



Restoration of Sierra Nevada Yellow-legged Frogs: Experimental Fish Removal



“Certain of the lakes in the higher parts of the Yosemite contain large numbers of Yellow-legged Frogs in both the tadpole and adult conditions. It is a commonly repeated observation that frogs, in tadpole form at least, do not occur in lakes which are stocked with trout... the advent of fish in a lake sooner or later nearly or quite eliminates the frogs. It seems probable that the fish prey upon the tadpoles, so that few or none of the latter are able to reach the stage at which they transform. The frogs which live along the streams probably spawn in small temporary pools in the meadows which the trout cannot reach.”

- Animal Life in the Yosemite by J. Grinnell and T.I. Storer, 1924

Why is the park removing non-native fish?

Lakes and streams above approximately 4,000 feet in Yosemite were naturally fishless due to waterfalls and cascades that kept fish from moving upstream. As a result of these barriers, frogs and other wildlife in these mountain lakes and streams existed and evolved without the presence of fish.

Nonnative fish were introduced into most of Yosemite’s lakes and streams as early as 1878 to provide recreational opportunities and increase the supply of fish for local consumption. The introduced fish have been harmful to many native inhabitants of Yosemite’s lakes and streams, including the Sierra Nevada yellow-legged frog, once the most abundant amphibian in the high Sierra and encountered by the hundreds on lake shores. Today, this species is one of the most endangered amphibians in North America, having declined by over 95 percent.

In 2007, with the support of park entrance fee funds, Yosemite National Park initiated an experimental nonnative fish removal project at limited sites to restore the aquatic ecosystems to more natural conditions, including the recovery of frogs, and guide future management.

Yosemite offers, and will continue to offer, high quality fishing opportunities in a wide variety of habitats. Most of the sites for the current fish removal project were chosen in part because they are remote and not popular among most anglers.

How do non-native fish affect the ecosystem?

Non-native fish feed on many of the native animals found in aquatic ecosystems, including aquatic insects and the eggs and tadpoles of frogs. Fish also compete for the food of frogs and snakes, and of bats and even some birds, several of which feed on the adult stage of the aquatic insects. Predation and competition by nonnative fish has decreased the populations of many of these animals, most notably frogs, and has altered the aquatic animal community, decreasing the resilience of the aquatic ecosystem.

Within in a few decades of fish stocking, researchers noticed that frogs and fish were rarely found in the same lake or stream. Fish stocking in Yosemite was ceased in 1991, but fish continue to persist in most deep lakes and streams. Fish have died out in some lakes due to lack of suitable spawning habitat. In these now-fishless lakes, researchers have found that native species, including frogs, finches, and invertebrates, such as backswimmers, damselflies, and mayflies, rapidly returned once fish were no longer present.



Where are non-native fish being removed?

Fish are currently being removed from the following sites in Yosemite:

- Site 1: Virginia Lake, Upper Mattie Lake and Mattie Satellite Lake (completed)
- Site 2: Lower Hutchings Lake
- Site 3: Bartlett Creek Lakelets (completed)
- Site 4: Middle (discontinued) and Tiny McCabe Lakes
- Site 5: Ardeth and Miwok Lakes
- Site 6: Roosevelt Lake

Note: These names may not appear on USGS maps.

These sites constitute 5% of the lakes that currently contain fish in the park.

Detailed maps of these sites are available at wilderness permit offices in the park.

What else is having an impact on frogs?

Chytridiomycosis, a disease caused by the fungal pathogen *Batrachochytrium dendrobatidis* (amphibian chytrid fungus) was first identified in 1999. This disease has had a further catastrophic impact on the remaining Sierra Nevada yellow-legged frog populations. However, a few populations of frogs have been able to persist in Yosemite despite chytrid infection. These persistent populations are a topic of research currently supported by the National Science Foundation.

These topics, as well as other possible causes of amphibian declines, such as habitat loss, airborne contaminants, and climate change, are the subjects of ongoing research. The information obtained from this research will help inform future management actions to promote the recovery of the Sierra Nevada yellow-legged frog and the ecosystems of which they are a part.

How can I learn more?

The National Park Service is preparing the High Elevation Aquatic Ecosystem Recovery and Stewardship Plan and Environmental Assessment to guide how Yosemite will protect the park's diverse high-elevation aquatic ecosystems into the future. The plan will address future actions that may be needed to restore native species, habitats, and systems that have been disturbed by past or ongoing human activities. Here are ways to learn more about this plan and stay involved:

- **Attend a monthly Yosemite National Park Open House** to talk with Park staff and obtain more information on this and other planning process:
 - Open House: generally the last Wednesday of each month in the Yosemite Valley Visitor Center Auditorium from 1:00-5:00pm
 - **Add your name to the park's planning list** and receive the *Planning Update* or **submit your email address** to receive the park's periodic electronic newsletter online at www.nps.gov/yose/parkmgmt/updates.htm.
 - **The Environmental Assessment will be open to public review in the future.** To request notification about the plan's availability for review
Mail: Superintendent
Attn: High Elevation Aquatic Resources Management Plan
P.O. Box 577
Yosemite, CA 95389
Phone: 209/379-1365; **Fax:** 209/379-1294
E-mail: Yose_Planning@nps.gov
 - **Visit online:** www.nps.gov/yose/parkmgmt/aquatic.htm
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