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2.0 Environmental Setting

2.1 Collection and Synthesis of Data

2.1.1 Data Sources

Two major data sources were used during preparation of this document. The first source consists of technical reports, white papers, and other data prepared by Plum Creek Timber Company (Plum Creek). These reports are summarized in this section. The second major data source consists of documents prepared by various federal agencies, which are also listed in this section. Other important data sources, including states and the primary scientific literature, are listed at the end of this section.

Plum Creek Technical Reports and White Papers

Plum Creek's Science Team developed 13 technical reports and 4 white papers that were peer reviewed by outside experts. These reports contain the detailed scientific foundations for Plum Creek's proposed Native Fish Habitat Conservation Plan (NFHCP), presented in Chapter 3, and range from ecological mapping to stream temperature modeling. They also contain background information used to describe the affected environment for some of the resources in the 1.6-million-acre Project Area (Plum Creek's land). In addition, modeling and analytical tools described in several technical reports (for example, sediment delivery, large woody debris [LWD] loading, and stream temperature) were used to predict some of the potential effects resulting from the proposed NFHCP, other action alternatives, and the No Action Alternative (Chapter 4, *Affected Environment and Environmental Consequences*).

What is the Purpose of the Environmental Setting Chapter?

The purpose of this chapter is to broadly characterize environmental settings in the Project Area and Planning Area as related to land ownership, Planning Area basins, management activities on Plum Creek and adjacent federal, state, tribal, and other private lands, and activities that Plum Creek seeks coverage for under the Incidental Take Permit. This chapter also briefly describes the area's climate, and the collection and synthesis of data used during document preparation. Descriptions of physical, biological, and social resources of the Project and Planning Areas are presented in Chapter 4 under Affected Environment discussions.

Technical reports and white papers were developed by a team of scientists and analysts from Plum Creek's internal staff, consulting firms, and universities. Drafts of several of the documents were peer reviewed by at least three outside experts mutually identified by Plum Creek and U.S. Fish and Wildlife Service (FWS). Peer review comments were analyzed by Plum Creek and reviewed with FWS scientists during a series of technical workshops.

Brief overviews of the 13 technical reports and 4 white papers are presented below. Executive summaries of each are contained in Appendix B. Copies of the completed technical reports and white papers, and descriptions of modeling and analytical methods developed specifically

for assessing potential impacts in the environmental consequences sections of Chapter 4, are available on CD-ROM from Plum Creek (see Appendix B).

Technical Report #1—Implementation of a Method to Detect the Presence of Bull Trout. This report describes results of a new survey method for determining bull trout populations in streams and watersheds. Scientists working with Plum Creek implemented this statistically based survey method on 43 streams in Idaho, Montana, and Washington in 1993, and surveyed 82 more streams from 1994 to 1997. Six of the original 43 streams surveyed represented new bull trout discoveries. The U.S. Forest Service (FS) had previously surveyed three of those streams with no detection of bull trout. Comparison of the old (FS) and new (Plum Creek) survey methods indicates the old method was less rigorous (Plum Creek 1997b).

Technical Report #2—Factors Affecting the Distribution and Abundance of Bull Trout: An Investigation at Hierarchical Scales. Bull trout were listed as a threatened species by FWS in June 1998. To help this species recover, it is important to understand the factors affecting bull trout distribution and population density. Technical Report #2 considers the kinds of factors affecting bull trout populations and assesses to what extent this species could be managed on a site-specific or region-wide basis (Watson and Hillman 1997 [Technical Report #2]).

Technical Report #3—Surface Erosion and Mass Wasting Assessment and Management Strategies for Plum Creek's Native Fish Habitat Conservation Plan. This report develops the basis for management strategies in the NFHCP that deal with the effects of surface erosion and mass wasting on aquatic habitat. Erosion is the movement of soil or rock by water, wind, ice, or gravity. Although erosion occurs naturally, its rate and magnitude can increase because of human activities, such as grazing, logging, or farming. Technical Report #3 summarizes the impacts of historical logging and road construction practices in the Pacific Northwest; discusses current regulations and the protection they provide; evaluates the effectiveness of current Best Management Practices (BMPs) in controlling erosion; and presents general strategies and opportunities to better address erosion in Plum Creek watersheds (Plum Creek 1998a).

Technical Report #4—An Ecological Classification Integrating Uplands and Riverine/Riparian Habitats Applied to the Thompson River Basin, Montana. Effective land management requires an understanding of climate, geology, vegetation patterns, landforms, soils, and streams. Ecological classification provides a framework and descriptive attributes for interpreting the effects of land uses on habitat. Technical Report #4 describes a classification system developed for the Thompson River Basin in northwestern Montana that can be used to assess the ecological potential and existing condition of riparian habitat (Plum Creek 1998b).

Technical Report #5—Goat and Piper Creeks Watershed Analysis. Plum Creek initiated watershed analysis in the Goat Creek and Piper Creek Basins in May 1997. Both basins are tributaries to the Swan River Basin in northwestern Montana. Watershed analysis is a process used to assess the cumulative effects of

forest practices on two public resource areas: fish habitat and water quality. Technical Report #5 presents results of the watershed resource assessments and provides documentation and justification for identifying and managing sensitive areas. The report describes existing and potential resource conditions and the physical processes that affect resource conditions (Plum Creek 1996a).

Technical Report #6—Summary of Regulatory and Voluntary Programs for Protecting Bull Trout on Forest Lands within Plum Creek's Aquatic Habitat Conservation Planning Area. Various events have impacted water quality and native fish, including bull trout, over the last 190 years of settlement in the Pacific Northwest. From trappers in the early 1800s to 20th-century livestock grazing, fish harvest, and timber practices, the needs of native fish have been historically ignored. During the past 25 years, however, timber harvest practices and other land uses have gradually come under regulation in the United States. Technical Report #6 summarizes and evaluates regulatory and voluntary programs for protecting bull trout habitat on forestlands in the vicinity of Plum Creek's ownership (Plum Creek 1997a).

Technical Report #7—Design of Effective Riparian Management Strategies for Aquatic Resource Protection in Montana, Idaho, and Washington. A complex issue facing the forest industry is the management of riparian areas. These sensitive areas surround streams and affect fish habitat in a number of ways. Scientists often disagree on the amount of riparian area required to maintain healthy fish habitat. Technical Report #7 does not provide specific standards and guidelines on this issue, but does provide the foundation for answering the question: "how much riparian buffer is enough?" This report describes differences in fish resource sensitivities within a watershed; presents a design for evaluating the results of various riparian management scenarios; uses this design to evaluate existing management strategies; and identifies gaps in existing riparian management strategies. This report discusses the use of the Forest Vegetation Simulator and Riparian Aquatic Interaction Simulator to model forest growth and LWD loading, respectively (Plum Creek 1999a).

Technical Report #8—Synthesis of Watershed Analysis and Ecoclassification at a River-Basin Scale for the Conservation and Management of Aquatic Ecosystems. Federal and state laws typically provide for the management of aquatic ecosystems by establishing a standard-width buffer zone on either side of a stream. Fixed buffer zones are limited in their effectiveness because they do not consider variation in conditions within and among watersheds. Some buffer zones are too small (narrow) to allow proper riparian function, while others are too large (wide) and exclude management for timber harvest, disease control, and fire prevention. A better, but costly approach, is watershed analysis, which consists of an extensive assessment of stream conditions and the cause-effect relationships among streamside vegetation, fish habitat, and water quality. Technical Report #8 develops a watershed analysis framework, based on the classification of watershed components, that can be applied cost-effectively to different watersheds (Plum Creek 1998c).

Technical Report #9—Swan River Basin Ecological Classification. This report uses the ecological classification system developed in Technical Report #4 (see above) to describe a classification system for the Swan River Basin in Montana. This classification system can be used to assess the ecological potential and existing condition of riparian habitat (Plum Creek 1996b).

Technical Report #10—Thompson River Basin Ecological Classification. This report uses the ecological classification system developed in Technical Report #4 (see above) to describe a classification system for the Thompson River Basin in Montana. This classification system can be used to assess the ecological potential and existing condition of riparian habitat (Plum Creek 1997c).

Technical Report #11—Thompson Watershed Analyses: Beatrice Creek, Boiling Springs Creek, Murr Creek. The nature of this technical report is the same as Technical Report #5, except that it presents results of watershed analyses for Beatrice, Boiling Springs, and Murr Creeks, which are tributaries to the Thompson River in Montana (Plum Creek 1998d).

Technical Report #12—Stream Temperature Considerations in the Development of Plum Creek's Native Fish Habitat Conservation Plan. Many scientific studies have proven that streamside timber harvest can increase stream (water) temperatures. The primary reason is that harvest removes steam shading and sunlight reaches the water's surface, warming the stream. Native salmonids, particularly bull trout, are sensitive to increases in stream temperature. Technical Report #12 evaluates stream temperature features that were considered in the development of Plum Creek's NFHCP (Plum Creek 1998e).

Technical Report #13—Adaptive Management: Concepts and Applications to Plum Creek's Native Fish Habitat Conservation Plan. Adaptive management is a challenging blend of rigorous science and practical management designed to provide the basis for "learning by doing." Plum Creek's NFHCP uses adaptive management to address areas of uncertainty and risk. Adaptive management can be used to address "leaps of faith" in the NFHCP where there is dependence on theoretical models and adoption of untested conservation measures. Technical Report #13 defines adaptive management, describes potential research and monitoring projects for the NFHCP, and identifies evaluation criteria for the projects (Plum Creek 1999b).

White Paper—Plum Creek Timber Company Higher and Better Use Lands and Implications for Native Fish Conservation. Higher and Better Use (HBU) lands are those lands owned by Plum Creek that might have a higher value for some use other than timber harvest. For example, HBU lands may be more valuable for recreation or conservation than timber harvest. While land sales are generally an issue addressed in the Implementing Agreement (IA) for HCPs, Plum Creek has addressed certain land use planning measures as conservation commitments under the NFHCP (Plum Creek 1998g).

White Paper—Livestock Grazing on Plum Creek Timber Company Land in the Native Fish Habitat Conservation Planning Area. Livestock grazing has been a traditional use of much of Plum Creek's land in the NFHCP Project Area since the turn of the century. Improper livestock grazing can adversely affect fish habitat and water quality. This white paper discusses the history of grazing in the Project Area, current status of grazing on Plum Creek lands, condition of riparian areas in grazing allotments, and Plum Creek's Grazing BMPs (Plum Creek 1998f).

White Paper—Thompson River Riparian Reconnaissance and Monitoring. The riparian area along the Thompson River in northwestern Montana has been impacted by legacy land use activities over the past 100 years. This white paper assesses conditions along the Upper Thompson River, predicts future riparian vegetation conditions, and recommends methods for restoring impacted riparian areas. The study will be used as a pilot for developing other riparian assessments under the NFHCP (Plum Creek 1997d).

White Paper—Grazing Best Management Practices. This document outlines Plum Creek's Grazing BMPs, which set policies to conduct grazing in an environmentally sensitive manner. The grazing BMPs are intended to fulfill obligations under the federal Clean Water Act. A toolbox of individual BMPs is provided in this white paper for ranching leaseholders to include in their resource management plans (Plum Creek 1999c).

Interior Columbia Basin Ecosystem Management Plan Documents

Documents prepared by the FS and Bureau of Land Management (BLM) for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) were frequently referred to during Environmental Impact Statement (EIS) and NFHCP preparation. These documents include *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins: Volumes I-IV* (Quigley and Arbelbide 1997), the *Upper Columbia River Basin Draft Environmental Impact Statement: Volumes I and II* (ICBEMP 1997a), and the *Eastside Draft Environmental Impact Statement: Volumes I and II* (ICBEMP 1997b). These documents contain information important to the NFHCP because they cover all or large portions of the 1.6-million-acre Project Area and the 16.5-million-acre Planning Area, describe the affected environment at a scale appropriate for many of the same resource areas being assessed in this EIS/NFHCP, and were recently completed (in 1997). The Inland Native Fish Strategy (INFISH) was implemented as an interim management strategy for native, non-anadromous (resident) salmonids until long-term management direction is developed through the ICBEMP Final EISs.

Other Data Sources

Numerous other studies provided important data and information during preparation of this document. Examples include Biological Opinions, recovery plans, and background documents prepared by FWS and National Marine Fisheries Service (NMFS; used together, the Services) for species covered in the NFHCP, rigorously reviewed papers that

have been published in refereed scientific journals, other EISs, Land and Resource Management Plans and associated programmtic EISs for National Forests within the Planning Area, and the Services' policy documents dealing with issues associated with HCPs and EISs. Information from states, including bull trout conservation documents and other sources, was also used, as well as information from the primary scientific literature. Full references for all data and information sources referred to in the text are contained in Chapter 7, *References*, of this document.

2.1.2 Geographic Information System

Much of the analysis of project data was accomplished using the overlay capabilities of a Geographic Information System (GIS). An Intergraph Modular GIS Environment (MGE) was used to graphically display and spatially analyze project data. This technology allows the user to test hypotheses and perform sensitivity tests on a variety of assumptions and alternatives in different combinations on the same base area.

Plum Creek collects and synthesizes data specific to managing its own lands. Data for adjacent lands were acquired from numerous sources. Adjacent land ownership data were acquired from the ICBEMP reports; these data are to a large scale and only several years old. Their accuracy was considered acceptable because of the large size of the NFHCP Project Area and EIS Planning Area. Stream location data were acquired from state agencies or directly from U.S. Geological Survey (USGS) 7.5-minute quadrangles.

2.2 Land Ownership and Planning Area Basins

2.2.1 Plum Creek and Adjacent Lands

The 16.5-million-acre Planning Area includes 1.6 million acres of Project Area lands (10 percent of the total) and 14.9 million acres of adjacent lands (90 percent of the total). Project Area lands are owned by Plum Creek, while adjacent lands are owned or administered by federal, state, tribal, and other private entities and occur in the same key river basins as Project Area lands. Adjacent lands are integral parts of the Services' strategy to address the entire Planning Area as an ecosystem. An ecosystem approach is needed because native salmonids, which are the species included in the proposed Incidental Take Permit (Permit), inhabit streams throughout the Planning Area and are not restricted to Plum Creek lands. In the interim period between release of the DEIS and publication of this FEIS, Plum Creek acquired additional lands in southwest Washington and sold lands in northern Idaho. Since the total land area of these changes equals only 0.6 percent of the Planning Area and less than 6 percent of the Project Area, the conclusions reached in this FEIS were not significantly influenced by this shift in ownership pattern. Some lands in Montana are excluded (along with road use as a covered activity associated with actions on those lands) from this Permit application but may be included by amendment pending consideration of additional environmental issues by Plum Creek. These amendment lands comprise about 15,000 acres (0.9 percent) of the Project Area and are evaluated in this FEIS.

Project Area lands are located in western Montana (1,460,000 acres, 93 percent of the entire Project Area), northern Idaho (40,000 acres, 3 percent), and Washington (70,000 acres, 4 percent). The 14.9 million acres of adjacent lands include 9,619,803 acres (58 percent of the entire Planning Area) of federal lands; 403,478 acres (2 percent) of state lands; 1,295,166 (8 percent) of tribal lands; and 3,603,610 acres (22 percent) of other private lands. The Project Area, Planning Area, and Land Ownership are depicted in Map 1.3-1.

2.2.2 Planning Area Basins

The Planning Area is comprised of 15 key river basins (referred to as Planning Area basins). Planning Area basins are depicted in Map 2.2-1 and include ten basins in Montana, one in Idaho, and four in Washington. Table 2.2-1 summarizes acres owned by Plum Creek and by adjacent landowners or administrators in each Planning Area basin. Table 2.2-1 also lists those "outliers" or comparatively small acreages of Plum Creek (Project Area) lands that are outside of Planning Area basins. As stated in the NFHCP, these outliers will be considered with the Lewis River Planning Area basin for the purposes of adapting management, including trigger calculation and management response development.

Boundaries of the Planning Area basins were largely identified through other conservation planning processes for bull trout. In Montana, the Montana Bull Trout Restoration Team identified Restoration Conservation Areas (RCAs) based generally on existing, interconnected river basins that are subsets of bull trout metapopulations. Those RCAs are used in this document to represent Planning Area basins in Montana. The exception to the watershed or hydrologic divide approach is where river basins cross state and international boundaries. In Idaho, Key Bull Trout Basins identified in the Governor's Bull Trout Conservation Plan are used as Planning Area basins where they contain Plum Creek Project Area lands. In Washington, a rationale similar to the Montana interconnected river basin approach was used to identify Planning Area basins.

Why Distinguish Between the Project Area and Planning Area?

The Project Area is 1.6 million acres of land owned by Plum Creek in Montana, Idaho, and Washington. Because Plum Creek has management control of these lands, the NFHCP only covers this Project Area. The Planning Area is the big picture: 16.5 million acres of Project Area, federal, state, tribal, and other adjacent lands that can be affected as an ecosystem by actions within and outside the Project Area. Therefore, the NFHCP directly affects approximately 10 percent of the Planning Area considered in this EIS. Approximately 58 percent of the Planning Area is comprised of federal lands.

Planning Area basins are all subsets of Permit species' ranges. Planning Area basins subdivide the Planning Area so that alternatives could be analyzed in a meaningful way for Permit species.

2.3 Land Management within the Planning Area

2.3.1 Plum Creek's Land Management

The following sections describe Plum Creek's ownership, activities to be

TABLE 2.2-1
Land Ownership or Administration (acres) by State and Planning Area Basin

	Tribal	Bureau of Land Management	Forest Service	Fish and Wildlife Service	National Park Service	Plum Creek	Other Private	State	Water/ Other*	Total
Montana										
Upper Kootenai River	0	0	664,643	0	0	7,030	119,100	8,161	851	***799,785***
Middle Kootenai River	0	0	460,930	0	0	328,597	103,396	16,533	635	***910,091***
Lower Kootenai River	0	0	568,801	0	0	33,232	44,401	2,844	330	***649,608***
Flathead River	167,149	0	1,038,710	0	630,118	102,980	520,808	122,603	-186	***2,582,182***
Swan River	1,432	0	280,705	2,251	0	84,413	63,801	39,324	0	***471,926***
Blackfoot River	3,519	83,986	613,996	0	0	292,926	476,359	8,640	3	***1,479,429***
Bitterroot River	0	0	1,246,531	2,759	0	80,646	463,233	28,249	1,130	***1,822,548***
Upper Clark Fork River	0	63,445	1,014,711	0	1,545	105,490	1,145,950	36,135	4	***2,367,280***
Middle Clark Fork River	1,115,694	0	1,236,997	23,145	0	421,538	356,361	40,671	4,387	***3,198,793***
Lower Clark Fork River	0	0	586,374	0	0	2,651	121,728	2,491	3,281	***716,525***
Montana Total	**1,287,794**	**147,431**	**7,712,398**	**28,155**	**631,663**	**1,459,503**	**3,415,137**	**305,651**	**10,435**	**14,998,167**
Idaho										
Lochsa River	0	0	716,014	0	0	40,424	530	6	-52	***756,922***
Idaho Total	**0**	**0**	**716,014**	**0**	**0**	**40,424**	**530**	**6**	**52**	**756,922**
Washington										
Ahtanum Creek	7,372	37	591	0	0	10,130	22,374	30,594	1	***71,099***
Lewis River	0	66	321,289	0	0	27,692	68,906	49,977	219	***468,149***
Lower Tieton River	0	0	45,013	0	0	10,067	2,520	12,180	39	***69,819***
North Riffe Lake	0	31	17,115	0	0	15,216	94,143	5,070	630	***132,205***
Outliers	0	0	0	0	0	7,357	0	0	0	***7,357***
Washington Total	**7,372**	**134**	**384,008**	**0**	**0**	**70,462**	**187,943**	**97,821**	**889**	**748,629**
Grand Total	**1,295,166**	**147,565**	**8,812,420**	**28,155**	**631,663**	**1,570,389**	**3,603,610**	**403,478**	**11,272**	**16,503,718**

*Water refers to all designated waters such as streams, rivers, and lakes. Other includes owners or administrators of small, unspecified parcels such as the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and counties. Negative values for the Flathead River (Montana) and Lochsa River (Idaho) reflect discrepancies between Interior Columbia Basin Ecosystem Management Plan ownership and Planning Area basin data.

Certain lands (4,026 acres in the Flathead River Planning Area basin and 10,806 acres in the Blackfoot River Planning Area basin) included In this table have been analyzed in this EIS, but withdrawn from Permit application pending additional environmental considerations for a possible future amendment.

Map 2.2-1
Page 1 of 2 (11" x 17")

Planning Area Basins, Tier 1 Watersheds, and Tier 2 Lands in the Planning Area

Map 2.2-1
Page 2 of 2 (11” x 17”)

Planning Area Basins, Tier 1 Watersheds, and Tier 2 Lands in the Planning Area

covered under the Permit, and classification of Tier 1 watersheds and Tier 2 lands within the Project Area.

Ownership

The Project Area consists of certain Plum Creek lands in western Montana (1,460,000 acres, 93 percent of the entire Project Area), northern Idaho (40,000 acres, 3 percent), and Washington (70,000 acres, 4 percent). These lands are distributed across the 15 Planning Area basins (Table 2.2-1). The greatest Plum Creek ownership occurs in the Middle Clark Fork River, Middle Kootenai River, and Blackfoot River Basins.

The history and checkerboard configuration of many of the lands now owned by Plum Creek in the Planning Area began with the 1864 land grant established by Congress (Raedeke Associates, Inc., 1995). Under that legislation, Northern Pacific Railroad Company was authorized to construct a railway from Lake Superior to Puget Sound. Upon completion of each 25 miles of railroad, the law provided Northern Pacific 400-foot right-of-ways and alternate sections of land of 20 square miles each on either side of the right-of-ways in territories between Minnesota and Oregon. Plum Creek purchased this land from Burlington Resources in 1989. Burlington Resources had previously acquired this land from Burlington Northern, Northern Pacific's successor (Raedeke Associates, Inc., 1995).

Activities to be Covered under the Permit

Current management activities on Plum Creek lands and activities that Plum Creek seeks coverage for under the Permit are described briefly below. The management activities for which Plum Creek seeks Permit coverage are regulated according to federal, state, and local regulations and BMPs. Specific governing regulations for each of the Plum Creek management activities proposed for coverage under the Permit are listed in Chapter 3, Section 3.3.1, *Existing Regulations—No Action Alternative*.

Plum Creek manages its lands in Montana, Idaho, and Washington primarily to grow, harvest, and sell timber, while seeking to use environmentally and economically sound forest management practices. A minor portion of the Project Area lands are managed for other purposes, which include seed and seedling production, forest products manufacturing, miscellaneous forest products, and other land uses. Specific prescriptions associated with some of the covered activities are summarized in Chapter 3, Table 3.3-1, *Habitat Conservation Prescriptions Contained in the Alternatives*. Prescriptions are presented for Plum Creek's proposed NFHCP, two other action alternatives, and the No Action Alternative considered in this document. Commercial forestry activities, as well as other activities in the Project Area that Plum Creek wishes to include in the Permit, are described below. Potential effects of these activities are assessed in Chapter 4, *Affected Environment and Environmental Consequences*.

Commercial Forestry and Associated Activities

These activities consist of silvicultural activities (tree planting, site preparation, prescribed burning, timber harvest in riparian and upland areas, stand maintenance, forest nurseries, and seed orchards), as well as associated activities, including logging road construction and maintenance and gravel quarrying for roads. These activities are described below.

Tree Planting. Plum Creek is required by Idaho and Washington state laws to regenerate harvested forestlands within specified time frames. Montana BMPs encourage "rapid" reforestation of harvested areas to re-establish protective vegetation to avoid erosion. Plum Creek's Environmental Principle on reforestation sets a policy of reforestation of all harvested areas within 2 years in the westside forests of the Cascade Region, and within 5 years on the east slopes of the Cascade Region and in the Rocky Mountain Region. Reforestation occurs through natural or artificial regeneration. Natural regeneration plays a much greater role in reforestation of Plum Creek lands today as Plum Creek moves away from clearcutting as a timber harvest method. However, Plum Creek still plants over 2 million seedlings annually in the Project Area to ensure adequate stocking where natural regeneration success is less likely, and to supplement naturally occurring tree establishment and species diversity. Planting is done by hand, although machine planting has been used on a limited basis in the past and may be used again in the future.

Potential risk to fish habitat from soil disturbance while planting trees is low. Soil disturbance just prior to planting, known as scalping, is typically by hand. A tree-planting hoe is used to expose a 12-inch square of ground in which the seedling is planted. In Montana, trees are never planted closer than 50 feet to any stream, unless it is a restoration project not associated with timber harvest. In Idaho, planting may occur up to the edge of intermittent streams if an area has been clearcut (clearcutting comprised only 2 percent of the acres harvested by Plum Creek in 1998). In Washington, seedlings are routinely planted up to the edge of intermittent and non-fish-bearing perennial streams using hand-scalping techniques. Tractor scalping is used less than 20 percent of the time near these Washington streams, and is never closer than 25 feet to a stream. This technique consists of lightly scattering rather than piling slash, and results in some incidental, minor soil exposure away from the stream.

Tree species selected for planting vary according to geographic location as well as environmental and growing conditions. Important species planted east of the Cascades include ponderosa pine, Douglas fir, western larch, lodgepole pine, western white pine, and Engelmann spruce. Important species planted west of the Cascades include Douglas fir, noble fir, and western hemlock. The resultant fully-stocked stands of improved, native tree species contribute to ecological function in riparian and upland areas of the Project Area.

Site Preparation. Plum Creek sometimes prepares sites for forest regeneration within 1 year following harvest, if needed. Such preparation provides better assurances that sites will be fully stocked with healthy trees and desirable species. Site preparation consists of clearing slash and competing vegetation and exposing

adequate mineral soil for subsequent tree planting or natural regeneration. This is accomplished using one or more techniques, such as tractors or excavators, tree planting hoes, and broadcast burns (described further below). The extent of site preparation has been reduced over the last few years because of specific environmental concerns. For example, Plum Creek seldom practices broadcast burning; and scarification of large areas is used only when necessary for seedling establishment and survival, and when erosion and runoff can be controlled.

Only about 5 percent or less of the total acres harvested by Plum Creek are mechanically site-prepped. This is done primarily by tractor scalping on some lands in Washington, as described above under *Tree Planting*. Tractor scalping causes some incidental, minor exposure of soil as slash is scattered, but never closer than 25 feet to a stream. A tractor can be used to prepare sites with slopes of up to 25 percent, while special backhoe equipment can be used on sites with steeper slopes (up to 45 percent), if needed. Existing state regulations and forest practices acts are designed to provide some stream and streamside protection by governing or excluding mechanical site preparation activities in riparian buffers. The proposed NFHCP builds on these existing regulations and practices through equipment exclusion prescriptions in riparian buffers and special site preparation provisions in Interface Caution Areas located between riparian and upland habitat types. NFHCP prescriptions, and prescriptions associated with the other alternatives, are described in Chapter 3 and evaluated in Chapter 4 of this EIS/NFHCP.

During the fall, Plum Creek conducts controlled burns of some debris and brush piles remaining from harvests as a part of site preparation. The timing of burns reduces the potential for wildfire to ignite or spread through the site.

Prescribed Burning. Prescribed burning is used in commercial forestry primarily to reduce fire hazard and in site preparation (discussed above). Prescribed burns can also be used to enhance wildlife habitat, to control potentially competing vegetation, and in grazing management. The main use of prescribed burns on Project Area lands is to reduce slash loads, thereby complying with state laws to minimize fire hazards associated with logging debris. The three main kinds of slash disposal from most to least common are as follows:

1. Burning of slash piles accumulated at roadsides where trees have been processed into logs

2. Burning of slash in the woods that has been machine-piled

3. Broadcast burning, where a fire is ignited that can carry itself across the forest floor. This includes “jack-pot” burning, which is discontinuous and occurs only in high concentrations of slash.

Slash burning was routinely used by Plum Creek prior to 1990, but today more of the tree is used to create forest products, which minimizes the amount of slash left after harvest. Any slash that remains is often left unburned to enhance habitat by covering land and providing nutrients through decay.

When controlled burning is prescribed to reduce moisture stress and competition from other vegetation for space, fires are ignited during fall or winter when state regulations and weather conditions permit.

Large broadcast burns are no longer used by Plum Creek as a standard management tool. This minimizes the potential for exposing large areas of barren soil for extended periods of time that may become subject to slope erosion and possible sediment delivery to streams.

Timber Harvest. Plum Creek uses even-aged and uneven-aged timber harvesting methods in riparian and upland habitat types of the Project Area. Even-aged methods include clearcuts, seed-tree harvests (where 20 or fewer trees per acre remain after harvest), and overstory removal (where large trees are harvested and a fully stocked stand of young trees remains after harvest). Plum Creek's Environmental Principles encourage the minimization of clearcutting in the Rockies, where clearcutting constitutes less than 5 percent of the acres harvested. Uneven-aged methods include shelterwood harvest (where 20 to 50 trees per acre remain after harvest), encouraging regeneration in the understory; commercial thinning (where 70 or more merchantable but thrifty growing trees per acre remain after harvest); and other selective harvesting. Combining uneven-aged harvesting methods can be effective in maintaining diverse wildlife habitats. Shelterwood harvests are normally followed 10 to 20 years later by a shelterwood removal harvest, and Plum Creek varies the approach to accomplish site-specific objectives, such as maintaining structural diversity.

Uneven-aged silvicultural practices are typically used by Plum Creek in Montana, Idaho, and Washington east of the Cascades where arid conditions prevail, and stand structure and species composition are more varied. Even-aged silviculture is widely used by Plum Creek in Washington west of the Cascades. This harvesting technique favors tree species, such as Douglas fir, that grow best in open conditions with full sunlight.

Timber harvest operations in even-aged and uneven-aged stands include felling trees, then moving (yarding) them to landing sites where they are limbed and bucked (trimmed). Methods of moving trees depend on terrain slope, road access, worker safety, and other factors. Tractor-based systems are usually used on relatively flat slopes, cable yarders are used on steeper slopes, and helicopters are used where there is limited road access or slopes are very steep. Logs are loaded on trucks at the landings, then transported over private and public roads to mills where they are processed. In some cases, small logs or tree tops may be manufactured into wood chips on site and transported in chip vans to paper or pulp mills.

Plum Creek seeks to protect and enhance environmental values of uplands and riparian areas during timber harvest in several ways. These include complying with all applicable state and federal forest practices regulations and BMPs (described in Section 3.3.1, *Existing Regulations—No Action Alternative*), and by making these requirements of timber felling contractors:

1. Avoid yarding logs through streams
2. Refrain from causing soil erosion or degrading side slopes
3. Mitigate impacts on natural resources
4. Comply with special conditions such as trail protection or visual sensitivity
5. Maintain a cost-effective production level while meeting state and federal safety guidelines

Representative trees are left standing in upland areas, either individually or in clumps, to serve as wildlife reserves, green recruitment trees (trees that will mature into wildlife reserves), visual buffers, green-up strips, and wildlife corridors. During timber harvest, Plum Creek also ensures that riparian buffers are maintained along all fish-bearing streams and along most non-fish-bearing streams. Timber harvest in riparian areas is addressed in Plum Creek's NFHCP and other alternatives in Chapter 3.

Stand Maintenance. Stand maintenance is an essential component of forest management to promote tree growth and control undesirable, competing vegetation. Tree growth is promoted by precommercial and commercial thinning. Thinning of overstocked even-aged stands concentrates the site's growth potential on fewer trees. Pre-commercial thinning occurs about 15 years after stand regeneration. Commercial thinning begins at about 35 years. Retained (leave) trees are selected for even spacing across a site so that each benefits from greater growing space. Thinned trees are processed onsite or harvested for transport to mills where they are processed.

Vegetative competition for moisture is a major cause of seedling mortality east of the Cascades, while competition for light is a major contributor to seedling mortality west of the Cascades. Plum Creek controls competing vegetation manually by chainsaw. Trees are inspected for several years following planting to check that their survival and growth is not impeded by competing vegetation.

Forest Nurseries and Seed Orchards. Other common commercial forestry activities include the operation of forest nurseries and seed orchards. Plum Creek operates two forest nurseries and two seed orchards in Montana, and one forest nursery and one seed orchard in Washington. These are confined facilities without known influences on riparian and aquatic areas.

Logging Road Construction. Plum Creek constructs new logging roads and upgrades existing roads to minimize impacts on the landscape and to use for forest management activities. Roads are planned and located where appropriate for the terrain, soils, and timber type. Plum Creek's typical road design and construction standards are single lanes with occasional turnouts, surface width of 12 feet, and grade less than 15 percent. Roads are typically constructed with native surfacing and are outsloped without a ditch, but may consist of 15 feet of subgrade with a 2-foot drainage ditch. Excavated soil is used as part of the subgrade fill or disposed at a stable site. Culverts or bridges are placed at all water crossings. Erosion control measures typically used by Plum Creek during road construction include installing cross drainage or ditch-line relief features to minimize water velocity, armoring (stabilizing) culvert head walls, constructing stable cut-and-fill slopes, and using grass seeding, sediment filters, straw matting, ditch-line energy dissipaters, and appropriately placed riprap.

Plum Creek's proposed NFHCP, presented at the end of Chapter 3, and other alternatives discuss in detail all aspects of forest road management. Effects of forest road management on sediment delivery and on other Project Area resources, and the projected effects under the proposed NFHCP, two other action alternatives, and the No Action Alternative, are described in Chapter 4, *Affected Environment and Environmental Consequences*.

Logging Road Maintenance. Plum Creek inspects and maintains roads to provide proper drainage function and subgrade stability. Plum Creek's road maintenance plans are intended to reduce the potential effects of roads and their use on streams and riparian habitat by the following:

1. Minimize road building activities through regular maintenance
2. Minimize disruption of natural hydrologic flow patterns
3. Restrict sidecasting to prevent sediment from entering streams and riparian areas
4. Minimize erosion at road sites using advanced erosion control techniques
5. Identify roads and associated drainage features that pose a potential risk
6. Close or stabilize roads based on short-term and long-term transportation needs in each watershed

Current effects of forest road maintenance on sediment delivery and on other Project Area resources, and the projected effects under each of the alternatives, are described in Chapter 4, *Affected Environment and Environmental Consequences*.

Gravel Quarrying for Roads. Plum Creek surfaces some of its roads with gravel to improve the road standard and reduce the potential for road-related erosion. Gravel is normally obtained from nearby gravel pits on Plum Creek lands. Smaller pits are located adjacent to roads in specialized locations where the subsurface rocky material has desirable characteristics. These produce "pit run" gravel and are 1 to 3 acres in size, constituting over 90 percent of Plum Creek's pits. Larger gravel pits greater than 5 acres are developed at high-quality rock sources that have characteristics desirable for crushing. A rock crusher is used at these sites to manufacture "crushed gravel" to desired specifications. Plum Creek occasionally purchases gravel from adjacent landowners. Although the sites have not been inventoried, Plum Creek estimates that 250 to 500 gravel pits are located in the Project Area and that 25 to 50 more gravel pits would be developed during the proposed 30-year Permit period.

Plum Creek's gravel pits tend to be located away from streams and near ridges because the best rock is generally along ridgetops. In addition, forest practices rules and BMPs in Montana, Idaho, and Washington prohibit gravel quarrying in streams or within equipment exclusion zones of riparian areas. New gravel quarries are not permitted in Streamside Management Zones (SMZs) of perennial and connected streams, and they would not be permitted in Interface Caution Areas (ICAs) under Plum Creek's proposed NFHCP. ICAs modify and provide extra caution for forest management activities adjacent to but outside SMZs of perennial and connected streams. Current Plum Creek operational procedures and state forest practice rules and BMPs minimize the potential for sediment delivery from gravel quarries to streams. Legacy quarries that no longer produce gravel exist. They would be inspected along with the road systems under the proposed NFHCP and treated as hot spots when warranted.

Other Forestry Activities

Forest Fire Suppression. Actions are taken to fight and suppress forest fires to

minimize the total number of acres that could potentially be affected by unwanted wildfires. Forest fires are caused by nature (lightning), carelessness (escaped campfires), or prescribed fires that have escaped control. Forest fires originate on Plum Creek lands or adjacent ownerships. Suppressing unwanted forest fires protects human life, private property, and trees, the primary economic asset of commercial forests. Fire suppression can protect the environment, including terrestrial and aquatic resources and their habitats, and prevents the potential for accelerated erosion of barren soil and sedimentation of streams. State governments have the primary responsibility for suppressing unwanted forest fires. However, Plum Creek fights fires, as needed, using currently accepted standard techniques and tools that include fire trucks, hoses, shovels, and tractors.

Open Range Cattle Grazing. Livestock have grazed portions of Project Area lands for more than a century. Over 90 percent of the Project Area is "open range" under state law and 46 percent is leased or allotted for grazing. Specific grazing management prescriptions are summarized in Chapter 3, Table 3.3-1, for the proposed NFHCP, two other action alternatives, and the No Action Alternative. Grazing management prescriptions associated with the proposed NFHCP are described in detail at the end of Chapter 3. Current effects of grazing livestock on riparian resources in the Project Area and the projected effects under the proposed NFHCP, two other action alternatives, and the No Action Alternative are described in Chapter 4, *Affected Environment and Environmental Consequences*.

Miscellaneous Forest and Land Product Sales. Forest managers occasionally supplement or diversify Plum Creek's commercial forestry revenues through the sale of miscellaneous forest and land products encountered during normal forestry operations. These activities represent a very small fraction of the overall commercial activities on Project Area lands and require no additional facilities or equipment beyond those routinely used in Plum Creek's commercial forestry operations. Examples of miscellaneous forest and land product sales include the following: stones collected from roadsides and talus slopes for landscaping and chimney construction; gravel for roads to nearby landowners; Christmas trees to commercial tree sellers; conifer branches collected for making Christmas boughs; Pacific yew bark for making medicine; stumps for certain chemicals they contain; and sawdust and wood chips.

Conservation Activities. Conservation activities include stream enhancement projects, livestock exclusions, engineered fish habitat restoration, irrigation diversion management, landslide repairs, and scientific surveys and studies. Plum Creek performs stream habitat enhancement and constructs engineered fish habitats under various cooperative agreements with landowners, agencies, and organizations. Projects include development of pool structures and removal of fish passage obstructions. Scientific surveys and studies are conducted by Plum Creek staff, contractors, resource agency staff, and independent researchers. The research focuses on commercial forestry, fish (for example, the brook trout suppression experiment) and wildlife, water quality and hydrology, and related natural resource topics. Surveys of listed species are subject to approval by the federal and state agencies with jurisdiction over the

species and, if collection or other forms of take are involved, a federal Endangered Species Act (ESA) Section 10(a)(1)(A) permit and equivalent state authorization are required as appropriate. Conservation activities anticipated under the NFHCP and other action alternatives are described in Chapter 3.

Non-Forestry Activities and Special Forest Uses

Commercial Outfitting. A Special Forest Use Permit is required from Plum Creek when professional outfitters wish to use Project Area lands to conduct their business. A commercial outfitter is defined by Plum Creek as someone who is familiar with an area and an activity and sells their guiding services to recreationists who wish to pursue those activities, such as hunting, fishing, or photography. Outfitting can be exclusive, although Plum Creek does not currently sell exclusive rights to outfitters for an activity in the Project Area. Outfitters must conduct their business on Plum Creek lands in compliance with Plum Creek's Environmental and Land Use Principles, applicable state fishing and hunting regulations, and other state regulations directed specifically at commercial outfitting.

Recreation and Other Special Forest Uses. Special Forest Use Permits may be required by Plum Creek for various categories of activities. One activity category is group recreation, although this activity is not common in the Project Area. For example, a permit may be required if a club sponsors a group mountain bike ride on Plum Creek lands and the participants pay an entry fee. Also, a permit may be sold by Plum Creek to grant the right to use a Plum Creek road for a specific purpose, such as hauling logs. Special Forest Use Permits provide Plum Creek the opportunity to generate income, require certain provisions of the permitted activity so that it complies with Plum Creek's Environmental and Land Use Principles and applicable government regulations and BMPs, and require insurance coverage by the Permittee.

Electronic Facility Sites. Plum Creek leases sites for the construction and operation of electronic transmission facilities. The sites are located at the tops of mountains, which are numerous on Plum Creek lands. There are less than two dozen electronic transmission sites in the Project Area. Existing roads provide access to these sites. Existing regulations referenced in Tables 3.3-2 and 3.3-3 in Chapter 3 determine the siting, construction, and operation of facilities.

Manufacturing of Forest Products. Forest products manufacturing facilities are located in Columbia Falls, Kalispell, Fortine, and Pablo, Montana. The facilities produce finished products of lumber, plywood, and medium-density fiberboard for retail, industrial, and other specialty markets. They include four sawmills, two plywood plants, one medium-density fiberboard plant, and one remanufacturing plant.

Typically, logs are brought to the facilities by truck and stored onsite prior to processing. They are debarked and cut to rough dimension in the sawmill buildings. The green dimensional lumber is sorted and stacked, then placed in green inventory until it is dried in drying kilns. Dried lumber is placed in dry rough inventory. Once dried, the lumber is surfaced and cut to final length in the planer buildings, where it also is sorted, stacked, and packaged for shipment. No wood treating or processing of treated

lumber is conducted on the sites. Typical structures at the facilities include office buildings, sawmill/planer buildings, drying kiln buildings and cooling sheds, boilers, maintenance shops, and various storage buildings. Sites have large areas of log and finished product storage. Water-holding ponds in the event of fire, process water infiltration ponds, stormwater retention basins, and gravel pits may be present.

In the plywood process, logs are peeled into thin sheets of veneer using a lathe. After being cut to size, these sheets are dried in a veneer dryer to the proper moisture content. Resin is then applied to them and several veneer sheets are pressed into plywood panels. These panels are cut to final size, sanded, patched, and packaged for shipping.

In the medium-density fiberboard process, sawdust and planer shavings are refined into fine cellulose fibers. These fibers are mixed with resin and dried to the proper moisture content. The dried fibers are then formed into a mat and pressed into fiberboard panels. These panels are sanded, cut to final size, and packaged for shipment.

In the remanufacturing process, short sections of lumber are fingerjointed and glued into longer sections of lumber or are edge-glued into wider boards. These are cut to size if necessary, then packaged for shipment. Larger boards are also cut into smaller sizes to remove defects and increase the quality.

Log yard waste—mixed bark, soil, and rock—is handled according to state solid waste regulations. Onsite waste storage occurs away from aquatic areas and potential receiving waters, or is separated by erosion control structures to prevent discharges. Solidified waste resins and non-log-yard wastes are transported to municipal landfills for proper disposal. Industrial chemicals and fuels, such as diesel fuel, gasoline, lubricating and hydraulic oils, and boiler water treatment chemicals, are stored in above ground storage tanks and containers surrounded by concrete secondary containment areas. Each facility has a Spill Prevention Control and Countermeasure (SPCC) Plan, if required. Office trash and wasted packaging materials are hauled to approved offsite municipal landfills for disposal. Used oil is completely consumed onsite for equipment lubrication or properly disposed of by a licensed used oil recycler.

The facilities do not have any ongoing, direct discharges of process water to surface waters; however, periodic discharges of stormwater may occur. The mills generate wastewater from the boiler blowdown, boiler water treatment, and equipment washing. The boiler blowdown water and boiler water treatment blowdown water are sent to holding ponds where it is reused or sent to a public wastewater treatment plant for disposal. Boiler steam condensate is returned to the boiler and reused. Wash water from equipment washing is run through oil/water separators. Water used for watering logs for blue stain fungus control (wet decking) is collected and recycled back to the log watering system. With the exception of minimal sheet flow from a few areas, all stormwater is collected in retention basins or in stormwater ponds. Groundwater and surface water discharges are regulated under state water quality discharge permits and monitored for compliance. Sanitary wastewaters are disposed of onsite in septic tank/drainfield systems, or piped to a public wastewater treatment plant. Air emissions are

regulated under the federal Clean Air Act, and tribal and state laws.

Tier 1 Watersheds and Tier 2 Lands

To customize NFHCP conservation commitments based on specific habitat needs, Plum Creek categorized watershed units based on bull trout biology. This species is the most widely distributed native salmonid in the Project Area and has the most specific habitat requirements. In addition, because Plum Creek has studied bull trout habitat and distribution in the Project Area since 1993, more data are available for bull trout than for other Permit species. Native salmonid habitat management, conservation, and restoration activities under the NFHCP designed to conserve bull trout spawning and rearing habitat would use Tier 1 designations to aid prioritization, along with other prioritization methods identified during NFHCP development. While based on bull trout spawning and rearing, the Tier 1 designation organizes conservation commitments that also apply to all life requisites of other Permit species of native salmonids occurring in Project Area Tier 1 drainages. Similarly, conservation commitments designed to conserve foraging, migration, and over-wintering habitat would be applied in Tier 2 lands, as prescribed under the NFHCP. These commitments are also intended to benefit all life requisites of other Permit species occurring in Project Area Tier 2 drainages.

Tier 1 Watersheds. Tier 1 watersheds, depicted in Map 2.2-1, are those Plum Creek Project Area lands within catchment areas tributary to first-, second-, third-, and fourth-order watercourses known to support spawning and juvenile rearing of bull trout. On an areal basis, Tier 1 watersheds cover 19 percent of the entire Project Area (Table 2.3-1).

What Does Land Ownership Mean to Permit Species?

Land ownership in the Project Area is discussed in terms of Tier 1 watersheds and Tier 2 lands. These classifications are based on bull trout biology. Tier 1 watersheds are the catchment areas for those streams with known bull trout spawning and juvenile rearing. These are the most specialized of bull trout life history stages and, in some cases, may be the most sensitive to land management. Tier 2 lands are the remaining Plum Creek lands in the Project Area and may include areas where bull trout migrate, forage, and over-winter. Habitat improvements in Tier 1 watersheds and Tier 2 lands are designed to benefit bull trout life history stages present in those areas, and other Permit species as well.

Of the 301,067 acres of Tier 1 watersheds in the Project Area, 272,624 acres (91 percent) are in Montana, 13,368 acres (4 percent) are in Idaho, and 15,075 acres (5 percent) are in Washington. Tier 1 acreages within each Planning Area basin are summarized in Table 2.3-1.

Of the 81 Tier 1 watersheds in the Project Area, 65 are in Montana, 7 are in Idaho, and 2 are in Washington. Appendix C lists the individual Tier 1 watersheds within each Planning Area basin.

Tier 2 Lands. Tier 2 lands, depicted in Map 2.2-1, are those Plum Creek Project Area lands within catchment areas tributary to all other watercourses within the Columbia River Basin. Some of these areas are known or suspected to provide migratory, foraging, and over-wintering

habitat for adult and sub-adult bull trout. These areas also provide the majority of available habitat (on Plum Creek lands) for the other native salmonid Permit species that occur on Plum Creek lands, including westslope cutthroat trout, the Snake River steelhead trout ESU, redband trout, coastal rainbow trout, pygmy whitefish, and mountain whitefish. Tier 2 lands cover an estimated 81 percent of the Project Area.

Of the 1,269,322 acres of Tier 2 lands in the Project Area, 1,186,879 acres (93 percent) are in Montana, 27,056 acres (2 percent) are in Idaho, and 55,387 acres (5 percent) are in Washington. Tier 2 acreages within each Planning Area basin are summarized in Table 2.3-1.

TABLE 2.3-1
Plum Creek's Tier 1 Watersheds and Tier 2 Lands by State and Planning Area Basin

Planning Area Basin	Tier 1 (acres)	Tier 2 (acres)	Total Area (acres)
Montana			
Upper Kootenai River	0	7,030	7,030
Middle Kootenai River	12,153	316,444	328,597
Lower Kootenai River	6,311	26,921	33,232
Flathead River	11,440	91,540	102,980
Swan River	36,183	48,230	84,413
Blackfoot River	124,580	168,346	292,926
Bitterroot River	19,223	61,423	80,646
Upper Clark Fork River	10,580	94,910	105,490
Middle Clark Fork River	50,242	371,296	421,538
Lower Clark Fork River	1,912	739	2,651
Montana Total	**272,624**	**1,186,879**	**1,459,503**
Idaho			
Lochsa River	13,368	27,056	40,424
Idaho Total	**13,368**	**27,056**	**40,424**
Washington			
Ahtanum Creek	7,443	2,687	10,130
Lewis River	7,632	20,060	27,692
Lower Tieton River	0	10,067	10,067
North Riffe Lake	0	15,216	15,216
Outliers	0	7,357	7,357
Washington Total	**15,075**	**55,387**	**70,462**

TABLE 2.3-1
Plum Creek's Tier 1 Watersheds and Tier 2 Lands by State and Planning Area Basin

Planning Area Basin	Tier 1 (acres)	Tier 2 (acres)	Total Area (acres)
Project Area Total	***301,067***	***1,269,322***	***1,570,389***
Percent of Total Project Area	19%	81%	100%

Certain lands (4,026 acres in the Flathead River Planning Area basin and 10,806 acres in the Blackfoot River Planning Area basin) included in this table have been analyzed in this EIS, but withdrawn from Permit application pending additional environmental considerations for a possible future amendment.

Approximately 124 miles of rivers flowing through lands in the Project Area were designated as **Key Migratory Rivers** by Plum Creek during NFHCP development.

Key Migratory Rivers are segments of large rivers bordering and longitudinally encompassed by Plum Creek lands that provide habitat for any and all Permit species and are shown on Map 4.6-1 in Chapter 4 of the EIS. The distinguishing feature of Key Migratory Rivers is that they serve to connect the variety of habitats used by the migratory life forms of the Permit species. These are generally rivers that Permit species use to migrate from the ocean or a lake or a big river to smaller, lower order spawning or rearing streams. The Key Migratory River designation captures the largest streams throughout the Project Area where Permit species rely on the distinct features provided by larger river habitat, such as over-wintering habitat, foraging habitat, or pre-spawn staging habitat. Key Migratory Rivers also share a common legacy of historic land management patterns not usually found on other Project Area lands, including railroads and highways, residential development, concentrated recreation, and flood control and channelization.

2.3.2 Adjacent Federal Land Management

Nearly 9.6 million acres of federal lands lie within the Planning Area, representing approximately 58 percent of the total Planning Area acreage. The FS manages approximately 92 percent of these lands (Table 2.3-2). The National Park Service (NPS), BLM, and FWS manage the remainder. Table 2.2-1 summarizes major federal land managers by Planning Area basin. Other federal land managers present within the Planning Area but who do not represent significant acreages include the U.S. Army Corps of Engineers, Department of Defense, Department of Energy, and Bureau of Reclamation.

Adjacent federal land managers in the Planning Area and their management units are listed in Table 2.3-3.

Primary Assumptions for Federal Land Management

Management on federal lands is described by the FWS (1998a) in its Biological Opinion of the effects on bull trout from continued implementation of existing FS and BLM plans. Activities administered by the FS are carried out under the existing direction of their Land and Resource Management Plans (LRMPs). BLM

TABLE 2.3-2
Summary of Adjacent Federal Lands Within the Planning Area

Agency	Montana (acres)	Idaho (acres)	Washington (acres)	Total (acres)	Percent of Planning Area
Forest Service	7,712,398	716,014	384,008	8,812,420	53.4%
National Park Service	631,663	0	0	631,663	3.8%
Bureau of Land Management	147,431	0	134	147,565	0.9%
Fish and Wildlife Service	28,155	0	0	28,155	0.2%
Totals	**8,519,647**	**716,014**	**384,142**	**9,619,803**	**8.3%**

TABLE 2.3-3
Adjacent Federal Land Managers and Their Management Units

Federal Agency	Management Units
Montana	
Forest Service	Beaverhead National Forest Bitterroot National Forest Deerlodge National Forest Flathead National Forest Helena National Forest Kootenai National Forest Kaniksu National Forest Lewis and Clark National Forest Lolo National Forest Cabinet Mountain Wilderness Mission Mountains Wilderness Scapegoat Wilderness Rattlesnake Wilderness Welcome Creek Wilderness
National Park Service	Glacier National Park Grant-Kohrs Ranch National Historic Site
Fish and Wildlife Service	Lee Metcalf National Wildlife Refuge Ninepipe National Wildlife Refuge Pablo National Wildlife Refuge Swan River National Wildlife Refuge National Bison Range
Corps of Engineers	Seattle District
Bureau of Land Management	Butte District
Idaho	
Forest Service	Clearwater National Forest Selway Bitterroot Wilderness
Corps of Engineers	Walla Walla District

TABLE 2.3-3
Adjacent Federal Land Managers and Their Management Units

Federal Agency	Management Units
Washington	
Forest Service	Gifford Pinchot National Forest Wenatchee National Forest William O. Douglas Wilderness Area Goat Rocks Wilderness Area Indian Heaven Wilderness Trapper Creek Wilderness Columbia River Gorge National Scenic Area
National Park Service	Fort Vancouver National Wildlife Refuge Mt. Ranier National Park
Fish and Wildlife Service	Columbian White Tailed Deer National Wildlife Refuge Conroy Lake National Wildlife Refuge Ridgefield National Wildlife Refuge Toppenish National Wildlife Refuge
Corps of Engineers	Seattle District
Department of Defense	Present but unspecified
Department of Energy	Present but unspecified
Bureau of Reclamation	Pacific Northwest Region

activities are administered under the direction of Resource Management Plans (RMPs) or Management Framework Plans. For convenience, all plan documents are referred to in this document as LRMPs.

LRMPs for both FS and BLM are amended by the following two interim fish protection strategies:

- Interim Strategy for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (INFISH: USDA and USDI 1995a)

- Interim Strategy for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH: USDA and USDI 1995b)

PACFISH and INFISH provide the basis of the assumptions used in federal land management and implemented by the LRMPs. Recent decisions by the FS and BLM have added interim aquatic strategies to LRMPs within the geographic range of the Columbia River Basin bull trout distinct population segment (CRB bull trout DPS; in this document, bull trout). National Forests and BLM Districts with anadromous fish have modified their LRMPs to include PACFISH either through amendment (FS) or instruction memorandum (BLM). The FS, through INFISH, amended LRMPs where PACFISH was not already in place. The BLM produced instruction memoranda to apply INFISH direction to bull trout watersheds. The agencies also consult on

site-specific actions conducted under the direction of the LRMPs that may affect federally listed species. LRMPs, PACFISH, and INFISH are discussed further below.

Purpose and Function of LRMPs.

Within the range of bull trout, LRMPs provide direction and standards for broad classes of project activities and land and water management practices that may affect bull trout. LRMPs provide policy guidance for various federal activities carried out on the forest or management area. While all FS and BLM administrative units implement many of the same land-use practices, the levels of activities and outputs vary depending on local conditions. Although LRMPs set important parameters for authorization of specific projects, with some exceptions, LRMPs do not themselves authorize the projects. Actual authorization of projects depends on analysis of site-specific effects and consistency with appropriate management direction and applicable legal requirements.

LRMPs provide direction and standards for a variety of projects and activities, including forest management, recreation, range management, mining, watershed restoration, fish and wildlife habitat management, fire and fuels management, land exchanges and acquisitions, and other special uses. Specific actions associated with these program activities are described by the FWS (1998a).

Broad-scale, science-based management direction for lands administered by the FS and BLM in the interior Columbia River Basin is under development through the ICBEMP. Technical documents supporting the NFHCP rely upon information contained in the ICBEMP DEISs. The ICBEMP has not yet been approved as an amendment to the affected LRMPs in the Planning Area. It is reasonably foreseeable, however, that the ICBEMP will be approved early in the Permit period and will contribute to additional conservation commitments and protection for native fish.

PACFISH and INFISH Implementation.

PACFISH and INFISH provide programmatic direction for management of lands administered by the FS and BLM. Both are interim strategies intended to provide protection against extinction or further endangerment of fish stocks and to maintain long-term management options, such as those being considered in two DEISs for the ICBEMP. For details on the aquatic conservation strategies contained in INFISH and PACFISH, refer to INFISH (USDA and USDI 1995a), PACFISH (USDA and USDI 1995b), and FWS (1998a).

Federal land management agencies selected these interim strategies because they recognize their prominent role in administering much of the remaining habitat used for spawning and larval and juvenile rearing by salmonids. Most of the remaining strong populations of steelhead and stream-type chinook salmon are in subwatersheds on federal land (70 percent and 88 percent, respectively) (Quigley and Arbelbide 1997). More than 90 percent of remaining bull trout and westslope cutthroat trout subwatersheds with known or predicted strong populations are on FS and BLM administered lands.

Federal land management recognizes that rehabilitation of depressed native salmonid populations cannot rely on habitat improvement alone, but requires a concerted effort to address causes of mortality in all life stages. These include freshwater spawning, rearing, juvenile

migration, ocean survival, and adult migration. Federal recovery efforts attempt to maintain good-quality habitats and populations, as well as increases in the distribution of high-quality spawning and early-rearing habitats.

2.3.3 Adjacent State Lands Management

There are 403,478 acres of state lands within the Planning Area, representing approximately 2 percent of the entire Planning Area acreage. Of this total, 305,651 acres (76 percent) are in Montana, 6 acres (<1 percent) are in Idaho, and 97,821 acres (24 percent) are in Washington (Table 2.2-1).

As important as state lands are to certain fishes and aquatic communities, Quigley and Arbelbide (1997) found that improvements are not expected to be uniform throughout the Planning Area and conditions are not expected to improve substantially. This conclusion was also reached during ICBEMP analyses for the following reasons:

1. The goals of state natural resource agencies charged with managing state lands are generally directed at providing the states revenues while minimizing impacts, and are therefore more similar to private landowners' goals than federal landowners' goals. States are not charged with the mission of restoring aquatic ecosystems.

2. As one moves from broad and uniform application of forest practice rules, which may not be fully protective of riparian function, to rangelands and settlement areas, the outcomes of regulations and laws are variable, localized, and often vague.

3. Adequate information about species at a site that will be affected by management activity is generally lacking, especially in terms of the biological condition and presence of rare species.

Current management practices on adjacent state lands in Montana, Idaho, and Washington are described below.

Montana Current Management Practices

The Montana Department of Natural Resources and Conservation (MDNRC), Trust Land Management Division, oversees forested, state-owned trust lands to provide income to the various school trusts, which is derived from the sale of forest products (Montana Forest Management Bureau [MFMB] 1998). The MDNRC also provides program direction and support to the field foresters, who have primary responsibility for on-the-ground land management activities. That support is provided in several subprograms or areas of expertise: forest land management, planning, hydrology, soils, economics, wildlife, and fisheries. Support and program direction are offered in several different ways: the development of resource management standards, site-specific review and recommendations for proposed management activities, and participation as members of inter-disciplinary teams to develop land management proposals.

The Montana State Forest Land Management Plan (SFLMP), approved by the State Land Board in 1996, guides the management of forested trust lands. This guidance is provided in the form of general management philosophy and specific resource management standards. The strategic guidance provided by the

SFLMP aims to produce long-term income for the trust by managing intensively for healthy and biologically diverse forests. The MDNRC manages with the philosophy that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream. Healthy and biologically diverse forests would provide for sustained income from timber and a variety of other uses. They would also help maintain stable trust income in the face of uncertainty regarding future resource values. In the foreseeable future, timber management will continue to be the primary source of revenue and primary tool for achieving biodiversity objectives.

Idaho Current Management Practices

Following a mandate set forth in the 1863 Organic Act of the Territory of Idaho, the 1890 Idaho Admission Bill granted Idaho the equivalent of 2 out of every 36 square miles of federally-owned land within the borders of Idaho. The Admission Bill designated these granted, or endowed, lands as "school lands," requiring that they (or the proceeds from their sale or lease) be used exclusively for the support of public schools (Idaho Department of Lands 1998). The Idaho Admission Bill also authorized additional substantial grants of federal land to the state, to be held in trust and used for the support of public beneficiaries. Idaho received over 3.65 million acres in nine individual endowments. In keeping with the spirit and intent of the Admission Bill, the Idaho state constitution mandates forever protecting and improving the entrusted lands and the revenues they generate.

To effectively manage the endowment lands and funds, Article IX of the Idaho Constitution established the State Board of Land Commissioners. To allow the Board to more efficiently carry out its constitutional functions, the Idaho legislature created the Idaho Department of Lands (IDL) in 1905. The Department's mission statement echoes that of the Board: "We manage endowment trust lands for the beneficiaries and protect natural resources for the people of Idaho." Today, lands owned by the State of Idaho are managed by the IDL, Idaho Department of Fish and Game (IDFG), Idaho Department of Parks and Recreation (IDPR), or other state agencies, and are required to be managed in compliance with Idaho laws and Idaho water quality standards, including bull trout standards (IDFG 1996).

Endowment lands currently total nearly 2.5 million acres, including 780,000 acres of commercial timberland and about 3 million acres containing minerals. The IDL applies the "manage and protect" philosophy to such diverse activities as the following:

- Land sales, exchanges, leases, and permits
- Cropland and grazing land management and leasing
- Lake encroachment protection
- Recreational and commercial minerals management and leasing
- Fire prevention, suppression, and hazard management
- Forest practices management and insect and disease control

IDL is the agency responsible for managing Idaho endowment and public trust lands, and is responsible for "on-the-ground" vegetative and soil management on these lands. These lands receive a mixture of forest, grazing, recreation, and

other uses. IDL implements management plans to meet water quality standards and protect beneficial uses. Its primary authorities stem from the Idaho Forest Practices Act (Title 38, Chapter 1, Idaho Code); Dredge and Placer Mining Protection Act; Idaho Surface Mining Act; Idaho Abandoned Mine Reclamation Act (Title 47, Chapters 13, 15 and 17, Idaho Code); and the Idaho Lake Protection Act (Title 58, Chapter 13, Idaho Code).

Washington Current Management Practices

Washington state lands range from scattered, isolated parcels under 40 acres in size to large contiguous blocks in excess of 110,000 acres (NMFS 1998a). Current management of state land in the Planning Area is guided by the Washington Department of Natural Resources (WDNR) HCP, which was finalized in 1997. The Lewis River and North Riffe Lake Planning Area Basins in the NFHCP are in the Columbia Unit of the WDNR HCP, which also provides conservation measures for fish.

Most WDNR-managed lands have been logged at least once in the last 100 years. The WDNR HCP contains a riparian conservation strategy in western Washington that aims to maintain or restore salmonid habitat and help conserve other riparian and riparian-obligate species. Specific riparian protection relies on watershed-level assessments of physical and biological conditions to determine the level of protection over the long term. Interim management strategies and buffer-width guidelines are provided while assessments are being completed. In addition to the HCP measures, the WDNR will continue to participate in watershed analysis in accordance with state Forest Practice Rules. If watershed analysis indicates that state resources require a greater level of protection than that specified in the WDNR HCP, measures developed through watershed analysis to provide this additional protection are implemented.

The WDNR HCP provides average streamside management zones of 150 to 160 feet, but can be up to 250 feet and vary by stream type. In the inner riparian buffer, no timber harvest is allowed in the first 25 feet, and minimal harvest can occur within the next 75 feet. Low harvest is allowed in the outer wind buffer more than 100 feet from the active channel margin. Harvest restrictions apply to intermittent streams on unstable slopes.

The WDNR HCP provides a road management strategy that uses road management plans to direct annual road condition inventories; repair legacy problems; conduct aggressive maintenance, stabilization, and access control; and place limits on road network expansion.

2.3.4 Adjacent Private Lands Management

Approximately 3.6 million acres of adjacent private lands are within the Planning Area, representing approximately 22 percent of the total Planning Area. Of this total, 3,415,137 acres (95 percent) are in Montana, 530 acres (less than 1percent) are in Idaho, and 187,943 acres (5 percent) are in Washington (Table 2.2-1). These lands can be generally grouped into industrial and non-industrial private lands.

Private lands affect river and stream corridors, low- to mid-elevation watersheds, valleys, and meadows. All of these are important to different aquatic

communities and to water quality. The interspersion, checkerboard nature, and varying parcel sizes of private lands among different ownerships present challenges to consistent and coordinated maintenance and restoration of aquatic resources across ownership boundaries.

Federal, state, and local regulations and BMPs provide varying levels of consistent direction and goals for land management within jurisdictions. The array of basic regulations applicable to private land management is covered in detail in Chapter 3 under the No Action Alternative. Surveys suggest that compliance with BMPs is high, especially among large industrial private landowners. For example, in Montana Plum Creek has averaged 97 percent compliance with BMP application since 1994, higher than any other Montana landowner, public or private (Frank 1994; Mathieus 1996; Fortunate et al. 1998). While BMP compliance is high, their effectiveness at conserving Permit species is uncertain.

Within the context of basic regulations, individual management decisions among private ownerships vary according to many factors, including land management history, market conditions, stakeholder expectations, access, and site-specific conditions and land capabilities. Industrial forests, and many other private forests, are managed primarily for timber production east of the Cascades (O'Laughlin et al. 1993). Generally, private land management east of the Cascades has increased efforts to improve forest health. Management has shifted from even-aged and single species stands, to uneven-aged management promoting species better adapted to naturally-occurring wildfire conditions. A concerted effort is being made to reduce fuel loads and fire hazards from forested ecosystems using this management approach.

Economics drive many of the site-specific project decisions within the context of regulatory compliance. Industrial forestry often involves strategies to sustain a high volume and quality of timber by applying the most appropriate management techniques and silvicultural practices. High levels of capital and labor are used, with environmental concerns operating as constraints (O'Laughlin et al. 1993). Non-industrial private forest landowners are likely to follow a strategy involving relatively low-level applications of operating and investment costs to a forest property. However, state forest practice regulations require minimum reforestation and water quality standards (O'Laughlin et al. 1993).

Conservation efforts attempt to bridge management inconsistencies among ownerships, such as the Idaho Bull Trout Conservation Plan, Washington Wild Salmonid Policy, and the Montana Bull Trout Restoration Plan. However, the ICBEMP did not assume that private land management would anchor efforts to maintain fish habitat and water quality (Quigley and Arbelbide 1997). As it did for state lands, the ICBEMP assumed that, as important as private lands are to certain fishes and aquatic communities, improvements are not expected to be uniform throughout the Planning Area and conditions are not expected to improve substantially (Quigley and Arbelbide 1997). This ICBEMP conclusion was reached through similar reasoning as stated earlier for state land management.

2.3.5 Adjacent Tribal Lands Management

Nearly 1.3 million acres of adjacent tribal lands occur within the Planning Area, representing approximately 8 percent of the entire Planning Area. Of this total, 1,287,794 acres (99 percent) are in Montana and 7,372 acres (1 percent) are in Washington (Table 2.2-1). No tribal lands lie within the Planning Area in Idaho. Adjacent tribal landowners in the Planning Area are as follows:

- Montana
  - Flathead Indian Reservation
  - Blackfeet Indian Reservation
- Washington
  - Yakama Indian Reservation
- Idaho (tribal landowners adjacent to the Planning Area)
  - Nez Perce Indian Reservation

Tribal governments have broad natural resource responsibilities, and often operate under different cultural and organizational goals than federal, state, or private land managers (Quigley and Arbelbide 1997). Enrolled tribal members may exercise those reserved rights and benefits held by a tribal government, but are subject to tribal government regulations. Differences in the character of tribal organizations exist among tribes based on how they were given federal recognition, provided reservations, and whether they adopted the Indian Reorganization Act of 1934.

Tribes' traditional and complex cultural ties to lands generate direction on how those lands are managed. Tribal governments, now with enhanced governing authority, directly address natural resource issues. Most tribes have evolving internal organizations and deliberative skills to deal with land management. Native American people have long held pronounced and special attachments to the land. Traditional land uses usually occur in the context of culturally significant places, and tribes are interested in maintaining the integrity of such sites. Many tribal land management decisions are made with consideration of cumulative effects of individual actions.

2.4 Climate

The Planning Area occurs within a transition-type climatic zone that is influenced by three distinct air masses (Quigley and Arbelbide 1997):

- Moist, marine air from the west that moderates seasonal temperatures.
- Continental air from the east and south, which is dry and cold in winter and hot with convective precipitation and lightning in summer.
- Dry, Arctic air from the north that brings cold air to the area in winter and cools the area in summer.

Most precipitation accumulates in winter (about 60 to 100 inches in the western Cascades, 30 to 50 inches in the eastern Cascades, and 10 to 37 inches in the northern Rockies). The mountain snowpack acts like a natural reservoir and supplies the Planning Area with most of its useable water. Only the eastern part of the Planning Area has summer maximum precipitation, which is associated with considerable thunderstorm activity. Summer precipitation throughout the Planning Area ranges from about 8 to 20 inches (Quigley and Arbelbide 1997).

Temperatures are usually moderate in much of the Planning Area because of periodic influences of Pacific moisture. Mean monthly temperatures range from approximately 15 to 30°F during winter to approximately 50 to 60°F during summer (Quigley and Arbelbide 1997).

High mountain areas have cold winters and short, cool summers with growing seasons as brief as 30 days. Lower elevation valleys and plateaus have cool to cold winters, hot summers, and growing seasons as long as 200 days (ICBEMP 1997b).

Climatic events that occur in the Planning Area can significantly disrupt ecosystem processes. Such events include lightning, weather front passage and the spread of wildfire, strong winds and blow-down, drought, extreme cold, and rain on snow floods (Quigley and Arbelbide 1997).