

A Review of Salmon as Keystone Species and Their Utility as Critical Indicators of Regional Biodiversity and Ecosystem Integrity

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ABSTRACT

Seven species of anadromous salmon comprised of more than 9000 local populations return annually to thousands of streams in coastal and interior watersheds throughout British Columbia. Salmon are commonly used as biological indicators of state changes in marine or aquatic environments because they are: (i) relatively widespread in freshwater and marine ecosystems, (ii) highly valued from economic and cultural perspectives, (iii) reasonably diverse in terms of species, life histories and genetic variations within species, (iv) highly sensitive to environmental change at each of several life history stages, and (v) commonly the subjects of long term assessment programs. Observations from studies of salmon allow us to draw inferences about changes in the state of aquatic and riparian ecosystems on a variety of temporal scales ranging from weeks to centuries and spatial scales ranging from meters to thousands of kilometers. An increasing body of research has confirmed that freshwater and especially anadromous salmon serve as keystone species that exert control as predators, prey and as suppliers of critical nutrients in both aquatic and terrestrial riparian ecosystems. Important ecosystem linkages to salmon exist at levels ranging from primary producers, through aquatic invertebrates, to aquatic vertebrates, to terrestrial invertebrates and finally to a diversity of terrestrial vertebrates including large carnivores, small mammals, amphibians and even birds. Given their demonstrated role as keystone species, their importance as west coast cultural icons for people of all races and their long history of careful assessment as an economically important regional resource, salmon exhibit utility for continued development as a highly cost effective indicator of the functional integrity of aquatic and terrestrial riparian ecosystems and of their continued potential to support both species populations at risk (bears, eagles, steelhead etc.) or general levels of biodiversity throughout much of British Columbia.

