



NORTH CASCADES NATIONAL PARK
SERVICE COMPLEX

Mountain Lakes Fishery Management Plan

Draft

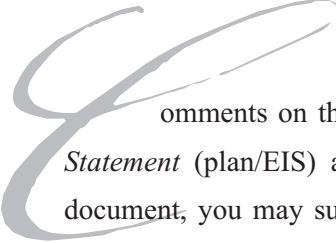


Environmental Impact Statement

VOLUME ONE

MAY 2005

How to Comment on this Document



Comments on this *Draft Mountain Lakes Fishery Management Plan / Environmental Impact Statement* (plan/EIS) are welcome. If you wish to respond to the information contained in this document, you may submit your comments by any one of several methods. It is important to note that all comments must be postmarked, transmitted, or logged no later than 90 days from the date the U.S. Environmental Protection Agency filing notice is published in the *Federal Register*. This deadline will be posted on the North Cascades National Park Service Complex website at <http://www.nps.gov/noca/highlakes.htm> and will be published in a press release in local and regional newspapers. Written comments can be mailed to

Bill Paleck, Superintendent
Mountain Lakes Fishery Management Plan/EIS
North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284-1239

Reviewers are encouraged to submit comments, ideas, or questions online at the National Park Service Planning, Environment, and Public Comment (PEPC) website (<http://parkplanning.nps.gov/noca>). Once at the website, click on the “Mountain Lakes Fishery Management Plan/EIS” link, then click on “Documents and Links,” then click on the “Draft Mountain Lakes Fishery Management Plan/EIS” link—this will bring up the draft plan/EIS and a link to an online comment form.

You may hand deliver comments at one of the several public meetings to be announced in the media following release of this document. Meeting details will be posted on the project website listed above. Comments can be hand delivered to the North Cascades Complex headquarters in Sedro-Woolley (810 State Route 20). Comments can also be faxed to 360.856.1934, attention: Mountain Lakes Fishery Management Plan/EIS.

We may not consider anonymous comments. However, individual respondents may request that we withhold their address from the decision-making record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent’s identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.

**UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE**

DRAFT MOUNTAIN LAKES FISHERY MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT

North Cascades National Park Service Complex, Washington

Lead Agency: National Park Service (NPS), U.S. Department of the Interior

Cooperating Agency: Washington Department of Fish and Wildlife (WDFW)

This *Draft Mountain Lakes Fishery Management Plan / Environmental Impact Statement* (plan/EIS) evaluates a range of alternatives and management actions for 91 naturally formed mountain lakes in the North Cascades National Park Service Complex (North Cascades Complex) that currently have, or at one time had, a fish presence as a result of either documented or undocumented fish stocking activities. Under natural conditions, these 91 mountain lakes would be fishless, but available records indicate these lakes have either been stocked in the past or are stocked now. This plan/EIS assesses impacts that could result from continuation of the current management framework (the no-action alternative) or from implementation of any of the three proposed action alternatives. The purpose of the fishery management plan is to guide future actions by the NPS and WDFW that would conserve native biological integrity; provide a spectrum of recreational opportunities and visitor experiences, including sport fishing; and resolve the long-standing debate and conflicts over fish stocking in the 91 naturally fishless mountain lakes in the North Cascades Complex. Upon conclusion of the plan/EIS and decision-making process, one of the four alternatives would become the “Mountain Lakes Fishery Management Plan” and guide future actions for a period of 15 years.

Alternative A—No Action, Existing Management Framework of 91 Lakes (62 Lakes Have Fish). No new management actions were applied. This alternative assumes that the existing management decisions, without any new criteria or factors, would continue.

Alternative B, Proposed Adaptive Management of 91 Lakes under a New Framework (42 Lakes May Have Fish) (Preferred Alternative). The proposed management framework would be to eliminate high densities of reproducing fish populations from lakes while allowing low densities of reproducing and nonreproducing fish populations in select lakes. After monitoring or evaluation, restocking of nonreproducing fish would be allowed in certain lakes only if impacts on biological resources could be minimized. Lakes that are currently fishless would remain fishless. The possible future outcome would be that recreational fishing opportunities may occur in up to 42 lakes.

Alternative C, Proposed Adaptive Management of 91 Lakes under a New Framework (11 National Recreation Area Lakes May Have Fish). The proposed management framework would be to eliminate high densities of reproducing fish populations from lakes while allowing low densities of reproducing and nonreproducing fish populations in select lakes in the Ross Lake and Lake Chelan National Recreation Areas (NRA) and to maintain currently fishless NRA lakes as fishless. The possible future outcome would be that 11 NRA lakes may have fish and 11 would be fishless, and 69 national park lakes would either remain fishless or become fishless over time.

Alternative D, 91 Lakes Would Be Fishless (Environmentally Preferred Alternative). The emphasis of this alternative would be to eliminate all fish from the mountain lakes in the study area. Currently, 62 of the 91 lakes have fish, 29 lakes are fishless.

The review period for this document will end 90 days after the U.S. Environmental Protection Agency has accepted this document and published a “Notice of Availability” in the *Federal Register*. All review comments must be received by that time and addressed to

Bill Paleck, Superintendent
Mountain Lakes Fishery Management Plan/EIS
North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284-1239

For further information, write the above address or call the superintendent’s assistant at 360.856.5700, ext 351.

EXECUTIVE SUMMARY

This *Draft Mountain Lakes Fishery Management Plan / Environmental Impact Statement* (plan/EIS) 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/EIS assesses the impacts that could result from continuation of the current management framework (the no-action alternative) or implementation of any of the three action alternatives. Upon conclusion of the plan/EIS and decision-making process, one of the four alternatives would become the “Mountain Lakes Fishery Management Plan” and guide future fishery management actions for a period of 15 years.

This plan/EIS is mostly programmatic in nature, which means it provides a framework for taking a range of management actions. Some actions would require additional, more site-specific analyses before they could be implemented. If additional analyses are required, environmental compliance, including an opportunity for public comment, would be completed.

The National Park Service (NPS) is the lead agency for development of this plan/EIS, and the Washington Department of Fish and Wildlife (WDFW) is a cooperating agency.

PROJECT SITE LOCATION

The 684,000-acre North Cascades Complex is located in the northwest part of Washington State, with its northern boundary forming the international border with Canada. 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 geographical study area for this plan/EIS, but the focus of this document 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 North Cascades Complex contains 561 natural water bodies that include lakes, tarns, and ponds. Approximately 245 of these water bodies are considered mountain lakes because of their elevation, size, and depth. At least 154 of the 245 lakes have always been, and would continue to be, fishless regardless of the alternative selected. Because no changes in this policy are anticipated for any of the 154 lakes, and because they have never been part of the managed fishery at the North Cascades Complex, they are not addressed further in this document, nor are the reservoirs, streams, and their associated beaver ponds.

State Route 20 follows the Skagit River and Skagit River Hydroelectric Project for much of its way through the North Cascades Complex.

“Map 1” (contained in the envelope that accompanied this plan/EIS) 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/EIS is to guide management actions by the NPS and WDFW in order to

Biological integrity refers to “the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region” (Karr and Dudley 1981).

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 in the naturally fishless mountain lakes in North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area (which together make up the three NPS administrative units known as “North Cascades National Park Service Complex” or “the North Cascades Complex”)

NEED FOR ACTION

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 2001a, 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 define the fishing and fish-stocking activities that would be allowed within its boundaries, and partly because the area has a history of fish management by the state of Washington and sport fishing groups. This history of fish management pre-dates the 1968 establishment of the North Cascades Complex by many years.

“Biota” refers to the combined plant and animal life of a particular region.

Because of the differences in policies and missions between the WDFW and the NPS, the two agencies drafted a Memorandum of Understanding in 1985, followed by a Supplemental Agreement in 1988 that 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 while further studies were being done. A long-term research study was then initiated to determine how continued stocking practices would affect native biota in mountain lakes.

Before this research could be completed, the NPS was challenged in court by the North Cascades Conservation Council on several issues relating to management of the North Cascades Complex. As a result, the NPS entered into a 1991 Consent Decree, wherein the NPS agreed to complete its research and then



“conduct a NEPA [*National Environmental Policy Act*] review of the fish stocking of naturally fish-free lakes.” The research was completed in July 2002 (Liss et al. 2002) by a team that included scientists from the U.S. Geological Survey (USGS) - Biological Resources Division and Oregon State University (OSU). The research was completed in three phases, and full reports of the findings are available at <http://www.nps.gov/noca/pphtml/relatedlinks.html>. This plan/EIS was initiated shortly after the research was completed and is the document required in the 1991 Consent Decree.

OBJECTIVES IN TAKING ACTION

Objectives are more specific statements of purpose that support the goals an alternative must meet, to a large degree, for this plan/EIS to be considered a success. Meeting objectives to a large degree is part of what makes an alternative “reasonable.” Objectives also support the purpose of this plan/EIS 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/EIS:

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.

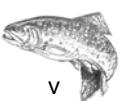
Apply science and research in decision-making at multiple spatial scales that include landscape, watershed, lake cluster, and individual lakes.

Provide to the public and interested parties full and open access to available information.

BACKGROUND

HISTORY OF FISH MANAGEMENT IN NORTH CASCADES MOUNTAIN LAKES

Settlers began stocking North Cascades lakes in the late 1800s with exotic (nonnative) fish. By the 20th century, stocking was a routine management practice of the U.S. Forest Service and various counties. In 1933 the Washington Department of Game (currently the WDFW) assumed responsibility for stocking mountain lakes throughout the state in order to establish and maintain a recreational fishery. The department’s involvement grew largely out of the need to prevent haphazard stocking by individuals without expertise in biology. With particular emphasis on systematic assessment of fish species and stocking rates, the department conducted the first high-lakes fisheries research. Since its creation, many agencies and groups have collaborated to assist in managing the



natural resources in the North Cascades Complex. These include state and federal agencies, such as the WDFW, and sport fishing groups such as the Washington State Hi-Lakers and Trail Blazers, Inc.



*Fish stocking
Thunder Lake
in the early years.*

Fish stocking in the mountain lakes took place for many years prior to the establishment of the North Cascades Complex in 1968; however, the enabling legislation for this newly formed unit of the national park system did not define the fishing and fish-stocking activities that would be allowed within its boundaries; thus, the appropriateness of continued fish stocking in the naturally fishless mountain lakes was an issue debated between the NPS and WDFW for many years.

To resolve differences in policy and to foster a spirit of cooperation, the NPS and WDFW negotiated a series of agreements beginning in 1979 that allowed stocking to continue in select lakes in the North Cascades Complex.

Currently, the management of mountain lakes is performed under a temporary extension of the 1985 Memorandum of Understanding and 1988 Supplemental Agreement between the two agencies. Both of these documents were written “to continue cooperative efforts in management of protection and enhancement of the fisheries and wildlife resources of mutual concern.” The Memorandum of Understanding provided the following three management directives for both the NPS and the WDFW:

To consult with the Department [WDFW] prior to initiating research projects or implementing plans, programs, or regulations affecting fish and wildlife species distribution, numbers, or public use of fish and wildlife found within areas administered by the Service [NPS].

To practice those forms of management which will benefit fish and wildlife, and their habitats, and to maintain or restore their natural and historic distribution and abundance, consistent with the respective Service [NPS] policies and park objectives.

To permit the harvest of fish and wildlife in accordance with applicable state laws and regulations of the Department [WDFW] in those areas under the jurisdiction of the Service [NPS], which are open to hunting and/or fishing. It is recognized that some park regulations may vary for management purposes.

To be able to continue stocking in light of NPS policies generally prohibiting it, a memorandum from the NPS Director was issued in 1986 (hereinafter referred to as the “policy waiver”). The policy waiver states “fishing is an acceptable recreational activity in the park, provided it is done consistent with *NPS Management Policies* and with provisions of the *General Management Plan*, and other approved plans.” The policy waiver only allowed stocking with fish species that are native to the national park or native to the ecological region. The waiver acknowledged long-standing fish-stocking practices and allowed for continued



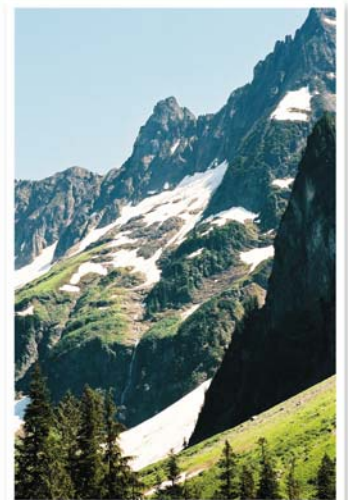
stocking in select lakes while ecological research was conducted to determine the impacts of fish stocking. A long-term research study was initiated by Oregon State University soon after the 1988 Supplemental Agreement was finalized. The Supplemental Agreement between the NPS and WDFW that permits fish stocking in the national park was reaffirmed in February 2000 and again in July of 2002. The agreement expired in December 2004, and any future agreements between the NPS and WDFW concerning mountain lakes fishery management, including fish stocking in the national park, will depend on the outcome of this plan/EIS process.

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 portions of the North Cascades Complex in the national recreation areas 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 allowed stocking.

Although the *Wilderness Act* implies that management actions that manipulate natural processes in wilderness conflict with wilderness values, stocking is not expressly prohibited in the Act. 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 (Landres et al. 2001). These views are supported 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 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 a 1986 policy waiver. Should a management alternative that allows for continued stocking be selected through this plan/EIS decision-making process, a new policy



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

waiver may not be granted for several reasons. First, various national parks (Sequoia-Kings Canyon National Park, Yosemite National Park, Glacier National Park, Rocky Mountain National Park, and Yellowstone National Park) have discontinued stocking. If this plan/EIS process resulted in the selection of an alternative that allowed for continued stocking, 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 only temporary and do not provide a permanent solution because they can be rescinded as circumstances change. The goal of this plan/EIS is to forge a lasting solution for mountain lakes fishery management in the North Cascades Complex. Finally, the minimum requirement analysis for fish stocking in the Stephen T. Mather Wilderness indicates that stocking is not necessary to meet the minimum requirements for administration of the area, and the *Wilderness Act* is unclear whether stocking is allowed in designated wilderness areas. For these three reasons, a policy waiver would not be pursued if this plan/EIS process resulted in the selection of an alternative that included continued fish stocking.

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. Therefore, should a management alternative that allows for continued stocking be selected through this plan/EIS decision-making process, the NPS intends to ask Congress for a change to the North Cascades Complex enabling legislation to clarify how the mountain lakes should be managed. 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 National Park Service Complex is authorized so long as both the National Park Service and the State of Washington agree on the lakes, species of fish, and number of fish to be stocked.

A change in the enabling legislation for the North Cascades Complex to allow for continued fish stocking would set a precedent for this NPS unit, and possibly others that have, or may have in the future, fish-stocking issues. If Congress should choose to allow stocking through a change in the enabling legislation, it will have clarified that fish stocking is an appropriate activity in the North Cascades Complex. That unambiguous clarification would allow the NPS to implement any of the management alternatives that include the practice of stocking. Congressional action to allow fish stocking would also honor various verbal commitments in support of stocking that proponents believe were made by federal officials prior to establishing the North Cascades Complex but never codified in law.

Congressional action to clarify enabling legislation is an intricate process that could take several years. If the NPS does not receive clarification from Congress by the time a record of decision for this plan/EIS is issued, alternative D (91 Lakes Would Be Fishless) would be implemented until clarification is received.



APPLICATION OF RESEARCH

This plan/EIS incorporates the results of the OSU study and other research into the impact analysis of the four alternatives for management of the mountain lakes fishery. The Technical Advisory Committee for this plan/EIS applied the research results and ecological concepts 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

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

The use of research results, including widely accepted ecological principles, helped to achieve the stated objective of ensuring that decisions would be made in accordance with the best available science.

The Technical Advisory Committee adopted the following common definition of biological integrity:

The capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region (Karr and Dudley 1981).

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 OSU 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. 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 took the general concept of biological integrity and defined it in the context of this plan/EIS. This approach allowed the committee to formulate a conceptual 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.

The Technical Advisory Committee is an interdisciplinary planning team comprised of NPS resource specialists, WDFW biologists, and other individual resource specialists.

DEVELOPING MANAGEMENT ACTIONS FOR ALTERNATIVES B AND C

*Adaptive management
incorporates
monitoring and
research into
conservation actions.
Specifically, it is the
integration of
planning,
management, and
monitoring to test
assumptions in order
to adapt and learn.*

During its review of the research, the Technical Advisory Committee defined various decision-making criteria (ecological risk factors) for the 91 lakes. Based partly on these factors, the committee then developed 10 standard adaptive management actions that were applied to a differing subset of lakes in alternatives B and C. For alternative A, the management actions were not applied to the lakes because it represents current management that would not change if alternative A were selected. Only 4 of the 10 management actions were applied to lakes under alternative D, which proposes that all 91 lakes would eventually be fishless.

The standardized adaptive management actions are shown in table ES-1, and a lake-by-lake application of the management actions is in table ES-2 (these tables are located at the end of this executive summary).

The Technical Advisory Committee recognized that each management alternative was developed with scientific information and data that are provisional and possibly incorrect. In light of this uncertainty, the committee included the principle of adaptive management (see figure ES-1) as an element common to all action alternatives and also developed a lake monitoring plan that would incorporate adaptive management in order to evaluate management actions and create a mechanism for changing those actions if management goals were not being achieved.

ALTERNATIVES

This plan/EIS evaluates four alternatives for management of the 91 study area lakes in the North Cascades Complex (table ES-3 provides a summary comparison of the four alternatives). 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 alternatives.

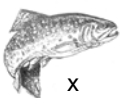
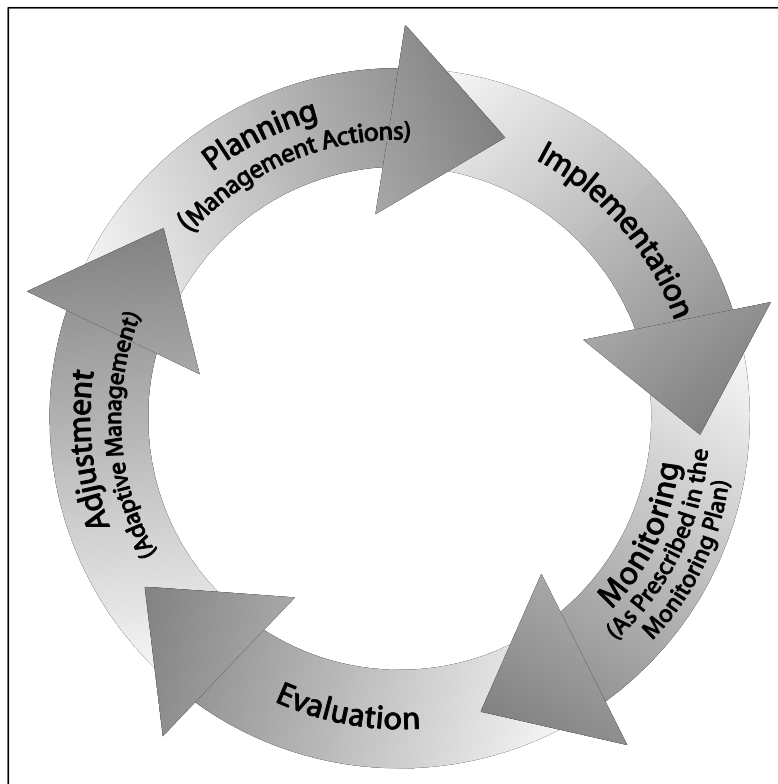


FIGURE ES-1: ADAPTIVE MANAGEMENT PROCESS



Mechanical Methods. The three intensive mechanical methods of removing fish (gillnetting/electrofishing/trapping) would not be used independently but in combination to treat appropriate lakes. A varied combination of gillnetting, electrofishing, fyke nets, and traps near spawning areas 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. For small mountain lakes, the method that has shown the most promise is gillnetting in combination with electrofishing.

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.

Chemical Methods. The antibiotic, antimycin, has been used since the 1960s for fish removal. Small amounts of the chemical are required to kill fish because antimycin is toxic to fish in extremely low concentrations. The concentration of antimycin necessary to remove fish has a fairly wide range of impacts on aquatic organisms, depending upon taxonomic groups. For example, the toxicity of antimycin to aquatic invertebrates is similar to that of fish (Finlayson et al. 2002). Antimycin

is considered to be harmless to waterfowl, mammals, and humans at the relatively minute (4–8 parts per billion) concentrations needed to control trout (Rosenlund and Stevens 2002; Schnick 1974).

Treatment with antimycin would occur during late summer and fall because water flows are lowest in the fall, meaning less water is moving into and out of the lake. Antimycin would be diluted with lake water and then injected into the prop wash of a small motor. Bilge pumps would also be used to help mix the chemical in deeper water. Crews on the shoreline would use a diluted mixture of antimycin to hand treat areas that could not be reached by boat.

Mitigation measures — Antimycin that is dripped into a stream flowing out of a lake could be carried to downstream waters. Because antimycin is very sensitive to oxidation, exposing it to oxygen rapidly breaks it down, resulting in loss of toxicity (Rosenlund 1992). Potassium permanganate, an oxidizer, would be placed at outlet streams to remove residual antimycin and prevent it from traveling downstream. Antimycin dose rates would be double verified and monitored to prevent inadvertent overdoses, and potassium permanganate would be on hand as a contingency measure. 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. Lakes that would be candidates for the natural treatment method are those that contain only nonreproducing stocked fish. For lakes that contain only stocked fish that do not reproduce, the method of treatment may be as simple as ceasing stocking. The initial decline in fish densities could be accelerated by providing incentives for anglers, such as increased bag limits. For lakes where the rate of reproduction is very low and likely not to occur at all in some years, it may also be possible to use natural attrition to remove the fish over a period of years, especially if natural reproduction has been supplemented by stocking of nonreproducing fish.

Mitigation measures — Increased trampling of shoreline vegetation could occur as a result of incentives that encourage anglers to increase the amount of fishing to help reduce fish populations. The NPS would provide additional educational information about shoreline sensitivity by posting information on bulletin boards, the website for the North Cascades Complex, and at visitor centers.



**ALTERNATIVE A : NO ACTION,
EXISTING MANAGEMENT FRAMEWORK OF 91 LAKES (62 LAKES HAVE FISH)**

The management framework dictates the parameters under which the fishery management program is applied. The framework controls which lakes are stocked, stocking densities and frequencies, types of fish, methods used for stocking, and monitoring efforts. Under the current management framework for alternative A, the 62 lakes that currently contain fish would continue to be managed as they are today (see tables ES-1 and ES-2).

The no-action alternative would continue existing management practices in the 91 lakes slated for management consideration in the study area. Fish occur in 62 of the 91 lakes; the remaining 29 lakes are currently fishless and not actively managed for fish. This would continue under existing management. Of the 62 lakes, 40 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. Table ES-2 shows the status of the 91 lakes.

The continued stocking of fish in select lakes in the North Cascades Complex has occurred under both the Memorandum of Understanding and the Supplemental Agreement, in addition to a policy waiver issued by the NPS director in 1986.

**ALTERNATIVE B : PROPOSED ADAPTIVE MANAGEMENT OF 91 LAKES
UNDER A NEW FRAMEWORK (42 LAKES MAY HAVE FISH) (PREFERRED ALTERNATIVE)**

This alternative would conserve biological integrity in lakes by eliminating or reducing (if elimination proved infeasible) reproducing fish populations. Sport fishing would continue to be managed in lakes where the risks to biological integrity could be minimized. The proposed management framework under alternative B would be to eliminate high densities of reproducing fish populations from lakes in the study area while allowing low densities of reproducing and nonreproducing fish populations. Management actions would be applied to the 91 study area lakes throughout the North Cascades Complex (see tables ES-1 and ES-2). Up to 20 lakes would be permanently returned to fishless conditions (added to the 29 currently fishless lakes, the potential outcome of this alternative would be 49 fishless lakes). The restocking of nonreproducing fish would be allowed only where impacts on biological resources could be minimized. Based on the best available science, 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 adjust future management and to avoid unacceptable effects on native biota from fish presence.

Alternative A

62 lakes would
have fish
29 lakes would remain
fishless

Alternative B

29 lakes would
have fish
49 lakes would be
fishless
13 lakes would be
evaluated for
restocking

Alternative C

8 lakes would
have fish
80 lakes would be
fishless
3 lakes would be
evaluated for
restocking

ALTERNATIVE C : PROPOSED ADAPTIVE**MANAGEMENT OF 91 LAKES UNDER A NEW FRAMEWORK (11 LAKES MAY HAVE FISH)**

Alternative C applies a new management framework to the 91 lakes in the study area, wherein 9 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.

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 best available science, some lakes could be restocked with nonreproducing 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 : 91 LAKES WOULD BE FISHLESS**(ENVIRONMENTALLY PREFERRED ALTERNATIVE)**

The emphasis of this alternative would be to eliminate all fish from mountain lakes in the study area. Currently, 62 of the 91 study area lakes have fish and 29 are fishless. Under alternative D, four management actions would be available for a given lake (see table ES-2).

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.

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

Issues are problems, opportunities, and concerns regarding the current and potential future management concepts for managing aquatic resources, impacts of anglers, and sport-fishing opportunities in the 91 mountain lakes that are included in this plan/EIS. The issues were identified by the NPS, WDFW, other agencies, and the public throughout the scoping process. The impact topics are a more refined set of concerns that were analyzed for each of the management alternatives. The impact topics were derived from the issues and were used to examine the extent to which a problem would be made better or worse by the actions of a particular alternative (the environmental consequences of an alternative).



The issues include

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 impact topics analyzed in this plan/EIS include

Aquatic organisms—includes plankton, macroinvertebrates, 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

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

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.



ENVIRONMENTAL CONSEQUENCES

The environmental impacts of each action alternative were analyzed and compared to alternative A (no action). Table ES-4 summarizes the environmental consequences of the alternatives for each of the impact topics listed above.

TABLE ES-1: DESCRIPTION OF MANAGEMENT ACTIONS

<p>This table presents a standard set of fishery management actions for implementation under alternatives B and C. Note that management actions under alternative A would not change from current management, and management actions under alternative D only involve stopping stocking and removing all fish. The standard management actions in this table are broken down into classes 1-4, based on the Technical Advisory Committee's current understanding of the presence, reproductive status, and density of fish in the lakes. These standard management actions would require periodic monitoring and evaluation to facilitate adaptive management.</p>	
For a lake that is currently fishless:	
1	The lake would remain fishless.
For a lake with high densities of reproducing fish, apply one of the following management actions:	
2A	Remove all reproducing fish. Monitor the recovery of native organisms and keep the lake fishless.
2B	Remove all reproducing fish. Monitor lake conditions and use the results to determine whether or not to restock the lake with nonreproducing fish. If the lake is restocked and monitoring results indicate fish are causing major adverse impacts, then fish densities would be reduced by changing stocking densities, stocking cycles, or the species of stocked fish. If these management changes do not work, then discontinue stocking (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).
2C	Remove all reproducing fish. Implement a resting period (that is, keep the lake fishless for a period of time) to foster recovery of native organisms. The duration of the resting period will be determined on a lake-by-lake basis based upon monitoring results. If monitoring results indicate favorable recovery of native organisms, then restock the lake with low densities of nonreproducing fish and monitor lake conditions. If monitoring results indicate fish are causing major adverse impacts, then reduce stocking densities, stocking cycles, or the species of stocked fish. If these management changes do not work, then discontinue stocking (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).
For a lake with low densities of reproducing fish, apply one of the following management actions:	
3A	Remove all reproducing fish. Monitor the recovery of native organisms, and keep the lake fishless.
3B	Evaluate the reproductive status of fish and the status of indicator taxa. If fish density is high enough that impacts on indicator taxa may be major, apply prescription 2A, 2B, or 2C. If fish densities and impacts to indicator taxa are low, maintain the low fish densities. If monitoring data indicate fish are causing major adverse impacts, then completely remove fish (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).
3C	For lakes with extremely low densities of fish, augment the population with supplemental stocking and monitor indicator taxa. If monitoring results indicate fish are causing major adverse impacts, then stop stocking and remove all fish (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).
For a lake that has been stocked and does not contain a reproducing population of fish, apply one of the following management actions:	
4A	Discontinue stocking. Monitor the recovery of native organisms.
4B	Lack of data for decision-making. Discontinue stocking and monitor lake conditions. If the lake is restocked and monitoring results indicate fish are causing major adverse impacts, then discontinue stocking (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).
4C	Continue stocking with low densities of fish expected not to reproduce in the lake. If monitoring results indicate fish are causing major adverse impacts, then reduce stocking densities, stocking cycles, or the species of stocked fish. If these management changes do not work, then discontinue stocking (see "Appendix F: Proposed Monitoring Plan for the Mountain Lakes Fishery Management Plan" for more information on adaptive management).



TABLE ES-2: MANAGEMENT ACTIONS FOR EACH OF THE 91 LAKES

Note: The shaded rows indicate the 22 lakes that are in Ross Lake and Lake Chelan National Recreation Areas; the other 69 lakes are in the national park portion of the North Cascades Complex.

Lake Name	NPS Lake Code	Current Condition of Lake (as represented under alternative A)	Management Action		
			Alternative B	Alternative C	Alternative D
Azure	MP-09-01	Fishless	1	1	1
Battalion	MLY-02-01	High density reproducing fish	2B	2B	2A
Bear	MC-12-1	High density reproducing fish	2C	2A	2A
Berdeen	M-08-01	High density reproducing fish	2C	2A	2A
Berdeen, Lower	M-07-01	High density reproducing fish	2A	2A	2A
Berdeen, Upper	M-09-01	High density reproducing fish	2A	2A	2A
Blum (Largest/Middle, No. 3)	M-11-01	High density reproducing fish	2B	2A	2A
Blum (Lower/West, No. 4)	LS-07-01	High density reproducing fish	2C	2A	2A
Blum (Small/North, No. 2)	MC-01-01	Fishless	1	1	1
Blum (Vista/Northwest, No. 1)	MC-02-01	Fishless	1	1	1
Bouck, Lower	DD-04-01	High density reproducing fish	2C	2C	2A
Bouck, Upper	DD-05-01	Stocked with nonreproducing fish	4A	4A	4A
Bowan	MR-12-01	Stocked with nonreproducing fish	4A	4A	4A
Coon	MM-10-01	Stocked with nonreproducing fish	4C	4C	4A
Copper ^a	MC-06-01	Stocked with nonreproducing fish	4B	4A	4A
Dagger	MR-04-01	High density reproducing fish	2B	2A	2A
Dee Dee, Upper	MR-15-01	High density reproducing fish	2B	2A	2A
Dee Dee/Tamarack, Lower	MR-15-02	Stocked with nonreproducing fish	4A	4A	4A
Despair, Lower	M-14-01	Fishless	1	1	1
Despair, Upper	M-13-01	Fishless	1	1	1
Diobsud No. 1	LS-01-01	High density reproducing fish	2A	2A	2A
Diobsud No. 2, Lower	LS-02-01	High density reproducing fish	2B	2A	2A
Diobsud No. 3, Upper	LS-03-01	Stocked with nonreproducing fish	4A	4A	4A
Doubtful	CP-01-01	High density reproducing fish	2C	2A	2A
Doug's Tarn	M-21-01	High density reproducing fish	2C	2A	2A
East, Lower	MC-14-02	Fishless	1	1	1
East, Upper	MC-14-01	Fishless	1	1	1
Firn	MP-02-01	Low density reproducing fish	3B	3A	3A
Green	M-04-01	High density reproducing fish	2B	2A	2A
Green Bench	LS-04-01	Fishless	1	1	1
Hanging	MC-08-01	High density reproducing fish	2A ^b	2A ^b	2A ^b
Hidden	SB-01-01	Low density reproducing fish	3C	3A	3A
Hidden Lake Tarn	EP-14-01	Stocked with nonreproducing fish	4A	4A	4A
Hi-Yu	M-01-01	Stocked with nonreproducing fish	4B	4A	4A
Hozomeen	HM-02-01	High density reproducing fish	2A	2A	2A
Ipsoot	LS-06-01	Low density reproducing fish	3B	3A	3A
Jeanita	DD-01-01	Low density reproducing fish	3B	3A	3A
Kettling	MR-05-01	High density reproducing fish	2A	2A	2A
Kwahnesum	MC-07-01	Stocked with nonreproducing fish	4A	4A	4A
McAlester	MR-10-01	High density reproducing fish	2B	2B	2A
Middle, Lower	MC-16-02	Fishless	1	1	1
Middle, Upper	MC-16-01	Fishless	1	1	1
Monogram	M-23-01	High density reproducing fish	2C	2A	2A
Monogram Tarn	M-23-11	Stocked with nonreproducing fish	4A	4A	4A
Nert	M-05-01	Stocked with nonreproducing fish	4A	4A	4A

TABLE ES-2: MANAGEMENT ACTIONS FOR EACH OF THE 91 LAKES (CONTINUED)

Lake Name	NPS Lake Code	Current Condition of Lake (as represented under alternative A)	Management Action		
			Alternative B	Alternative C	Alternative D
Noisy Creek, Upper	LS-14-01	Fishless	1	1	1
No Name	PM-01-01	Stocked with nonreproducing fish	4C	4A	4A
Panther Potholes, Lower	RD-05-02	Stocked with nonreproducing fish	4A	4A	4A
Panther Potholes, Upper	RD-05-01	Fishless	1	1	1
Pegasus	EP-10-01	Fishless	1	1	1
Pond SE of Kettling Lakes	MR-09-01	Stocked with nonreproducing fish	4C	4C	4A
Quill, Lower	M-24-02	Stocked with nonreproducing fish	4B	4A	4A
Quill, Upper	M-24-01	Stocked with nonreproducing fish	4B	4A	4A
Rainbow	MR-14-01	High density reproducing fish	2C	2C	2A
Rainbow, Upper (North)	MR-13-01	Fishless	1	1	1
Rainbow, Upper (South)	MR-13-02	Stocked with nonreproducing fish	4A	4A	4A
Rainbow, Upper (West)	MM-11-01	Stocked with nonreproducing fish	4A	4A	4A
Redoubt	MC-11-01	Fishless	1	1	1
Reveille, Lower	MC-21-02	Fishless	1	1	1
Reveille, Upper	MC-21-01	Fishless	1	1	1
Ridley	HM-03-01	Stocked with nonreproducing fish	4C	4C	4A
Sky	EP-13-01	Fishless	1	1	1
Skymo	PM-03-01	High density reproducing fish	2C	2A	2A
Sourdough	PM-12-01	High density reproducing fish	2B	2A	2A
Sourpuss	ML-01-01	Fishless	1	1	1
Stiletto	MR-01-01	Stocked with nonreproducing fish	4B	4A	4A
Stout	EP-09-02	Low density reproducing fish	3B	3A	3A
Stout, Lower	EP-09-01	Low density reproducing fish	3B	3A	3A
Sweet Pea	ML-02-01	Stocked with nonreproducing fish	4C	4A	4A
Talus Tarn	M-06-01	Fishless	1	1	1
Tapto, Lower	MC-17-03	Fishless	1	1	1
Tapto, Middle	MC-17-02	Fishless	1	1	1
Tapto, Upper	MC-17-01	Fishless	1	1	1
Tapto, West	MC-17-04	Fishless	1	1	1
Thornton, Lower	M-20-01	Low density reproducing fish	3C	3A	3A
Thornton, Middle	M-19-01	Stocked with nonreproducing fish	4C	4A	4A
Thunder	RD-02-01	Fishless	1	1	1
Tiny	MC-15-01	Fishless	1	1	1
Torment	ML-03-01	Stocked with nonreproducing fish	4A	4A	4A
Trapper	GM-01-01	Low density reproducing fish	3B	3A	3A
Triplet, Lower	SM-02-01	High density reproducing fish	2C	2C	2A
Triplet, Upper	SM-02-02	High density reproducing fish	2A	2A	2A
Triumph	M-17-01	Stocked with nonreproducing fish	4C	4A	4A
Unnamed	FP-01-01	Fishless	1	1	1
Unnamed	MR-11-01	Stocked with nonreproducing fish	4C	4C	4A
Unnamed	MR-16-01	Low density reproducing fish	3B	3B	3A
Vulcan	ML-04-01	Fishless	1	1	1
Wilcox/Lillie, Upper	EP-06-01	High density reproducing fish	2A	2A	2A
Wilcox/Sandie, Lower	EP-05-01	High density reproducing fish	2C	2A	2A
Wild	MC-27-01	Fishless	1	1	1
Willow	HM-04-01	Stocked with nonreproducing fish	4C	4C	4A

Notes:

- In August 2004, a large fish kill was observed in Copper Lake, possibly due to disease. Further surveys are needed to confirm that the lake is fishless.
- Remove all reproducing fish pending agreement with British Columbia.



TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
General Concept				
Lake management	No change in the way the North Cascades Complex fishery is managed. Lakes that are currently stocked would continue to be stocked, lakes with reproducing fish would be allowed to maintain reproducing fish, and all lakes without fish would continue to be fishless.	Manage 91 lakes in the study area that have a fish history from either a documented or undocumented history of fish stocking; the 91 lakes would be managed under a new adaptive management framework, which includes taking action to remove fish from select lakes.	Manage 91 lakes in the study area that have a fish presence from either a documented or undocumented history of fish stocking. 22 lakes are in the two national recreation areas (NRA) would be managed under a new adaptive management framework, which includes taking action to remove fish from some lakes (11 of the 22 NRA lakes may continue to have fish). 69 lakes in the national park either would remain fishless or be returned to fishless conditions.	The 91 lakes in the study area that have a history of fish presence from either documented or undocumented fish stocking would all become fishless over time, and stocking would be eliminated.
Current and Proposed Management				
Current and proposed management for fishless lakes	Current Management 29 lakes in the study area are currently fishless, including 3 in the national recreation areas and 26 in the national park.	Proposed Management 49 lakes in the study area would remain fishless or be actively returned to fishless conditions.	Proposed Management 80 lakes in the study area would remain fishless or be actively returned to fishless conditions; this includes 11 lakes in the national recreation areas and 69 lakes in the national park.	Proposed Management 91 lakes in the study area would remain fishless or be actively returned to fishless conditions.
Current and proposed management of lakes with high densities of reproducing fish	Current Management 27 lakes currently contain high densities of reproducing fish.	Proposed Management No lakes would contain high densities of reproducing fish.	Proposed Management No lakes would contain high densities of reproducing fish.	Proposed Management No lakes would contain high densities of reproducing fish.



TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY (CONTINUED)

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
Current and Proposed Management (continued)				
Current and proposed management of lakes with low-densities of fish (reproducing and nonreproducing)	Current Management 9 lakes currently contain low densities of reproducing fish.	Proposed Management 7 lakes would contain low densities of reproducing fish.	Proposed Management 1 lake in a national recreation area and no lakes in the national park would contain low densities of reproducing fish.	Proposed Management No lakes would contain low densities of reproducing fish.
Current and proposed management of lakes with nonreproducing fish	Current Management 26 lakes are currently stocked with nonreproducing fish.	Proposed Management 22 lakes would have nonreproducing fish.	Proposed Management 8 lakes in the national recreation areas would have nonreproducing fish. No lakes in the national park would be stocked.	Proposed Management No lakes would have fish.
Current and proposed management of lakes lacking data	Current Management No additional data would be needed to make final management action determinations.	Proposed Management 13 lakes would be evaluated under a new adaptive management framework prior to determining management action.	Proposed Management 2 lakes in the national recreation areas would be evaluated under a new adaptive management framework prior to determining management action.	Proposed Management No additional data would be needed to make final management action determinations.
Outcome of continuing current management framework or implementing proposed new adaptive management framework	Current Management Outcome Of the 91 lakes in the study area, 62 would continue to have fish 29 would remain fishless.	Possible Future Outcome Of the 91 lakes in the study area, 29 lakes would have fish 49 lakes would be fishless 13 lakes would be evaluated before determining management action.	Possible Future Outcome Of the 91 lakes in the study area, 9 lakes would have fish 80 lakes would be fishless 2 lakes would be evaluated before determining management action.	Possible Future Outcome Of the 91 lakes in the study area, 91 lakes would either remain fishless or become fishless over time
Implementation	The NPS would seek clarification from Congress as to whether stocking should be an accepted practice in the North Cascades Complex.	Same as alternative A.	Same as alternative A.	No congressional action would be necessary.

TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY (CONTINUED)

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
Current and Proposed Management (continued)				
Consistency with <i>NPS Management Policies</i> (NPS 2001a)	This alternative is not consistent with existing <i>NPS Management Policies</i> regarding fish stocking and the introduction of exotic species.	This alternative is not consistent with existing <i>NPS Management Policies</i> regarding fish stocking and the introduction of exotic species.	This alternative is consistent with existing <i>NPS Management Policies</i> regarding fish stocking and the introduction of exotic species into national recreation areas lakes.	This alternative is consistent with existing <i>NPS Management Policies</i> regarding fish stocking and the introduction of exotic species.
Fish species (and strains) stocked (under alternative A) or fish species (and strains) proposed to be stocked under alternatives B and C	<ul style="list-style-type: none"> • Golden Trout • Coastal Cutthroat Trout (Lake Whatcom Strain) • Rainbow Trout (Mt. Whitney Strain) • Rainbow Trout (Ross Lake Strain) • Westslope cutthroat trout (twin Lakes Strain) 	<ul style="list-style-type: none"> • Rainbow Trout (Mt. Whitney Strain) • Rainbow Trout (Ross Lake Strain) • Golden Trout 	<ul style="list-style-type: none"> • Rainbow Trout (Mt. Whitney Strain) 	No lakes would be stocked.
Current and proposed reproducing fish species (and strains) to be maintained under alternatives A, B, and C	<ul style="list-style-type: none"> • Rainbow Trout (Packwood Lane Strain) • Westslope Cutthroat Trout (Twin Lakes Strain) • Brook Trout • Coastal cutthroat Trout (Lake Whatcom Strain) • Yellowstone Cutthroat Trout 	<ul style="list-style-type: none"> • Rainbow Trout (Strain unknown) • Westslope Cutthroat Trout (Strain unknown) • Golden Trout • Westslope Cutthroat Trout (Twin Lakes Strain) • Yellowstone Cutthroat Trout 	<ul style="list-style-type: none"> • Westslope cutthroat trout (Twin Lakes Strain) • Westslope cutthroat (Unknown Strain) 	<p>Two lakes potentially would contain reproducing fish populations:</p> <ul style="list-style-type: none"> • Westslope cutthroat trout (Twin Lakes Strain) • Westslope cutthroat (Unknown Strain)

TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY (CONTINUED)

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
Current and Proposed Management (continued)				
Fish hatchery locations	<ul style="list-style-type: none"> • Arlington Hatchery, Washington • Eells Springs Hatchery, Washington • Marblemount Hatchery, Washington • WDFW Bellingham Hatchery, Washington • WDFW Chelan Hatchery, Washington 	Same as alternative A.	Same as alternative A.	No lakes would be stocked.
Stocking density	Stocking density varies from year to year; see table 6 for stocking density of the most recent stocking efforts.	Same as alternative A.	Same as alternative A.	No lakes would be stocked.
Specific times of year for stocking	Stocking occurs during the ice-free period, which varies from year to year, but on average is between mid-July to mid-September; stocking can occur as early as mid-May or as late as mid-October depending on weather conditions.	Same as alternative A.	Same as alternative A.	No lakes would be stocked.
Stocking methods (and performed by whom)	Fixed-wing aircraft (by WDFW). Backpack (by WDFW and volunteers from Trail Blazers, Inc.).	Same as alternative A.	Same as alternative A.	No lakes would be stocked.

TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY (CONTINUED)

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
Lake Treatments to Manage the Fishery				
Mechanical methods (using gill and fyke nets/electrofishing/trapping/exclusion of habitat)	No mechanical methods are used to remove fish.	8 lakes	10 lakes	11 lakes
Chemical methods (using chemicals that kill fish)	No chemical methods are used to remove fish.	19 lakes	25 lakes	25 lakes
Natural methods (discontinue stocking)	No natural methods are used to remove fish.	12 lakes	21 lakes	26 lakes
Monitoring Program				
	Trail Blazers and Hi-Lakers perform periodic surveys. From 1968 to 2001, 133 anglers filed 90 reports for 31 lakes. Reports yield estimates of fish abundance, growth, and species composition, as well as angler effort, success, and usage. Continue monitoring macroinvertebrates and expand to include stocked lakes. WDFW would continue to collect data from Trail Blazers and Hi-Lakers. Continue monitoring visitor use. Data related to fishing would be useful in determining adaptive management, especially fish stocking.	Same as alternative A, with additional monitoring of <ul style="list-style-type: none"> species assemblages in lakes with fish visitor use relating to fishing species assemblages and collecting of physical data needed before treating lakes for fish removal recovery of species assemblages after treating lakes for fish removal 	Same as alternative B.	Same as alternative B.

TABLE ES-3: ALTERNATIVES ELEMENTS SUMMARY (CONTINUED)

Elements	Alternative A (No Action) Existing Management Framework of 91 Lakes (62 Lakes Have Fish)	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)
Mitigation				
	No mitigation occurs under alternative A.	Nonreproducing fish would be stocked to prevent establishment of reproducing, self-sustaining populations of fish. Reproduction would be limited by inducing genetic sterility or selecting hatchery strains that cannot reproduce due to spawning habitat limitations and/or timing of spawning limitations (e.g., Mount Whitney rainbow trout). For lakes with no spawning habitat, fish native to the surrounding watershed (e.g., Ross Lake rainbow trout in the Skagit River basin) would be stocked. Over the long term, the WDFW would also work toward creating hybrid, sterile hatchery strains to further minimize the risks of in-lake reproduction and downstream dispersal and hybridization with native fish. Where applicable, stocking would be rotated to allow resting periods so native species could recover. Stocking methods could be limited to horse or backpack to limit impacts on other park visitors. Protocols for fish removal would be strictly enforced to avoid impacts on other species and on worker and visitor safety (see appendix I).	Same as alternative B.	Same as alternative B.
Cost of Implementation				
	Approximately \$270,000 over the next 15 years.	Approximately \$2.14 million over the next 15 years.	Approximately \$2.84 million over the next 15 years.	Approximately \$3 million over the next 15 years.

TABLE ES-4: 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 under alternative A, would result in short- and long-term minor to</p>	<p>Impacts on aquatic organisms in lakes stocked with low densities of nonreproducing fish would be the same as 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>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</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 ES-4: 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)				
	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. Impairment of aquatic organisms across the study area would not occur under alternative A.	drainages throughout the North Cascades Complex. Impacts over the long term would be minor to moderate and adverse. 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. Impairment of aquatic organisms across the study area would not occur under alternative B.		
Wildlife				
	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. 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.	Removal of fish would result in the loss of a food source for fish-eating 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. Impacts from stocking activities would be similar to alternative B, except the number of lakes stocked would decrease under alternative B. 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 short-term disturbance to birds and mammals that inhabit the lake and shoreline from the noise of human	Impacts on fish-eating species from removal of fish would be similar to alternative B. Impacts from stocking activities would be similar to alternative B, except the number of lakes stocked would substantially decrease under alternative C. Impacts from mechanical and chemical treatment methods would be the same as alternative B. Cumulative impacts would be similar to alternative A. Impairment of wildlife species across the study area would not occur under alternative C.	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. Under alternative D, stocking activities would be eliminated, a benefit to wildlife that would be disturbed by the noise and human disturbance associated with stocking activities.

TABLE ES-4: 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>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>Impairment of wildlife species across the study area would not occur under alternative A.</p>	<p>presence and helicopters used to transport equipment for mechanical treatment.</p> <p>Cumulative impacts would be similar to alternative A.</p> <p>Impairment of wildlife species across the study area would not occur under alternative B.</p>		<p>Impacts of treatment methods would be the same as alternative B.</p> <p>Cumulative impacts would be the same as under alternative A.</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 ES-4: 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 ES-4: 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>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 major adverse impacts on any special status plants.</p> <p>No lakes are treated for fish removal under alternative A.</p> <p>Trampling by stock (horses, mules, llamas) and visitors (anglers and other visitors) would likely result in minor to moderate cumulative impacts at some lakes and moderate to major at others, depending on the intensity of use and location of sensitive plants.</p>	<p>Fewer lakes would be stocked under alternative B. 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>Select lakes would be treated for fish removal under alternative B. 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 in cross-country zones or near camps</p>	<p>Impacts from stocking activities would be similar to alternative B, 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, 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 alternative B.</p> <p>Cumulative impacts would be the same as under alternative C.</p> <p>Impairment of special status plant species across the study area would not occur under alternative D.</p>



TABLE ES-4: 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.	that receive medium to high visitor use, and negligible to minor adverse impacts at lakes in zones or near camps that have low visitor use. Cumulative impacts would be similar to alternative A but would be reduced as fish are removed from lakes. 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 minor 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 moderate benefits to shoreline meadow vegetation over time. Temporary negligible to moderate 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 have	Alternative C would provide substantial 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. One lake may continue to experience minor or even moderate impacts on	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 moderate 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. If high visitor use, stock use, and trail use are related to fishing, a decline in fishing opportunity would offer substantial benefits to this more sensitive vegetative community. 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 would have short-term negligible to moderate adverse impacts. Adverse cumulative impacts would be negligible to moderate and long term.

TABLE ES-4: 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>short-term negligible to moderate 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>shoreline forest 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 would have short-term negligible to moderate 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.</p> <p>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. 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 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>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. 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 purpose of compliance with section 106 of the <i>National Historic Preservation Act</i>, there would be no adverse effect on cultural resources.</p>

TABLE ES-4: 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)				
	Impairment of cultural resources across the study area would not occur under alternative A.	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. Adverse cumulative impacts would range from negligible to minor over the long term. Impairment of cultural resources across the study area would not occur under alternative B.	There would be beneficial cumulative impacts for cultural resources from reduced human activity at a number of mountain lakes. Impairment of cultural resources across the study area would not occur under alternative C.	Cumulative impacts would be beneficial. Impairment of cultural resources across the study area would not occur under alternative D.
Visitor Use and Experience				
Recreational Use	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. 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 Stehekin	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.	Same as alternative B. 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.	Same as alternative B. 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. 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.

TABLE ES-4: 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)	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 ES-4: 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 nine 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 ES-4: 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 ES-4: 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 ES-4: 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 for implementation are projected at</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 ES-4: 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>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>



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This *Draft Mountain Lakes Fishery Management Plan / Environmental Impact Statement* is organized by the chapters listed below. Each of the chapters has its own “mini” table of contents on the back of the corresponding divider page to give you an idea how the chapter is organized.

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