

SUMMARY

This *Final Mountain Lakes Fishery Management Plan / Environmental Impact Statement* (plan/FEIS) analyzes a range of alternatives and management actions for the mountain lakes fishery in the North Cascades National Park Service Complex (North Cascades Complex) in Washington State. This plan/FEIS assesses the impacts that could result from continuation of current management (the no-action alternative) or implementation of any of three action alternatives. Through this analysis, “Alternative B: Proposed Adaptive Management of 91 Lakes Under a New Framework (42 Lakes May Have Fish)” was identified as the preferred alternative for the Mountain Lakes Fishery Management Plan that will guide future fishery management actions for a period of 15 years. However, the National Park Service (NPS) has determined it does not have the authority to implement alternative B. If Congress does not provide this authority by summer 2009, then the NPS will implement “Alternative D: 91 Lakes Would Be Fishless (Environmentally Preferred Alternative).”

PROJECT SITE LOCATION

The 684,000-acre North Cascades Complex is located in the northwest part of Washington State, with its northern boundary on the international border with Canada (Figure 1: Vicinity Map). The North Cascades Complex is made up of three NPS administrative units: North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area. These three units make up the study area for this plan/FEIS, which contains approximately 245 lakes. Prior to stocking, none of these water bodies ever contained fish. The focus of this plan/FEIS, however, is the 91 naturally fishless mountain lakes that have documented stocking records, as well as those where no stocking records exist but where observations or

harvest of fish have been documented. These 91 lakes have reproducing and self-sustaining fish populations, have been stocked repeatedly because they contain nonreproducing fish, or have been stocked in the past but are now fishless.

The vicinity map shows the locations of the 91 lakes: 69 lakes are in the national park, 7 are in Ross Lake National Recreation Area, and 15 are in Lake Chelan National Recreation Area. Of the 91 lakes in the study area, 90 are located in designated wilderness (Stephen T. Mather Wilderness) that overlays approximately 93% of the North Cascades Complex.

PURPOSE OF THE ACTION

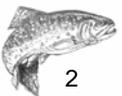
The purpose of this plan/FEIS is to guide management actions by the NPS and Washington Department of Fish and Wildlife (WDFW) in order to:

- conserve native biological integrity
- provide a spectrum of recreational opportunities and visitor experiences, including sport fishing
- resolve the long-standing debate and conflicts over fish stocking the North Cascades Complex

The North Cascades Complex contains some of the most rugged and remote wilderness in the contiguous United States.



S U M M A R Y



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NEED FOR ACTION

This plan/FEIS is needed to apply the results of long-term research into the ecological effects of fish stocking as directed in 1986 by the Director of the NPS, and in 1987 by the Assistant Secretary of the Interior for Fish and Wildlife and Parks. It is also needed to satisfy partially the terms of a 1991 Consent Decree between North Cascades Conservation Council and the NPS.

OBJECTIVES IN TAKING ACTION

Objectives are specific statements of purpose that support the goals an alternative must meet, to a large degree, for this plan/FEIS to be considered a success. Meeting objectives is part of what makes an alternative “reasonable.” Objectives also support the purpose of this plan/FEIS as stated in the “Purpose of the Action” section above and help to resolve the need for action.

The following objectives were developed for this plan/FEIS:

- Obtain support from interested parties and groups to implement a new management plan for mountain lakes within the North Cascades Complex should the governing agencies decide a new plan is needed.
- Advance the protection and rehabilitation of native biological integrity by maintaining native species abundance, viability, and sustainability.
- Provide a spectrum of recreational opportunities, including sport fishing, while minimizing impacts to the biological integrity of natural mountain lakes.
- Apply science and research in decision-making at multiple spatial scales that include landscape, watershed, lake cluster, and individual lakes.
- Provide to the public and interested parties full and open access to available information.

BACKGROUND

HISTORY OF FISH MANAGEMENT IN NORTH CASCADES MOUNTAIN LAKES

All of the approximately 245 natural mountain lakes in North Cascades were historically barren of fish. In the



Members of the Trail Blazers stocking Doug's Tarn.

late 1800s settlers began stocking lakes within the present-day boundaries of North Cascades with various species of nonnative trout for food and recreation. By the 20th century, fish stocking had become a routine practice. In 1933, the Washington Department of Game (now Washington Department of Fish and Wildlife or “WDFW”) assumed responsibility for stocking mountain lakes throughout the state to create and maintain a recreational fishery.

In most NPS units, natural resources (including lakes and fish) are managed in accordance with the *Organic Act of 1916* and NPS Management Policies, which allow sport fishing unless it is specifically prohibited (NPS 2006, 4.4.3), but prohibit stocking in most NPS waters. In the North Cascades Complex, fish have historically been managed by a combination of agencies and user groups. This is partly because the 1968 enabling legislation for the North Cascades Complex does not specifically address fisheries management, and partly because the area has a history of fish management by the state of Washington and sport fishing groups that pre-dates the 1968 establishment of the North Cascades Complex by many years.

After North Cascades Complex was established, a conflict over fish stocking emerged between the NPS and WDFW. The conflict was driven in part by a state versus federal jurisdictional dispute over fish and wildlife management authority, and by fundamental policy differences: NPS policies prohibited stocking in order to protect native ecosystems; WDFW policies encouraged stocking to enhance fishing opportunities. Early attempts to phase out stocking at North Cascades by park managers were abandoned in the face of strong objections by the state of Washington (Louter 2003).



The NPS again attempted to eliminate stocking of mountain lakes in the mid-1980s, and this renewed the dispute between the NPS and the state of Washington. The dispute was temporarily settled by former NPS Director William Mott, who in 1986 issued a policy variance that authorized stocking to continue only in lakes that had been previously stocked (see appendix A). The policy variance also directed park staff to conduct ecological research to provide an informed basis for management of fish stocking in the future. The policy variance, however, did not settle the disagreement between the NPS and WDFW, and the dispute over fish stocking intensified.

In 1987, William Horn, Assistant Secretary of the Interior, Fish and Wildlife and Parks intervened to settle the dispute. The Assistant Secretary negotiated an agreement between the NPS and WDFW that authorized fish stocking to continue in certain lakes. The agreement also stipulated that the results of research into the ecological impacts of stocking would be used to “support development of a publicly reviewed recreational fishery management plan.” That following year the NPS and WDFW formalized the agreement negotiated by the Assistant Secretary. The agreement, referred to as a “Supplemental Agreement” to a 1985 Memorandum of Understanding between the NPS and WDFW (see appendix A), established a mutually agreed to list of lakes in North Cascades National Park that the WDFW would stock with fish as part of its fish management program. The Supplemental Agreement also helped to formally initiate a long-term research study through Oregon State University and the U.S. Geological Survey (USGS) - Biological Resources Division to understand the ecological effects of fish stocking.

That same year, the North Cascades Conservation Council sued the NPS in regard to various management plans for Lake Chelan National Recreation Area (Louter 1998). The NPS and North Cascades Conservation Council settled the lawsuit in a 1991 Consent Decree (see appendix A). One element of the Consent Decree stipulated that upon completion of the ecological research into the impacts of fish stocking, the NPS would “conduct a NEPA [*National Environmental Policy Act*] review” of the fish stocking of naturally fish-free lakes.”

In 2002, Oregon State University and the USGS Biological Resources Division completed the long-term research into the ecological effects of fish stocking, and in January 2003 this *Mountain Lakes Fishery Management Plan/Environmental Impact Statement* was initiated. This plan/FEIS fulfills the research-informed policy guidance provided by the former

Director of the NPS, and the adaptive management intent of the Supplemental Agreement between the NPS and WDFW negotiated by the former Assistant Secretary of the Interior for Fish and Wildlife and Parks. This plan/FEIS also fulfills the directive of the 1991 Consent Decree between the NPS and the North Cascades Conservation Council.

IMPLEMENTING THE FISHERY MANAGEMENT PLAN THROUGH CONGRESSIONAL ACTION

The enabling legislation for the North Cascades Complex does not mention fish stocking, and the legislative record regarding fish stocking in the North Cascades Complex is not clear. The language in the enabling legislation for the National Recreation Areas within the North Cascades Complex does affirm that fishing is an important recreational use, but it does not mention fish stocking as being an appropriate means of fishery management.

The *Washington Park Wilderness Act of 1988* (WPWA) established 93% of the North Cascades Complex as Stephen T. Mather Wilderness and directed the NPS to manage the wilderness in accordance with the *Wilderness Act of 1964*. At the time the WPWA was passed, NPS policies prohibited fish stocking in naturally fishless waters, and the WPWA did not include a provision that authorized stocking. Stocking is not expressly prohibited in the *Wilderness Act*. Although the *Wilderness Act* implies that management actions that manipulate natural processes in wilderness conflict with wilderness values, according to the definition of wilderness in the *Wilderness Act*, wilderness must retain its “primeval character and influence” so that it “appears to have been affected primarily by the forces of nature.” This language has been interpreted in the scientific literature to affirm two closely linked values that are fundamental components of wilderness character: “naturalness” and “wildness.” Naturalness has been defined as the native compositions, patterns, and processes of an area. Wildness has to do with ensuring that wilderness areas are minimally influenced by human intervention, so those who enter wilderness can experience primitive and unconfined forms of recreation. Though recreational fishing is widely regarded as an important and traditional use of wilderness, the role of stocking to create and maintain an artificial fishing opportunity in naturally fishless mountain lakes is viewed by many as an artificial manipulation of both wildness and naturalness. These views are informed by a wide body of scientific research into the impacts of fish stocking, including findings specific to lakes in the North Cascades



Complex. However, some people disagree with these views and maintain that if nonnative fish were stocked appropriately, there would be no unacceptable adverse impacts on wilderness values because biological integrity would be conserved.

Fish stocking has been allowed to continue in the North Cascades Complex under the 1986 policy waiver issued by the Director of the NPS. A new policy waiver to allow for continued stocking is not being sought for several reasons. First, various national parks (Sequoia-Kings Canyon, Yosemite, Glacier, Rocky Mountain, and Yellowstone) have discontinued stocking. This plan/FEIS process resulted in the identification of an alternative that allows for continued stocking, and issuance of a policy waiver to the North Cascades Complex could encourage other state fish and wildlife agencies to revisit the issue of stocking in NPS units where stocking has been discontinued. Second, policy waivers are temporary and do not provide a permanent solution because they can be rescinded as circumstances change. The goal of this plan/FEIS is to forge a lasting solution for mountain lakes fishery management in the North Cascades Complex.



Fish stocking Thunder Lake in the early years.

Finally, the Minimum Requirement Analysis for fish stocking in the Stephen T. Mather Wilderness (provided in Volume Two, Appendix K) indicates that stocking is not necessary to meet the minimum requirements for administration of the area. For these three reasons, a policy waiver is not being pursued. Instead, the NPS has determined that fish stocking in the Stephen T. Mather Wilderness would only be implemented if Congress granted the NPS the unambiguous legal authority to do so.

Because the preferred alternative (alternative B) identified in the plan/FEIS allows for continued stocking, the park superintendent, in coordination with

the Pacific West Regional Director, will seek clarification from congress as to whether or not stocking is appropriate (see pages 12 and 13 for descriptions of alternatives). The following is an example of clarifying legislation that would allow stocking to continue in the North Cascades Complex:

Notwithstanding any other provision of law, a fisheries management program that includes the stocking of fish in select lakes within the North Cascades Complex is authorized so long as both the NPS and the state of Washington agree on the lakes, species of fish, and number of fish to be stocked.

A clarification in the legal authorities for the North Cascades Complex to allow for continued fish stocking would set a precedent for this and other NPS units. If Congress should choose to explicitly authorize stocking through clarifying legislation, it will have determined that fish stocking is an appropriate activity in the North Cascades Complex. That unambiguous clarification would authorize the NPS to implement any of the management alternatives that include the practice of stocking.

Congressional action to clarify the enabling legislation is an intricate process that can take several years. Such legislation was introduced in June 2006 (H.R. 5732) and again in July 2007 (H.R. 3227). A hearing was held in April 2008 on H.R. 3227, however, no further action on the bill has taken place since printing of this plan/FEIS. If the NPS does not receive clarification from Congress by the time a Record of Decision for this plan/FEIS is issued, alternative D (91 lakes would be fishless) would be implemented unless or until affirmative clarification is received.

APPLICATION OF SCIENCE AND RESEARCH

The NPS established a Technical Advisory Committee to achieve the stated objective of ensuring that decisions would be made in accordance with the best available science.

The Technical Advisory Committee applied the results of science and research results to:

- develop management alternatives that conserve biological integrity while allowing fish to occur in some lakes
- describe the ecosystem functions and human values that could be potentially affected by fishery management actions



SUMMARY

- evaluate the potential impacts of management alternatives on ecosystem functions and human values

To relate the purpose of “conserving biological integrity” to mountain lakes fishery management, the Technical Advisory Committee drew upon one of the principle conclusions of the Oregon State University research: the ecological effects of nonnative trout are related to the reproductive status and abundance of trout in lakes. The Technical Advisory Committee interpreted this finding to mean that lakes with the lowest degree of biological integrity (or greatest departure from biological integrity or pristine conditions) contained reproducing populations of nonnative trout or char that had achieved high densities and exceeded the carrying capacity of the lake. On the other end of the biological integrity spectrum, the Technical Advisory Committee assumed mountain lakes that had never been stocked represented the highest degree of biological integrity.

The Technical Advisory Committee applied the general concept of biological integrity to formulate a framework for “conserving biological integrity” by relating how the reproductive status and abundance of nonnative trout influenced the biological integrity of the mountain lakes. This conceptual framework was used to craft management alternatives B and C based on the hypothesis that the biological integrity of mountain lakes could potentially be conserved by managing for nonreproducing trout at low densities in some lakes and managing for fishless conditions in other lakes.

DEVELOPING MANAGEMENT ACTIONS

The Technical Advisory Committee defined various ecological risk factors for the 91 lakes (table 1). The Technical Advisory Committee then used the ecological risk factors to develop eight standard adaptive management actions (table 2) that were applied to a differing subset of lakes in alternatives B and C.

The Technical Advisory Committee recognized that each management alternative was developed with data that are provisional and possibly incorrect. In light of this uncertainty, the committee included the principle of adaptive management (figure 2) as an element common to all management alternatives. The Technical Committee also developed a Mountain Lakes Fishery Monitoring Plan (Volume Two, Appendix F of the

plan/FEIS) to evaluate management actions and create a mechanism for changing those actions if management goals were not being achieved.

MANAGEMENT ALTERNATIVES

This plan/FEIS evaluates four alternatives for management of the 91 study area lakes in the North Cascades Complex. The three “action” alternatives (B, C, and D) have the following elements in common:

1. **ADAPTIVE MANAGEMENT.** The action alternatives would incorporate the principle of adaptive management using monitoring and evaluation to determine if management actions were achieving objectives.
2. **OUTREACH AND EDUCATION.** The NPS would establish a long-term public outreach campaign to help educate and inform the public about the selected alternative.
3. **PARTNERSHIPS.** The NPS would actively seek partnerships with the WDFW, fishing groups, and the public to implement fishery management actions.
4. **LAKE TREATMENT METHODS.** Each lake has its own particular chemical and physical characteristics that dictate the best means of removing fish; therefore, methods of removing fish would differ among lakes, but the prescribed method (mechanical, chemical, or natural) of fish removal for a particular lake would not differ across the action alternatives.

MECHANICAL METHODS. Three intensive mechanical methods of removing fish (gillnetting / electrofishing/trapping) would be used in combination to treat selected lakes. Mechanical methods would be used to catch and remove fish from lakes generally smaller than 5 acres in surface area and less than 30 feet deep. The exact choice of equipment would depend upon lake conditions.

Mitigation measures—No nets would be left unsupervised. Crews would free any wildlife observed in the nets. In order to mitigate trampling of shoreline vegetation, crews would be kept small and would walk in the lake (to the extent possible), rather than along the shoreline when setting nets.



TABLE 1: ECOLOGICAL RISK FACTORS FOR NEW MANAGEMENT FRAMEWORK

Fishless conditions currently present	Is the lake currently fishless? This suggests that protecting currently fishless (though historically stocked) lakes is biologically beneficial because the lakes are slowly reverting to pre-stocking conditions, and there is no compelling reason to alter that process.
Unique lake features or circumstances	<p>Does the lake possess any unique features or circumstances that would favor fishless conditions, such as</p> <p>Geographic Isolation: Is the lake isolated from other water bodies that serve as a refuge or breeding habitat for the long-toed salamander? Isolated lakes may be very important for protecting isolated populations of salamanders, especially if the surrounding habitat consists of shallow ponds or wetlands that could dry up or be otherwise impacted by random natural events. This risk factor acknowledges that isolated populations of native species, such as long-toed salamanders that are slow to disperse, must be sufficiently distributed across the landscape to ensure their long-term sustainability. Consideration of geographic isolation helps to ensure that metapopulations of such amphibian species are adequately protected at the broadest spatial scales.</p> <p>Species of Conservation Concern: Do rare or unique species (such as the blind amphipod) reside in the lake? Blind amphipods are found in at least two park lakes and may be in other lakes that have not been sampled. Amphipods are a type of macroinvertebrate that can be an important food source for fish and could be inadvertently lost due to predation. Should other organisms of conservation concern be found through monitoring, fishery management actions would be adjusted to prevent harm. Could species of special concern (such as the bull trout) be affected by the presence of nonnative fish in lakes? Native fish species that reside in streams could potentially be affected through hybridization and competition by nonnative fish escaping from lakes into streams.</p> <p>Under-represented Lake Type: Is the lake large and deep or geologically unique? These lakes are often candidates for stocking, and most of the large lakes in the park have traditionally been stocked. Therefore, it is necessary to establish a representative number of large, deep lakes as fishless in order to protect the unique aquatic organisms that may prefer this type of lake.</p>
Capacity to serve as suitable habitat for, and within the range of, long-toed salamanders	Does the lake have the appropriate physical habitat and biological productivity to produce and maintain source populations of long-toed salamanders? Long-toed salamanders are biological indicators of an unsustainable fish density because they are particularly sensitive to fish predation. Since the long-toed salamander is more sensitive than most other amphibians to fish predation, protecting habitat for long-toed salamanders helps to prevent elimination of in-lake populations and protect overall health of amphibians in the North Cascades Complex. This criterion recognizes that lakes in the North Cascades Complex vary widely in habitat quality for salamanders. The physical, chemical, and biological characteristics of lakes make some more suitable than others for nurturing genetically sustainable populations of long-toed salamanders. Populations of long-toed salamanders in lakes that provide high-quality habitat can withstand the impacts of disturbance (such as drought) and, presumably, recolonize the surrounding watershed following disturbance. Long-toed salamanders are only able to reproduce in large numbers in lakes that provide high-quality habitat. In addition to reproduction, their offspring must be able to survive in numbers that are sufficient for ensuring long-term genetic diversity. To meet this criterion, the lake must also be located in what is considered the geographic range of the long-toed salamander.
Shared lake conditions exist between the long-toed salamander and fish	Does evidence suggest that a lake can maintain fish populations while allowing salamanders to coexist? Situations have been observed in lakes where both fish and salamander populations exist. It is assumed that these lakes possess special features such as shallow habitat, large amounts of woody debris, or a complex shoreline configuration that protects salamanders from fish predation.
Presence of high density of reproducing fish	Have stocked fish reproduced and overpopulated the lake? High densities of fish have the ability to deplete their food base and cause measurable declines and, in some cases, disappearance of native aquatic species. This factor seeks to identify lakes that should be considered and prioritized for fish removal.
Macroinvertebrate populations are suppressed	Are macroinvertebrate populations within a lake suppressed? Certain taxa of macroinvertebrates are sensitive to fish predation. Macroinvertebrates, like amphibians, are good indicators of ecosystem health and the effect fish have on the ecosystem. Currently, limited data are available for this criterion, but it is an important factor.
Lake grouping	Is the lake a part of a unique grouping where at least one of the lakes should be established as fishless? In certain areas, several lakes are located in relatively close proximity (e.g., Hozomeen, Willow, and Ridley lakes). Management actions for these lakes need to be considered collectively. This criterion suggests that at least one lake in a grouping of lakes in a unique geographical location or physical circumstance should be maintained as fishless in order for natural conditions to exist. This concept allows for a wide diversity of lake types to be represented in a fishless state. Lakes that contain fish and are in relatively close proximity to one another were considered collectively, and management actions were tailored to minimize the potential impacts to metapopulations of salamanders in these lake groupings.
Lack of Information	Data is lacking for some lakes. This factor acknowledges uncertainty and the need for gathering additional information before taking management actions.



TABLE 2: PRINCIPLES FOR MANAGING THE MOUNTAIN LAKES FISHERY TO CONSERVE BIOLOGICAL INTEGRITY

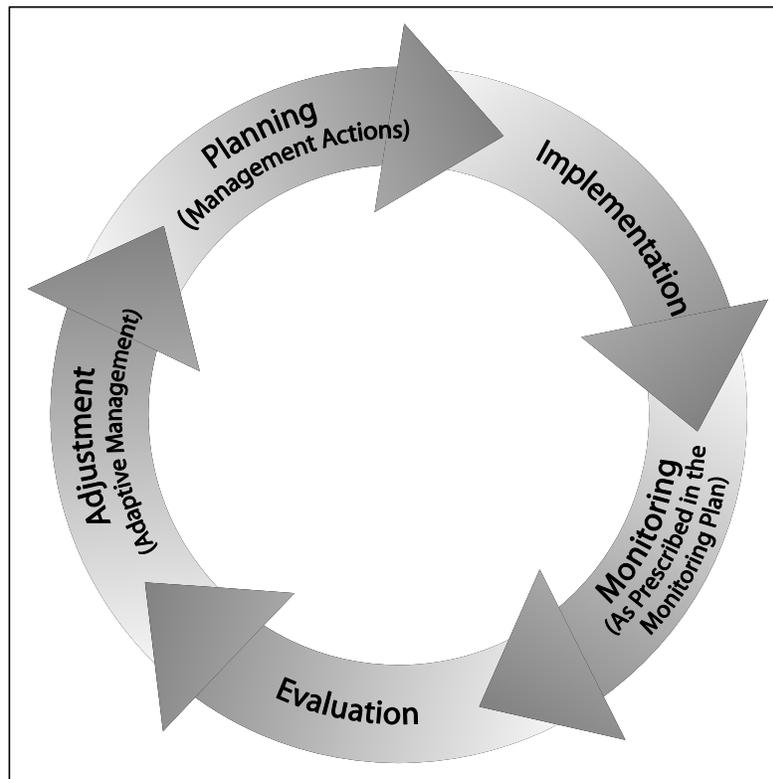
1.	A prudent and precautionary management strategy should protect all lakes that are currently fishless. A lake that is fishless today would remain fishless in the future.
2.	Reproducing populations of fish that have achieved high densities would be removed from all lakes where feasible. Following removal, the biological conditions of the lakes would be monitored for recovery. Monitoring results would be used to decide whether or not the lake could be stocked with low densities of nonreproducing fish.
3.	Lakes that serve as high-quality breeding and rearing habitat for amphibians and are located within the range of long-toed salamanders, generally would be returned to a fishless condition, or low densities of nonreproducing fish would be allowed if no other criteria applied. However, observations indicate that certain lakes have complex habitat conditions, such as extensive shallow areas and woody debris, which would allow amphibian populations to persist in spite of fish predation or competition. Where a lake has a long history of stocking and salamanders are known to exist sympatrically (together in the same area; for example, Coon Lake), nonreproducing fish would be stocked at low densities.
4.	Certain lakes would be managed as fishless due to unique features. These features include the presence of a species of conservation concern; large, deep lakes in fishless conditions (which are underrepresented in the North Cascades Complex); geologically unique lakes; and geographically isolated lakes. Geographically isolated lakes need to remain fishless to protect metapopulations of salamanders. A lake was considered isolated if (1) it was more than 2,000 feet from other permanent water bodies, (2) it was within the range of long-toed salamanders, and (3) there was no evidence that salamanders and fish could survive sympatrically. Lakes that possessed these unique features were considered on a larger landscape scale to determine if fishless conditions were represented among these lake types. A lake that belonged to an underrepresented type in the study area would be returned to a fishless condition.
5.	Benthic (bottom dwelling) macroinvertebrate monitoring data (collected through the NPS long-term ecological monitoring program) indicate that certain lakes have suppressed populations of macroinvertebrates. A lake with suppressed populations of macroinvertebrates would become fishless or would be evaluated further before determining final management action.
6.	In closely grouped lakes, fishless conditions in at least one lake would be maintained to provide fishless habitat for aquatic organisms in the localized area.
7.	Where key information for a given lake was lacking for this stage of planning, the lake would be evaluated before management actions would be recommended.
8.	Lakes that do not possess any of the identified risk factors (decision criteria) would be considered for stocking to maintain fish densities commensurate with the protection of biological integrity.



Green Lake, Green Lake with Bacon Peak in the background, Wilcox Lakes, and Coon Lake.



FIGURE 2: ADAPTIVE MANAGEMENT PROCESS



CHEMICAL METHODS. The piscicide antimycin was selected for fish removal in larger, deeper lakes where mechanical methods of fish removal would not be feasible. Antimycin was chosen for fish removal because it is less toxic than other fish toxicants (e.g., rotenone), degrades rapidly following application and has been successfully used for fish removal at several National Parks. Treatment with antimycin would occur during late summer and fall during low flows.

Antimycin would be diluted with lake water and then injected into the prop wash of a small outboard motor mounted to an inflatable boat. Bilge pumps and hoses would also be used to help mix the chemical in deeper water. Crews on the shoreline would hand treat the shoreline areas that could not be reached by boat.

Mitigation measures—Antimycin dose rates would be double verified and monitored to prevent inadvertent overdoses, and potassium permanganate (a neutralizing agent) would be used to treat outlet streams to remove residual antimycin and prevent it from traveling downstream. In order to mitigate trampling of shoreline vegetation, crews would be kept small and would walk in the lake (to the extent

possible), rather than along the shoreline when applying antimycin. Crews treating lakes with antimycin would be required to wear eye protection and gloves and would also receive safety briefings.

NATURAL METHODS. For lakes that contain only stocked fish that do not reproduce, the method of treatment may be as simple as ceasing stocking; the fish would eventually be fished-out or die off. For lakes where the rate of reproduction is very low and likely not to occur at all in some years, ceasing stocking may also eliminate fish over a period of years, especially if natural reproduction has been supplemented by stocking and the stocked fish cannot reproduce due to lack of spawning habitat. For some lakes with extremely limited spawning habitat, spawning gravels would be covered by hand with rock to reduce or eliminate the potential for reproduction.

The four management alternatives are described below.



ALTERNATIVE A: NO ACTION
Existing Management
Framework of 91 Lakes (62 Lakes Have Fish)

Fish occur in approximately 62 of the 91 lakes with a history of fish stocking. Under current management for alternative A, the 62 lakes that currently contain fish would continue to be managed as they are today. The other 29 lakes that were stocked historically but are currently fishless would remain fishless.

Forty of the 62 lakes that currently contain fish are in North Cascades National Park and managed by the WDFW under the terms of the 1988 Supplemental Agreement to the 1985 Memorandum of Understanding. The remaining 22 of 62 lakes are in Ross Lake and Lake Chelan National Recreation Areas. The WDFW manages 19 of the 22 lakes as a recreational fishery; these 19 lakes are not part of the Supplemental Agreement but are managed by the WDFW according to historical practices. Three of the 22 lakes are also located inside the national recreation areas but are not managed under the 1988 Supplemental Agreement nor are they actively managed by the WDFW.

ALTERNATIVE B: PREFERRED
ALTERNATIVE
Proposed Adaptive Management of 91 Lakes
under a New Framework (42 Lakes May Have Fish)

This alternative would seek to conserve biological integrity in lakes by eliminating or reducing reproducing fish populations. Sport fishing via continued stocking would be managed in lakes where the risks to biological integrity could be minimized. Management actions would be applied to the 91 study area lakes throughout the North Cascades Complex in accordance with the ecological risk factors and lake management principles (see tables 1 and 2). For alternative B, a maximum of 42 lakes may have fish and may be fishable in the future. The actual numbers of fishable lakes may be revised downward as more data are collected for lakes currently lacking information. Up to 20 lakes would be permanently returned to a fishless condition (added to the 29 currently fishless lakes; the potential outcome of alternative B would be 49 fishless lakes). Following removal of reproducing populations, some lakes could be restocked with low densities of nonreproducing fish once reproducing fish have been removed. Lakes where critical information is missing would not be stocked until that information becomes available. An extensive monitoring program would be implemented to enable adaptive management and avoid unacceptable effects to native species.

ALTERNATIVE C: PROPOSED ADAPTIVE
MANAGEMENT OF 91 LAKES
UNDER A NEW FRAMEWORK
(11 Lakes May Have Fish)

Alternative C would prohibit continued stocking within North Cascades National Park, and allow continued stocking of select lakes in Ross Lake NRA and Lake Chelan NRA. The same ecological risk factors and management principles for alternative B would apply. Nine lakes in Ross Lake and Lake Chelan National Recreation Areas would have fish, and 2 lakes would be evaluated for restocking. Of the other 11 lakes in the national recreation areas, 3 would remain fishless, 3 would have high-density reproducing fish removed, and stocking would be discontinued in 5 lakes. The remaining 69 lakes are in the national park portion of the North Cascades Complex and would be returned to their natural fishless condition or would remain fishless.



All reproducing fish would be removed from McAlester Lake, and monitoring would help determine whether to restock.

Similar to alternative B, the proposed management framework would eliminate or reduce reproducing fish from lakes in the national recreation areas because high densities of reproducing fish populations can alter the lake ecosystem and negatively effect native biota. Restocking of nonreproducing fish would be allowed only where biological resources could be protected in lakes located in the national recreation areas. Based on monitoring results, some lakes could be restocked with non-reproducing fish at low densities once reproducing fish have been removed. Where critical information is missing, lakes would not be stocked until such information becomes available. As with alternative B, a monitoring program would be incorporated to adjust future management actions in order to avoid unacceptable effects on native biota from fish presence.



**ALTERNATIVE D: ENVIRONMENTALLY
PREFERRED ALTERNATIVE
91 Lakes Would Be Fishless**

The emphasis of this alternative would be to eliminate all fish from mountain lakes in throughout North Cascades Complex wherever feasible. Currently, 62 of the 91 study area lakes have fish and 29 are fishless. Stocking would be discontinued in all lakes currently stocked, and the stocked fish would die off within several years. Reproducing populations of fish would be gradually removed over time, and the rate of removal would depend upon the availability of resources (funding and personnel) and differences among methods of removal.

Lake treatment methods to remove fish would vary depending upon lake conditions and fish reproductive status. For lakes with no fish reproduction, stocking would cease and the fish would eventually die off or be fished out. For lakes with reproduction, mechanical or chemical methods would be used for fish removal. Mechanical methods (gillnetting, electrofishing, trapping, and/or spawning habitat exclusion) would be used to remove fish from lakes generally smaller than 5 acres or less than 30 feet deep. Chemical methods of fish removal would involve treatment with the piscicide antimycin. These methods would be used in the larger, deeper lakes where mechanical methods would not be feasible. For some of the larger, deeper lakes, fish removal may not be possible. These lakes would remain fishable until feasible methods of fish removal became available.

Alternative D was crafted to meet the spirit and intent of NPS *Management Policies* by discontinuing stocking and eventually removing reproducing fish populations from mountain lakes wherever feasible.

ISSUES AND IMPACT TOPICS

The following issues were identified by the NPS, WDFW, other agencies, and the public throughout the scoping process:

Predation and competition. Nonnative fish have measurably changed the composition and abundance of

native aquatic organisms in some lakes. The most significant impacts are caused by reproducing populations of stocked fish that have become self-sustaining.

Hybridization with native fish. Nonnative fish are dispersing downstream from some lakes and hybridizing (interbreeding) with native fish. Hybridization could harm bull trout (federally threatened), westslope cutthroat trout, and other native trout populations.

Conflicting social/wilderness values. Some people strongly oppose the management of a nonnative fishery in North Cascades Complex mountain lakes that were naturally fishless. Others believe that the mountain lakes fishery provides an unparalleled opportunity for high-lakes fishing that cannot be duplicated elsewhere.

Legislative ambiguity. The enabling legislation and legislative history for the North Cascades Complex are not clear with respect to fishing and fish stocking. The NPS believes an affirmative legislative clarification from Congress would be needed to justify continued fish stocking in naturally fishless mountain lakes in the North Cascades Complex / Stephen T. Mather Wilderness.

The following impact topics were analyzed in this plan/FEIS. Impacts for each of the alternatives are described in table 3.

Aquatic organisms—includes plankton, macro-invertebrates, amphibians, and native fish.

Other wildlife—such as fish-eating wildlife that have benefited from stocked fish at a number of lakes in the North Cascades Complex.

Special status wildlife and plant species—includes native fish, amphibians, and other vertebrates.

Vegetation—particularly riparian areas.

Cultural resources—includes archeological resources, cultural landscapes, historic structures, and ethnographic resources.





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Aquatic Organisms				
	<p>Aquatic organisms (including plankton, macroinvertebrates, and amphibians) would continue to experience long-term negligible to minor adverse impacts from fish predation and competition in lakes stocked with low densities of nonreproducing fish.</p> <p>In lakes with high densities of reproducing fish, certain plankton and macroinvertebrates would continue to experience long-term moderate to major adverse impacts from intensive predation and competition. Long-term minor to moderate adverse impacts on amphibians would continue in lakes with reproducing populations of fish, limited refugia, relatively high nutrient (for example, high total Kjeldahl nitrogen) availability, and limited lake connectivity to other water bodies with suitable amphibian habitat.</p> <p>Long-term moderate to major adverse impacts from hybridization between native and nonnative fish would continue to persist.</p> <p>Short- and long-term adverse cumulative impacts on aquatic organisms would vary widely depending upon trends in aquatic ecosystem stressors such as air pollution, development in surrounding watersheds, and climate change. Overall, the cumulative impacts associated with other actions in the area, added to the impacts predicted</p>	<p>Impacts on aquatic organisms in lakes stocked with low densities of nonreproducing fish would likely be less than in lakes with high densities of reproducing fish under alternative A, except these impacts would decline further in the future as stocking is curtailed or eliminated in lakes based upon adaptive management decisions pertaining to stocking.</p> <p>Removal of reproducing populations of fish from select lakes would eventually result in long-term beneficial effects on aquatic organisms in those lakes; however, removal of reproducing fish populations would take many years. Until fish are removed, minor to major impacts on aquatic organisms would persist as described in alternative A.</p> <p>Mechanical methods of fish removal (netting, trapping, spawning habitat exclusion) would have short-term negligible to minor adverse impacts on aquatic organisms. Chemical methods of fish removal (application of the piscicide antimycin) would have short-term negligible to moderate adverse impacts on certain aquatic organisms.</p>	<p>Impacts on aquatic organisms would be similar to alternative B except impacts would only occur in national recreation area lakes that would continue to be stocked with low densities of nonreproducing fish.</p> <p>Removal of reproducing populations of fish from lakes in the national park portion of the North Cascades Complex would have the same effects on aquatic organisms as under alternative B.</p> <p>Impacts of mechanical and chemical methods of fish removal would be the same as under alternative B.</p> <p>Impacts on native fish from hybridization between native and nonnative fish would be the same as under alternative B.</p> <p>Compared to alternative A, there would be a long-term beneficial cumulative impact on populations of native aquatic organisms because a minimum of 51 lakes (all lakes in the national park unit and select national recreation area lakes) would eventually become fishless. Short- and long-term adverse cumulative impacts on aquatic organisms from threats other than nonnative fish would be similar to alternative B.</p> <p>Impairment of aquatic organisms across the study area would not occur under alternative C.</p>	<p>Compared to alternative A, long-term beneficial impacts would occur to aquatic organisms as lakes are returned to a fishless condition. Once stocked fish were gone, native aquatic communities would eventually revert to predisturbance (that is, prestocking) conditions, and this would result in long-term beneficial impacts on native aquatic organisms.</p> <p>Removal of reproducing populations of fish from all study area lakes in the North Cascades Complex would have the same effects on aquatic organisms as under alternative B.</p> <p>Impacts of mechanical and chemical methods of fish removal would be the same as under alternative B.</p> <p>Impacts on native fish from hybridization between native and nonnative fish would be the same as under alternative B.</p> <p>Compared to alternative A, there would be a long-term beneficial cumulative impact on populations of native aquatic organisms because all study area lakes in the North Cascades Complex would eventually become fishless. Short- and long-term adverse cumulative impacts on aquatic organisms from threats other than nonnative fish would be similar to alternative B.</p> <p>Impairment of aquatic organisms across the study area would not occur under alternative D.</p>

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Aquatic Organisms (continued)				
	<p>under alternative A, would result in short- and long-term minor to potentially major adverse impacts on plankton, macroinvertebrates, and amphibians, and/or certain species of native fish in individual lakes in the study area but with overall minor to moderate adverse impacts for the region.</p> <p>Impairment of aquatic organisms across the study area would not occur under alternative A.</p>	<p>Compared to alternative A, the risk of hybridization would decline over the long term as reproducing populations of fish are removed, and fewer nonnative fish dispersed downstream from lakes. The risk of hybridization, however, would not be entirely eliminated primarily because reproducing populations of nonnative fish are now present in many drainages throughout the North Cascades Complex. Impacts over the long term would be minor to moderate and adverse.</p> <p>Compared to alternative A, there would be a long-term beneficial cumulative impact on native aquatic organisms because a minimum of 20 lakes would eventually become fishless. Short- and long-term adverse cumulative impacts on aquatic organisms from threats other than nonnative fish would be similar to alternative A.</p> <p>Impairment of aquatic organisms across the study area would not occur under alternative B.</p>		





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Wildlife				
	<p>The historic and current stocking of fish created suitable conditions for piscivorous wildlife, such as fish-eating ducks, while potentially restricting populations of other species, such as amphibians, that are prey for several wildlife species. As such, the continued presence of fish in formerly fishless lakes would have long-term negligible to minor adverse impacts to native wildlife. Impacts from activities associated with periodic fixed-wing aircraft stocking (noise disturbance) and backpack stocking (human presence and habitat trampling) under alternative A would be short term negligible to minor and adverse on wildlife at or near the lakes. Animals that roost or dwell further away from lakes, such as ungulates, bats, rodents, and many forest-dwelling birds, would incur short-term negligible adverse impacts or no impacts from stocking activities. None of the 91 lakes are currently treated for fish removal under alternative A; therefore, wildlife in or near the lakes would not incur impacts from lake treatments.</p> <p>The impacts associated with other projects and fishery management actions in the area, plus impacts from potential airborne pollution, added to the impacts predicted under alternative A, would result in long-term minor adverse cumulative impacts on wildlife populations and communities in the region.</p>	<p>The historic and current stocking of fish created suitable conditions for piscivorous wildlife, such as fish-eating ducks, while potentially restricting populations of other species, such as amphibians, that are prey for several wildlife species. Removal of fish would result in the loss of a food source for fish-dependent species, requiring them to disperse to other areas in search of resources; because of this, piscivorous wildlife would incur long-term negligible to minor adverse impacts when lakes are returned to fishless conditions. However, native wildlife would experience a long-term negligible to minor positive impact from a reduced presence of piscivorous wildlife. Stocking activities would decrease, and wildlife at or near the lakes would incur short-term negligible to minor adverse impacts from periodic fixed-wing aircraft stocking (noise disturbance) and backpack stocking (human presence and habitat trampling) that would continue under alternative B but to a lesser degree than under alternative A. Stocking activities would have short-term negligible adverse impacts or no impacts on animals, such as ungulates, bats, rodents, and many forest-dwelling birds, that roost or dwell further away from the lakes. Mechanical and chemical treatment methods used to remove fish under alternative B would result in short-term negligible to minor adverse impacts on wildlife, with</p>	<p>The historic and current stocking of fish created suitable conditions for piscivorous wildlife, such as fish-eating ducks, while potentially restricting populations of other species, such as amphibians, that are prey for several wildlife species. Removal of fish would result in the loss of a food source for fish-dependent species, requiring them to disperse to other areas in search of resources; because of this, piscivorous wildlife would incur long-term negligible to minor adverse impacts when lakes are returned to fishless conditions. However, native wildlife would experience a long-term negligible to minor positive impact from a reduced presence of piscivorous wildlife. Stocking activities would substantially decrease, and wildlife at or near the lakes would incur short-term negligible to minor adverse impacts from periodic fixed-wing aircraft stocking (noise disturbance) and backpack stocking (human presence and habitat trampling) that would continue under alternative C but to a much lesser degree than under alternatives A and B. Stocking activities would have short-term negligible adverse impacts or no impacts on animals, such as ungulates, bats, rodents, and many forest-dwelling birds, that roost or dwell further away from the lakes. Mechanical and chemical treatment methods used to remove fish under alternative C would result in short-</p>	<p>Alternative D would have long-term minor to moderate adverse impacts on fish-eating wildlife in lakes that would become fishless. Removal of fish would result in the loss of habitat for fish-eating species, requiring them to relocate to other areas (potentially outside the North Cascades Complex) in search of resources, which would result in local population decreases for those species, returning the area to pre-stocked conditions. Conversely, native wildlife would experience long-term minor positive impacts from the reduced presence of fish-eating wildlife. Under alternative D, stocking activities would be eliminated, a slight benefit to wildlife that have been disturbed by the noise and human disturbance associated with stocking activities. Mechanical and chemical treatment methods used to remove fish under alternative D would result in short-term negligible to minor adverse impacts on wildlife, with short-term disturbance to birds and mammals that inhabit the lake and lakeshore from the noise of human presence and helicopters used to transport equipment for mechanical treatment. The impacts associated with other projects and fishery management actions in the area, plus impacts from potential airborne pollution, added to the residual adverse and long-term beneficial effects predicted under alternative D, would be expected to result in long-term minor adverse cumulative impacts on wildlife</p>

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Wildlife (continued)				
	<p>Impairment of wildlife species across the study area would not occur under alternative A.</p>	<p>short-term disturbance to birds and mammals that inhabit the lake and lakeshore from the noise of human presence and helicopters used to transport equipment for mechanical treatment.</p> <p>The impacts associated with other projects and fishery management actions in the area, plus impacts from potential airborne pollution, added to the residual adverse and long-term beneficial effects predicted under alternative B, would be expected to result in long-term minor adverse cumulative impacts on wildlife populations and communities in the region.</p> <p>Impairment of wildlife species across the study area would not occur under alternative B.</p>	<p>term negligible to minor adverse impacts on wildlife, with short-term disturbance to birds and mammals that inhabit the lake and lakeshore from the noise of human presence and helicopters used to transport equipment for mechanical treatment.</p> <p>The impacts associated with other projects and fishery management actions in the area, plus impacts from potential airborne pollution, added to the residual adverse and long-term beneficial effects predicted under alternative C, would be expected to result in long-term minor adverse cumulative impacts on wildlife populations and communities in the region.</p> <p>Impairment of wildlife species across the study area would not occur under alternative C.</p>	<p>populations and communities in the region.</p> <p>Impairment of wildlife species across the study area would not occur under alternative D.</p>
Special Status Wildlife Species				
	<p>Based on available information, fixed-wing aircraft noise and human disturbance associated with periodic fish-stocking activities under alternative A would have a range of short-term negligible to minor effects on special status wildlife species.</p> <p>Fish removal does not occur under alternative A, so there would be no impacts on special status wildlife species from lake treatments to remove fish.</p>	<p>Fish-stocking activities under alternative B would have a range of short-term negligible to minor effects on some special status wildlife species but would be reduced from the effects that would occur under alternative A.</p> <p>The use of the chemical, antimycin, to remove fish is not known to have adverse impacts on amphibians. There would be long-term beneficial effects on some aquatic species because most high-density reproducing populations of fish would be replaced with low-density nonreproducing stocked fish.</p>	<p>Fish-stocking activities under alternative C would have a range of short-term negligible to minor effects on some special status wildlife species but would be reduced from the effects that would occur under alternatives A and B.</p> <p>Short-term impacts related to lake treatments to remove fish would be minor, mostly due to noise from helicopters transporting lake treatment equipment and human disturbance during treatment activities. Impacts from the use of antimycin to remove fish would be the same as under alternative B.</p>	<p>All fish stocking would be discontinued under alternative D.</p> <p>Short-term impacts related to lake treatments to remove fish would be minor, mostly due to noise from helicopters transporting lake treatment equipment and human disturbance during treatment activities. Impacts from the use of antimycin to remove fish would be the same as under alternative B.</p>





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Special Status Wildlife Species (continued)				
	<p>Based on the available information, alternative A would have no adverse effects on federally listed species from fish stocking. Regarding federally listed species:</p> <p>21 species may be affected but are not likely to be adversely affected (American peregrine falcon, California wolverine, Canada lynx, gray wolf, grizzly bear, marbled murrelet, Northern goshawk, Northern spotted owl, Pacific fisher, Yuma myotis, long-eared bat, bald eagle, harlequin duck, little willow flycatcher, olive-sided flycatcher, Cascades frog, Columbia spotted frog, northern red-legged frog, bull trout, Chinook salmon, Coho salmon).</p> <p>2 species would incur no effect (tailed frog and Western toad).</p> <p>1 species may be affected and is likely to be adversely affected (westslope cutthroat trout)—effects would be limited to one drainage downstream from McAlester Lake as a result of documented hybridization and colonization.</p> <p>Regarding state-listed species that are not federally listed, 6 species would incur short-term negligible to minor adverse impacts (solely from noise related to stocking activities), and the common loon would incur short-term negligible adverse impacts. Continuation of stocking would provide beneficial effects by</p>	<p>Based on the available information, alternative B would have no adverse effects on federally listed species from fish stocking or lake treatments to remove fish. Regarding federally listed species:</p> <p>23 species may be affected, but are not likely to be adversely affected: Same as A, with the addition of the Western toad, and western cutthroat trout.</p> <p>1 species would incur no effect (tailed frog).</p> <p>Regarding state-listed species that are not federally listed, 6 species would incur short-term negligible to minor adverse impacts from noise related to stocking and lake treatment activities, and the common loon would incur long-term minor to moderate adverse impacts due to the removal of its primary food source from Hozomeen Lake.</p> <p>Cumulative impacts would be the same as under alternative A.</p> <p>Impairment of special status wildlife species across the study area would not occur under alternative B.</p>	<p>Based on the available information, alternative C would have no adverse effects on federally listed species from fish stocking or lake treatments to remove fish. Regarding federally listed species:</p> <p>23 species may be affected, but are not likely to be adversely affected: Same as alternative B.</p> <p>1 species would incur no effect (tailed frog).</p> <p>Regarding state-listed species that are not federally listed, 6 species would incur short-term negligible to minor adverse impacts from noise related to stocking and lake treatment activities, and the common loon would incur long-term minor to moderate adverse impacts due to the removal of its primary food source from Hozomeen Lake.</p> <p>Cumulative impacts would be the same as under alternative A.</p> <p>Impairment of special status wildlife species across the study area would not occur under alternative C.</p>	<p>Based on the available information, alternative D would have no adverse effects on federally listed species from lake treatments to remove fish. Regarding federally listed species:</p> <p>22 species may be affected, but are not likely to be adversely affected (American peregrine falcon, California wolverine, Canada lynx, gray wolf, grizzly bear, little willow flycatcher, marbled murrelet, Northern goshawk, Northern spotted owl, olive-sided flycatcher, Pacific fisher, Yuma myotis, long-eared bat, bald eagle, harlequin duck, Cascades frog, Columbia spotted frog, northern red-legged frog, Western toad, bull trout, Chinook salmon, Coho salmon, and westslope cutthroat trout).</p> <p>2 species would incur no effect (Cascades frog and tailed frog).</p> <p>Regarding state-listed species that are not federally listed, 6 species would incur negligible to minor adverse impacts from noise related to fish removal activities, and the common loon would incur minor to moderate adverse impacts due to the removal of its primary food source from Hozomeen Lake.</p> <p>Cumulative impacts would be the same as under alternative A.</p> <p>Impairment of special status wildlife species across the study area would not occur under alternative D.</p>

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Special Status Wildlife Species (continued)				
	<p>supporting an adequate food base for nesting loons near Hozomeen Lake and other stocked lakes.</p> <p>Cumulative impacts on each special status species from projects or actions occurring throughout the region would be adverse; however, alternative A would contribute only a small increment to overall cumulative impacts.</p> <p>Impairment of special status wildlife species across the study area would not occur under alternative A.</p>			
Special Status Plant Species				
	<p>No lakes are treated for fish removal under alternative A.</p> <p>Fish-stocking activities at lakes with shoreline meadow or shrub vegetation would have short-term negligible to minor adverse impacts on any special status plants in the shoreline areas of lakes in cross-country zones or near camps with low visitor use. Stocking activities at lakes in zones or near camps with medium to high visitation would result in short-term negligible to moderate adverse impacts on any special status plants.</p> <p>Trampling by stock (horses, mules, llamas) and visitors (anglers and other visitors) would likely result in minor to moderate cumulative impacts at the lakes, depending on the intensity and type of use and location of sensitive plants.</p>	<p>Fewer lakes would be stocked under alternative B and select lakes would be treated for fish removal. Trampling during stocking activities may result in negligible to minor adverse impacts at lakes in cross-country zones or near camps that have low visitor use and negligible to moderate adverse impacts on any special status plants that may be present in the shoreline of lakes that are in zones or near camps that receive medium to high use. There would long-term beneficial effects on special status plant species at lakes where stocking would not occur.</p> <p>Trampling during mechanical and chemical lake treatment activities may result in short-term negligible to minor adverse impacts on any special status plants that may be present in the shoreline of lakes that are being treated.</p>	<p>Impacts from stocking activities would be similar to alternative B (negligible to moderate, overall), except that with considerably fewer lakes stocked, impacts would be reduced to negligible to minor and adverse over the long term.</p> <p>Impacts from mechanical and chemical lake treatment activities to remove fish would be similar to alternative B, although a higher number of lakes would be treated for fish removal under alternative C than under alternative B.</p> <p>Cumulative impacts would be similar to alternative B (negligible to moderate), except as fish stocking is eliminated in the park, impacts would be reduced to negligible over the long term.</p> <p>Impairment of special status plant species across the study area would not occur under alternative C.</p>	<p>Fish stocking would not occur under alternative D, which would result in long-term beneficial effects on special status plant species.</p> <p>Mechanical and chemical lake treatment activities to remove fish would result in impacts similar to alternatives B and C (short-term negligible to minor).</p> <p>Cumulative impacts would be negligible to minor, less than under alternative C.</p> <p>Impairment of special status plant species across the study area would not occur under alternative D.</p>





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Special Status Plant Species (continued)				
	Impairment of special status plant species across the study area would not occur under alternative A.	Cumulative impacts would be similar to alternative A but would be reduced as fish are removed from lakes, resulting in an overall range of negligible to moderate impacts. Impairment of special status plant species across the study area would not occur under alternative B.		
Vegetation				
	Fifty-nine of the 62 lakes in the study area where fishing would continue have meadow and/or shrub vegetation. Of these, about 75% have low to medium visitation, and vegetation would experience only negligible impacts. The remaining 25% that have high visitation would continue to experience long-term negligible to moderate adverse impacts from trampling. Forest shoreline vegetation would generally not be affected more than a negligible or minor level from visitor use, including angling. Cumulative impacts would be negligible to moderate and adverse over the long term. Impairment of vegetation across the study area would not occur under alternative A.	Twenty-nine of the 35 lakes in the study area where fishing would continue have meadow vegetation that is sensitive to trampling. Eleven of the 29 lakes are within cross-country zones or near camps that would continue to experience low visitor use, with resulting negligible to minor adverse impacts. Eighteen of the 29 lakes are within cross-country zones or near camps that would continue to experience medium to high visitor use, and vegetation would experience negligible to moderate impacts. In addition to the 29 lakes that are currently fishless in alternative A, alternative B would return 20 lakes to a fishless condition with possible negligible to minor benefits to shoreline meadow vegetation over time. Temporary negligible to minor adverse impacts on shoreline vegetation from trampling related to chemical or mechanical lake treatments would occur, and continued fishing as a means of natural removal would also	Alternative C would provide long-term benefits to meadow and sensitive forest vegetation from the return of 51 additional lakes to fishless conditions compared to alternative A. The majority of these lakes have meadow vegetation, and 29 of the 51 lakes are located in cross-country zones or near camps that receive a medium to high level of use. To the extent this use is attributable to fishing and fishing-related stock use, benefits to vegetation would occur at these lakes. Of the 9 lakes where fishing would continue, 6 are in cross-country zones or near camps that experience light use now, which would most likely continue to have negligible adverse impacts on vegetation. Three lakes are in cross-country zones or near camps that would continue to experience medium or high use, with resulting negligible to moderate adverse impacts on meadow vegetation.	Under alternative D, 62 additional lakes would be returned to fishless conditions compared to alternative A. Vegetation at these lakes would experience overall beneficial impacts. The degree of benefit would range from negligible to minor and would depend on the level of visitor use, access, sensitivity of the vegetation, and other factors. The majority of these lakes have meadow vegetation. Temporary negligible or minor adverse impacts on shoreline vegetation from trampling related to chemical or mechanical lake treatment would occur, and continued fishing as a means of natural removal also would have short-term negligible to minor adverse impacts. Adverse cumulative impacts would be negligible to moderate and long term.

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Vegetation (continued)				
		<p>have short-term negligible to minor adverse impacts.</p> <p>Adverse cumulative impacts would be negligible to moderate and long term.</p> <p>Impairment of vegetation across the study area would not occur under alternative B.</p>	<p>Temporary negligible or minor adverse impacts on shoreline vegetation from trampling related to chemical or mechanical lake treatment would occur, and continued fishing as a means of natural removal also would have short-term negligible to minor adverse impacts.</p> <p>Adverse cumulative impacts would be negligible to moderate and long term.</p> <p>Impairment of vegetation across the study area would not occur under alternative C.</p>	<p>Impairment of vegetation across the study area would not occur under alternative D.</p>
Cultural Resources				
	<p>Alternative A would not change the number of lakes for fishing or the number of anglers using them over the long term. Potential adverse impacts of unknown intensity on archeological resources would be mitigated to negligible to minor. Mitigation would also help keep impacts on historic structures from exceeding minor levels. Potential impacts on cultural landscapes would be mitigated to no greater than minor. No impacts on ethnographic resources are anticipated. For the purpose of compliance with section 106 of the <i>National Historic Preservation Act</i>, there would be no adverse effect on cultural resources. Adverse cumulative impacts would range from negligible to minor over the long term.</p>	<p>Possible impacts on archeological resources that would result from preparation of mechanical fish removal equipment and helicopter use (and associated landing pads adjacent to lakes) to transport the equipment would be mitigated to negligible to minor through survey and monitoring prior to use. Possible adverse impacts on historic structures are of unknown magnitude but would not likely exceed negligible to minor. Potential impacts on identified cultural landscapes would be mitigated to no greater than minor. The temporary water-quality degradation from chemicals used to remove fish would potentially result in adverse impacts of unknown intensity on ethnographic resources used by Native Americans for traditional purposes. Such impacts would be</p>	<p>The impact of reduced sport-fishing opportunities would result in negligible impacts on archeological resources in general, with beneficial effects as a result of the return of one lake identified as sensitive to a fishless state. Possible impacts on archeological resources that would result from preparation of mechanical fish removal equipment and helicopter use (and associated landing pads adjacent to lakes) to transport the equipment would be mitigated to negligible to minor through survey and monitoring prior to use. Adverse impacts on historic structures are likely to be negligible; the elimination of fishing at one particularly sensitive lake would result in a benefit to historic structures. Cultural landscapes in the study area may incur no greater than minor adverse impacts; in one case, a benefit to the resources would be realized. Impacts on ethnographic</p>	<p>Under alternative D, the long-term effects of elimination of fishing at all of the mountain lakes in the study area would result in reduced human fishing activity, a benefit to archeological resources in the North Cascades Complex. More specifically, those lake and trail areas identified as sensitive regarding cultural resources would incur benefits by way of reduced risk of disturbance. Possible impacts on archeological resources that would result from preparation of mechanical fish removal equipment and helicopter use (and associated landing pads adjacent to lakes) to transport the equipment would be mitigated to negligible to minor through survey and monitoring prior to use. Adverse impacts on cultural landscapes would likely be negligible; minor benefits may be realized at one designated cultural landscape where fishing would be eliminated. For the</p>





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Cultural Resources (continued)				
	<p>Impairment of cultural resources across the study area would not occur under alternative A.</p>	<p>mitigated to negligible through an agreement with the NPS, affected Tribes, and the State Historic Preservation Office regarding the timing of management activities and locations of specific areas that should be avoided. For the purpose of compliance with section 106 of the <i>National Historic Preservation Act</i>, there would be no adverse effect on cultural resources.</p> <p>Adverse cumulative impacts would range from negligible to minor over the long term.</p> <p>Impairment of cultural resources across the study area would not occur under alternative B.</p>	<p>resources would likely be mitigated to negligible. For the purpose of compliance with section 106 of the <i>National Historic Preservation Act</i>, there would be no adverse effect on cultural resources.</p> <p>There would be cumulative beneficial impacts for cultural resources from reduced human activity at a number of mountain lakes.</p> <p>Impairment of cultural resources across the study area would not occur under alternative C.</p>	<p>purpose of compliance with section 106 of the <i>National Historic Preservation Act</i>, there would be no adverse effect on cultural resources.</p> <p>Cumulative impacts would be beneficial.</p> <p>Impairment of cultural resources across the study area would not occur under alternative D.</p>
Visitor Use and Experience				
Recreational Use	<p>Impacts on non-anglers under alternative A would primarily be related to noise and disruption from fixed-wing aircraft stocking activities. Such adverse impacts would be negligible and temporary but would continue over the long term as stocking activities continue. Anglers would experience long-term beneficial impacts because they would continue to enjoy fishing activities unchanged from the past.</p> <p>Cumulative impacts would result from the partial loss of the Stehekin Valley Road due to flooding that occurred in the fall of 2003. The fate of the road is currently uncertain. If the road is not repaired, then access to backcountry portions of the</p>	<p>Adverse impacts on non-anglers under alternative B would primarily be related to lake treatment methods. These impacts would be negligible to minor adverse over the long term. Removal of fish from some lakes would reduce visitor use and have some long-term beneficial impacts on non-anglers seeking greater solitude in the backcountry. Impacts on most anglers overall would be minor to moderate, adverse, and long term from management actions under alternative B compared to alternative A. Major adverse impacts would occur to some anglers who believe fishing in North Cascade Complex lakes is a truly unique experience that cannot be duplicated elsewhere.</p>	<p>Same as alternative B.</p> <p>Major adverse impacts would occur to some anglers who believe fishing in North Cascade Complex lakes is a truly unique experience that cannot be duplicated elsewhere.</p>	<p>Same as alternative B.</p> <p>Major adverse impacts would occur to some anglers who believe fishing in North Cascade Complex lakes is a truly unique experience that cannot be duplicated elsewhere.</p> <p>Overall, cumulative impacts would be moderate, adverse, and long term. The cumulative impact of reduced access in the Stehekin Valley due to flood damage would be minor adverse or beneficial to backcountry users.</p>

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Visitor Use and Experience (continued)				
Recreational Use (continued)	Stehekin Valley may be more difficult, and this would reduce the amount of backcountry visitation. Some visitors might enjoy the increased solitude and wilderness setting, while others might lament the reduced access to backcountry areas in the Stehekin Valley, including fishable lakes. Therefore, adverse cumulative impacts on visitor use would be minor to moderate over the long term.	Cumulative impacts related to angler displacement to overused areas outside the North Cascades Complex would overall be minor to moderate, adverse, and long term. The cumulative impact of reduced access in the Stehekin Valley due to flood damage would be minor adverse or beneficial to backcountry users.		
Social Values	Continuation of existing management actions under alternative A would have a beneficial effect on the social values of anglers and angler groups because stocking and sport fishing would not change. Impacts on social values of conservationists and conservation groups would be long term, moderate to major, and adverse. Continuation of management actions as described in alternative A would not alter angler use; therefore, cumulative impacts on social values of anglers would be long term and beneficial. Continuation of management actions as described in alternative A would have a moderate to major adverse cumulative impact on conservationists and conservation groups.	Alternative B would have a minor adverse impact on the social values of anglers and angler groups over the long term because some level of stocking and sport fishing would continue over the long term. Impacts on social values of conservationists and conservation groups would be beneficial for some who would support the new management framework but moderate to major adverse and long term for those who oppose any stocking of lakes over the long term. Alternative B would have a moderate to major adverse cumulative impact on conservationists and conservation groups, but some may support the adaptive management approach, which may reduce impacts to some degree. Cumulative impacts on anglers and angling groups would be moderate to major, adverse, and long term, but some may support the adaptive management approach, which may reduce impacts to some degree. Cumulative impacts related to flood damage to upper Stehekin Valley Road would be minor to moderate, adverse, and long term.	Alternative C would have a moderate to major adverse impact on the social values of anglers and angler groups over the long term because sport fishing would eventually be eliminated in the national park, and many anglers and angler groups believe that fishing in the park is a unique opportunity that cannot be duplicated elsewhere. Impacts on social values of conservationists and conservation groups would be the same as under alternative B. Cumulative impacts would be the same as under alternative B.	Alternative D would have a moderate to major adverse impact on the social values of anglers and angler groups over the long term, especially for those who use and value the park for this experience. Anglers may choose to pursue sport fishing outside the North Cascades Complex. Overall, impacts on social values of conservationists and conservation groups would be beneficial. Cumulative impacts would be the same as under alternative B.





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Visitor Use and Experience (continued)				
Wilderness Values	<p>Backpack stocking would have a short- and long-term negligible direct impact on visitor solitude. Given the brief and infrequent nature of fixed-wing aircraft stocking, there would be a short- and long-term minor adverse impact on opportunities for solitude.</p> <p>Sport-fishing opportunities would remain at current levels. This would result in long-term negligible impacts on opportunities for solitude for those areas that receive relatively little use, and would result in long-term minor adverse impacts on opportunities for solitude for those areas that receive high use.</p> <p>Impacts on other visitors' opportunities for primitive recreation in high-use areas over the summer would be long-term minor to moderate and adverse.</p> <p>Those with an anthropocentric perspective (valuing human use and enjoyment of wilderness) would experience negligible long-term impacts under alternative A.</p> <p>Those with strong biocentric views (support protection of natural processes in wilderness areas) of wilderness would experience major, long-term adverse impacts by the continued fishery management practices under alternative A. Impacts on wilderness users who are unaware that fish are present in the lakes would be negligible over the long term.</p> <p>Cumulative impacts on fishing opportunities in mountain lakes from</p>	<p>Backpack and fixed-wing aircraft stocking would result in impacts similar to alternative A, except fewer lakes would be stocked.</p> <p>Fishery management actions would reduce sport-fishing opportunities compared to alternative A. This would result in a long-term minor beneficial impact on opportunities for solitude in some areas. However, some lakes in certain high-use areas would remain fishable, resulting in minor adverse impacts on opportunities for solitude over the long term. The impacts on solitude from fish removal activities would be minor to moderate and adverse over the long term.</p> <p>Anglers who choose to fish elsewhere due to the reduced fishing opportunities would experience long-term minor adverse impacts. Anglers who believe the fishing experience cannot be duplicated elsewhere would experience long-term major adverse impacts. Impacts on other visitors' opportunities for primitive recreation in high-use areas over the summer would be minor to moderate adverse over the long term.</p> <p>Those with anthropocentric perspective would experience negligible long-term impacts under alternative B. Those with an anthropocentric perspective may view the application of a science-based adaptive management plan as a negligible impact, and some may view this as beneficial. Those with strong biocentric views of wilderness would experience long-term major</p>	<p>Backpack and fixed-wing aircraft stocking would result in impacts similar to alternative A, except to a lesser degree because fewer lakes would be stocked, and these lake would only be in the national recreation areas.</p> <p>Fishery management actions would reduce sport-fishing opportunities compared to alternatives A and B. Sport-fishing opportunities would be eliminated in national park lakes but would continue to exist in select national recreation area lakes. This would result in a long-term moderate beneficial impact on opportunities for solitude in some areas. However, some lakes in certain high-use areas would remain fishable, resulting in long-term minor adverse impacts on opportunities for solitude. Impacts on solitude from fish removal activities would be long term minor to moderate and adverse. Anglers who choose to fish elsewhere due to the reduced fishing opportunities would experience long-term minor adverse impacts. Anglers who believe the fishing experience cannot be duplicated elsewhere would experience major adverse long-term impacts. Impacts on visitor opportunities for primitive recreation in high-use areas over the summer would be long term minor to moderate and adverse.</p> <p>Those with an anthropocentric perspective would experience long-term moderate adverse impacts under alternative C due to the loss of</p>	<p>Sport-fishing opportunities would be vastly reduced compared to alternative A because all stocking in the North Cascades Complex would cease, and fish would be removed from all lakes, where feasible. This would result in long-term moderate to major beneficial impacts on opportunities for solitude in areas where fishing opportunities are eliminated. However, fishing opportunities would continue to exist in the 10 deep lakes where complete fish removal may not be feasible, resulting in long-term minor adverse impacts on opportunities for solitude.</p> <p>Impacts on solitude from fish removal activities would be minor to moderate and adverse over the long term.</p> <p>Anglers who choose to fish elsewhere due to reduced fishing opportunities would experience long-term minor adverse impacts. Anglers who believe the fishing experience cannot be duplicated elsewhere would experience long-term major adverse impacts.</p> <p>The cessation of anglers using wilderness would result in long-term beneficial impacts on other visitors.</p> <p>Those with an anthropocentric perspective would experience long-term major adverse impacts. Those with an anthropocentric perspective may view the application of a science-based adaptive management plan to remove fish as a negligible impact, and some would view this as beneficial.</p>

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Visitor Use and Experience (continued)				
Wilderness Values (continued)	<p>reduced access would likely be negligible over the short and long terms.</p> <p>There would be a long-term major adverse cumulative impact on those who believe that continued stocking and continued presence of reproducing fish populations under alternative A would compromise natural processes in wilderness.</p> <p>There would be long-term negligible cumulative impacts on those who believe that human use and enjoyment of wilderness should continue.</p>	<p>adverse impacts from fishery management actions under alternative B. Some with biocentric perspectives would view the application of a science-based adaptive management plan as beneficial over the long term. Impacts on wilderness users who are not aware that fish are present in the lakes would be negligible over the long term.</p> <p>Cumulative impacts on fishing opportunities in mountain lakes from reduced access would likely be negligible over the short and long terms.</p> <p>There would be a long-term major adverse cumulative impact on those who believe that the continued stocking (as proposed under alternative B) in wilderness and continued presence of reproducing populations of fish would compromise natural processes in wilderness. There would be long-term negligible cumulative impacts on those who believe that human use and enjoyment of wilderness should continue. Depending on one's views regarding the application of science-based adaptive management principles in wilderness areas, cumulative impacts would be long term beneficial or adverse. Fishery management actions, including fish removal, would have a minor adverse cumulative impact on solitude over the long term.</p>	<p>fishable lakes in the national park; however, fishing opportunities would still remain in wilderness areas in select national recreation area lakes. Those with an anthropocentric perspective may view the application of a science-based adaptive management plan as a negligible impact, and some may view this as beneficial over the long term. Those with strong biocentric views of wilderness would experience long-term major adverse impacts from the fishery management actions under alternative C. Some with biocentric perspectives may view the application of a science-based adaptive management plan as beneficial over the long term. Impacts to wilderness users who are not aware that fish are present in the lakes would be negligible over the long term.</p> <p>Cumulative impacts on fishing opportunities in mountain lakes from reduced access would likely be negligible over the short and long terms.</p> <p>There would be a long-term major adverse cumulative impact on those who believe that the stocking proposed under alternative C and continued presence of reproducing populations of fish would compromise natural processes in wilderness. There would be long-term negligible cumulative impacts on those who believe that human use and</p>	<p>Those with strong biocentric views of wilderness would experience major long-term beneficial impacts because all fish would be removed (where feasible) under alternative D. Some with a biocentric perspective may view the application of a science-based adaptive management plan as beneficial over the long term. Impacts to those wilderness users who would not be aware that nonnative fish have been removed from the lakes would be negligible over the long term.</p> <p>Cumulative impacts on fishing opportunities in mountain lakes from reduced access would likely be negligible over the short and long terms. There would be major long-term beneficial cumulative impacts on those who believe that continued stocking in wilderness and continued presence of reproducing populations of fish would compromise natural processes. There would be long-term major adverse cumulative impacts on anglers who believe that human use and enjoyment of wilderness should continue. Depending on one's views regarding the application of science-based adaptive management principles to remove fish from wilderness areas, cumulative impacts either would be beneficial or adverse over the long term. Fishery management actions, including fish removal, would have minor adverse cumulative impacts on solitude over the long term. Due to the cessation of</p>





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Visitor Use and Experience (continued)				
Wilderness Values (continued)			enjoyment of wilderness should continue. Depending on one's views regarding the application of science-based adaptive management principles in wilderness areas, cumulative impacts either would be beneficial or adverse over the long term. Fishery management actions, including fish removal, would have a long-term minor adverse cumulative impact on solitude. Due to the cessation of stocking in national park lakes, long-term moderate beneficial cumulative impacts on wilderness values would be expected.	stocking, moderate to major beneficial cumulative impacts on wilderness values would be expected over the long term. The displacement of anglers to other wilderness areas would result in negligible adverse cumulative impacts, even if all anglers decided to fish elsewhere.
Human Health				
	Alternative A would have negligible impacts on human health over the long term from the consumption of stocked fish that may have been exposed to persistent organic pollutants and methyl-mercury, and no adverse impacts on human health from any lake treatment chemicals since none would be used. Cumulative impacts on human health would be negligible adverse over the long term.	Impacts from stocking decisions and consumption of stocked fish would be the same as alternative A. Proposed chemical treatments that would be used to remove fish from 19 lakes would have long-term negligible adverse impacts on human health. Cumulative impacts on human health would be negligible to minor adverse over the long term.	Impacts from stocking decisions and consumption of stocked fish would be the same as alternative A. Impacts from the proposed chemical treatment of 25 lakes would be the same as alternative B. Cumulative impacts on human health would be the same as alternative B.	Impacts from consumption of fish from previously stocked lakes would be the same as alternative A. Impacts from the proposed chemical treatment of 25 lakes would be the same as alternative B. Cumulative impacts on human health would be the same as alternative B.

TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Socioeconomic Resources				
	<p>Alternative A would have long-term negligible impacts on the local and regional economies. Estimated revenues from mountain lake angling account for roughly \$1 out of every \$100,000 spent in the three-county region. The effects of continuation of the current fishery management program on some local businesses in the Stehekin area would be beneficial since some patrons may also engage in sport fishing in the mountain lakes located in Lake Chelan National Recreation Area.</p> <p>Expenditures associated with sport fishing in the mountain lakes in the North Cascades Complex would continue to have long term negligible cumulative impacts on the local and regional economies.</p>	<p>Similar to alternative A but with potential long-term major adverse impacts on a limited number of businesses in Stehekin due to reduced fishing opportunities in mountain lakes.</p> <p>Cumulative impacts would be similar to alternative A.</p>	<p>Similar to alternative B, except that anglers who no longer would have fishing opportunities in high mountain lakes in the national park may choose to fish in the national recreation areas. This would have a beneficial long-term impact on local businesses in Stehekin. However, if the number of anglers choosing to fish in the mountain lakes in the recreation areas substantially decrease, there would be a long-term major adverse impact on some businesses in Stehekin.</p> <p>Cumulative impacts on the local and regional economies overall would be long term and negligible, while some businesses in Stehekin may experience long-term major adverse impacts because other visitor uses are not expected to increase substantially. There would be beneficial economic impacts on Stehekin area businesses if anglers chose to fish in the Lake Chelan National Recreation Area because fishing in the mountain lakes outside of the national recreation areas would be eliminated.</p>	<p>Overall, the local and regional economies would experience long-term negligible to minor adverse impacts from the elimination of sport fishing in the mountain lakes in the study area. Compared to alternative A, some Stehekin businesses would experience long-term major adverse impacts under alternative D if their primary source of income is from anglers who fish in the study area lakes.</p> <p>Overall, cumulative impacts would be long term, negligible, and adverse.</p>
Management and Operations				
	<p>Alternative A would have a negligible to minor adverse impact on management and operations over the long term. Total implementation costs would be \$270,000 over a 15-year period and would primarily be borne by the WDFW. Average annual costs would be approximately \$18,000 per year.</p>	<p>Alternative B would have moderate adverse impacts on management and operations over the long term, assuming all sources of funding remain fairly constant. Total implementation costs would be approximately \$2.14 million over the next 15 years. Average annual costs</p>	<p>Alternative C would have similar moderate adverse impacts on management and operations as alternative B over the long term. Total implementation costs would be approximately \$2.84 million over the next 15 years. Average annual costs would be similar to alternative B, but</p>	<p>Alternative D would have moderate adverse impacts on management and operations over the long term, assuming all funding sources remain fairly constant. Total cost of implementing alternative D would be approximately \$3 million over the next 15 years. Average annual costs</p>





TABLE 3: SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONTINUED)

Impact Topics	Alternative A (No Action) Existing Framework of 91 Lakes	Alternative B Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative)	Alternative C Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish)	Alternative D 91 Lakes Would Be Fishless (Environmentally Preferred Alternative)
Management and Operations (continued)				
	<p>Cumulative impacts would be negligible to minor and adverse over the long term.</p>	<p>for implementation are projected at approximately \$112,100 for the first three years. As experience is gained conducting lake treatment and management, the number of lakes treated increases, raising costs to nearly \$150,000 per year. Future stocking would be funded and implemented by the WDFW. However, should a long-term increase in NPS base funding for fishery management become available, implementing alternative B would have negligible to minor adverse impacts over the long term. Other sources of funding would be sought to reduce impacts on the park's operating budget.</p> <p>Cumulative adverse impacts on operations could arise from the need to respond to future unanticipated events such as flooding, wildfire, or other events. However, the magnitude of adverse impacts may range from negligible to major depending on the severity of individual future events, which could reduce the amount of potential funding available to implement the fishery management plan or cause the NPS to shift priorities to respond to more pressing needs.</p>	<p>the additional lakes targeted for fish removal would increase the total cost.</p> <p>Future stocking would be funded and implemented by WDFW. Similar to alternative B, if a long-term increase in NPS base funding becomes available, adverse impacts would become minor. Other sources of funding would be sought to reduce impacts on the park's operating budget.</p> <p>Cumulative impacts would be the same as alternative B.</p>	<p>for fish removal would be similar to alternative C. Although there are no average annual costs associated with fish stocking, the additional costs of protection required to prevent unsanctioned stocking of lakes would increase total implementation costs. Other sources of funding would be sought to reduce impacts on the park's operating budget.</p> <p>Cumulative impacts would be the same as alternative B.</p>

Human Health—analyzes potential effects of persistent organic pollutants, methyl-mercury, and chemical treatments to remove fish.

Visitor use and experience—includes recreational use, social values, and wilderness values.

Socioeconomic Resources—includes expenditures associated with sport fishing.

Management and operation of the North Cascades Complex—looks at current and future budgets and the costs related to fishery management now and in the future.

AGENCY CONSULTATION

USDA—FOREST SERVICE

Mount Baker-Snoqualmie, Wenatchee, and Okanogan National Forests adjoin the North Cascades Complex. The Forest supervisors for these units were regularly briefed on research results and the planning process. The forests chose not to be directly involved in the planning process for this plan/EIS, having stated that the WDFW manages the mountain lakes fishery on Forest Service lands.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Consultation with the WDFW began with a meeting in Sedro-Woolley, Washington, on October 1, 2002. During the meeting, it was determined that Mark Downen, inland fisheries biologist, would be the principal representative for the department. Mr. Downen requested that Bob Pfeifer, currently with the WDFW (formerly an inland fisheries management biologist and high lakes fishery manager with WDFW), also be involved because of his extensive experience in mountain lakes fishery management. The WDFW agreed to serve as a cooperating agency in the NEPA process. The regional director for the WDFW, Bob Everitt, is the principal contact for policy issues, and the inland fisheries biologist, Mark Downen, is the contact for technical issues. The correspondence documenting the role of the department as a cooperating agency is contained in the project's administrative record.

On July 17, 2003, Roy Zipp, Natural Resources Specialist of the North Cascades Complex, consulted with Cynthia Pratt, the WDFW coordinator for Washington State Environmental Protection Act (SEPA) and NEPA issues, to determine whether the NEPA process would suffice for the Washington SEPA. Ms. Pratt followed up the phone conversation in

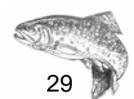
writing with SEPA-related materials and guidance for producing an environmental impact statement that meets the SEPA requirements.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Discussions with the U.S. Environmental Protection Agency (EPA) began following their review of the notice of intent. Tom Connor, EPA environmental specialist, requested (via a telephone conversation with Roy Zipp on March 6, 2003) that he be included in all email correspondence. Mr. Connor also requested that the NPS include in their impact analysis (1) water quality, nonnative fish as pollutants; and (2) impacts to bull trout from downstream dispersal. Mr. Connor also recommended consultations with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Since that initial phone call, Mr. Connor was included on all email correspondence, including Technical Advisory Committee discussions. In a subsequent phone conversation between Roy Zipp and Tom Connor on July 17, 2003, Mr. Connor and Mr. Zipp discussed the need to document, in writing, that the EPA had been consulted. Mr. Connor said that such written documentation was not necessary; continued dialogue via email would suffice, and he was looking forward to reviewing the draft plan/EIS.

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service was first notified of the proposed plan/EIS for the North Cascades Complex at the start of the scoping process. Letters were sent to several regional offices and various personnel. No comments or feedback were received. Informal consultations with the service began in the summer of 2003, with a written request for an up-to-date species list and any information on the current status on the westslope cutthroat trout. The U.S. Fish and Wildlife Service requires a biological assessment that evaluates the impacts of proposed actions on listed species. They also recommended evaluating impacts to candidate species, since those species could be listed in the future. The service suggested that federal agencies, particularly the NPS, should be proactive in its efforts to prevent listing of species. Both the letter of request from the NPS and the reply from the U.S. Fish and Wildlife Service are included in appendix C. Also included in appendix C are tables listing special status species in the North Cascades Complex. Discussions with the U.S. Fish and Wildlife Service continue, with Linda Saunders as the principal contact. In July 2006, the Biological Assessment was revised to include an analysis of impacts to critical habitat for bull trout. The NPS received a concurrence letter from the U.S. Fish and Wildlife Service on August 18, 2006. In 2007,



SUMMARY

consultation was updated. The updated consultation letters are included in appendix C.

NATIONAL MARINE FISHERIES SERVICE

Informal consultations with the National Marine Fisheries Service (NOAA Fisheries) began in the summer of 2003 with a telephone conversation with Tom Sibley of the Habitat Conservation Division. Mr. Sibley recommended that the NPS evaluate impacts to Chinook salmon (threatened) and Coho salmon (candidate). When asked if NOAA Fisheries would like to receive a written request for their input, Mr. Sibley stated that the phone dialogue would suffice and pledged further technical assistance with the biological assessment, as needed.

NATIVE AMERICAN TRIBES

A public scoping letter requesting input was sent to the following tribes on March 31, 2003: Yakama Nation, Skagit System Cooperative, Nlakapamux National Tribal Council, Swinomish Tribe, Sauk-Suiattle Indian Tribe, Nooksack Tribal Office, and Colville Confederated Tribes. Mr. Larry Campbell, of the Swinomish Tribe, was the single tribal representative who responded during public scoping. Mr. Campbell expressed the concern that if any ground disturbance could occur from high lakes fishing activities, there should be compliance with section 106 of the *National Historic Preservation Act*.

Further consultations with the Skagit and Swinomish tribes were conducted by park archeologist, Bob Mierendorf, to determine whether or not the widespread belief that stocking is a modern practice that was not performed by native people. All responded that they had never heard of stocking prior to European settlement, though several individuals suggested it might have been possible. Based on this response, the decision was made to dismiss ethnographic resources, including the cultural practice of stocking, as an issue in this plan/EIS.

WASHINGTON STATE HISTORIC PRESERVATION OFFICE

The Washington State Historic Preservation Office (SHPO) was consulted in the summer of 2003

regarding their cultural resource and ethnographic concerns related to mountain lakes fishery management. The SHPO did not envision any concerns for the various actions under consideration but expressed interest in receiving appropriate correspondence. A copy of the draft plan/EIS was sent to the SHPO and comments were not received.

U.S. GEOLOGICAL SURVEY

Early in the planning process, the U.S. Geological Service (USGS) Forest Range and Experiment Station expressed its decision to not be involved in this plan/EIS in order to maintain scientific objectivity. This is because scientists from the USGS and Oregon State University completed a long-term research study to determine how continued stocking practices would affect native biota in mountain lakes in the North Cascades Complex (see the "Purpose of and Need for Action" chapter for a summary of how that research was used in this plan/EIS). Informal discussions with various staff members from the USGS have occurred throughout the planning process. These discussions have served to clarify elements of their research findings and on gathering additional data and information to support this plan/EIS.

PUBLIC COMMENT

The Environmental Protection Agency Notice of Availability (NOA) was published on May 31, 2005. The publication of the NOA initiated an 83-day public comment period that ended August 15, 2005.

Correspondence received during the public comment period included letters, electronic mail, transcripts from public meetings, and comments on the NPS Planning, Environment and Public Comment (PEPC) website. The park received 65 pieces of correspondence from individuals, correspondences from members and representatives of: 7 recreational groups, 1 business, 2 federal government agencies, 1 state government, and 4 conservation and preservation groups. The correspondence contained 475 comments on various topics. All correspondence received during the public comment period may be viewed at the park headquarters during regular business hours.

FOR A COMPLETE SET OF DOCUMENTS PLEASE SEND YOUR REQUEST TO THE SUPERINTENDENT'S OFFICE

**PALMER JENKINS, SUPERINTENDENT
NORTH CASCADES NATIONAL PARK SERVICE COMPLEX
810 STATE ROUTE 20
SEDRO-WOLLEY, WA 98284**

