
RECREATING SUSTAINABLE SOCKEYE FISHERIES IN THE SKEENA WATERSHED

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Introduction

This paper discusses how the re-introduction of First Nations selective in-river and terminal fisheries—founded on a blend of traditional law, ecological knowledge, technology, and modern science and management—could both protect sockeye salmon biodiversity and produce significant economic benefits in the Skeena Watershed of British Columbia.

Modern conservation policies for Pacific salmon have attempted to protect distinct populations in order to conserve genetic diversity and ecological resilience. However, the policies have largely failed because mixed-stock fisheries remain entrenched—most salmon are still harvested commercially in coastal waters before individual stocks have segregated to their natal streams (Wood, 2001). Thus, although productive stocks may be harvested sustainably, other less productive, co-migrating stocks are often overfished.

Canada's west coast fisheries managers have struggled to find politically acceptable trade-offs between conflicting goals. They endeavor to maintain the economic benefits of harvesting commercially valuable salmon stocks in coastal waters, while at the same time modifying commercial exploitation rates in order to preserve the diversity essential for sustainability. This management strategy has not worked from either an economic or a conservation standpoint. The Skeena mixed-stock fishery is no longer economically viable due largely to decreasing access to Skeena sockeye salmon (Blewett, 2008). Neither is the fishery ecologically viable; a recent report of the Skeena Independent Science Review Panel (2008) stated that some stocks have been extirpated, Babine wild stocks have been moderately overfished, and many of the less productive non-Babine stocks have been severely overfished at rates that could eventually cause further extinctions.

An alternative vision is to recreate and grow First Nations selective in-river and terminal fisheries. Because most of these fisheries occur in relatively terminal areas, they can generate economic benefits while also maintaining healthy and diverse salmon populations in the watershed. By working with First Nations to recreate the selective in-river and terminal fisheries, managers can work towards solutions that benefit both local economies and salmon biodiversity.

Pre-Contact Fisheries Management

First Nations managed highly effective fisheries in the Skeena Watershed prior to European contact. Archeological research and First Nations accounts suggest that Skeena First Nations had sufficient population, combined with the necessary harvesting technology and processing capacity, to potentially compromise salmon biodiversity in the Watershed during the two to three millennia prior to contact. Yet, at the time industrial mixed-stock fisheries were introduced in 1873, most Skeena sockeye stocks

were still abundant and supporting viable terminal fisheries—providing evidence that First Nations were effectively and sustainably managing the resource.

First Nation's fisheries management prior to contact was founded on six principles that would provide for sustainable harvests and protect biodiversity over time:

1. Fishing rights and access were recognized as property (groups could exclude other groups)
2. Continued access was contingent upon proper management
3. Conservation ethics defined abuse of the resource as reduction in productivity for future generations
4. Economic exchange was through a system of reciprocity that provided insurance against misfortune and reduced incentives to overharvest
5. Enforcement of rules was transparent and public in the feast halls
6. The governance of Chiefs was guided by a set of rules that maintained the above five elements (Trosper, 2002)

First Nations fisheries were neither small-scale nor inefficient. A photograph of a weir completely blocking the Kitwanga River in Appendix 1 of this paper provides evidence that First Nations fishing technology could effectively block a river or stream to migrating salmon. Sustainable management required a decision-making process that would ensure adequate numbers of salmon escaped the fishery to spawn upstream.

The Babine Weir was another example of sustainable management of fishing technology. It was described by Fishery Officer Hans Helgerson in 1906 as having, “the most formidable and imposing appearance...constructed of an immense quantity of materials, and on scientific principle...which not a single fish could get through. People were catching and processing some three quarters of a million fish” (see photograph in Appendix 2). Similar weirs and barricades were used throughout the Skeena Watershed (Copes, 1992).

It is evident that First Nations managed an intensive, sustainable and resilient fishery for many centuries—a system that abruptly changed with the introduction of the industrial mixed stock fishery in 1873. No longer were fish terminally harvested in or near their natal rivers. Instead, fisheries were concentrated in the estuary where stocks were mixed.

Mixed Stock Fisheries and the Decline of Biodiversity

Early sockeye fisheries on the Skeena saw large catches of sockeye, peaking between 1918 and 1920. Catches fell off steadily after this point. The number of operating canneries also peaked around this time (see Appendix 3). In order to give priority to mixed stock fisheries, authorities stripped First Nations of their rights to fish with traditional methods in their traditional areas (Haggan et al, 2006; Copes, 1995). But catches of wild sockeye salmon in Skeena mixed-stock fisheries continued to fall to

where the average sockeye catch between 1960 and 1969 was only 42% of the average sockeye catch between 1910 and 1919.

Research in the late 1950's and early 1960's provided evidence that Babine Lake could produce significantly more adult sockeye if the numbers of sockeye fry were artificially enhanced. This research led to a decision to construct spawning channels at Fulton River and Pinkut Creek on the west side of Babine Lake. Thereafter, enhanced production from the spawning channels significantly expanded the Skeena sockeye harvest through the 1980's and 1990's (Appendix 4).

Fisheries scientists understood as early as 1968 that accessing the surplus production from the channels would mean overfishing less productive stocks (Larkin and McDonald, 1968, Ricker, 1975). Their studies were the first mention of managers having to consider making trade-offs between conservation of less productive stocks in order to maximize economic benefits in the mixed-stock marine fishery. These trade-offs still exist today. For example, although the enhanced sockeye production from the Babine spawning channels can support harvest rates in excess of 70%, harvest of some of the less productive non-Babine wild stocks would have to be around a third of this rate, or between 20% and 30%, to ensure that they are not extirpated (Walters et al., 2008).

In order to maintain a mixed-stock fishery without causing the extirpation of less productive stocks, Fisheries and Oceans Canada's (DFO) salmon management strategy has fluctuated from year to year, as it has responded to variations in abundance, pressure from stakeholders and new policy directions. Mixed-stock harvests rates at the mouth of the Skeena River since 1980 have averaged around 40%; however, annual harvest rates have varied widely within this time frame. DFO has allowed much higher harvest rates in years of high abundance, while on other occasions has adjusted harvest rates to modify impacts on specific salmon stocks.

For instance, in the period between 1980 and 1991, the weekly mixed-stock harvest rate peaked at about 50%, with weekly harvest rates allocated relatively evenly between the first of July and the middle of August. In response to increasing concerns about declining steelhead and coho salmon numbers in the 1990's, DFO significantly reduced the August fishery and expanded weekly harvest rates at the beginning of the season in an attempt to maintain overall catches in the mixed-stock fishery. This strategy increased pressure on early-run sockeye stocks returning to the Morice Lake, reducing the number of sockeye available to the Wet'suwet'en Nation who rely on these fish to fulfill their constitutionally protected food fish needs. DFO responded by reducing early fishing opportunities while maintaining many of the August restrictions. However, in an attempt to maintain mixed-stock harvests, commercial fishing was concentrated in a relatively narrow window. In 2008, the consequence was that weekly harvest rates peaked at 70% at a time when the most vulnerable sockeye stocks were present in the fishery (Appendix 5). The limited spawning surveys conducted in the fall of 2008 revealed very poor escapements to the less productive non-Babine sockeye stocks (Gottesfeld pers. Comm.; DFO, 2008).

Current Status of Fishery

Despite new management directions over time, DFO has struggled to safeguard salmon biodiversity while also sustaining an economically viable mixed-stock fishery. The mixed-stock fishery is no longer viable as currently structured because industry has been faced with reduced access to sockeye, higher costs and declining prices, beginning in 1989. (Blewitt and Nelson, 2008) At the same time there are clear indications that at least five sockeye conservation units (CUs) are of serious conservation concern and one has been “red-listed” by the IUCN (Wood, 2001, Cox-Rogers, 2004, Walters et al 2008; Gottesfeld, 2008; IUCN, 2008). In a recent survey (2009), the Skeena Wild Conservation Trust estimated that, of 30 lake-type sockeye conservation units (CU), five CUs are of serious concern, 6 CUs are of concern, two CUs are at or above their Maximum Sustained Yield (MSY), and the other 17 CUs have insufficient data, but are assumed to be well below their MSY levels (Greg Knox, pers. Comm., Appendix 6).

Modern Selective In-river and Terminal Fisheries

In 1992, DFO initiated Excess Salmon to Spawning Requirement (ESSR) fisheries on the Skeena. These fisheries provided an opportunity for First Nations located upriver of the mixed-stock fishery to selectively harvest surplus enhanced Babine sockeye after all mixed-stock fishing opportunities were exhausted. ESSR fisheries, and the more recent Economic Opportunity fisheries, have harvested over 3.2 million sockeye and almost 300,000 pink salmon since their inception. These fish have gone into national and international fresh, frozen, canned and roe markets.

The problem with ESSR fisheries is that DFO typically has allowed harvest opportunities only in years with better than average returns (Appendix 7). This management approach has generated two negative consequences: sockeye salmon populations and sockeye salmon diversity are declining, and the inconsistency of supply has limited First Nations' ability to build relationships in the market, and thereby maximize economic returns for the broader community.

The 2008 season points to what can be achieved by in-river and terminal fisheries. In 2008, selective in-river and terminal fisheries' harvests comprised 29% of the total Canadian catch of Skeena River sockeye. It is estimated that 45% of the total number of people commercially fishing Skeena River sockeye in 2008 were employed within selective in-river and terminal fisheries, which generated almost \$1.2 million dollars for First Nations communities. This revenue is particularly noteworthy given that median income in these communities is 36% of the average income in British Columbia, and the employment rate is approximately 50% of the B.C. average (Statistics Canada, 2006).

Skeena sockeye and pink salmon have been selectively harvested, using a variety of methods, in five locations: Mid-River beach seines between Cedarvale and Glen Vowell; dip-nets and fish wheels in Gisgagaas Canyon; dip-netting fish at the Babine Fence,

beach seining and a “pocket” seiner in Babine Lake, and dip-netting pink salmon at Moricetown (Appendices 8 and 9). The Babine Fence and Lake Fisheries are the most productive. The mid-river fishery located on the mainstem of the Skeena River below Kispiox remains a mixed-stock fishery. The Giseagaas, Babine Fence and Babine Lake fisheries are relatively stock selective as they are located upstream of the confluence of the Babine and Skeena Rivers, thereby avoiding intercepting sockeye bound for other tributaries of the mainstem Skeena.

Industry critics have described in-river sockeye as being of inferior quality and therefore not suitable for traditional salmon markets. In addition, they maintain that markets pay less for in-river and terminally harvested sockeye products than for sockeye harvested by mixed-stock fisheries in coastal waters. Consequently, some critics conclude that it is a wasteful or inefficient use of the resource to harvest sockeye in-river.

As sockeye migrate upriver, it is true that flesh quality deteriorates. During years with well above average sockeye returns, some of the late-run fish harvested directly in front of the spawning channels can deteriorate to the point where the fish are not marketable (although the quality and value of the roe can potentially offset this problem). Yet, in an average year like 2008, all sockeye selectively harvested in the Skeena Watershed were successfully marketed. Prices ranged from 90% of what fishermen participating in the coastal mixed-stock fishery received (in the case of the mid-river fishery), to prices in excess of what marine fishers received (in the case of the Giseagaas fishery). While the Fence and Lake fishers earned only 40% of what mixed-stock fishers received, it is important to consider that the gross revenues of in-river and terminal fisheries do not have to support the same level of vessel, fuel, R&M and fishing gear costs as the mixed-stock fisheries. Furthermore, 100% of the revenues stay in northern B.C., as compared to the mixed-stock fishery where a large proportion of the fleet is based in southern B.C.

It is interesting to note that the pink salmon caught in the Moricetown dip-net fishery (300 kilometers upriver of tidewater) command a higher price than pink salmon harvested by commercial fisherman on the coast. The higher price is because most of the fish are processed and marketed locally (An accompanying presentation which can be accessed at <http://www.skeenawild.org/> describes the strengths and challenges of each of the selective fisheries in the Skeena Watershed).

First Nations possess the harvesting capacity and infrastructure to catch significantly more fish than in 2008. However, it is difficult to invest in the equipment, training and infrastructure required without a defined share of the surplus sockeye returning to the Skeena Watershed. In-river and terminal fishers—like mixed-stock fishers—need to be able to inform their markets that as long as there is an acknowledged surplus, they will receive a designated share (defined share) of the harvest. DFO has acknowledged this problem and has committed to address the situation through the **Pacific Integrated Commercial Fisheries Initiative**. However, to date, little progress has been made because of the political controversy associated with defined shares, which would require integration of commercial and First Nations salmon allocations.

Conclusion

Canada's Wild Salmon Policy (WSP) aims to restore and maintain healthy and diverse salmon populations and their habitats by, "safeguarding the genetic diversity of wild salmon populations, maintaining habitat and ecosystem integrity, and managing fisheries for sustainable benefits" (Canada's Policy for Conservation of Wild Pacific Salmon, 2005). A challenge of the WSP, however, is that fisheries managers are interpreting its goals within the context of maintaining mixed-stock salmon fisheries on the coast—in essence, a "trade-off" approach is still required.

This paper has outlined an alternative management vision that could potentially merge the twin goals of economic sustainability and the preservation of sockeye salmon biodiversity. DFO could achieve the improvements in biodiversity envisaged by the Wild Salmon Policy and increase economic benefits to northern communities by modifying the mixed-stock fishery and increasing selective in-river and terminal fisheries.

The mixed-stock fishery does not need to be eliminated, but it needs to be significantly reduced. A much smaller mixed-stock fishery focused on supplying higher-end markets could still produce significant benefits for local coastal communities. At the same time, a selective in-river and terminal fishery that is allocated defined shares of the Total Canadian Commercial Catch would allow these fisheries to grow their businesses and increase economic benefits to upriver communities.

First Nations involved in the management of in-river and terminal commercial fisheries have stated that they are committed to ensuring that management focuses on conservation, biodiversity and ecological integrity, and that decision-making integrates peer-reviewed science, traditional ecological knowledge and Traditional Law.

First Nations commercial fishers who participate in selective in-river and terminal fisheries in the Skeena Watershed have recently organized the Skeena Watershed Selective Harvester's Association (SWSHA) to begin work on the following objectives:

1. Work with the Skeena Fisheries Commission, DFO and other organizations to improve the management, in-season assessment and selectivity of in-river and terminal fisheries.
2. Improve the stability and economics of selective in-river and terminal fisheries by ensuring that each fishery has a defined share of the total Canadian Commercial Allocation of sockeye salmon. Such a policy will allow SWSHA members to grow their businesses while increasing sockeye salmon biodiversity in the Watershed.
3. Certify all sockeye products as selectively harvested in "fair-trade" fisheries.
4. Increase the value of sockeye harvested in selective fisheries, either through product development (skinless/boneless fillets, salmon caviar, etc.) or by accessing markets which will pay more for selectively harvested, fair-trade sockeye.

5. Identify investment opportunities in infrastructure and processing capacity that would return a greater share of the market value to local communities.
6. Provide educational workshops on fish handling, selective harvesting practices, and safety.

First Nations are in the process of building the necessary framework to recreate a sustainable sockeye fishery in the Skeena watershed. Future generations of Canadians will benefit from a fisheries management approach that fosters robust fisheries harvesting a healthy, diverse and abundant salmon resource.

References

- Blewitt, E and S. Nelson. 2008. Economic Dimensions of Skeena Watershed Salmonid Fisheries. Counterpoint Consulting, Vancouver.
- Copes, P. 1995. The Profits of Justice: Restoring Aboriginal River Fisheries in British Columbia. Workshop in Political Theory and Policy Analysis, Indiana University.
- Cox-Rogers, S., J.M.B. Hume and K.S Shortreed, 2003. Stock Status and lake-based relationships for wild Skeena River sockeye salmon. PSARC Working Paper S2003-09.
- Cox-Rogers, S. 2000. Skeena River Sockeye Management Model, Department of Fisheries and Ocean's.
- Gazey, William. J. 2008. Interception of Skeena River Sockeye Salmon Stocks in Northern Boundary Marine Fisheries. Prepared for the Skeena Wild Conservation Trust.
- Gottesfeld, Allen S., Ken a. Rabnett and Peter E. Hall. 2002. Conserving Fish Poulations and their Habitats. Skeena Fisheries Commission.
- Gottesfeld, A.S. and Ken A. Rabnett. 2008. Skeena River: Fish and their Habitat. Skeena Fisheries Commission, Ecotrust, Portland Oregon.
- Hagan, N. Nancy Turner, Jennifer Carpenter, James T. Jones, Quentin Mackie and Charles Menzies. 2006. 12,000+ Years of Change: Linking traditional and modern ecosystem science in the Pacific Northwest, Fisheries Center, University of British Columbia.
- Larken, P.A. and J.G. McDonald. 1968. Factors in the population biology of the sockeye salmon of the Skeena River. *Journal of Animal Ecology* 37: 229 – 558.
- Ricker, W.E. & H.D. Smith. 1975. A Revised Interpretation of the history of the Skeena River Sockeye Salmon. *Journal of the Fisheries Research Board of Canada* 32: 1369-1381.
- Trosper, R.L. 2002. Northwest coast indigenous institutions that supported resilience and sustainability. *Ecological Economics* 41 pp. 329-344.
- Walters, C.J., Lichatowich, J.A., Peterman, R.M., and Reynolds, J.D. 2008. Report of the Skeena Independent Science Review Panel. A report to the Canadian Department of Fisheries and Oceans and the British Columbia Ministry of the Environment. May 15, 2008, 144 p.
- Wood, C. 2001. Managing Biodiversity in Pacific Salmon: The Evolution of the Skeena River Sockeye Salmon Fishery in British Columbia
[http://www.unep.org/bpsp/Fisheries/Fisheries%20Case%20Study%20Summaries/Wood\(Summary\).pdf](http://www.unep.org/bpsp/Fisheries/Fisheries%20Case%20Study%20Summaries/Wood(Summary).pdf)

Appendix 1

Kitwanga Weir



Fish weir and basket traps on the Kitwanga River as photographed by Louis Shotridge in 1918 (Courtesy of the Canadian Museum of Civilisation, 71-8442).

Note barrel basket traps on far shore

Courtesy of Allen Gottesfeld and Ken Rabnett

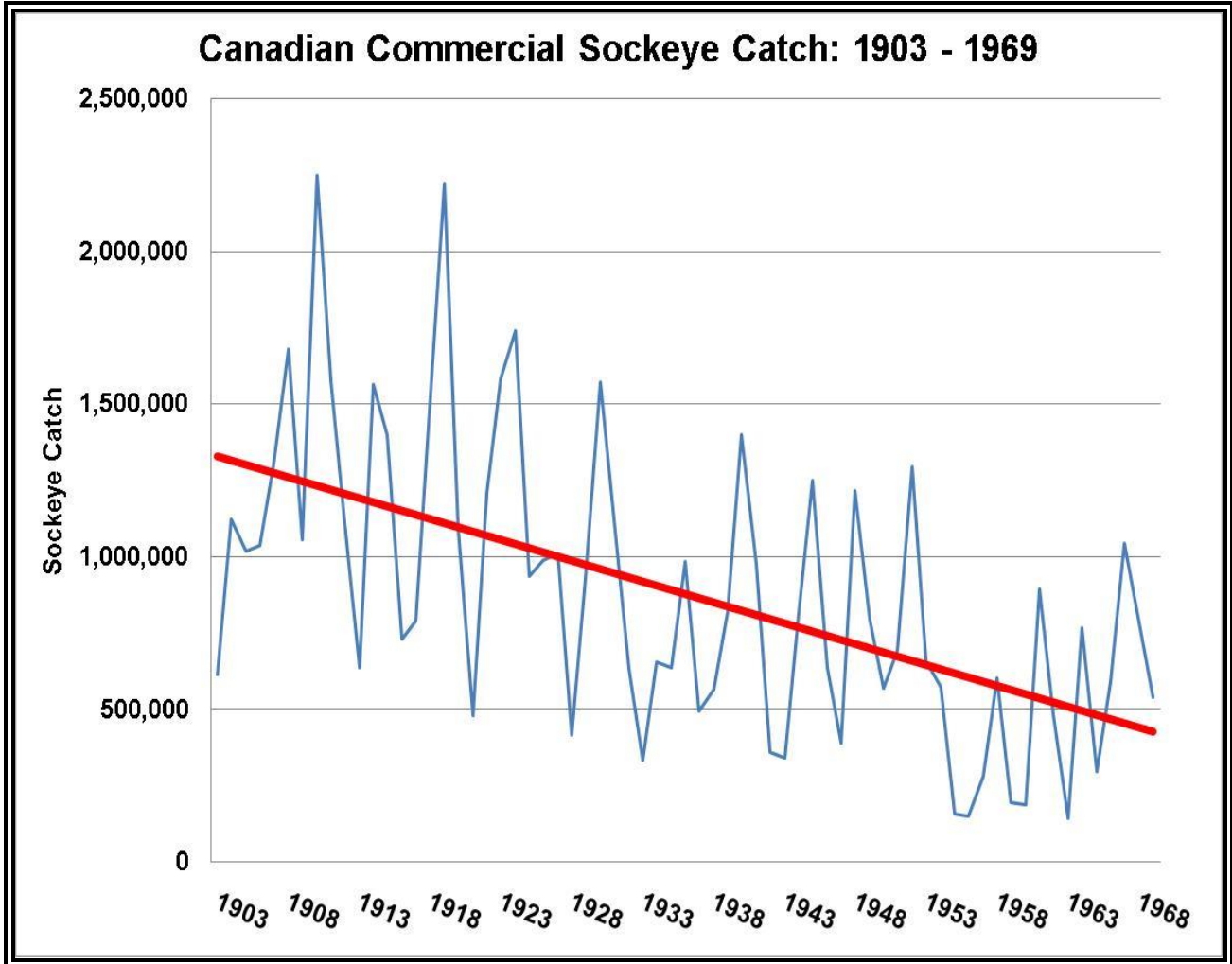
Appendix 2

Babine Weir



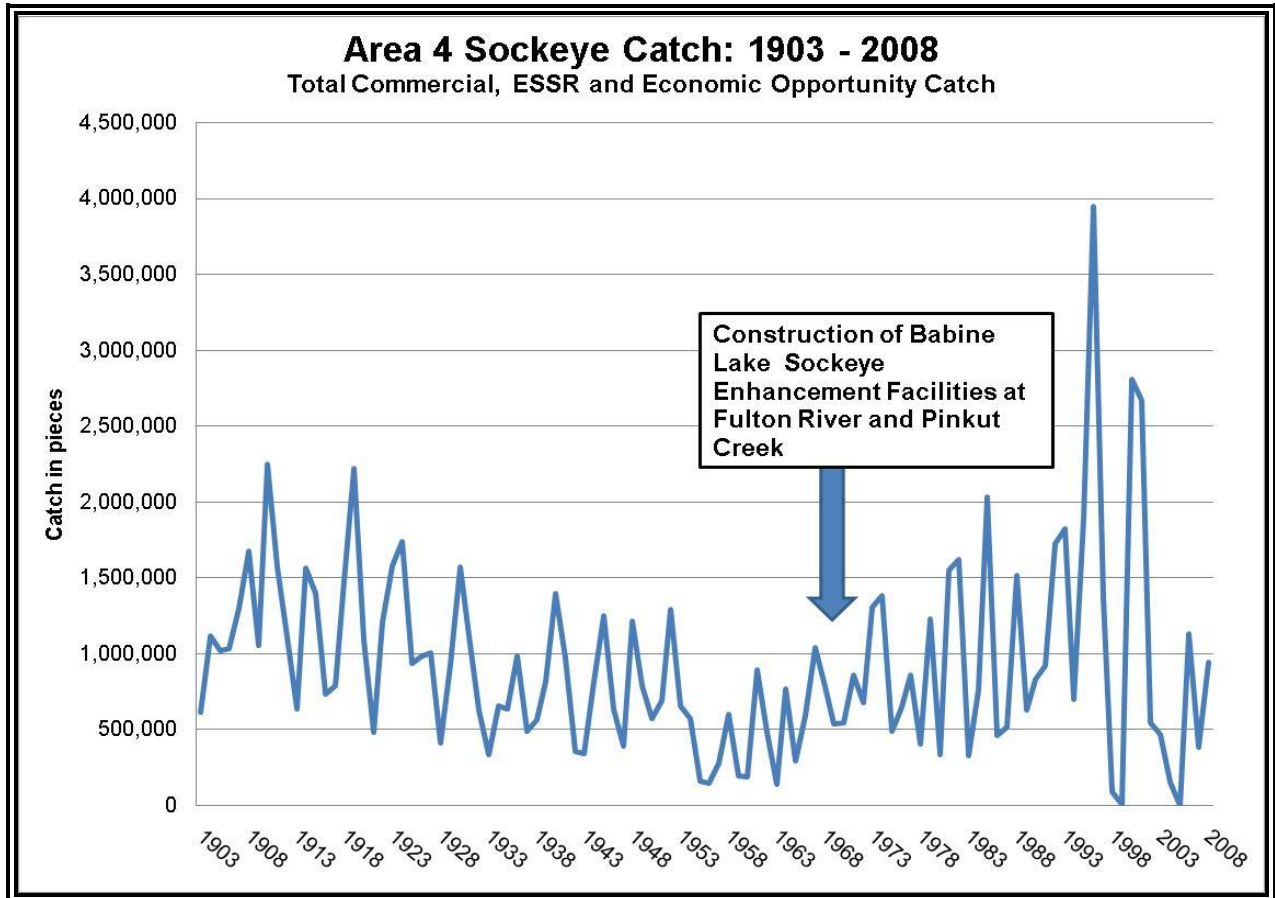
Courtesy of Bill Spenst and Lake Babine Nation

Appendix 3: Catch of Skeena Wild Sockeye Stocks: 1903 – 1969



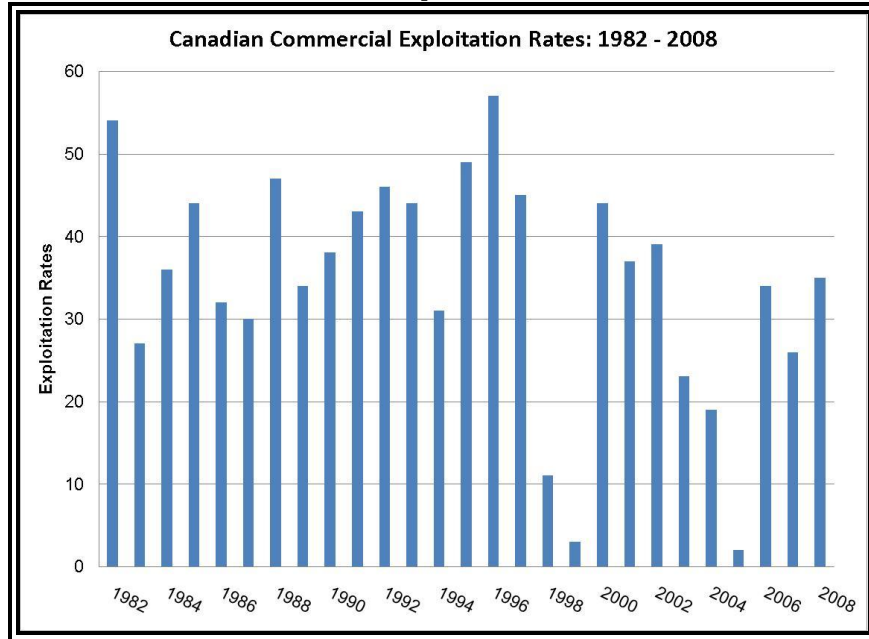
Appendix 4

Area 4 Commercial Catch of Skeena River Sockeye Illustrating the Increased Catch Produced by the Babine River Spawning Channels

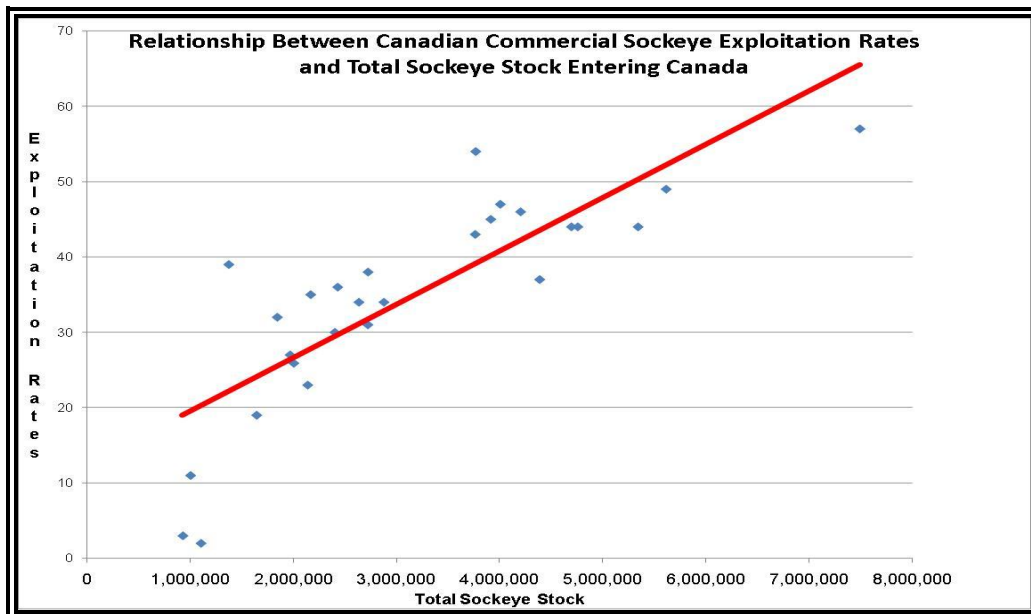


Appendix 5 Exploitation/Harvest Rates and the Trade-offs between Biodiversity and Marine Catch in Mixed Stock Fisheries

Canadian Commercial Exploitation Rates: 1982: 2008



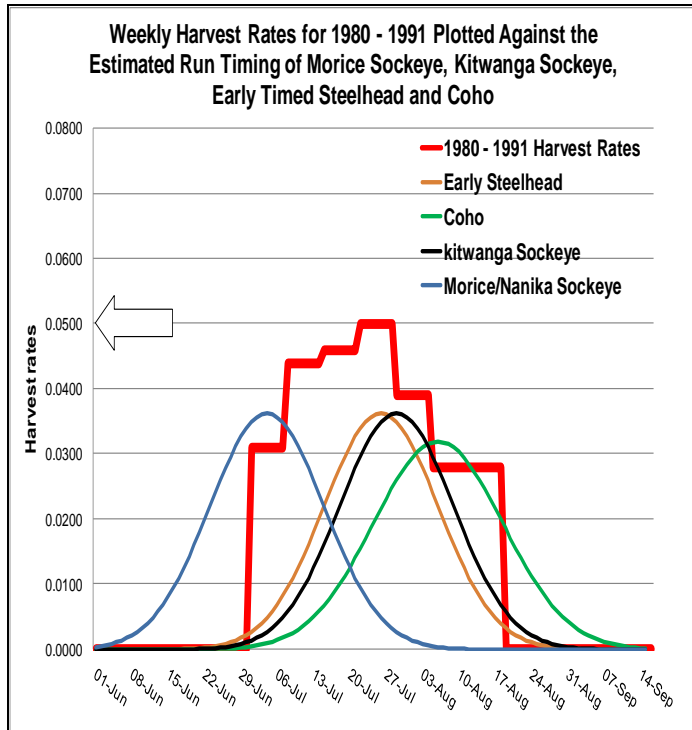
Management Response to Annual Variations in Abundance



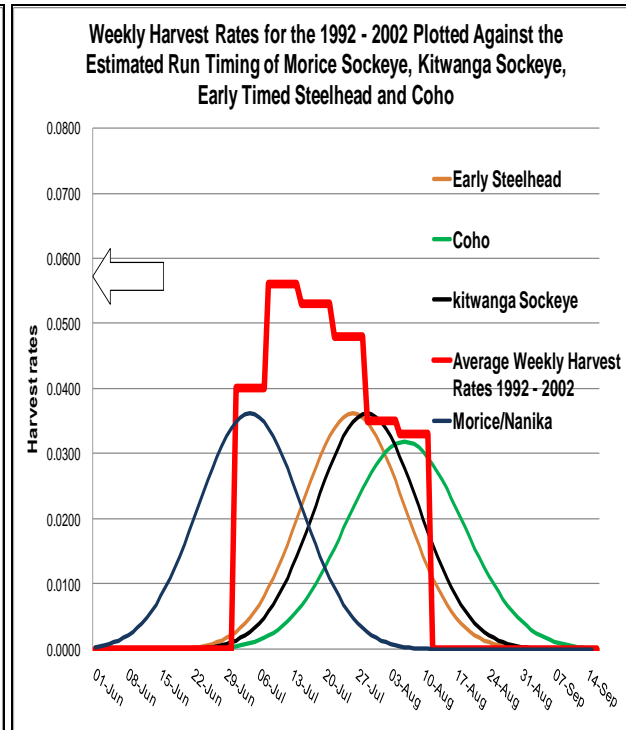
Appendix 5 cont'd

Illustration of how weekly harvest rates have actually increased over time as DFO struggled to maintain aggregate mixed stock harvest rates while at the same time attempting to address the impacts of the mixed stock fishery on non-Babine sockeye and upriver coho stocks.

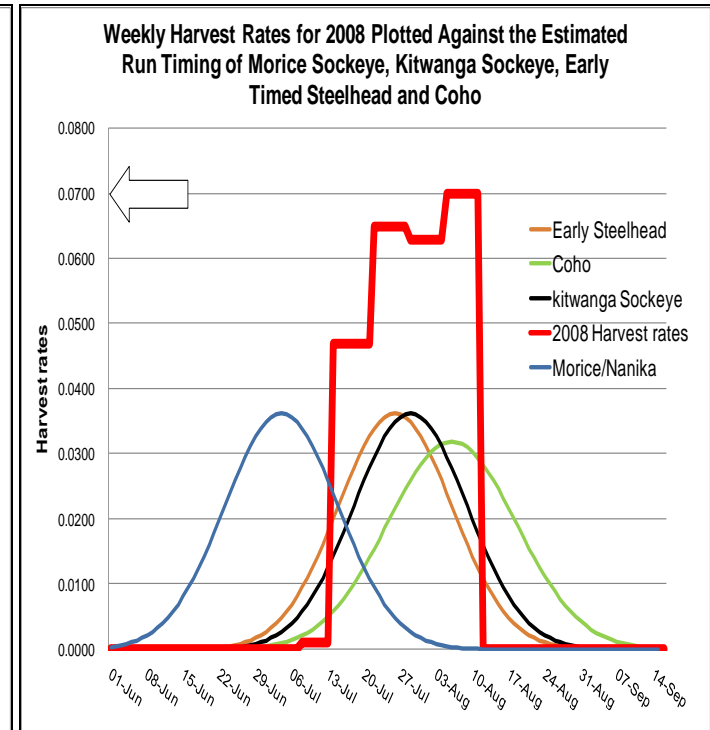
1980 – 1991



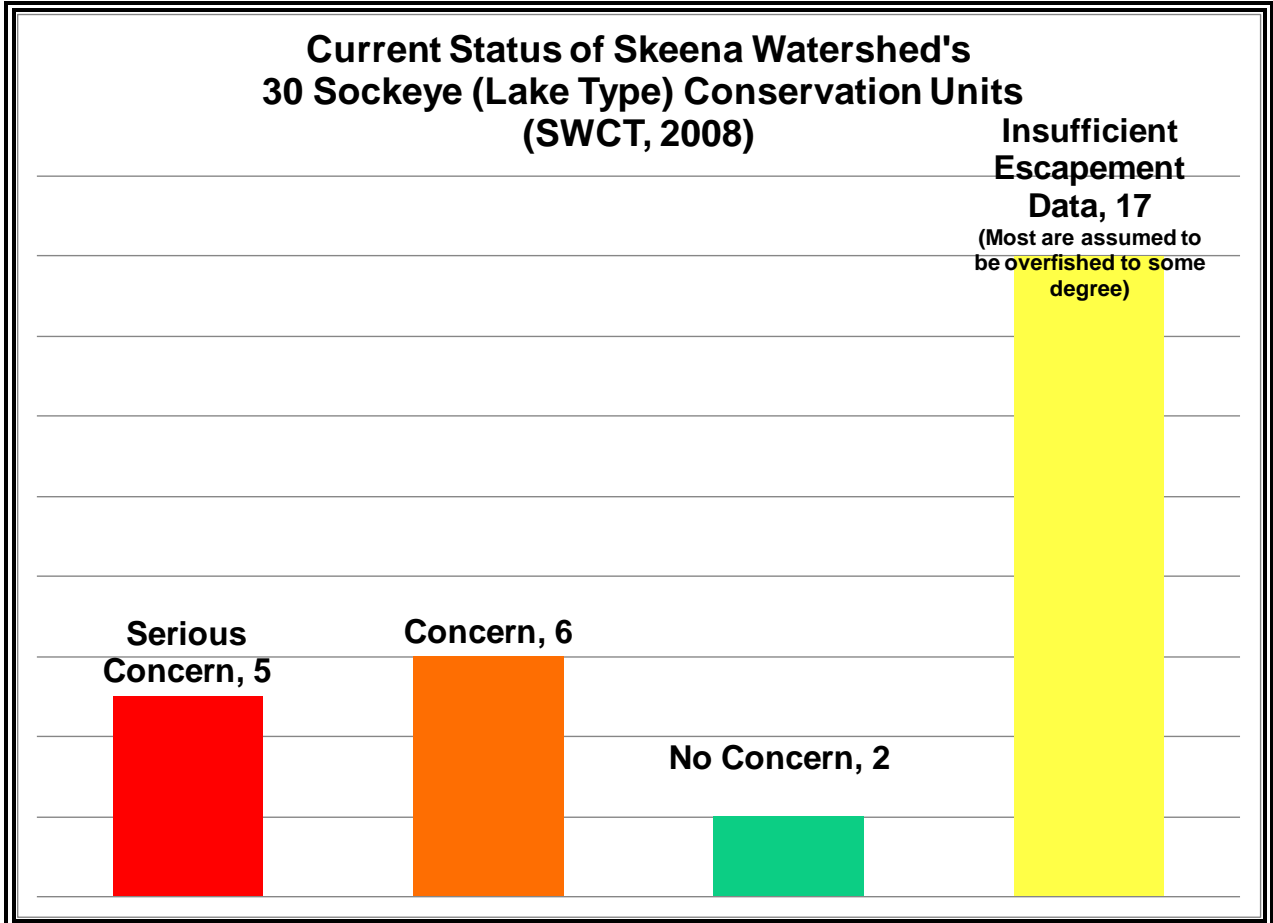
1992 – 2002



2008

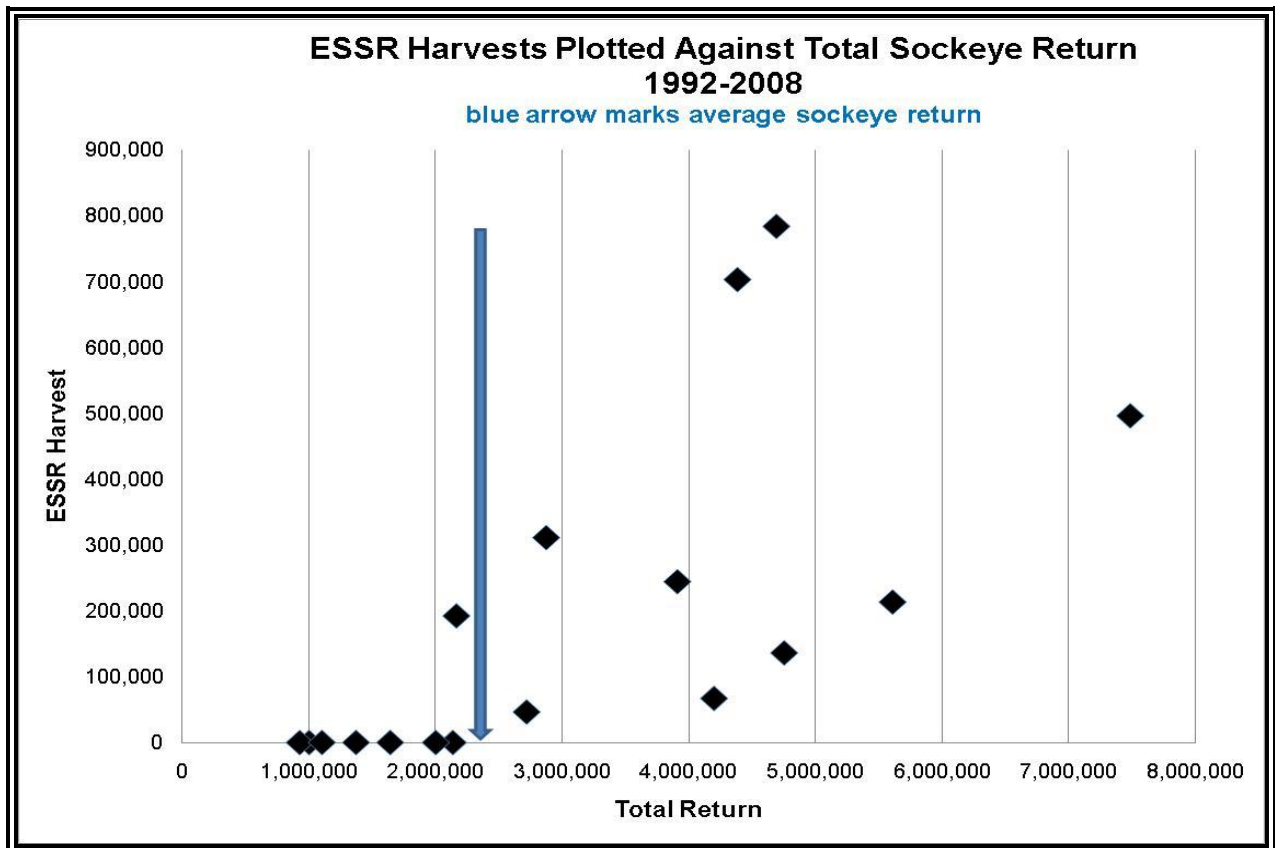


Appendix 6



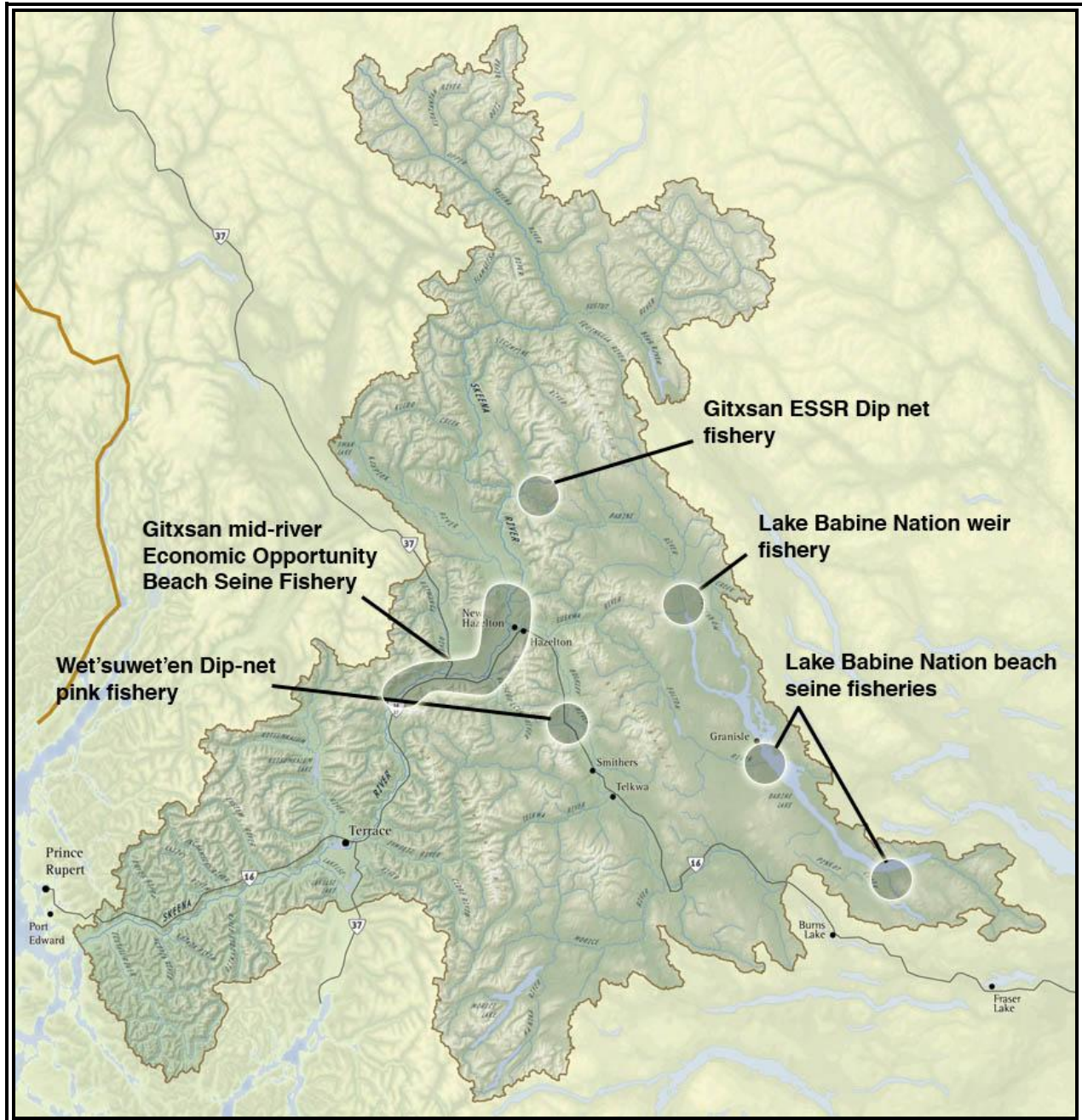
Appendix 7

Skeena Watershed Excess Salmon to Spawning Requirement (ESSR) Fisheries



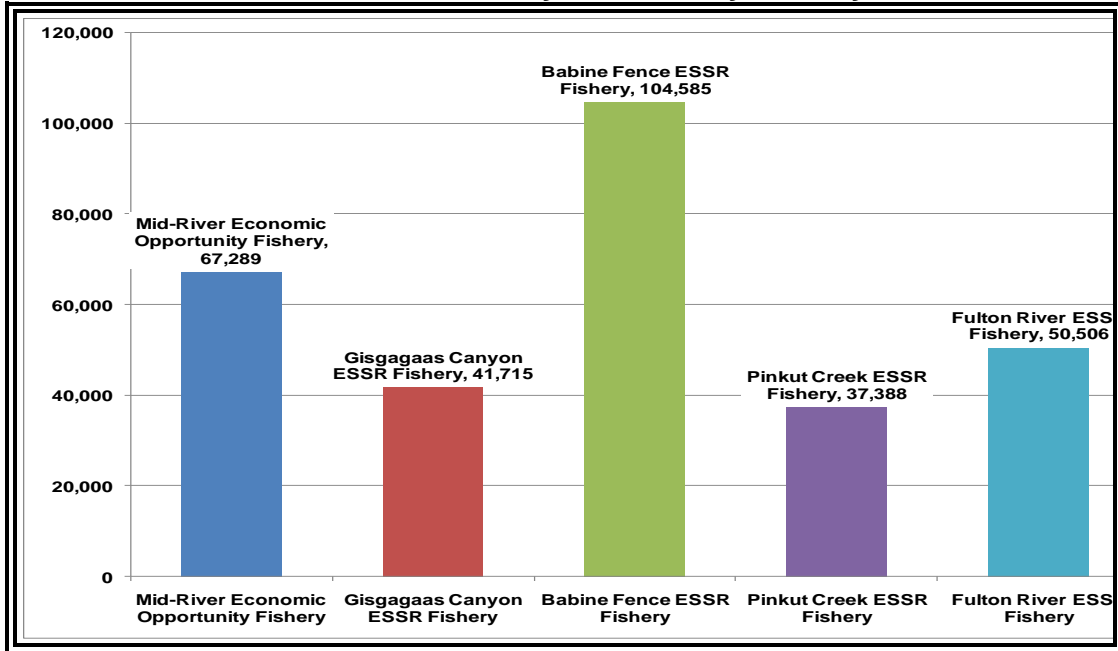
Appendix 8

Location of Selective in-river and terminal fisheries and terminal fisheries Fisheries



Appendix 9 Distribution of Catch and Revenues from the 2008 Fishery

Numbers of Sockeye Landed by Fishery



Value of Sockeye Landed By Fishery

