



Interior Fraser Steelhead – Webinar Questions

- 1) **Re: Deadman’s Creek - Other than the ongoing enumeration fence are there any other plans for this system that historically produced 600 to a 1000 fish?**

There is no longer an enumeration fence on Deadman River. It was removed in 1999. An electronic counting system is now in place, located much further downstream from where the fence was located. The current plan for this system and other Interior Fraser Steelhead populations is titled: Interior Fraser Steelhead BC/Canada Action Plan 2019.

- 2) **In the Thompson/Nicola Valley alone the records from the province indicate near 1 billion rainbow trout have been added to the system. The record dates back to 1903. Obviously, a huge disintegration of gene pool purity. Has anyone investigated this?**

The potential for stocked fish to survive and stray into the steelhead bearing waters should be very low. In addition, many stocked rainbow are stocked as all-female or all-female and sterile.

- 3) **Based on the past behaviours of the federal and provincial responses to the issues surrounding IFS, what, if any, positive expectation for survival of the steelhead in the system should be expected?**

Ultimately, positive expectation for survival is conditional on the extent by which smolt to adult survival can be improved. The most immediate and direct way to improve a positive expectation for survival at this time is to reduce fishing mortality to near zero. To achieve this, larger periods of protection from the use of gillnets and purse seines is needed in the places and times when these steelhead are migrating. At any given point along the migration route, the period of protection should be around three months with some variation depending on the area. Positive expectation for survival is also conditional on the extent of implementing protection from targeted fishing during overwinter and spawning periods.

- 4) **Is there any “real” effort that will have a substantial effect on saving or enhancing IFS?**

For the intended effort, see the Interior Fraser Steelhead BC/Canada Action Plan 2019.

- 5) **What current undertaking by provincial government on the federal government is currently underway to deal with a species (IFS) facing extirpation?**

The province and federal government have developed and are implementing a joint action plan titled: Interior Fraser Steelhead BC/Canada Action Plan 2019.

6) A number of questions related to seine versus gillnet fisheries. Can you please post links to some of the work on bycatch for the Salish Sea and Fraser?

There are many studies since the 1970s by many authors. Two studies that represent a culmination of prior work are:

Bison, R. 2016. Fishing Mortality Trends for Thompson River Steelhead from 1991 to 2015. Fish and Wildlife Branch, BC Ministry of Natural Resource Operations. Kamloops, BC. 30 pp.

Bison, R. 2007. A simulation model to investigate the potential effects of marine and freshwater fisheries on the Thompson River steelhead trout population (*Oncorhynchus mykiss*). Fish and Wildlife Branch, BC Ministry of Environment, Kamloops, BC. 60 pp.

Questions via Facebook Live:

1) Why is there no consideration for the numbers of Steelhead begin harvested in the non-selective net fishery in the Lower Fraser? (this came up several times, in reference to the causal mechanisms related to decline presented at the beginning of the meeting – not the RPA piece discussed at the end)

Consideration during the RPA piece is in the recommendation fishing mortality needs to be near zero and “natural” survival also needs to increase from the latest estimates observed. If natural survival increases to the average observed over the last 5 or 10 years, then there is a good possibility of a very limited increase. Thompson and Chilcotin steelhead have not yet been protected to near zero fishing mortality. Recently and up to the 2018 fishing season, fishing mortality rates are estimated to have varied around 20-25% year depending on whether just chum were fished or whether chum and either pink or late-run sockeye were fished. These estimates include fisheries not only in the Fraser River, but also in Johnstone Straits, West Coast Vancouver Island, US Juan de Fuca Strait, and US North Puget Sound. As of 2019, the start of gillnet fishing for chum salmon in the various Canadian areas has been delayed for steelhead conservation. In the Lower Fraser River, the start of gillnet fishing for chum salmon has been delayed by about two weeks from near the peak of the steelhead run around October 9 to the last week of October. However, to assure near zero fishing mortality in the Lower Fraser commercial fishing area from Mission to Steveston for example, gillnet fisheries would have to be prohibited from August 26 to November 21. The latest conservation measure still allows gillnets to start well within this time period.

2) Do you have data on resident abundance?

Yes, for Deadman and Bonaparte. For example, resident spawner abundance estimate in spring 2020 in the Deadman is 2900.

3) How can you tell if a fry or par is a steelhead or rainbow?

In the field, you can not tell what they will become. You can tell who their mothers were if you analyze the chemical composition of the otoliths. Geneticists can detect the expression of anadromous genes well before it becomes visually apparent.

4) How are the spawners actually counted?

In the Chilcotin, spawners are counted by helicopter overflights. In the Deadman and Bonaparte, they are counted with electronic counters. In the Nicola, they are counted from drift boat counts. Other types of data are also collected in the Nicola as required for the estimation procedure developed specifically for the Nicola watershed. A distinct estimation method has been developed for each watershed where the count data are used to produce estimates.

5) Do you have data on steelhead use of the North Pacific?

There are a variety of data. For a description of the various data and what is known, see Myers, K. 2018. Ocean Ecology of Steelhead. Pages 779-904. In R.J. Beamish, editor. The Ocean Ecology of Pacific Salmon and Trout. American Fisheries Society, Bethesda, Maryland.

6) In your graph showing the breakdown of pinnipeds, I see the large increase in California sea lions. Where did this data come from? I am working with Dr. Walters and DFO on getting a harvest of pinnipeds in GOG going and DFO has no data on the Californians.

See Dr. Walters and Dr. McAllister for these data.

7) Are there anadromous genes in the rainbow trout on the Cheakamus above the falls at 14km?

I don't know. I don't think that is known at this time.

Remaining Zoom Questions:

1) Do you think there are significant impacts from logging watersheds over the last three decades and the spawning or juvenile rearing impact due to high sediment load in the Deadman and other rivers?

Not in the Chilcotin. In the Thompson, Deadman is the same or improved from the 1970's and 1980's. Bonaparte has only recently deteriorated due to the Elephant Hill Wildfire that occurred in 2017, so that effect has not appeared in the time series data yet. Those effects may be observed in the next few years. In the Nicola, Guichon Creek, and the Nicola mainstem downstream of Guichon Creek have recently deteriorated, the effects of which may be observable in the next few years. Over the time series to date, the habitat quality in the streams where steelhead dominate has been relatively stable and, in some areas, improved.

2) Decades ago, the Skeetchesen band cryogenically preserved steelhead genetic material. Is this material still available?

Not to my knowledge.

3) Is there evidence that other salmon populations that stay in freshwater systems longer would also benefit from a pinniped harvest?

Yes. See the following, available online.

Thomas, A.C., Nelson, B.W., Lance, M.M., Deagle, B.E. and Trites, A.W., 2017. Harbour seals target juvenile salmon of conservation concern. *Canadian Journal of Fisheries and Aquatic Sciences*, 74(6), pp.907-921.

4) Are there any steelhead returns in the Bonaparte?

Yes, steelhead continue to return to the Bonaparte. The spawning population estimates in 2019 and 2020 are 37 and 60.

5) Have you calculated the reduction in pinnipeds that would equal the reduction in fishing impacts that you believe is necessary to stabilize steelhead stocks?

Fishing mortality reduction alone, to near zero, is unlikely to stabilize the downward trend. Simulations suggest a slow and continuous decline if natural survival does not improve somewhat from the most recent level. To stabilize steelhead stocks or reverse the downward trend, fishing mortality needs to be near zero and “natural” survival also needs to increase from the latest estimates observed. If natural survival increases to the average observed over the last 5 or 10 years, then there is a good possibility of a very limited increase.

6) Is there any indication inshore predation is having the same impact on other migrating salmonids?

Inshore predation on other species of salmon, on both smolts and adults, has been well documented. For smolts, larger smolts appear to be disproportionately targeted by harbour seals which means that Steelhead and anadromous Cutthroat may experience higher risk of being predated by Harbour Seals. The following reading is available online:

Thomas, A.C., Nelson, B.W., Lance, M.M., Deagle, B.E. and Trites, A.W., 2017. Harbour seals target juvenile salmon of conservation concern. *Canadian Journal of Fisheries and Aquatic Sciences*, 74(6), pp.907-921.

Chasco, B., Kaplan, I.C., Thomas, A., Acevedo-Gutiérrez, A., Noren, D., Ford, M.J., Hanson, M.B., Scordino, J., Jeffries, S., Pearson, S. and Marshall, K.N., 2017. Estimates of Chinook salmon consumption in Washington State inland waters by four marine mammal predators from 1970 to 2015. *Canadian Journal of Fisheries and Aquatic Sciences*, 74(8), pp.1173-1194.

Nelson, B.W., Walters, C.J., Trites, A.W. and McAllister, M.K., 2019. Wild Chinook salmon productivity is negatively related to seal density and not related to hatchery releases in the Pacific Northwest. *Canadian Journal of Fisheries and Aquatic Sciences*, 76(3), pp.447-462.

7) Is there any observable impact on the steelhead from other species such as pike minnow?

Juvenile Steelhead and rainbow are undoubtedly subject to predation in freshwater, but there are no obvious qualitative trends in freshwater predators to my knowledge that might explain the observed decline in Steelhead. Plus, for a freshwater predator to impact juvenile population abundances, they would have to overcome the tendency of the juvenile population to compensate for such losses with improved survival, as illustrated in the plots that were used to help explain how the species is good at filling up freshwater habitat.

8) How does the science community explain the fact coastal summer steelhead in the Coquihalla hasn't followed the same trajectory as Thompson and Chilcotin. Winter steelhead in the lower Fraser have not either.

A possible explanation is lower fishing mortality on Coquihalla due to much earlier run timing into the Fraser, peaking in late June. Coquihalla Steelhead arrive to the Fraser between the time that early run Chinook migrate and when Early Stuart sockeye migrate, both of which have been relatively protected from fishing. Thompson and Chilcotin Steelhead migrate much later, arriving to the Fraser from late August to late November and migrating with late-run sockeye, pink salmon and chum salmon, populations that are fished with gillnets and seines more intensely than early run Chinook or Early Stuart Sockeye. Thompson and Chilcotin steelhead have not yet been protected to near zero fishing mortality. Near zero fishing mortality is needed to stability and reverse the trajectory plus some improvement in "natural" survival. For example, to assure near zero fishing mortality in the lower Fraser commercial fishing area from Mission to Steveston, gillnet fisheries would have to be prohibited from August 26 to November 21 with the run peaking in that Area on October 9 (on average). The latest conservation measure allows for gillnets to start around October 23.

Another possible explanation is lower predation rates on adult Steelhead adults when Coquihalla Steelhead migrate in comparison to when Interior Fraser Steelhead migrate.