Seafood Watch® Standard for Salmon Fisheries

Public comment period – 3: Comment Form

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Public Comment Guidance:

Salmonid fisheries are significantly different to typical wild-capture fisheries and have some unique characteristics. In order to ensure that Seafood Watch assessments consider these unique characteristics and the conservation concerns associated with these fisheries we have developed a modified set of criteria for assessing salmon fisheries. One of the major considerations within this set of criteria is the impacts of supplementation from artificial production which is widely used throughout salmonid fisheries across the globe.

This document is the comment form for the second draft of the Seafood Watch Criteria for Salmon Fisheries which can be found here. Please use this document to comment on the salmon specific guidance and scoring identified in blue text.

Criterion 1 – Impacts on the Species Under Assessment

Public comment guidance – During the second public comment period we received comments regarding the appropriateness of MSY-based reference points for salmonid populations for the purposes of determining sustainable populations. An alternative option that we have considered is using Minimum Viable Populations, or Viable Salmonid Populations, which are developed particularly for salmonid populations that are listed under the Endangered Species Act. We have been unable to identify a way of relating MVP-based targets to the MSY-based targets used by fishery managers, and in order to allow effective assessment and ensure consistency with other Seafood Watch assessments we have decided to retain our guidance with respect to MSY-based reference points. We have also considered that it is most likely that concerns about achieving MVP are greatest for ESA listed populations which are already considered a High Concern for abundance using the draft methodology.

We welcome thoughts and suggestions of how MVP-based assessments could be used and scored in a Seafood Watch assessment.

We have made some changes to the Productivity and Susceptibility Analysis that we use to determine the vulnerability of a species or population. This method is used to help guide our assessment of abundance in the absence of a formal stock assessment or where abundance is otherwise considered unknown. We have used the PSA that was accepted as part of the Seafood Watch Standard for Fisheries and added a factor for susceptibility. This is in response to comments received during the second public comment period that traditional PSAs do not accurately reflect the vulnerability of salmonids. The changes to the PSA will also be subjected to a public comment period later in 2016 as part of an interim review of the Seafood Watch Standard for Fisheries. Any changes will be made to both standards to ensure consistent vulnerability assessments across all species.

We welcome comments and suggestions on whether these additions are appropriate and whether alternative factors should be considered.

Comments:

There is an extensive literature describing the demographic, ecological, and economic risks associated with using MSY-based fisheries targets. MSY-derived reference points require estimates of stock-recruitment parameters, which are often imprecise for salmonid populations because of short data time series and high inherent variability in salmon population trajectories. MSY-based targets often do not adequately recognize the uncertainty associated with the models and data on which they are based. MSY-based targets also assume stationarity in the demographic and ecological processes controlling salmon population productivity. However, non-stationarity in the flow and temperature regimes of freshwater salmon and steelhead rearing habitats is now the norm and this will likely have knock-on demographic effects influencing the productivity of salmon and steelhead populations, including sustainable harvest levels. Given these uncertainties, in

many cases MSY-based targets may not be sufficiently precautionary to ensure the long term sustainability of salmon and steelhead production. Space should be given in the assessment for an examination of trends in total run size, whenever available, in addition to management targets such as escapement. This would give analysts some indication as to whether MSY-based targets, when met, are helping to facilitate sustained population sizes.

Additionally, both long-term and near-term population trends should be examined, when available. Salmon and steelhead abundance are strongly influenced by a number of phenomena operating at decadal time scales, which can confound the interpretation of recent population trends when taken out of context from their longer-term trends.

With regard to relating maximum sustained yield approaches to minimum viable population targets, some potentially helpful references are:

Holt, C.A., 2010. Will depleted populations of Pacific salmon recover under persistent reductions in survival and catastrophic mortality events?. *ICES Journal of Marine Science: Journal du Conseil*, p.fsq117.

Holt, C.A. and Irvine, J.R., 2013. Distinguishing benchmarks of biological status from management reference points: a case study on Pacific salmon in Canada. *Environmental Conservation*, *40*(04), pp.345-355.

Johnston, N.T. and Secretariat, C.S.A., 2000. *Biological reference points for the conservation and management of steelhead, Oncorhynchus mykiss*. Canadian Stock Assessment Secretariat.

White, J., Maoiléidigh, N.Ó., Gargan, P., de Eyto, E., Chaput, G., Roche, W., McGinnity, P., Crozier, W.W., Boylan, P., Doherty, D. and O'Higgins, K., 2016. Incorporating natural variability in biological reference points and population dynamics into management of Atlantic salmon (Salmo salar L.) stocks returning to home waters. *ICES Journal of Marine Science: Journal du Conseil*, p.fsw015.

Vulnerability and Susceptibility

Vulnerability scores appear to be based on life history criteria for marine species. Salmon and steelhead are different from marine species in that they depend on freshwater ecosystems for reproduction and juvenile rearing. For many salmonids, mortality rates are highest during the freshwater phase of the life history. Because of their freshwater dependency, previous life history assessments have grouped salmon and steelhead more with freshwater fishes (Mims et al. 2010). Comparing life history trait diversity among North American freshwater fish species, Mims et al. (2010) classified Salmonidae (salmon and trout) as late-maturing, large-bodied, and long-lived species. This indicates that, relative to freshwater fish experiencing similar ecological challenges, salmon and steelhead possess the same qualitative suite of life history traits that have been associated with high fisheries vulnerability in marine species. In order to be applied to salmon and steelhead, trait-based fisheries vulnerability scores need to be parameterized using species that experience similar ecological challenges to salmon and steelhead, not marine species.

The susceptibility metrics would be improved by including additional or alternative habitat quality considerations. The draft susceptibility criteria only consider spawning habitat quality, but spawning habitat, even in moderately degraded conditions, may not limit freshwater habitat quality for salmon and steelhead. For salmonid species that rear for multiple years in freshwater, the quality of rearing habitat, particularly pools with sufficient cover, may be a metric that has a much greater influence on population susceptibility to fishing mortality. These types of rearing habitats are easily degraded due to non-fishery impacts, resulting in reduced capacity of natal streams to support the salmon and steelhead.

Finally, steelhead and Pacific salmon are closely related by they differ in two major life history traits: parity mode and the ability to mature without undergoing marine migrations. Steelhead are capable of repeated spawning migrations in contrast to Pacific salmon, which spawn only once in their lifetime, and steelhead commonly give rise to freshwater resident forms (i.e., "rainbow trout"; McMillan et al. 2007; Sloat and Reeves 2014; Kendall et al. 2015). These major life history differences should be considered explicitly in salmonid fisheries vulnerability assessments. Steelhead fisheries probably warrant modified or additional vulnerability considerations due to the potential for fisheries to result in a relatively high proportion of young and first-time spawners (which may reduce egg viability), a reduction in the number of spawning age classes, and potential major life history shifts such as the increased frequency of freshwater maturing residents (Theirault et al. 2008). Because there are few targeted wild capture steelhead fisheries, development of these additional vulnerability standards could be considered on a case-by-case basis.

References:

Kendall, N.W., J.R. McMillan, M.R. Sloat, T.W. Buerhens, T.P. Quinn, G.R. Pess, K.V. Kuzishchin, M.M. McClure, and R.W. Zabel. 2015. Anadromy and residency in steelhead and rainbow trout *Oncorhynchus mykiss*: a review of processes and patterns. Canadian Journal of Fisheries and Aquatic Sciences 72: 319- 342.

McMillan, J.R., Katz, S.L. and Pess, G.R., 2007. Observational evidence of spatial and temporal structure in a sympatric anadromous (winter steelhead) and resident rainbow trout mating system on the Olympic Peninsula, Washington. Transactions of the American Fisheries Society, 136(3), pp.736-748.

Mims, M.C., J.D. Olden, Z.R. Shattuck, N.L. Poff. 2010. Life history trait diversity of native freshwater fishes in North America. Ecology of Freshwater Fish, 19: 390-400.

Sloat, M.R., and G.H. Reeves. 2014. Individual condition, standard metabolic rate, and rearing temperature influence steelhead and rainbow trout (*Oncorhynchus mykiss*) life histories. Canadian Journal of Fisheries and Aquatic Sciences 71: 491 – 501.

Thériault, V., Dunlop, E.S., Dieckmann, U., Bernatchez, L. and Dodson, J.J., 2008. The impact of fishing-induced mortality on the evolution of alternative life-history tactics in brook charr. *Evolutionary Applications*, *1*(2), pp.409-423.

Criterion 2 – Impacts on Other Capture Species

Criterion 2 will be assessed according to guidance set forth in the Criteria for Fisheries.

Criterion 3 – Effectiveness of Fishery Management

Criterion 3 will be assessed according to guidance set forth in the Criteria for Fisheries.

Criterion 4 – Impacts on the Habitat and Ecosystem

Criterion 4 will be assessed according to guidance set forth in the Criteria for Fisheries.

Criterion 5 X – Impact of Artificial Production

Public Comment Guidance for Criterion 5

Criterion 5X is an exceptional Criterion which is to be assessed only where there is artificial production associated with stocks that are caught and retained within the fishery under assessment.

Previously the assessment of these factors had been combined with the corresponding factors within the fisheries standard; however it was clear that this was preventing the concerns associated with a particular operation from being clearly identified. For example, a well-managed fishery associated with poorly managed hatcheries may receive a moderately effective score and while the overall result may be the same, the case for concern is not clearly identified. By assessing artificial production in a separate criterion we are able to better highlight any causes of concerns and areas that require improvement.

The Criterion is based on recommendations from the Hatchery Scientific Review Group, which is the independent scientific panel of the Pacific Northwest Hatchery Reform Project; a project set up by US Congress to reform hatchery management in the region. While the recommendations set forth by the group may not be appropriate in all instances, we believe that they provide the

most comprehensive science-based recommendations that can broadly be applied to the management of artificial production and supplementation of salmonids.

Feedback: Please comment below on these proposed changes as well as any other comments on this factor.

Comments:

Factor 5.1 Impact of Artificial Production on Wild Populations

Public Comment Guidance: Factor 5.1 assesses the impact or influence that artificial production is having on wild stocks caught within the fishery being assessed.

Feedback: We welcome feedback on whether these metrics are realistic and whether they adequate consider the concerns associated with the mixing of wild fish and hatchery origin fish on the spawning grounds.

Comments:

Factor 5.2 Management of Artificial Production

Public Comment Guidance: Factor 5.2 assesses the management systems in place for artificial production. Due to the large number of artificial production systems that may be associated with fish caught in any given fishery, the proposal is to assess a 'typical' or 'average' artificial production system. This is consistent with Seafood Watch Aquaculture assessments at a country level where it is not practical to assess the wide range of performance that is often found across an industry. Where there are regional management systems in place, it is likely that most systems operate at a similar level of performance.

Feedback: The requirements are based on recommendations from the HSRG. We welcome comments regarding whether these requirements are appropriate; whether it is appropriate to require all of them for a highly effective management plan; whether there are additional requirements that should be considered.

Comments:

Our experience suggests that assuming that most hatcheries within a region operate at a similar level of performance is potentially very misleading. The ecological and genetic impacts of hatcheries are often site-specific. The strength of the assessment will be much greater if it includes an assessment of the hatchery systems associated with a given fishery, not just a "typical or average" production system.

We also are concerned that the ranking of management programs depends on the setting of targets and goals, not the meeting of those targets and goals. More weight should be placed on management performance with regard to reaching targets for minimizing the effects of artificial production.