



Wild Fish Conservancy

N O R T H W E S T

S C I E N C E E D U C A T I O N A D V O C A C Y

A Study of Ecological Recovery and Recolonization in Icicle Creek Accomplishments and Implications 2006–2007

With support from the Icicle Fund, the Wild Fish Conservancy laid the groundwork in 2006 for long-term study of ecological change in the Icicle Creek watershed and began an associated public outreach campaign. Recent major improvements in fish passage at the Leavenworth National Fish Hatchery (LNFH) provide invaluable scientific and educational opportunities, which Wild Fish Conservancy is pursuing as the overarching goals of its efforts in the Icicle watershed.

The primary scientific goal of the project is to use Icicle Creek as a model to explore how a large section of a watershed that has long been isolated from migratory fish responds to the removal of fish passage barriers; to learn how the process of recolonization by migratory fish occurs; and to examine how the return of anadromy impacts overall watershed health.

From an educational perspective, Wild Fish Conservancy's goal is to engage the public in learning about the challenges facing fish in Icicle Creek and to invite local, regional and national audiences to understand the positive ecological changes that have occurred, and that are continuing to occur, in this ecosystem. Our research agenda also includes opportunities for undergraduate and graduate education through our association with Dr. Brian Kennedy at the University of Idaho.

Project Facts

- The Icicle Creek Project has two major scientific research components: (1) annual mainstem census surveys performed in August to document fish species composition and distribution; (2) weekly site-specific fish sampling and related research performed between June and October to measure fish movement, growth and genetic make-up.
- The 2006 and 2007 fish censuses, performed by multiple teams of snorkelers, collectively covered 68 miles of stream channel (43 miles of mainstem Icicle Creek and, in nearby reference watersheds, 21 miles of the Chiwawa River and four miles of Chiwaukum Creek). These surveys were undertaken by nine Wild Fish Conservancy biologists along with six volunteers including USFWS staff, motivated high school and college students, and University of Idaho graduate students with their advising professor.
- Site-specific research, initiated in 2007 at selected reaches along the mainstem Icicle and Chiwaukum Creeks, involves four Wild Fish Conservancy staff in the field full-time for over 20 consecutive weeks. In 2007, the team collected 720 rainbow trout (51 juvenile rainbow/steelhead in Chiwaukum Creek and 669 resident rainbow in Icicle Creek), of which 693

were implanted with uniquely coded (PIT) tags to allow tracking of fish movement upon future recapture. Length and weight measurements were taken from all 720 fish along with tissue and scale samples for genetic analysis by NOAA Fisheries, a primary project partner.

- The Icicle Creek Project has two major outreach and education components: (1) development of local environmental education programs targeting both the general public and area school children; (2) communication of Wild Fish Conservancy's scientific findings to regional and national audiences.

Project Accomplishments and Implications

- Wild Fish Conservancy's work in 2006 opened new avenues of collaboration with federal agency biologists. Highlights of accomplishments achieved jointly with USFWS staff include: (1) critical improvements in fish passage at LNFH's headgate and fish ladder; and (2) development of novel fish sampling and rescue protocol at LNFH sediment deposition facility.
 - *These collaborative actions have measurably improved conditions for Icicle Creek's fish populations and are testimony to Wild Fish Conservancy's positive presence in the watershed.*
- Following critical improvements in fish passage at LNFH, Wild Fish Conservancy immediately documented use of habitat above the hatchery by large, presumably migratory salmonids. In August 2006, two adult steelhead (listed as "endangered" under the ESA) were observed above LNFH near the hatchery diversion dam. At this time an adult bull trout (listed as "threatened" under the ESA and presumed to be migratory by virtue of its large size) was also observed near Johnny Creek, more than seven river miles above LNFH. In 2007, two adult bull trout of migratory size were observed near Chatter Creek, four river miles further upstream.
 - *These observations suggest that improvements in fish passage at the hatchery have given pioneering migrant fish the potential to utilize a far broader range of habitat in the Icicle Creek watershed than in previous years, possibly including the highest reaches of the upper basin.*
 - *Fishing regulations should reflect the expanding range of at-risk species in the watershed.*
 - *Breeding between resident and recolonizing migratory salmonids is expected to increase genetic diversity and thereby improve the overall health of local populations.*
- Wild Fish Conservancy's fish census surveys on Icicle Creek in 2006 and 2007 have revealed that (1) the large boulder field above LNFH and a series of other formidable rapids upstream are not insurmountable barriers to migratory fish, as widely assumed by resource managers; (2) the upper Icicle Creek basin supports a robust, well-conditioned population of resident rainbow trout (more than 30,000 fish total observed in 2006 and 2007, or nearly one fish, on average, in every linear meter surveyed), despite an earlier claim that the watershed has poor productivity. Approximately half of these fish were six inches in length or longer—the size of the average migrating steelhead smolt in the Upper Columbia Basin.
 - *Wild Fish Conservancy's research requires a reexamination of the existing resource management assumption that habitat above the hatchery is unimportant for anadromous fish.*

- *Our observations suggest that the eventual return of wild steelhead to the upper Icicle Creek basin will be supported by abundant, high-quality rearing habitat for smolts.*
- Wild Fish Conservancy's fish tagging and recapture efforts in summer 2007 revealed that juvenile rainbow trout exhibit a high degree of site fidelity during the period of major summer growth from July to mid-September.
 - *Long-term research on Icicle Creek, involving continued effort to recapture tagged fish, is critical for shedding light on how resident fish currently utilize available habitat and how returning migratory fish may impact resident fish movement.*
- Wild Fish Conservancy's long-term monitoring of water temperature in Icicle Creek, by means of temperature loggers, will provide important baseline data for tracking the impact of global warming on native salmonid populations in the upper Columbia basin, and for exploring the ecological role of cool-water refuges like Icicle Creek.
- Wild Fish Conservancy's long-term monitoring of the process of recolonization by migratory salmonids in Icicle Creek will serve as a model for other northwest watersheds of the potential ecological benefits of passage-barrier removal.
- Wild Fish Conservancy's participation in the Wenatchee River Salmon Festival is an annual highlight of the Icicle Creek Project's outreach and education initiative.
 - During the 2006 festival, nearly 500 children entered paintings into our "Happy Salmon Homecoming" poster contest and staff biologists presented newly acquired information about fish populations in Icicle Creek.
 - The 2007 festival will mark our fifth year sharing environmental science with children and their families, and will include research updates from our summer 2007 field work.
- Wild Fish Conservancy has developed a series of educational resources to provide current information about Icicle Creek and Wenatchee River fish and their habitats.
 - These resources include fish field guide pages, with species list and habitat map, for the Barn Beach reach of the Wenatchee River surveyed by Wild Fish Conservancy in fall 2006, maps depicting the current distribution of migratory fish in Icicle Creek, ID cards for teaching how to distinguish among the juvenile salmon living in the Wenatchee basin, and an underwater video system that provides the public live images of local fish, their behavior and their habitats.
- Wild Fish Conservancy has partnered with the Barn Beach Reserve Learning Center to develop and deliver environmental education programs for local public schools.
 - We have volunteered our successful Environmental Discovery Program as a model for classroom and field-based outdoor education at the Reserve for students from the Cascade, Wenatchee, Cashmere, Eastmont and Entiat school districts.
 - In summer 2007, using learning resources described above, we presented a field program to forty students from Foothill Middle School in Wenatchee participating in GEAR UP, a national program that encourages underserved students to finish high school and continue to college, and conducted a teacher training for four instructors from Osborne Elementary School in Leavenworth.
 - In fall 2007, approximately 100 fourth-grade students from Osborne Elementary will participate in the inaugural year of a five-day field-based environmental education

program at Barn Beach Reserve developed jointly by Wild Fish Conservancy and the Reserve's Learning Center.

- Through local media, speaking engagements, and the Internet, Wild Fish Conservancy has disseminated information about its ongoing research on Icicle Creek to regional and national audiences.
 - Wild Fish Conservancy biologists were interviewed about the Icicle Creek Project on KOHO radio in January, April, and August, 2007.
 - Wild Fish Conservancy's Science Director presented an educational talk on fish recolonization in Icicle Creek to the North Cascades Audubon Society.
 - Icicle Creek Project research updates, including new findings and photographs, are published regularly on the Wild Fish Conservancy Web site.

WILD FISH CONSERVANCY IS EXTREMELY GRATEFUL FOR THE ICICLE FUND'S GENEROUS SUPPORT.
PLEASE FEEL FREE TO CONTACT US AT ANY TIME WITH QUESTIONS ABOUT OUR ONGOING WORK.