the amount of net board foot volume harvested per acre, which is indicated by the AAC. The designated AAC used in this analysis was calculated by modeling the alternative with the longest rotation length for a planning period of more than one and one half times its rotation length. For this planning period, the longest rotation length is approximately 80 years, therefore the model will cover 150 years. However, only the indicated harvest over the first 10-year period was used for the analysis of consequences. The net board foot calculated for the current management guidelines is 50 million board feet (MMbf).

Employment Opportunities

For the purpose of comparing the effects of the alternatives, a calculation of the number of harvest man-days it would take to harvest the projected AAC will be used. It has been estimated that it takes approximately 7 man-days to cut, yard, process, load and haul to market, one acre of timber. Based on acres available for harvest management under current FMP guidelines, the current annual allowable cut is approximately 1,500 acres a year. This would provide 10,500 man-days per year of harvest-related employment. In addition, employment needs related to road construction and maintenance, technical forestry work, forestry labor and management or supervision are closely tied to the level of harvest activity and, in general, will increase or decrease along with the level of harvest.

What are the impacts of the alternatives on the timber base?

The following is a brief summary of impacts that each alternative will have on the timber base indicators that have been identified for the purpose of comparing and evaluating the alternatives.

Impacts to Number of Harvestable Acres

Alternative 1: Under Alternative 1, current timber harvest practices would continue as they have over the last decade. There are some changes to the harvestable land base as compared to the current plan. These changes are due to data being updated since the beginning of the current plan, such as the roads, streams, and non-forest boundaries.



Forest on the eve of being logged. Photo courtesy of L. Workman.

Under Alternative 1, the total acres available for harvest on trust land is 141,247 acres. Based on the AAC calculation (50 MMbf/year) and an estimated average volume of 33,000 board feet per acre, the average number of acres harvested each year of the plan would be approximately 1,500 acres.

Alternative 2: Under Alternative 2, current timber harvest practices would change little with the exception of the leave tree and partial harvest buffer areas. Inside the floodplain of major rivers and

streams, much of the harvest would involve partial harvesting instead of regeneration harvesting. The other significant change is the number of acres available for harvest, which will be less than the current plan due to increases in the size of buffers on streams, rivers, prairies, and alongside paved roads.

Under Alternative 2, the total acres available for harvest on trust land are 137,463 acres. Of these, 111,417 acres are available for regeneration harvesting and 26,046 acres are available for partial harvesting. Based on the AAC calculation (32.5 MMbf/year) and an estimated average volume of 33,000 board feet per acre, the average number of acres harvested each year of the plan would be approximately 1,000 acres.

Alternative 3: Under Alternative 3, current timber harvest practices would continue as they have over the last decade. There are changes to the harvestable land base as compared to the current plan due to larger buffers on rivers and streams. Other changes in the acres available for harvest are due to data being updated since the beginning of the current plan, such as roads, streams, and non-forest boundaries.

Under Alternative 3, the total acres available for harvest on trust land are 137,751 acres. Based on the AAC calculation (48 MMbf/year) and an estimated average volume of 33,000 board feet per acre, the average number of acres harvested each year of the plan would be approximately 1,450 acres.

Alternative 3.1: Under Alternative 3.1, current timber harvest practices would change little with the exception of the buffer on the Channel Migration Zones (CMZ) of rivers and streams. Inside the buffered CMZ areas, most of the red alder harvest would involve regeneration harvests of some acres, while conifer areas would involve partial harvesting. The other significant change is in the number of acres available for harvest, which will be less than the current plan due to increases in the size of buffers on streams, rivers, and prairies.

Under Alternative 3.1, the total acreage available for harvest on trust land is 138,770 acres. Of the total, 123,334 acres are available for regeneration harvest and 15,436 acres are available for partial harvest. Based on the AAC calculation (44.5 MMbf/year) and an estimated average volume of 33,000 board feet per acre, the average number of acres harvested each year of the plan would be approximately 1,350 acres.

Rationale: The number and size of required buffers and other protection measures, as well as the intensity of harvesting techniques, as described in the alternatives, directly influence the number of acres and the amount of volume available for future timber harvest.

Impacts to Timber Volume per Year

Alternative 1: During the planning period, the projected number of board feet harvested each year should be approximately 50 MMbf.

Relative to other alternatives, current practices (the no action alternative) would allow the most volume to be harvested during the 10-year planning period. This is for two reasons: fewer acres are restricted from harvest and regeneration harvests are allowed on all available acres except conifer stands in the active floodplain of major rivers, which can be partially harvested.

Alternative 2: During the planning period, the projected number of board feet harvested each year would be approximately 32.5 MMbf. This represents an annual reduction from current practices in available net board foot volume of approximately 17.5 MMbf.

Major differences between this alternative and current practice include the extension of the rotation length to a minimum of 70 years. Some phase-in of this requirement was used to help offset the volume shortfall in the next 10 years, but this will still lead to significantly less volume in this 10-year period. The other substantial difference is the partial harvesting that will occur in the floodplains of the major rivers and the extension of buffers to all lengths of streams, both fish and non-fish bearing. It will result in less volume harvested in the next 10-years and less volume harvested in the years beyond.

Alternative 3: During the planning period, the projected number of board feet harvested each year would be approximately 48 million board feet (MMbf). This represents an annual reduction from current practices in available net board foot volume of approximately 2 MMbf.

Relative to current practices, this alternative would allow the second most volume to be harvested during the 10-year planning period. Harvesting practices are very similar to current practices, with the only substantial difference being increases in the size of no-harvest buffers.

Alternative 3.1: During the planning period, the projected number of board feet harvested each year would be approximately 44.5 million board feet (MMbf). This represents an annual reduction from current practices in available net board foot volume of approximately 5.5 MMbf.

There are two primary differences between this alternative and current practice. The differences are inter-related and will be discussed together. The first is an expansion of the restricted harvest area to include the CMZ of all waters plus a buffer. This larger buffer area reduces the acreage available for regeneration harvest. Harvesting techniques inside the CMZ and its associated buffer will include some regeneration harvests of red alder but will consist mostly of partial harvesting or restricted regeneration harvests. The net effect is that more trees are left standing, reducing the total harvest.

Rationale: The amount of volume and how that volume is being harvested has a direct impact on the value derived from the timber resource and on employment opportunities.

Impacts to Employment Opportunities

Alternative 1: Employment opportunities derived directly from the harvesting operation would be 10,500 workdays annually.

Alternative 2: Employment opportunities derived directly from the harvesting operation would be 7,000 workdays annually.

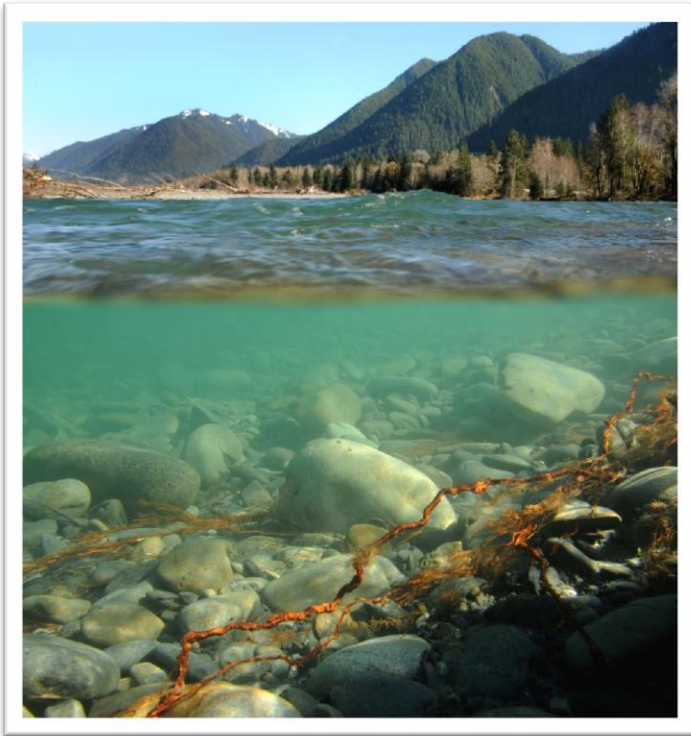
It should be pointed out that the workdays would be slightly higher for alternative 2 since it takes longer to do partial harvests versus regeneration harvests. This additional employment would result in lower revenue for the landowner

Alternative 3: Employment opportunities derived directly from the harvesting operation would be 10,150 workdays annually.

Alternative 3.1: Employment opportunities derived directly from the harvesting operation would be 9,450 workdays annually.

It should be pointed out that the workdays would be slightly higher for Alternative 3.1 than projected; the layout process is more time consuming to implement partial harvests versus regeneration harvests

Rationale: The acreage available for timber harvest has a direct effect on the size of the workforce needed to accomplish the amount of work associated with each level of harvest activity.



Water view. Photo courtesy of L. Workman.



3.2 Water Quality

The quality of our water has direct implications on the many resources within the QIR, including human uses of the QIN. Species inhabiting the QIR rely upon cool clean water for their survival. However, this can be substantially impacted by natural resource management activities. For example, timber harvest adjacent to water systems results in an increase of stream temperature, due to the reduction of shading capacity. Water temperature increases have implications on aquatic flora and fauna, which require clean, cool, well-oxygenated water for optimum growing conditions. Fauna of particular interest to the QIN are

salmonids (*Oncorhynchus spp.*), which have

cultural, commercial, and recreational value and Bull trout (*Salvelinus confluentus*), a designated threatened species under the Endangered Species Act in 1998. Furthermore, forestry activities that affect water quality may have an impact on invertebrate communities within streams that form the main food source for fish (Campbell and Doeg, 1989).

One potential impact to water quality associated with timber harvest practices is an increase in sedimentation. Research has shown that timber harvest practices can increase the direct input of sediment to the stream channel (Swanson et al. 1987) as a result of: stream adjacent harvest and subsequent erosion (Scrivener and Brownlee 1989); surface runoff from harvest roads; and from large scale landslides (Cederholm et al. 1981; Swanson et al. 1987; Cederholm and Reid 1987).

Forest practices effects on water quality also include elevated concentrations of dissolved salts and suspended solids and nutrients, especially during peak flows, which contribute to a degradation of water quality (Campbell and Doeg 1989). Any chronic or acute increase in suspended fine sediment reduces the quality of habitat for salmonids and other aquatic species. Fine sediment that settles in streams or moves in suspension can reduce salmonid viability (Hicks et al 1991). While salmonids have exhibited adaptability to ambient sediment levels because of natural variations in sedimentation due to brief periods of high flow, overall increased fine sediment in spawning gravels and food production areas for salmonids leads to both reduced spawning success and a reduced food supply (Hicks et al 1991). Furthermore, fine

sediment deposited in spawning gravel can reduce interstitial water flow, which can lead to a decrease in dissolved oxygen concentrations (Campbell and Doeg 1989).

What is the current condition of water quality?

Because of a lack of quantitative data regarding water quality, sedimentation levels has been estimated based on buffer widths, an important factor for reducing runoff directly into the stream during and after stream adjacent harvest. Road density also effects sedimentation levels in streams, and is currently 2.86 miles of road per square mile of forestland.

Buffer widths are important for reducing runoff directly to the stream during and after stream adjacent harvest. Under current management practices, type D streams receive a no-entry buffer of 100 to 200 feet unless a thinning or restoration harvest occurs in which case type D streams would receive a 25 to 50 foot no-entry buffer. Type H streams receive a no-entry buffer of 60 to 80 feet unless in rare instances a thinning or restoration harvest occurs in which case type H streams would receive a 25 to 50 foot no-entry buffer. Perennial type O streams receive a no-entry buffer of 50 feet for the first 300 to 500 feet upstream of the confluence with a type D or H stream. Intermittent type O streams receive a 30 foot equipment limitation zone.

Road density of open, drivable roads on the reservation is currently 2.86 miles of road per square mile of forestland. A plan to abandon existing roads does not currently exist; therefore existing roads would only be abandoned over time through decreased use and natural succession. As timber harvest continues, new roads are reconstructed and or newly built; therefore road density may be increasing. A further discussion of Road Density is can be located in the Wildlife Section – Road Density (Section 3.4.2.3).

Unstable slopes are currently managed to prevent or avoid an increase or acceleration of the naturally occurring rate of landslides due to harvesting.

What are the impacts of the alternatives on water quality?

While certain best management practices exist to reduce sedimentation, each alternative differs in the range of practices that may affect sedimentation rates, such as, riparian buffer widths, road density, and the management of unstable slopes.

The estimated impacts of implementation of the four alternatives on water quality were analyzed using sedimentation as the indicator. An increase in sedimentation from current conditions is expected in Alternative 3 and 3.1 over the 10 year planning period; however, Alternative 3.1 offers the greatest protection of unstable slopes. A slight decrease in sedimentation would result from implementation of Alternative 2.

Impacts to Sedimentation

Alternative 1: Under this alternative, the risk of sedimentation would remain the same as current conditions. Buffer widths would remain the same, thereby contributing the same

amount of sediment as is currently occurring. However, under this alternative, only 50 percent of a river mile could be harvested within a five year period, thereby reducing the amount of harvest per river mile in the floodplain. Road density would continue to increase as new roads are opened up to access new timber harvests. Unstable slopes would continue to be managed to prevent or avoid an acceleration of the naturally occurring rate of landslides due to timber harvest.

Alternative 2: Under this alternative, the risk of sedimentation would decrease from current conditions. No-entry buffer widths would remain the same on type D streams, would increase by 25 to 150 percent on type H streams, would increase by 50 percent on perennial type O streams, and would increase by 100 percent on intermittent type O streams. Road density would remain at approximately 2.86 miles of road per square mile over the next ten-year planning period. This alternative includes plans for abandonment of roads following harvest, particularly in the floodplain, which would mean no net gain of roads would occur, at least in the floodplain. No harvest would occur on slopes greater than 70 percent with the potential of mass sediment delivery to streams.

Alternative 3: Under this alternative, the risk of sedimentation would likely decrease slightly from current conditions. No-entry buffer widths would increase by 100 percent on type D streams and by at least 25 percent on type H streams. No-entry buffer widths on type O streams would not change from current conditions. Road density would likely increase to a density higher than 2.86 miles of road per square mile, similar to that of Alternative 1, as new roads are opened to access new harvest units over the next ten-year planning period. This alternative does not include a plan to abandon existing roads; therefore existing roads would only be abandoned over time through decreased use and natural succession. Unstable slopes would continue to be managed to prevent or avoid an acceleration of the naturally occurring rate of landslides due to timber harvest.

Alternative 3.1: Under this alternative, the risk of sedimentation would likely increase slightly from current conditions; however, this increase would not be a significant impact. Under this alternative, buffer widths would be reduced to 50 feet from the ordinary high water mark on type D and H streams with active management of 150 feet of riparian buffer occurring to retain one-third acreage of an alder stand or two-thirds acreage of a conifer stand; there is also a requirement to leave 30 dominant/co-dominant conifer per acre outside of this no-entry buffer. Between this actively managed buffer edge and the edge of the channel migration zone buffer, 30 dominant/co-dominant conifer per acre would be retained. Even though overall the buffers would be increasing from current levels, sedimentation is likely to increase because of the active management that would occur within the RFMC. The resulting sedimentation would be a negative impact on water quality; however, this impact would be considered a minor impact in light of current conditions and would not overall significantly affect the resource.

Road density would likely increase to a density higher than 2.86 miles of road per square mile as new roads are opened to access new harvest units over the next ten-year planning period.

Increased road development may be necessary in the floodplain to operate around conifer patches and leave trees that would be retained. These roads would remain open until the stands have reached free-to-grow status (approximately 4-7 years) in order to conduct reforestation activities. This alternative offers the greatest protection of unstable slopes by developing measures to safeguard sensitive areas.

Rationale: Research has shown that timber harvest practices can increase direct sediment input to the stream channel (Swanson et al. 1987) as a result of stream adjacent harvest and subsequent erosion (Scrivener and Brownlee 1989), surface runoff from harvest roads, and from large scale landslides (Cederholm et al. 1981; Swanson et al. 1987; Cederholm and Reid 1987). Any chronic or acute increase in suspended fine sediment reduces the quality of habitat for salmonids and other aquatic species. Riparian buffer widths, road density, and management of unstable slopes have a direct effect on sedimentation. No-entry buffer widths were used as a comparison because harvest operations have the potential to increase sedimentation.



3.3 Fish and Fish Habitat

The Quinault people have depended upon various fish species for sustenance and livelihood since time immemorial. Pacific salmon (*Oncorhynchus* spp.) in particular are an iconic species integral to both the culture and heritage of the Quinault and other tribes throughout the greater Pacific Northwest (Pulwarty and Redmond 1997). Pacific salmon have historically served as a primary source of subsistence and income to many by supporting cultural, commercial, and recreational fisheries throughout the region.

Furthermore, the QIR contains 1,294 miles of rivers and streams and 2,301 acres of wetlands providing habitat and spawning grounds for many species of fish (QDNR, unpublished data). The QIR contains the entire Raft River watershed and portions of the Queets, Quinault, Salmon, Clearwater, and Moclips River watersheds. In addition, there are nine small independent watersheds that drain directly to the Pacific Ocean partially or entirely contained within the QIR.

Fisheries throughout the QIR have been significantly impacted by historic timber harvest practices, which have cumulatively contributed to the current degraded condition of QIR fisheries. The large-scale harvesting of mature riparian forests from the 1920's through the 1980's disrupted forest regeneration cycles within the floodplain. This historic approach to timber harvests led to an increase in road densities, the installation of fish passage barriers, the degradation of in-stream habitat, and the removal of in-stream, habitat forming, woody debris. Research has shown that such practices have considerably negative impacts on aquatic species, particularly Pacific salmon (Lichatowich 1999). Thus it is assumed that all species known to occur within the QIR were impacted by historic timber harvest practices.

Table 3-2. Ratings of stock status for Pacific salmon in the Quinault and Queets River systems (QDFi, 2008; QDFi, 2014).

Stock ^a		Origin ^b	Lineage ^c	Risk Status ^d
Quinault River				
Chinook	Fall	Integrated	Composite	Low
	Spring/Summer	Natural	Wild	Moderate
Chum		Natural	Composite	Moderate
		Hatchery	Composite	Moderate
Coho		Natural	Composite	Low
		Hatchery	Composite	Low
Sockeye		Natural	Wild	High
Steelhead		Hatchery	Hatchery	Low
Queets River				
Chinook	Fall	Natural	Wild	Low
	Spring/Summer	Natural	Wild	Moderate
Chum		Natural	Wild	Moderate
Coho		Natural	Wild	Low
		Hatchery	Composite	Low
Steelhead		Natural	Wild	Low
		Hatchery	Composite	Low

^aStock: A stock may be made up of several breeding populations.

^bOrigin: The proximate source of annual runs.

^cLineage: Known history of genetic sources to the population; composite refers to a population that is derived from both wild and hatchery sources.

^dStatus: Qualitative rating of risk for continued decline or virtual extinction.

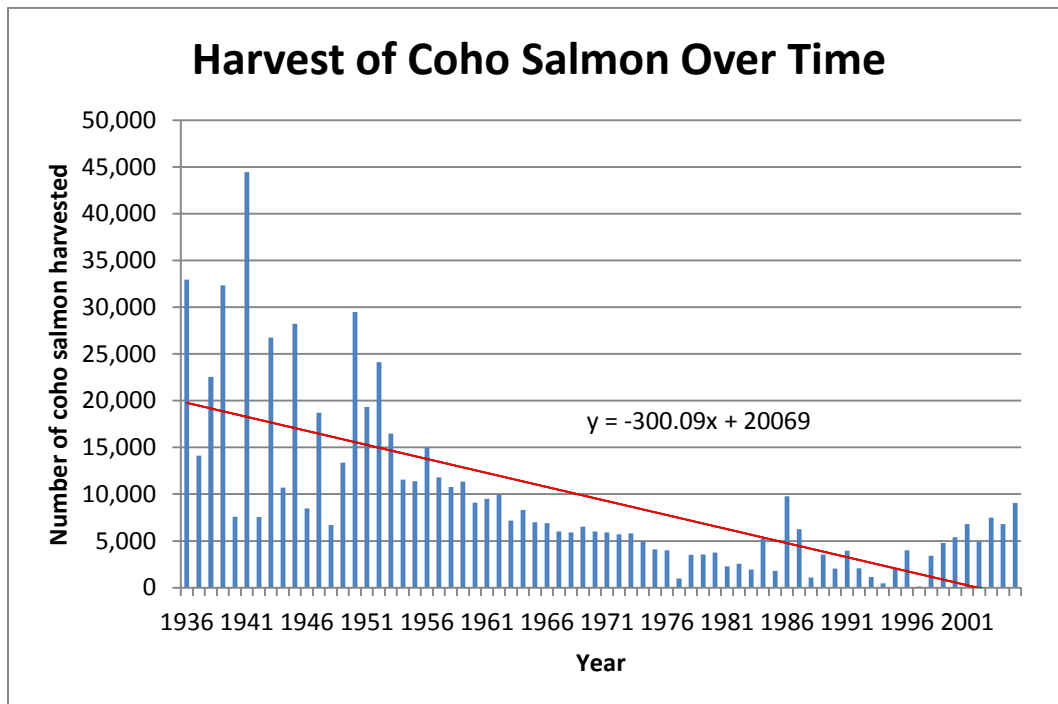
Historically robust populations of Pacific salmon, which once occupied virtually all accessible and suitable habitats within the QIR and greater Pacific Northwest (Fulton 1968), have declined precipitously over the past century as a result of human activity (Matthews and Waples 1991; NRC 1996). On a large scale, Pacific salmon populations have experienced three major detrimental impacts that led to population declines: heavy fishing pressure in the early 1900s (Levin and Schiewe 2001); habitat destruction resulting from ill managed timber harvests (Pearse 1982; Lichatowich 1999); the construction of hydropower projects throughout the mid-1900s (Levin and Tolimieri 2001). These impacts were then compounded by a natural downturn in ocean productivity (Beamish et al. 1999) has resulted in alarming population-level impacts. Despite recent restoration efforts and improving forest practices to better protect riparian areas, the habitat for fish on the QIR is significantly impacted from the accumulation of these historic activities (refer to Table 3-2).

Current Pacific salmon stocks produced from the waters of the QIR are diminished from historic abundance (QDFi 1981; QDFi 2008; QDFi unpublished data). Estimates of salmon and steelhead harvests and escapements from the Queets and Quinault River's indicate that natural salmon produced from waters of the QIR may be reduced by as much as 70 percent since the 1940's and 1950's (QDFi unpublished data). Of the salmon stocks on the QIR, natural coho salmon (*Oncorhynchus kisutch*) escapement data provide a good indicator to demonstrate declines of

salmon production associated with forest removal and habitat loss (Figure 3-1) particularly because Coho utilize a range of stream types and accessible wetlands across the QIR.

Salmonid fish require cool, clean, well-oxygenated water with a diverse range of available habitats. Salmonid fish use a wide array of the river system, including stream reaches ranging from small tributaries to channels of main stem rivers. Localized habitat conditions on the QIR range from those represented by a mature, unmanaged riparian forest buffer condition, to those that are severely impaired and commercially managed. Because of a lack of data required to perform a quantitative analysis of the current conditions of riparian and in-stream salmon habitat on the QIR, a qualitative analysis was performed to describe the current riparian and in-stream habitat level of impairment (LI) on the QIR (Table 3-3). Table 3.3 illustrates the current LI on the QIR using a series of indicators and the assignment of “low, moderate, and high” of each indicator on the corresponding stream type.

Figure 3-1. Historic harvest of natural coho salmon in the Quinault River, including trend line.
Consistency of regulations governing schedules and fishing effort makes these data a robust index of relative stock abundance. The trend line illustrates the decline of Coho Salmon populations on the Quinault River.





Fisherman. *Photo courtesy of L. Workman.*

What is the current Condition of the Fisheries?

While it is difficult to assess the current condition of fish habitat on the QIR, stream temperature will be used as the indicator for the current condition of fisheries because of its importance in the complex habitat of fish, the impacts that forest practices have had historically, and the likelihood that future forest practices will have, on stream temperature. Research indicates that a warming climate is already increasing stream temperatures (Poff et al. 2002; Rahel and Olden 2008) and if current trends of climate warming continue in the future, stream temperatures will increase under all of the proposed alternatives.

Stream Temperature

Preliminary analysis of 2013 QIN stream temperature data indicates that most of the larger rivers and streams within the Queets watershed display warm summer temperatures (QIN unpublished data). In the absence of water quality standards, these data will be examined using a range of 12.0° C to 14.0° C as the preferred temperature range for salmonids (MacDonald et al. 1991; Rashin et al. 1993). Lethal effects on salmonids have been observed between 20.0° C and 29.0° C (MacDonald et al. 1991; Rashin et al. 1993). Therefore, 20.0° C will be used as an indicator for temperatures approaching lethal limits for salmonid fish.

Most (68 percent) of the 87 sites sampled in 2013 in the Queets River watershed exceeded applicable 7-day average daily maximum (7DADM) temperatures at least once during the year. Thirty-one percent did not exceed the applicable 7DADM.

Temperatures at the Grays Harbor-Jefferson County line, in the lower Salmon River sub-watershed of the Queets watershed, exceeded the preferred range for salmonids for most of the summer months, with many of these days exceeding the lower lethal limit. Stream temperatures exceeded 16.0° C on 87 of the 140 days sampled. In addition, stream temperatures exceeded 20.0° C on 23 of the 140 days sampled. Therefore, stream temperatures exceeded the preferred range for salmonids from the mouth of the Salmon River upstream to the Salmon River Hatchery during much of this time period. Sampling upstream of the hatchery identified 77 days where the 7DADM exceeded 16.0° C of the 117 days that were sampled. However, no daily maximum temperatures exceeded 20.0° C.

Cooler temperatures were observed on the Salmon River, upstream of the confluence with the North Fork Salmon River where of the 114 days sampled, no daily maximum temperatures exceeded the preferred range of 16.0° C.

Overall, stream temperatures in the lower Salmon River exceeded the preferred range posing a potential stress factor to salmonids during the mid to late summer months of 2013. Stream temperatures in the upper reaches of the Salmon River and its tributaries appear to be at the upper end of the preferred range. Given this information, riparian management must consider an increase to the shading capacity of the channel throughout the watershed over short and long term ranges. Under current forest management, only 73 percent of the stream miles located within the QIR receives a riparian buffer. The remaining 27 percent are type O streams, or streams that do not fit the habitat criteria to contain fish, and as such do not receive a buffer.

What are the impacts of the alternatives on fisheries?

The current level of impairment on fish habitat is already high, not only on the QIR, but up and down the Pacific Coast. While it is probable that any of the alternatives would result in increases in stream temperature over the 10 year planning period, it is likely that the overall impact to fisheries in the short-term 10-year planning period would be minor in comparison to the current conditions and not result in significant impacts.

Impacts to Stream Temperature

Alternative 1: Under this alternative, buffer widths would remain the same with 17,232 acres of riparian buffer providing shade to 73 percent of the stream miles located within the QIR. Twenty-seven percent of stream miles, type O streams, would not receive a riparian buffer. Under this alternative, thinning and restoration harvests exist and, if implemented, could reduce the riparian buffer adjacent to type D and H streams in order to perform hardwood conversion activities. Stream buffers could be reduced to as little as 25 feet from the ordinary high water mark for a length no greater than 700 contiguous feet. If implemented, this could negatively impact localized stream temperature in the short term.

Alternative 2: Under this alternative, buffer widths would increase to 300 feet on type D and large type H streams, 150 feet on smaller type H streams, and 75 feet on all type O streams with

42,702 acres of riparian buffer providing shade to 100 percent of the stream miles located within the QIR. This alternative would provide the most shade to the maximum amount of stream miles over the short, intermediate, and long-term as it offers the most riparian buffer acres and it provides for shading of all streams located within the QIR regardless of stream type.

Alternative 3: Under this alternative, buffer widths would increase to 200 feet on type D streams and to 80 or 100 feet on type H streams with 19,889 acres of riparian buffer providing shade to 73 percent of the stream miles located within the QIR. Twenty-seven percent of stream miles, type O streams, would not receive a riparian buffer. Under this alternative, restoration harvest, if implemented, could reduce the riparian buffer adjacent to type D and H streams in order to perform hardwood conversion activities. Stream buffers could be reduced to as little as 25 feet within the ordinary high water mark for a length no greater than 700 contiguous feet. If implemented, this would reduce shading and could negatively impact localized stream temperature at least in the short-term.

Alternative 3.1: Under this alternative, buffers would increase from current levels; however, limited-entry buffer widths in the core zone adjacent to the stream would be reduced to 50 feet from the ordinary high water mark on type D and H streams. From the edge of this core zone to 150 ft., active management of 150 feet of riparian buffer occurring to retain one-third acreage of an alder stand or two-thirds acreage of a conifer stand would be allowed. Between this actively managed buffer edge and the edge of the channel migration zone buffer, 30 dominant/co-dominant conifer per acre would be retained. A total of 8,738 stream adjacent acres of no-entry riparian buffer and 16,051 acres of riparian forest in the variable retention shade reduction zone for a total of 24,789 acres would provide shade to 73 percent of the stream miles located within the QIR. Twenty-seven percent of stream miles, which includes type O streams, would not receive a riparian buffer. Because no-entry buffer widths would be reduced to 50 feet within the ordinary high water mark on all streams, and some harvest would occur in the variable retention shade reduction zone, this alternative could negatively impact stream temperature in the short term.

Rationale: Considering stream temperatures may be on the upper end of the preferred range or in some cases exceeding the preferred range and will continue to increase as a response to climate change, management of stream adjacent riparian buffers must provide shade to the channel.



Elk. Photo courtesy of L. Workman.



3.4 Wildlife

Timber harvest on the QIR is an important factor affecting all wildlife species and their habitats. Harvest practices alter plant species diversity, ecological succession, and access by the construction of new roads or reconstruction of existing roads. Forest management practices may alter the quantity and quality of nutrition and both thermal and security cover provided by conifers and woody shrubs for big game species. Big game foraging habitat created by timber harvest occurs in the 6-15 year old clear cuts. Furthermore, riparian forests provide a high quality forage and habitat on the QIR. Even-aged pole-sized stands provide little nutritional value to big game species such as Roosevelt Elk (*Cervus canadensis roosevelti*) and Black-tailed Deer (*Odocoileus hemionus columbianus*).

Impacts of forestry practices on non-game wildlife species on the QIR are also of concern for a few reasons: the presence of Federally Threatened and Endangered Species, the lack of population monitoring of game and non-game wildlife species, and the cultural significance of many game and non-game wildlife species to the Quinault people.

Forestry practices on the QIR must consult with the United States Fish and Wildlife Service concerning affects to Federally Threatened Species: northern spotted owl (*Strix occidentalis*) and marbled murrelet (*Brachyramphus marmoratus*). In order to carry out timber harvest, management must be found not to have a significant effect on the continued existence of these species. Limited data exists for these species, along with most other non-game species, on the QIR, making it a challenge to wildlife biologists responsible for monitoring the health of wildlife populations that inhabit the reservation.

Additionally, many game and non-game wildlife species are culturally important to the Quinault people. Besides providing a source of nutrition and income for the Quinault people, certain body parts of animals are used ceremonially. The sight and sound of wildlife on the landscape bind the Quinault to their home through time.

What is the current condition of wildlife?

Wildlife habitat on the QIR is diverse, and includes forests, riparian zones, prairies, estuaries, and the foothills of the Olympic Mountains; these habitats provide cover and forage for many species of mammals, birds, amphibians, and reptiles. Currently, wildlife habitat that exists on the QIR is primarily low elevation temperate forests that exhibit past and present human disturbance effects, primarily due to timber harvest and road construction. There are small natural disturbances from fire and wind throw.

Limited population data is available for most wildlife species. With the exception of the bald eagle (*Haliaeetus leucocephalus*), there are currently no monitoring programs for any populations of non-game wildlife species on the QIR. Data for Roosevelt elk (refer to Appendix C) and bald eagle is available (refer to Appendix D). Population studies for cougar, black-tailed deer, and black bear are being developed. Historic data is available for marbled murrelet and northern spotted owl. The lack of population data provides a challenge to wildlife biologists responsible for monitoring the health of wildlife populations, response to management, and in recommending management prescriptions. Increased monitoring of wildlife populations is necessary to provide the data required to analyze the condition of wildlife on the QIR and the cumulative impacts of timber management. Monitoring information may be used periodically throughout the life of the next FMP to inform adaptive management to improve wildlife habitat and decrease negative impacts.

Current suitable habitat for nesting and roosting bald eagles occurs along the Quinault, Raft, Salmon, Queets Rivers, Cook Creek, Lake Quinault & the Coast. Suitable bald eagle nesting habitat includes nests that are found in emergent trees that can support large nest structures and have unobstructed views of the surrounding area. Bald eagles within the QIR have been observed nesting in a variety of tree species such as black cottonwood (*Populus balsamitera*), western hemlock (*Tusuga heterophylla*) and most commonly Sitka spruce (*Picea silchensis*). Additional components of bald eagle habitat include perching and fledging trees, alternate nest

trees and forested buffer trees protecting the nest tree from wind damage or wind throw. In addition to canopy structure, bald eagle nesting habitat on the QIR is all located near water bodies that will support adequate food supply. Wintering habitat for bald eagles on the QIR require perches with great foraging proximity and a canopy structure that provides both protection and communal night roosts.

Specific habitat components important to wildlife have not been maintained over the past ten years and would benefit from increased protection. Snags, legacy trees and green-tree retention are lacking across the landscape, limiting important wildlife habitat components. Course woody debris is currently represented across the landscape at acceptable levels, however current firewood extraction and cedar salvage operations are diminishing the large pieces, therefore monitoring and increased preservation may be necessary in the future.

The current condition of big game (Roosevelt elk and black-tailed deer) and federally protected species (marbled murrelet and northern spotted owl) habitat will be measured by three indicators to describe the current condition and future conditions of wildlife habitat on the QIR. The indicators that will be used to describe the current condition and evaluate alternatives with regards to wildlife will be:

1. Acres of Land in Conservation Status
2. Clear-cut Size
3. Road Density

Acres of Land in Conservation Status

Of 183,000 total acres managed under the current Forest Management Plan, 21,646 are in conservation status. That means 12 percent of the land that is managed by the QIN and BIA is in conservation status. Only 4,079 of those acres are in long-term conservation easements. The remaining 17,232 are riparian and wetland buffer areas that are subject to change with site-specific management prescriptions and FMP updates. Old-growth in the Conservation Easement Blocks is in long-term conservation status. Old-growth is defined by QIN biologists as a forest composed of large trees, large snags, and numerous large downed logs, containing a multi-storied canopy (USFS, 1985). Most of the marbled murrelet and northern spotted owl habitat on the QIR occurs within these conservation blocks. The current rotation age of 50 years does not allow for development of additional habitat for old-growth obligate species to aid in long-term recovery.

The old-growth conservation areas are also utilized by game species and contain high value as they provide forage and escape cover, especially during the winter months. A minimum of 20 percent of big game range should be managed as optimal cover. Optimal cover contains an overstory component which provides a weather intercepting component, as well as an



Bald Eagle. *Photo courtesy of D. Ravenel*

understory component which provides forage. Optimal cover habitat occurs at elevations below 1,500 feet that face a southern aspect and contain dominant trees averaging over 21 inches in diameter that create 70 percent of greater canopy closure (USFS, 1985).

Clear-cut Size

The current clear-cut harvest unit size limit is 240 acres.

Managing for this size creates an even-aged stand of one size or age class where the stand is harvested every 35 to 50 years by clear-cut harvest. This results in low diversity within the forest stand. Silvicultural practices of this manner will not create a broad spectrum of wildlife habitat. During the early period of the clear-cut harvest will create new forage areas, however the young conifer forests will quickly develop into cover habitat with limited forage production.

Retention of green trees, emergent conifer, wildlife trees, snags, and coarse woody debris on timber sales will increase diversity on the landscape for wildlife. Retention of snags creates food and cavity nests for a variety of wildlife species on the QIR. Coarse woody debris includes stumps, logs, and limb material that will decay and return nutrients back into the forest ecosystem. In addition, coarse woody debris provides habitat to many small mammal species.

The ratios in which cover and forage are interspersed will affect the time and energy required for big game to utilize the habitat. As forage and cover areas become larger than optimum, less of the total available habitat will be used by big game and other species. Diversity in the forest stand will increase or decrease with edge created by clear-cut layout and size. The larger the openings, the less edge created thus the lower diversity on the landscape.

Road Density

The extensive road system on the QIR is a result of forest practices over time, and intersects important habitat utilized by a variety of wildlife. The current road density on the QIR can be calculated in one of two ways: using the total road density or by using the drivable road density. There is a total of 1,936 miles of road on the QIR, or 5.98 miles of road per square mile of the reservation. Of that, 927.6 miles are considered to be drivable or 2.86 miles of drivable road per square mile of the reservation. The percentage of road that is considered not drivable at this time is in varying stages of regeneration and will remain in regeneration until they are reopened to access new harvest units.

Wildlife, both terrestrial and aquatic species, are dramatically and adversely affected by roads open to vehicular traffic; both directly and indirectly. Direct effects of road density include outright mortality and injury secondary to vehicle collision, increased energy expenditure

secondary to stress-induced movement, increased vulnerability to mortality through legal and illegal hunting, and displacement from high quality habitat types. As more roads are opened, traffic increases thereby increasing the risk of mortality through collision, increasing movement rates of wildlife secondary to stress, and increasing access for hunting. Survival rates of big game are reduced in areas with higher road density (Leege, 1984; McCorquodale et. al., 2003). Stress and increased movement rates have also been observed in big game exposed to high road density. Indirect effects of road density include loss of habitat and barriers to movement, especially in small animals such as small mammals and amphibians. Road density results in two types of habitat fragmentation. First, roads reduce the total amount of habitat for foraging, thermal cover, and hiding cover. Second, roads reduce the remaining habitat into smaller, more isolated patches of habitat (Saunders et al., 1991).

There are many benefits to reducing road density, especially in the floodplain. First, road closure would decrease the amount of energy expended as a result of disturbance by vehicular traffic. Decreased disturbance would result in improved diet quality as big game species are able to forage in undisturbed areas. Second, road closure would reduce mortality and injury rates secondary to vehicular collision and access for hunting. Third, road closure would reduce the amount of habitat fragmentation and improve connectivity among habitat patches.

What are the impacts of the alternatives on wildlife?

Impacts to Land in Conservation Status

Alternative 1: Under this alternative, 21, 646 acres would remain in conservation status, with 4,079 acres in conservation easement status and riparian and wetland buffer areas making up the remaining 17,232 acres. Most of the suitable old-growth on the QIR would remain in long-term conservation status, thereby protecting late-successional forest dependent species such as the northern spotted owl and marbled murrelet. However, any late-successional forest habitat within 300 feet of the conservation block boundary would be degraded when hard edges are created through timber harvest on adjacent lands. This alternative may also negatively impact late-successional forest-dependent species through the removal of remaining habitat outside the conservation block during sensitive time periods. In addition, the rotation age would remain at 50 years, so no additional habitat will be developed to aid in the long-term recovery of these species under this alternative. Under Alternative 1, Forest management practices near active bald eagle nests will follow the National Bald Eagle Management Guidelines, unless a permit is issued by the Service for a specific project. Habitat for other non-game species such as insects, amphibians, mollusks and small mammals would likely remain the same under the no action alternative due to similar retention of snags and green trees as current levels.

Alternative 2: Under this alternative, 47,116 acres would be in conservation status, with 4,079 acres in conservation easement status and the remaining 42,702 in riparian and wetland buffer areas.

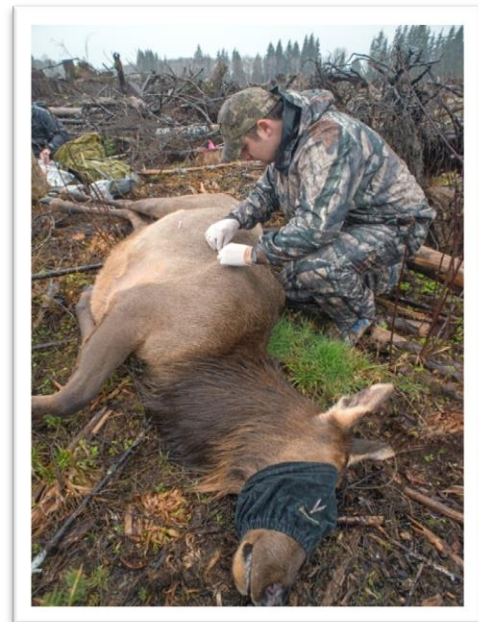
Most of the old-growth on the QIR would remain in long-term conservation status, thereby protecting the majority of the QIR's habitat for late-successional forest dependent species such as the northern spotted owl and marbled murrelet. However, any late-successional forest habitat within 300 feet of the conservation block boundary would be degraded when hard edges are created through timber harvests on adjacent lands. This alternative may also negatively impact late-successional forest dependent species through the removal of remaining habitat outside the conservation block during sensitive time periods. Roosting and foraging habitat for the northern spotted owl would improve across the lower Reservation due to a longer rotation age; however nesting habitat would likely remain absent. Increased riparian buffers would provide greater dispersal habitat for marbled murrelets as they migrate from the sea to the foothills of the Olympic Mountains. Nesting habitat would likely remain absent on the lower reservation over the next ten year planning period, but over the long-term may develop with longer harvest rotations. While having greater potential to grow late-successional forest habitat, this alternative could also negatively impact late-successional forest dependent species through the removal of remaining habitat outside the conservation block during sensitive time periods.

Under Alternative 2, Forest management practices near active bald eagle nests will follow the National Bald Eagle Management Guidelines, unless a permit is issued by the Service for a specific project.

Increased aquatic buffers, snag and green-tree retention, and longer rotation age would improve wildlife habitat components across the landscape by creating corridors between conservation areas and aiding seasonal migration for some species.

Big game would benefit by the increase of old growth habitat creating optimal habitat that would provide thermal and forage. The increased riparian zones will work as gateways between the river and upland habitats for big game species.

Alternative 3: Under this alternative, 24,303 acres would be in conservation status, with 4,079 acres in conservation easement status and 19,889 in riparian and wetland buffers. Most of the old-growth on the QIR would remain in long-term conservation status, thereby protecting the majority of the QIR's habitat for late-successional forest dependent species such as the northern spotted owl and marbled murrelet. However, any late-successional forest habitat within 300 ft. of the conservation block boundary would be degraded



Kenny McCoy with cow Elk. *Photo courtesy of D. Ravenel.*

when hard edges are created through timber harvests on adjacent lands. This alternative may also negatively impact late-successional forest dependent species through the removal of remaining habitat outside the conservation block during sensitive time periods. No additional late-succession habitat would be created. Increased riparian buffers may provide slightly greater dispersal opportunities to marbled murrelets migrating from the sea to nesting habitat in the foothills of the Olympic Mountains.

Under Alternative 3, Forest management practices near active bald eagle nests will follow the National Bald Eagle Management Guidelines, unless a permit is issued by the Service for a specific project. Habitat for other non-game species such as insects, amphibians, mollusks and small mammals will remain the same under Alternative 3 due to retention of snags and green trees, but increased wetland buffers would likely benefit all non-game wildlife over time.

Alternative 3.1: Under this alternative, 29,203 acres would be in conservation status, with 4,079 acres in conservation easement status and 24,789 in riparian and wetland buffers. Most of the old-growth on the QIR would remain in long-term conservation status, thereby protecting the majority of the QIR's habitat for late-successional forest dependent species such as the northern spotted owl and marbled murrelet. However, any late-successional forest habitat within 300 feet of the conservation block boundary would be degraded when hard edges are created through timber harvests on adjacent lands. This alternative may also negatively impact late-successional forest dependent species through the removal of remaining habitat outside the conservation block during sensitive time periods. The marbled murrelet may also be negatively affected due to increased noise disturbance and edge effects created by increased management activities in the floodplains, which serve as migratory corridors.

Under Alternative 3.1, forest management practices near active bald eagle nests will follow the National Bald Eagle Management Guidelines, unless a permit is issued by the Service for a specific project. Habitat for other non-game species such as insects, amphibians, mollusks and small mammals will remain the same under Alternative 3.1 due to retention of snags and green trees. In addition, decreased hard buffers on riparian areas may negatively impact sensitive areas. Decreased aquatic buffers may not be sufficient to protect riparian function for fish and wildlife habitat.

Rationale: Threatened and endangered species present on the QIR are late-successional forest-dependent species that utilize the old-growth forests in conservation easement status. In addition, under certain management regimes, riparian habitat and leave areas could be utilized as migration corridors, nesting, roosting, and foraging habitat by these listed species. Old-growth stands will also be selected by big game species in preference to second growth stands (Jones 1974). Old-growth stands will provide optimal cover to big game species on the QIR. River corridors and riparian areas on the QIR contain high levels of moisture, rich soils, and a diversity of vegetation that make them highly selective by big game species on the QIR. The riparian zones on the QIR are dominated by woody, deciduous trees and shrubs such as red alder, cottonwood, and a thick understory of salmonberry, oceanspray, elderberry, grasses, and

sedges. This diverse understory provides valuable forage for elk and deer in the spring time when calving and lactating occur.

Impacts to Clear-cut Size

Alternative 1: Under this alternative, clear-cut size could be up to 240 contiguous acres. Large, 240 acre clear-cut harvest units would have a negative effect on big game habitat throughout the QIR. This alternative would result in less edge, larger openings, and greater distances for big game to travel between cover and forage habitat which would result in decreased big game habitat overall.

Alternative 2: Under this alternative, clear-cut size could be up to 80 contiguous acres. Smaller clear-cut harvest units would improve wildlife habitat components across the landscape by creating corridors between habitats providing safe seasonal migration and resiliency to the effects of global climate change. Also, under this alternative, no harvest would occur in areas designated as critical elk calving areas by the wildlife biologist. This alternative would lead to improved big game habitat with increased edge habitat, smaller openings, and an improved mix of hiding cover, thermal cover, and open forage areas. This alternative would provide better conditions for big game species on the QIR as compared to the current FMP and the other alternatives.

Alternative 3: Under this alternative, clear-cut size could be up to 240 contiguous acres. Large, 240 acre clear-cut harvest units would have a negative effect on big game habitat throughout QIR. This alternative would result in less edge, larger openings, and greater distances for big game to travel between cover and forage habitat which would result in decreased big game habitat overall.

Alternative 3.1: Under this alternative, clear-cut size could be up to 240 contiguous acres, however patches and leave trees will be retained in the floodplain, reducing the amount of contiguous clear-cut acres. Large, 240 acre clear-cut harvest units would have a negative effect on big game habitat throughout the QIR. This alternative would result in less edge, larger openings, and greater distances for big game to travel between cover and forage habitat resulting in decreased big game habitat overall.

Rationale: Forest management activities can have a substantial impact on wildlife habitats by frequently changing patterns of forage and cover at both broad and fine scales (Jenkins & Starkey 1984). All wildlife species have four basic habitat components: food, water, cover, and space. Equally important to big game is the arrangement of these habitat components. The size and shape of clear-cut harvest units determine the amount of edge and distances between habitat types and thus their use by big game species. Habitat use by big game decreases with increased distance from the edge between forest and non-forest cover types (Leckenby 1984) Big game use in clear-cut units occurs at the highest rate within the first 300 yards of the forest edge (Leckenby 1984); openings with a diameter of twice this distance will likely result in low use by big game.

Impacts to Road Density

Alternative 1: Under this alternative, road density would likely increase to a density higher than 2.86 miles of road per square mile as new roads are opened to access new harvest units over the next ten-year planning period. This alternative does not include a plan to abandon existing roads; therefore existing roads would only be abandoned over time through decreased use and natural succession.

Alternative 2: Under this alternative, road density would remain at approximately 2.86 miles of road per square mile over the next ten-year planning period. This alternative includes plans for abandonment of roads following harvest, particularly in the floodplain, which would mean no net gain of roads would occur, at least in the floodplain. Road abandonment in the floodplain post-harvest would also eliminate vehicular access to these areas for hunting, which would protect big game species. The use of weed free gravel would benefit wildlife by reducing noxious weeds along roadsides and preventing the introduction of them with new road construction.

Alternative 3: Under this alternative, road density would likely increase to a density higher than 2.86 miles of road per square mile, similar to that of Alternative 1, as new roads are opened to access new harvest units over the next ten-year planning period. This alternative does not include a plan to abandon existing roads; therefore existing roads would only be abandoned over time through decreased use and natural succession.

Alternative 3.1: Under this alternative, drivable road density would likely increase to a density higher than 2.86 miles of road per square mile as new roads are opened to access new harvest units over the next ten-year planning period. Upland road construction or reconstruction would be similar to that of Alternatives 1 and 3; however increased roading will be necessary in the floodplain to operate around conifer patches and leave trees that would be retained. These roads would remain open until the stands have reached free-to-grow status (approximately 4-7 years) in order to conduct reforestation activities. Because these roads would remain open, there would be increase vehicular access to newly clear-cut areas for hunting, which would negatively impact big game species. There is also an increased threat of spreading invasive species throughout harvest units in the floodplain secondary to timber harvest operations taking place only 50 feet from the ordinary high water mark, where species such as knotweed and reed canary grass are prevalent. This would have a negative impact on wildlife habitat in the recent harvest units.

Rationale: Wildlife, both terrestrial and aquatic species, is dramatically and adversely affected by roads open to vehicular traffic. Finally, under Alternative 3.1, road density is expected to increase over the course of this plan (see section 3.4.3.3). Increased road density is expected to have a negative impact on wildlife habitat in recently harvested units due to (1) increased mortality and injury through vehicular collision and hunting, (2) increased daily movements or home range size of big game thus increasing energy needs, and (3) direct habitat loss and

barriers to movement for many wildlife species, such as small animals such as, salamanders, frogs, and rodents.

Section 7 Consultation

Section 7 of the Endangered Species Act (ESA; 16 U.S.C. 1531 et seq.) of 1973 as amended, and its implementing regulations found at 50 CFR 402, require federal agencies to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat. On May 9, 2014, a formal Section 7 consultation was requested by the Superintendent of the BIA – Taholah Agency. The USFWS issued a Biological Opinion, outlining the FMP's effects on bull trout, marbled murrelet, northern spotted owl, and designated critical habitat for bull trout, northern spotted owl, and marbled murrelet. On September 27, 2016, the USFWS was issued an updated BA and draft FMP reflecting the preferred alternative 3.0. On January 27, 2016, the USFWS issued a memo on the QIR FMP. The USFWS's Opinion was that the cumulative effects are not likely to jeopardize the continued existence of the species consulted, nor likely to destroy or adversely modify designated critical habitat (see Biological Opinion and Biological Opinion Reinitiation Memo on File at the BIA Taholah Agency). A complete record of this consultation is on file at the Washington Fish and Wildlife Office in Lacey, Washington.



Mountain lions inhabit the Quinault Indian Reservation. *Photo courtesy of D. Ravenel.*



3.5 Cultural Resources

Cultural resources on the QIR include villages, burial grounds, archaeological sites, culturally important sites, and historic artifacts. Some of these sites remain in use today; their value is not limited to their historic conditions. Villages include both established residential areas and temporary camps used for traditional fishing, hunting, berry picking, and herbal gathering. Burial grounds include both cemeteries and unknown, traditional grounds. Archaeological sites include those that have been identified and those that have not yet been identified. Culturally important sites include those areas where traditional activities occur. These sites include areas where social, artistic, and religious activities occur; fishing and hunting grounds; sites of harvesting and gathering of plants and herbs; groves where cedars are felled for canoe building; and other landmarks related to legendary, religious, or traditional events. The Quinault people and the other peoples living on the QIR retain their traditional rights to these activities as the governing body of and the landowners on the Reservation.

What is the current condition of cultural resources?

Although many Tribal members continue to use these sites today, the locations of the actual sites have not been officially recorded. Several professional cultural resource surveys have been conducted within the Quinault River Basin (Olson, 1936; Wesson, 1978). These efforts, however, did not identify or locate artifacts or other evidence of the Quinault Indian culture. Seasonal flooding

and the meandering Quinault River channel likely erased any vestiges of former Quinault settlement sites (Wesson, 1978). Therefore, the current condition of all cultural resources is not known which is a major shortcoming for proactive management of cultural resources is the limited inventory of resources, resource locations, and current cultural needs of the Quinault people.

Timber harvest activities could negatively impact cultural resources directly and indirectly by providing access for trespass or illegal harvest of cultural resources. Mitigation of adverse effects is required under the Archaeological Resources Protection Act and the Native American Graves Protection and Repatriation Act. Possible mitigations range from full protection of the site by leaving it undisturbed to careful recording of the site before destroying it. The interdisciplinary team will work to identify and protect cultural resources when reviewing timber sales.



Quinaults paddling to shore. Photo courtesy of L. Workman.

While the exact locations of archaeological and cultural resources are not known, there are certain areas that have been identified as being culturally important or supporting culturally important resources. These sites include residential areas, cemeteries, riparian forests, wetlands, prairies, and western red cedar stands.

In order to evaluate the current condition of cultural resources and the impacts each alternative will have on cultural resources, two indicators will be used:

1. Conservation Areas Containing Cultural Resources
2. Archaeological and Cultural Site Protection

Conservation Areas Containing Cultural Resources

The Canoe Stand is a 40-acre stand of old-growth western red cedar that has been set aside as this species plays a vital role in Quinault culture. This stand, however, is a finite product and with the ongoing harvest of these trees for cultural purposes, although limited, fewer trees are available than in the past and regrowth is not likely to replace this harvest.

Historically, prairies were burned to reduce competing vegetation and promote the growth of desired plant communities; however a shift in fire management has likely altered the availability of cultural resources within prairies. Nonetheless, prairies within the QIR continue to serve as culturally important sites for the harvest of medicinal and traditionally used plants and big game.

Riparian forests continue to serve as culturally important sites as they support fish and wildlife important to Quinault culture and serve as traditional sites. Past logging practices have significantly altered riparian forests along the rivers and streams of much of the Reservation from their historic condition.

Acres Protected of Archaeological and Cultural Sites

The towns of Taholah and Queets are located at historic village sites. Taholah is located at the mouth of the Quinault River at the historic site of the Indian village K'winail, where the Quinault River Treaty was signed on July 1, 1855. Queets is located at the site of an ancient Indian fishing village on the Queets River, about one mile from the Pacific Ocean.

Due to erosion from the ocean, mass wasting, and encroachment of vegetation, the cemetery at the mouth of the Quinault River was relocated further upstream and is currently maintained by volunteer staff. Another cemetery exists in Queets. Both will be expanded in the next ten-year planning period. The condition and/or locations of ancestral sites are still unknown.

What are the impacts of the alternatives on cultural resources?

Impacts to Conservation Areas Containing Cultural Resources

Alternative 1: Under this alternative, 25,010 acres would continue to be protected. This acreage includes 3,364 wetland acres, 17,232 riparian acres, and 4,079 acres in conservation easement status; these areas may contain culturally important resources.

Alternative 2: Under this alternative, 51,993 acres would be protected. This acreage includes 4,877 wetland and prairie acres, 42,702 riparian acres, and 4,079 acres in conservation easement status; these areas may contain culturally important resources.

In addition, no harvest would occur within critical elk calving areas as designated by the wildlife biologist. Cedar stands or patches would be identified and managed for late-successional development for future cultural uses. In areas where the site index is less than 100, harvest would be limited to commercial thinning across all size classes. Patches of trees would be retained for multiple rotations to provide for the visual appearance of big trees across the landscape and support species that require older forest components. A buffer strip of 150 feet would be applied to all paved roads.

Alternative 3: Under this alternative, 28,611 acres would be protected. This acreage includes 4,308 wetland and prairie acres, 19,889 riparian acres, and 4,079 acres in conservation easement status; these areas may contain culturally important resources.

In addition, up to ten legacy trees with a diameter at breast height of 40 inches or greater could be retained per timber sale if available.

Alternative 3.1: Under this alternative, 33,511 acres would be protected. This acreage includes 4,308 wetland and prairie acres, 24,789 riparian acres, and 4,079 acres in conservation easement status; these areas may contain culturally important resources.

In addition, up to ten legacy trees with a diameter at breast height of 40 inches or greater could be retained per timber sale if available.



Preparing salmon - the traditional Quinault way. *Photo courtesy of L. Workman.*

Rationale: Wetland and prairie ecosystems support culturally important plant and game species. The more protection awarded to these ecosystems, the more protection awarded to culturally important plant and game species.

Archaeological and Cultural Sites Protection

Alternative 1: Under this alternative, no additional protection will be granted to areas that have the potential to contain unknown archaeological and/or cultural resources.

Alternative 2: Under this alternative, an additional 26,983 acres would be protected along wetlands, prairies, and riparian areas that have the potential to contain unknown archaeological and/or cultural resources.

Alternative 3: Under this alternative, an additional 3,601 acres would be protected along wetlands, prairies, and riparian areas that have the potential to contain unknown archaeological and/or cultural resources.

Alternative 3.1: Under this alternative, an additional 8,501 acres would be protected along wetlands, prairies, and riparian areas that have the potential to contain unknown archaeological and/or cultural resources.

Rationale: Known archaeological and/or cultural sites will be protected under all alternatives. Unknown archaeological and/or cultural sites that are discovered inadvertently through timber harvest operations are potentially at risk of being lost or damaged. To assure NHPA compliance, projects will be thoroughly assessed on a site-by-site basis, which could include site specific cultural surveys. By increasing the acreage in protection along culturally sensitive areas such as wetlands, prairies, and riparian areas, unknown archaeological and/or cultural sites are less likely to be disturbed.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) as amended, and its implementing regulations found at 36 CFR Part 800, require federal agencies to identify cultural resources for a federal action. The significance of the resources must be evaluated using established criteria outlined at 36 CFR 60.4. If a resource is determined to be a historic property, Section 106 of the NHPA requires that effects of the undertaking on the resource be determined. A historic property is: "...any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in the National Register of Historic Places, including artifacts, records, and material remains related to such a property..." (NHPA, 16 USC 470w, Sec. 301[5]). The State Historic Preservation Office (SHPO) will be consulted with on a site by site basis in order to comply with these regulations.

3.6 Cumulative Impacts

Cumulative impacts can result from individually minor, but collectively significant actions taking place over time. Sometimes the combined effects of several projects are more substantial and of a different nature, than the incremental impact of each project viewed separately. Potential sources of cumulative effects are:

Natural Trends: These are naturally occurring changes in existing physical and biological systems. Natural trends may have the effect of compounding the effects caused by the preferred alternative.

Past Human Actions: the effects of the preferred alternative when added to past forest management projects and human activities may create significant effects to the environment.

Concurrent Actions: other projects and human activities, which if occurring simultaneously with the preferred alternative could create significant effects.

Foreseeable Future Actions: Projects and human activities which are scheduled or reasonably likely to occur in the foreseeable future, and which when combined with the preferred alternative, may create significant effects to the environment.

When analyzing the additive effects of the three alternatives analyzed with the combined effects of past, present, and future human activities and natural trends, the potentially affected environment extends beyond the QIR. The area analyzed for cumulative effects includes adjacent lands including Olympic National Forest and Olympic National Park, Washington State Department of Natural Resources, and adjacent privately owned commercial timberlands. Within the reservation, the cumulative effects include privately owned fee status properties.

Natural Trends

Forest Conditions: While we can't say for certain how specifically our forests will be affected by climate change, studies and modeling suggest that a number of different scenarios are possible for Pacific Northwest Forests. Climate change has the potential to compromise the health of forests but also to increase their productivity due to warmer temperatures and the increase in carbon dioxide available. While scenarios range from projections of forest expansion to dieback, most likely, forests will see increased primary productivity in the near future until a threshold is reached and temperature increases overwhelm the ability of trees to make use of high levels of carbon dioxide and an increase in winter precipitation.

Hydrological Trends: Climate change can impact thermal regimes in rivers and streams across the reservation and the greater watershed. Thermal regimes are expected to change in response to rising air temperatures and changes in winter precipitation (Isaak, D.J., Wollrab, S., Horan, D. et al. Climatic Change (2012) 113: 499. doi:10.1007/s10584-011-0326-z). Changes in magnitude and timing of flooding and low flow risks can have substantial impacts to water quality and fish habitat, as well as timber production.

Other potential impacts: Climate change impacts can also include but aren't limited to: species loss, replacement of native species by non-native species that are more tolerant to rapid change, changes in species composition, density, and shifts in ranges, loss of biodiversity, introduction of invasive species, warmer, drier, and longer fire seasons which will increase the fuel load, risk of wildfires, increased frequency and intensity of wildfires, drought, extreme precipitation patterns, and increased frequency of extreme weather events.

In order to achieve our goal of maintaining a sustainable forest, we must continue to learn about the impending effects of climate change and modify our plans to mitigate them. This can be done through periodic assessments of forest health, observed changes, and assessing species vulnerability along with

keeping up to date on current climate science and forestry applications. Ultimately, it is up to us to maintain a healthy forest ecosystem that will be able to withstand changes over time through our forestry management practices.

Past Human Actions

Timber harvesting: Throughout the past twelve year planning period, harvest levels have fluctuated from what was analyzed in the 2003 EA for the QIR FMP. In the 2003 FMP Biological Opinion, the 10-year timber harvest rate that was evaluated was about 28,420 acres across the QIR (approximately 14% of the land base). However, only 12,823 acres were harvest on the QIR between 2003 and 2015 (6.2% of the land base). Table 3-3 displays the actual green timber harvest on the QIR between 2003 and 2014.

Table 3-3. Green Timber Harvest Summary 2003 thru 2014 :

	TRIBAL	BIA TRUST	TOTAL
Year	Volume MBF	Volume MBF	Volume MBF
2003	5,203	9,804	15,007
2004	6,870	22,211	29,081
2005	7,888	23,919	31,807
2006	8,501	15,246	23,747
2007	5,564	12,100	17,664
2008	8,304	21,181	29,485
2009	13,227	9,846	23,073
2010	15,099	34,438	49,537
2011	13,033	34,020	47,053
2012	6,197	14,234	20,431
2013	4,851	22,400	27,251
2014	14,890	14,000	28,890
Twelve Year Average			28,586

Concurrent Actions

Adjacent timber harvesting: There are privately owned fee lands within the reservation that could contribute to negative cumulative effects to affected forest resources. Such effects may also result from activities on private commercial timber lands adjacent to the QIR, but the location and timing of planned forest management activities on private lands outside the QIR are unknown. Residential development, recreation, and agricultural activities may also impact resources, but plans for such activities in the future are unknown. Adjacent timber harvesting can have a positive cumulative impact on the timber base as a steady flow of timber to mills fosters employment opportunity and market stability.

Foreseeable Future Actions

Available Timber and AAC: It is likely that the overall AAC based on the preferred alternative on the reservation will be met during this ten-year planning period, 32.8 MMbf/year on BIA managed Trust land and 14.2 MMbf/year on Tribal Trust land. With a minimum rotation age of 40 years for conifer and 35 years for hardwoods, there is a substantial amount of acres of commercially mature timber on Tribal Trust land that will become available for harvest the next ten to twenty years. On the other hand, BIA managed trust land has many more acres of harvestable timber for the next twenty years compared to Tribal Trust. Their harvest levels are not expected to remain consistent over the thirty years. Due to the increased volume that will become commercially available on Tribal Trust lands, the AAC on the reservation is expected to increase steadily over the next few planning periods.

The location and timing of planned forest management activities, residential development, recreation, and agricultural activities on private lands outside the QIR are unknown.

Chapter 4. List of Preparers

Lead Agency:	U.S.D.I. Bureau of Indian Affairs Taholah Field Office P. O. Box 39 Taholah, WA 98587
Cooperating Agency:	Quinault Indian Nation P. O. Box 189 Taholah, WA 98587
Primary Preparer:	Cynthia Harbison M.F.R. Peace Corps Masters International, University of Washington B.S. Biology, Chemistry; University of South Carolina Years in Profession: 3 Years with QIN: 2
For more information:	Jim Plampin, Acting Forest Manager B.S. Forest Management; Washington State University Years in profession: 36 Years with QIN: 27

List of Preparers

Daniel Ravenel, Wildlife Section Manager
B.S. Natural Resource Sciences, Wildlife Ecology; Washington State University
Years in profession: 15
Years with QIN: 9

Justine James, Off Reservation Biologist
A.S. Forestry; Grays Harbor Community College
Cultural Resource Technician Program; South Puget Sound Community College
B.A. Environmental Studies, Native American History; Evergreen State College
Years in profession: 19
Years with QIN: 30

Lawrence Wiechelman, Inventory Forester
B.S. Forest Management; Humboldt State University
Years in profession: 29
Years with QIN: 25

Greg Weist, Harvest Manager
B.S. Forest Management: Washington State University
Years in profession: 34
Years with QIN: 13

Tony Hartrich, GIS Program Manager
B.S. Biology
Certificate Program in GIS
Years in profession: 21
Years with QIN: 20

Dave Bingaman, Director, Quinault Division of Natural Resources
Years in profession: 29
Years with QIN: 29

Jim Plampin, Silviculturist
B.S. Forest Management; Washington State University
Years in profession: 36
Years with QIN: 27

Mark Mobbs, Former Manager, Environmental Protection Department
B.S. Fisheries; University of Washington
Years in profession: 39
Years with QIN: 28

Jerry Orr, Former Fire Management Officer
B.S. Western Montana College
Years in profession: 36
Years with QIN: 8

Gary LaLonde, Roads Manager
A.A.S. Fisheries Technology; Peninsula College
Years in profession: 26
Years with QIN: 16

Bill Armstrong, Salmon Resources Scientist
B.S. Fisheries Science; University of Washington
Years in profession: 17
Years with QIN: 17

Participating Former QIN Staff

Chris Antilla, Former Planning Forester
B.S. Forest Management; Washington State University
Years in profession: 31
Years with QIN: 2

Bonnie Eystone, Former QIN Invasive Species Specialist
B.S. Environmental Science and Resource Management; University of Washington
Years in profession: 5
Years with QIN: 2

Nancy Eldridge, Forest Manager, and Quinault Indian Nation
B.S. Forest Resource Management; University of Washington
M.S. Silviculture & Forest Protection; University of Washington
Years in profession: 19
Years with QIN: 7

Heather May, Former QIN Wildlife Biologist
B.S.; The Evergreen State College
Years in profession: 11
Years with QIN: 2

Tom Gibbons, Former QIN Water Quality Section Leader
B.S. Environmental/Engineering Geology; Western Washington University
Licensed Geologist, Hydrogeologist and Engineering Geologist
Years in profession: 25
Years with QIN: 6

Ashlie Laydon, Former QIN Hydraulics Officer; Former QIN Planning Forester
Years in profession: 5
Years with QIN: 2

Mike Stamon, Special Projects Forester
B.S. Wildlife Biology; Washington State University
A.A.S. Forestry; Peninsula College
Years in profession: 38
Years with QIN: 25

Wayne Moulder, Former Taholah Agency Forest Manager
B.S. Forest Management; Washington State University
Years in profession: 36
Years with BIA: 34

Consulting Staff

Larry Freeman, Ph.D.
The Shipley Group, Inc.

Chapter 5. Consultation and Coordination

Section 7 Consultation requirements under the ESA have been completed. A record of this consultation process is on file at the BIA Taholah Agency in Taholah, WA.

Consultation requirements under section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) with the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) were completed as well. A complete record of this consultation is on file at NMFS in Lacey, WA.

A Quinault Cultural Resource Representative was consulted on effects to historic properties (National Historic Preservation Act, as amended 16 U.S.C. 470) for the purpose of 36 CFR 800.9 (b).

Other conditions and compliance related to this project include the determination of a Finding of No Significant Impact (FONSI), if appropriate, by the Bureau decision maker and compliance with appropriate Tribal requirements.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
Oregon and Washington Coastal Area Office
510 Desmond Drive SE, Suite 103
Lacey WA, 98503

Refer to
NMFS No: 2014-0853

April 15, 2015

Mr. Gregory Masten
BIA Superintendent, Taholah Agency
Post Office Box 39
Taholah, WA 98587

Re: Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat
Response Quinault Indian Reservation Forest Management Plan

Dear Mr. Masten:

On May 9, 2014 NOAA's National Marine Fisheries Service (NMFS) received your request to review the Bureau of Indian Affairs (BIA) Quinault Indian Reservation (QIR) Forest Management Plan (FMP), under the National Environmental Policy Act (NEPA), for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System. A complete record of this consultation is on file at Lacey, WA.

Proposed Action and Action Area

The proposed action is the revision and reissue of the Quinault Indian Reservation (QIR) Forest Management Plan (FMP). Forestland management activities on trust land are based on the objectives laid out in the National Indian Forest Resources Management Act of 1990 (25 USC Sec 3104) and the regulations set forth in 25 CFR Part 163 (general Forestry Regulations, Subpart B (Forest Management and Operation) of the Code of Federal Regulations (CFR) and Title 61 of the Quinault Tribal Code of Laws.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503



AUG 25 2015

In Reply Refer To:
01EWF00-2014-F-0417

Memorandum

To: Superintendent, Bureau of Indian Affairs, Taholah Agency
Taholah, Washington

From:  State Supervisor, Washington Fish and Wildlife Office
Lacey, Washington

Subject: Quinault Forest Management Plan

This memorandum transmits the U. S. Fish and Wildlife Service's (Service) Biological Opinion on the proposed Forest Management Plan for the Quinault Indian Reservation located in Grays Harbor County, Washington, and its effects on bull trout, marbled murrelet, northern spotted owl, and designated critical habitat for bull trout, northern spotted owl and marbled murrelet. Formal consultation was conducted in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your May 9, 2014 request for formal consultation was received on May 14, 2014.

The attached Biological Opinion is based on information provided in the May 9, 2014 Biological Assessment, the October 2014 draft Environmental Assessment, telephone conversations, field investigations, and other sources of information as described in the Biological Opinion. A complete record of this consultation is on file at the Washington Fish and Wildlife Office in Lacey, Washington.

It is our understanding that the revised Forest Management Plan is scheduled for final signature and implementation by October 24, 2015. This Biological Opinion becomes effective concurrent with the adoption of the revised Forest Management Plan, and is applicable to all forest management actions consistent with the standards and guidelines established in the revised plan.

If you have any questions regarding the attached Biological Opinion or our shared responsibilities under the Act, please contact my staff Vince Harke at 360-753-9529, or Carolyn Scafidi at 360-753-4068.

Enclosure



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503



JAN 27 2017

In Reply Refer To:
01EWF00-2014-F-0417-R001

Memorandum

To: Northwest Regional Director, Bureau of Indian Affairs

From: State Supervisor, Washington Fish and Wildlife Office

Subject: Reinitiation of ESA Section 7 Consultation for the Quinault Forest Management Plan

This memorandum is in response to your letter, dated September 27, 2016, to the U.S. Fish and Wildlife Service (Service) requesting reinitiation of consultation under section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 *et seq.*) on the revised Forest Management Plan for the Quinault Indian Reservation located in Grays Harbor County, Washington, and its effects on bull trout (*Salvelinus confluentus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), and designated critical habitat for bull trout, northern spotted owl and marbled murrelet. Your revised Biological Assessment and request for reinitiation of consultation was received on September 29, 2016.

Consultation History

The Bureau of Indian Affairs Taholah Agency (BIA) and the Quinault Indian Nation (QIN) have been conducting forest management activities within the Quinault Indian Reservation (QIR) under an existing Forest Management Plan (FMP) since 2003. The Service completed a programmatic Biological Opinion on the 2003-2013 FMP at that time (Service #1-3-02-F-1602, August 25, 2003). In 2014, the BIA/QIN initiated planning to update and revise the Quinault FMP. In the interim, the BIA/QIN with concurrence from the Service has continued to manage under the existing 2003 FMP until a revised FMP is formally adopted.

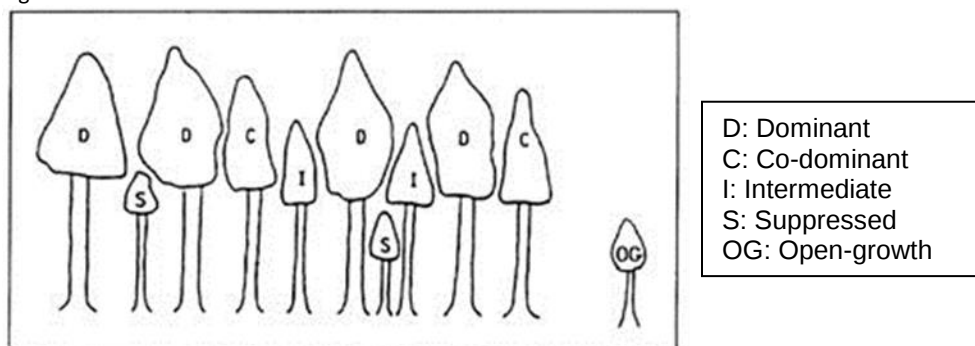
Glossary

7-Day Average Daily Maximum (7DADM): Applied as a limit on summer maximum temperature the 7DADM is an average of maximum temperatures that may be experienced during the seven day period of the hottest one to two weeks of the year, though the average temperatures approaching the 7DADM can be experienced for longer periods depending on the magnitude of diurnal and seasonal swings in temperature. Because it is an average, some actual stream temperatures during the hottest days will likely be higher than this seven day average.

Bedrock Hollow: Landforms which are commonly spoon-shaped areas of convergent topography (upward or contour concavity) within un-channelled valleys on hill slopes. Hollows are formed on slopes of varying steepness and tend to be longitudinally linear on the slope. The upper ends can extend to the ridge, or begin as much as several hundred feet below. Most hollows are approximately 75 to 200 feet wide at the top and may narrow to 30 to 60 feet downhill. They terminate at distinct channels, either at the point of the channel initiation or along a streamside. Unless they have recently experienced scouring by landslide or debris flow, bedrock hollows are partially or completely filled with colluvial soils that are typically deeper than those on the adjacent spurs and planar slopes. Hollows that are completely filled with colluvium may show no surface continuity. Many hollows have no surface water, but others contain seeps and springs. Hollows should not be confused with other hill-slope concavities such as small valleys, the bodies of large landslides, tree-throw holes, or low-gradient grassy swales. Bedrock hollows typically experience episodic evacuation of debris by shallow-rapid mass movement, followed by slow refilling with colluvium. Debris slides that begin within bedrock hollows commonly evolve into debris torrents, which have the potential to reach great distances downhill and downstream.

Co-dominant Tree: A tree that extends its crown into the canopy and receives direct sunlight from above but limited sunlight from the sides. One or more sides of a co-dominant tree are crowded by the crowns of dominant trees.

Figure 1. Crown Position Classes.



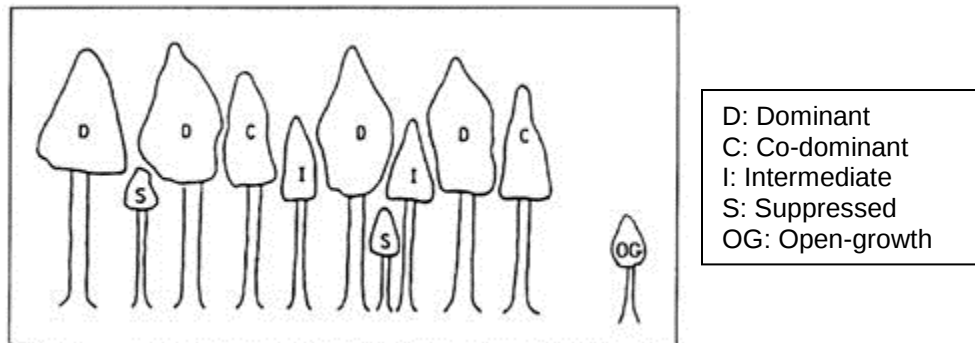
Convergent Headwall: Landforms which are teardrop-shaped, broad at the ridge top, and terminate where headwaters converge into a single channel. They are broadly concave both longitudinally and across the slope, but may contain sharp ridges that separate the headwater channels. Convergent headwalls generally range in size from about 30 to 300 acres; slope gradients are typically steeper than 35 degrees and may exceed 45 degrees. Unlike bedrock hollows, which exhibit a wide range of gradients, only very steep convergent landforms with obvious history of landslides are called convergent headwalls. Soils are thin because slides are frequent in these landforms. It is the arrangement of bedrock hollows and first-order channels on the landscape that cause a convergent headwall to be a

unique mass-wasting feature. The highly convergent shape of the slopes, coupled with thin soils, allows rapid saturation during rainfall and/or snowmelt. The mass-wasting response of these areas to storms, to natural disturbances such as fire, and to forest practices is much greater than is observed on other steep hill slopes in the same geologic settings. Convergent headwalls are also prone to surface erosion. Landslides that evolve into debris flows in convergent headwalls typically deliver debris to larger channels downstream. Channel gradients are extremely steep within headwalls, and generally remain so for long distances downstream. Channels that exit the bottoms of headwalls have been formed by repeated debris flows and have forms and gradients that are efficient at conducting them. Convergent headwalls commonly have debris fans at the base of their slopes.

Deep-seated Landslide: Landslides in which the zone of movement is below the maximum rooting depth of forest trees, to depths of tens to hundreds of feet. Deep-seated landslides can vary greatly in size (up to thousands of acres) and activity level and can occur almost anywhere on the hill-slope. Deep-seated landslides are usually formed in incompetent materials such as glacial deposits, volcanoclastic rocks, and fault gouges. Commonly, development of a deep-seated landslide begins after a slope has been over-steepened by glacial and fluvial under-towing; however the initiation of such slides has also been associated with changes in land use, increases in ground-water levels, and the degradation of material strength through natural processes. Movement can be translational, rotational, or complex, range from slow to rapid, and include small to large displacements. Deep-seated landslides in bedrock commonly occur in masses that are relatively weak. These can include bodies in which the rocks themselves are incompetent, such as certain types of clay-rich sediments and volcanics (e.g., some shales and tuffs), or low-grade metamorphic rocks (e.g., phyllite) or in highly weathered materials, such as deeply weathered rock and saprolite. In other cases, the geologic structure weakens the rock strength; bedding planes, joints, and faults commonly act as planes of weakness that can become slide surfaces. Deep-seated landslides are common in thick glacial deposits, usually where very permeable and impermeable materials are juxtaposed. Impermeable deposits can perch ground water, causing elevated pore-water pressures in the overlying deposits, which can then slide out and downward. Groundwater recharge areas for glacial deep-seated slides are the area upslope that can contribute water to the landslide. This assumes that there is an impermeable perching layer in or under a deep-seated landslide in glacial deposits. It is assumed to be equivalent to the topographically defined sub-basin directly above the active slide. The spatial extent of the groundwater recharge area can be identified in the field using one of several accepted methods as explained in greater details in the Washington State Forest Practices Board Manual. Many deep-seated landslides occur in the lower portions of hillslopes and extend directly into stream channels. In such situations, streams can undercut the landslide toes, promoting further movement; such over-steepened toes can also be sensitive to changes caused by harvest and road construction. On the other hand, deep-seated landslides confined to the upper slopes may not have the ability to deposit material directly into stream channels. The ability of scarps and marginal streams to deliver sediment to waters or structures varies with local topography. Steep marginal streams can be subject to debris-flow initiation.

Dominant Tree: A tree that extends above surrounding individuals and capture sunlight from above and around the crown.

Figure 2. Crown Position Classes.



Emergent Conifer: Scattered and isolated conifers that emerge above the main continuous canopy layer of the stand.

Equipment Limitation Zone (ELZ): 30' measured horizontally from the ordinary high water mark of any water. No more than 10% of the soil within the equipment limitation zone will be disturbed as a result of ground-based equipment, skid trails, stream crossings, or partially suspended cabled logs.

Groundwater Recharge Area: the area of drainage of an aquifer that contributes to the hydrologic process where water moves downward from surface water to ground water.

Headwall Seep: A seep of water located at the toe of the edge of a cliff and at the head of a type O stream which connects to the stream by overland flow, and is recognized by loose substrate and/or fractured bedrock with perennial water at or near the surface throughout the year.

Headwall Spring: A permanent spring at the head of a perennial channel.

Hydrologic Floodplain: The surface of strip of relatively smooth land adjacent to a river channel, constructed by the present river in its existing regiment, and covered with water when the river overflows its banks. It is built of alluvium carried by the river during floods and deposited in the sluggish water beyond the influence of the swiftest current. A river has one floodplain and may have one or more terraces representing abandoned floodplains.

Individual Trust Lands: Lands owned in trust status by individual Indian landowners.

Inner Gorges: Canyon walls created by a combination of the downcutting and undercutting action of a stream and mass movement on the slope walls. Inner gorges may show evidence of recent movement, such as obvious landslides, vertical tracks of disturbance vegetation, or areas that are concave in contour and/or profile. In competent bedrock, slope gradients of 35 degrees or steeper can be maintained, but soil mantles are increasingly sensitive to root-strength loss at these angles; slope gradients as gently as 28 degrees can be unstable in gorges cut into incompetent bedrock. The top of the inner gorge is typically a distinct break in slope but in some places the upper boundary is a subtle zone where the slope becomes markedly steeper or convex downhill. Inner gorge walls can be continuous for great lengths, as along a highly confines stream that is actively downcutting; or they can be discontinuous, as along a floodplain channel that is undercutting the adjacent hillslopes in isolated

places where the stream has meandered to the valley edge. Inner gorges experiencing mass wasting are likely to deliver sediment to waters or structures downhill. Inner gorges are distinguished from ordinary steep valley sides; ordinary valleys can be V-shaped with distinct slope breaks at the top, but they commonly do not show evidence of recent movement. In practice, a minimum vertical height of 10 feet should be applied to distinguish between inner gorges and slightly incised streams. The upper boundary of an inner gorge is assumed to be a line along the first break in slope of at least 10 degrees or the line above which slope gradients are typically gentler than 30 degrees.

Merchantable Tree: A tree with at least one 16-foot log with a diameter inside the bark (dib) of 5 inches.

Merchantable Stand: A stand with an average stand diameter at breast height (dbh) greater than 8 inches (using trees in the stand that are greater than 5 inches dbh) and with a volume of at least 10,000 board feet per acre.

North Boundary Area (NBA): The upper reservation, approximately 12,000 acres, was acquired on November 8, 1988 and borders the foothills of the Olympic Mountains.

Ordinary High Water Mark (OHWM): the mark on the shores of all waters, which will be found by examining the beds and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation. PROVIDED, that in any areas where the ordinary high-water mark cannot be found, the ordinary high-water mark adjoining salt water shall be the line of mean

Quinault Indian Nation (QIN): A party, along with the United States, to the Treaty of Olympia of 1855 (12 STAT. 97; II Kappler 719); federal recognition of the QIN has continued to this day. The QIN is organized under a constitution adopted by the membership on March 22, 1975. The Quinault Business Committee (QBC) is the duly constituted governing body of the QIN by the authority of Article V of the Constitution and Bylaws of the QIN.

Quinault Indian Reservation (QIR): The QIR was created on July 1, 1855 and expanded in 1873 and again on November 8, 1988 when the NBA was acquired. The Enabling Act under which Washington was admitted to statehood did not become law until February 22, 1889, and the State was not admitted to the Union until November 11, 1889. Thus, the QIR predates the existence of the State of Washington.

Side-slope Seep: A seep within 100' of a type O stream located on side-slopes which are greater than 20%, connected to the stream channel network by overland flow, and characterized by loose substrate and fractured bedrock, excluding muck with perennial water at or near the surface throughout the year. Water delivery to the type O stream is visible by someone standing in or near the stream.

Snag: Any dead tree at least 10 inches in dbh and at least 6 feet tall.

Class 1: All limbs and branches are present. The top is pointed. 100 percent of bark remaining. Intact sapwood is sound, incipient decay, hard, original color. Heartwood condition is sound, hard, original color.

Class 2: Few limbs and no fine branches. Top is broken. Percentage of bark remaining is variable. Sapwood is sloughing, and in advanced stages of decay. It is fibrous, firm to soft, and light brown. The heartwood is sound at the base, incipient decay in outer edge of upper bole, hard, light to reddish brown.

Class 3: Limbs are limited to stubs only. Percentage of bark remaining is variable. Sapwood is sloughing, fibrous, soft, and light to reddish brown. Heartwood shows incipient decay at the base, advanced decay throughout the upper bole, fibrous, hard to firm, and reddish brown.

Class 4: There are few or no stubs left. The percentage of remaining bark is variable and the sapwood is sloughing. Sapwood is cubicle, soft, and reddish to dark brown. Heartwood shows advanced decay at the base. Sloughing from the upper bole, fibrous to cubical, soft, and dark reddish brown.

Class 5: There are no limbs or branches, and only about 20 percent of the bark remains. All sapwood is gone. Heartwood is sloughing, cubical, soft, dark brown; or fibrous, very soft, dark reddish brown, and encased in a hard shell.

Stream Typing:

Type D Waters: Designated Waters. All waters designated as type D by the Quinault Indian Nation. These waters include the entire reach of the Quinault River; all of the Queets that flows through the QIR, the Salmon River up to the confluence point with the south fork; the main stem of the Raft River up to the confluence point with Meadow and Lunch Creeks; the north fork of the Raft up to the confluence point with Wolf Creek; the main stem of the Wreck up to the confluence point with the north fork; the main stem of the Moclips River up to the confluence point with the north fork; and all of Lake Quinault.

Type H Waters: Waters presumed to provide fish habitat. All stream segments not designated as type D waters with a defined channel greater than or equal to two feet between the ordinary high water marks (OHWMs) and a gradient of 16% or less. If a stream segment meets the gradient requirements and originates in a wetland, then the stream segment and the associated wetland are Type H water. Stream segments with a defined channel greater than or equal to two feet between the OHWMs and a gradient of greater than 16% and less than or equal to 20% with a contributing basin of 50 acres or greater are type H waters. The hydraulics officer will determine the break between type H and type O waters.

Type O Waters: Other waters. All natural stream segments with a defined channel not classified as a type D or type H.

Tribal Lands: Lands owned in either trust or fee status by the Quinault Indian Nation.

Wetlands:

Forested Wetland: Any wetland or portion thereof that has, or if the trees where mature would have, a crown closure of > 30 percent

Non-forested Wetland: Any wetland or portion thereof that has, or if the trees where mature would have, a crown closure of < 30 percent.

Prairie: Five named prairies exist within the boundaries of the QIR: Chow Chow, Baker, Moses, Moclips, and O'Took.

Manmade Wetland: Wetlands that have been created in last five years due to forest practices.

Bog: Wetlands that have the following characteristics: Hydric organic soils (peat and/or muck) typically 16 inches or more in depth (except over bedrock or hardpan); and vegetation such as sphagnum moss, Labrador tea, bog laurel, bog rosemary, sundews, and sedges; bogs may have an overstory of spruce, western hemlock, lodgepole pine, western red cedar, western white pine, Oregon crabapple, or quaking aspen, and may be associated with open water.

Wildlife Reserve Tree: Defective, dead, damaged, or dying trees which provide or have the potential to provide habitat for those wildlife species dependent on standing trees. Wildlife reserve trees are categorized into the following:

Type 1: Defective or deformed live trees that have observably sound tops, limbs, trunks, and roots. They may have part of the top broken out or have evidence of other severe defects that include: 'cat face' (partially healed or grown-over wound) animal chewing, old logging wounds, weather injury, insect attack, or lightning strike. Unless approved by the ID team, only green with visible cavities, nests, or obvious severe defects capable of supporting cavity dependent species shall be considered as Type I. These trees must be stable and pose the least hazard for workers.

Type 2: Dead Type 1 trees with sound tops, limbs, trunks, and roots.

Type 3: Live or dead trees with unstable tops or upper portions. Unless approved by the ID team, only green trees with visible cavities, nests, or obvious severe defects capable of supporting cavity dependent species shall be considered as Type 3. Although the roots and main portion of the trunk are sound, these reserve trees pose high hazard because of the defect in live or dead wood higher up in the tree.

Type 4: Live or dead trees with unstable trunks or roots, with or without bark. This includes 'soft' snags as well as live trees with unstable roots caused by root rot or fire. These trees are unstable and pose a high hazard to workers.

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Appendix A: Criteria Common to All Alternatives and Mitigation Measures

Appendix A. Management and Mitigation Measures

A.1. Interdisciplinary Team Functions.

The Interdisciplinary (ID) team is comprised of staff members identified by the Division to review proposed and active forest practices activities in order to ensure they are consistent with federal regulations [25 CFR Part 163] and with tribal codes [Title 61] and regulations applicable on trust and QIN-owned lands.

The role of the ID team is to ensure forest practices are carried out according to applicable laws and regulations, to review and implement technically-based and scientifically-sound site-specific operations, and to serve as a forum for resolving technical differences and disputes over proposed permit conditions. In order to achieve this, the ID team is responsible for reviewing all proposed and active forest practices on both QIN-owned and trust lands.

The ID team will be actively involved in the review of proposed forest practices, specifically those classified as a class III or class IV. The review process for proposed forest practices is achieved by holding a minimum of once a month ID team meetings, conducting field reviews, reviewing contracts before they are put out for bid, and conducting pre-work meetings with the operator prior to the commencement of forest practices.

Dispute Resolution

In the event that the ID Team process cannot resolve technical differences and disputes, the dispute resolution process will be implemented. Dispute resolution will be staged and may be applied at any stage of the dispute process. Any participant may invoke each succeeding stage, if agreement is not reached by the previous stage within the specified time (see below) or if agreements are not substantially implemented.

1. Stage one occurs within the ID Team. On technical issues, the ID Team shall have up to 3 months to reach a conclusion unless otherwise agreed to by the QDNR Director and the BIA Superintendent. Non-technical issues can be moved to the QDNR Director and the BIA Superintendent whenever they arise.
2. Stage two will be a review by the QDNR Director and the BIA Superintendent and will be completed within 1 month unless otherwise agreed to at the start of the stage. If no decision is agreed to within the allotted time, the issue will be elevated to stage three.
3. Stage three moves the issue to the QIN Business Committee and the BIA Superintendent.
4. Stage four moves the issue to the QIN Business Committee and the BIA Northwest Regional Director.

A.2 Harvest Operations.

The selection of a logging system is based on:

- Ground conditions;
- Presence or absence of streams or wetlands;
- Soil conditions (e.g., low-lying wet areas with poor drainage that may be susceptible to compaction); or
- Type of product being harvested.

Cable harvest systems are targeted to be utilized on steep or broken topography (slopes of greater than 40% for longer than 200' measured from the top of the slope to the bottom), and may be used on soils that are wet or susceptible to compaction.

If approved by the officer in charge, shovel logging on slopes greater than 40% for longer than 200' measured from the top of the slope to the bottom may be utilized if a logging plan is presented outlining how soils and other resources will be protected through mitigation measures. The plan must be approved a week in advance by the officer in charge or approved during the pre-work meeting, and should be reviewed by the ID Team.

Felling & Bucking:

Timing of felling and bucking will be coordinated to reduce hazardous situations.

When harvesting trees on steep ground, feller safety shall be the primary consideration. Use comes secondarily as these large trees are felled and/or jacked into lead for yarding.

Cutting block design will consider the exclusion of hazardous falling and bucking situations such as steep, unstable slopes, and the presence of rock ledges. Trees will be felled and yarded away from the cutting block boundary lines, riparian and wetland buffers, and other excluded areas unless it is recommended that trees be felled to the lead to facilitate yarding as directed by the Officer in Charge.

Hazard trees in riparian or wetland buffers, outside of the cutting block boundary, or along transportation routes may be felled as directed by the Officer in Charge. Removal of a bearing tree or reference tree, if required for a hazard tree removal, would be done as directed by the Officer in Charge and in such a manner that the scribing and/or tags are preserved. Hazard trees that must be felled should be done so towards the stream channel and left as fish/wildlife habitat.

Feller bunchers will avoid rutting and soil compaction. If excessive rutting is occurring, operations will cease until the soils are not saturated. If rutting has occurred, the operator will need to mitigate the ruts by "fluffing" the skid trails with the grapples and if on steep ground may be required to also place some slash on the trail to prevent erosion concerns.

Skid/Shovel Trails:

The location of skid trails and skid operations will be designed to minimize soil disturbance. Logging shovels will avoid rutting and soil compaction. If excessive rutting is occurring, operations will cease until the soils are not saturated. If rutting has occurred, the operator will need to mitigate the ruts by “fluffing” the skid trails with the grapples. If rutting has occurred on steep ground, the operator may be required to also place slash on the trail to prevent erosion concerns.

Skid trails are to be placed away from wildlife and cultural reserve trees. A slash mat should be kept under equipment.

Landings

The road design plan will be reviewed with the logging operator in order to minimize the number of landings and to ensure that landings are not larger than necessary for safe operation.

Landings will be located in well-drained areas. Slope the surface of the landing to drain water onto the forest floor. The number of landings is to be minimized, especially on steep slopes where large fills are necessary.

Avoid excessive cuts and fills, constructing landings on soils with potential for erosion, and constructing landings adjacent to streams or wetlands.

Landings should not be located in the following areas:

- Natural drainage channels
- Riparian buffers
- Within the 30’ ELZ of any stream.

Fill material used to construct landings should be free of loose stumps and other wood debris. Sufficient rock must be used on the surface of the landing and adequate drainage devices be installed if using the landing through the wet season.

Table 3.4: Yarding Methods and Restrictions

Wildlife snags shall not be left standing where they would constitute a hazard to personnel or running lines and equipment. Where operationally feasible, the snag should be cut to a height that would make it safe for retention (minimum height of 10ft). If not possible, they shall be felled and left on-site as designated by the wildlife biologist.

Yarding in cedar salvage sales is accomplished either by helicopter or by hand packing cedar products to the road. Heavy equipment can be used along roadsides for old landings or decks of cedar.

Any use of rubber-tired vehicles and tractors must be pre-approved by the ID Team. Designated skid roads would be mapped and flagged on the ground to minimize impacts. Restoration of skid roads may be necessary after logging is completed.

Total openings resulting from yarding corridors within riparian buffers must not exceed 20% of the stream length associated with the harvest operation (this percentage is intended to be a limitation on a per harvest unit basis). These corridors will be no wider or more numerous than necessary to accommodate safe and efficient transport of logs.

Ground-based machines approved by the Officer in Charge, such as hydraulic shovels are used wherever on-site conditions permit and are required to operate on a mat of slash while off-road and observe any equipment limitation zones.

Shovel yarding distances will not exceed 500 feet unless approved by the officer in charge.

Landing or roadside sorting and decking areas within 100 feet of flowing water must be avoided. However, in some cases, it may be necessary and will require prior approval by the Officer in Charge.

Cases are:

1. Constructing a new road through non-tribal fee land where clearing limits have been identified and marked;
2. Pre-roading activity where the standing timber may not be felled for quite some time;
3. When terrain and ownership/property lines limit where sorting and decking can occur.

It may be necessary to pile and burn roadside slash.

On QIN owned units, small logs will be decked for firewood cutting and left along the roadside.

Cable yarding machinery (tower, line, carriage) will be fitted to the terrain, stream, and wetland protection areas, yarding distances, and timber size.

All operating lines and running blocks, with the exception of chokers, carriage tag lines, and tower guy lines and blocks, will be suspended above the ground and clear of logging debris and snags during periods of high fire danger.

Avoid throwing cull material over the edge of the landing on steep slopes. Pile the material on or near the landing for burning.

A.2 Mechanical Site Preparation for Pile Burning

Mechanical site preparation includes the use of low ground pressure, tracked machinery designed to either pile brush and/or logging slash, or to disturb the soil thus reducing the slash and/or vegetation for the creation of a planting spot. Mechanical site preparation activity is usually confined to the dry soil season months, generally June through October, to reduce the impacts of soil compaction.

The specifications for treating logging slash and/or brush are as follows:

- All logging debris within 100 feet of the running surface of any state or Federal highway, county road, railroad, or any road specified by the QIN Fire Management Officer must be pulled back and piled or scattered as determined by the officer in charge to produce a remaining average volume of forest debris of no greater than 9 tons to the acre of material, 3 inches or less in diameter. No pile should be located within 75 feet of the running surface of these roadways, or within 50 feet of the dripline along the edge of the cutting block boundary, leave trees, snags, or riparian buffers.
- All logging debris concentrated along roads as a result of harvest must be treated, as directed by the officer in charge, to expose a total of at least 300 planting spots per acre.
- When a pre-plant exam determines there are less than 200 well distributed planting spots per acre, an adequate amount of the slash (under 4-inch diameter material) and noncommercial trees and brush may be piled so as to expose at least 300 distributed planting spots per acre.
- All living material (brush and/or noncommercial tree species) pulled out of the ground shall be shaken so as to remove as much dirt from the root system as possible before being piled.
- Piles may be placed at random with a minimum pile size of 10 feet in diameter by 4 feet in height. Piles should not exceed 40 feet in diameter. No pile width may be wider than $\frac{1}{2}$ the height. Windrowing, piling on top of stumps, and piling stumps is forbidden. Distance between piles shall be a minimum of 10 feet. All material 8 feet or longer must be piled parallel within the pile.

Pile Burning

Treatment must occur when fuel moisture in 10-hours fuels is greater than 13% and significant rainfall (at least .25 inches) has developed to reduce the risk of the fire spreading to surrounding fuels.

Field inspection is completed on each unit scheduled for pile burning.

- Access roads are flagged.
- Piles are counted and measured for calculated tonnage.
- Maps are produced.
- Burn plans completed.

Special safety regulations are followed when burning next to mainlines or public roads (See Job Hazard Analysis on file at QDNR).

Every effort will be made to minimize impacts to local communities.

A.3 Fire Management Strategy

Preparedness Strategy—Organization

The responsibility for wildland fire management activities is assigned to the QDNR, Division of Forestry – Fire Management Program. The Forest Manager has oversight responsibility for all forestry functions, including fire. The Fire Management Section has three full-time employees—a Fire Management Officer (FMO), an Assistant Fuels Management Specialist (AFMS), and a dispatcher. Funding for the FMO, Fire/Fuels Specialist and dispatcher comes from fire preparedness funds and is currently funded for 52 weeks per year. Fire facilities; agreements; cooperators; shared resources; and training, fitness, physicals, & qualifications records are continuously updated and can be found in the QIN FMPA and/or Mobilization Plan.

Mobilization Strategy—Initial Attack

The BIA Northwest Regional Office has entered into a Cooperative Fire Protection Agreement with the WDNR for wildland fire suppression on the forested trust lands. The QIN provides a significant presence during initial attack for fires on the QIR because of the “closest resources available” concept.

Initial attack resources are dispatched in a variety of ways. During regular business hours, initial attack resources are dispatched from the main fire office in Taholah, WA. Any employee qualified for engine operations is required, during fire season, to be available by radio during business hours. After business hours, these employees carry radios and are available through the cell phone system.

Any of QIN’s fire resources can be requested for mutual aid by other agencies directly from the QIN. (See the Quinault Indian Nation Fire Mobilization Plan on file in the QDNR Fire/Fuels Office.)

The QIN supports at least one Type II fire crew and its miscellaneous overhead. Crews and overhead are used for local, regional, and national assignments. The Fire Management Program office dispatches the fire resources and provides organization, transportation, personnel, leadership, and equipment for the crews. Requests for crews and overhead are received from several sources. Locally, any neighboring agency can directly order from the QIN. For fires out of the local area requiring additional support personnel, requests come through the Puget Sound Interagency Coordination Center. (See the FMPA and QIN Fire Mobilization Plan.)

Prevention Strategy

Wildfires that have the potential to cause damage to natural or human developed resources will be prevented if possible. This is accomplished through a variety of methods including hazard reduction, fire prevention education, engineering, and enforcement. Until the QIN assumes the responsibilities of the WDNR fire suppression agreement, the official policy is to assist the WDNR in the enforcement of its fire regulations. After assuming its responsibilities, the QIN will continue to cooperate with the State.

During the fire season, timber sale administrators are responsible for keeping forest operators informed of state fire laws, special restrictions or closures, and for assisting the WDNR in conducting industrial inspections. Copies of completed inspection reports are forwarded to the Olympic Region-WDNR.

A bulletin board is maintained in the QIN Fire/Fuels Office, by the Fire/Fuels staff, on which the fire precaution level of the day is posted. The Fire Management Officer and the local WDNR Manager are responsible for the implementation of any special fire restrictions. These special restrictions are approved in advance by the QIN Forest Manager. The Fire Management Officer handles all coordination efforts.

All operations must comply with the requirements outlined in this section of the Forest Management Plan. These operations are subject to inspection. Failure to meet these requirements may result in shutdown of the operation until corrections are made, a citation is issued, or both.

If a fire occurs in a land clearing, right-of-way clearing, or landowner operation, the fire will be fought to the full limit of available employees and equipment. The fire must be reported to the WDNR in a timely fashion. The WDNR reports the fire to the QIN if on their protective areas. Such firefighting effort shall continue as necessary to suppress the fire.

When, in the opinion of the QIN, any or all forested area(s) of the QIN are particularly exposed to high fire danger, the QIN may designate such land as an area of extra fire hazard subject to closure, and/or issue an order suspending any and all burning permits in that area.

General Fire Prevention Requirements

All landowners, timber owners, firewood cutters, salvagers, or operators shall furnish and maintain, in good and serviceable condition, such fire tools and equipment and provide such fire protection as may be required by the QIN and/or the WDNR. In the absence of specific QIN regulations, the requirements shall not be less than those required under the laws of the State of Washington.

There is a shutdown zone number on each QIN forest practice notification/application that corresponds to the zone in which the operator will be conducting the forest operation. The QIR has been divided into zones (see “Fire Management Zones” on page 19) based on elevation, historical weather data, and slope exposure. During high forest fire danger periods, restrictions on the use of spark-emitting equipment may occur within any or all zones.

If restrictions are imposed, notification will occur by public radio or recorded phone message at the Olympic Region of the WDNR and would stipulate shutdown zones affected and the type of restrictions imposed.

Industrial Restrictions

When, in the opinion of the QIN and/or the WDNR, weather conditions arise that present a hazard to the forested lands of the QIR, whereby life and property might be endangered, the QIN Forest Manager may designate Industrial Fire Precaution Levels that regulate logging, land clearing, or other forest operations that might cause a fire on, or adjacent to, forestlands.

In making a decision as to when restrictions or shutdowns should occur, the Forest Manager shall utilize available information relating to current and projected fire danger, current and projected weather, and current local fire activity. The decision to designate the Industrial Fire Precaution Levels is largely consistent with the WDNR’s recommendations.

All persons performing logging, land clearing, salvage, firewood cutting, or other operations that might cause a fire to start on or adjacent to forestlands, shall comply with the restrictions described in the designated Industrial Precaution Level.

Industrial Fire Precaution Levels.

- LEVEL I: Closed season (Fire season). Fire precaution requirements are in effect. A Fire Watch/Fire Security is required at this and all higher levels unless otherwise waived.
- LEVEL II: Partial Hoot owl. The following may operate only between the hours of 8 p.m. and 1 p.m.:
 - Power saws, except at loading sites;
 - Cable yarding;
 - Blasting, welding, or cutting of metal.
- LEVEL III: Partial shutdown. The following are prohibited:
 - Cable yarding - except that gravity-operated logging systems employing non-motorized carriages may be operated between the hours of 8 p.m. and 1 p.m. local time when all blocks and moving lines are 10 feet or more above the ground, excluding the line between the carriage and the choker.
 - Power saws - except at loading sites and on tractor/skidder operations between the hours of 8 p.m. and 1 p.m.
 - In addition, the following are permitted only between the hours of 8 p.m. and 1 p.m.:
 - Tractor/skidder operations
 - Mechanized loading and hauling
 - Blasting
 - Welding or cutting of metal
 - Any other spark-emitting operation not specifically mentioned
- LEVEL IV General shutdown. All operations are prohibited. With QIN consent, the WDNR may issue an advance written waiver of the above precautions.

The following definitions shall apply to the above listed Industrial Fire Precaution Levels.

- Cable yarding systems: A yarding system employing cables and winches in a fixed position.
- Closed Season (Fire Precautionary Period): That season of the year when a fire hazard exists and as described in FPR-44-030 (A).
- Hauling: Where hauling involves transit through more than one shutdown zone/regulated use area, the precaution level at the forested site shall govern the level of haul restrictions, unless prohibited by other than the Industrial Fire Precaution Level System.

- Loading sites/woods site: A place where any product or material (including but not limited to logs, firewood, slash, soil, rock, poles, posts, etc.) is placed in or upon a truck or other vehicle.
- Tractor/Skidder Operations: A harvesting operation, or portion of a harvesting operation where tracked machines, or other harvesting equipment capable of constructing fire line, are actively yarding forest products and can quickly reach and effectively attack a fire start.

Operator(s) shall, on a daily basis, obtain the predicted Industrial Fire Precaution Level from the WDNR for the zone in which they are working. When the Industrial Fire Precautions Level is I or higher, unless waived by the WDNR and mutually agreed to by the QIN, the operator will designate a person as "firewatch." The designated person will be capable of operating the purchaser's communications and firefighting equipment, excluding helicopters, and of directing the activities of the purchaser's personnel on forest fires. Such person must report any fire detected to WDNR within 15 minutes of detection (QIN Fire Management Planning Analysis, QIN Forest Practice Regulations).

QIN Fire Management staff is currently working on a burn permit system that will be incorporated into the appropriate regulation when complete. This burn permit system will only address burning in commercial forestlands.

Appropriate Management Response Strategy

The QIN establishes the following response strategy:

- (i) All fires are aggressively attacked and controlled. The overarching goal is to control all fires 95% of the time at or below one acre at all fire intensity levels, and contain 95% of all fires by the next operational period.
- (ii) Initial attack response is in accordance with the WDNR Olympic Region Interagency Systematic Dispatch System. An Incident Commander (IC) will be identified immediately when the systematic dispatch is implemented. The IC may adjust the level of dispatch at any time based on current and projected burning conditions.
- (g) Fire Management Constraints. Fire management constraints that affect fire management decisions and activities are based on QIN/BIA policies, environmental concerns, and hazards. They include:
 - (i) Keeping the health and well-being of human lives as a top priority in all fire management decisions.
 - (ii) Protecting with all efforts wildland-urban interface communities.
 - (iii) Limiting use of heavy equipment to what will cause the least amount of impact on the land. All efforts must be made to keep heavy equipment out of and away from streams, rivers, headwalls, wetlands, slumps, bogs, and prairies, obtaining an emergency permit if stream entry occurs.
 - (iv) Using cold trail and wet line methods when they are a practical and effective fire use tool.
 - (v) Using all fire practices in efforts to protect threatened and endangered wildlife species and their habitat.
 - (vi) Using all efforts to protect known and discovered cultural resource sites.

(vii) Rehabilitating all fire control lines, especially those with the potential to impact wetlands and watercourses.

A.4 Forest Regeneration (outside of floodplain)

The major goal of the Regeneration Program is to establish healthy, fully stocked stands within 2 years of harvest that reach free to grow status by the fifth growing season. The desired stocking at the time of planting is 400 trees per acre, on the lower reservation, 680 for pure alder plantations and 500 on the poorly accessible steep slopes of the North Boundary Area. In the floodplains where conifer can be established the desired species mix and stocking levels will vary. Sitka spruce will be the primary conifer planted with a mix of red alder to lessen the impacts of the spruce tip weevil. The density of the two species will vary, red alder approximately 100 per acre and spruce approximately 300 per acre. The regeneration discussion is broken into seven components including what species are planted, contract specifications and activities surrounding nursery stock, planting contracts and monitoring requirements, seed tree retention and selection criteria, post-harvest regeneration monitoring requirements, the need for fertilizer, and conifer release requirements and techniques.

Species

What species to plant is mostly determined by the soil type, site index, geographic location, presence of insect or disease, and the naturally occurring species removed during current and past harvest (old growth species). The species out-planted on the QIR include Douglas-fir, western hemlock, Sitka spruce, lodgepole pine, western redcedar, western white pine, red alder, and, possibly, Pacific silver fir and Alaska yellow cedar.

The flood plain areas are planted with red alder and Sitka spruce at a density of 400 trees/acre when intermixed, 680 trees per acre if pure alder and 500 trees per acre if pure spruce. Within these areas, the spruce are either planted separately in blocks to facilitate future vegetation management or intermixed with alder, usually 70% conifer and 30% alder.

The coastal zone, which stretches from the coastline inland approximately 2 miles, is affected by Swiss needle cast, is predominantly planted with western hemlock and Sitka spruce; with a possible intermix of western redcedar, western white pine and lodgepole pine. Further inland from the coastal zone the higher quality sites are planted predominantly with Douglas-fir and western hemlock with a possible mix of the minor species. The medium productive sites are planted predominantly with western hemlock and a possible mix of Douglas-fir and/or some minor species. The lower productive sites are planted with a mixture of the minor species and western hemlock with seed trees left in the unit to assist with artificial planting.

The most critical insect and disease considerations for selection of species to be planted include:

- The presence of Swiss needle cast affecting the Douglas-fir, primarily along the coastal zone and up to 5 miles inland.
- The presence of tip weevil affecting Sitka spruce
- The presence of red band needle blight affecting lodgepole pine
- The presence of white pine blister rust

- The presence of root rots
- The presence of dwarf mistletoe affecting western hemlock

Other considerations when selecting species to plant include water drainage, amount of vegetation present or expected, aspect, location (e.g., floodplain or upland, coastal or inland), and use by elk (larger planting stock).

On the steep slopes of the North Boundary Area where soil depth can be shallow and access is limited, the units are sometimes planted with 1-year-old container seedlings; otherwise 2yr old stock is used. The rest of the QIR is usually planted with 2-year-old bareroot and or large 1-year-old container conifer seedlings and 1-year-old red alder bareroot stock.

Nursery Stock

Nursery contract specifications for morphology and physiology are set forth in the contracts for seedlings. These specifications are often higher than industry standards because of the restriction of herbicides for site preparation and conifer release vegetation control. Nurseries are usually visited twice a year, once in the spring to assess germination and transplanting and again in the fall to assess growth, morphology, physiology, vigor, inventory, and pack out and delivery plans. When the seedlings are delivered to the QIN, a 1% sample is conducted to measure stem height, root length, caliper, and general health and form of the seedlings mostly on lots that have been viewed in the nursery beds and talking to the managers of problems or issues with a particular seedlot.

Planting

Site preparation may be necessary to increase the amount of planting spots needed to meet reforestation objectives. After harvest is completed the Regeneration Forester will determine if site preparation is needed by conducting a walk through in the logging unit. If the walk through is insufficient then the area will be inventoried for plant-able spots. Site preparation is conducted using a shovel/excavator equipped with a slash grapple to pile the fine slash material; large logs are left out of the piles. The piling activity usually occurs during the summer months to avoid saturated soils that can cause compaction and degradation. The piles are then burned in the fall by the Fire crew.

The use of herbicides for site preparation may be necessary on steep slopes where shovel/excavators cannot safely work or on allotments that were harvested and never planted. On some FEE lands that were harvested and not planted the brush growth is extensive and may need to be treated with herbicides to affectively start a new plantation. Steep slopes that were logged in the past that were either planted or not or failed to maintain may have extensive understory brush that would need to be treated with herbicides to meet reforestation Forest Practice Regulations (Forest Chemicals Section).

The QIN employs seasonal tribal tree planters and, given the large number of acres to reforest every year, contract a tree planting crew is also utilized to assist with the needs of the regeneration program.

Both the contractor and tribal crew are inspected daily to ensure quality performance and proper tree care and handling. One plot per acre is sampled for above- and below- ground quality and density. The Regeneration Program has specific inspection guidelines and procedures written in the Inspection

Procedures Manual and the Tribal Tree planter Payment Manual. The data collected by the inspectors are entered into a regeneration database and queried for various reports.

Units are surveyed once or twice during the planting season to detect signs of rabbit and or mountain beaver damage to seedlings. If a significant amount of damage is occurring, the seedlings will be protected using vexar tubing UV=0. Depending on the severity of the damage either every tree or every other tree will be protected.

Seed Trees

Seed trees may be retained within clear-cut harvest units on low sites (site index of less than 100) to assist with the artificial regeneration program, and be either distributed across the stand at 2 to 15 trees per acre (if available) or clumped to facilitate regeneration efforts. If no suitable seed trees can be located, and if suitable seed trees are lacking around the stand edge, then the clear-cut area may be aerial seeded in conjunction with artificial regeneration. The objective is to obtain natural regeneration on a site beneath individually selected trees or small clumps of trees distributed uniformly over the site.

If an existing seed source is sufficient to meet regeneration goals then it may not be necessary to leave clumped or individual seed trees within the clear-cut areas or portions thereof. For example, in a riparian management zone within the cutting block, adjacent seed producing stands, and/or in deferred or excluded areas within the cutting block capable of producing seed. The size and shape of the clear-cut has a direct influence on the above listed considerations.

Seed trees and/or clumps will be marked with paint at the stump and at or above 6 feet on the bole. In some circumstances, seed trees will not be marked and may be selected by the operator with the timber sale administrator overseeing the selection. Seed trees will be selected from among the dominant and co-dominant individuals within the stand. Normally shade tolerant species will be favored.

Species preference is as follows:

1. Western hemlock
2. Western redcedar
3. Western white pine
4. Douglas-fir
5. Finally, lodgepole pine and Pacific silver fir if others are not available

Selected leave trees should be as disease free as possible. Species preference is a higher-priority selection criterion than lightly diseased or damaged trees. A tree with mechanical injuries may still be a suitable seed tree. Trees with minor damages occurring from bears or logging injury will not be discriminated against if they meet other criteria of a suitable seed tree. No single selection criterion is sufficient.

Other selection criteria include:

- Straight bole and absence of forking

- A minimum 30% crown ratio, live crown to the top, and minimal dead branch ends
- Good vigor with little chlorosis
- The ability to produce cones or is producing cones as evidenced by cones in the crown and/or on the ground

Individually selected leave trees are subject to windthrow. However, the use of the following selection criteria may help to minimize this problem:

- Select leave trees that are not growing on hummocks or nurse logs especially if large portions of their roots are visible above ground.
- Avoid trees that are leaning or have some curve in the bole.
- Clump trees that are growing in areas where water tends to pond significantly. Single leave trees are at higher risk to blowdown because of the high water table softening the soil and the high wind rocking the tree.
- If possible, avoid trees growing on or near ridge tops.

Monitoring

Each unit is surveyed upon completion of the first growing season to quickly determine the need for replanting or animal protection. Each unit is then formally inventoried on completion of the second and fifth growing season. Both the 2- and 5-year inventory information is used to assess the need for replanting, animal protection, conifer release, and fertilization. The fifth year inventory is specifically used to compare stocking densities to minimum acceptable stocking requirements as outlined in the QIN Forest Practice Regulations, there are no minimum height requirements. A 10-15year survey will be conducted on selected units for the purpose of precommercial thinning, conifer release, and or fertilization.

Fertilization

The need for application of fertilizer to young stands that have not reached crown closure and are experiencing signs of poor health and vigor is determined by the 2, 5 and 10-year inventories, along with incidental observation. It is important to ascertain the reasons for the poor health and vigor before prescribing the treatment. Factors to consider are soil type, available soil nutrients and chemistry, height of water table during the year, presence of insects or disease, site preparation (hot slash burns or mechanical treatment with excessive removal of organic layer), soil compaction, amount of competing vegetation, and species planted.

These young stands are treated with a fertilizer designed to address the needs of the stand and will be applied by experienced personnel and or contractors, either by manual or aerial application, in accordance with the QIN Forest Practice Regulations. In young plantations (2-5 years old) with manual application, typically each best tree on a 10-by 10-foot spacing receives about 4 ounces of fertilizer (covering an area 3.5 by 3.5 feet). Other forms of fertilizer may be used during the planning period at

various rates and spacing given new information from research trials and recommendations from the Stand Management Cooperative.

Fertilizer not only improves health, vigor, and growth, but also increases the tree's ability to produce shade in riparian management zones and shortens the plantation's time to become hiding cover for big game.

Conifer Release

Stands are continually monitored if 2-, 5-, or 10- to 15-year inventories reveal significant brush or hardwood competition. Conifers planted in the flood plains are monitored more closely because of the rapid brush growth in these high site areas. Units are treated if the stocking levels are expected to fall below the minimum stocking requirements as set forth in the QIN Forest Practice Regulations.

The QIN has been reluctant to use herbicides for brush control because of the amount of annual rainfall, significant number of streams, fisheries, big game, and recreational and gathering uses. Herbicides are usually not an option for release treatment because of the presence of hemlock or other susceptible species in the stands. Herbicides could possibly be used during the planning period to include aerial, base line, and ground applications with sprayers.

The release treatment is typically performed by mechanically cutting all competing brush 20 feet away from any conifer within the unit. Specifications for the release treatment are listed in Attachment A of Conifer Release Contracts. Timing of release is critical to success. Removal of competing vegetation between July and late September proves to be the most effective period to hinder regrowth during the following spring. Furthermore, to make the release effective and limit the number of releases on any one unit, the conifers should be in their second to fourth growing season, exhibiting rapid height growth, and/or just beginning to become overtopped by competing vegetation. On very young stands on sites with slow brush and seedling growth, hand fertilization of seedlings may be used to increase their growth and allow them to out- compete the brush.

A.5 Road Construction and Hydraulic Projects.

Road Location

Road location is identified by the QIN/BIA forester as part of the sample contract/permit, including centerline flagging and determination of the volume of surface material needed for road construction. If the purchaser and/or operator wish to vary from the proposed road location, they must submit a detailed road location plan to the Officer in Charge and centerline flag the location within 30 days of contract approval. The Officer in Charge will approve or disapprove the proposal with input from the ID team.

The size and type of stream crossing structures and drainage structures will be determined by the hydraulics officer and the QIN/BIA forest roads manager.

Road location will consider the following:

- Reduce duplication of roads. Investigate using existing roads across another ownership before constructing new roads.
- Consider using an existing road if it is in the appropriate location and fits the needs of the project.
- Consider using an existing road if new construction will have more impacts on resources than using the existing road.
- Locate roads where the risk of sediment entering water is minimized and where there will be the least disturbance to stream channels, lakes, wetlands, and floodplains.
- Choose location for roads that limits water crossings.
- Locate roads to find optimal water crossings first.
- Utilize the natural topography to keep runoff out of streams.
- Minimize the risk of slope collapses or slides.
- Utilize topographic benches to disconnect stream crossings and landings.
- Use natural grade breaks to locate drainage structures.
- Avoid crossing wetlands including forested wetlands.
- Avoid or minimize roads in the following locations:
 - On side slopes greater than 60%,
 - On unstable slopes and landforms,
 - In areas with a history of road failures or slides,
 - Within 300' of a typed water or wetland, or
 - Where seeps or springs are evident.
- When unavoidable, roads located in sensitive areas, such as adjacent to riparian zones or in slide-prone areas, will be constructed of a full bench approach and waste will be end-hauled to an approved designated site.
- Road should include adequate drainage.
- Waste material must be end-hauled to an approved waste site when constructing roads adjacent to or on side slopes greater than 60%.
- End-hauling may be required if there is potential for displaced material to enter a wetland or typed stream.
- Ensure the sub-grade can support log and rock haul.
- Avoid creating sunken roads, which are lower than the surrounding ground level.
- Design road shape (crowned, inslope, outslope) to support the anticipated haul of timber, rock, or other forest products.

Road Construction and Maintenance

The provisions of timber sale contracts govern most road construction, reconstruction, and maintenance on all Individual Trust and Tribal timber sales.

- Construct roads when moisture and soil conditions are not likely to result in excessive erosion or soil movement, but have sufficient moisture to achieve proper compaction.

- Advance planning and use of the right equipment will minimize the construction footprint and reduce the cost of mitigating soil disturbance.
- Consider the intended use of the road in construction and build the road to accommodate that use.
- Gravel surface roads when possible to provide all-weather access, reduce road maintenance costs, and improve water quality protection.
- Non-compacted roads should be given several weeks to settle before log haul or heavy truck use takes place.
- Compact the road sub-grade ensures a solid structure with minimal potential for failure, extends the life of the running surface, and reduces sediment runoff.

Maintenance requirements extend for the life of the contract, and include cleaning and opening culverts, brushing and cleaning ditches, surface blading, spot rocking of soft spots in the road surface, replacement of old or damaged culverts, cleanup of slides or slumps, and other road protection measures.

- Grade roads before the surface reaches severe stages of pothole formation, washboarding, or water begins to pool.
- Mark culverts on the ground before grading.
- Avoid grading roads unnecessarily or when soils are saturated or excessively dry.
- Install and/or replace culverts during the dry season.
- Remove debris from culverts during the dry season, unless deemed an emergency. Remove wood from the culvert inlet and relocate downstream in a way where it interacts with the stream but does not inhibit fish passage as directed by the hydraulics officer.
- Check road surface material prior to harvest or heavy use, and especially during the rainy season; additional surfacing material may be needed.
- Do not use roads during excessively wet or freeze/thaw conditions.
- Reduce any sediment that has the potential to enter streams or wetlands; measures include using fabric or spreading straw to stabilize surfaces prone to erosion and not using the road.
- Exposed soil can be seeded with native grass along roadsides to help control erosion, provide forage, and minimize vegetation maintenance costs if work is done within the seeding window (February 1- May 1 and September 1- October 15).
- Control roadside vegetation where it interferes with drainage. If using chemicals, keep them away from streams and wetlands unless manufactured for approved aquatic use.
- When plowing snow, leave 2 to 4" on the surface and provide breaks in the snow berm to allow road drainage. Avoid locating breaks where runoff will drain to a wetland or stream.
- Any downed wood that blocks vehicular traffic on stream-adjacent parallel roads will be removed and placed on the side of the road closest to the adjacent water.

Drainage & Erosion Control

- Construct a crowned road—sloped to both sides from the centerline at 3 to 5%-- for high use roads, when drainage structures can be routinely maintained, on double-lane main haul routes, or in areas that experience slippery or icy road conditions.
- Construct an outslowed road—sloped from the cutslope to outside road edge 3 to 5%-- on gentle grades (<8%), when maintaining drainage structures is not feasible, on low use or unused roads, or in areas where the outslope can be maintained to prevent rutting.
- Construct an insloped road—sloped from the outside edge to the ditch 3 to 5%-- when surface drainage needs to be carried to a ditch line, if outslowing would cause fill erosion, to avoid runoff from directly entering a stream, in areas that experience slippery road conditions, or on steeper road grades.
- Avoid sediment delivery to all streams. Even the smallest streams carry sediment down to fish habitat.
- Place cross-drains in locations to take water off the road surface quickly and direct runoff to a stable, forest floor for filtering and dissipation.
- Reduce sedimentation by:
 - Building check dams in ditch lines,
 - Installing slash filter wind rows on fill slopes below the road,
 - Installing a double ditch to carry water over stream crossings, or
 - Placing straw wattles, silt fencing, logs in road ditches perpendicular to the slope to filter and slow flow.
- Stabilize soils disturbed by construction, especially near stream crossings.
- Cover exposed soils with bio-matting, straw, tree boughs, or hydro mulching to prevent rain drop erosion and loosening soils.
- Re-vegetate all exposed soils with non-invasive locally native plants.
- Schedule construction during dry conditions only.

Table A.2: Drainage Structures used on the QIN

Drainage Structures	
Ditches	• Ditch water should not flow directly into streams and/or wetlands. • Ditch water should be directed towards the forest floor or other vegetated areas at regular intervals through ditch-outs or relief culverts. • Use sediment traps in ditch lines if water cannot be diverted to the forest floor so flow can filter before entering stream or wetland courses. • Seed exposed soils on road edges with native grasses to minimize surface runoff.
Relief Culverts	• Install relief culverts to manage and control ditch water. • Relief culverts must be at least 18" in diameter. • Install cross-drains or ditch relief culverts on crowned or in-sloped roads to divert water and sediment away from streams and onto the forest floor. • Protect steep slopes and erodible fill at drainage structure outfalls with flumes to carry the water to a safe location or use energy dissipaters such as large rocks or heavy wood material. • Drainage structures should be installed: ▪ As close to the stream as possible, ▪ In natural drainage area for seeps and springs, ▪ In a location that prevents piracy of water from one basin to another, ▪ At the bottom of vertical curves, or ▪ Where there is evidence of insufficient drainage.
Water Bars	• Use water bars to divert water from ditches and the road surface. • Install so that water bar runs the width of the road surface and is sufficient to drain water to a ditch, the forest floor, or a vegetated surface. • Use energy dissipaters, such as rocks, at the outlet to minimize erosion. • Most effective on low-use roads.
Rolling Dip	• Slope to carry water to the outside edge of the road. • Use energy dissipaters, such as rocks, at the outlet to minimize erosion. • Construct to accommodate truck haul if that is the intended use.
Berms	• Construct using a grader to create short earthen barriers along the edge of the road. • Use where a road parallels a stream or wetland. • Should be kept to a minimum length. • And water that flows along the berm edge need to be routed to the forest floor in an area that will not affect a stream or wetland.
Ditch Out	• Use when the terrain allows ditch water to be drained away from the road on the same side the ditch is on. • Use on ridge tops and switchbacks. • Do not use where water will drain towards an unstable slope or directly into a stream or wetland.

Hauling Policies, Safety, and Routing

Haul routes are an important part of the overall timber sale process because of the need to calculate with some degree of accuracy the amount of road-use fees and road-maintenance fees or allowances.

Hauling routes and periods for all timber sales are addressed in detail in the contract and during the preparation of the Logging Plan of Operations for each sale or unit.

Coordination of hauling is accomplished if operations on adjacent ownerships are involved.

The BIA has oversight authority in these cases. Each log truck must have a load ticket stapled to the rear of the load when it leaves the landing; a “mule train” trailer for short logs or pulp must also have a separate load ticket. Depending on the destination of cedar products, a QIR haul permit and a Washington State haul permit may be required.

Seasonal restrictions in periods of high fire danger or during wet weather are also addressed in the Plan of Operations.

Road Closures

Timber sale roads are usually kept open for at least 1 year after completion of harvest to allow for necessary slash disposal and tree planting work to be completed. Following reforestation, secondary and spur roads will be closed to protect natural resources. These include wildlife management, resource or personal property theft, risk of mid-slope road failure, stream adjacent parallel roads, roads in special management areas, roads on unstable ground, roads not needed for management of the forest lands, etc. A secondary or spur road may remain open if the ID team determines it necessary.

To close a road means to restrict motor vehicle traffic by means of a ditch, gate, cement barrier, or guardrail, but does not require the removal of culverts and bridges. However, culverts requiring annual debris removal or showing signs of frequent (every year or two) overflow resulting in road/ditch erosion will be removed or replaced with properly sized culverts or bridges. Road closures may be temporary, seasonal, or long term as determined by the ID team.

Temporary. Closed for a short period of time to all vehicle traffic by a removable structure. A temporary road closure is usually necessitated by a resource activity such as a timber sale.

Seasonal. Closed to all vehicle traffic by a removable structure for a specific period of time. The Director of QDNR sets the time period based on input from resource managers. An example of a seasonal road closure is closing the road for hunting season.

Long Term. Closed to all vehicular traffic by reclamation of the road, by installation of a road closure ditch, or by placing a non-removable structure across the road surface. Long-term closure of a road requires thorough review of existing ditches and drainage functions for possible removal or management.

Procedures for closure:

- The ID Team will review closure projects or activities prior to implementation of closure. Future needs will be considered prior to closure, such as, forest regeneration activities, fertilization or conifer release activities, potential thinning or salvage activities, special minor forest product harvest, habitat restoration and enhancement activities, hunting and fishing access, or other use by tribal members. The cost and/or risk of leaving the road open will also be considered.

- Roads proposed for reclamation will be inventoried for necessary road stabilization and proper drainage. Stabilization and proper drainage will be accomplished prior to the placement of a non-removable structure or a road closure ditch. Ditches will be constructed with a backhoe or other mechanized ditch construction equipment.
- Secondary road closures will leave room for a vehicle to turn-around.

Road Abandonment

To abandon a road means to permanently close it by preparing the ground for vegetative growth and to revert to its original profile. Abandoning the road includes removing ditch lines, culverts, and bridges; stabilizing cut and fill slopes; and (where necessary to prevent erosion) seeding, fertilizing, and mulching of bare mineral soil (and other ID Team approved measures). Roads to be considered for abandonment will be those with chronic problems that require frequent maintenance to protect public resources such as those:

- Adjacent to a stream,
- Within a riparian forest management corridor,
- Inhibiting natural stream processes,
- With areas of uncontrollable erosion and/or sediment delivery to typed waters,
- Water crossing failures, or
- Cut and fill slope failures.

Procedures for Abandonment:

If the ID team determines a road should be abandoned, the following must be completed:

- Remove side cast and fills if failures have the potential to damage a public resource or pose a risk to public safety. Areas to look for include cracks and/or slumps in the road surface or shoulder, unstable slopes or landforms, and areas where the weight and volume of side cast material could cause a slide. This material should be end hauled to a stable location or placed against the cut slope or in another stable location. Material should not be placed in areas on the road surface that will allow water to pond or on the road surface of steep slopes in high rainfall areas. This material will become saturated and unstable.
- Remove water crossing structures to restore the natural drainage of streams. When removing water crossing structures:
 - Re-establish the natural streambed as close to the original location as possible and so it matches the up and downstream width and gradient characteristics.
 - Place all excavated material in stable locations.
 - Leave stream channels and side slopes at a stable angle that matches adjacent topography.
- Install self-maintaining drainage structures that will not require future maintenance.

- Provide for drainage by removing relief culverts, removing berms or punching holes in them so they drain to a stable location, ripping the road surface to promote re-vegetation, and ensuring side slopes are left at a stable angle.
- Install non-drivable water bars to intercept the ditch making sure to key the water bar into the road cut-slope. The outflow will be directed onto stable locations. Water bars will be appropriately skewed. For roads greater than 3% grade, skew at least 30 degrees from perpendicular to the centerline. For roads less than 3% grade or at the bottom of a dip, install them perpendicular to the centerline. Water bars should be spaced to disperse runoff and minimize erosion and sedimentation. Water bars will be installed at natural drainage points.

A.6 Management of Forested Wetlands

A forested wetland is any wetland or portion thereof that currently has, or at maturity will have, a crown closure of 30% or greater. Harvest is permitted within forested wetlands under the following conditions unless otherwise approved by the ID Team:

- Harvest methods are limited to low-impact harvest or cable/tower systems. At least one end of the log will be suspended during yarding.
- Seed trees will be retained and will either be distributed across the stand at 2 to 15 trees per acre (if available) or clumped to facilitate regeneration efforts. If no suitable seed trees can be located and if suitable seed trees are lacking around the stand edge, then the area may be aerial seeded in conjunction with other forms of artificial regeneration.
- Non-merchantable trees will be left standing where feasible. Feasibility is partially based on how leave trees will impact regeneration and will be determined by the ID Team.

A.7 Management of Seeps and Springs.

A 50' no-entry buffer will be applied to headwall seeps, headwall springs, and side-slope seeps with perennially saturated soils. This buffer will be measured from the outer perimeter of the perennially saturated soil zone.

A.8 Application of Forest Chemicals.

Currently Approved Use

Forest chemicals may be used at the seed orchard to maintain the health and vigor of the seed orchard trees for conifer seed production and at other developed sites for vegetation control. Also, Garlon 4a may be used to control gorse on the QIR. The QIN has been actively restoring riparian forest habitat by removing invasive Japanese knotweed species. For these activities glyphosate and imazapyr herbicides have been approved for use in all knotweed control projects.

For the purposes of this discussion, forest chemicals include pesticides and herbicides. The use of fertilizer is addressed in the Stand Improvement component of this section.

Process for Future Forest Chemical Use

Following ID Team recommendation and approval from the Business Committee, forest chemicals may be used on lands within the QIR boundaries to protect trust and tribal resources, to maintain road right of ways, maintain weed free rock pits, and for forest development activities (such as site preparation and conifer release) in accordance with all QIN laws and regulations. Consideration will be given to avoid chemical application in riparian areas.

The use of forest chemicals (outside the seed orchard and developed sites) must be approved by the QIN Business Committee (through the Land and Natural Resources Committee). Once this approval has been granted, the process for approval continues with a Forest Practice Application (FPA). The Manager of the Forestry Department must be informed of the need and the FPA submitted to the QIN Environmental Protection Division (EP) for review and approval. An HPA will be required if applying forest chemicals within 200' of a water body. Once approval is granted through EP, the FPA and HPA must be submitted to the Director of QDNR for approval.

Following is a list of forest chemicals that may be used and is not to be considered exhaustive:

• Aquamaster	• Oust
• AquaNeat	• Accord
• Polaris AQ	• Rodeo
• Habitat	• Arsenal A.C.
• Chopper	• Escort
• Garlon 4A	• Transline
• Weedone	

In the event of an emergency insect or disease outbreak, insecticides or fungicides may be considered.

Guidelines for Forest Chemical Use

- Use of forest chemicals will be managed to meet water quality standards and to avoid harm to the environment, with particular attention to protecting riparian and wetland vegetation.
- All label requirements will be followed.
- Attempt to the fullest extent possible to have zero drift and zero entry of aerially applied forest chemicals into water. However, with current technology and operational needs, it is not practical to achieve zero drift. Recognizing this, the QIN forest practice regulations (FPRs) will be amended to implement best management practices designed to eliminate the direct entry of chemicals to water (defined as the entry of medium to large droplets), while minimizing off-target drift. In addition, the

FPRs will be revised to minimize entry into riparian areas at levels that would cause damage to vegetation.

Guidelines for Aerial Application of Forest Chemicals:

- To keep chemicals out of surface water and wetlands, a buffer will be left on all typed waters and wetlands, as set forth on the following table. Operators will maintain an offset from the outer edge of riparian and wetland buffers. These application requirements do not apply to *Bacillus thurengensis* (Bt) which is a biological control. When applying Bt, however, the operator will be required to meet all label requirements.

Table A.1. Buffers on streams and wetlands for aerial application.

***Adapted from Title 222 WAC-Forest Practice Rules Chapter 222-38 WAC-Forest Chemicals.**

		WIND			
		Favorable		Calm or Unfavorable	
Nozzle Type	Application Height	Buffer on water	Offset from Riparian Buffer	Buffer on water	Offset from Riparian Buffer
Regular Nozzle	Low (<16')	Width of the Riparian Buffer	As needed for safety	150'	50 feet
	Medium (17-50')	Width of the Riparian Buffer	As needed for safety	250'	N/A
	High (51-65')	Width of the Riparian Buffer	As needed for safety	325'	N/A
Raindrop Nozzle	Low (<16')	Width of the Riparian Buffer	As needed for safety	100'	20 feet
	Medium (17-50')	Width of the Riparian Buffer	As needed for safety	100'	20 feet
	High (51-65')	Width of the Riparian Buffer	As needed for safety	125'	20 feet

*Dry (no surface water at the time of application) type O streams segments do not require a buffer unless the chemical used has a half-life that extends into the wet season.

- To protect riparian vegetation, chemicals will not be applied within any riparian buffers.
- Operators applying aerial chemicals will apply the initial swath parallel to the buffer strip identified in the preceding table unless a deviation is approved in advance by the ID Team. Drift control agents shall be required adjacent to buffer strips.
- Operators applying aerial chemicals will use a bucket or spray device capable of immediate shutoff.
- Operators applying aerial chemicals will shut off spray equipment during turns and over riparian buffers, wetland buffers, and open water.

- Operators applying aerial chemicals will leave a 200-foot buffer strip around residences and 100-foot buffer strip adjacent to lands used for agriculture unless such residence or farmland is owned by the forest landowner or the aerial application is acceptable to the resident or landowner.

Guidelines for Ground Application of Forest Chemicals with Power Equipment:

Ground application of chemicals with power equipment will not be permitted within 50 feet of Type D and H waters, unless prescribed for hardwood conversion or as necessary to meet requirements for noxious weed control. In any event, operators are to leave a 25-foot buffer strip on each side of wetlands and all other surface waters; provided, however, that dry stream segments (i.e., with no surface water at the time of application) do not require a buffer unless the chemical used has a half-life that extends into the wet season. The use of machinery for roadside or road right-of-way applications for vegetation control or noxious weed control will follow the rules for ground application.

Guidelines for Hand Application of Forest Chemicals:

Hand application of forest chemicals will only be applied to specific targets, such as vegetation, trees, stumps, and burrows, or as bait or in traps. No chemicals will be applied by hand within the riparian buffers of any Type D and H waters, unless prescribed for hardwood conversion or as necessary to meet requirements for noxious weed control.

Operator Education and Licensing:

Operations managers and field supervisors are encouraged to include a minimum of 10 hours of training on forest best management practices and water quality issues every 5 years, with no more than 3-1/2 hours in any one year. Training similar to that required for the applicators and operators should also be required for the operations managers and field supervisors. Private and Commercial applicators applying restricted use pesticides (RUPs) in Indian country must be federally certified, unless the tribe is covered under another EPA-approved or EPA-implemented plan. Private applicators also have the option of obtaining the federal certification by submitting a signed application form and proof of completing the training requirement. See the application or website for more details on the training requirement. Applicators and supervisors may also be required to be licensed or certified by the State of Washington.

A.9 Management of Areas with Site Index of less than 100.

When soil moisture is high and unrestricted operation of ground-based equipment would result in unreasonable soil compaction as determined by the ID Team, mitigation measures will be implemented that minimize widespread soil compaction, or postponed until site conditions improve such that yarding may proceed without causing unreasonable soil compaction. If soils are saturated and rutting is occurring, or has the potential to occur, harvest operations will not be permitted until soil saturation decreases. On areas with site index less than 100, harvest operations with heavy equipment should be completed between **May 1st and October 15th**.

Cable yarding and helicopter yarding is permitted when soils are saturated.

Seed trees may be retained within clear-cut areas with a site index of less than 100. Where available, they will be distributed across the harvest unit at 2-15 trees per acre. Where not available, they will be clumped to facilitate regeneration efforts.

Additional Requirements for Harvest within the Floodplain

Whenever possible, natural occurring characteristics of the floodplain are to be maintained. It is strongly advised to carefully plan harvest activities to occur between June 1st and September 30th to minimize impacts to natural resources. Operations will be allowed outside this window with the approval of the Forest Manager(s) and Environmental Protection Manager (upon consultation with the QDNR Roads Manager, Silviculturist, and Hydraulics Officer). If approval is granted, harvest within the floodplain will be completed by February, or coordinated with Forest Development to facilitate reforestation efforts. Floodplain soils are identified in a soils layer on GIS.

In order to maintain forest floor structure and habitat characteristics in the floodplain, downed wood 24 inches in diameter or greater may not be moved without permission from the OIC. Downed wood 24 inches in diameter or greater is not allowed to be removed from the floodplain as well.

All conifer individuals and groupings of conifer less than 1 acre in size will be retained. In patches of conifer (areas with greater than or equal to 50% basal area conifer) greater than 1 acre, 30 dominant/co-dominant conifers per acre will be retained. Sitka Spruce is the priority species for leave trees.

Riparian management zone enhancement actions may occur within the RMZ as identified by the ID team. This includes, but is not limited to, in-stream habitat restoration activities, felling of riparian trees for use in in-stream habitat restoration activities, felling of riparian trees for conifer restoration planting, and removal of cedar spaults and other fish passage barriers.

Requirements for harvest within the floodplain if authorized outside June 1st – September 30th

Harvest operations must be completed by February, or coordinated with Forest Development, to facilitate regeneration efforts.

If hauling beyond September 30th, the logger should only cut and deck what s/he can load out to a landing or truck within three days.

Stream crossings will be sized for permanent structure specifications in order to provide fish passage and reduce the likelihood of culvert failure. These structures/culverts may be required to be removed by the operator after harvest or removed after free to grow, depending on ID team requirements.

Equipment may not be stored for long-term on the floodplain outside the target dates, (ie one month or more while waiting for floodwaters to recede).

If impending floods are occurring, the OIC may require the operator to move equipment to higher ground.

No in-stream work will occur outside the hydraulic window (June 1st- September 30th).

A.10 Management of Downed Wood (outside of the floodplain).

Two downed logs will be left per acre following harvest. Downed wood will have a small-end diameter of 12" or greater and a length of 20' or greater. Live trees will not be felled to meet this requirement. If the wildlife biologist determines that the unit is deficient in downed wood, the ID Team may require some otherwise merchantable trees be left.

A.11 Management of the Coastline

A 200 foot no-entry buffer measured from either the edge of the bluff, or in the absence of a bluff, from the vegetation line will be applied to the coast.

Appendix B: Fish Species Assumed Present on the QIR

Appendix B: Fish Species Assumed Present on the QIR

Resident Fish Species Presumed Present on QIR.

Common Name	Scientific Name
Western Brook Lamprey	<i>Lampetra richardsoni</i>
Mountain Whitefish	<i>Prosopium williamsoni</i>
Cutthroat Trout	<i>Oncorhynchus clarki</i>
Rainbow Trout	<i>Oncorhynchus mykiss</i>
Dolly Varden	<i>Salvelinus malma</i>
Bull Trout	<i>Salvelinus confluentus</i>
Brook Trout	<i>Salvelinus fontinalis</i>
Olympic Mudminnow	<i>Novumbra hubbsi</i>
Common Carp	<i>Cyprinus carpio</i>
Redside Shiner	<i>Richardsonius balteatus</i>
Longnose Dace	<i>Rhinichthys cataractae</i>
Speckled Dace	<i>Rhinichthys osculus</i>
Peamouth	<i>Mylocheilus caurinus</i>
Largescale Sucker	<i>Catostomus macrocheilus</i>
Threespine Stickleback	<i>Gasterosteus aculeatus</i>
Coastrange Sculpin	<i>Cottus aleuticus</i>
Torrent Sculpin	<i>Cottus rhotheus</i>
Prickly Sculpin	<i>Cottus asper</i>
Riffle Sculpin	<i>Cottus gulosus</i>
Reticulate Sculpin	<i>Cottus perplexus</i>

Anadromous Fish Species Presumed Present on QIR.

Common Name	Scientific Name
Pacific Lamprey	<i>Lampetra tridentate</i>
White Sturgeon	<i>Acipenser transmontanus</i>
Green Sturgeon	<i>Acipenser medirostris</i>
Cutthroat Trout	<i>Oncorhynchus clarki</i>
Steelhead	<i>Oncorhynchus mykiss</i>
Dolly Varden	<i>Salvelinus malma</i>
Pink Salmon	<i>Oncorhynchus gorbuscha</i>
Coho Salmon	<i>Oncorhynchus kisutch</i>
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>
Chum Salmon	<i>Oncorhynchus keta</i>
Sockeye Salmon	<i>Oncorhynchus nerka</i>
Eulachon	<i>Thaleichthys pacificus</i>
Threespine Stickleback	<i>Gasterosteus aculeatus</i>

Appendix C: Population Data for Roosevelt Elk

Appendix C: Population Data for Roosevelt Elk

The Quinault wildlife staff has been conducting herd composition flights from 2003-2012 that were flown both on and off reservation in the GMU's utilized by Quinault hunters (refer to Table C of this appendix).

Aerial surveys are the most common method for examining elk and deer population size and structure (Otten et al. 1993, Eberjardt et al. 1998, Noyes et al. 2000.). This technique is known to suffer from biases as not all animals have an equal probability of being seen. The biases can vary depending on time of day, weather conditions and ground cover.

Helicopter surveys were used to obtain estimates of the composition of elk populations. Herd composition counts are an estimate of the proportions of various age and sex classes occurring in the populations. Elk were classified as cow, calve, spike or branched-antler. No attempts were made to separate yearling females from adult females. Herd composition flights were flown during the early morning during the foraging period on clear to slight overcast days. Surveys were conducted typically before or after the deciduous trees had lost the leaf canopy. Herd composition surveys are conducted to determine the number of animals in each sex and age class. An example of such an age and sex class would be the number of calves per 100 cows, or the number of bulls per 100 cows. Herd composition data is collected annually or semiannually during helicopter surveys. One flight is always conducted in the spring before the green up of riparian vegetation. This count reflects adult and calf winter survival rates. The second herd composition count is conducted when funds or flight time is available. This count is conducted in the fall late September to early October during the "rut" season. This survey is conducted to estimate calf productivity and bull to cow ratios.

Table C. Herd Composition

Year	Cows	Calves	Branched Bulls	Spike Bulls	Total	Calves/100 cows	Bulls/100 cows	Herds
2005-2006	221	52	13	28	314	24	19	18
2006-2007	227	82	25	17	401	30	15	20
2007-2008	380	77	NA	NA	529	20	18	23
2008-2009	171	26	21	7	225	15	16	13
2009-2010	243	88	19	20	368	36	16	19
2010-2011	176	49	9	13	247	29	15	19
2011-2012	329	113	24	17	483	34	12	34
Average	336	101	23	28	496	28	16	23

Appendix D: Population Data for Bald Eagles

Appendix D: Population Data for Bald Eagles

The reservation coastline, major rivers and stream systems (Quinault, Raft, Salmon and Queets) provide abundant food and nesting opportunities for several pairs of breeding / non-breeding adults and juveniles. The graph below represents the number of breeding bald eagle pairs observed within QIR from 1998-2011. These numbers were calculated using nest occupancy data from all spring flights conducted from 1998-2011. To represent a bald eagle breeding pair the nest would need to be occupied by at least one adult, a chick or an egg.

Table D. Number of Breeding Pairs of Bald Eagles within the QIR.

Year	Number of Breeding Pairs
1998	10
1999	15
2000	15
2001	15
2002	12
2003	17
2004	20
2005	22
2006	22
2007	20
2008	17
2009	15
2010	14
2011	19

Appendix E: Riparian Protections Illustrations

E.1: Alternative 1.0: No-Change

Floodplain Harvest

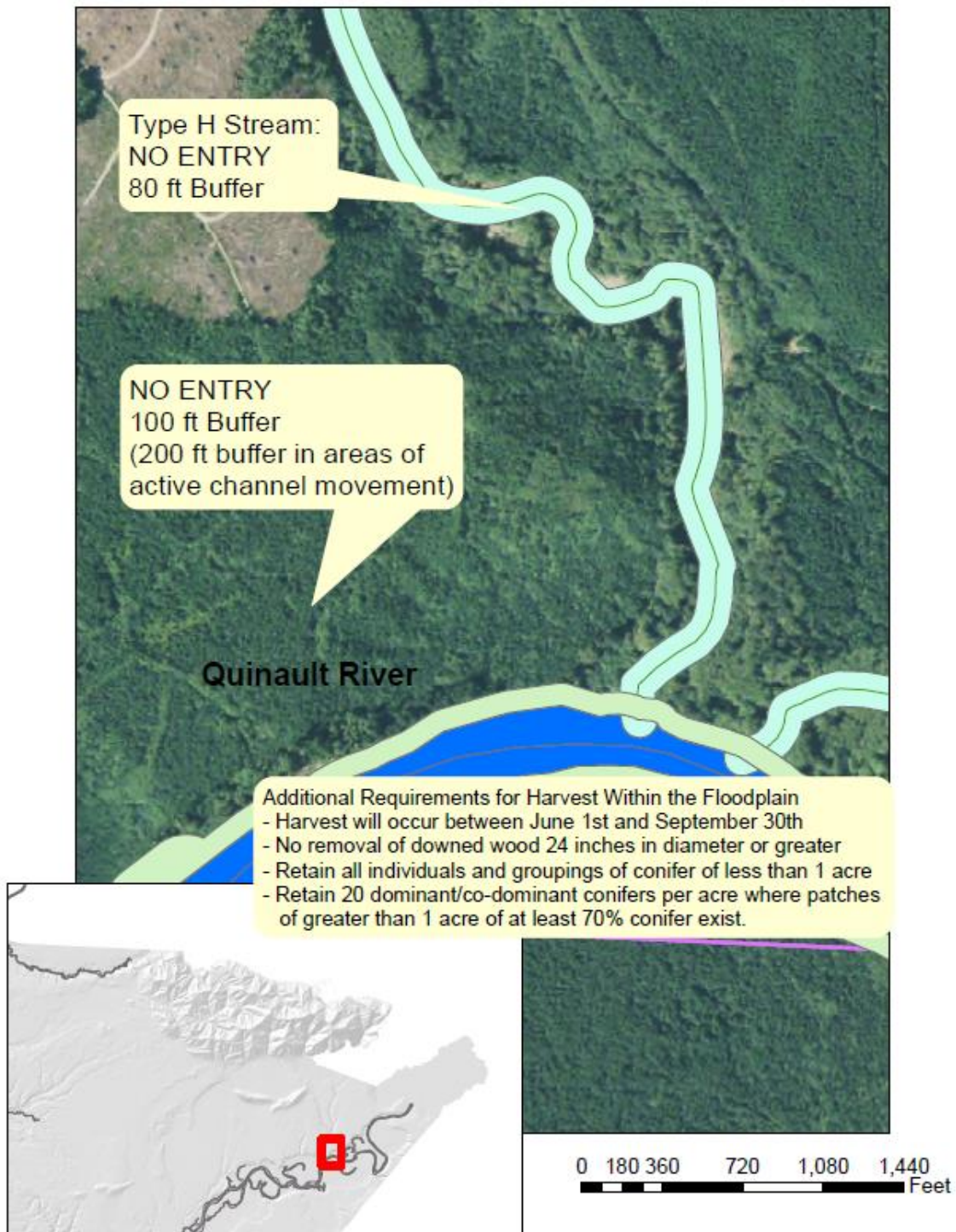


Figure E.2: Alternative 2 – Fish, Wildlife, and Cultural Resources

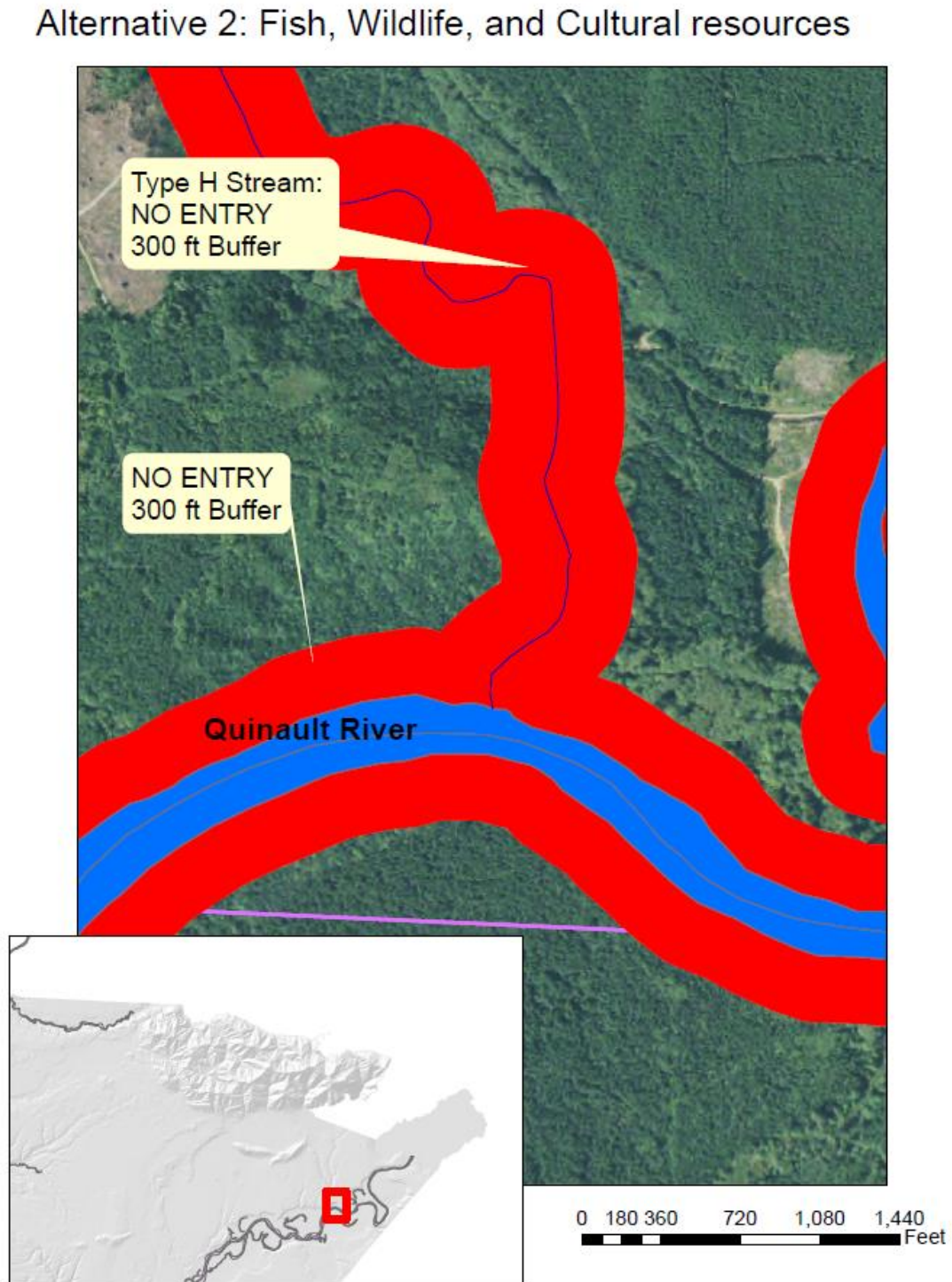


Figure E.3: Preferred Alternative 3.0

Alternative 3: Modified No-Action

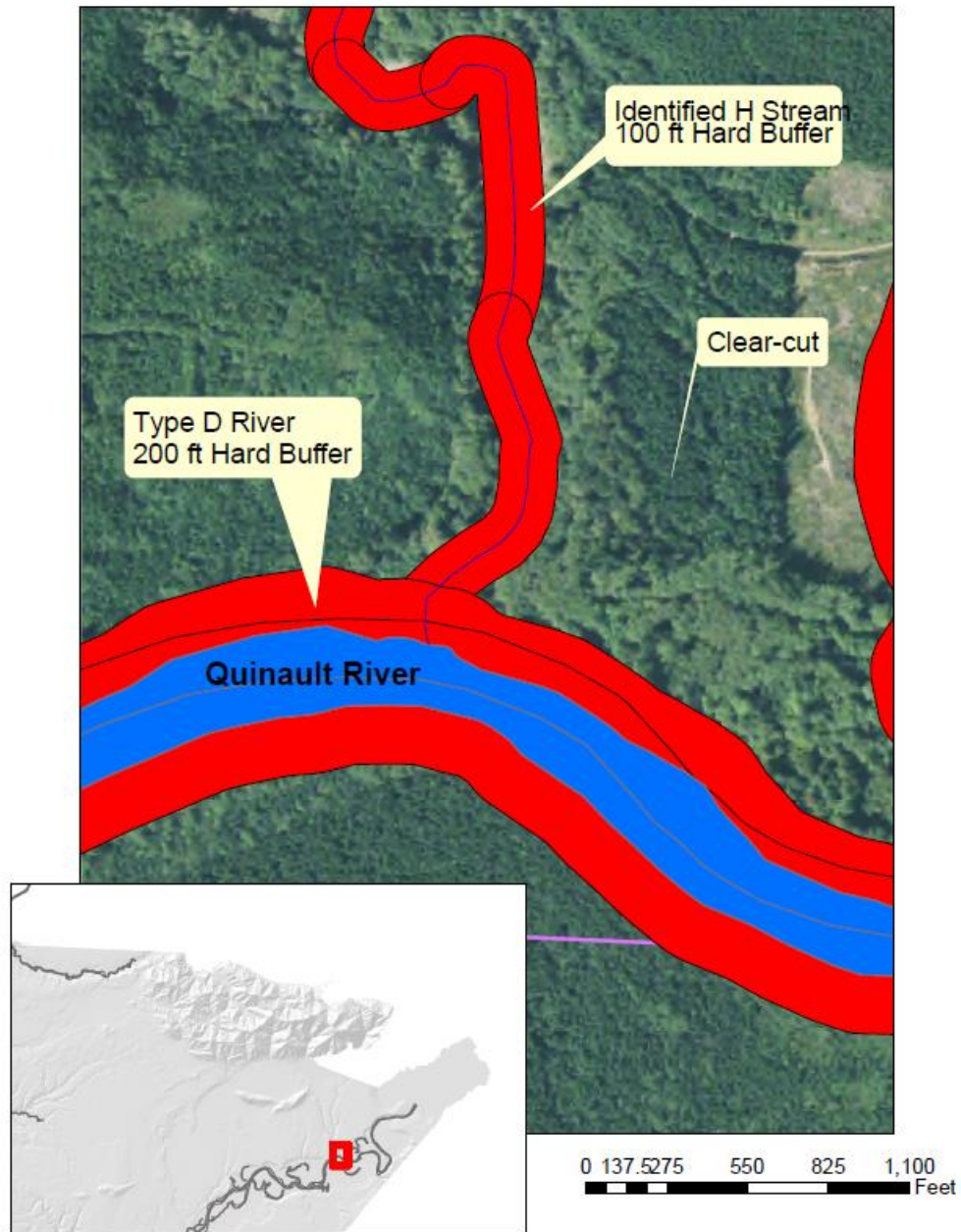
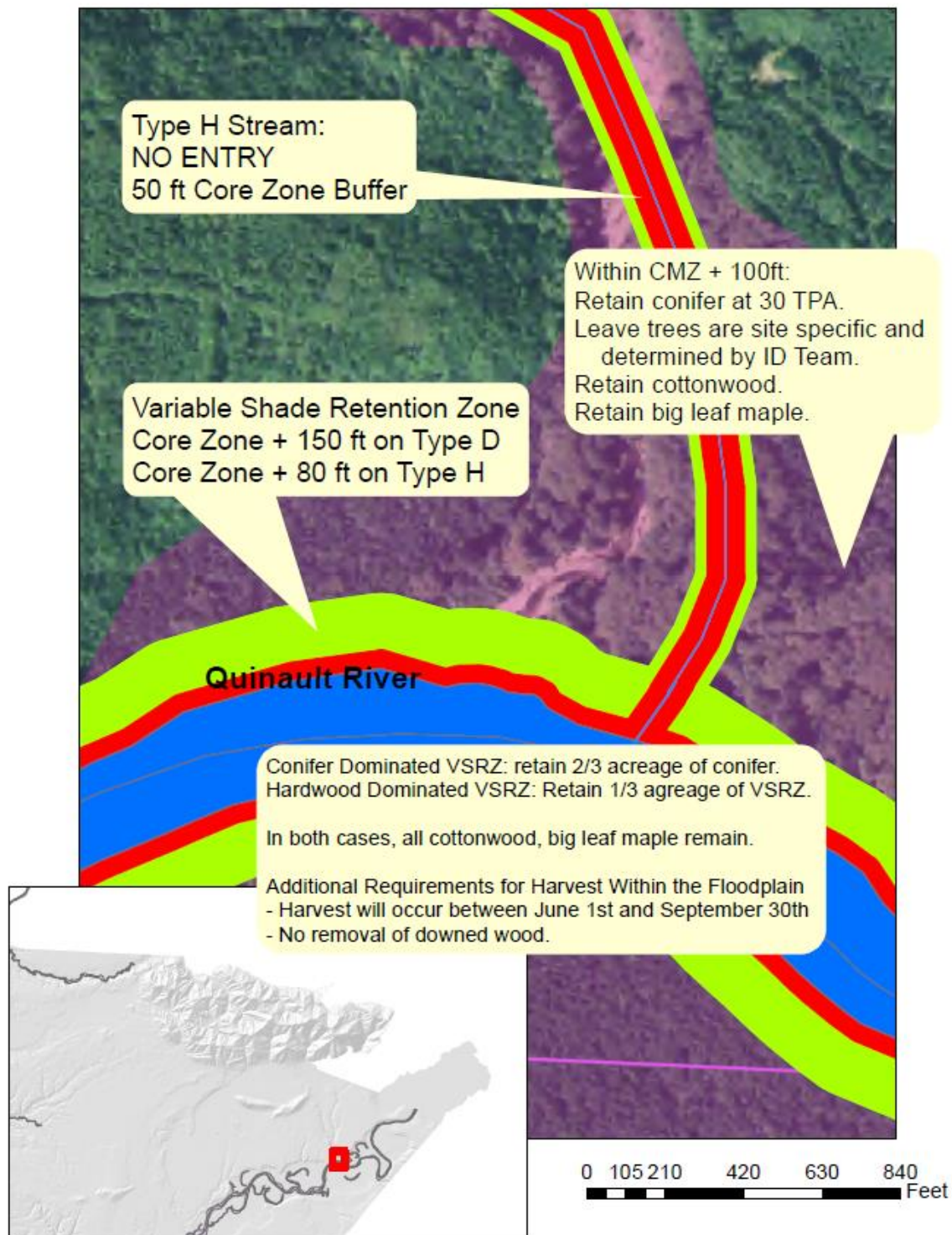


Figure E.4: Alternative 3.1: Riparian Forest Management Corridors
Floodplain Harvest



F: Public Comments

QUINULT INDIAN RESERVATION
FOREST MANAGEMENT PLAN
DRAFT ENVIRONMENTAL ASSESSMENT COMMENT

Karen Sotomish Harp
October 12, 2015

My concern is that the Quinault Tribe's requirements will not be fairly imposed on all timber owners and harvesting entities.

Regarding timber harvesting, I oppose the past QIN practice of either exempting themselves or taking certain timber harvesting liberties based on their "economic need" rather than requiring themselves to strictly adhere to all the timber cutting rules and practices required of allottee landowners. For instance, the previous QFP stated the tribe could harvest 30 year old trees, while allottee trees had to wait until they were at least 50 years old.

Regarding economic need, It's fair to say that if one cared to investigate, most allottee owner could also show economic distress – especially the elders.

The Quinault Tribe need to be fair.

Any Quinault requirement should be imposed on all. If a rule is breached, it not only weakens the policy, it weakens the perception of the tribe.

Submitted by:
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Quinault member and landowner for 60 years.
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Member of the Quinault tribe and allottee land owner

Draft EA comments, Quinault Indian Nation Forest Management Plan

43 CFR 46.305 DOI Regs.

§ 46.305 Public involvement in the environmental assessment process.

(a) The bureau must, to the extent practicable, provide for public notification and public involvement when an environmental assessment is being prepared.

In this instance, I am preparing and submitting comments as a 'stakeholder' with interests in several individual allotments on the Quinault Reservation that will be affected by the Quinault Forest Plan (QFP) update upon approval by the Secretary of Interior.

Background

The existing FMP has been in effect for a ten year period with two single year extensions granted while the new QFP update has been in progress.

I would like to go back in time prior to the initial FMP that was implemented in 2003 with some historical perspectives about the Quinault Reservation, the people, and important litigation relevant to the management of forests on the reservation.

A Brief History about the Quinault Reservation

- Treaty of Olympia in the 1850s¹
- 1904 – The Quinault Reservation was expanded to 200,000 acres for the use of the Quinault, Quileute, Hoh, Queets, and 'other fish-eating Indians on the Pacific Coast'. [I.C. Kappler, Indian Affairs]
- 1925 – *Mason v. Sams* – 5f (2d) W.D. Wash – Court decided that fish on Quinault Reservation streams **did not** belong to State **nor to** the United States but to the Indians of the reservation

¹ The Treaty of Olympia, 12 Stat 971, was negotiated by Indian representatives from the Quinault, Queets, Hoh, and Quileute and Governor Stevens. Their homelands were reserved for a way of life that included hunting, fishing, and gathering guaranteed by this Treaty agreement and a large area of their territory was ceded to the government.

- 1931 - *Halbert v. U.S.* – Chehalis, Chinook, and Cowlitz tribes, not allotted elsewhere, are entitled to take allotments on the Quinaielt Reservation.
- 1956 – *Squire v. Capoeman*, 361 U.S. 1, 351 U.S. 10 – The statutes and regulations mandated compensation by the Federal Government for violations of its fiduciary responsibilities in the management of Indian property.
- 1969 – 71 – litigation against the BIA for timber mismanagement began, 1465 individual Indian Allottees plaintiffs, *Mitchell v. United States*
- 1974 – *Quinault Allottee Assn. v. U.S.* – Cert denied
- 1977 – 1983 – additional 2% from individual Allottees collected to help with the litigation expenses²
- 1983 – *Mitchell v. United States* – U.S. Supreme Court decision in favor of the individual Allottees claims, (Helen Mitchell, aka Sanders, et al), regarding timber mismanagement on the Quinault Reservation
- 1988 – North Boundary added an additional ~12,000 acres to the Quinault Reservation³
- 1990 – FMD for Quinault Reservation was 6% on Nov. 28, 1990 through the present date⁴
- 1991 – Self-Governance Demonstration Project began – the Quinault tribe one of ten tribes participating in the contracting of funds from the BIA 93-638 funds appropriated from Congress. The IHS also became part of this when the Self-Governance Act of 1992, P.L. 103-413, was signed by President Bill Clinton and implemented to replace P.L. 93-638 for the participating tribes, including Quinault, on Oct. 25, 1994⁵

² The 2% contributions were repaid in full to individual Allottees when the \$25M was distributed to individual Indian Allottees as part of the terms of settlement of the Mitchell case

³ The North Boundary was Congressional action taken to correct a survey error that occurred when the reservation boundaries from the northernmost point, north of the village of Queets, to the eastern point of Lake Quinault were originally established

⁴ The FMD is established by regulations to be prescribed by the Secretary of Interior, 25 CFR at 406 – Sale of timber on lands held under trust – For the Quinault Reservation, the FMD was 6% on November 28, 1990 and the actual percentage in effect unless changed by the Secretary of Interior

⁵ Title IV of the Act, at section 406, Disclaimer. “(B) Federal Trust Responsibilities – Nothing in this Act shall be construed to diminish the Federal Trust responsibility to Indian tribes, **individual Indians, or Indians with Trust Allotments.** [Emphasis added]

- 2003 – Quinault Forest Plan (QFP) approved and implemented for a ten year period providing guidance of timber harvests on the reservation. It expired on Sept. 30, 2013 and was granted a one-year extension, followed with an additional one-year extension that expired on Sept. 30, 2015
- 2010 – Claims Resolution Act passed by Congress appropriating \$3.4B for the *Cobell* settlement on behalf of individual allottee land owners with IIM accounts (\$1.4B) and established the DOI *Cobell* Land Buy-Back Program for Tribal Nations (with \$1.5B over a ten year period to purchase fractionated interests from willing sellers at fair market value.)
- 2015 – Quinault enters into a Cooperative Agreement with DOI *Cobell* Land Buy-Back Program for Tribal Nations with \$19.2M to purchase fractionated interests from willing sellers at fair market value

Specific to the draft EA, I have the following comments and concerns regarding the QFP update.

1. In March, 2013, I prepared and submitted comments to QDNR during a public meeting held at the BIA OPA office in Aberdeen.
2. Finding of No Significant Impact (FONSI).
 - a. 1.5 Public Outreach Process. Table 1-3. Activity. There was a FMP update presentation at the AA & AT's monthly meeting held on June 2012 and followed up during the AA & AT annual meeting held in July 2012. Since then, the AA & AT has received no additional presentations by QDNR staff. The AA & AT has invited QDNR to meetings for additional updates but this did not happen.
 - b. 1.8 Permits, Licensing, and Consultation. Because of the presence of federally listed threatened and endangered species on QIR, consultation with the United States Fish & Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA Fisheries) is required before the selected alternative can be implemented. My comment and concern here is regarding the 'consultation' with federal agencies. See *Mason v. Sams*, *U.S. v. Washington*, and other case laws. Further, I have some additional comments on species such as Marbled Murrelet, Spotted Owl, and Bull Trout.
 - c. 8. The cumulative effects to the environment are mitigated to avoid or minimize effects of implementation of the proposed project (*EA Chapter 3 and EA Appendix A*)
 - d. Chapter 2. Alternatives.
 - i. 2.1 The Process used to Develop Alternatives. 2) To improve and maintain habitat that will sustain harvestable numbers of fish and wildlife species important to the Quinault people, and...

Preferred Alternative: Alternative 3.1: Riparian Forest Management Corridors (RFMCs). This alternative emphasizes active management using specific management prescriptions to improve riparian forest conditions along rivers, streams, and wetlands to enhance ecological and geomorphic functions over the long-term. [Comment: The management prescriptions to improve riparian forest conditions along rivers, streams, and wetlands pose a potential loss of revenues from timber harvests and some sort of compensation should be considered.](#)

Key Issue 3 – Effects on Fisheries

Pacific salmon stocks produced from waters of the QIR support valuable tribal commercial, sport, and subsistence fisheries. Fish species of importance on the reservation include Chinook, coho, sockeye, chum, steelhead, cutthroat trout, eulachon, Pacific lamprey and White sturgeon. The reservation also contains Bull trout which is also considered a fish species of importance.

[Comment:](#) Although important, eulachon are not produced from waters of the QIR; White sturgeon are not produced from waters of the QIR; the importance of Bull trout is questionable. Bull trout are not harvested in tribal fisheries, have no subsistence value.

Riparian Protections and Floodplain Management [My comments and concerns are that individual allottee landowners lose harvestable timber that are within the Riparian Area or floodplains in the QIR without any management measures that will address the losses. Riparian Protections, buffers, sensitive areas can serve a useful purpose but should not be at the expense of the individual allottee landowner.](#)

Alternative 3.1: Riparian Forest Management Corridors (RFMCs)

This alternative focuses on actively managing riparian zones within floodplains and channel migration zones to reestablish conifer in riparian areas in order to improve ecological, geomorphic, and floodplain processes; improve wildlife habitat; and improve fish habitat **while providing economic return to the landowner.**

The primary goals of Alternative 3.1 are to:

- 1.
- 2.
- 3.
4. Provide an economic return to the landowner

[Comment:](#) How will goal #4 be achieved? What is the standard to measure the economic return to the landowner? Without some mitigation efforts, the landowner faces losses of timber revenues with the expanded Riparian Forest Management

Corridors from the original FMP. The QIN should develop a process of mitigation to the land owner for lost revenues from harvestable timber on their allotments that are constrained by the RFMCs in the updated QFP. If the QIN does not provide mitigation to the landowners, this could be considered a “taking.”

3.2 Water Quality

Comment: 1. Bull Trout (*Salvelinus confluentus*) may be listed as threatened species under ESA, however this is on a coastwide basis and very little information exists specifically within the QIR of the estimated abundance numbers, areas where they ‘may be’ present within the rivers and streams, and needs for management measures for additional restrictions. 2. The potential impact to water quality associated with timber harvest practices is an increase in sedimentation. Research by Cederholm, et al, was conducted in the Clearwater River, a tributary of the Queets River, outside the reservation boundaries which, however, may have little similarities to the timber harvests on the reservation.

3.3 Fish and Fish Habitat

This section describes the impacts on fisheries and issue and/or concern?

There is no doubt that logging in the 1920s – 1980s disrupted forest regeneration cycles within the floodplain. While research has shown that such practices have considerable negative impacts on aquatic species, particularly Pacific salmon. Thus it is assumed that all species known to occur within the QIR were impacted by historic timber harvest practices.

Comment: The first mitigation for salmon began with the construction and operation of the Cook Creek Fish Hatchery in the 1960s to compensate for the lost production of salmon runs. Additional hatchery salmon production was added with the construction of the Penned Rearing Project at Lake Quinault in the early 1970s to further mitigate for the impacts of timber harvest practices. Then, the Salmon River Salmon Enhancement Facility was constructed in the 1990s to provide additional salmon production for harvests by both tribal and non-tribal fishers. For natural or wild salmon, most of the spawning areas occur upstream from the QIR. As such, additional constraints to timber harvests may not be needed with the new FMP. On a much larger scale, global warming likely has a larger impact upon salmon than timber harvest within the QIR.

Pacific salmon populations experienced four detrimental impacts that led to population declines: heavy fishing pressure in the early 1900s; habitat destruction resulting from ill managed timber harvests; the

construction of hydropower projects throughout the mid-1900s; and **the development of supplemental hatcheries.** [Comment:](#) I have not seen any evidence where supplemental enhancement programs have contributed to detrimental impacts to salmon populations. To the contrary, supplemental salmon enhancement programs have rebuild salmon runs on the Queets River; Columbia River tributaries; and other river systems in the Pacific Northwest.

Appendix B: Fish Species Assumed Present on the QIR

Anadromous Fish Species Presumed Present on QIR

[Comment:](#) In my experience as a life-long tribal fisher and former fishery manager, I have first-hand knowledge of White Sturgeon, Green Sturgeon, and Eulachon, (in addition to the other species listed as resident and anadromous).

Both White Sturgeon and on rare occasion Green Sturgeon ‘dip-in’ to the QIR lower river areas but do not need the entire river system for their life cycles. The White Sturgeon originate from the Columbia River, (and Fraser River in Canada and Sacramento River in California). Little information is known about the Green Sturgeon compared to the White Sturgeon. Eulachon (see attachment) also ‘dip-in’ to the QIR lower river areas on their way back to streams of origin (Cowlitz River, Willamette River, and mainstem Columbia River). None of these three fish species are impacted by timber harvests within the QIR.

Another salmon species, pink salmon, are *presumed* present on QIR. The fishery management program does not collect any data, does not manage in a commercial, subsistence or recreational fishery, for pink salmon. A vestigial remnant amount of Pink salmon return on ‘odd years’ and the southernmost portion of their range is part of the QIR. Pink salmon are not a commercially valuable fish like other salmon within the QIR and no data collection by QDFi of the numbers returning to the rivers.

Harvest Unit Planning and Design

The way in which harvest units are planned and designed differs between alternatives in rotation age at which harvest occurs, the size and design of harvest units, and the requirement for green-up of adjacent stands. Table 2-1 illustrates comparison of Harvest Unit Planning and Design.

[Comment:](#) The Alternative 3.1 with conifers: 40 year old; hardwoods: 35 year old offers an improvement from the existing FMP and should be applied equally to both tribal lands and individual allottee allotments. The original FMP had two different harvest unit plans, one for the tribe ‘for economic considerations’ and another for the individual allottee landowners.

- The current timber harvests under the current QFP favor the Quinault tribe's very aggressive rate of timber cuts on its lands, possibly at the detriment of many individual landowners, e.g. within a river drainage area where stream protections are needed, necessary, required under the QFP.
- The pre-sale process to harvest timber is very long, time consuming, and at times held up by the environmental review by QDNR for the individual landowners seeking to harvest timber.
- There should be some recognition of tribal elders that own individual allotments with mature timber to harvest and should be reviewed on a case by case (and need) basis. Priority should be considered within the 'Ten Year Plan' for timber harvests by the BIA/Quinault tribe.
- For individual owned allotments, some method of fair compensation for timber not harvested for environmental protection (RFMCs) should be offered to the individuals.

ATTACHMENT 'A'

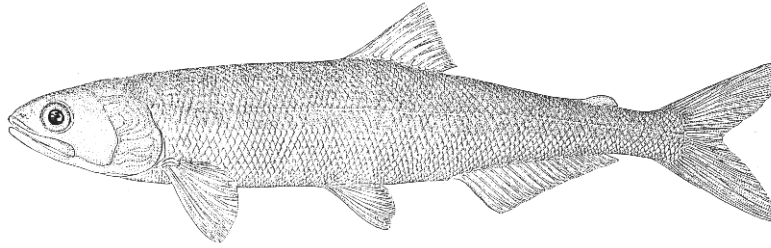
The **Marbled Murrelet** (*Brachyramphus marmoratus*) is a small [seabird](#) from the [North Pacific](#). It is a member of the [auk](#) family. It nests in old-growth [forests](#) or on the ground at higher latitudes where trees cannot grow. Its habit of nesting in trees was suspected but not documented until a tree-climber found a chick in 1974 making it one of the last North American bird species to have its nest described. The Marbled Murrelet has experienced declines in their numbers since humans began logging their nest trees beginning in the latter half of the 19th century. The decline of the Marbled Murrelet and its association with [old-growth forests](#), at least in the southern part of its range, have made it a flagship species in the forest preservation movement. In Canada (north of 50° North Latitude) and Alaska, the declines are not so obvious because populations are much larger and the survey techniques have not had sufficient power to detect changes.

Marbled murrelets are coastal birds that occur mainly near saltwater within 1.2 miles (2 km) of shore. However, marbled murrelets have been found up to 59 miles (80 km) inland in Washington, 35 miles (56 km) inland in Oregon, 22 miles (37 km) inland in northern California, and 11 miles (18 km) inland in central California. Over 90% of all marbled murrelet observations in the northern Washington Cascades were within 37 miles (60 km) of the coast. In Oregon, marbled murrelets are observed most often within 12 miles (20 km) of the ocean. Many marbled murrelets regularly visit coastal lakes. Most lakes used by marbled murrelets are within 12 miles (20 km) of the ocean, but a few birds have been found at lakes as far inland as 47 miles (75 km). All lakes used by marbled murrelets occur within potential nesting habitat.



Comment: The Marbled Murrelet should not constrain timber harvests on the lower reservation since there are no old-growth forests remaining, except for the North Boundary area of QIR.

ATTACHMENT 'B'



Eulachon

Eulachon are fish also known as 'candlefish', Columbia River smelt, and other common names like hooligan. Eulachon is from the Chinookan language.

I have been around smelt, including eulachon, nearly all of my life. I grew up in the village of Queets at the northern end of the Quinault Reservation. I come from a long line of fishers. We have fished for smelt, salmon, halibut, and many other types of fish.

Eulachon, or Columbia River smelt as we called them, were an important food source for us. We caught the Columbia River smelt in the winter/early spring time of the year near the mouth of the Queets River.

With the recent listing of eulachon as Threatened under the Endangered Species Act (ESA), there seems to be very little information available to determine the actual abundance of the fish from one year to the next. This year is an example of the fish manager's predictions and the actual returns to the Columbia River and its tributaries that seemed to have an abundance of fish.

Source: Jim Harp

ATTACHMENT 'C'
Northern Spotted Owl



The two main threats to the spotted owl's continued survival are habitat loss and competition from the barred owl, a species native to eastern North America.

The Northern Spotted Owl (*Strix occidentalis caurina*) is one of three spotted owl species.

The Northern Spotted owl was listed as a threatened species under the ESA by USFWS on June 23, 1990. There are approx. three to five thousand pairs remaining in the wild, mostly in WA and OR. Most spotted owls occur on US Federal lands (US Forest Service, BLM, and National Park).

The Northern Spotted owl primarily inhabits old growth forests in the northern part of its range (Canada to Oregon) and landscapes with a mix of old & younger forest types in the southern part of its range (Klamath region & California). Northern Spotted owls live in forests characterized by dense canopy closure of mature and old growth trees. Typically, forests do not attain these characteristics until they are 150 – 200 years old.

Another cause for concern is the increased competition for habitat & prey the spotted owl faces from the barred owl. The more aggressive barred owl is not native to the Pacific NW but by the 1990s barred owls started to take over spotted owl nest sites in WA and OR. This increased competition, in conjunction with habitat loss due to logging, has resulted in some populations of spotted owl dropping from what they were in the 1980s, when the fight to save the bird began.

Comment: The Northern Spotted owl should not constrain the timber harvests of 2nd growth trees, (primarily hemlock), on QIR on allotments of individual allottee landowners.

Attachment 'D'

Bull Trout

Bull Trout Range

Historically, Bull trout were found in river systems of southeast Alaska, California, Idaho, Montana, Nevada, Oregon, Washington, British Columbia and Alberta. The current distribution and abundance of Bull trout is significantly reduced from the historical range.

Within the Interior Columbia Basin, Bull trout populations have declined or been eliminated in the mainstems of most large rivers. Bull trout are now found primarily in upper tributary streams. A few populations inhabit lakes and reservoirs.

What is a Bull trout?

Bull trout are members of the char subgroup of the salmon family, which also includes Dolly Varden, lake trout, and Arctic char.

Bull trout and Dolly Varden look very similar and were once considered the same species. Bull trout are mainly an inland species, while Dolly Varden are more common in coastal areas. Many people still refer to Bull trout as "Dolly Varden."

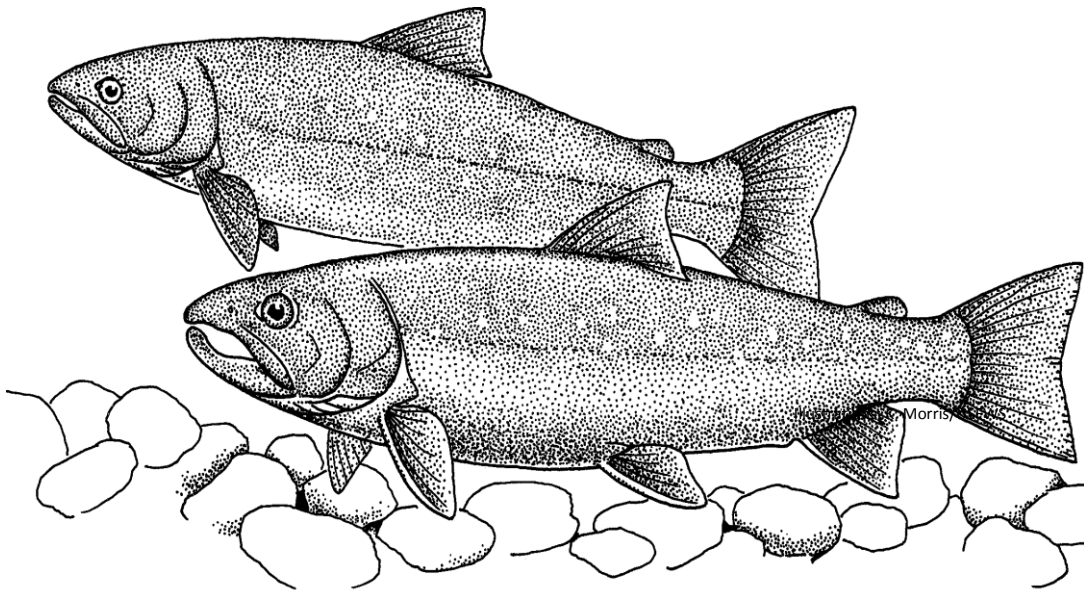
Comment: Bull trout should not be a constraint on timber harvests on QIR. Two weeks ago, the USFWS issued a Press Release that it has completed the Final Bull Trout Recovery Plan. The six recovery units include Coastal. However, it is more qualitative than quantitative with no timeline for recovery; no measurable criteria (i.e. escapement goals, conservation objectives, thresholds, minimum population size, etc.) for individual rivers and streams within a recovery unit.

Q. Are recovery plans regulatory documents?

A. No, recovery plans are guidance documents; not regulatory documents. This means that no agency or entity is required by the ESA to implement the recovery strategy or specific actions recommended in a recovery plan.

Bull Trout

*Migratory type,
spawning pair*



Jim Harp

October 2015

