Forestry Policy Analysis for Salmon Recovery Planning in the

Stillaguamish Watershed (WRIA 5)

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Stillaguamish Implementation Review Committee
(SIRC)

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**Cover Photo:** North Fork Stillaguamish River valley and White Horse Mountain as seen from the Finney Adaptive Management Area (Sean Edwards, October 4, 2000).
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1. Introduction
Forestry is the most geographically extensive land use in the Stillaguamish watershed. Approximately 76% (530 square miles) of the 700-square mile watershed is either zoned for commercial forestry or managed as national forest (STAG 2000). Of the total forestland area within the watershed, approximately 150 square miles (28%) is private forestland, 110 square miles (21%) is state forestland, and 270 square miles (51%) is federal forestland. The geographic extent of these three main types of forestland management are shown in Appendix B, Map 1.1 Much of the federal forestland in the Stillaguamish watershed is currently not managed for timber harvest.

The past and potential impacts of forestry on salmon habitat in the Pacific Northwest are well documented. Timber harvest, forest roads, and other forest management activities can significantly alter hydrologic and erosional processes that affect sediment, streamflow, temperature, and other important freshwater salmonid habitat conditions (Murphy 1995).2 Because forestry is such an extensive land use in the Stillaguamish watershed it is important for local salmon recovery efforts to account for how the existing regulatory framework for the forestry sector contributes to the protection and restoration of salmon habitat.

This document is intended to summarize how the forestry sector is responding to the need for salmon habitat protection and restoration in the Stillaguamish watershed. It describes potential and past impacts of forest management on local salmon habitat. It also provides an overview of the existing policy and regulatory framework for private, state, and federal forestland management and how it is intended to protect and restore local salmon habitat. It also highlights some of the existing stakeholder issues that relate to local salmon recovery planning efforts. Finally, it recommends a variety of follow-up actions to coordinate local salmon recovery planning efforts with the existing policy and regulatory framework of the forestry sector.

This document was developed by Stillaguamish Lead Entity staff with guidance from representatives of private, state, and federal forestland managers who are participating in local salmon recovery planning efforts led by the Stillaguamish Implementation Review Committee (SIRC). This paper is intended to clarify for the SIRC the existing constraints and opportunities within the forestry sector for local salmon recovery actions. Similar analyses of the agricultural and urban sectors are anticipated to help produce a complete picture of how each of the major land use sectors are currently contributing to local salmon recovery. The results of this work can be used by the SIRC in the development of a local salmon recovery plan that is appropriate for the unique socioeconomic and environmental conditions of the Stillaguamish watershed.

1 For the purpose of this analysis private forestland includes parcels designated for tax purposes as forest, timber, or open space timber; state forestland includes all land managed by the Washington Department of Natural Resources; and federal forestland includes all land managed by the Forest Service.

2 “Forestry Impacts on Freshwater Habitat of Anadromous Salmonids in the Pacific Northwest and Alaska – Requirements for Protection and Restoration was developed by Michael L. Murphy of the NOAA National Marine Fisheries Service Center... The document presents a science overview of the major forest management issues involved in the recovery of anadromous salmonids affected by timber harvest in the Pacific Northwest and Alaska. The synthesis reviews salmonid habitat requirements and potential effects of logging, describes the technical foundation of forest practices and restoration, analyzes current federal and non-federal forest practices, and recommends required elements of comprehensive watershed management for recovery of anadromous salmonids” (from Note to Readers in Murphy (1995)).
The SIRC was established as a local stakeholder group in 1990 to oversee implementation of the Stillaguamish Watershed Action Plan. The Action Plan included seventy-one recommendations for controlling non-point source pollution in the Stillaguamish watershed. Twenty-one state agencies, local governments, tribes, and interest groups confirmed their commitment to implement the recommendations by signing statements of concurrence. Most of these original recommendations have been implemented, including the creation of the Lower Stillaguamish River Clean Water District to address water quality and water quantity issues.

In the mid 1990s, with leadership from the Stillaguamish Tribe and Snohomish County, the SIRC began addressing salmon habitat restoration issues in the Stillaguamish watershed. Since 1999, the SIRC has served as the local citizens committee for the Stillaguamish Lead Entity. In this role the SIRC has final oversight authority for prioritized lists of salmon habitat restoration projects that are submitted to the Washington State Salmon Recovery Funding Board. Snohomish County and the Stillaguamish Tribe are the administrative co-lead entity and staff the SIRC.

The SIRC is also partnering with the Shared Strategy for Puget Sound. The Shared Strategy is a voluntary and collaborative approach to recovering salmon in the Puget Sound region. It is designed to give local watersheds control over salmon recovery planning decisions and to build on current watershed protection and restoration efforts. This partnership will enable the SIRC to develop a local watershed response to federal threatened species listings of chinook salmon and bull trout. The Shared Strategy is cooperating with the SIRC and the Stillaguamish Lead Entity to build the Stillaguamish watershed chapter in a regional Puget Sound recovery plan. This document provides an essential starting point for evaluating the potential local effects of management actions that are already in place.
2. Forestry Impacts on Salmon Habitat in the Stillaguamish Watershed

Productive salmon habitat is created, maintained, and sometimes disrupted by the dynamic interaction of natural processes and the landscape. Human settlement and industrial use of the Pacific Northwest landscape introduced an additional disruptive force that has had a significant impact on salmon habitat. Forestry is one of the major land uses that have significantly altered the natural processes and landscape of the Pacific Northwest, which salmon depend on for their survival.

Forestry impacts on salmon habitat in the Puget Sound region began in the mid-1800s with timber harvesting and the clearing of land for homesteads and agriculture along the lower mainstems of major rivers. Timber harvesting was initially limited to lowland areas along streams and river channels large enough to carry logs downstream where they could be transported by water to saw mills. As timber hauling and transportation technology improved from the use of draft animals to steam engines and railroads, the area accessible to timber harvesting expanded to include more of the floodplain, the valley bottoms, and the lower slopes of foothills. In the 1930s and 1940s the ability to construct forest roads and haul logs by truck opened up the more difficult hill and mountain terrain. Mechanization of timber harvesting, transportation, and processing improved significantly after World War II and enabled lumber production to reach historic highs during the 1980s.

Much of the historical impact of industrial forestry on salmon habitat in the Pacific Northwest was due to timber harvesting in riparian zones, timber harvesting on steep or unstable slopes, and inappropriate forest road construction (Murphy 1995). These forest practices, both individually at localized sites and cumulatively across the landscape, have had a variety of impacts on the natural processes and material inputs that form and maintain productive salmon habitat. Cumulative effects “…result incrementally and collectively from the combined effects of separate management activities through time and space” (Murphy 1995, 124). The potential impacts of industrial forestry practices on salmon habitat are summarized in Table 1 below. Current forestry policies and regulations are intended to limit these impacts by requiring buffer zones, best management practices, and watershed analysis. The application of forest management prescriptions derived from watershed analysis can prevent or mitigate cumulative effects.

The geographical and technological progression of timber harvesting in the Stillaguamish watershed likely followed the same general pattern of timber harvesting throughout the coastal areas of the Pacific Northwest region. The specific impacts of forestry on salmon habitat in the Stillaguamish watershed are examined in a 1997 study by Brian Collins. This study describes how historic land uses, including forestry, changed the morphology and sediment load of the Stillaguamish River. According to Collins (1997, 20-21) the earliest logging in the Stillaguamish

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4 Effects of Land Use on the Stillaguamish River, Washington, ~1870 to ~1990: Implications for Salmonid Habitat and Water Quality and their Restoration is a report prepared by Brian Collins for the Tulalip Tribes, Stillaguamish Tribe, Snohomish County, and the Washington State Department of Ecology. Brian Collins is a research scientist in the Earth and Space Sciences Department of the University of Washington. He specializes in the historical analysis of land use effects on river systems.
watershed probably occurred in 1863 and by 1909 the riparian forests along most of the streams accessible to salmon had been logged. By 1942 nearly all of the riparian zone of the anadromous stream network had been logged, except for the middle and upper portions of Deer Creek on the North Fork and the upper portions of Jim and Canyon creeks on the South Fork (for the geographic distribution of subbasins in the Stillaguamish watershed see Map 2). The Collins study does not provide any estimates of the spatial extent of timber harvesting outside of the riparian zone of the Stillaguamish River system.

Table 1. Potential impacts of timber harvest and forest roads on salmon habitat (adapted from Murphy 1995).

<table>
<thead>
<tr>
<th>Forest practice</th>
<th>Potential change</th>
<th>Potential impact on salmon habitat</th>
</tr>
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| Timber harvest in riparian zones                 | Decreased shade                       | • Increased summer water temperature  
• More light, algae, food production                                                         |
| Timber harvest in riparian zones                 | Decreased supply of large woody debris| • Less instream cover  
• Less pool habitat  
• Less storage capacity for gravel and organic matter  
• Less hydraulic complexity  
• Less food production                                                                          |
| Streambank erosion                               | Addition of slash (bark, branches)    | • Increased organic matter and oxygen demand  
• More cover  
• Less channel stability                                                                         |
| Timber harvest on steep or unstable slopes       | Altered streamflow                    | • Temporarily increased summer base flow  
• Less groundwater recharge  
• Increased peak flows  
• Increased bedload shift                                                                             |
| Timber harvest on steep or unstable slopes       | Increased erosion                     | • Increased fine sediment in stream gravels  
• Reduced food production  
• Less cover  
• Increased supply of coarse sediment  
• Increased debris torrents  
• Less cover in torrent track  
• More debris jams                                                                 |
| Forest road construction and use                 | Stream crossings                      | • Reduced fish passage  
• Increased supply of sediment                                                                     |
| Forest road construction and use                 | Altered streamflow                    | • Increased peak flows  
• Increased bedload shift  
• Less groundwater recharge                                                                         |
| Forest road construction and use                 | Increased erosion                     | • Increased fine sediment in stream gravels  
• Reduced food production  
• Less cover  
• Increased supply of coarse sediment  
• Increased debris torrents  
• Less cover in torrent track  
• More debris jams                                                                 |
In the Stillaguamish watershed, extensive landslides and increased frequency and magnitude of high stream flows are attributed in large part to past timber harvesting and forest road management practices (STAG 2000, WCC 1999). Landslides and other forms of surface erosion that may be natural or induced by past forest practices or other land use activities have contributed to increased sediment loading in tributaries, main channels, and the mouth of the Stillaguamish River (Collins 1997). Channelization of streams in floodplain areas for agriculture has also exacerbated the routing of water and sediment into stream reaches used by salmon. Increased sediment loading has reduced the amount and quality of deep holding pools, spawning gravel, and rearing habitat. Accretion of sediment at the mouth of the Stillaguamish River has created extensive sand flats that may expose returning spawners and outmigrating smolts to increased predation. Increased frequency and magnitude of high stream flows is due in part to the loss of forest cover from timber harvesting and the routing of surface runoff from forest roads into streams. This has contributed to the scouring of upstream salmon spawning beds and smothering downstream spawning beds. Peak flows may also flush juvenile salmon out of normally slower moving portions of the river that are used for rearing habitat. Each of these impacts on salmon habitat have contributed, along with impacts from other land uses, to the historic decline of salmon populations in the Stillaguamish watershed and continue to limit the productivity of the existing populations.

Forestry in the Stillaguamish watershed continues to be an important economic activity, but since the early 1990s the rate and extent of timber harvesting and forest road construction has tailed off. This is due to a combination of factors, including changing regional and global market conditions, exhaustion of old growth timber supplies, and the implementation of state and federal environmental laws. Forest management on private, state, and federal forestland has been limited by the listing of the northern spotted owl, marbled murrelet, chinook salmon, and bull trout as threatened species under the Endangered Species Act (ESA). The listing of other species, such as grizzly bear, lynx, bald eagle, and wolf, has also constrained forest management, particularly on federal forestland. Portions of the Mount Baker-Snoqualmie National Forest have also been designated as wilderness areas, old growth forest reserves, or riparian reserves. These designations generally restrict timber harvest.
3. Existing Policy and Regulatory Framework of the Forestry Sector

In Washington State a broad framework of state and federal laws and land management plans strives to limit the environmental impacts from forest practices on private, state, and federal forestland. A common objective of this regulatory framework is to protect and restore freshwater habitat and water quality, which is intended to help salmon populations recover to sustainable and harvestable levels. This existing regulatory framework has three main components: the Washington Forest Practices Rules, the Washington Department of Natural Resources Habitat Conservation Plan, and the Northwest Forest Plan. The following discussion provides an overview of these three main regulatory elements. Maps 3 and 4 in Appendix B illustrate the geographic distribution in the Stillaguamish watershed of state and federal land allocations and watershed analyses, which are discussed below.

3.1 Washington Forest Practices Rules

The Washington Forest Practices Act regulates forestry activities on all local government, state, and private forestlands. The Forest Practices Act (RCW 76.09) was passed by the state legislature in 1974. The Forest Practices Act is implemented through the Forest Practices Rules (WAC 222), which are adopted by the Forest Practices Board. In 1986 a major multi-stakeholder effort to improve the regulation of forestry activities under the Forest Practices Act was initiated through the Timber, Fish and Wildlife (TFW) process. The TFW process involved state agencies, tribes, timber industry, and the environmental community. In 1998 local government and federal agencies joined the process, but the environmental community and several tribes later withdrew. The negotiation process culminated in 1999 with publication of the Forests and Fish Report (TFW Caucuses 1999).

The Forests and Fish Report presented a comprehensive set of recommendations for improving the state’s forest practices rules along with a commitment by federal and state agencies, landowners and participating tribes to improve the forest practices program, provide continuing policy participation to support full implementation, and to support funding for agency and tribal participation (Heide 2003). The report also recommends an adaptive management program designed to provide science-based recommendations and technical information for rule and program adjustments as necessary. The Forests and Fish Report established the following goals:

- Provide compliance with the Endangered Species Act for aquatic and riparian-dependent species on non-federal forestlands;
- Restore and maintain riparian habitat on non-federal forestlands to support a harvestable supply of fish;
- Meet the requirements of the Clean Water Act for water quality on non-federal forestlands; and
- Keep the timber industry economically viable in Washington State.

In 2000 the Forest Practices Board subsequently adopted changes to the Forest Practices Rules based on the Forests and Fish Report recommendations. The rules were encoded in May 2001. These regulatory changes substantially improved the standards and guidelines for riparian buffers and forest road maintenance.5

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5 To date several third party reviews of the Forests and Fish Report have been completed. For example, the Washington Forest Protection Association sponsored a private sector review of the scientific foundations of the
Under the old rules, cumulative watershed effects are addressed through a two-step watershed analysis process in which sensitive areas are defined within each watershed, regardless of land ownership, and management prescriptions are developed to limit the risk of forestry related impacts on public resources, including fish habitat, water supplies, and capital improvements (DNR 1997a). Watershed analysis is conducted by an interdisciplinary team of scientists who must meet specific qualifications, including education, field experience, and training in the watershed analysis process. Tribes, private forestland owners, natural resource management agencies, and other interested parties may participate in watershed analysis. Prescriptions from watershed analysis may include voluntary prescriptions for restoration actions. In the Stillaguamish watershed, watershed analyses have been completed according to state guidelines for the Deer Creek and Hazel watershed administrative units (WAUs). These WAUs cover approximately 273 square miles within the North Fork Stillaguamish River drainage (see Map 4). A third watershed analysis is being conducted by the Stillaguamish Tribe for the French-Boulder WAU and it will be completed soon.

Since the new Forest Practices Rules were adopted in 2000, the Department of Natural Resources has redirected staff resources from watershed analysis to support implementation of the new rules. Staff is especially being directed toward implementation of the riparian buffer and road maintenance provisions of the rules (Sturhan 2002, Heide 2003). These two provisions along with improvements in unstable slope identification and more strict road construction rules address the most common prescriptions that were developed from many of the watershed analyses that had been completed in the years leading up to the Forests and Fish Report. Changes brought about by the Forests and Fish Report supplant existing prescriptions from completed watershed analyses. Mass wasting issues, restoration opportunities, other watershed specific issues, and continued concern regarding cumulative effects may lead the Department of Natural Resources and forest landowners to return some of their attention to watershed analysis in the future (Heide 2003).

Washington State is now in the process of seeking assurances from the federal government that state and private forestry activities carried out in accordance with the revised Washington Forest Practices Rules will be in compliance with the Clean Water Act and the Endangered Species Act (DNR 2002). Program improvements, non-regulatory commitments, functioning adaptive management and funding support along with the details of an implementation agreement between the State of Washington and federal services are currently being finalized to complete the federal assurances (Heide 2003). This process is scheduled for completion by June 30, 2005.

The conversion of private forestland to other uses triggers a transfer of jurisdiction from the state to the local county government. Forest practices on lands platted after 1960, on lands where the owner intends to convert forestland to another land use, and on lands which are not to be reforested because of future conversion to urban development are defined as Class IV General forest practices (WAC 222-16-050 (2)). This type of forest practice requires a license from a county or city because it involves changing the land use designation of the property. When the Department of Natural Resources receives an application for this type of forest practice the


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The department must determine the lead agency (i.e., city or county) for the purpose of compliance with the State Environmental Policy Act (SEPA). The city or county must then conduct an environmental review of the proposed forest conversion. If the conversion is permitted, then the property is no longer regulated by the Forest Practices Rules. Forest conversions are important to salmon recovery efforts because they represent a permanent loss of forest cover and an increase of impermeable surfaces, which contributes significantly to cumulative effects on watershed processes and salmon habitat.

On conversions, the state's reforestation requirements do not apply, and the proposed forest practice becomes subject to applicable local government authority such as zoning and critical areas regulations (Middaugh 2003). With few exceptions, local governments are preempted under the Forest Practices Act from regulating any aspect of non-conversion types of forest practices. All applications to the Department of Natural Resources for a forest practices permit must indicate whether any land covered by the application will be permanently converted or is intended to be converted to a use other than commercial forest production within three years after completion of the forest practices. If a forest practices permit application does not state that the land will be or is intended to be converted to a non-forestry use, then for six years following the filing of the application the local government may deny any or all applications for permits or approvals relating to non-forestry uses of the land. All forest practices occurring on lands platted after 1960 or on lands within designated Urban Growth Areas (also referred to as Areas Likely to Convert (ALTCs)) are automatically classified as conversions.

Class IV designations do not apply if the forest landowner provides a written statement of intent not to convert to a use other than commercial forestry for 10 years, accompanied by either a written forest management plan acceptable to DNR, or documentation that the property is enrolled in the state's special taxation program for forest land. The Class IV designation also does not apply if a forest landowner attaches to the forest practices application a conversion option harvest plan approved by the local government.

While Class IV forest practices provide local governments with some ability to limit clearing near streams and wetlands via their local critical areas and zoning regulations, there are some gaps in what can be regulated. For example, there are exemptions in the Forest Practices Act for clearing on lots smaller than two acres with less than 5,000 board feet of timber removed or building less than 600 feet of road. DNR also exempts the removal of trees within 1.5 tree lengths of existing structures. As local government clearing regulations are generally limited in their scope (i.e., primarily in and adjacent to critical areas), there is very little ability to restrict clearing on Class IV permits in order to protect hydrologic functions at subbasin or watershed scales. Local governments are required to adopt regulations for and take over all permitting of Class IV forest practices by December 31, 2005. All local government conversion ordinances must be approved by the Department of Natural Resources and are required to be at least as protective as existing forest practices rules and regulations.

3.2 Washington Department of Natural Resources Habitat Conservation Plan
The Washington Department of Natural Resources Habitat Conservation Plan (HCP) was approved January 30, 1997, to protect state forest management activities from legal liabilities related to the Endangered Species Act. It was developed to deal primarily with the conservation
of habitat for the marbled murrelet and northern spotted owl. It also anticipated the federal listing of chinook salmon and bull trout as threatened species. As such it is an example of a multi-species HCP. The HCP covers 1.6 million acres and includes significant portions of the Stillaguamish watershed (DNR 1997b). In the Stillaguamish watershed state forestland management is administered by the DNR Northwest Region office, based in Sedro-Woolley.

The HCP established standards and guidelines for state forestland management that the federal government determined will adequately protect threatened and endangered species. The federal government issued an incidental take permit to the Department of Natural Resources that will remain in effect for 70 years. This permit can be revoked due to non-compliance with the terms of the HCP implementation agreement (DNR 1997b, B.1).

Forest practices on state forestland must comply with the Washington Forest Practices Rules and the HCP. Management of state forestland is also guided by policies and operational procedures from the DNR Forest Resource Plan (DNR 1992) and the Forest Practices Board Manual (DNR 2000). The HCP includes a Riparian Conservation Strategy for five western Washington planning units of the Department of Natural Resources. This is the primary mechanism by which the HCP limits forestry impacts on salmon habitat in the Stillaguamish watershed. The Riparian Conservation Strategy includes limitations on timber harvesting and road building in riparian zones, unstable hillslopes, rain-on-snow zones, and wetlands.

The HCP also includes an implementation plan that requires implementation, effectiveness and validation monitoring. A monitoring report must be submitted by the Department of Natural Resources to the U.S. Fish and Wildlife Service by March 30 of each year. Comprehensive review of the HCP is also required to be submitted within one month after the first, fifth, and tenth anniversaries, and every tenth anniversary thereafter from the date of the HCP agreement.

Under the HCP some state forestlands are designated as “nesting, roosting, and foraging” (NRF) or “dispersal” habitat for the northern spotted owl. NRF habitat contributes to maintaining the existing distribution of the northern spotted owl. Dispersal habitat supports the movement of northern spotted owls from one subpopulation to another. Timber harvesting within NRF and dispersal areas is limited according to a complex set of rules laid out in the HCP (DNR 1997b, IV.1-19). Within the Stillaguamish watershed a substantial amount of state forestland is designated as NRF habitat, but there is no dispersal habitat (see Map 3).

3.3 Northwest Forest Plan
The Northwest Forest Plan established a comprehensive ecosystem management strategy for federal forestland in the Pacific Northwest by amending existing land and resource management plans with additional land allocations and standards and guidelines. The Northwest Forest Plan guides federal forestland management throughout the range of the northern spotted owl, which primarily includes western Washington, western Oregon, and northern California. It was adopted

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6 Implementation monitoring determines whether the HCP conservation strategies are implemented as written. Effectiveness monitoring determines whether the HCP conservation strategies result in the anticipated habitat conditions. Validation monitoring evaluates the cause-and-effect relationships between habitat conditions resulting from the HCP conservation strategies and the animal populations these strategies are intended to benefit.
jointly by the Forest Service and the Bureau of Land Management in 1994 (USFS and BLM 1994a). Amended land allocations are shown in Map 3.\(^7\)

The Northwest Forest Plan created a network of old-growth forest and riparian reserves to protect critical habitat and watershed processes. Much of the existing old-growth forest was allocated as Late-Successional Reserves. Programmed timber harvest was limited to lands allocated as Matrix Areas and, in some places, Adaptive Management Areas. Adaptive Management Areas are special landscape units intended to encourage the development and testing of different approaches to achieve ecological, economic, and social objectives. The Northwest Forest Plan limited timber harvest in other areas to thinning or salvage logging only if such operations are needed to achieve ecosystem management objectives. The Forest Service also manages federal forestland in the Pacific Northwest according to various nation-wide policies and operating procedures.

The Stillaguamish watershed includes a portion of the Mount Baker-Snoqualmie National Forest, which is managed according to a 1990 Land and Resource Management Plan (USFS 1990) as amended by the regional Northwest Forest Plan. The Mount Baker Ranger District, based in Sedro-Woolley, manages parts of the Deer Creek subbasin. The Darrington Ranger District, based in Darrington, manages the rest of the National Forest within the Stillaguamish watershed. Parts of the French-Segelsen and Upper North Fork Stillaguamish subbasins are included in the Finney Adaptive Management Area, which is managed primarily for restoration of late-successional and riparian habitat (USFS and BLM 1994a, D-13). A management plan for the Finney Adaptive Management Area has not yet been completed. The Boulder River Wilderness covers about 38 square miles, which includes significant portions of the north and south forks of the Stillaguamish River.

A central part of the Northwest Forest Plan is the Aquatic Conservation Strategy, which provides guidance for the management of aquatic and riparian habitat. The Aquatic Conservation Strategy established the following nine objectives (USFS and BLM 1994a) to maintain and restore:

1. the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. spatial and temporal connectivity within and between watersheds.
3. the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.
5. the sediment regime under which the aquatic ecosystems evolved.
6. instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.
7. the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

\(^7\) Amended land allocations are also referred to as “merged” land allocations because the existing Land and Resource Management Plan (LRMP) land allocations were merged with the allocations from the Northwest Forest Plan. There are many different types of amended land allocations. Those shown in Map 3 represent a selection of the major types of amended land allocations in the Stillaguamish watershed.
8. the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Explicit standards and guidelines are defined for each of the land allocations under the Northwest Forest Plan. The standards and guidelines must be used to evaluate whether proposed projects or management activities “meet” or “do not prevent attainment” of the Aquatic Conservation Strategy objectives. Additional standards and guidelines exist in the 1990 Land and Resource Management Plan for the Mount Baker-Snoqualmie National Forest.

The Aquatic Conservation Strategy has four major components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. Riparian Reserves are lands along permanently flowing streams, intermittent streams, lakes, wetlands, and unstable and potentially unstable areas where special standards and guidelines direct land use. Standards and guidelines prohibit programmed timber harvest in Riparian Reserves and regulate other land uses to achieve objectives of the Aquatic Conservation Strategy. The boundaries of Riparian Reserves are prescribed based on various site-specific elements and characteristics, including the size of a site-potential tree. Watershed analysis is required to change the size and locations of Riparian Reserves.

Key Watersheds are designated to provide high quality water and serve as large refugia that are crucial to at-risk fish species and stocks. There are two designations for Key Watersheds. Tier 1 Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. Tier 2 Key Watersheds do not necessarily contain at-risk fish stocks, but they are important sources of high quality water. Within the Stillaguamish watershed the federal lands in the Deer Creek, the North Fork Stillaguamish River, and South Fork Stillaguamish River watersheds are designated as Tier 1 Key Watersheds (USFS and BLM 1994c, B-102). Timber harvest and other resource management activities may not occur in Key Watersheds unless watershed analysis has been completed. Key Watersheds receive high priority for restoration work.

Watershed Analysis is a set of procedures for evaluating geomorphic and ecologic processes in specific watersheds and it provides baseline information for evaluating project compliance with the objectives of the Aquatic Conservation Strategy. Watershed Analysis is also intended to guide monitoring, restoration, and Riparian Reserve delineations. The Forest Service has completed watershed analyses for large portions of the North Fork and South Fork Stillaguamish drainages (see Map 4) (USFS 1995, 1996, and 2000). Each of these watershed analyses includes a list of potential restoration projects.

Watershed Restoration is a comprehensive, long-term program to restore watershed health and aquatic ecosystems including the habitats supporting fish and other aquatic and riparian-dependent organisms (USFS and BLM 1994c, B-84). The Aquatic Conservation Strategy
recognizes that the most important types of watershed restoration work on federal forestland within the Northwest Forest Plan region are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of instream habitat complexity (USFS and BLM 1994a, B-31).

3.4 Summary
This analysis shows how implementation of the Washington Forest Practices Rules, the DNR Habitat Conservation Plan, and the Northwest Forest Plan provides a broad policy and regulatory framework for limiting the most significant impacts of industrial forestry on salmon habitat across ownerships in the Stillaguamish watershed. The next section of this paper examines how this policy and regulatory framework deals specifically with timber harvesting in riparian zones, timber harvesting on steep or unstable slopes, and forest road construction and use.
4. Policies and Regulations for Timber Harvesting and Forest Roads

The previous section presented an overview of the scope and evolution of the existing policy and regulatory framework for forestland management in the Stillaguamish watershed. This section presents a more detailed examination of existing policies and regulations that apply to private, state, and federal forestlands. This more detailed examination is organized according to recommendations from a comprehensive analysis by Michael Murphy (1995) of forestry impacts on freshwater salmon habitat. Murphy recommends that forest practices in the Pacific Northwest be regulated by implementing:

- **buffer zones** to protect streams and unstable slopes,
- **best management practices (BMPs)** to minimize disturbances that increase sediment and peak flows, and
- **watershed analysis** to support management of cumulative effects.

For the Stillaguamish watershed the existing regulatory framework includes these elements in a variety of ways for private, state, and federal forestlands. Existing forestry regulations for the Stillaguamish watershed are summarized in Table 2 below. A more detailed presentation of existing forestry policies and regulations is presented in Appendix A.

**Table 2. Summary of the existing forestry regulatory framework as it applies to the Stillaguamish watershed (WRIA 5).**

<table>
<thead>
<tr>
<th>Type of Forestry Regulation</th>
<th>Private Forestland</th>
<th>State Forestland</th>
<th>Federal Forestland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buffer zones to protect fish-bearing streams?</strong></td>
<td>YES. Washington Forest Practices Rules (FPR) requires 90-200’ Riparian Management Zone for fish-bearing streams, determined by site class. Smaller and less restrictive stream buffer requirements for properties that qualify for small forest landowner program.</td>
<td>YES. DNR Habitat Conservation Plan (HCP) requires Riparian Buffer width equal to the average height that an adjoining conifer stand would be expected to reach at 100 years of age or 100’, whichever is greater. Additional 100’ wind buffers for fish-bearing streams &gt; 5’ wide and 50’ wind buffers for streams &lt; 5’ wide.</td>
<td>YES. Northwest Forest plan (NWFP) requires Riparian Reserve buffer width for fish-bearing streams equal to 2 x Site Potential Tree height (SPT) or 300’ slope distance, whichever is greater.</td>
</tr>
<tr>
<td><strong>Buffer zones to protect nonfish-bearing streams?</strong></td>
<td>PARTIAL. FPR requires 50-100’ buffers for at least 50% of the length of nonfish-bearing streams.</td>
<td>PARTIAL. HCP requires 100’ buffers for Type 4 nonfish-bearing streams. DNR must comply with Forest Practices Rules for Type 5 streams. No additional wind buffers required for nonfish-bearing streams &lt; 5’ wide.</td>
<td>YES. NWFP requires Riparian Reserve buffer width for permanently flowing nonfish-bearing streams equal to 1 x SPT or 150’, whichever is greater. For seasonally flowing or intermittent streams, buffer width is 1 x SPT or 100’, whichever is greater.</td>
</tr>
<tr>
<td>Type of Forestry Regulation</td>
<td>Private Forestland</td>
<td>State Forestland</td>
<td>Federal Forestland</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td><strong>Buffer zones to protect steep or unstable slopes?</strong></td>
<td>YES. FPR requires 50’ timber harvest buffers for sensitive areas, such as headwall and side slope seeps.</td>
<td>YES. HCP requires DNR to identify unstable slopes and comply with FPR.</td>
<td>YES. NWFP includes unstable and potentially unstable areas in Riparian Reserves. Resource management is generally not allowed within the extent of these areas; however, there are some exceptions.</td>
</tr>
<tr>
<td><strong>BMPs for timber harvest?</strong></td>
<td>YES. FPR defines various BMPs for timber harvest size, timing, and methods that minimize impacts on salmon habitat.</td>
<td>YES. DNR must comply with FPR for timber harvesting. Additional BMPs defined in HCP and DNR operating procedures.</td>
<td>YES. Timber harvest practices in Matrix Areas must follow NWFP standards and guidelines. Timber harvest is prohibited (with some exceptions) in Riparian Reserves and Late Successional Reserve (LSR) stands over 80 years old. Thinning, for the purpose of creating or maintaining late-successional forest conditions, may occur in LSR stands up to 80 years old. Additional BMPs for timber harvest are defined in the Mount Baker-Snoqualmie LRMP.</td>
</tr>
<tr>
<td><strong>BMPs for road construction and maintenance?</strong></td>
<td>YES. FPR defines various BMPs for road design, construction, maintenance, and decommissioning that minimize impacts on salmon habitat.</td>
<td>YES. DNR must comply with FPR for road construction and maintenance. Additional BMPs defined in HCP and DNR operating procedures.</td>
<td>YES. Various BMPs, national and regional specifications, and certification process for administration of construction contracts.</td>
</tr>
<tr>
<td><strong>Watershed analysis to address cumulative effects?</strong></td>
<td>PARTIAL. Watershed analysis methods and procedures are clearly defined in FPR and Forest Practices Board Manual. Watershed analysis produces local prescriptions to minimize cumulative effects. Restoration needs and opportunities are also identified. Process may be led by state, tribal, or private entity. Optional for private forestland.</td>
<td>PARTIAL. DNR oversees watershed analysis. Progress has been limited and continued implementation is uncertain. “If watershed analysis indicates that a greater level of protection is required than that specified by HCP, the watershed analysis prescriptions shall be implemented” (DNR 1997b, IV.55). Method does not account for hydrologic effects of roads.</td>
<td>YES. Watershed analysis is used to guide management prescription and monitoring programs, refine Riparian Reserve boundaries, and assist in identifying restoration needs and opportunities. Watershed analysis is required in Key Watersheds prior to timber harvest and other management activities.</td>
</tr>
</tbody>
</table>

This summary analysis demonstrates that the existing policies and regulations do include all of the key elements of a comprehensive regulatory system for forestry practices as recommended by Murphy (1995). However, this analysis does not evaluate the effectiveness of these existing policies and regulations as they are applied to private, state, and federal forestlands. It should be noted that monitoring programs are in place to evaluate the effectiveness of this regulatory system.
system. These monitoring programs support the implementation of adaptive management for regulation of forestry practices on private, state, and federal forestlands.
5. Stakeholder Issues
Through the process of writing and editing this paper several stakeholder issues emerged. These issues warrant some discussion so participants in salmon recovery planning may be more informed about the context of their efforts. These stakeholder issues are presented here to acknowledge areas of concern and disagreement. Negotiations between the various parties involved in these issues are at various stages of development. The following discussion attempts to briefly explain the nature of some of these issues, the parties involved, and the status of negotiations among the parties.

5.1 Rate of Timber Harvest and Hydrology
One of the major issues raised by the environmental community and some of the tribes during the Forests and Fish process was the rate of timber harvest. This issue is about the relationship between the rate at which forest managers in a given watershed may harvest their timber and the cumulative watershed effects of deforestation, especially on hydrology as manifested by increased size and frequency of peak flow events. Under the existing regulatory framework, there are few limits on the rate of timber harvest because private and state forestland managers have opposed limitations on the timing of harvest activities. Private and state forestland managers contend that limits on rate of harvest would create an unacceptable economic burden and that existing requirements for replanting after harvest and limitations on the size of harvest units provide adequate measures for protecting hydrologic functions. Nevertheless it is possible for one or more forestland owners in a watershed to harvest timber at rates that could deforest an area wide enough to increase peak flows. This issue was taken off the table during the Forests and Fish process and it is not part of the current negotiations between the State of Washington and the federal government for an incidental take permit based on the new forest practices rules.

5.2 Watershed Analysis and Cumulative Effects
Prior to the adoption of new forest practices rules following the Forests and Fish Report, cumulative effects were addressed through watershed analysis conducted according to the Washington State protocol. The Department of Natural Resources is responsible for overseeing and conducting watershed analysis. However, it appears that the only watershed analysis currently underway is the French-Boulder watershed analysis, which is being conducted by the Stillaguamish Tribe for a portion of the Stillaguamish watershed. The Stillaguamish Tribe and other stakeholders are concerned that cumulative effects are not being adequately addressed under the new forest practices rules and that the State of Washington should continue to conduct and oversee watershed analyses as required under the existing forest practices rules. The effectiveness of current forest practices rules is being assessed through the Forests and Fish adaptive management process. Watershed analysis as modified by Forests and Fish rules is a tool that remains available to address basin specific situations. Funding support for conducting future watershed analysis is problematic (Heide 2003).

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8 The Forest Practices Rules include a provision for monitoring the rate of timber harvest to examine the relationship between the rate of timber harvest to sustainability of the timber industry and protection of public resources (WAC 222-30-120). Beginning in August 1992, DNR was required to report the results of monitoring the rate of timber harvest to the Forest Practices Board annually. The rate of harvest monitoring program was to be reviewed and evaluated by the Forest Practices Board no later than March 1996. This program is still active and rate of harvest information is available for each WRIA.
5.3 Buffer Zones to Protect Nonfish-Bearing Streams
As demonstrated above in Table 2, nonfish-bearing streams on private and state forestland only receive partial protection with riparian buffers and BMPs. This is considered by some stakeholders to be a shortcoming of the Washington forest practices rules because the downstream effects of timber harvesting on water quality and aquatic habitat can be significant. This issue is being addressed through monitoring conducted by DNR and various tribes, including the Stillaguamish Tribe.

5.4 Exemptions for Small Forest Landowners
The new forest practices rules adopted following the Forests and Fish process exempt the smallest parcel forest landowners from the standard riparian management zone regulations (WAC 222-30-023). This exemption was added to the rules as a result of legislation that modified the Forests and Fish agreement. The Forests and Fish Report recommended the riparian easement program for non-industrial private landowners with relatively small ownerships as partial compensation for the economic costs of Forests and Fish stream buffers. It is intended to reduce the economic impact on small forest landowners who may otherwise feel it necessary to convert forestland to a higher value use in order to prevent the financial loss of greater restriction on timber harvest. The easement program also offsets the disproportionate impact Forests and Fish rules impose on some small forest landowners whose property falls largely within fish habitat stream riparian zones (Heide 2003). The environmental community and some tribes are concerned that this exemption may create a significant hole in the regulatory framework for the protection of salmon habitat, especially since most small forestlands are at lower elevations, which coincide with the distribution of accessible anadromous fish habitat. However, the extent of qualifying forestlands and the effectiveness of the voluntary riparian easement program are not yet clear.

Under the new forest practices rules small forest landowners currently are not exempt from the road maintenance and abandonment planning (RMAP) regulations. However, this requirement has been widely criticized for putting a disproportionate economic burden on small landowners. In response, the DNR is requesting legislation that would provide an RMAP exemption for small landowners and those who harvest less than two million board feet of timber per year. The inclusion of an RMAP exemption for small forest landowners may generate new concerns among environmental and tribal stakeholders. It may also be necessary for the state to provide cost sharing incentives to enable small forest land owners to participate in the RMAP program.

It should be noted that the legislative exemption releases small landowners from the planning and reporting requirements of RMAP rules, but does not change the basic road maintenance rules. All forest landowners, regardless of the size of ownership, are required to maintain forest roads on their property to the same standards. The Department of Natural Resources is required to implement these rules and to measure the rate of compliance to determine if roads are being properly maintained across the state (Heide 2003).

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9 Small forest landowners are defined as forest landowners who own less than 80 acres total ownership in the state and 20 acres or less in a single contiguous parcel.
10 56th Washington State Legislature. 1999. Engrossed substitute House bill 2091 as amended by the Senate new section 505 an addition to Chapter 76.13 RCW.
5.5 Dwindling State and Federal Budgets
State and federal budgets for natural resources management have generally declined in recent years and this trend may compromise many programs, including the effective implementation and refinement of existing policies and regulations. Budget cuts may reduce funding for the various types of monitoring and research, which are intended to ensure compliance and provide the information needed for adaptive management. Continued funding for salmon habitat restoration work is also uncertain.

5.6 Forest Conversions for Development
The conversion of forestland to other uses is a growing concern among some stakeholders because it results in a permanent loss of forest cover, which impacts the hydrologic function of the watershed. Forest conversions (i.e., Class IV General forest practices) generally involve the clearing of trees and other natural vegetation and are often followed by development of the property for suburban or urban uses, which includes construction of roads, buildings, and other impervious surfaces. In the Stillaguamish watershed most forest conversions involve county government in the environmental review, which is required to assess the potential environmental impacts of each proposed conversion. The rate and extent of forest conversions and how they relate to local salmon recovery are not well understood at this time.

5.7 Lowland Flood Storage Capacity
In addition to the hydrologic effects of forest practices, downstream land uses also contribute to increased magnitude and frequency of flood events in the Stillaguamish watershed. Channelization of streams and draining of wetlands in floodplain areas for agricultural and urban land uses have reduced the overall flood storage capacity of the watershed. Coordination on efforts to address upland and lowland hydrologic problems can help produce more effective strategies in the long run.
6. Conclusion and Recommendations
The existing policy and regulatory framework includes a variety of elements that are intended to minimize the impact of industrial forestry on salmon habitat in the Stillaguamish watershed. For the purpose of salmon recovery it is important to recognize that these are in place and that the forestry sector has made a significant financial contribution through reductions in acreage available for timber harvest and increased expenditure for road construction and maintenance. However, some stakeholder groups remain concerned about the effectiveness of this policy and regulatory framework. Effective implementation of the existing policies and regulations depends on feasibility, funding, and policy commitment.

Implementation of this regulatory framework is intended, over time, to improve salmon habitat in the following ways:

- Increase the extent and quality of riparian vegetation, which will result in lower stream temperature, proper routing of large woody debris, more pool habitat, and greater bank stability.
- Increase the amount and quality of forest cover, especially on unstable or potentially unstable slopes and in rain-on-snow zones. This may help reduce mass wasting related to timber harvest on steep or unstable slopes and it may reduce the frequency and magnitude of peak flows.
- Decrease the amount of surface erosion and mass wasting from forest roads. This may reduce the amount of fine sediment in streams and thereby improve spawning gravel and water quality conditions.
- Decrease the number of stream crossings that block salmon from accessing potential upstream habitat.

These benefits are likely to occur from implementation of the existing policy and regulatory framework, but as discussed in the previous section, there are a variety of issues and uncertainties that might limit the expected improvements to salmon habitat.

Following this analysis, salmon recovery planning efforts for the Stillaguamish watershed should include the following actions:

1. Recognize watershed restoration efforts of forestland managers that go beyond existing regulations and contribute to local salmon recovery.

2. Examine watershed restoration project needs and opportunities that are identified in state and federal watershed analyses.

3. Track any watershed analysis that may be conducted in the future for portions of the Stillaguamish watershed where such work has not already been completed according to the Washington State protocol.

4. Promote local stakeholder participation in the annual Road Maintenance and Abandonment Plan (RMAP) workshop facilitated by the Department of Natural Resources for the Stillaguamish watershed.
5. Determine the amount and location of areas that qualify for regulatory exemptions under small forest landowner provisions of the Forest Practices Rules. This is needed to assess the importance of small forest land holdings to salmon recovery in the Stillaguamish watershed. The DNR Small Forest Landowner Office may be available to provide technical assistance for this work.

6. Follow the progress of the federal assurances process as it relates to implementation of the Washington Forest Practices Rules for regulatory certainty under the Endangered Species Act. This is important because it may result in changes to the existing policy and regulatory framework for private and state forestlands.

7. Conduct further analysis of how the regulation and permitting of forest conversions relates to the protection and restoration of salmon habitat. This would be an appropriate subject to include in any future analysis of the existing policy and regulatory framework for the urban development sector.

8. Support efforts to increase the flood storage capacity of lowland areas. For example, the Stillaguamish River Comprehensive Flood Hazard Management Plan (Snohomish County 2003) identifies site-specific opportunities to increase flood storage capacity and flood conveyance on public land (e.g., Snohomish County parks).

9. Conduct similar analyses of the agricultural and urban sectors to broaden the understanding of all stakeholders about how other major land use sectors are contributing to local salmon recovery.

10. Policy and regulatory measures can only accomplish so much. Other cooperative ventures should be found that will provide incentives for solving specific short-term watershed and salmon habitat problems attributed to past forest practices and other land uses.
Appendix A: Detailed Policies and Regulations

The following is a more detailed presentation of the existing policies and regulations as they relate to timber harvesting in riparian zones, timber harvesting on steep and unstable slopes, and forest road construction and use.

A-1 Timber Harvesting In Riparian Zones
The existing policy and regulatory framework limits timber harvesting in riparian zones on each of the three major types of forestland through a complex system of riparian buffers. The different types of riparian buffer zones for private, state, and federal forestland are described below.

A-1.1 Washington Forest Practices Rules

Policy
“The goal of riparian rules is to protect aquatic resources and related habitat to achieve restoration of high levels of riparian function and maintenance of these levels once achieved. The riparian functions include bank stability, the recruitment of woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features that are important to both riparian forest and aquatic system conditions” (WAC 222-30-010 (2)).

Regulations

- Riparian Management Zones (RMZ) are required for Type 1, 2, and 3 waters (i.e., fish-bearing streams) (WAC 222-30-021 (1)). RMZ widths for fish-bearing streams are composed of a core zone, inner zone, and outer zone. The total RMZ width on each side of a stream, measured from the bankfull width or the edge of the channel migration zone, is determined by site class as follows:
  a. Site Class 1: RMZ = 200 feet
  b. Site Class 2: RMZ = 170 feet
  c. Site Class 3: RMZ = 140 feet
  d. Site Class 4: RMZ = 110 feet
  e. Site Class 5: RMZ = 90 feet

- Timber harvest is not allowed in the core zone (50 feet from stream). Timber harvest may be permitted in the inner and outer zones if the harvest can preserve the “stand requirement.” Stand requirement means the number of trees per acre, the basal area, and the proportion of conifer in the combined inner zone and adjacent core zone so that the growth of the trees would meet site class basal area targets when the stand is 140 years old (WAC 222-30-021 (1)).

- Various other RMZ regulations apply to Type 4 and 5 waters (i.e., nonfish-bearing, perennial and seasonal streams). These include 30-foot equipment exclusion zones for Type 4 and 5 waters, 50-foot no-harvest buffer zones for at least 50% of the length of Type 4 waters, and no-harvest buffer zones for various kinds of sensitive sites, such as perennial seeps, springs,

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11 Site class is a generalized measure of the tree-growing capability of a given site based on local soil conditions over a 100-year period. For the complete definition of “site class” see WAC 222-16-18.
unstable inner gorge slopes, alluvial fans, and perennial stream intersections (WAC 222-30-021 (2)).

- Small forest landowners are exempt from the RMZ regulations described above (i.e., WAC 222-30-021). Small forest landowners are defined as forest landowners who own less than 80 acres total ownership in the state and 20 acres or less in a single contiguous parcel. For those who qualify for the small forest landowner exemption the minimum RMZ width is 29 feet for Type 1, 2, and 3 waters. Within this RMZ, timber harvest may be allowed, but some trees must be retained. The number, size, species, and ratio of leave trees, deciduous to conifer, is specified by the stream bed material and average width of the water type within the harvest unit (WAC 222-30-023).

- Stream bank integrity is expressly protected as follows: Within the RMZ of Type 1, 2, and 3 streams operators must avoid disturbing brush, stumps, and root systems and any logs. Trees that have large root systems embedded in the stream bank may not be harvested (WAC 222-30-030).

- Minimum shade requirements for Type 1, 2, and 3 streams must also be met to maintain water temperature. No tree may be harvested from the RMZ inner zone if the shade provided by the tree to the stream is necessary to maintain compliance with temperature standards. Within the bull trout overlay, all available shade is retained within 75 feet of the stream (WAC 222-30-040).

- The Forest Practices Rules also protect riparian areas from tree falling, bucking, yarding, and skidding operations (WAC 222-30-050, -060, and -070).

A-1.2 DNR Habitat Conservation Plan

Policy
The Department of Natural Resources HCP riparian conservation strategy, which applies to the Stillaguamish watershed, includes two conservation objectives:

1. to maintain or restore salmonid freshwater habitat on DNR-managed lands, and
2. to contribute to the conservation of other aquatic and riparian obligate species.

Conservation objective (1) requires maintaining or restoring the riparian ecosystem processes that determine salmon habitat quality...[and minimize] adverse effects of upland management activities (DNR 1997b, 55-56).

Regulations
- Riparian Buffers are defined as follows:
  - For Type 1, 2, and 3 waters, the buffer width on each side of the stream is equal to or greater than the average height that an adjoining conifer stand would be expected to reach at 100 years of age or 100 feet, whichever is greater.
  - For Type 4 waters, the riparian buffer is 100 feet.
  - Additional wind buffers may be required on one or both sides of a stream depending on risk of windthrow and stream width. For streams greater than 5 feet wide, the wind buffer is 100 feet for Type 1 and 2 waters and 50 feet for Type 3. For streams less than 5 feet wide, no wind buffer is required.
Under the HCP there are no stream buffer requirements for Type 5 streams, but the Department of Natural Resources must comply with the Washington Forest Practices Rules, as described above.

A-1.3 Northwest Forest Plan

Policy
The Northwest Forest Plan does not provide a single concise policy statement regarding riparian zones, but many of the objectives of the Aquatic Conservation Strategy relate to riparian zone protection.

Regulations

- Riparian Reserve width on each side of a stream varies as follows (USFS and BLM 1994a, C-30):
  a. Fish-bearing streams: the area on each side of the stream equal to the height of two site-potential trees (SPT), or 300 feet slope distance, whichever is greater.
  b. Permanently flowing nonfish-bearing streams: one SPT or 150 feet, whichever is greater.
  c. Seasonally flowing or intermittent streams: one SPT or 100 feet, whichever is greater.

- Timber harvest is prohibited in Riparian Reserves except for silvicultural practices aimed at creating vegetation characteristics needed to attain Aquatic Conservation Strategy objectives (USFS and BLM 1994a, C-31).

A-2 Timber Harvesting On Steep or Unstable Slopes

The existing policy and regulatory framework limits timber harvesting on steep or unstable slopes on private, state, and federal forestlands. Timber harvest regulations are defined in a variety of ways to protect unstable slopes and hydrologic functions.

A-2.1 Washington Forest Practices Rules

Policy
There are no explicit policy statements in the Forest Practices Rules regarding limitations on timber harvesting on steep or unstable slopes. However, the watershed analysis provisions of the Forest Practices Rules are intended to assess the effects of multiple forest practices on fish, water, and publicly owned capital improvements (WAC 222-22-010).

Regulations

- Any forest practices conducted on potentially unstable slopes or landforms are considered Class IV - Special and require a State Environmental Policy Act (SEPA) checklist (WAC 222-16-050).12

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12 Under the Washington Forest Practices Act there are four classes of forest practices, all of which must be conducted in accordance with the forest practices regulations. Certain forest practices are considered “Class IV – special” because they have potential for significant impact on the environment. For a complete definition of the different classes of forest practices see WAC 222-16-050.
• No timber harvest is permitted within 50’ of the outer perimeter of soil zones perennially saturated from headwall or side slope seeps (see WAC 222-30-021(2)).

• Even-aged harvest of a single area greater than 120 acres and less than or equal to 240 acres and owned or controlled by one landowner must be reviewed by an interdisciplinary team, if the Department of Natural Resources determines that review is necessary (WAC 222-30-025(1)). Even-aged harvest of a single area greater than 240 acres is prohibited (WAC 222-30-025(2)). This applies to all private and state forestland.

• Additional regulations are intended to minimize the impact on steep or unstable slopes from tree falling, bucking, yarding, and skidding operations (WAC 222-30-050, -060, and -070).

A-2.2 DNR Habitat Conservation Plan

Policy
As mentioned above for timber harvesting in riparian zones, the Department of Natural Resources HCP riparian conservation strategy seeks to “…[minimize] adverse effects of upland management activities” (DNR 1997b, 55-56). This conservation objective also provides the policy basis for regulation of timber harvesting on steep or unstable slopes on DNR-managed forestland under the HCP.

Regulations
• Unstable hillslopes will be identified through field reconnaissance or identified with slope geomorphology models and verified through field reconnaissance with qualified staff (DNR 1997b, IV.62). Harvest in these areas and other areas identified as having a high risk of mass wasting will be deferred until it can be demonstrated that such activity can be accomplished without increasing the frequency or severity of slope failure (DNR 1997b, IV.78).

• Two-thirds of DNR-managed forestland in drainage basins in the significant rain-on-snow zone shall be maintained in forest that is hydrologically mature. Hydrologically mature is defined as a well-stocked conifer stand that is at least 25 years old. This hydrologic maturity prescription is applied to basins that are 1,000 acres or larger (DNR 1997b, IV.68). DNR-managed forestland in a basin need not conform to the basin hydrologic maturity prescription when:
  ▪ less than one-third of the basin is in the significant rain-on-snow zone; or
  ▪ at least two-thirds of the basin is in the significant rain-on-snow zone covered by hydrologically mature forests, and there is a reasonable assurance that it will remain in that condition; or
  ▪ less than one-half of the basin is in the significant rain-on-snow zone under DNR management, and there is no reasonable assurance that other landowners will contribute hydrologically mature forests.

• The hydrologic maturity prescription may also be replaced by locally specific prescriptions developed using the Hydrologic Change Module of the state watershed analysis process (DNR 1997b, IV.69).
A-2.3 Northwest Forest Plan

Policy
Instead of a single concise policy statement on timber harvesting on steep or unstable slopes, the Northwest Forest Plan provides timber harvesting standards and guidelines for each type of land allocation. The most pertinent of these are presented below.13

Regulations
- Watershed analysis is required in Key Watersheds and all roadless areas prior to resource management (USFS and BLM 1994a, C-3).

- Timber harvest is not allowed in Late-Successional Reserve (LSR) stands over 80 years old. Thinning may occur in LSR stands that are up to 80 years old regardless of origin of stands, but only for the purpose of creating and maintaining late-successional forest conditions (USFS and BLM 1994a, C-12).

- In Matrix Areas of the Mt. Baker-Snoqualmie National Forest, site-specific prescriptions should be developed to maintain biological diversity and ecosystem function, including retention of green trees (singly and in patches). Green-tree retention patches should be at least 2.5 acres (USFS and BLM 1994a, C-41).

A-3 Forest Road Construction and Use
Existing forestry policies and regulations for private, state, and federal forestlands address the potential impacts of forest roads on salmon habitat in a variety of ways. Forest road policies and regulations that contribute most directly to protecting and restoring salmon habitat are presented below.

A-3.1 Washington Forest Practices Rules

Policy
“To protect water quality, and riparian aquatic habitat, roads must be constructed and maintained in a manner that will prevent potential or actual damage to public resources. Forest roads should be constructed and maintained as to not result in the delivery of sediment and surface water to any typed water in amounts, at times, or by means, that preclude achieving desired fish habitat and water quality, including restoring and maintaining passage for fish in all life stages. This includes retaining streams in their natural drainages and routing subsurface flow captured by roads and road ditches back onto the forest floor” (WAC 222-24-010 (1)).

Regulations
- Forest Practices Rules include various standards and specifications for the location, design, construction, and maintenance of permanent and temporary forest roads, landings, water crossing structures, and drainage structures (WAC 222-24-020, -026, -030, -035, -040, -052).

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13 The Land and Resource Management Plan (LRMP) for the Mount Baker-Snoqualmie National Forest also includes standards and guidelines pertaining to soil resources. Areas classified as irreversible soils (S-8) are generally considered unavailable for road construction and timber harvest. Resource management may be allowed with additional restrictions depending on the degree of soil stability.
• Installation, maintenance and removal of water crossing structures in or across the bankfull
width of Type 1, 2, or 3 waters are subject to hydraulic code rules, WAC 220-110, and
require hydraulic project approval (HPA) issued by the Washington Department of Fish and
Wildlife (WAC 222-24-040 (1)).

• Landowners must meet road maintenance requirements by July 1, 2016 (WAC 222-24-050).

• All forest roads must be covered under a road maintenance and abandonment plan (RMAP)
within 5 years of the effective date of this rule or 2005 (WAC 222-24-051).

• Road maintenance and abandonment plans must pay particular attention to roads that deliver
sediment to typed water or block fish passage, roads or ditchlines that intercept groundwater,
and roads that deliver surface water to any typed waters (WAC 222-24-051(4)).

• Priorities must be given to maintenance work that removes blockages to fish passage, limits
sediment delivery/mass wasting, disconnects road drainage from typed waters, improves
hydrologic connectivity (WAC 222-24-051(6)).

• Each year on the anniversary date of the plan’s submittal, landowners must report work
accomplishments for the previous year and submit modifications to the Department of
Natural Resources (WAC 222-24-051(8)).

• The Department of Natural Resources will facilitate an annual water resources inventory area
(WRIA) meeting with landowners, the Washington Department of Fish and Wildlife, the
Department of Ecology, affected tribes, the National Marine Fisheries Service, the U.S. Fish
and Wildlife Service, affected counties, local U.S. Forest Service, watershed councils, and
other interested parties. The purpose of the meeting is to suggest priorities for road
maintenance and abandonment planning and exchange information on road maintenance and
stream restoration projects (WAC 222-24-051 (9)).

• Any forest practices conducted on potentially unstable slopes or landforms are considered
Class IV – special and require a SEPA checklist (WAC 222-16-050).

A-3.2 DNR Habitat Conservation Plan
Policy
The objectives of the Department of Natural Resources current road management program are to:
(1) minimize further road related degradation of riparian, aquatic, and identified species habitat;
(2) plan, design, construct, use, and maintain a road system that serves DNR’s management
needs; and
(3) remove unnecessary road segments from the road net (DNR 1997b, IV.64).

Regulations
• Road design, construction, use, and maintenance standards for state forestland meet or
exceed the Washington Forest Practices Rules (DNR 1997b, IV.64).
Efforts to reduce mass wasting and surface erosion on state forestland focus on abandoning or improving problem roads and on implementing improved road design, construction, use, and maintenance BMPs for new and existing roads (DNR 1997b, IV.65).

**A-3.3 Northwest Forest Plan**

**Policy**

Instead of a single concise policy statement on forest roads, the Northwest Forest Plan provides road management standards and guidelines for each type of land allocation. The most pertinent of these are presented below.

**Regulations**

- In addition to the standards and guidelines presented below, the Forest Service and Washington State have entered an agreement that ensures that the Forest Service will manage its roads to meet the standards adopted in the Washington Forest Practices Rules.

- No new roads will be built in unroaded portions of inventoried roadless areas or in Key Watersheds. Outside roadless areas, existing system and non-system road mileage will be reduced or, if funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds (USFS and BLM 1994a, C-7).

- Road construction in Late-Successional Reserves is not recommended unless potential benefits exceed the costs of habitat impairment. If new roads are necessary to implement an allowed practice, they will be kept to a minimum, be routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts (USFS and BLM 1994a, C-16).

- Each existing or planned road should meet Aquatic Conservation Strategy objectives by:
  - a. minimizing road and landing locations;
  - b. completing watershed analysis prior to construction of new roads in Riparian Reserves;
  - c. preparing road design criteria, elements, and standards criteria;
  - d. preparing operation and maintenance criteria that govern road operation, maintenance, and management;
  - e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
  - f. restricting sidecasting as necessary; and
  - g. avoiding wetlands entirely (USFS and BLM 1994a, C-32).

- The influence of each road on the Aquatic Conservation Strategy objectives is determined through watershed analysis. Objectives of the Aquatic Conservation Strategy are met by:
  - a. reconstructing roads and associated drainage features that pose a substantial risk.
  - b. prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.
  - c. closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs (USFS and BLM 1994a, C-32).
• New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate 100-year flood, including associated bedload and debris. (USFS and BLM 1994a, C-33).

• Sediment delivery to streams from roads shall be minimized by outsloping road surface and routing drainage away from potentially unstable channels, fills, and hillslopes (USFS and BLM 1994a, C-33).

• Fish passage shall be provided and maintained at all road crossings of existing and potential fish bearing streams (USFS and BLM 1994a, C-33).

• Road Management Plans or Transportation Management Plans shall be developed and implemented to include inspections and maintenance during and after storm events, road operation and maintenance, traffic regulation during wet periods, and to establish a purpose for each road (USFS and BLM 1994a, C-33).
Appendix B: Maps

Map 1. Forestland management in the Stillaguamish watershed.
Map 2. Salmon recovery subbasins in the Stillaguamish watershed.
Map 3. State and federal land allocations in the Stillaguamish watershed.
Map 4. State and federal watershed analyses completed in the Stillaguamish watershed.
Glossary

Adaptive management – A continuing process of action-based planning, monitoring, researching, evaluating, and adjusting with the objective of improving implementation and achieving the goals of the selected alternative (USFS and BLM 1994b).

Adaptive Management Area (AMA) – Landscape unit designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives (USFS and BLM 1994b).

Age-class – A management classification using the age of a stand of trees (USFS and BLM 1994b).

Age-class distribution – The area in each age class of trees across a forest, watershed, stands or any together area of consideration (USFS and BLM 1994b).

Anadromous fish – Fish that are born and rear in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples (USFS and BLM 1994b).

Bedload sediment – That part of a stream’s total sediment load moved along the bottom by running water, in contrast to suspended sediment which is carried in the water column (Murphy 1995).

Best management practices (BMP) – Methods, measures, or practices designed to prevent or reduce water pollution (Murphy 1995).

Buffer zone – An administratively defined area established along a stream, lake, wetland, or erosion hazard to provide protection of aquatic resources during land-use activities (Murphy 1995).


Cumulative effects – Effects that result incrementally and collectively from the combined effects of separate management activities through time and space (Murphy 1995).

Ecosystem management – The use of an ecological approach in land management to sustain diverse, healthy, and productive ecosystems. Ecosystem management is applied at various scales to blend long-term societal and environmental values in a dynamic manner that may be adapted as more knowledge is gained through research and experience (USFS and BLM 1994b).
Effectiveness monitoring – Sampling of soil erosion, streams, and other features to determine whether properly implemented Best Management Practices are effective in meeting their intent (Murphy 1995).

Endangered species – A federal and state designation. A species determined to be in danger of extinction throughout all or a significant portion of its range (DNR 1997b).

Endangered Species Act (ESA) – The federal Endangered Species Act of 1973, as amended, sets up processes by which plant or animal species can be designated as threatened or endangered. Two federal agencies, the U.S. Fish and Wildlife Service and the National marine Fisheries Service, administer the act. Once species are listed, the act also provides that these agencies develop recovery plans for these species, including conserving the ecosystems on which listed species depend (DNR 1997b).

Fish-bearing streams – Any stream containing any species of fish for any period of time (USFS and BLM 1994a).

Forest land – All land which is capable of supporting a merchantable stand of timber and is not being actively used for a use which is incompatible with timber growing (WAC 222-16).

Forest practices – The full range of forest management activities employed in silviculture and harvest of timber (Murphy 1995).

Forest Practices Board (FPB) – The Washington State board created to write forest practices rules which are administered and enforced by the Washington Department of Natural Resources (DNR 1997b).

Forest Practices Rules (FPR) – The Washington State statute establishing minimum standards for forest practices and providing for necessary administrative procedures and rules applicable to activities conducted on or pertaining to forests on both state-managed and private lands (DNR 1997b).

Green tree retention – A [forest] stand management practice in which live trees as well as snags and large down wood are left as biological legacies within harvest units to provide habitat components over the next management cycle (USFS and BLM 1994a).

Habitat Conservation Plan (HCP) – An implementable program for the long-term protection and benefit of a species in a defined area; required as part of a Section 10 incidental take permit application under the federal Endangered Species Act (DNR 1997b).

Implementation monitoring – Sampling of management activities to determine whether practices are adequately applied as specified (Murphy 1995).

Intermittent stream – Any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometime referred to as ephemeral streams if they meet these two criteria (USFS and BLM 1994b).
**Key Watershed** – As defined by National Forest and Bureau of Land Management District fish biologists, a watershed containing (1) habitat for potentially threatened species or stocks of anadromous salmonids or other potentially threatened fish, or (2) greater than 6 square miles with high-quality water and fish habitat (USFS and BLM 1994b).

**Large woody debris (LWD)** – Large pieces of wood in stream channels or on the ground – includes logs, pieces of logs, and large chunks of wood; provides streambed stability and/or habitat complexity. Also called coarse woody debris or down woody debris (DNR 1997b).

**Late Successional Reserve (LSR)** – A forest in its mature and/or old-growth stages that has been reserved under… [the Northwest Forest Plan] (USFS and BLM 1994b).

**LS/OG Forest** – Late-successional and/or old-growth. Forests or stands consisting of trees and structural attributes and supporting biological communities and processes associated with old-growth and/or mature forests (USFS and BLM 1994b).

**Matrix** – Federal lands outside of reserves, withdrawn areas, and Managed Late-Successional areas (USFS and BLM 1994b).

**Monitoring** – The process of collecting information to evaluate whether anticipated or assumed results of a management plan are being realized or whether implementation is proceeding as planned (Murphy 1995).

**Nesting, roosting, foraging habitat (NRF)** – Habitat with the forest structure, sufficient area, and adequate food source to meet the needs of a nesting pair of northern spotted owls. The forest structure consists of stands at least 70 years old that include a three-layer canopy of very large diameter trees (200+ years old) from the previous stand, large diameter trees (70+ years old), and small understory trees, along with snags and large down woody debris (DNR 1997b).

**Northern spotted owl** – A medium-size dark brown owl that has round to elliptical white spots on the head, white mottling on the body and abdomen, and white bars on the tail; native to the Pacific coastal region. Federally listed as a threatened species, and listed as endangered by Washington State (DNR 1997b).

**Perennial stream** – A stream with flowing water all year long (Murphy 1995).

**Rain-on-snow zone** – Area, generally defined as an elevation zone, where it is common for snowpacks to be partially or completely melted during rainstorms several times during the winter (DNR 1997b).

**Recovery plan** – A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act, to improve the status of the species to justify delisting in accordance with the Endangered Species Act (USFS and BLM 1994b).
**Revised Code of Washington (RCW)** – A revised, consolidated, and codified form and arrangement of all the laws of the state of a general and permanent nature (DNR 1997b).

**Riparian area** – Area between a stream or other body of water and the adjacent uplands (Murphy 1995).

**Riparian Reserve** – Designated riparian area found outside Late-Successional Reserves (USFS and BLM 1994b).

**Salmonids** – Fish species belonging to the family Salmonidae, including trout, salmon, char, and whitefish species (DNR 1997b).

**Site index** – A measure of forest productivity expressed as the height of the dominant trees in a stand at an index age (DNR 1997b).

**Site potential tree height (SPT)** – The height a dominant tree may attain, given site conditions where it occurs (DNR 1997b).

**Standards and guidelines** – The rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved and maintained (USFS and BLM 1994a).

**State Environmental Policy Act (SEPA)** – This law is the basic state charter for protection of the environment. SEPA requires all state agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agency’s decision-making process; and to consider the environmental impacts in the agency’s decision-making process (DNR 1997b).

**Take** – A prohibited action under federal law, except where authorized. To harass, harm, pursue, hunt, wound, kill, trap, capture, or collect a federally listed threatened or endangered species, or to attempt to do so (ESA, Section 3[19]). Take may include disturbance of the listed species, nest, or habitat, when disturbance is extensive enough to disrupt normal behavioral patterns for the species, although the affected individuals may not actually die. See also “Harm” and “Incidental take” (DNR 1997b).

**Threatened and endangered species** – Formal classifications of species. Federal designations are made by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. State of Washington designations are made by the Washington Fish and Wildlife Commission (RCW 77.08.010).

**Threatened species** – A federal and state designation as defined in the Endangered Species Act for species likely to become an endangered species throughout all or a significant portion of their range within the foreseeable future (DNR 1997b).
Washington Administrative Code (WAC) – All current, permanent rules of each state agency, adopted pursuant to chapter 34.05 RCW (DNR 1997b).


Water resource inventory area (WRIA) – Watershed-based planning unit, defined by the Washington State Department of Ecology. WRIAs are determined by drainages to common water bodies (DNR 1997b).

Water typing system – A simplified explanation of Washington’s classification of water types appears here (DNR 1997b). For the complete classification system, see WAC 222-16-030.

Type 1: All waters, within the ordinary high-water mark, as inventoried as “shorelines of the state.”

Type 2: Segments of natural waters which are not Type 1 and have a high fish, wildlife, or human use. These are segments of natural waters and periodically inundated areas of their associated wetlands.

Type 3: Segments of natural waters which are not Type 1 or 2 and have a moderate to slight fish, wildlife, and human use. These are segments of natural waters and periodically inundated areas of their associated wetlands.

Type 4: Segments of natural waters which are not Type 1, 2, or 3, and for the purpose of protecting water quality downstream are classified as Type 4 water upstream until the channel width becomes less than 2 feet in width between the ordinary high-water marks. These may be perennial or intermittent.

Type 5: Natural waters which are not Type 1, 2, 3, or 4; including streams with or without well-defined channels, areas of perennial or intermittent seepage, ponds, natural sinks and drainage ways having short periods of spring or storm runoff.

Watershed – The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake (DNR 1997b).

Watershed administrative unit (WAU) – In Washington, the basic hydrologic unit for watershed analysis (DNR 1997b). See WAC 222-22-020 for more information.

Watershed analysis – A systematic procedure for characterizing watershed and ecological processes to meet specific management objectives; provides a basis for resource management planning. In Washington, the assessment of a watershed administrative unit completed under state law (DNR 1997b).
References


USFS and BLM (USDA Forest Service and USDI Bureau of Land Management). 1994b. Final Supplemental Impact Statement on Management of Habitat for Late-Successional and Old-
Growth Forest Related Species Within the Range of the Northern Spotted Owl, Volume I – Appendices. February 1994. Portland, OR.
