

Salmonid Survival



in the Soquel Creek Watershed

Santa Cruz County Resources Conservation District

The Santa Cruz County Resource Conservation District (RCD) is a non-regulatory, non-for-profit entity. The mission of the SCCRCD is to help people protect, conserve, and restore natural resources through information, education, and technical assistance programs. The District provides an active program for the conservation of soil, water, plant, and wildlife resources in Santa Cruz County.

Informational Resources

Santa Cruz County RCD
(831) 464-2950

Natural Resources Conservation Service
(831) 475-1967
www.nrcs.usda.gov

County of Santa Cruz Planning Department
(831) 454-2580
www.co.santa-cruz.ca.us

California Department of Fish and Game
(831) 649-2870
www.dfg.ca.gov

National Marine Fisheries Service
www.nmfs.noaa.gov

Army Corps of Engineers
www.spn.usace.army.mil

United States Fish and Wildlife Service
www.fws.gov

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The Soquel Creek Watershed Assessment and Enhancement Plan

Through the assessment and enhancement planning process, an interdisciplinary team of scientists has assessed aspects of the Soquel Creek Watershed as they pertain to fish habitat. The team has studied the riparian forest, fish populations and their in-stream habitat, hydrology, and geomorphology in the watershed.

Several fish passage impediments have been identified through this process. The types of fish passage impediments identified include undersized, damaged, or unmaintained culverts; concrete fords; flashboard dams; and natural barriers such as waterfalls.

What Can You Do to Improve Fish Passage?

You can be aware of the issue and participate in projects to restore fish passage. There are many opportunities to participate in local watershed groups and to attend local watershed educational workshops.

You can include provisions for fish passage when planning new alterations to the river bed or banks. Local resource professionals and permitting agencies (see list of Informational Resources on the last page of this brochure) will provide pertinent guidelines. By seeking out the appropriate technical assistance you can minimize your impacts while you enjoy Soquel Creek.

It is important to note that any type of dam put in Soquel Creek or its tributaries requires a consultation with the California Department of Fish and Game.

Salmonids in the Soquel Creek Watershed

The Soquel Creek Watershed is 42.9 square miles and has approximately 23 miles of blue line stream. Elevations range from sea level at the mouth of the creek to 2900 feet in the headwater areas. This watershed is habitat for steelhead trout and coho salmon. Coho salmon were last seen in 1987. Steelhead trout populations were estimated at just 500-800 from the 1997 and 1998 juvenile production. The decline has been attributed to adverse effects of human activities (including erosion, sedimentation and water use). The limiting factors in this watershed that can impede the survival of these fish populations are sedimentation, loss of riparian habitat, high water temperature, channel clearing of woody debris, and fish passage impediments.



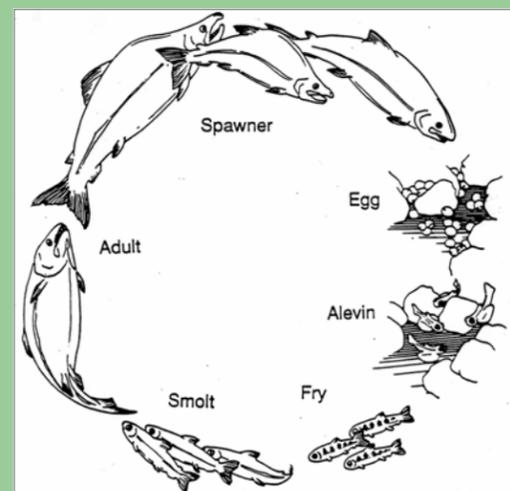
Steelhead Trout



Coho Salmon

Steelhead trout are now listed as threatened under the Federal Endangered Species Act (ESA). Coho salmon are now listed as threatened under the Federal ESA and as endangered under the California ESA. Endangered Species Act listings promote preservation and restoration of watershed health as the preferred means to assure survival of aquatic species. To try to achieve sustainable populations of steelhead trout and coho salmon through watershed preservation and restoration, it is necessary to understand their life cycle and habitat requirements, and the human impacts that adversely affect their survival.

Salmonid Life Cycle



Steelhead trout and coho salmon are scientifically classified in the family Salmonidae, which is why we call them salmonids. Both are anadromous, which means they spawn in freshwater streams and migrate to the ocean to mature.

Salmonids lay eggs in nests called "redds" in gravel beds of freshwater streams. Each newly-hatched salmonid, called an alevin or sack fry, is born with an attached yolk sack. When nutrients in the yolk sack have been consumed, the fish emerge from redds to find food. Fish that have emerged from redds are called fry and feed on aquatic insects.

Steelhead trout live in freshwater streams for their first 1-4 years, while coho salmon stay in freshwater streams for just their first year. When juvenile salmonids begin migrating to the ocean, they undergo smoltification. Smoltification is a change in body chemistry that adapts an aquatic fish to life in saltwater. These fish, now called smolts, become silvery and elongated.

Steelhead trout and coho salmon live in the ocean for six months to two years, growing much more rapidly than they do in freshwater, before returning to spawn in natal streams. Some steelhead trout return to the ocean after spawning, and repeat the spawning cycle more than once. Coho salmon die after spawning once.

Salmonid Habitat Requirements



Cool Water

Optimum water temperature for survival varies throughout the life stages of steelhead trout and coho salmon. Preferred water temperature for juvenile steelhead trout is from 45 to 58 degrees Fahrenheit. Preferred water temperature for juvenile coho salmon is from 53 to 58 degrees Fahrenheit. Higher water temperatures can cause starvation and increased rates of disease.

Well Oxygenated Water

Salmonids require well-oxygenated water. Oxygen content in stream flow can be reduced by warm water temperatures and slow water speeds. Increased water temperature can also cause growth of algae, and decay of algae often consumes much of the oxygen necessary for salmonid survival.

Clean Spawning Gravel

Spaces between gravels in a redd are necessary for survival of eggs and sack fry. When the spaces between gravels in a redd are filled with fine sediment, like sand or silt, stream flow through the redd is reduced and salmonid eggs and sack fry may not receive oxygen necessary for survival. Fine sediments also

Riffles

Riffles are stream reaches where shallow water flows over gravel. Relatively high oxygen-content water and stable cobbles in riffles provide excellent habitat for the aquatic insects that juvenile salmonids eat. Inundation of riffles with ponded water and/or fine sediment eliminates that food source.

Pools

Deep pools with, and often formed by, large woody debris are excellent summer habitat where juvenile salmonids can hide from predators and winter habitat where juveniles can avoid high stream flow. This essential habitat is reduced or eliminated when pools fill with sediment. Removal of large woody debris drastically slows habitat recovery.



Riparian Vegetation

Riparian vegetation serves many important functions. Overhanging vegetation reduces water temperature and shelters salmonids from predators. Insects that drop from overhanging riparian vegetation into streams are food for salmonids. Healthy riparian vegetation reduces stream bank erosion. Removal of native riparian vegetation can degrade water quality, increase predation on juvenile salmonids, reduce food available for juvenile salmonids, and accelerate stream bank erosion.

Why is Fish Passage Important for Steelhead Trout and Coho Salmon?

- ◆ To allow their yearly spawning migration
- ◆ To maximize available spawning and rearing habitat
- ◆ To diversify populations and genetics
- ◆ To reduce competition among different species for limited resources
- ◆ To find favorable over-wintering habitat
- ◆ To find food
- ◆ To find relatively cool and well-oxygenated water, particularly during summer

Common Human-Made Fish Passage Impediments:

- ◆ Road crossings, particularly culverts
- ◆ Permanent and seasonal dams
- ◆ Structures installed to control stream gradient

Fish Passage Problems Associated with improperly Installed Culverts:

- ◆ Water inside culvert is too shallow during fish migration
- ◆ Culvert outlet is perched above the streambed
- ◆ Movement of water inside the culvert is too fast

What are the Effects of Passage Impediments on Movement of Adult Fish?

- ◆ Disrupt spawning migrations
- ◆ Under-utilization of tributary habitat
- ◆ Over-crowding of available spawning habitat
- ◆ Increased stress, injury, or predation/ poaching
- ◆ Less separation of competing species

What are the Effects of Passage Impediments on Movement of Juvenile Fish?

- ◆ Limit or prevent use of over-wintering habitat in tributaries
- ◆ Increase predation
- ◆ Limit or prevent summer migration from thermally-stressed mainstems to cool water refugia

Critical Times for Fish Passage in the Soquel Creek Watershed

- ◆ **November through May** is a critical period for adult steelhead trout and coho salmon passage. From the moment stream flow breaches the sand bar at the ocean, adults may begin to swim up river to spawn.
- ◆ **February through June** is a critical period when juvenile fish (called smolts) migrate from the streams to the ocean. Steelhead trout live in freshwater streams for their first 1-4 years, while coho salmon stay in freshwater streams for just their first year.
- ◆ **June through October** is a critical period for juvenile fish as they seek favorable conditions within and among streams.