Proposed 2018 Fisheries Management Measures to Support Recovery of Interior Fraser River Steelhead

22-March-2018

Spawning escapements of two Interior Fraser River steelhead stocks, Thompson and Chilcotin Steelhead, have exhibited dramatic declines of approximately 80% over the last 3 generations, with recent years' escapements reaching the lowest levels on record. Less than 300 spawners were counted in 2017, down from escapements of greater than 10,000 individuals observed pre-2000. On February 13, 2018, COSEWIC informed the Minister of Environment and Climate Change Canada that COSEWIC's Emergency Assessment Subcommittee had assessed both the Thompson River and Chilcotin River Steelhead Trout (*Oncorhynchus mykiss*) as *Endangered* and recommended that an Emergency Order be issued placing these wildlife species on Schedule 1 of the *Species at Risk Act* in accordance with Section 29(1). Threats to steelhead include poor ocean survival (which includes but is not limited to predation of juveniles by marine mammals and increased ocean temperatures), reduced freshwater habitat quality, bycatch release mortalities from fisheries targeting Pacific salmon, and release mortalities from recreational catch and release fisheries targeting adult steelhead.

Given ongoing declines in Interior Fraser River (IFR) steelhead escapement, a comprehensive, precautionary approach to the management of all fisheries in southern BC that have the potential to impact steelhead is required for the 2018 fishing season. The Department will be consulting with First Nations and other stakeholders to develop management actions that protect the IFR steelhead migration from incidental fisheries impacts as they migrate from marine approach areas, through the Fraser River, and into their spawning tributaries. The intent of additional management measures implemented in 2018 is to support the objective of minimizing the impacts of Canadian fisheries on IFR steelhead.

To achieve a high degree of protection for IFR steelhead, the Department is proposing implementation of a rolling window closure for those times and areas where IFR steelhead are likely to be present based on our current understanding of the return migration timing of this stock aggregate. Assuming average run timing and migration speed for the IFR steelhead return, the length of the closure required to protect a 90% of the steelhead migration is approximately four weeks with the peak at around Oct 11th at Albion. Table 1 shows these idealized window closure dates for the major Pacific Fisheries Management Areas currently understood to be within the IFR steelhead migration corridor. Idealized dates are based on statistical properties of the run timing distribution and may be adjusted to reflect operational considerations and feedback from consultations.

Table 1. Idealized window closure dates to protect 90% of the IFR steelhead migration given average peak timing, spread of the run, and migration speed

Fishery Location	Start Date	End Date
Area 11	Sep/11	Oct/07
Area 12	Sep/12	Oct/08
Area 13	Sep/17	Oct/13
Area 21/121	Sep/18	Oct/14
Subareas 29-6, 29-7, 29-9 and 29-10	Sep/28	Oct/24
Fraser River – Below Mission	Sep/28	Oct/24
Fraser River – Mission to Hope	Sep/29	Oct/29
Fraser River – Hope to Sawmill Creek	Oct/03	Oct/31
Fraser River – Sawmill Creek to Lytton	Oct/05	Dec/31
Fraser River – Lytton to Williams Lake River	Oct/12	Dec/31
Thompson River – D/S of the confluence of the North and South Thompson Rivers	Oct/12	Dec/31

Using the assumption of average stock migration timing and speed to guide protective fishery management actions is an approach that the Department has used in the past to protect stocks of concern (e.g. Interior Fraser River coho, Early Stuart sockeye). However, it is well understood that there is considerable variability in the return timing of a given stock among years, and that this variability needs to be taken into account when evaluating the probability of achieving the desired level of protection for a stock of concern. DFO biologists have developed a model that can estimate the probability that a specified window closure period will protect a given portion of the IFR Steelhead return using our current estimates of variability in peak timing, spread, and migration speed for this stock. Outcomes from this model (shown in Table 2), indicate that the closure dates identified in Table 1 will protect at least 80% of the IFR steelhead return 74 years out of 100.

Table 2. Level of protection provided to IFR steelhead return based on window closure dates from Table 1 (and accounting for variability in peak timing, spread, and migration speed)

Protection Level	Expected frequency of achieving protection level based on historic steelhead timing information
Frequency of protecting at least 70% if the IFR SH return	89 out of 100 years
Frequency of protecting at least 80% of the IFR SH return	74 out of 100 years
Frequency of protecting at least 90% of the IFR SH return	43 out of 100 years

Note that the current version of the DFO model only evaluates the majority of commercial salmon fisheries for sockeye, pink and chum in southern BC including those in Johnstone Strait, Georgia Strait, and the Fraser River up to Sawmill Creek (i.e. those fishing areas coloured grey in Table 1 are

not included in the model). However, given that a similar window closure approach is proposed for fisheries outside of these areas (e.g. Areas 21/121 and Fraser River above Sawmill Creek greyed out areas in Table 1), it is expected that incorporating these areas into the model would not result in a meaningfully different outcome in terms of the level of protection afforded to IFR steelhead. Values used as inputs to the DFO model and to derive the idealized window closure dates noted in Table 1 are detailed in Appendix 1.

Due to significant overlap in migration timing of IFR steelhead with chum salmon, a rolling window closure designed to protect IFR steelhead will have considerable impacts on all fisheries targeting chum in 2018. In developing detailed plans for specific fisheries, consideration will be given to salmon allocation priorities, and to the extent to which the fishery has previously demonstrated a high degree of species selectivity. Figure 1 provides a draft plan for your consideration of how we may operationalize the idealized rolling window closure dates identified in Table 1. This plan identifies dates for the following management measures:

1. Interior Fraser River Coho closure (only previously demonstrated selective fisheries permitted)
2. Overlap between IFR Coho and IFR Steelhead closures (proposed no fishing permitted)
3. IFR Steelhead closure (proposed no fishing permitted except marine recreational salmon fishery)
4. Food, Social and Ceremonial and marine recreational salmon fishing only (proposed)

The draft plan described in Figure 2 identifies actions proposed by the Department of Fisheries and Oceans, and is targeted at salmon-directed fisheries that are managed by the Department. These actions have been identified to address conservation concerns for IFR steelhead. In addition to the management measures identified in Figure 2, the Department is working with the Provincial Ministry of Forest, Lands, Natural Resources Operations and Rural Development to ensure that actions proposed for Provincially-managed fisheries are well aligned with the actions proposed by the Department in this document. The Province of British Columbia has indicated that it plans to close IFR steelhead-targeted catch and release fisheries in 2018, and is actively examining all provincially managed sport fisheries that have by-catch of steelhead, with the objective of having interim or full fishing closures on Interior Fraser and its tributaries by fall of 2018. The Province is not proposing recreational closures for provincially-managed species in Region 2 (Lower Mainland) recreational fisheries at this time. The Province is also collaborating with First Nations to identify effective conservation and recovery measures for IFR steelhead.

In evaluating this proposed approach, please consider the following:

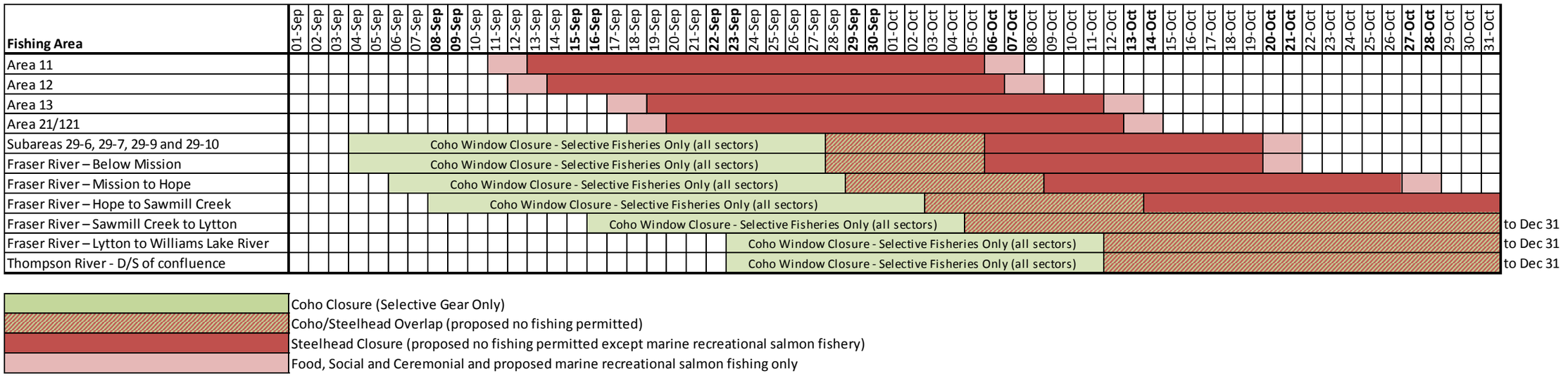
1. Does the proposed plan provide the appropriate level of protection for Interior Fraser River Steelhead?

2. Should selective fishing for salmon be permitted during the steelhead window closure? If so, what fisheries / gears should be considered?
3. Are there additional measures that should be considered?

DFO will be consulting with First Nations and key stakeholders to refine the details of additional management actions to be taken in 2018. The outcome of these consultations will be reflected in the final 2018 Southern BC Salmon Integrated Fisheries Management Plan.

If you require further information on this material, please contact your local area manager(s) or Marla Maxwell at marla.maxwell@dfo-mpo.gc.ca.

Figure 1. Proposed 2018 Interior Fraser River Steelhead Window Closure Dates



Appendix 1.

Derivation of IFR Steelhead Window Closure Dates

1. IFR Steelhead return timing to Albion test fishery

It is standard practice to use a normal distribution to represent the pattern of migrating salmon past a fixed point. To characterize IFR steelhead migration, a normal distribution was fit using a Bayesian hierarchical approach to 22 years (1995-2016) of steelhead encounters at the Albion test fishery to estimate the peak migration date and distribution of the migration timing each year. The average peak date past Albion over these 22 years was October 11 (with a standard deviation of 15 days) and the average spread (equal to 1SD of the normal distribution) of the run was 9 days (with a standard deviation of 5 days). The October 11 peak and 9 day spread were used to develop the average migration timing curve for IFR Steelhead past Albion. The window closure dates identified in Table 1 encompass the central 90% of this normal distribution.

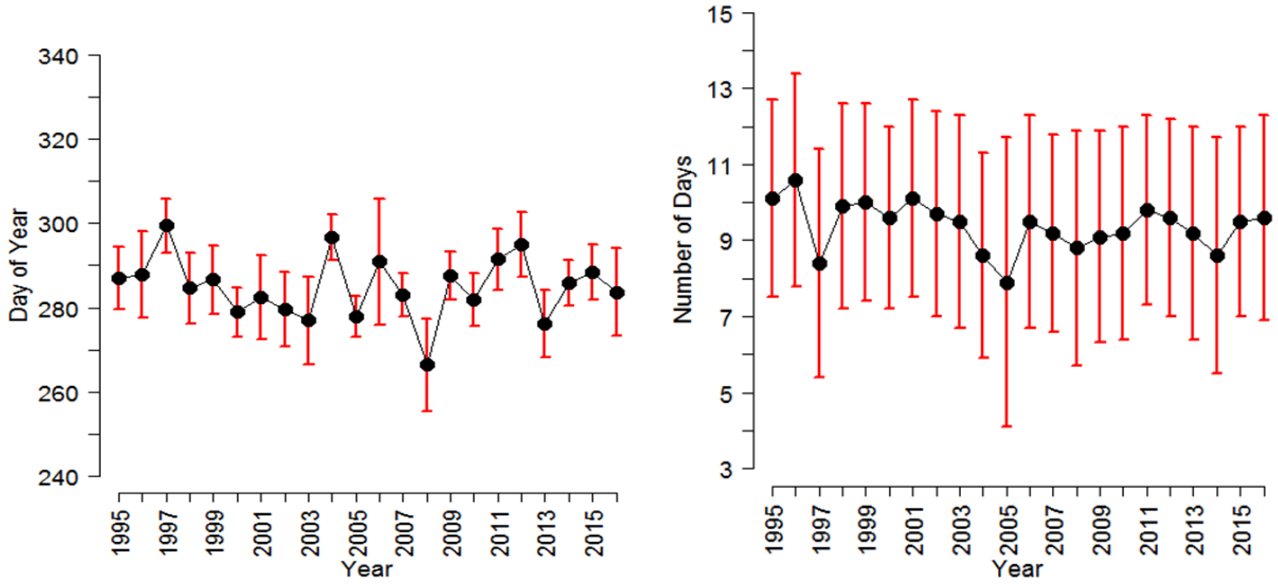


Figure 2. The mean (+/- 1 SD) of estimated timing of peak of migration (left figure) and of the spread of the distribution (right figure) of the steelhead return to the Albion test fishery. Data provided for 1995 to 2016.

2. IFR Steelhead migration speed

A variety of studies were reviewed that estimated migration speeds for steelhead and other similar sized salmonids. The individual studies reported average migration speeds ranging from 17 to 35 km per day, with maximum and minimum values ranging from 6.5 to 62 km per day. Most of these studies were done in marine waters. For deriving window closure dates, we assumed marine migration speeds of IFR Steelhead of 29.5 km/day (with a standard deviation of 4.1 km/day), and an in-river migration speed of 20 km/day (with a standard deviation of 3 km/day).

3. Distance travelled

Migration distance to a particular Fishery Management Area was measured from Albion to the furthest seaward boundary of a PFMA (for example, the most northern point of Area 13) using Google Earth. This distance was then divided by the migration speed (taking into account different speeds in the freshwater portion of the migration), to estimate the average number of days required for steelhead to migrate from each Fishery Management Area to Albion. These "timing offsets" are shown in the table below.

Timing Offsets from Albion	**# days**
Area 11	17
Area 12	16
Area 13	11
Area 21/121	9
Subareas 29-6, 29-7, 29-9 and 29-10	0
Fraser River – Below Mission	0
Fraser River – Mission to Hope	1
Fraser River – Hope to Sawmill Creek	5
Fraser River – Sawmill Creek to Lytton	7

Estimation of probabilities (i.e. frequency of achieving stated levels of protection of the steelhead population from fisheries)

The DFO "exposure" model was used to estimate the proportion of the population that would be protected from fishing given the window closure dates identified in Table 1. Results of the model output are shown in Table 2. We assumed a migration pattern drawn from the historical distribution of run spread and peak migration date estimated annually (described on page 5) to generate 10,000 simulated patterns of IFR steelhead migration through the various fisheries included in the model. The proportion of the run exposed is recorded (and the proportion protected equals 1 – proportion exposed). Because we are using a Monte Carlo procedure to simulate a large number of possible IFR steelhead return distributions, we can estimate not only a range of the proportion of IFR steelhead exposed, but also the uncertainty around the estimated proportion exposed due to the variability in migration speed and timing.