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The Western Fisheries Research Center Studies: Threatened and Endangered Fishes

Within historical time, western native fish communities have faced increasing threats from habitat loss, invasive species, and pollution. It should come as no surprise that human development has greatly altered fish habitat in the west because of the importance of water for domestic, agricultural, and industrial uses, power generation, waste disposal, flood protection, and transportation. Fish that were adapted to natural cycles of river flow, lake levels, and water temperatures have been unable to adapt to the changes to these cycles caused by development, leading to the listing as threatened or endangered of 68 species of western native fishes. Rapid expansion of non-native fishes, aquatic plants, and invertebrates has increased competition for food and space while pollutants from past and present degrade our lakes, streams, and rivers.

The Western Fisheries Research Center (WFRC) and its affiliate field stations and laboratories are providing information to the Department of the Interior and other stakeholders to stop the decline of western native fishes. Species with limited distributions, such as most desert and arid lands fishes, are more likely to be jeopardized than fishes with extensive ranges, such as anadromous salmon. In fact, many desert species have extremely limited distribution such as the Devils Hole pupfish (*Cyprinodon diabolis*) which is restricted to a small depression on the side of a hill, and thus could be lost by a single catastrophic event. Some of the widespread species such as the Snake River stock of fall Chinook salmon (*Oncorhynchus tshawytscha*) face more insidious threats that act over time scales of years or decades and continuously pressure populations into decline.

The Devil's Hole pupfish are a short lived species of one year or less. The spring population varies from 150 to 250, and the fall population from 400 to 500. This large disparity between spring and fall populations is due to severe environmental conditions, low oxygen levels, scant algae-producing sunlight within the cavern during winter months, and the short lives of these pupfish which naturally decline during the winter. They reach a size of only 2.5 cm or less because they occur in one of the most restricted habitats (size wise) in the world (several square meters).

Society recognized the importance of preventing the extinction of species in 1973 with the passage of the Endangered Species Act. Sound species recovery science is needed because decisions made to halt declines often have very high economic costs. Scientists at the WFRC apply many research approaches to the study of causes of decline and effects of recovery efforts. Combinations of field and laboratory studies coupled with mathematical modeling of populations and application of remote sensing technologies are used to gather data, analyze trends, determine cause and effect, report findings, and help direct recovery. The scientific and economic impacts of these studies benefit all segments of society.

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INTERESTING FACTS

What does ESA mean?

Endangered Species Act

Creation of present Endangered Species Act: 1973

What does "endangered species" mean?

Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.

What does "threatened species" mean?

Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

How can a species be listed in one place and not in another?

Listings can apply to all individuals of a species, only to those in part of their range, or just to certain genetically-distinct groups. For example, the listing of the Whooping Crane (*Grus americana*), a native of North America, applies to the species throughout its range. Sockeye salmon (*Oncorhynchus nerka*) occur in areas from Alaska to Idaho, but only the genetically-distinct populations from the Snake River in Idaho and Ozette Lake, Washington, are listed as endangered and threatened, respectively.

How many species of fish are listed as endangered or threatened in the U.S.?

114 species of fish are listed in the U.S.

For more information:
http://www.fws.gov/endangered/
http://www.nmfs.noaa.gov/pr/

What is "Critical habitat"?
"Critical habitat" is defined as areas essential for the "conservation" of the species in question.

"Conservation" is defined as using all means necessary to bring a species to the point it no longer needs the protection of the Act - i.e. recovery.

WFRC Studies of Threatened and Endangered Fishes

Water Quality and Salmonid Population Viability

In order to fully integrate the effects of poor water quality on ESA recovery planning it is necessary to (1) identify locations of known and suspected water pollution and (2) be able to ascribe some level of risk to salmonid population viability (lethal and sublethal effects) when fish are exposed to specific compounds (or mixes of compounds) at any life history stage. Sublethal effects include reproductive abnormalities (see photo) caused by a class of chemicals that mimic estrogens. Our objective is to compile existing information into a format that will allow endangered species recovery planners to consider risks posed by various sources and types of water pollution.

Left: Developing testis (with developing sperm). Right: Developing ovary (with developing ova).

Swimming Performance of Bull Trout (*Salvelinus confluentus*)

Bull trout in the western United States are now listed as threatened under the ESA. One cause of bull trout population decline is poor fish passage around water diversion structures and through road culverts. Scientists are measuring the swimming performance of bull trout to help engineers design or modify culverts and other fish passage structures in watersheds where bull trout are present.

Response to Water Quality in Upper Klamath Lake, Oregon

Severe water quality problems in Upper Klamath Lake, Oregon, have led to concerns about how Lost River (*Deltistes luxatus*) and shortnose suckers (*Chasmistes brevirostris*) are distributed during the summer and whether the suckers can find and use areas with better water quality. USGS scientists are using radio telemetry to examining the movements and behavior of adult suckers and relating these to water quality in Upper Klamath Lake.

Additional WFRC studies concerning threatened and endangered species can be found on the Center's website at http://wfrc.usgs.gov.

Female Lost River sucker

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