Restoration of Native Species in High Elevation Aquatic Ecosystems

Plan and Draft Environmental Impact Statement

Sequoia and Kings Canyon National Parks

Public Meeting Participant Guide

Message from the Superintendent

Dear Friends,

Since I was 5-years-old, I have hiked and camped extensively in the wilderness of the Sierra Nevada. I have seen places I never imagined. Those moments of solitude and beauty have touched me. On these adventures, I would often rest at high elevation lakes, where the solitude would be punctuated with the sounds of croaking frogs along the shoreline.

Sadly, for many high elevation lakes, that is only a memory. Today, people travel the same trails without ever seeing a frog. Nonnative fish, planted as recently as the 1980s, have played a large role in depleting frog populations almost to the point of extinction.

And the impact is more than aesthetic. As frogs occupy the center of the food chain, acting both as predators and prey, their absence skews the entire system, affecting everything from aquatic invertebrates to large mammals, like coyotes.

Restoring conditions that protect frogs and native biodiversity can be accomplished in a balance approach that does not diminish recreational access and fishing – a "win-win" for protection and access. Fishing is a welcomed and popular form of recreation that will continue to be available and promoted throughout Sequoia and Kings Canyon National Parks to meet a wide variety of interests and abilities.

The plan proposes restoration actions that would affect less than 16 percent of fish populations in park lakes, ponds, and marshes. These actions were selected to avoid lakes with a reputation for good fishing. Indeed, the actions target high elevation lakes that are remote and difficult to access – yet provide ideal conditions for restoring native species. Moreover, stock use and other appropriate forms of recreational access are not affected by this plan.

The staff at Sequoia and Kings Canyon National Parks has designed a plan that restores native species in high elevation aquatic ecosystems. Subject matter experts from inside and outside the National Park Service have evaluated possible tools, best practices, public comment, and environmental impacts to present alternatives that best meet ecosystem management objectives. We value your input again in reviewing the Restoration of Native Species in High Elevation Aquatic Ecosystems Plan/Draft Environmental Impact Statement, as we work towards development of the Final Restoration Plan/Final Environmental Impact Statement.

Thanks for your interest, and for sharing in this legacy. With your help we will be able to restore these diverse ecosystems and preserve the recreational opportunities found at Sequoia and Kings Canyon National Parks.

Sincerely,

Woody Smeck
Superintendent

For more information or to provide comments on this project:

Please visit the Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/aquatics where you will find additional information and a link to provide comments, or submit written or faxed comments to:

Superintendent
Attention: Restoration Plan/DEIS
47050 Generals Highway
Three Rivers, CA 93271

Fax: 559-565-4202

Purpose of and Need for Action

The purpose of this Restoration of Native Species in High Elevation Aquatic Ecosystems Plan and Draft Environmental Impact Statement (Restoration Plan/DEIS) for Sequoia and Kings Canyon National Parks (SEKI) is to guide management actions by the National Park Service (NPS) to restore and conserve native species diversity and ecological function to selected high elevation aquatic ecosystems that have been adversely impacted by human activities, and to increase the resistance and resilience of native species and ecosystems to nonnative fish, disease, and climate change. The Final Restoration Plan/Final EIS would be implemented over a period of 25 to 35 years, with an internal evaluation of management effectiveness scheduled every 5 to 10 years.

Action is needed at this time:

- because nonnative fish have severely reduced native biological diversity and disrupted ecological function;
- to prevent the extinction of two species of mountain yellow-legged frogs (*Rana muscosa* and *Rana sierrae;* MYLF) and to restore MYLF populations to many locations in the parks where they have gone extinct;
- to enable the NPS to fulfill its mission and policy directives to conserve native animals, plants and processes found in SEKI's aquatic ecosystems;
- because large scale restoration of more complex habitat (areas containing large lakes or clusters of many lakes with many and/or large connecting stream sections) is critical for native species and ecosystem recovery;
- to increase the resistance and resilience of native high elevation aquatic species and ecosystems to human induced environmental change; and
- to restore and protect the natural quality of wilderness character.

Many studies conducted in SEKI and elsewhere in the Sierra Nevada analyzed the effects that nonnative trout have on native species and ecosystems. These studies consistently document that the widespread introduction and continued presence of nonnative trout has caused substantial impacts to native species and ecosystems. Because nonnative trout are efficient predators and competitors, their introduction results in modifications to native food webs: they prey on large organisms such as amphibians and large-bodied aquatic insects and zooplankton, and alter, deplete or eliminate populations of these animals from naturally fishless habitats. This results in less food being available to native aquatic and terrestrial predators, altering their distribution and abundance in turn. Thus, the presence of nonnative trout has negative, cascading effects on entire ecosystems, and their presence in individual lakes, connecting streams and entire lake basins in SEKI continues to cause negative impacts to native species and ecosystem processes. These impacts are replicated on a landscape scale across the parks' high elevations. The NPS has shown that eradication of nonnative trout from relatively-simple habitats can reverse these impacts on a small scale, but the parks have not had the tools necessary to restore habitats on larger scales. Therefore, this Restoration Plan/DEIS is needed to establish tools for conducting high elevation aquatic ecosystem restoration at the landscape scale in SEKI.

Two species that are integral components of SEKI's high elevation aquatic ecosystems are the MYLFs. Nonnative trout and disease (amphibian chytrid fungus) are the primary factors that have caused formerly abundant MYLFs to disappear from more than 92% of historic sites in the Sierra Nevada. Most of the remaining MYLF populations are small, isolated, often restricted to small ponds vulnerable to drying, and diseased – with low survival and recruitment rates. As a result, both species were listed under the California Endangered Species Act in 2012, and both species were proposed for listing under the federal Endangered Species Act in April 2013.

Intervention is urgently needed to prevent extirpation of both MYLF species from the parks, and SEKI has a viable solution. Eradication of nonnative trout from 15 SEKI lakes and ponds since 1997 has allowed remnant MYLF populations to quickly expand, with two growing into the largest MYLF populations existing today. Native snakes, birds and invertebrates have also benefited from the fish eradication and frog increases.

Using a combination of physical tools and piscicides, SEKI could eradicate trout at a larger scale than previously achieved, thereby maximizing restoration while providing climate change buffered habitat for MYLFs and other native species. Simultaneously, SEKI could increase MYLF survival and recruitment at these sites by treating frogs for disease with antifungal agents. This strategy shows high potential to eradicate trout from large areas, while strengthening imperiled MYLF populations to also overcome disease and climate change, and restoring and conserving high elevation aquatic ecosystems at the landscape scale.

Note: Literature references are shown in the Restoration Plan/DEIS

Objectives in Taking Action

The following management objectives were developed for this Restoration Plan/DEIS based on the purpose and need for the plan, and are in accordance with the executive orders, laws, policies, and plans that guide management of natural resources in National Parks.

A) Restore and conserve the natural abundances, distributions and functions of native species, populations and communities within selected high elevation aquatic ecosystems, by:

- implementing management actions to create more favorable conditions for these populations to persist and be more resilient to human induced changes to environmental conditions; and
- restoring habitat to its historically fishless condition at the parks scale, including the eradication of fish from up to 87 (16%) of 549 nonnative fish-containing lakes, ponds and marshes, approximately 41 miles of streams, and connected fish-containing habitat as necessary.

B) Develop a long-term conservation strategy for both species of MYLFs (*Rana muscosa* and *Rana sierrae)* to ensure the self-sustaining, long-term viability and evolution of MYLF populations in perpetuity within portions of their present and historic geographic range within the parks, and to maintain the genetic and ecological diversity of these species. Specific objectives related to this strategy include:

- reverse widespread loss of the ecological function formerly provided by MYLFs and maintain the viability of existing MYLF populations throughout the range of both species within the parks;
- restore selected habitat and expand existing MYLF populations;
- re-establish MYLFs in selected basins where populations were historically present but are now absent; and
- collaborate with partner agencies and organizations to exchange information, enhance use of available resources, and strategically restore and conserve MYLFs in the Sierra Nevada.

C) Identify presently incomplete information that is needed for effective conservation and management of aquatic ecosystems in the face of unprecedented rates of human-induced change.

D) Use results from restoration efforts and new knowledge from research studies to refine program methodologies over time and mitigate impacts that have the potential to occur during restoration.

E) Restore and protect natural processes in wilderness, using an appropriate range of management actions derived from thorough analyses of potential effects to wilderness character.

F) Provide an appropriate range of visitor experiences and recreational opportunities at wilderness lakes and streams concurrent with minimizing the degradations that have occurred to the biological integrity of high elevation aquatic ecosystems.

Space provided for personal notes

Summary of Alternatives

Actions Common to All Alternatives

- Site assessments would occur for each restoration basin to confirm the treatment approach.
- Crew camps would be established for each project area.
- Helicopters and/or stock would be utilized to transport tools and equipment.
- Reintroduction of mountain yellow-legged frogs would be considered.
- Monitoring, research and scientific studies would continue to inform project, and may result in the expansion of management tools available for future management activities.
- Captured fish would be disposed of by sinking them in lakes or by scattering them in nearby terrestrial areas.

Alternative A: No Action

- Limits fish eradications to 26 previously approved lakes and ponds of 575 known to contain nonnative fish.
- Fifteen of these 26 lakes/ponds are complete; eleven are in-progress and expected to be completed by 2016.
- No new lakes/ponds proposed for fish eradication.

Alternative B: Prescription Treatment (Physical and Piscicide) Preceding Restoration (*Preferred Alternative*)

- Nonnative fish would be eradicated from an additional 87 lakes/ponds and 41 miles (66 km) of stream in 20 basins, including:
  - 49 lakes/ponds and 14 miles (22 km) of stream using physical treatment methods in 15 basins; and
  - 38 lakes/ponds and 27 miles (43 km) of streams using piscicide treatment in 11 basins.
- MYLFs and other native species would be restored to these 87 lakes/ponds using natural recolonization where adjacent source populations exist, and reintroductions where adjacent source populations do not exist.
- Eradication sites represent 16% of the parks' remaining 549 lakes/ponds known to contain fish.
- 462 lakes/ponds would remain with fish and thus continue to support recreational fishing.

Alternative C: Physical Treatment Preceding Restoration

- Nonnative fish would be eradicated from an additional 49 lakes/ponds and 14 miles (22 km) of stream in 15 basins using physical treatment methods only.
- Blasting is considered in up to five locations to create vertical fish barriers in streams.
- MYLFs and other native species would be restored to these 49 lakes/ponds using natural recolonization where adjacent source populations exist, and reintroductions where adjacent source populations do not exist.
- Eradication sites represent 9% of the parks' remaining 549 lakes/ponds known to contain fish.
- 500 lakes/ponds would remain with fish and thus continue to support recreational fishing.

Alternative D: Piscicide Treatment Preceding Restoration

- Nonnative fish would be eradicated from an additional 87 lakes/ponds and 41 miles (66 km) of stream in 20 basins using piscicide treatment methods only.
- MYLFs and other native species would be restored to these 87 lakes/ponds using natural recolonization where adjacent source populations exist, and reintroductions where adjacent source populations do not exist.
- Eradication sites represent 16% of the parks' remaining 549 lakes/ponds known to contain fish.
- 462 lakes/ponds would remain with fish and thus continue to support recreational fishing.

Basin Selection Criteria

Favorable	Rule-out
Elevation is between 6,000 and 12,000 ft (1,800 and 3,700 m).	Elevation is under 6,000 ft (1,800 m) or above 12,000 ft (3,700 m). Lake basins in SEKI typically do not occur outside of these elevations.
Adequate downstream barrier (large waterfall or long, steep cascade) exists naturally, or the stream could be altered by blasting to create a vertical fish barrier, which would prevent fish from recolonizing restoration area. Barrier potential would be assessed prior to the onset of restoration.	No adequate downstream fish barrier exists naturally and there is no potential to create a barrier by blasting. Fish are observed breaching all possible barriers and would likely continue breaching even after blasting.
Fish eradication is feasible from a logistical standpoint. Habitat structure would allow fish eradication without extreme difficulty, and site can be safely accessed by field crews.	Fish eradication is considered infeasible from a logistical standpoint. Habitat structure is so complex that it would be extremely difficult to eradicate fish, and/or site cannot be safely accessed by field crews.
Crew presence unlikely to jeopardize the existence of known threatened or endangered plant or wildlife species.	Crew presence could jeopardize the existence of known threatened or endangered plant or wildlife species.
Evidence of current or recent populations within natural distribution of MYLFs (includes sites where frogs recently died out due to disease).	There is no evidence of current or past MYLF populations. Removal of fish would benefit other native species.
Other Consideration Factors	
Achieves Comparatively More Objectives	**Acheives Comparatively Fewer Objectives**
Restores/conserves genetic diversity of MYLFs within SEKI – several sites restored within each of three major genetic groups.	Total number of restoration sites is imbalanced with respect to genetic diversity of MYLFs within SEKI.
Restores/conserves spatial representation MYLFs within SEKI – sites restored across park latitudes and longitudes.	Total number of restoration sites is imbalanced with respect to historic representation of MYLFs within SEKI.
Groupings of waterways appropriate for treatment. For basins in which some fish lakes would remain, restoration lakes are at top of basin. Several entire basins are restored, spread across SEKI.	Groups of waterways not considered appropriate for treatment. For basins in which some fish lakes would remain, restoration lakes are at middle or bottom of basin. No entire basins are restored in SEKI.
For individual lake selection, recreational fishing value of lake is medium to low – not a very popular or trophy fishery. For the overall project, fishing opportunities within SEKI continue to exist that satisfy a range of visitor values, including multiple fish lakes within each of the following categories: 1) near trailheads for easy access; 2) in remote basins for solitude; 3) having large fish for a trophy experience; 4) having many fish for a high-catch experience.	For individual lake selection, recreational fishing value of lake is high – a very popular or trophy fishery. For the overall project, multiple fish lakes within each of the following categories do not continue to exist within SEKI: 1) near trailheads for easy access; 2) in remote basins for solitude; 3) having large fish for a trophy experience; 4) having many fish for a high-catch experience.
Other known threats not an issue.	Other threats make site less desirable. For example, considering piscicide use in areas close to human populations.