

EXECUTIVE SUMMARY:

Project 7: Fraser River Sockeye Fisheries and Fisheries Management and Comparison with Bristol Bay Sockeye Fisheries

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1. Catch Monitoring Programs – The overall ratings for Fraser sockeye catch estimates were: “Good” for accuracy, “Unknown” for precision and “Medium” for reliability since 2001. The catch estimates prior to 2001 are likely to be biased low due to under-reporting of commercial catches in the sale slip system and deficiencies in catch monitoring efforts for First Nation fisheries. The limited documentation for DFO catch monitoring program, few estimates of precision and minimal verification at landing sites for most Canadian commercial fisheries (42% of the harvest) leaves substantial room for improvement in the catch monitoring programs.

2. Non-Retention Fisheries – Two types of non-retention fishing affect Fraser sockeye: 1) releases from freshwater recreational and selective beach seine fisheries and 2) net fallout from gillnet fisheries. Recent radio-telemetry studies have shown that survival from releases in the lower Fraser River to spawning areas were 57.0%, 52.2 % and 36.3% for releases of sockeye caught using fishwheels, beach seines and angling, respectively. The data compiled from 2005-09 provide compelling evidence that the largest en-route losses occur at times and locations where upstream-migrating sockeye are stressed by a combination of elevated water temperature, in-river gillnet fisheries, and difficult passage points. While there is little that can be done about annual water temperatures or difficult passage points, it is possible to minimize cumulative environmental effects and fishery related factors by dissociating the timing and location of in-river fisheries from these other stressors.

3. Pre-season Forecasts – Fraser River forecasts explained 44% of the year-to-year variation in returns between 1980 and 2009 (i.e., 56% left unexplained), and we can expect total returns in any given year to vary from total forecasts by about 25%. However, the relationship between forecasts and returns was not reliable for seven of the 18 Fraser sockeye indicator stocks. Forecasts for Bowron, Pitt, Chilko, and Stellako have been particularly poor, having explained only 8.7%, 0.4%, 9.1%, and 9.3% of return variation in the past 30 years. This is especially alarming for Chilko because this group contributes (on average) about 24% of the total Fraser return. The recognized challenges with forecasting salmon returns have led most managers to rely on in-season information to manage sockeye fisheries.

4. In-season Forecasts – The accuracy and precision of in-season run size estimates varies through the season and between the different run-timing groups. The bias and error rapidly improves for Early Stuart and Summer-run stocks as the run approaches the typical 50% point. The in-season forecasts for Early Summer and Late-run groups tend to be more accurate throughout their respective migration periods and precision remains at about 10-25% for most of the run. In general, in-season forecasts have been sufficiently accurate, precise, and timely to make the necessary management decisions to achieve harvest rate goals defined for each of the four run-timing groups.

5. Escapement Enumeration – The reliability of in-season estimates has been questioned on a number of occasions when spawning-ground surveys have estimated substantially fewer or greater numbers of sockeye than the number estimated to have passed Mission. These major

discrepancies have undermined confidence in the in-season escapement estimates and have recently led to the development of alternative in-season monitoring systems such as using DIDSON hydroacoustic techniques at Mission and Qualark for fish counts and using fishwheels in the lower Fraser River to estimate species composition. Post-season escapement estimates are much more reliable than in-season estimates for Fraser sockeye. Virtually every type of enumeration method used to estimate escapement for salmon has been used or tested in the Fraser watershed for Fraser sockeye. The methods currently used are appropriate and the best of the available alternatives for Fraser sockeye.

6. Escapement Targets – The methods used to define escapement targets for Fraser sockeye were relatively simple from 1987-2002, more complex from 2004-2010, and are destined to become more complex in the future as Wild Salmon Policy benchmarks are identified for each sockeye Conservation Unit. The large year-to-year variability in escapement targets makes it difficult to regulate fisheries and evaluate management performance. The trend towards increasing complexity in the definition of escapement goals may have become an impediment to achieving these goals. From 2003-2006, observed escapements were substantially less than the escapement targets for three of the four run-timing groups (-42% to -54%). A detailed comparison of observed escapement with the escapement targets for each of the 19 indicator stocks was not possible because the annual targets have not been documented for each of these stocks. A clearly defined set of escapement goals for each run-timing group and indicator stock would be much easier to communicate to fishers than the current complex “Total Allowable Mortality” (TAM) rules. These escapement goals would still offer managers the latitude to implement harvest rate ceilings to protect less productive stocks when returns of the target stocks are large.

7. Escapements versus Minimum Escapement Goals – Low Escapement Benchmarks (LEBs) have been defined for each Fraser sockeye indicator stock and run-timing group. These LEBs have been used in the Fraser River Sockeye Spawning Initiative and Marine Stewardship Council certification process to evaluate management options and stock status for Fraser sockeye. For most stocks, the LEBs were set equal to 40% of the 4-year average escapement that maximizes recruitment. Historical escapements for each indicator stock and run-timing group were compared with these LEBs to assess stock status and trends. For three of the four run-timing groups, escapements to spawning areas have been consistently above the LEBs. Escapements for the fourth run-timing group (Early Stuart) fell below its LEB goal from 2005-09 but no commercial fisheries have been permitted to target early run-timing group in these years. Some harvesting of Early Stuart sockeye has been permitted in middle and upper Fraser First Nations FSC fisheries. Escapement of all summer-run stocks declined rapidly from 2003 to 2009 and most sockeye fisheries were closed from 2007-09 to maximize escapements for these stocks. Within the Early Summer and Late-run timing groups, two stocks (Bowron and Cultus) have been consistently below their LEBs in recent years.

8. Abundance Estimates – For most salmon stocks, total abundance is estimated by summing catch and escapement. For Fraser sockeye, en-route losses (fish not accounted for in the catch and escapement estimates) can exceed 90% of fish having entered the Fraser River. The location, timing, and magnitude of these en-route losses are critical for estimating total abundance and exploitation rates. No estimates of en-route loss are available for years prior to 1992 and this may have contributed to a negative bias in abundance and positive bias in exploitation rates (prior to 1992), if substantial en-route losses occurred but were not detected.

9. Extent of Overharvesting – Based on available estimates of abundance and exploitation rate, it is likely that overharvesting occurred for Early Stuart sockeye in the period 1984-2000

and for Early Summer sockeye in the period 1960-89. No evidence of overharvesting was detected for the other two run-timing groups as a whole but there is clear evidence that at least one component of the Late-run group (Cultus Lake sockeye) was overharvested during the late 1980's and early 1990's.

10. Status of Cultus Sockeye – Progress has been made on reducing the abundance of sockeye predators in Cultus Lake, reducing harvest rates on Cultus adults, and increasing smolt production through hatchery supplementation efforts, yet such efforts have not resulted in meeting any of the defined conservation objectives for the population. Given the current uncertainty associated with the outcomes of various conservation actions for Cultus sockeye, past and present recovery efforts should be considered “experimental” and thus require ongoing and rigorous monitoring programs.

11. Bristol Bay – There are substantial differences between the Fraser River and Bristol Bay fisheries that make many of the approaches used in Bristol Bay inappropriate for Fraser sockeye stocks and fisheries. One aspect of the Bristol Bay fisheries that should be considered seriously for application to the Fraser is the clarity and priority associated with their escapement goals. A clearly defined set of escapement goals for Fraser sockeye would not guarantee success but is one way that the management of stocks could be made simpler and increase the potential for achieving these escapement goals.

12. State of the Science – The scientific methods used to prepare pre-season forecasts, monitor catch and escapement, estimate returning abundance during the fishing season and determine the annual returns for each of the major sockeye stocks are consistent with the best practices for salmon fisheries. DFO and PSC have maintained a time series of abundance estimates available for these 19 indicator stocks dating back to 1952. These estimates are widely considered to be some of the best available for sockeye salmon stocks. However, the future of this valuable time series and the conversion of historical and future data into catch, escapement and total abundance estimates for each CU will depend heavily on the resources available to support critical monitoring programs, capture these data in structured databases and complete the necessary analyses.

13. Recommendations – The final section of our report provides recommendations which address important data gaps and known deficiencies in the fisheries management system.