



United States Department of the Interior
U. S. GEOLOGICAL SURVEY

Forest & Rangeland Ecosystem Science Center
777 NW 9th Street, Suite 400
Corvallis, OR 97330

January 15, 2003

Memorandum

TO: Superintendent, Olympic National Park

FROM: Gary Larson

SUBJECT: Lake Crescent Panel Report

Olympic National Park asked the USGS Forest and Rangeland Ecosystem Science Center to evaluate the status of the fish populations in Lake Crescent. A panel of experts on fish ecology, fish population dynamics, fish systematics, fish genetics, aquatic plants, limnology, and wastewater assembled for a workshop in Seattle on February 13, 2002. Park staff presented talks about the limnology of the lake and what was known about the fish populations. The panel then discussed what they learned and offered many ideas and recommendations for future management actions. Each panel member sent his comments and recommendations to me. I summarized the comments and sent the summary to the panel for review. The panel reviewed the summary and offered additional comments, which were incorporated into the summary. The summary was then reviewed and approved by park staff.

Enclosed please find the summary of the recommendations and comments that the panel sent to me. Please note that Jim Shaklee provided additional genetic information after the workshop that clearly suggests that Beardslee trout are unique. I have listed the panel's comments and recommendations under three categories: Lake Ecology, Habitat Management, and Fisheries Management. The items under each category are in priority order. If you have any questions, please feel free to contact me at (541) 750 - 1032 or gary_l_larson@usgs.gov.

Evaluation of the Status of Fish Populations in Lake Crescent, Olympic National Park

Olympic National Park asked the USGS Forest and Rangeland Ecosystem Science Center to evaluate the status of the fish populations in Lake Crescent. A panel of experts on fish ecology, fish population dynamics, fish systematics, fish genetics, aquatic plants, limnology, and waste water assembled for a workshop in Seattle on February 13, 2002. Park staff presented talks about the limnology of the lake and what was known about the fish populations. The panel then discussed what they learned and offered many ideas and recommendations for future management actions. Each panel member sent his comments and recommendations to Gary Larson. He summarized the comments and sent the summary to the panel for review. The panel reviewed the summary and offered additional comments, which were incorporated into the summary. The summary was then reviewed and approved by park staff.

Summary of the Lake Crescent Panel Recommendations January 3, 2003

Lake Ecology

Initiate a long-term program for monitoring water temperature, water quality (including phosphorus and nitrogen), chlorophyll, Secchi disk clarity, zooplankton (species and biomass), and fish (species, age structure, growth, and abundance).

Develop water and nutrient budgets for the lake.

Conduct hydrological monitoring of water inflows and outflows.

Determine seasonal and spatial concentrations of nitrogen, phosphorus, and major ions.

Estimate nutrient inputs from sewage treatment facilities, atmospheric deposition, surface water, and ground water.

Nutrient loading appears to have increased and resulted in periphytic algae in the spawning area of the Beardslee trout. Determine periphyton production and standing crop.

Conduct a paleolimnological study to establish the degree to which residential and commercial developments in the watershed have impacted the water quality of the lake and assess whether anadromous fishes were ever in the lake system. This type of study would enable park management to place the current ecological conditions in the lake in a longer-term context of natural ecosystem dynamics.

Habitat Management

Develop a plan for dealing with human waste (especially sewage) within the watershed. Park management should develop specific strategies for converting current water disposal systems into a system that transports waste out of the watershed.

Develop a policy to protect the nearshore riparian habitat of the lake. Minimize removal of riparian vegetation (including snags) and prohibit removal of large woody debris. Long-term management of fish populations in the lake may depend on the productivity and heterogeneity provided by littoral habitats. Olympic National Park should work with riparian landowners to prevent further habitat degeneration and encourage habitat restoration. It also is important to raise the public awareness about the importance of littoral areas for survival and growth of young fishes and obtain conservation easements for critical shoreline rearing habitats.

Measure and monitor sediment accumulation/dispersal in fish spawning areas. Olympic

National Park should request information about timber/road management practices in the upper Lyre River and Boundary Creek drainages.

Park management should develop an official policy for preventing the spread of exotic species into the lake, including new plant species on boat trailers and through intentional, but uninformed, introductions.

Do not remove the log jam on the Lyre River. Insure that processes that provide for the input of large wood in the outlet to the lake are not impaired by development and road maintenance.

Improve fish habitat by replacing the culvert at Peidmont Creek with a bridge and “reload” the stream channel with large woody debris.

Fisheries Management

Genetic evidence suggests that the Beardslee are quite unique and possibly an interesting example of extreme genetic drift.

For cutthroat trout, the genetic data did not disprove the null hypothesis that the Barnes Creek and Lyre River populations are panmictic. Park management should be aware of life history variation/plasticity and perhaps look for differences in early life history ecology, including whether there is any evidence of fidelity to birthplace.

An integrated annual monitoring program, including creel surveys and assessment of spawning in Barnes Creek and the Lyre River, should be initiated to assess the status and trends of fishes in the lake. Emphasis should be placed on precise data that can be collected annually. Additional sampling programs should emphasize demographic information. Monitoring of spawning in Barnes Creek and the Lyre River should include measurement of fish and collection of scales for age and growth determinations. Fish traps should be used at Barnes Creek and the Lyre River. Archived scale samples should be used to compare the current age distribution to historical age distributions.

Primary research should include consistent and cost-effective monitoring of the adult Beardslee population, spawning sites, and juvenile habitat requirements. A fishery is an effective, low cost way to sample a fish population. Catch and release fishery does not appear to pose a serious threat to Beardslee trout, but it would be beneficial to try to evaluate catch and release mortality [Note: one panel member recommended closure of the Beardslee trout fishery]. Consistent, annual surveys of fish on the spawning ground(s), including frequency of repeat spawning, and in juvenile habitats could provide a valuable basis for future decisions.

The present status and expected future condition of the Lyre River Beardslee trout spawning area should be a high research/monitoring priority.

Determine if Beardslee trout have additional spawning areas in the lake.

Hydroacoustic monitoring may reveal additional spawning sites for Beardslee trout.

If hydroacoustics cannot be used for locating other potential Beardslee trout spawning areas, perhaps “Judas fish” could be employed. This method involves capturing mature fish throughout the lake and tagging them with radio or acoustic transmitters, liberating the fish, and then monitoring their locations as the spawning season approaches. If more than 1 spawning area exists, any “Judas fish” using these alternative sites should be detected spending significant amounts of time in localized areas away from the Lyre River during the spawning season.

Given its ecological importance in transferring energy between trophic levels, kokanee salmon life history, genetic and population structure investigations should be a high priority.

A hydroacoustic assessment and radio-telemetry techniques may be appropriate for potential application to monitoring and life history studies, especially to estimate the number of large fish in the lake, abundance and distribution of kokanee, reveal spawning areas for kokanee, and distribution and abundance of pygmy whitefish.

Tagging or scale analysis could be conducted to assess interactions of lake fishes with resident fish populations in the Lyre River and Boundary Creek.

Lake Crescent Panel Members

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