

## **Presentation: A scientific view of conservation and sustainability**

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**Salmon diversity** includes variation within and among populations in genetics, morphology, life histories, and behaviour, any of which may create differences in productivity (e.g., survival rate from eggs to adults) and enable populations to adapt to changes in environmental conditions.

**Conservation** is the restoration and protection of salmon and their habitats throughout the life cycle, maintaining salmon diversity and abundance, interactions with other species, and continuance of evolutionary and natural production processes.

**Sustainable use** involves use of salmon in a way that maintains their abundance and diversity at levels that match the diverse values that current and future generations of people place upon them.

These definitions of *conservation* and *sustainable use* are similar to those used in Canada's Wild Salmon Policy<sup>1</sup>. My definition of *salmon diversity* is adapted from the widely used definition of biological diversity as set out by the Convention on Biological Diversity<sup>2</sup>. This definition has also been imbedded within the definition of *conservation* in the Wild Salmon Policy. The distinction between conservation and sustainable use also matches both the Wild Salmon Policy and the Millennium Ecosystem Assessment<sup>3</sup>. These initiatives make it clear that we cannot divorce species from their interactions with other parts of their ecosystems when setting conservation objectives, including *sustainable use*, which figures prominently in all three initiatives. They also emphasize the many levels of diversity, from genetic variation within populations to variation among species and their interactions with their environments. Maintenance of these various elements of diversity helps to maintain resilience of salmon populations, which increases the chance that they will produce social, economic, and ecological benefits over the long term.

It is important to understand these concepts because a lack of clarity about them can lead to debates that are more about values than science. For example, some people place a higher value on activities that may harm wild salmon populations than those that protect them. Scientific interpretations of research results are then corrupted by the differing values of those who want to win their arguments. Less obvious examples occur even within the sustainable use paradigm because, for example, while fisheries on large stocks may be sustainable, these may have adverse impacts on smaller stocks and

on ecosystem services. How much this matters depends on what people value. Two scientists may come to different conclusions about the best options for management because of unstated differences in which objectives of sustainable use they are referring to, such as short-term value to the commercial sector or long-term value of a diverse portfolio of stocks. Ideally, society should set out the objectives, and indeed the Wild Salmon Policy does provide some guidance on this. Many scientists see it as their right and responsibility to help formulate objectives by illuminating tradeoffs between competing goals and defending against misinterpretation of evidence.

Decisions about conservation and sustainable use must often be made in the face of scientific uncertainty. While some uncertainties can be reduced through further study, others will remain a fact of life, such as forecasting returns of adult salmon two years in advance, which is arguably more difficult than forecasting the weather over the same period. Scientific uncertainties should not be used as an excuse for inaction. The precautionary approach, which has been adopted by many international fisheries agencies, involves exercising a level of precaution in management that is commensurate with the level of uncertainty, risks, and lack of reversibility of impacts.

1. Canada's Policy for Conservation of Wild Pacific Salmon (2005). Fisheries and Ocean's Canada. <http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/wsp-pss/index-eng.htm>
2. Convention on Biological Diversity. <http://www.cbd.int/>
3. Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, D.C. <http://www.maweb.org/en/index.aspx>