

5.0 Comparative Analysis of Impacts of the Proposed NFHCP and Alternatives

5.1 Introduction

This chapter summarizes and compares potential impacts from the No Action Alternative, Plum Creek Timber Company’s (Plum Creek’s) Native Fish Habitat Conservation Plan (NFHCP), the Internal Bull Trout Conservation Plan Alternative, and the Simplified Prescriptions Alternative. In Section 5.2.5, *Fisheries and Aquatic Resources*, this chapter also examines the effects of alternatives on the idea of **fully functioning habitat**, to compare how the alternatives would likely benefit fish habitat relative to a common reference. Detailed information regarding impacts of the proposed NFHCP and other alternatives is presented in Chapter 4, *Affected Environment and Environmental Consequences*. The impacts summarized in this chapter are the beneficial or adverse changes projected to occur from baseline conditions. Information on baseline conditions, also referred to as the environmental benchmark, is presented under *Affected Environment* in each resource section of Chapter 4.

Section 5.2 describes and compares the potential impacts of the proposed NFHCP and the other alternatives by each resource topic. Section 5.3 summarizes and compares the overall suitability of the proposed NFHCP and alternatives for benefiting the Permit species included in the NFHCP and for meeting project purpose and need.

What is the Purpose of this Chapter?

This chapter summarizes and compares the projected effects of implementing each of the alternatives. Based on the analysis presented in Chapter 4 and summarized in this chapter, the proposed NFHCP, followed by the Simplified Prescriptions Alternative, would be most beneficial to native salmonid habitat. The reasons for this conclusion are described in this chapter under the various resource categories addressed in this Environmental Impact Statement (EIS).

5.2 Comparison of Impacts

5.2.1 Geology and Soils

Current rates of sediment delivery to streams and soil productivity losses from erosion are lower than historical rates (that is, rates during the past 50 years) in the Project and Planning Areas, and are expected to continue to decline as a result of implementation of state forest practice regulations. Adverse effects from sediment delivery and lost soil productivity would continue to decline with the implementation of any of the alternatives. Sediment reductions would be greatest for those alternatives with the most extensive and rigorous sediment-reduction prescriptions, such as those for road and upland, riparian, and range management, and for those alternatives containing provisions for changed circumstances and adaptive management commitments. As a point of reference, the No Action Alternative would generally be comparable to existing conditions extended over the 30-year planning period, which is the proposed

duration of the Incidental Take Permit (Permit). Therefore, the present trend of declining sediment delivery would continue under the No Action Alternative. According to modeling efforts developed for this project, estimated sediment delivery to all Project Area streams from existing and new roads during the 30-year planning period would total 546,000 tons under the No Action Alternative. Compared to the No Action Alternative, sediment delivered from roads over the same period would be reduced by an estimated 178,000 tons (33 percent) under the NFHCP, 73,000 tons (13 percent) under the Simplified Prescriptions Alternative, and 47,000 tons (8 percent) under the Internal Bull Trout Conservation Plan Alternative.

5.2.2 Water Resources and Hydrology

Reduction of impacts on water resources and hydrology in the Project Area would be greatest under the NFHCP and the Simplified Prescriptions Alternative, less under the Internal Conservation Plan Alternative, and least under the No Action Alternative. Water resources and hydrology under the No Action Alternative would generally be similar to existing conditions. Changes in flow regimes under all of the alternatives would be small. Relatively fewer benefits would result under the Internal Conservation Plan Alternative because fewer prescriptions would be associated with road and upland management, riparian harvest, range management, irrigation diversions, and changed circumstances. There would be no determinable adverse cumulative impacts on water resources and hydrology in the Planning Area under any of the alternatives. The moderating effects of the more rigorous prescriptions on unnatural

stream flow spikes during precipitation events may slightly benefit downstream drainages in the Planning Area.

5.2.3 Water Quality and Contaminants

All of the alternatives are expected to result in improved water quality in the Project and Planning Areas during the next 30 years. Under the No Action Alternative of federal, state, and local existing regulations, water quality in the Project Area would slowly improve as sediment delivery to streams is reduced, riparian conditions are improved and maintained, and instream habitats are improved. Benefits to water quality in the Project Area would be more substantive and immediate under the proposed NFHCP and the other two action alternatives than under the No Action Alternative. This is primarily because of the timing and long-term benefits from road and upland management, riparian management, range management, and land use planning prescriptions that would be implemented. These prescriptions would reduce sediment delivery to streams (reduced most under the NFHCP) over large geographical areas and move towards re-establishing properly functioning riparian systems and ecological processes that contribute to improved water quality through large woody debris (LWD) and nutrient inputs, stream shading, and bank stability.

Riparian forest canopy cover would increase slightly under all alternatives with the greatest increase under the Simplified Prescriptions Alternative. Average water temperature would decline about 2°F under the Simplified Prescriptions Alternative and about 1°F under the NFHCP because of increased canopy cover and shade along streams. This average

reduction in water temperature would vary across the Project Area, depending on site-specific factors such as rate of increase in canopy closure, stream elevation, stream aspect, and groundwater influence.

If such levels of temperature reduction are not adequate to conserve Permit species within a portion of the Project Area, riparian management commitments would be adapted under the NFHCP to achieve adequate conservation. Based on the riparian conservation commitments under the proposed NFHCP and Simplified Prescriptions Alternative and resultant effects on sediment delivery, nutrient loading, and water temperature, overall water quality benefits would be greater under these two alternatives than under the Internal Conservation Plan Alternative or the No Action Alternative. Water quality in downstream drainages within the Planning Area may improve as a result of Project Area benefits, particularly under the proposed NFHCP, but also under the other action alternatives.

5.2.4 Vegetation Resources

None of the alternatives would alter the kinds of plant communities or their extent, the diversity of vegetation, or the viability of federally-protected or special status plant species. The representation of various forest structural types would be similar for all alternatives, with the greatest shifts being away from unstocked and young dense forest toward forest with intermediate-size trees and forest with less dense large trees. Vegetation structures and patterns within the Project Area would be more diverse under the action alternatives, with some differences such as more large tree retention in riparian zones under the Simplified Prescriptions Alternative, and more habitat structures retained in Interface Caution Areas outside riparian

management zones under the proposed NFHCP. The amount of recovery and development of riparian plant communities damaged by livestock grazing would be most rapid under the Simplified Prescriptions Alternative, intermediate under the other two action alternatives, and relatively unchanged under the No Action Alternative. Riparian forest canopy cover would increase slightly under all alternatives with the greatest increase under the Simplified Prescriptions Alternative, followed by the NFHCP.

Vegetation changes would cause the amount of LWD provided to fish-bearing streams to increase under all alternatives, but be greatest under Simplified Prescriptions, intermediate under the other two action alternatives, and least under the No Action Alternative. Improvements in LWD recruitment to non-fish-bearing streams would follow a similar pattern, but differences among alternatives would not be as great.

5.2.5 Fisheries and Aquatic Resources

Overall, a strong positive trend of improving habitat conditions beneficial to bull trout, other listed and unlisted Permit species, and other aquatic resources would be expected over the proposed 30-year Permit period under the NFHCP. Combined with robust research, monitoring, and adaptive management programs, the NFHCP would be the most overall beneficial alternative to Permit species and their habitat. The Simplified Prescriptions Alternative would provide less risk of impacts to Permit species up front because of more robust riparian set-asides under that alternative. However, sediment reduction benefits would be slightly less under the Simplified Prescriptions

Alternative than under the proposed NFHCP, and the ability to monitor and adapt management would be reduced as well. In addition to commitments in the proposed NFHCP and Simplified Prescriptions Alternative, the risk of impacts to Permit species habitat from management of adjacent federal lands (which comprise the majority of the Planning Area) is likely less than for private lands, given current management trends. Also, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (used together, the Services) could reduce any future potential fish habitat impacts on federal lands through future consultations under the Endangered Species Act (ESA), helping ensure complementary conservation measures are implemented to achieve adequate conservation of Permit species throughout watersheds and across ownerships.

Why Talk About Fully Functioning Habitat?

The concept of **fully functioning habitat** is used to represent conditions thought to be similar to what may have existed prior to historic human impacts on Permit species. The fully functioning habitat concept provides a common basis for describing how well each alternative achieves the Four C's and benefits fish. This concept was not a conservation goal or requirement in the development of the HCP, but is an indicator of how the alternatives relate to fish, how well the alternatives relate to one another, and which alternatives would potentially benefit fish most.

The magnitude of improvements in habitat components represented by the Four C's (Clean, Cold, Complex, and Connected water and habitat) and resultant benefits to native salmonids are discussed below.

Clean Water

Water and substrate of Project Area streams would be cleanest under the NFHCP, primarily because of reduced sediment delivery from forest roads compared to the other three alternatives.

Both the proposed NFHCP and Simplified Prescriptions Alternative would provide for the most rapid recovery of clean habitat, impacted by sediment delivery from past and current road management in the Project Area, of the four alternatives. The more aggressive road upgrading commitments in these two alternatives would result in the most rapid reduction in sediment delivery to streams, and movement towards fully functioning habitat conditions for Permit species. Under the proposed NFHCP, sediment delivery from roads would be reduced the most, by approximately 50 percent.

Implementation of the NFHCP is projected to result in a net sediment delivery reduction of about 50 percent across the Project Area by the end of the proposed 30-year Permit period. This amount of sediment reduction would reduce threats to Permit species, and to move towards fully functioning habitat conditions, in many, but not all, watersheds in the Project Area. It is not certain whether the net reduction would be adequate to provide clean habitat in Planning Area basins where existing management-related sediment loads are already considerably higher than natural background levels. Without site-specific analyses for all watersheds in the Project Area, the Services and Plum Creek cannot

ensure adequate conservation would be achieved in all cases. Therefore, the proposed NFHCP, and to a lesser extent, the Simplified Prescriptions Alternative, allows for monitoring and adaptive management across the Planning Area to determine when and where conservation measures are adequate, or not, to conserve Permit species.

The projected reduction in sediment delivery to streams in the Project Area under the NFHCP would move more quickly towards fully functioning habitat conditions for Permit species than any other alternative, and provides for adaptive management for future adjustments in conservation measures. Also, the NFHCP would significantly reduce the amount of sediment delivered over background levels in the Project Area. According to sediment budgets produced by Plum Creek, of 11 watersheds analyzed in the Planning Area, sediment delivery would be reduced from 137 percent above background before NFHCP implementation, to 77 percent above background after implementation of NFHCP commitments.

Cold Water

Reductions in average stream temperature because of increased riparian canopy cover would be slightly greater (about 1°F) under the Simplified Prescriptions Alternative than under the NFHCP or other alternatives after 30 years.

Overall, riparian canopy closure would be higher at the end of the Permit period than current conditions under all of the alternatives. The potential water temperature effects from changes in cover resulting from riparian harvest prescriptions would be similar for all alternatives, with an expected average reduction of about 1°F. Temperature reduction would approach

2°F under the Simplified Prescriptions Alternative. The lack of wide variation in expected temperature reductions among alternatives is because existing regulations preclude riparian harvest in essentially all younger riparian forest stands, which includes most riparian buffer areas in the Project Area. Therefore, the opportunity to move toward a fully functional habitat condition is limited, and similar among the four alternatives because of the current forest conditions in the Project Area of young riparian stands.

Implementation of existing state forest management regulations, coupled with the additional conservation commitments offered by Plum Creek under the NFHCP alternative to protect cold water habitat, would ensure that adequate conservation of Permit species is achieved in many, but probably not all, watersheds in the Project Area. The proposed NFHCP would allow for an increase in stream shading amounting to slightly more than half of the maximum amount of increase that could be achieved under the most risk-averse approach to riparian buffers, as represented in the Simplified Prescriptions Alternative. The Simplified Prescriptions Alternative represents the maximum opportunity to meet the cold water objective.

Complex Habitat

Habitat complexity, as affected by LWD loading, bank stability, channel migration zone integrity, canopy cover, sediment loading, and hydrologic regime, would be most improved under the Simplified Prescriptions Alternative, closely followed by the proposed NFHCP.

The average in-channel LWD load (pieces per 1,000 feet of stream channel) from unmanaged riparian stands (presumed to

be fully functioning), throughout the Planning and Project Areas, is estimated to be 78 pieces. Under the No Action Alternative, cumulative LWD load after 30 years is expected to be approximately 30 to 100 pieces per 1,000 feet of stream. Under the proposed NFHCP, cumulative LWD load after 30 years is expected to be approximately 36 to 166 pieces per 1,000 feet of stream. The NFHCP would provide more LWD over time to stream reaches than the No Action Alternative, especially to reaches used by native salmonids that may be most sensitive to LWD inputs for maintaining fish habitat, and would be closer to the middle of the range of the amount of LWD produced by unmanaged stands.

The amount of LWD provided in the NFHCP broadly spans the average number of pieces in an unmanaged stream and will reduce threats and move towards fully functioning habitat conditions in most cases. However, effects of this alternative would vary among locations. It is possible that actual and potential habitat complexity from LWD could decrease in some portions of the Project Area from reductions in riparian tree density at the time of harvest, and in circumstances where more wood leaves (exported or decomposes) a stream reach than is recruited. In the long-term, LWD levels should increase across most of the Project Area as younger stands mature. Potential increases in complexity would be greatest in Tier 1 streams because more wood would be left standing closer to streams than along Tier 2 streams.

Connected Habitat

Benefits from increased habitat connectivity because of fish passage prescriptions would be greatest under the NFHCP, as would potential reductions in the adverse

effects of non-native salmonids and poaching on native salmonids.

Historically, fully functioning habitat connectivity for Permit species was variable because of natural, random events such as landslides. However, these disruptions in connectivity occurred over time scales large enough, and were infrequent enough across the landscape, that Permit species could recolonize areas that became disconnected for periods of time. As a result of past management impacts, habitat connectivity has been disrupted more frequently and rapidly than what naturally occurred on unmanaged landscapes, resulting in threats to Permit species. Under the proposed NFHCP, Plum Creek would identify and remove human-caused barriers to habitat connectivity (such as at some road stream crossings) at an accelerated rate. Habitat connectivity would be restored as completely as possible for a fully functioning landscape condition under this alternative, and would exceed the rate and degree of connectivity restoration under each of the other three alternatives.

Adaptive Management and Other Factors

For the NFHCP, the Services cannot conclusively determine whether the changes in clean, cold, complex, and connected biological goals resulting from commitments agreed to at the outset of the plan would allow for recovery of all Permit species in all portions of the Project Area. However, the direction of change in habitat improvement toward achieving the biological goals is positive, and the magnitude of the change would be evaluated throughout the Planning Area over time to ensure it is sufficient to move toward fully functioning habitat conditions and adequately conserve Permit species.

In addition, further reductions in impacts on Permit species only associated with the proposed NFHCP would result from implementation of range management, land use planning, legacy and restoration, and administration and implementation commitments. These additional commitments would move conditions more quickly towards fully functioning habitat. The NFHCP also contains changed circumstances commitments that require a site-specific plan in the event a natural catastrophe (large or intense landslide, fire, or flood) occurs that could impact the Permit species.

5.2.6 Wildlife Resources

Potential impacts on wildlife resources primarily include modifications in forest and riparian vegetation structural characteristics as a result of natural and human-induced disturbances, including tree harvesting. These modifications may affect the quantity and quality of wildlife species' habitats. Habitat may increase for some species groups and decrease for others. From a wildlife resources perspective, land management activities under the proposed NFHCP, other two action alternatives, and the No Action Alternative would be similar, resulting in only slightly different proportions of forest structures that provide wildlife habitat. All alternatives focus on the integrity of riparian stand types, but the greatest changes would be under the Simplified Prescriptions Alternative such that there would be fewer riparian stands with intermediate-size trees, and more stands with large-size trees. None of the alternatives would substantively change landscape patterns, although the NFHCP includes conservation measures that would extend across Interface Caution Areas, beyond riparian management zones. All would promote the

connectivity of riparian corridors. In general, primary and secondary forested riparian habitats for most wildlife faunal groups (lifeforms) and special emphasis species would not be significantly or adversely affected under the NFHCP or any alternative. Primary forested riparian habitat would increase for those lifeforms that include frogs and salamanders, waxwings and grosbeaks, herons and eagles, and bats and owls. Primary forested riparian habitat would decrease but secondary riparian habitat would increase for those lifeforms that include ducks and turtles, elk and grouse, warblers and porcupines, sparrows and thrushes, and kingfishers and beavers. Under all alternatives, Plum Creek would avoid take of wildlife species listed under the ESA, but not covered by the Permit. Overall, compared to existing conditions, forested riparian habitat under the NFHCP and other alternatives would be about the same or slightly better for gray wolf and their prey, lynx and their prey, grizzly bear, bald eagle, and northern spotted owl.

5.2.7 Land Use

No existing land uses would be completely precluded under the proposed NFHCP or alternatives. However, some of the proposed conservation commitments could locally restrict the levels of certain existing land uses in the Project Area. Effects of such restrictions would be greatest under the Simplified Prescriptions Alternative (primarily for recreation, grazing, and to a lesser extent timber harvest), followed by the NFHCP and the Internal Conservation Plan Alternative, and least under the No Action Alternative.

The proportion of sales of Project Area lands with assurances of continued fish conservation measures and conservation certainty for Permit species would be

greatest under the NFHCP and would benefit native salmonids that occupy these lands. The proposed NFHCP is the only alternative that serves to meaningfully reduce the risk that overall conservation benefits would be reduced through land ownership transactions; and the subsequent risk that too many lands would be used in a way that negatively impacts Permit species. Under all other alternatives, Plum Creek could transfer title to land in a less restricted manner that would result in greater uncertainty of conservation for Permit species. The risk of land development was identified by the FWS as a significant threat factor in the final rule listing bull trout under the ESA. Under the proposed NFHCP, the geographical scope of conservation commitments would be extended to additional lands from the Planning Area that may be acquired and brought into the NFHCP. At a broad scale, land use types, opportunities, and levels of use in the Planning Area under the proposed NFHCP and alternatives would be about the same as at present.

Under the other three alternatives, no provisions would exist to balance the overall proportion of land with conservation protections; and conservation measures on Project Area lands could decline without offsetting conservation measures being generated on Project Area lands. No alternative ensures that specific land use practices would be provided across the Project Area, and the ultimate value of the commitments to conserving Permit species would be known only through NFHCP implementation (that is, dependent on the type and degree of land transactions), monitoring, and reporting.

5.2.8 Recreation Resources

Benefits associated with the use of, and access to, Project Area recreation

resources would be greatest under the NFHCP, followed by the Internal Conservation Plan Alternative. Recreation benefits under both would exceed existing conditions. Benefits under the No Action Alternative would be similar to existing conditions, while benefits under the Simplified Prescriptions Alternative would be less than at present because of reduced public access. There would be no adverse cumulative impacts on recreation resources, opportunities, or levels of use in the Planning Area under the NFHCP or other alternatives. However, use of recreation resources on public lands adjacent to the Project Area may increase under the Simplified Prescriptions Alternative because of reduced access to Plum Creek lands.

5.2.9 Visual and Aesthetic Resources

Benefits to the quality of visual resources in the Project Area would be minor under the proposed NFHCP and each alternative compared to existing conditions. Benefits would be slightly greater under the NFHCP or Simplified Prescriptions Alternative than under the No Action or Internal Conservation Plan Alternatives. There would be no adverse cumulative impacts on visual resources in the Planning Area under the proposed NFHCP or alternatives. Naturally-appearing forestlands would continue to predominate the landscape, and scenic integrity would continue to range from high to moderately high.

5.2.10 Cultural Resources

The proposed NFHCP and other alternatives would provide for similar regulatory protection of cultural resources, which have a comparatively high probability of

occurrence along perennial streams and rivers. The likelihood of encountering cultural resources would be lowest under the Simplified Prescriptions Alternative because of reduced activity in the riparian corridor, intermediate under the NFHCP and the Internal Conservation Plan Alternative, and highest under the No Action Alternative. The likelihood of encountering cultural resources under the No Action Alternative would be the same as at present. There would be no adverse cumulative impacts on cultural or ethnographic resources in the Project or Planning Areas under the proposed NFHCP and alternatives. The Services have identified a process to comply with the National Historic Preservation Act.

5.2.11 Social Resources

Social resources of timber-dependent communities would probably not benefit or be adversely affected to any substantive degree under the proposed NFHCP or the other alternatives. The NFHCP and Simplified Prescriptions Alternative would each offer better combined benefits of increased environmental protection for native salmonids and long-term community stability through regulatory certainty than would the Internal Conservation Plan Alternative or the No Action Alternative. Under the No Action Alternative, conditions and characteristics of social systems would be about the same as at present. Any adverse cumulative effects on social resources in the Planning Area would be minor, possibly consisting of cycles of socioeconomic transition and feelings of regulatory and economic uncertainty, depending on the alternative.

5.2.12 Economic Resources

Economic resources in the Project Area would be most affected under the Simplified Prescriptions Alternative and the NFHCP. The overall costs of program implementation under either would be high, with individual costs varying depending on the specific conservation category. The NFHCP and Simplified Prescriptions Alternative would both result in greater long-term certainty of economic use of Plum Creek lands while conserving salmonid habitat. However, there may be a slight risk of job loss in rural resource-dependent communities because of reduction in riparian timber harvest and perhaps subsequent declines in economic multiplier effects. Economic resources and systems under the No Action and Internal Conservation Plan Alternatives would be about the same as at present. The trends of increasing costs to address environmental concerns and uncertain economic uses of their lands by Plum Creek would continue under both of these alternatives. Any potential effects on economic resources in the Planning Area under the proposed NFHCP or alternatives would probably be minor given the considerably larger size of the Planning Area relative to the Project Area.

5.2.13 Air Quality

The potential for air quality impacts would be avoided or minimized under the proposed NFHCP and alternatives by complying with federal and state requirements that regulate forest practices. Because of associated management prescriptions, air quality in the Project Area under the NFHCP, Internal Conservation Plan, and Simplified Prescriptions Alternatives would probably be slightly better than under the No Action

Alternative. Air quality under the No Action Alternative would be about the same as at present. There would be no adverse cumulative impacts on air quality in the Planning Area under the proposed NFHCP or alternatives.

5.3 Comparison of the Alternatives

Based on the analyses and comparisons of the resource topics described above, the NFHCP, closely followed by the Simplified Prescriptions Alternative, would be most beneficial to Permit species and their habitat. These two alternatives would contribute substantially to the maintenance or improvement of habitat conditions expressed through the Four C's, which are crucial to the well being of native salmonid populations. The No Action Alternative would be least beneficial to Permit species, with future conditions expected to be only slightly better than at present, and improvements realized relatively slowly. Benefits associated with the Internal Conservation Plan Alternative would exceed those of the No Action Alternative. However, they would be considerably less than benefits associated with the NFHCP or the Simplified Prescriptions Alternative, primarily because many prescriptions of the Internal Conservation Plan Alternative focus on selected Tier 1 watersheds and would not be as extensive or rigorous as for the other action alternatives. See Table 5.3-1 for a comparison of effects of the four alternatives analyzed. The following effects occur under the NFHCP alternative:

- Sediment delivery from roads would be reduced by 49 percent.

- Stream water temperatures would be reduced by 1°F, and canopy cover would increase by 0 to 44 percent across the Project Area.
- LWD input would range from 36 to 166 pieces per 1,000 feet of stream length, spanning the natural average range of 78 pieces of LWD per 1,000 feet of stream length in unmanaged riparian areas.
- Essentially all known fish passage barriers in the Project Area would be removed, provided that removal of the barrier enhances recovery of Permit species (that is, for example, barrier removal may not occur if it would allow incursion of exotic species into habitat occupied by Permit species).

Other benefits to native fish habitat would likely occur under Range, Land Use Planning, Legacy and Restoration, and other commitments, that are not quantified in Table 5.3-1, or accounted for in the summary figures for NFHCP effects reported above.

There are essentially no differences in effects on Permit species from any of the other covered activities among the four alternatives. Other covered activities besides road use and riparian timber harvest include tree planting, site preparation, prescribed burning, timber sale preparation, stand maintenance, gravel quarrying, special use permits, and other similar activities.

Longer Permit terms generally provide greater benefits for Permit species. Long-term risk is low because of the ability to adapt, suspend, or revoke the Permit. Variation of effects of different Permit lengths among the four alternatives is minimal.

TABLE 5.3-1
EIS Alternatives Summary of Effects

	EIS Alternatives			
	No Action	NFHCP	Internal Conservation Plan	Simplified Prescriptions
Clean				
Roads: Net reduction in sediment delivery from baseline conditions.	28%	49%	33%	35%
Grazing: reduction of sediment delivery resulting from trampled stream banks.	none	large	moderate	large
Road abandonment	none	~1,000 miles	~200 miles	~1,950 miles
Cold				
Net increase in canopy cover in timbered riparian stands.	0-33%	0-44%	0-42%	7-47%
Grazing: reduction in "severely impacted" stream reaches through restoration of riparian vegetation.	0%	100%	9%	< 100%
Increase in shrubby and woody canopy cover associated with legacy and restoration work.	none	moderate	some	none
Complex				
Provide large woody debris to streams (pieces per 1,000 feet of stream)	30-73	36-166	33-78	49-181
Restoration of streambank integrity due to grazing measures	none	large	moderate	large
Increase in overhanging banks associated with legacy and restoration projects	none	large	some	none
Connected				
Restore fish passage where restricted by road culverts	some	Essentially all fish passage restored by year 15	some	moderate
Restore fish passage where impacted by diversions	none	Eliminate and minimize impacts from some to most diversions	none	none

Implementation of the proposed NFHCP and Simplified Prescriptions Alternative would provide the greatest likelihood of adequately conserving Permit species among the four alternatives, allowing for recovery of species currently listed under the ESA, and reducing the likelihood of the necessity to list other Permit species. The proposed NFHCP would best achieve the stated, dual purpose and need for this project (see Chapter 1) by reducing threats to Permit species while also allowing Plum Creek to implement viable timber management actions on their lands with reduced uncertainties regarding future ESA-related regulation. The Simplified Prescriptions Alternative would reduce threats to Permit species and the degree of Plum Creek's risk of future regulation, but it would have a greater impact on Plum Creek's ability to manage timber on their lands than the proposed NFHCP, primarily because of the larger riparian buffers and road abandonment program, as well as the reduced opportunity to build roads for management.

The proposed NFHCP would accelerate conservation efforts and move most active conservation to the first decade of the proposed 30-year Permit. This alternative would also allow for the use of project monitoring data, or other data, to continuously determine whether such levels of conservation are adequate to conserve Permit species. If agreed-to levels of conservation for meeting the clean, cold, complex, and connected biological goals are deemed inadequate, the Services and Plum Creek would use the best scientific data to adjust conservation levels to ensure that they are adequate. If the NFHCP would not, or could not, be adapted to ensure adequate conservation, then the Services may suspend, in whole or in part, the Permit under certain, specified conditions outlined in the Implementing Agreement

(IA). If continued implementation of the Permit terms is likely to jeopardize the continued existence of a Permit species, then the Services must revoke the Permit. This proposed NFHCP approach allows for maintaining land management flexibility while achieving species conservation. In contrast, the Simplified Prescriptions Alternative would reduce Plum Creek's forest management flexibility and would reduce uncertainty for the Services at the outset of the Permit. Therefore, the need to rely on adaptive management would be less under the Simplified Prescriptions Alternative. Also, the risk of Permit suspension or revocation would be lower, related to riparian management (if a Permit is issued under the Simplified Prescriptions Alternative), because the risk to species provided at the outset of the Permit period would be reduced.

A combination of the most conservative features of the NFHCP and Simplified Prescriptions Alternative would provide the greatest likelihood, of the four alternatives analyzed, for moving rapidly towards achieving fully functioning habitat conditions. For example, implementing the road and upland commitments under the proposed NFHCP, coupled with the riparian commitments from the Simplified Prescriptions Alternative, would result in the maximum rate of sediment reduction and riparian habitat protection possible under all alternatives. One obvious method for providing a more rapid trend towards fully functioning habitat conditions is if Plum Creek implemented all the most aggressive habitat mitigation and restoration efforts in these two alternatives and did not implement any new timber harvest, road building, or other development projects during the next 30 years that could impact Permit species' habitat. However, such an approach of little or no

timber harvest and road building across the Project Area for the Permit period was not evaluated because it would not meet Plum Creek's economic needs and therefore is beyond the scope of this document (see Chapter 3). Through future ESA consultations with federal land managers in all 15 Planning Area basins (the majority landowner across all Planning Area basins), the Services have additional opportunity to ensure sediment reduction on these federal lands sufficiently

complements Plum Creek's efforts so that adequate conservation of Permit species is achieved on a landscape basis.

The No Action and Internal Conservation Plan Alternatives would provide the lowest levels of conservation for Permit species among the four alternatives. These two alternatives also would not provide the degree of assurances Plum Creek seeks regarding the risk of future ESA-related regulation of their land management activities.