Scientific Case for Salmon Conservation at the Watershed Scale

The Tongass: A Unique Salmon Watershed Conservation Opportunity

Southeast Alaska's Tongass National Forest is a unique ecosystem, and a true "salmon forest." The Tongass produces an estimated 28% of Alaska's annual salmon harvest and includes an estimated 30% of the earth's remaining old-growth temperate rainforest. Salmon carry essential nutrients upstream and transfer them through complex food webs to the forest when they spawn and die. Many scientists agree the key to maintaining the biodiversity and ecological integrity of the Tongass is to protect the region's high-value salmon-producing watersheds—entire drainages that stretch from ridge top to ridge top and from river headwaters to river mouths. The Nature Conservancy and Audubon Alaska's assessment of Tongass watersheds showed that many of the region's highest-value salmon watersheds are still intact, and the majority of these whole watersheds are not currently in protected land status.[1]

Basis for Salmon Conservation at the Watershed Scale

A recently compiled 88-page searchable bibliography provides a range of scientific studies related to salmon conservation at the watershed scale in the Pacific Northwest and Alaska. The bibliography includes a complete citation and abstract/summary for each study.[2] Studies listed in the bibliography illustrate the importance of numerous and diverse watersheds for abundant and diverse salmon populations. In Southeast Alaska, many of these watersheds are still intact, unlike those throughout the Pacific Northwest.

The studies summarized in the bibliography highlight the following four attributes of intact, whole watersheds that are vital to the health and productivity of salmon populations:

1

Provide diverse habitats that best meet the needs of various salmon life histories

All salmon depend on freshwater habitats for spawning and rearing life stages, but each salmon species may use a different part or parts of a watershed during specific seasons. The variety of life history strategies of the five species of Pacific salmon requires a range of freshwater habitats within a watershed. The greater the habitat diversity, the more resilient individual salmon populations will be to small- or large-scale changes.

2

Protect intricate connections among watershed functions

Connectivity throughout watersheds is important to salmon in at least three dimensions: longitudinally (upstream/downstream), horizontally (extending out from the stream across the floodplain) and vertically (into the below-ground environment). Complex, interrelated ecological processes like nutrient and sediment cycling depend on interchange among all three dimensions. For example, floods carry nutrients across the flood plain and unimpeded access to upstream spawning habitats, off-channel refuge habitats and the intertidal and marine environment are critical connections for salmon.

3

Maintain diverse natural disturbance events that create a variety of habitats

Beaver dams, landslides and the blow down of large trees are examples of natural disturbance events that create diverse habitats and conditions critical to salmon. Such an event in one part of a watershed may influence habitats elsewhere in the watershed both upstream and downstream.

4

Maintain habitat diversity and salmon population diversity to maintain population resilience

Evidence from Bristol Bay demonstrates that diverse stocks of red salmon stabilize ecosystem services, including clean water production and climate regulation, as well as stabilize the economies and livelihoods of local people using those services. [3]

[1] Albert, D. and J. Schoen. 2007. A Conservation Assessment and Resource Synthesis for the Coastal Forests and Mountains Ecoregion of Southeastern Alaska and the Tongass National Forest. Audubon Alaska and The Nature Conservancy, Anchorage, AK. Available online at: http://home.gci.net/~tnc/.

[2] Bryant, M.D. 2011. The Case for Salmon Conservation at the Watershed Scale: An Annotated Bibliography. Trout Unlimited Alaska Program, Juneau, AK. Available online at: http://www.tu.org/conservation/alaska/tongass.

[3] Schindler, D. and R. Hilborn, et al. 2010. Population diversity and the portfolio effect in an exploited species. Nature 465: 609-613.