Watershed: effects of human activities on stream habitat

Problem statement

Land use activities such as logging, farming, urban development, and other human activities have degraded much of the freshwater habitat on which Pacific salmon stocks depend.

Critical factors

- The degradation of freshwater habitat has contributed significantly to the decline of Pacific salmon populations.
- Degraded freshwater habitat jeopardizes the recovery of threatened and endangered Pacific salmon.
- The National Marine Fisheries Service (NMFS) must consider land-use effects on freshwater habitat when it reviews habitat conservation plans (HCPs), develops recovery plans, or provides technical assistance to other agencies that develop land management plans, forestry or water quality regulations, and monitoring programs.

Status of research

Within the Northwest Fisheries Science Center's (NWFSC) Watershed Program, scientists are studying the degree to which freshwater habitats affect abundance and population growth of salmonids in order to assist in developing rational recovery strategies for listed salmon species. Ongoing research projects include studying the degree to which streamside buffers of different widths effectively protect stream ecosystem processes from logging, and examining the effects of different land-use protocols and the presence or absence of juvenile salmonids on food web dynamics in small streams. In addition, various streamside buffer treatments are being evaluated with respect to the survival and growth of trees and understory vegetation retained in buffer zones. Additional aspects of the research entail monitoring the impacts of fine sediment deposition and bed scouring on chinook salmon redds (i.e., the spawning grounds or nests of the fish), evaluating the relationships between coarse-scale habitat, land-use characteristics, and salmon populations in three large watersheds (the Snohomish River basin in Washington, the Salmon River basin in Idaho, and the Willamette River basin in Oregon), predicting relative salmon abundance in areas lacking fish data, and determining how low numbers of spawning salmon affect nutrient dynamics in streams and the productivity of salmon populations in the Snake River basin.

Future considerations

To mitigate human impacts on salmon habitat, additional studies are needed that address 1) the quantitative relationships between streamside buffer widths and actual instream conditions, 2) the impacts of land-use on stream hydrology, sediment dynamics, and nutrient availability, 3) the influence of habitat conditions on fish predation and salmon survival in freshwater, and 4) the effects of multiple water-quality stresses and the cumulative effects of individual stresses on instream habitat quality.

Spawning sockeye salmon

Key Players

Environmental Conservation (EC) Division, NWFSC
King County Department of Natural Resources
Oregon State University
University of British Columbia
University of Washington
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Fish & Wildlife Service
U.S. Geological Survey
Seattle Public Utilities
Washington Tribes
Washington Department of Natural Resources
Weyerhaeuser Company
Skagit Systems Cooperative
Tulalip Tribe

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