Long-Term Fraser Sockeye Escapement Planning Initiative

Report to Sierra Club of Canada – BC Chapter and the Pacific Marine Conservation Caucus

March 9, 2004

Background

The 'long term Fraser sockeye escapement planning initiative' was implemented by DFO following the 2002 Fraser Sockeye Review. The Sierra Club of BC and the Pacific Marine Conservation Caucus (MCC) have attended four workshops and numerous Steering Committee meetings. The process was billed originally as a long-term escapement planning initiative. It could more accurately be described as a long-term harvest planning initiative, but perhaps the point is moot. In the world of salmon management, spawning escapement is the 'flip-side' of harvest. In management jargon, salmon that are not harvested are 'spawners' (unless, as so often happens, significant numbers of sockeye thought to have entered the fishing area fail to arrive on the spawning grounds and are not accounted for as catch).

For many salmon managers, the only value of a spawner is to produce fish to catch in the future. It has been observed, in some cases, that when large numbers of salmon spawn in some areas, the number of offspring produced by each spawner declines. Biologists have long speculated on the possible causes for this including: later arriving spawners digging up the nests of salmon that have already spawned; crowding of eggs in the gravel leading to increased losses through disease; or competition for food leading to poorer growth and survival in the rearing lakes. Whatever the cause or causes, these speculations lead directly to the theory of maximum sustainable yield (MSY); the idea that for each spawning stock or population of salmon, there is some specific number of spawners that will produce the greatest future catches while still replacing the original spawning stock. All a biologist has to do to determine the escapement that produces MSY is to compare the number of spawners to the total number of adult fish that return from each spawning event (recruits), and fit an appropriate curve to these data. These so called Stock-Recruit (SR) curves have formed the theoretical basis for salmon management for over half a century.

For the last quarter century, the use of SR curves has been strongly and justifiably criticized. The detractors of SR curves note that errors in estimating the number of spawners and recruits can lead to large errors in estimating the number of spawners that

produce MSY. They note that MSY (even for a single population) is likely not constant (as SR models assume) but may vary with environmental conditions and habitat quality. Furthermore, when many stocks are fished together, pursuing MSY for the larger more productive stocks can and does lead to chronic overfishing of smaller and less productive stocks in the mix. MSY models have been described in the scientific literature as 'discredited', but ultimately I agree with Holling's (Gunderson and Holling 2002) view that MSY is simply an 'incomplete explanation' based on the myth that nature is stable. Because it is an overly simple and incomplete explanation that assumes inherent stability and constant productivity, MSY models lead to management overconfidence. Managers and MSY models assume that nature tends to return to stable equilibrium, and in so doing correct for the managers optimism and mistakes. For example, a Ricker curve (one of the most common SR MSY models used in salmon management) assumes that the stock will become more productive at small run sizes, making the run very difficult to fish into extinction. 'Depensatory' processes that might quickly drive stocks to extinction when runs become small can be incorporated into these models, but the dynamics of these processes are poorly understood.

The long-term Fraser sockeye escapement planning initiative is based on MSY Stock Recruit models developed for barely a dozen of the strongest stocks of Fraser sockeye. The majority of Fraser sockeye stocks cannot be modelled directly, because we lack sufficient data. The initiative also incorporates a simulation component, which models the long-term consequences of pursuing different harvest strategies. The model compares how well different long-term harvest strategies satisfy the 'objective function' (so called because it defines the model's objectives). The optimum strategy is the strategy that most closely satisfies the conditions of the objective function.

Where We Are At:

The MCC provided DFO with details of our concerns in a letter to Paul Macgillivray following the fourth workshop (letter dated January 19th, 2004). As of the first of March 2004, DFO has not responded to this letter. We raised a number of major issues in this letter, including:

- MSY models are suspect at best. The use of MSY models developed for only a handful of the strongest stocks of Fraser sockeye, but used to manage the harvest and escapement of large aggregates of strong and weak stocks mixed together in the ocean, is extremely risky. This approach has lead to over harvesting of weaker stocks.

- Salmon play a clear and important role in maintaining the health, integrity and productivity of many ecosystems, and also have intrinsic value. We insist that these values be considered explicitly in this process.

- A clear statement of DFO's management intent should inform our advice and goals relative to the best management of Fraser sockeye. The Wild Salmon Policy

(WSP) is intended to clearly state DFO's obligations and intentions in conserving, protecting and harvesting the diversity and abundance of wild Pacific salmon. The previous Minister promised this policy by the end of 2003 as part of his response to the 2002 Fraser Sockeye Review, but no policy has been provided—not even a working draft for those of us trying to develop a long-term strategy to protect and manage Fraser sockeye. Even though it appears that the implementation of this initiative has been delayed again, DFO has made no commitment to deliver the WSP in time to inform this process or to ensure that Fraser sockeye management is made consistent with this policy when it is released.

- DFO's current management approach is causing the extinction of smaller stocks of sockeye like Cultus and Sakinaw (emergency listed as endangered by COSEWIC), and we have asked for clarification concerning the protection of weak and endangered stocks in future harvesting plans.

- Given our poor theoretical understanding of the factors that affect the abundance of Fraser sockeye, we point out the value of learning about stock dynamics through adaptive management, and ask how the value of this information will be considered in developing management plans.

- Given the risks associated with more aggressive fishing regimes, more and better stock assessment information is required to safely mange fisheries and avoid forcing small stocks into extinction. While DFO seems prepared to consider the economics of the fishery from the narrow perspective of the harvesters in setting management plans, we ask how the larger management cost of alternative harvesting strategies for Fraser sockeye will be assessed.

These issues have not been addressed. At the recent Steering Committee meeting it was made clear that the model would not attempt to address (taken verbatim from the modeling scenarios work plan):

- Value of learning about stock dynamics
- Benefit of large escapements
- Management costs
- Ecosystem benefits.

No other process to address these or the other issues raised has been identified, and for this reason I have not agreed to the proposed work plans presented at the last Steering Committee meeting.

Recommended Action

At the end of the day, models don't manage salmon. People manage salmon.

Notwithstanding the profound theoretical deficiencies and problems already discussed, the model being developed has one very strong point: complex though it is, the objectives the model is attempting to satisfy in any particular scenario are completely explicit. It may take an enormous amount of work to figure out exactly what the model is doing, but the underlying arguments are clear. This said, the complexity of the model makes it difficult for anyone to understand precisely how the models (and indirectly the fisheries managers) goals for managing Fraser sockeye are being defined. The fundamental trade offs between catch and escapement, and total yield and risk to small stocks and the costs of management must be clearly understood if broad, meaningful public input (not to mention First Nations involvement) is expected. Properly designed, the model should be capable of determining the optimum harvest strategy for a wide range of management objectives, from those of ocean harvesters, to those of conservationists, and everything in between, but the technical development of the tool is really a fairly minor issue compared to the bigger issue of what we plan to do with it. The values incorporated in the model's objective function and the associated penalty weights will define 'good management'. The definition of good salmon management, as it concerns Fraser sockeye, is the heart of the issue. It is still unclear how DFO will use this tool and what sort of management structure they will build. We need to talk less about the sorts of tools the contractors need to bring to the job site, and more about what we intend to build when they get here, who's going to pay for it, who will get to enjoy it and why. This discussion has not even begun, yet DFO was, up until a few weeks ago, seriously considering implementing harvest plans based on preliminary model results for the 2004 season.

The heart of fisheries management is the development of transparent decision-making processes with clear goals based on the best available science, and clearly articulated values. The heart of the Fraser sockeye escapement-planning initiative, on the other hand, is the development of a model, and despite our best efforts on the 'steering committee' it remains a very limited technical process. Perhaps technical tinkering is really all DFO managers can do without any guidance from a Wild Salmon Policy, with no clear direction and no response at all from the Minister concerning SARA and the protection of weak or endangered stocks, and with no linkage to the recovery planning processes currently being developed for Cultus and Sakinaw sockeye. I think we are all prepared to work hard to help plan this trip, but spending our time under the hood helping the mechanic get the bus ready may be poor use of our limited time and resources when we still haven't decided where we are going. And who's to say that while we're busy under the hood, the politically astute and well connected aren't having lunch with senior managers and pouring over the maps. As soon as the bus is ready, they may load us on

board with our dirty hands, and take us where we do not want to go. But we'll pay for our share of the gas, and we'll get our full share of the 'credit'.

At the risk of throwing the baby out with the bathwater, and missing an opportunity to move towards some improvement in the currently fatally flawed process used to manage Fraser sockeye, I recommend, with deep regret, that the SCCBC and MCC end involvement in the long term Fraser sockeye escapement planning initiative at both the workshop and steering committee levels. If DFO is interested in the continued involvement of the MCC, I recommend this involvement be contingent on an acceptable working draft of the WSP to guide the process, and on a clear understanding of how the model will be used, how the management values of concern to the MCC will be explored, and how the tradeoffs inherent in developing a single objective function (to define the optimum harvest strategy) will be made.

Ken Wilson,
Sierra Club of Canada – BC Chapter

Reference

Gunderson, Lance H. and C. Holling (ed), 2002, Panarchy: understanding transformations in human and natural systems. Island Press, Washington DC