

Extinction by Miscalculation: The Threat to Sakinaw and Cultus Lake Sockeye

MART R. GROSS
Department of Zoology
University of Toronto

PABLO MONTAGNES, MIKE PARKES,
PAUL RIIS, BARBARA ROBERTS,
and
MATTHEW A. TURNER¹
Department of Economics
University of Toronto

Version 1.0
19 November 2004



University of Toronto
Department of Economics
Working Paper Series

KEYWORDS: Species at Risk Act, Sakinaw sockeye, Cultus sockeye, fisheries management, extinction.

¹Corresponding author: Department of Economics, University of Toronto, 150 St. George Street, Toronto, Canada M5S 3G7. Email: mturner@chass.utoronto.ca.

Introduction

On October 23, 2004, Canada's Minister of the Environment issued a decision on 76 species that the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) had recommended for protection under the Species at Risk Act (SARA). Among these 76 were two "species"¹ of sockeye salmon that live in or near the Fraser River in British Columbia, the Sakinaw and Cultus sockeye.

Between 1947 and 1987, the number of adult Sakinaw sockeye reaching Sakinaw Lake to spawn averaged around 5,000, with no declining trend. Between 1997 and 2001, the number reaching the lake to spawn ranged from 1 to 122 (COSEWIC, 2003a). Between the 1920s and the 1960s, the number of adult Cultus sockeye averaged around 20,000. Between 1991 and 2002, the number of adult Cultus sockeye that spawned decreased by 92% (COSEWIC, 2003b). There is no contention over COSEWIC's conclusion that these two species are at risk of extinction.

In spite of this, the Minister of the Environment declined to recommend the listing of Sakinaw and Cultus sockeye under SARA. SARA gives the Minister broad discretion in this decision, subject to the condition that he reports his reasons for not listing a species in the Canada Gazette. The Gazette states:

The Minister will propose that the Cultus and Sakinaw populations of Pacific sockeye salmon not be listed because of the unacceptably high social and economic costs ... Because these small populations mix with much larger sockeye populations during the marine migration and the fishery, extensive fishery closures to the mixed-stock fisheries are required to ensure the protection of these small populations mandated by a SARA listing. Lost benefits to fisheries are estimated at \$125 million over a four-year period if these populations are listed. (Gazette, pg. 2905, October 23, 2004)

The Species at Risk Act is a relatively new law, and the Cultus and Sakinaw sockeye are an important test case. Thus, Canada's Minister of the Environment is struggling with a decision that is largely unprecedented in Canada and is unarguably difficult.

Inquiries made to Fisheries and Oceans Canada, and Environment Canada, reveal that the assessment of the costs of listing the two species comes from two reports: GSGislason & Associates Ltd. (2004), and Fisheries and Oceans Canada (2004). The latter contains the \$125 million estimate of cost to the fishing industry if it captures fewer sockeye salmon due to SARA listing.

However, neither report is a sound socio-economic analysis of the net value of a SARA listing of Sakinaw and Cultus sockeye. For instance, the social and economic benefits from protecting these two species are not included when calculating the \$125 million cost.

¹ SARA defines "wildlife species" as a species, subspecies, variety or geographically or genetically distinct population. Sakinaw and Cultus sockeye are populations that are genetically and geographically distinct from other populations, collectively known as the sockeye salmon, *Oncorhynchus nerka*

It is likely that the cost of listing the Sakinaw and Cultus sockeye under SARA would be less than \$125 million. It is also likely that there are considerable benefits from listing these two species. But the analysis on which the Minister relies makes no effort to evaluate the costs of listing against the benefits of listing. While there may be circumstances under which it is simply "too expensive" to preserve a species, the analysis does not permit us to reach this conclusion.

In light of the historic nature of this decision, we encourage the Minister to revisit his recommendation and make a decision on the basis of sound economic analysis. In the following we point out some issues with the current economic analysis.

A. Failure to use benefit-cost analysis

The Minister declines to protect the Sakinaw and Cultus sockeye on the basis of "unacceptably high social and economic costs", and to justify this conclusion he states that "[l]ost benefits to fisheries are estimated at \$125 million" (Gazette, pg. 2905, October 23, 2004). Is \$125 million really too much to pay to protect the Cultus and Sakinaw sockeye? The answer is that it depends on the value of the fish, and this can only be determined by calculating both the benefits and the costs to Canadians. Such benefit-cost analysis is widely accepted in the economics profession, and widely used for public decisions. To see that the exclusion of benefits cannot lead to a correct decision, imagine trying to evaluate a public works project like a road or water treatment facility only on the basis of its construction cost. Since all projects are costly, if we consider only costs, all projects must fail. Thus, the Minister's conclusion that preserving Cultus and Sakinaw sockeye is 'too expensive' is an unavoidable consequence of not considering any benefits.

A partial listing of the benefits that society would derive from sockeye salmon conservation include: benefits to native peoples whose cultures and livelihoods revolve around these sockeye; recreational benefits to sport fishers; benefits derived from the contribution that sockeye make to maintaining a healthy ecosystem (e.g., delivery of nutrients and carbon from ocean to lakes; sustenance for birds, birds, invertebrates, other fishes); benefits derived from scientific knowledge²; benefits to a commercial fishery which cannot persist unless resources are conserved; and benefits to future generations of people. Some of these benefits are difficult to estimate, others less so. Nevertheless, the proposition that there are benefits associated with the conservation of Sakinaw and Cultus sockeye is beyond contention. These benefits must be considered to calculate the net value of SARA listing.

B. Failure to calculate net costs of fishing and processing

The claim that SARA listing for Sakinaw and Cultus sockeye will result in a gross loss of \$125 million to the industry is based on the reduction of fish captured to save

² The Cultus sockeye is one of the best-studied salmon populations in the world. The long-term data set derived from its study is increasingly important to the understanding of events such as the impacts of climate change.

Cultus and Sakinaw sockeye. However, what is required for this estimate of the impact on the fisheries is an assessment of the net cost of a reduced fishery. That is, the calculation needs to account not only for the lost revenues but also for the offsetting reductions in fuel, maintenance, boats, nets, and labour. These offsetting variables will reduce the gross loss but have not been calculated. The report by Fisheries and Oceans Canada (2004) acknowledges this issue and points out that the gross value "does not allow an assessment of impacts on industry" (p.7). It is therefore evident that the impact on the fishery remains to be calculated.

C. Failure to contemplate alternative harvest options

The sockeye fishery actually captures fish from at least 30 distinct populations of sockeye salmon (equivalent to Sakinaw and Cultus "species"), each of which makes its freshwater home in one of the many lakes or streams that drain into the Fraser River or into the Johnstone Strait. Juveniles of each population migrate from their freshwaters to the productive ocean waters off Alaska, and when they approach adulthood they return to their home in BC to spawn. Many of these populations return through Johnstone or Juan de Fuca Strait, and enter the Fraser River at overlapping times. Since the fishery is currently organized as a mixed stock fishery that simultaneously captures many different populations of returning sockeye salmon, it is difficult for fishers to avoid catching fish from any particular population. Because of this practice of a mixed-stock fishery, protecting the Cultus and Sakinaw sockeye by reducing the fishery impact on them also means reducing the harvest of many other populations as well.

However, there are a number of ways in which this fishing practice can be modified to reduce the impact of the commercial fishery on Sakinaw and Cultus sockeye. One of the distinguishing features of salmon is that they return to their home stream or lake to spawn. This means that by moving all capture activity closer to their home base, it is possible to increasingly target individual populations. If such measures were adopted, the lost capture and thus costs associated with a SARA listing for Sakinaw and Cultus sockeye could be reduced. Fisheries and Oceans Canada (2004) notes the possibility of alternative harvest practice, but states that "mitigative options have not been explored or developed" (p.7).

Conclusion

The Species at Risk Act is a relatively new law, and the Cultus and Sakinaw sockeye are an important test case. They are among the first species for which protection under SARA will, arguably, result in substantial economic costs. Thus, Canada's Minister of the Environment is struggling with a new and difficult decision.

However, to make this decision a sound socio-economic analysis that calculates both the benefits to society of conservation measures, and the costs of those measures, is necessary. This is not what has occurred. Instead the Minister has relied on analyses that do not calculate the benefits of conservation, and that likely overstate the costs of listing. These miscalculations cast significant doubt on the conclusion that it is too

costly to conserve Sakinaw and Cultus sockeye.

We therefore recommend that the Minister of the Environment revisit his recommendation and base his decision on a more exhaustive analysis of the benefits and costs of SARA listing for the Sakinaw and Cultus sockeye. It will be an unfortunate outcome if the Sakinaw and Cultus sockeye were to be miscalculated into extinction.

References

COSEWIC. 2003a. COSEWIC assessment of and status report on the sockeye salmon *Onchorhynchus nerka* (Sakinaw population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC. 2003b. COSEWIC assessment of and status report on the sockeye salmon *Onchorhynchus nerka* (Cultus population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Fisheries and Oceans Canada. 2004. Financial considerations associated with potential SARA listing of Sakinaw and Cultus Lake sockeye. Available: <http://www.pac.dfo-mpo.gc.ca/sara/OverviewSakinawCultus.pdf>.

Gazette. October 23, 2004. Canada Gazette part I 138 (43). Ottawa.

GSGislason & Associates Ltd. 2004. Socio-economic implications of the species-at-risk act Sakinaw & Cultus sockeye. Vancouver, BC. Available: <http://www.pac.dfo-mpo.gc.ca/sara/SARA%20Report%20FINAL.pdf>.