COHO SALMON

FINAL REPORT

COHO RESPONSE TEAM

FISHERIES AND OCEANS CANADA
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1. EXECUTIVE SUMMARY 4

2. INTRODUCTION 10

3. BACKGROUND 12

3.1 STATUS OF COHO STOCKS 12

3.2 PACIFIC STOCK ASSESSMENT REVIEW COMMITTEE (PSARC) ADVICE SUMMARY 16

3.3 CONSULTATIONS 19
3.3.1 PROCESS 19
3.3.2 INFORMATION PROVIDED 20
3.3.3 ADVICE RECEIVED 21

4. SCENARIOS AND POTENTIAL ACTIONS 35

4.1 FISHERIES MANAGEMENT 35
4.1.1 SOUTH COAST FISHERIES MANAGEMENT SCENARIOS 35
4.1.2 NORTH COAST FISHERIES MANAGEMENT SCENARIOS 38
4.1.3 POSSIBLE IMPLICATIONS FOR OTHER SALMON SPECIES OF A ZERO FISHING MORTALITY OPTION 40
4.1.4 SELECTIVE HARVESTING 44
4.1.5 SELECTIVE MARK FISHERIES 46

4.2 ENFORCEMENT, STOCK ENHANCEMENT AND HABITAT PROTECTION OPTIONS 48
4.2.1 ENFORCEMENT 48
4.2.2 STRATEGIC STOCK ENHANCEMENT AND HABITAT RESTORATION 50
4.2.3 HABITAT ISSUES AND POTENTIAL ACTION PLAN 58

5. REFERENCES 64

6. APPENDICES 65

6.1 APPENDIX - BACKGROUND INFORMATION SUPPLEMENTAL TO THE CONSULTATION PROCESS 65
6.1.1 SOCIO-ECONOMIC IMPACTS 65
6.1.2 CURRENT STATUS OF BRITISH COLUMBIA HERRING STOCKSError! Bookmark not defined. 74
6.1.3 STATUS OF SEALS AND SEA LIONS IN THE STRAIT OF GEORGIA AND THEIR ESTIMATED IMPACTS ON SALMON 77
6.1.4 STATUS OF COASTAL B.C. MARINE CLIMATE 79

6.2 APPENDIX - CHRONOLOGY OF MANAGEMENT ACTIONS TAKEN TO CONSERVE COHO 80

6.3 APPENDIX - COMMUNICATIONS SUMMARY **86**

6.4 APPENDIX - INFORMATION PACKAGES PROVIDED FOR CONSULTATION MEETINGS **87**
6.4.1 MARCH 30, 1998 PACKAGE 87
6.4.2 APRIL 3, 1998 PACKAGE 94
6.4.3 Other Material in Consultation Packages 111
6.4.4 1998 Coho Backgrounder Presentation Slides 123

6.5 APPENDIX - ADVICE AND COMMENTS FROM CONSULTATIONS **175**
6.5.1 Written Submissions Received 175
6.5.2 Summaries From Consultation Meetings 277

6.6 APPENDIX - PACIFIC STOCK ASSESSMENT REVIEW COMMITTEE (PSARC) ADVISORY DOCUMENTS **390**
6.6.1 PSARC ADVISORY DOCUMENT 98-2 PACIFIC SALMON MARCH 1998 390
6.6.2 PSARC ADVISORY DOCUMENT 97-6 PACIFIC SALMON DECEMBER 1997 412
6.6.3 PSARC ADVISORY DOCUMENT 98-3 PACIFIC SALMON APRIL 1998 437

6.7 APPENDIX - HABITAT STATUS AND MATRICES **485**
6.7.1 Regional Overview Of Habitat Conditions 485
6.7.2 Thompson Watershed Matrix 493
6.7.3 Skeena Watershed Matrix 497

1. EXECUTIVE SUMMARY

1. The Coho Response Team (CRT) reviewed the status of coho salmon stocks in southern and northern B.C., and also conducted extensive consultations to obtain advice on coho conservation measures from First Nations, stakeholders, other interest groups and the public. The CRT also analysed coho enhancement, habitat protection and restoration and enforcement options, and developed various fisheries management scenarios, to understand what measures might be required in 1998 and future years to conserve coho. The CRT also considered the additional scientific advice from PSARC and the available economic information (e.g. Job Protection Commission study conducted jointly with the Province). All of this advice and information is summarized in this CRT Final Report.

Status of B.C. Coho

2. The status of coho stocks in both northern and southern B.C. has declined significantly in recent years. The conservation concerns are most severe in 1998 for wild coho in the Thompson River drainage in southern B.C., and for upper Skeena River coho in northern B.C. Coho populations in most other parts of B.C. are not healthy and require a very conservative management approach.

3. The concern for conservation of coho stocks in southern B.C. has been growing for several years. Marine survival rates have declined from a range of 8 to 15 percent in the mid- to late 1980s to a range of 1 to 6 percent in 1996 and 1997. The abundance of Strait of Georgia and Fraser River coho has also declined sharply since the early 1990s as a result of this survival rate decline and the poor status of many spawning populations.

4. In northern B.C. generally poor coho escapements were recorded throughout the region in 1997 and escapements to most mid- and upper-Skeena tributaries fell to record lows in 1997. The near-zero ocean survival that apparently occurred in the 1996 smolt year (1997 returns) has produced a situation in the upper Skeena, particularly the upper Bulkley, the Babine and the high interior, that is perilous. Coastal populations appear to be more productive and have been stable despite high exploitation rates, probably because of a prolonged period of good marine survival. Status of coho on the Queen Charlotte Islands and much of the central B.C. coast is uncertain.

5. Among the far northern transboundary rivers (which cross the B.C. /Alaska border) the Taku River is the largest producer of coho and has shown a sharp decline in run size since 1994. The stock status of Stikine River coho salmon is poorly understood. The limited escapement counts and estimates which are available show no discernible trend, but it is generally believed that coho escapement has also declined in the Stikine River. For the Alsek River, index spawning escapement in the Klukshu River have shown a 2-3 fold increase in escapement counts since

1976. Little information exists for the status of coho salmon in other northern transboundary rivers.

6. Longer-term expectations for northern B.C. coho in the Queen Charlotte Islands, and north and central B.C. coast are for below average returns for the foreseeable future. The situation for mid- and upper-Skeena coho is particularly bleak because of already poor and now declining marine survivals and poor brood-year escapements.

7. Longer-term expectations for southern B.C. coho are for continued poor returns for the 1998 to 2001 period. Low spawning escapement levels combined with poor marine survival have resulted in very low returns in the past four-year period.

Historical Fisheries Management

8. The Department implemented progressively more stringent actions in southern B.C. fisheries in recent years to reduce harvest levels, including a reduction in total exploitation rate of coho in Canadian fisheries from 70-80% in 1995, down to about 60% in 1996.

9. The Pacific Stock Assessment Review Committee (PSARC) noted that, even with no fishing, some stocks likely would not reach conservation goals in 1997. PSARC therefore recommended prior to the 1997 season that fishing mortality of southern B.C. coho stocks should be further reduced through conservation measures in all intercepting fisheries.

10. As a result, in southern B.C. the Department implemented much more stringent measures to conserve coho in both commercial and recreational fisheries, which further reduced exploitation rates of coho. Most individual coho stocks experienced exploitation rates between 25-35% in 1997. The substantially reduced exploitation rates for coho in 1997, compared to 1996, resulted in some improvement in escapement levels of many south-coast stocks. However, severe conservation concerns still remain in 1998, particularly for coho populations in the Thompson River drainage.

Advice Received From Consultations

11. There was agreement in principle by all groups that the coho conservation problem is real and that stringent management measures are required to address it.

12. There was unanimous support by all groups for improved habitat protection, restoration and enforcement. There was widespread concern expressed that too little is currently being done to protect fish habitat. Significant coho habitat losses and impacts have occurred in the Thompson River and localized areas of the Skeena River in the past, and are continuing to occur throughout BC. Stakeholders

felt there is a need to embark on an aggressive habitat protection and restoration plan to address these concerns.

13. All groups supported more selective harvesting methods and opportunities.

14. Most groups also advised that more enforcement and monitoring of all salmon fisheries was required.

15. There was widespread support for special government assistance (support and direct compensation) for those directly affected by any drastic management measures taken by the Department to protect coho in 1998.

16. There was general support for additional programs to improve the knowledge of coho abundance (e.g. stock assessment, escapement monitoring), distribution and migration timing.

17. First Nations emphasized that provision of coho for food, social and ceremonial purposes is the first priority after conservation. They also emphasized that due to extremely poor returns of coho to the Thompson River, First Nations requirements for food, social and ceremonial needs for coho have not been met for several years. Many First Nations advised that there should be no mortality of coho permitted in any fishery in 1998, or at least that no directed fisheries for coho should be permitted by any sector in 1998.

18. The advisors for the recreational fishery recommended that some fisheries directed on coho in 1998 were acceptable and necessary for social and economic reasons. Fishing opportunities for coho would assist in maintaining effort levels and value in recreational fisheries that were severely impacted by chinook conservation measures and scarcity of coho in the Strait of Georgia since 1994. The recreational sector also recommended a selective mark fishery for southern B.C. coho in 1998.

19. The commercial sector advised that harvest of the significant surpluses of sockeye and chum salmon stocks that are anticipated to be available in the 1998 season was necessary in order for the commercial to survive and attempt to recover from two extremely poor fishing seasons in 1996 and 1997. The commercial fishing and processor sectors also advised that even with full opportunity to access these surplus stocks in 1998 the economic outlook for these sectors remains poor.

20. Many groups advised that additional measures will require decisions on both the short- and longer-term actions which are required for conserving and rebuilding depressed and severely threatened wild coho stocks.

21. There was consensus that there are compelling conservation and economic reasons why an early decision on the 1998 coho management plan is required from the Minister, including the facts that: 1) the recreational fishery is currently open and

coho will soon reach the size which will permit legal retention in the sport fishery and 2) some recreational and commercial interests will soon or have already made significant investments for the 1998 season which may be at risk, and 3) families and communities will be impacted by the 1998 coho plan.

22. Some groups advised that there was a need for the Minister's decisions to be accompanied by an action plan that addresses coho recovery, habitat conservation and restoration, and an economic recovery plan for affected communities.

23. It was recognized that a comprehensive action plan is required to stop and eventually reverse the decline in coho abundance. To be successful this plan must address the conservation issue on a number of fronts, including enhancement, habitat protection and restoration, and harvest management.

Enhancement

24. For enhancement the action plan should include two components; short-term supplemental enhancement of severely threatened wild stocks, and restoration of habitat. In the short-term the action plan could focus on enhancement facilities and strategies that could be employed in two of the most seriously affected systems, the Thompson and the upper Skeena. This could include short-term supplementation (one to two cycles over 3-6 years) of threatened wild stocks, probably by employing fry releases.

25. A review and potential re-profiling of production targets for coho and other species at existing enhancement facilities throughout B.C. is required to better meet local production planning requirements. In the longer term, it may also be necessary to consider a gene banking or a captive broodstock program in some cases.

Habitat Protection and Restoration

26. Coho salmon spend between one and two years in freshwater before smolting and typically utilize a greater diversity of freshwater habitats than other salmon species. Many of the habitats essential to coho are particularly vulnerable to damage and fragmentation due to agriculture, logging and urbanization.

27. Habitat restoration projects can play an important role in the maintenance and rebuilding of wild coho populations by improving the productive capacity of degraded habitat. Methods may include removal of obstructions, fishway installation, stabilization of stream banks to reduce erosion, and creation of off channel habitat for spawning or rearing.

28. Fisheries and Oceans Canada is responsible for the management of fish habitat throughout Canada as mandated by the *Fisheries Act* and guided by the National Policy for the Management of Fish Habitat. However, the Province of B.C., and in

some cases municipal governments, are responsible for permitting land and water use that impacts coho habitat, including forest harvest, agriculture, industrial development, hydro-electric facilities and dams, urban development and other activities.

29. There has been significant erosion of freshwater coho habitats throughout British Columbia. The losses that have occurred over the last century cannot be easily quantified, but it is clear that coho habitat has been reduced in both quality and quantity from historic levels. This has resulted mainly from development of mines, highways, railways, dams, cities and ports (with the associated infrastructure) and harvesting of trees, mineral resources, cash crops and livestock.

30. In many developed areas in B.C. (i.e. lower Fraser Valley, east coast of Vancouver Island, Sunshine Coast, Thompson-Shuswap) there are very significant, widespread and permanent impacts to coho habitat, many of which occurred decades ago as these areas were settled. In these areas the historic impacts are now also accompanied by enormous new growth and increasing development pressure. Many of the wild coho populations in these developed areas may never rebuild to historic levels due to the nature and magnitude of the habitat loss these areas have already experienced, and the inability to reclaim lost productivity despite significant restoration efforts.

31. The habitat productive capacity of many areas in the North and Central Coast of B.C. has not yet been significantly diminished, and many systems are still considered to be in relatively pristine condition. For example, the present productive capacity of the Skeena for coho is estimated to still be more than 80% of historic levels. As a result rebuilding coho runs in the upper Skeena to historic levels likely would not be constrained by current freshwater habitat capacity or productivity.

Management Of Fisheries In 1998 and Beyond

32. After reviewing the results from 1997, and the assessments of conservation risks for coho in 1998, the most recent PSARC Advisory document (98-3; provided in Appendix 6.6.3) recommended "..that extreme caution be used in 1998 Pacific fisheries that encounter coho salmon. Upper Skeena and Thompson coho in particular are extremely depressed and under the current climatic regime are expected to continue to decline even in the absence of fishing mortality. Since extinction risk increases exponentially with decreasing population size, the Subcommittee advises that the risks associated with fishing mortality are substantial." Although the situation in other areas is currently not as grim as for the upper Skeena and the Thompson, there is still a need to be extremely cautious with fishing mortality on all B.C. coho stocks for at least the next few years.

33. Recognizing that the scientific advice indicates severe concerns for conservation of coho in 1998, and that extreme caution be used in 1998 fisheries that encounter coho, the advisors generally recommended the exploitation rate of coho in 1998 should be within the range of 0% to 10% in southern B.C., and 0% to 6% in northern B.C. However, any exploitation rate above 0% requires decisions on allocation of coho catches or coho mortalities between the various fishing sectors. Any exploitation rate greater than 0% could be achieved in many different ways, each of which could result in dramatic changes to each fishery compared to previous years. Unfortunately there was no agreement or even consensus among the fishing sectors on how these allocations should be made in 1998. Several scenarios for management of the fisheries in 1998 were developed by the Department to illustrate the type of measures that might be taken to achieve exploitation rates for coho of 0% and 10% in southern B.C., and 0% and 6% in northern B.C.

34. A significant portion of the hatchery coho which will be distributed in southern B.C. waters in 1998 have been marked by fin-clips. These marks would allow fishermen to recognize and selectively harvest these hatchery coho, while releasing any wild coho that they caught. The recreational fishing sector strongly supported selective mark fisheries for southern coho in 1998. However, the PSARC Steering Committee advised that "..any non-retention fishery that catches coho (e.g. selective mark fisheries) will confound natural mortality with incidental fishing mortality in 1998; this would be a new source of unquantified fishing mortality. The Department must evaluate the potential impact of mark selective fisheries on the assessment of any threatened wild stocks (e.g. Thompson River coho)."

35. Fisheries in U.S.A. waters typically harvest 30% to 50% of B.C. north coast coho stocks every year, and 5% to 15% of B.C. south coast coho stocks. Any continued exploitation of B.C. coho in U.S. fisheries in 1998 and subsequent years is an additional pressure on B.C. coho.

36. Further substantial reductions in the fishery exploitation rate of coho in Canadian fisheries are required in 1998, and possibly many years beyond, to address the conservation concerns for both southern and northern B.C. coho stocks.

2. INTRODUCTION

There has been growing concern for coho salmon stocks in British Columbia for several years. In southern B.C. marine survival rates of coho declined from a range of 8 to 15 percent in the mid- to late 1980s, to a range of 1 to 6 percent in 1996 and 1997. The abundance of Strait of Georgia and Fraser River coho also declined sharply during this period, mainly as a result of this decline in survival rates and the poor status of many spawning populations. Fishing exploitation rates on coho were reduced from a range of 70 to 80 percent in the mid-1990s to approximately 60 percent in 1996, but spawning escapements for most wild coho populations in the Strait of Georgia and Fraser River continued to decline.

The Fisheries and Oceans Pacific Stock Assessment Review Committee (PSARC) recommended prior to the 1997 season that fishing mortality of southern B.C. coho stocks should be reduced through conservation measures in all intercepting fisheries. PSARC also noted that, even with no fishing, there would be some stocks that would not reach conservation goals. In response, very stringent conservation measures for coho were implemented by the Department in commercial and recreational fisheries in 1997, which resulted in a further substantial reduction in the exploitation rates on southern coho salmon. Most individual coho stocks experienced exploitation rates between 25-35% in 1997. The substantially reduced exploitation rates for coho in 1997, compared to 1996, resulted in some improvement in escapement levels of many south-coast stocks. However, severe conservation concerns still remain for 1998, particularly for coho populations in the Thompson River drainage.

In the fall of 1997 additional stock assessment analyses and subsequent advice from PSARC also confirmed significant concerns for coho in northern B.C., particularly for upper Skeena River stocks. Generally poor coho escapements were recorded throughout the region in 1997 and escapements to most mid- and upper-Skeena tributaries fell to record lows in 1997. The near-zero ocean survival that apparently occurred in the 1996 smolt year (1997 returns) produced a situation in the upper Skeena, particularly the upper Bulkley, the Babine and the high interior, that was considered to be perilous.

In February 1998, Fisheries and Oceans Canada formed a special Coho Response Team (CRT) in the Pacific Region. Based on the above information it was clear by then that further substantial reductions in fishery exploitation rate of coho in all Canadian fisheries would be required in 1998. The CRT was tasked with developing an Action Plan to communicate these conservation concerns to all interest groups, and also to consult with First Nations, stakeholder and other interest groups who would be directly or indirectly affected by any additional fisheries management actions required in 1998 to conserve coho. The advice provided to the CRT from these consultations ultimately would be provided to the Minister of Fisheries and Oceans Canada for consideration in his decisions on the conservation measures required in 1998 and future years.

This document is the final report of the Coho Response Team. It summarizes all the information that was provided to stakeholders, interest groups and the public by the CRT concerning the coho conservation problem. It also summarises the extensive consultation process which the CRT undertook during February-April 1998, and the advice that was provided to the Department and the Minister from these consultations.

3. BACKGROUND

3.1 STATUS OF COHO STOCKS

Stock status information is presented in PSARC Advisory Documents (Appendix 5.6) and in presentation material available through the Department's Internet site (http://www.pac.dfo.ca/pac/comm/pages/cohoresponse/cohoresp.htm). The following is a summary of that information and some ancillary information on northern transboundary river coho stocks.

Southern B.C.

Expectations for coho returns throughout southern British Columbia in 1997 were extremely poor. On the west coast of Vancouver Island, parent spawner levels (1994 spawning year) were severely depressed, likely due to El Nino–influenced predation in the spring and summer of 1993. In the Strait of Georgia, smolt to adult survival rates had declined to less than one quarter of 1980s levels by 1996, and the prospects for 1997 were for a continuation of this pattern. Spawner levels on the east coast of Vancouver Island, the Sunshine Coast and in the Thompson River watershed were especially weak in 1996. With the poor expected marine survival rate, it was clear that fishery exploitation rates (the proportion of a stock that is caught by all fisheries combined) on these stock groups needed to be substantially reduced in 1997.

An exploitation rate range of 20% to 25% on Strait of Georgia coho stocks and a total mortality range of 270,000 to 341,000 in southern B.C. fisheries were established to conserve wild coho stocks in 1997. This compares with an exploitation rate of 60% and a total catch of 1.0 million coho in 1996. Prior to 1995, exploitation rate averaged 70% to 80% annually and prior to 1993, total catch almost always was within the 2.5 to 3.5 million range. Analysis of 1997 tagging data indicate that exploitation rates will likely vary within a range of 20 to 40%. Most individual coho stocks experienced exploitation rates between 25-35% in 1997 and marine survival rates varied within the range of 1 to 6%.

Spawning returns to the west coast of Vancouver Island streams were much improved over the disastrous returns in 1994. Good freshwater and near average marine survival rates and much reduced fishing impacts are believed to be the main reasons for this improvement. Although spawner levels appear to still be less than average they represent significant progress to rebuilding of the 1994 brood-line (coho in southern B.C. generally have a 3-year life cycle).

Spawner levels on the east coast of Vancouver Island were generally improved over the very low 1996 returns but remained well below levels observed in the late 1980's. Black Creek, the wild indicator stock for this area had a spawning escapement of approximately 1,200 fish in 1997 compared to 147 in 1996 and an average of 3,598

from 1985 to 1989. Returns to Johnstone Strait and Sunshine Coast streams were poor while the lower Fraser River appeared to have fair returns based on estimates for two indicator stocks, the Upper Pitt and Salmon (at Langley) rivers. Returns to both lower Fraser indicators were better than 1996 and the 1994 brood year.

Total returns and spawning escapements of coho in the North and South Thompson Rivers have declined to record low levels over the last ten years. The number of streams in which no coho were observed has also increased during this period indicating that a number of populations are at critically low levels. A recent analysis (PSARC Advisory Document 98-3 (Appendix 5.6.3) also indicates that Thompson coho populations are generally well below levels required to fully seed freshwater habitats.

The outlook for coho returns to southern B.C. in 1998 is poor. Marine survival rates continued at the very low recent levels (1% to 6%) in 1997. Forecasts for marine survival and abundance (PSARC Advisory Document 98-2, (Appendix 5.6.1)) indicate that the low marine survival pattern will likely continue in 1998 and that coho abundance in 1998 might be similar to 1997 levels. The actual abundance in 1997 was about one-half the abundance which was forecast, and given the poor spawner levels for many areas in two of the three coho brood-lines (1996, 1997), we should be extremely cautious with the 1998 return.

North Coastal B.C.

There are two wild indicator streams in Statistical Area[1] 3 (Portland/Nass), at the head of Work Channel (Lachmach River) and the other in the lower Nass River (Zolzap Creek). Although escapements to these indicators fell in 1997 to levels about 50% of near-term averages, coho populations in this area appear stable and healthy due to a decade-long period of high marine survival that is now beginning to moderate. Coho in this area are heavily exploited in Alaskan troll and net fisheries but can sustain high levels of exploitation provided that marine survivals do not fall to the low levels seen in the Skeena.

Upper Skeena River

Coho populations throughout most of the upper Skeena (Bear-Sustut, Babine and Bulkley-Morice sub-areas) continue to be severely depressed and heavily exploited, a combination which makes them extremely vulnerable to episodes of poor marine survival. The near-zero ocean survival that appears to have occurred in the 1996 smolt year (1997 returns) has produced a situation in the upper Skeena, particularly the upper Bulkley, the Babine and the high interior, that can only be described as perilous. Coastal populations appear to be more productive and have been stable despite high exploitation rates, probably because of a prolonged period of good marine survival.

[1] Statistical Areas refer to standard areas which have been designated by the Department for fisheries management and assessment purposes.

The status of Skeena coho epitomizes the problems faced in attempting to manage the coho salmon of a large and varied geographic region when nearly all of the exploitation is exerted in mixed-stock ocean fisheries. Although coastal populations may be able to withstand the prevalent exploitation rates even during episodes of relatively poor marine survival, the interior populations clearly cannot.

Lower Skeena River

The escapement index for the lower Skeena, including all streams downstream of Terrace and the Kispiox, shows no trend during the period of decline for upper Skeena coho, but does indicate extremely poor escapement in 1997. This pattern is consistent with escapements seen at the Lachmach River (head of Work Channel) and suggests that the status of coho in the lower Skeena is considerably better than in the upper Skeena.

Areas 5 and 6

The information available on coho stock status for areas to the south of the Skeena is largely limited to the Department's time series of visual escapement counts. Because of changes in the numbers of systems enumerated, and in the intensity and timing of enumeration visual counts must be treated cautiously. However, these data indicate that escapements have been decreasing since the early 1970's in both statistical areas. The visual count information is consistent with verbal reports from local guides and fishermen that coho are disappearing from many streams in the southern parts of Area 6. Escapement counts in Area 5 were trending strongly downward as well but only one stream was enumerated in 1997 and none were enumerated in either 1995 or 1996.

Areas 7 through 10

The status of coho throughout much of the Central Coast is uncertain. In Statistical Areas 7 (Bella Bella) and 8 (Bella Coola) information on coho status is largely restricted to visual escapement counts. The reliability and comparability of these estimates has been affected by decreases in recent years in the number of streams enumerated and by the timing and intensity of surveys. Escapements in Area 7 appear to have fallen to low levels by the mid-1980s but have been stable in the 1990s. Escapements in Area 8 also fell to low levels by the mid-1980s but have been increasing slowly since then. Verbal reports from local residents have suggested that there are localized problems. There are some juvenile survey data from this area which indicate adequate seeding, but these data are limited in coverage.

The only information available for Area 9 (Rivers Inlet) and Area 10 (Smith Inlet) are visual escapement counts. Few streams were enumerated and all counts were terminated in 1990 for Area 9 and in 1992 for Area 10. In both areas escapements had shown no trends until the mid to late 1980s when there may have been a period of relatively low escapement. Verbal accounts from local residents suggest that coho

numbers have declined in these areas but there are no quantitative assessment data available.

Queen Charlotte Islands

The status of coho on the Queen Charlotte Islands is uncertain. Information in most areas is restricted to visual escapement counts. These are highly uncertain on the Islands because of late timing, the inaccessibility of many streams and their highly colored water that makes visual observation difficult. Escapement to streams on the north and northwest coasts of Graham Island (Area 1) was decreasing slowly from high levels in the late 1970's but no streams have been enumerated since 1993. Escapements to west coast streams (Area 2W) have been very low since the mid-1970s and fell to near record low levels in 1997. Escapements to streams on the east coast (Area 2E) have been slowly falling since the late 1970s but as in other areas there have been reductions in the number of streams enumerated and extensive changes in the timing and intensity of counts, making interpretation of escapement records difficult. Escapements to the two wild indicators on the Islands (Chown River in north east Area and the Deena in the central east Area) were about 50% of near-term averages, which was in keeping with poor marine survivals observed in the Skeena and mainland areas to the south of the Skeena.

Northern Transboundary Rivers

The Taku River is the largest producer of coho salmon amongst the transboundary rivers. Total run size estimates have averaged approximately 205,000 coho since 1979 reaching a peak of 443,000 in 1991. There has been a sharp decline in run size since 1994. The stock status of Stikine River coho salmon is poorly understood. Escapement information for Stikine River coho salmon consists of limited aerial survey data collected since 1984 and sporadic test fishery data from 1985. Although escapement counts and estimates show no discernible trend, it is generally believed that coho escapement is depressed in the Stikine River. For the Alsek River, index spawning escapement has been monitored annually since 1976 in the Klukshu River by means of a counting fence. Weir counts have averaged 2,400 over the past decade and there has been a noticeable and increasing trend (a 2-3 fold increase) in the counts since 1976. Little information exists for the status of coho salmon in other areas of the drainage.

3.2 PACIFIC STOCK ASSESSMENT REVIEW COMMITTEE (PSARC) ADVICE SUMMARY

The Pacific Stock Assessment Review Committee (PSARC) consists of several Sub-committees for different species groupings and a common Steering Committee. The PSARC Subcommittees and Steering Committee are comprised mainly of the Department's staff but also may include some members external to the Department, including representatives from the Province government. These PSARC committees meet formally several times every year to review scientific working papers which provide advice on stock assessments. Working papers are prepared by Fisheries and Oceans Canada staff, or in some cases are submitted to PSARC by other independent people or agencies. Each working paper is considered by PSARC through an open peer review process, and on the basis of the perceived scientific validity and merit of the working paper and stock assessment advice provided, each paper is either accepted by PSARC, accepted after required revisions are made, or rejected. At the conclusion of each PSARC meeting a PSARC Advisory Document is produced which summarizes the results of that meeting and the stock assessment advice which has been accepted by PSARC. These PSARC Advisory documents are published within a few weeks after each meeting and are public documents which are broadly distributed.

The PSARC Advisory Documents from the most recent meetings held in 1997 and 1998 (Appendix 5.6) have highlighted the poor status and very low expected coho returns to the upper Skeena River and to the Strait of Georgia/Fraser River areas in 1998. The following excerpts from the most recent PSARC Advisory Document (98-3) illustrates the grave conservation status of upper Skeena and Thompson River coho and the status of other coho stocks in the view of the PSARC Salmon Subcommittee.

> <u>"Concerns over Coho Stock Status"</u>
>
> "The (salmon) Subcommittee recommends that extreme caution be used in 1998 Pacific fisheries that encounter coho salmon. Upper Skeena and Thompson coho are extremely depressed and under the current climatic regime are expected to continue to decline even in the absence of fishing mortality. Since extinction risk increases exponentially with decreasing population size, the Subcommittee advises that the risks associated with fishing mortality are substantial. Although the magnitude of the risk cannot be precisely quantified, the Subcommittee is certain both that the risk will increase as population sizes fall below their already very low levels and that the need for corrective action will increase correspondingly.
>
> "The status of the Strait of Georgia and lower Fraser aggregate is also deteriorating due to continuing poor marine survivals. With current forecasts of continuing poor marine survival, fishing mortality will delay recovery. Although depressed, stocks in this area are not yet at the critically low levels prevalent in

the interior, the Subcommittee emphasizes that the necessary corrective actions will become more stringent as populations decline and that the likelihood of their success will fall. The Subcommittee therefore advises that extreme caution is warranted for this stock aggregate."

"For the west coast Vancouver Island aggregate, the Subcommittee advises that exploitation rates less than 30% are required to ensure that escapements to most streams will reach tentative, desired conservation levels of more than 3 females/km."

"For the lower Skeena aggregate the Subcommittee notes that although at 1997 exploitation rates (50%-60%) most streams would be expected to meet tentative, desired conservation levels of 3 females/km, similar forecasts for 1997 failed to predict the observed recruitment failure. Thus the Subcommittee advises that this forecast be treated cautiously."

The following is part of the PSARC Steering Committee assessment of the Salmon Subcommittee advice (98-3):

"The PSARC Steering Committee advises the application of extreme caution in applying forecasts of coho abundance in 1998. Recent trends in marine survival have been below forecasts and marine conditions during 1997 were exceptionally poor. The returns to many wild coho populations for 1998 are expected to be below 3 females/km and 2 major stock aggregates are at critical conservation levels."

"The Steering Committee advises that the Upper Skeena and Thompson River coho stock aggregates are extremely depressed, will continue to decline in the absence of any fishing mortality under current marine survival conditions, and that some individual spawning populations are at high risk of biological extinction."

"The Steering Committee advises that the majority of coho streams in the Strait of Georgia and Lower Fraser River will not reach 3 females/km in 1998 even in the absence of fishing mortality. This stock aggregate is deteriorating rapidly under current marine survival conditions and extreme caution is warranted for this stock aggregate."

"Similarly, under the anticipated low marine survival, many WCVI coho streams are not expected to achieve 3 females/km even in the absence of fishing mortality. In particular, conservation concerns were noted for Statistical Areas 21 and 22."

"The status of Central Coast coho is uncertain although potential conservation concerns have been identified in Statistical Areas 5 and 6."

> “Spawning escapement in the Babine Lake coho aggregate has declined from a range of 20,000 to 100,000 coho in the mid 1960s to 469 in 1997 (i.e. less than 1% of the historical average). In terms of females/km these numbers translate to approximately 25 females/km in the 1960s, 3 females/km in 1990-1996 period, and 0.3 females/km in 1997.”
>
> “In the Upper Skeena coho stock aggregate, 40% of the streams are not expected to achieve one female per km in 1998.”
>
> “The Steering Committee agrees with the Subcommittee recommendations that if marine survival does not improve, populations will likely continue to decline even in the absence of fishing mortality. Risk of extinction increases exponentially with decline in populations size.”
>
> “The Steering Committee is concerned about the very warm ocean waters that juvenile coho entered in 1997 (at least 3 Standard Deviations above average temperature). These are the fish that will return in 1998.”
>
> “The Steering Committee notes that the total returns and spawning escapement of coho in the North and South Thompson River have declined to record low levels over the last 10 years.”
>
> “The Steering Committee also notes that there has been a decline in the reproductive potential of Thompson coho. In 1997 there was a preponderance of males in the escapement, and a decline in the average size of females and their associated fecundity.”

“The Steering Committee also noted that:

- Coho salmon populations of the Thompson River drainage have been declining at a rate of 50-70% per generation since 1988.
- Escapements to the enhanced Eagle and Salmon River populations have declined to 1-2% of the 1988 escapement levels.
- Many streams have declined to ”no observed” (spawners) status within three generations (1988-1997).
- The cause of the decline is a combination of poor marine survival and overfishing. A full assessment of freshwater survival has not been completed.
- This information points to a conservation crisis that includes substantial risk of biological extinction.
- Fishing mortality will increase the rates of decline in these populations and will increase the risks of extinction.”

3.3 CONSULTATIONS

3.3.1 PROCESS

A multi-stakeholder Coho Summit Meeting was held in Vancouver on February 26 1998, to outline the scope of the coho crisis and to seek direction on how to secure the participation and advice from a broad array of interest groups. As a result, a strategy was developed based on the following principles:

- Ensure equal opportunity to participate and to access information
- Ensure that specific consultation objectives are clear by identifying what issues and questions need to be addressed, and what is to happen to the information provided.
- Ensure that the entire process is well documented and communicated to the public.

3.3.1.1 Focused Consultation Meetings

Fifty-four formal consultation meetings (Appendix 5.5.2) were held to solicit input on the development of a comprehensive coho plan.

	North Coast	South Coast/ Fraser River
FIRST NATIONS:	10	15
PUBLIC*:	5	2
RECREATIONAL:	7	4
COMMERCIAL:	4	7
	26	28

*Included Communities, Environmental and Non-Government Organizations, and the Public

Numerous additional meetings with First Nations and other interest groups occurred where the coho issue was included on already full consultation agendas. In response to identified questions and issues, numerous written briefs were also received.

3.3.1.2 Final Coho Summit Meetings

Final multi-stakeholder meetings were held in Prince Rupert (April 25) and in Vancouver (April 27) with attendance of approximately 100 and 150 respectively (Appendix 5.5.2). The goal of these meetings was to summarize to all participants the messages and advice that the Department had received through the focused consultation meetings, check for accuracy or additions, identify major areas of agreement and to note alternate views in the advice provided.

3.3.2 INFORMATION PROVIDED

- A “1998 COHO BACKGROUNDER” (Appendix 5.4.1) was distributed on March 30, 1998, to over 6500 individuals and sector representatives, including; all First Nations, commercial salmon licence-holders, environmental organizations and non-governmental groups, recreational licence vendors, fishing lodge-owners, local governments and others.

- This was followed by a more targeted distribution (over 2500 copies) of a subsequent package of additional information on April 3, 1998 (Appendix 5.4.2) which included PSARC papers, habitat reports etc.

- Additional information distributed to those directly involved in consultation meetings included a series of questions and issues upon which specific feedback was requested.

- An internet site (http://www.pac.dfo.ca/pac/comm/pages/cohoresponse/cohoresp.htm) was established to ensure that all information distributed, or provided throughout the consultation process and current summaries of all consultation meetings was readily available to all interested people. Feedback to the Department regarding this site was very positive, with numerous requests for this tool to be extended to cover all fisheries issues on an ongoing basis.

3.3.3 ADVICE RECEIVED

The following is a summary of advice received from the consultation process. This summary was presented at multi-stakeholder coho summit meetings in Vancouver on April 27th and Prince Rupert on April 25th. A summary of key points from these two meetings are provided at the end of this section.

This part is presented in two sections, north coast and south coast. They are presented separately since advice received differed between areas, reflecting geographical and other differences.

3.3.3.1 North Coast

First Nations Summary

- Habitat Restoration projects must be continued or expanded.
- Existing coho enhancement must continue or be expanded.
- First Nations are interested in taking a more active role in the Department's stock assessment work.
- Increase in number of indicator stocks is needed for coho.
- Growing concern over catch and release fisheries is being expressed.
- From Skeena River First Nations - fisheries must move to more terminal areas to allow more selectivity and reduce or eliminate mixed stock fisheries

Commercial Summary

- Strong, repeated advice that recreational fishing must be shut down if commercial fishing is closed.
- Strong endorsement for enhancement of salmon.
- Habitat issues need to be addressed.
- The Department must set goals and objectives, complete with a timeline for meeting them, so a rebuilding rate for coho can be established. The rebuilding strategy must be clear to everyone, and the "goal posts" must not be continually changing.
- Commercial exploitation rate of coho must be set to enable the industry to catch the available surplus of sockeye and pink salmon. It is advised that this rate be the average of the past 10 years (1987-96).
- The Department must then set the short term commercial exploitation rate depending on what rebuilding rate the Department decides upon. However, once the runs are rebuilt to levels established in the rebuilding strategy, then the commercial exploitation rate must revert to the 1987-96 average.
- Once the exploitation rate is set, a commercial fishing plan can be developed that maximizes catch of target species and still stays within the specified exploitation rate.

- The Department must provide observers for the commercial fleet, to establish the correct coho encounter rate in various restricted fisheries.
- Recreational creel survey in Areas 3/4/5 must be re-established.
- Seal predation is a major problem.

Recreational Summary

- The conservation concern for coho is real and immediate steps need to be taken to address it.
- Strong endorsement for habitat protection.
- The need for more enforcement officers was frequently mentioned.
- More effective monitoring of commercial fisheries is required with respect to coho conservation actions.
- Any enhancement actions should be geared towards improving natural habitat and stream rehabilitation, with hatchery enhancement used only in specific cases.
- In-season management: the Department must realize that we need stability in our fishery. Any in-season changes must be implemented only in an absolute emergency.

Communities, Environmental and Non-Government Organizations, and the Public

- Habitat issues need to be addressed properly.
- Enhancement of some type should be examined, for instance habitat improvement (not unanimous, but mentioned frequently).
- Decisions on fishing restrictions must be balanced with economic loss - some form of compensation to fishermen should be considered if fisheries are closed (mentioned by municipal governments)
- Monitoring and enforcement of habitat and all fisheries should be increased.
- Seal predation is thought to be a huge problem.
- Fishery restrictions should be shared equally by all sectors.
- More assessment work needs to be carried out (i.e. more indicator streams).

3.3.3.2 South Coast

First Nations Summary

NOTE: this advice represents the general information provided by those Bands/groups which consulted with the Department and should not be considered to represent the views of all First Nations in southern B.C. The majority of specific advice was received from Fraser River Bands. Two written briefs and many oral presentations were received.

Meetings were held on a Band, Tribal Council, Watershed or organizational level, and were either specifically for coho consultation or coho was an agenda item.

Conservation

- First Nations recognize the serious state of south coast coho stocks and are committed to participate in conservation measures needed for recovery of these stocks.
- First Nations have an aboriginal and constitutional entitlement to coho for food, social and ceremonial purposes; and they contend that Fraser River Indian Bands' coho needs are currently not being met.
- Fraser River Indian Bands have made significant sacrifices for coho conservation ranging from reduced allocations and fishing time to complete cessation of fishing which has also impacted their entitlement to other salmon species; they are only prepared to continue with these arrangements if other sectors cease their fishing on coho stocks.

Forecast Level

- First Nations believe that due to the precarious state of coho stocks that the most conservative run size forecasts should be used and recommend use of the 90% probability level for both inside and outside stocks.

Exploitation Rate

- South coast coho should be managed for Thompson coho stocks which are in an endangered state.
- There should be no directed fisheries on coho salmon except in terminal areas where surpluses can be identified or when fishing times for other species can be scheduled when coho are not present.
- All Canadian fisheries should be managed to zero or near zero exploitation rates and selective methods which allow release of coho unharmed should be encouraged in commercial and aboriginal fisheries.

Total Allowable Mortality (TAM)

Fraser First Nations are opposed to TAM's as all fisheries should be managed to minimize or eliminate coho by-catches, and as such, there should be no transferability of TAM's.

Selective Mark Coho Fisheries

- Fraser First Nations are opposed to these directed coho sport fisheries in areas where Thompson coho may be intercepted as the associated catch and release mortality on wild stocks is unacceptable due to the extremely threatened status of wild coho and particularly Thompson coho.

Catch Monitoring

- Fraser First Nations are recommending improved catch monitoring in commercial and recreational fisheries.

Habitat and Enhancement

- Fraser First Nations expressed concern over continued habitat loss both in the Thompson and on the lower Fraser; they fully supported the draft Habitat Action Plan and the need for continued protection, enforcement and rehabilitation of lost habitat.
- Enhancement was generally supported as a tool for rehabilitating weak coho stocks and some First Nations are advocating transplant of fry to now barren fish habitat.
- First Nations are anxious to continue to participate in enhancement and habitat restoration activities.

Other

Recommendations were received to:

- Form a public, joint technical process that will forecast Thompson coho mortalities by time, area and fishery (including impacts of aboriginal fisheries).
- Form a joint public Management Board that will, based on advice from the proposed technical committee, establish maximum allowable coho impacts for each fishery, develop monitoring programs and oversee a post-season review.

Commercial Sector Summary

Stock Forecasts

- Recognize severity of problem; generally support need to conserve coho.

- Provided advice based on 278k inside; 176k outside forecasts.
- Concerned that there is no in-season method to estimate actual abundance.

Exploitation Rate

- No specific exploitation rate suggested, but believe there are opportunities to harvest target species.
- Hard to provide input to potential fishing plans without exploitation rate.
- Can design commercial fisheries which provide protection to stocks of concern.

Catch Monitoring

- Support for more comprehensive catch monitoring programs (all species)
    - all fleets have to be on the same level.
    - fleets to work together cooperatively.
    - no confidence in sport creel surveys; need to be more comprehensive and identify release mortalities
- Want more enforcement in recreational fishery, especially the coho grilse (juvenile "blueback") fishery or else close the recreational coho fishery entirely

In-season Management

- No TAM management advice; want to discuss after Ministers announcement.
- Recommended utilizing different approaches such as:
    - time and area closures
    - hot spot closures
    - daylight fishing
    - education to fishermen (pamphlet and video) to reduce coho mortalities
    - yellow line/red line approaches
    - "front end" load sockeye fisheries in August
    - resuscitation boxes
    - brailing, sorting and proper use of seine stern ramps
    - test fisheries prior to opening a fishery to determine coho presence (e.g. Mainland pink)

- San Juan sockeye net fisheries, Fraser River sockeye gillnet fisheries in September and WCVI troll fisheries for chinook are problematic, but don't dismiss without further analysis.
- Utilize all low risk options (e.g. Barkley Sound sockeye, St. of Georgia chinook)

Habitat and Enhancement

- The Department has done poor job of protecting habitat; need to reverse this trend.
- Need financial commitment to do habitat enhancement/restoration work.
- Enhancement has role in stock rebuilding; this alone is not the answer.

Other

- Seals a problem, need control program.
- Sport fishery is the largest harvester; actions are required to lower harvest rates.
- Atlantic salmon farms are part of the marine survival problem.
- Belief that the Department's lack of action has led to the current conservation problems.
- Interest in potential buy back programs, standing licenses down for 1 or more years and compensation for not fishing

Recreational Sector

Stock Forecasts

- Recognize severity of problem; support need to conserve.
- Questioned conservative forecast for abundance inside; will work with estimate.
- Concerned that no in-season method to estimate actual abundance.

Exploitation Rate

- Work in the 10 to 15% range; believe opportunities are available within conservation limits (same as commercial view expressed at the multi-stakeholder meeting)
- Higher exploitation rates on hatchery stocks and in some terminal areas.

Catch Monitoring

- Support for more comprehensive catch monitoring program.
- Expand creel programs (e.g. Johnstone strait)
- Want more monitoring and enforcement of commercial fisheries, particularly non-retention fisheries (both seine and troll).

In-season Management

- Work with two main guidelines
    a) Maintain 2 coho per day limit (wild and marked options)
    b) Endorse selective mark fisheries
- Implement selective mark fisheries on SWCVI (outer Barkley Sound to Victoria), Fraser River and other areas as appropriate.
- Permit retention of wild coho in fisheries in other areas.

Habitat and Enhancement

- No specific advice, but support any efforts related to habitat enhancement, and restoration work.
- Enhancement has role in stock rebuilding; this alone is not the answer.

Sport Fish Advisory Board Proposal

The South Coast Sport Fish Advisory Board recommended an approach of conducting a combination of selective mark and wild coho retention fisheries. This approach would include:

- Maintain a 2 coho per day limit (wild and marked fish options)
- A selective mark fishery on SWVI (outer Barkley Sound to Victoria), Fraser River mainstem after October 10 (non-retention prior to this time) and other areas as needed.
- Retention of wild coho in all other areas

This plan would result in estimated total coho mortalities of 51,272 in 1998, including 28,773 coho from inside Strait of Georgia stocks, of which 13,594 would be wild coho. (Appendix 5.5.1).

Some independent anglers were advocating a ban on the use of bait, or complete non-retention of coho in areas where inside stocks of concern were prevalent.

Other

- 1996 chinook management plan had profound negative impacts on B.C. sport fishery.
- Work with the Department within required conservation guidelines to conduct a responsible fishery to preserve the future of the fishery.

Communities, Environmental and Non-Government Organizations, and the Public

The following represents advice from a group with a wide range of interests and perspectives, including: volunteers, stream-keepers, local hatchery and enhancement group, environmental activists, community organizations, local government representatives, and the general public.

Advise was received from this very diverse group in a number of ways. Many attended the sector and multi-stakeholder meetings, some provided written submissions (Appendix 5.5.1) and others sent advice by the internet. All meeting notes and communications were analysed by the Coho Response Team and the results are summarized below.

General

- Strong appreciation for specifically being included in consultation process this time
- Believe they have very important role and contribution to make

Stock forecasts

- Most advised that the Department should use conservative or most conservative estimate of coho abundance (Kamloops meeting unanimously recommended 90% probability level for forecasts).

Exploitation rate

- Range of opinions; most advised 0% exploitation rate and no directed fisheries**.**
- Some advised as close to 0% exploitation rate as possible.
- Others advised up to 10% exploitation rate to protect jobs and preserve economic value of fisheries for other salmon species**.**
- Many advised that the Department should manage 1998 fisheries to protect Thompson coho

Catch monitoring

- Broad support for improving catch monitoring
- Some suggested if any fisheries allowed, all must be monitored with full observer coverage

In-season Management

- No or little support for coho selective mark fishery
- Some suggested complete moratorium on coho fishing, for as long as is required to rebuild stocks
- Others advised only directed fishery could be recreational catch and release with only artificial lures (no bait)
- District of North Vancouver passed unanimously the motion that:
    1. the Department be urged to undertake whatever measures necessary to protect coho salmon including conservation measures and closure of the commercial and recreational coho fisheries
    2. volunteer groups be encouraged to undertake stream restoration
    3. enforcement of the Environmental Protection and Preservation Bylaw continue and Best Management Practices be implemented in District operations

Habitat and Enhancement

- Broad support for increased habitat protection and restoration
- Mixed support for direct enhancement (hatcheries) and “Quickstart”
- Many cautioned enhancement alone will not solve problem
- Some advised against any enhancement of very weak stocks due to genetic concerns

Other

- Frequently commented that the Department needed to ensure scientific advice was kept impartial and separate from other management issues and decisions
- Must ensure entire process remains transparent
- Advised that Minister provide detailed rationale to support and justify final decisions
- Strong support for broad distribution of information from the Department and for the Department internet site
- Need increased communication and awareness of general public of coho problem on on-going basis
- Suggested use of facilitator at these types of consultation meetings
- Advised to increase stock assessment, especially in mainland inlet systems
- Advised the Department to encourage Province to further strengthen and tighten up Forest Practices Code
- Advised the Department to give credence to on-the-ground or anecdotal information from volunteers
- Ottawa should recognize and not deny the “human face of the coho crisis”
- Coastal Community Network recommended 3-5 year Federal Fishing Community Investment Strategy

3.3.3.3 Agreement Or Consensus And Alternate Views In Advice Provided

The CRT reviewed all the advice provided to the Department and the following section summarizes those areas where there was agreement or consensus in this advice, and also where there were alternate views on what should be done to address the concerns for conservation of coho in 1998 and beyond. The summary of areas of agreement below is divided into separate parts for the north coast and south coast of B.C., because the problems, issues and possible approaches recommended by the advisors are somewhat different for these two geographical areas.

3.3.3.3.1 Agreement Or Consensus In Advice Provided From North Coast

- There was agreement that the coho problem is real, and the Department needs to deal with it (fix it).
- Improved habitat protection was emphasized everywhere.
- More enforcement and monitoring needs to be done, and was stated on a regular basis. This applies to habitat as well as the various fisheries.
- Increase in the number of indicator stocks. This was stated by a large number of groups.
- Compensation was mentioned a number of times, at various meetings.
- Commercial meetings strongly advised enhancement, expressed as well in the environmental and governmental meetings, and First Nations meetings, although not unanimously.
- Seal predation was mentioned often

3.3.3.3.2 Agreement Or Consensus In Advice Provided From South Coast

- Unanimous support for improved habitat protection, restoration and enforcement
- Agreement **in principle** by most groups that stringent fishery management measures are required in 1998 to deal with the coho conservation problem
- Acceptance by most groups that the short-term prognosis for coho is poor
- General (but not unanimous), agreement that we have serious coho conservation problems in some areas
- General support for improving knowledge of coho abundance, distribution and run timing
- Wide support for more monitoring & enforcement of fisheries
- Wide (but not unanimous) concern over seal predation of coho

- Wide support for need to improve stock assessments, especially for escapement monitoring and key stream or index systems, with focus on areas where current information is particularly poor (e.g. central coast, mainland inlets of the Strait of Georgia)

- General agreement that need much better stock composition information for assessment and management planning purposes - general support for DNA sampling program in this regard

- Many groups advised there was a need for more Fishery Officers

3.3.3.3.3 Alternate Views In Advice Provided For North And South Coasts

- Some groups were critical of the reliability and scope of information used to support the Department's statements of coho conservation concerns

- Some asserted that assessment information was so unreliable and sparse as to be unbelievable and unreliable, and that there were actually no conservation concerns at all

- Numerous criticisms of the Department's monitoring of catch and fishing-related mortalities

- Release mortality estimates were criticized by some groups as being too low in certain fisheries

- Other groups suggested the inclusion of all mortalities due to fishing in the Department's estimates, not just those in the final ocean year (e.g. juvenile release mortality by all gear types, seal predation facilitated by hooking and hook injury)

- Strong disagreements over the relative roles that the various sectors (troll, net, recreational, aboriginal) had played in the apparent declines and should now play in recovery plans

- Wide disagreement about how risk averse to be in managing mixed-stock fisheries.

- Disagreement over the Department's ability to address conservation concerns through intensified management. Some commercial groups and some sport fishermen want in-season and stock-specific abundance indicators and management designed to respond to presence/absence of stocks of concern. Other groups want strong conservation measures taken without in-season adjustments

- Considerable disagreement over the relative importance of habitat loss and over-fishing, and consequently general criticism of the Department for its inability to be definitive on those roles

Details of the all of the advice received from stakeholders and interested parties are provided in (Appendix 5.5) of this report, which includes summaries for each of the consultation meetings attended and also the written submissions received by the Coho Response Team.

4. SCENARIOS AND POTENTIAL ACTIONS

4.1 FISHERIES MANAGEMENT

Recognizing that the scientific advice indicates severe concerns for conservation of coho in 1998, and that extreme caution should be used in 1998 fisheries that encounter coho, the advice provided to the Department in the consultations with First Nations, stakeholders, and other interest groups generally recommended the exploitation rate of coho should be substantially reduced in 1998, to within a range of 0% to 10% in southern B.C., and 0% to 6% in northern B.C. However, any exploitation rate above 0% requires decisions on allocation of coho catches or coho mortalities between the various fishing sectors. Any exploitation rate greater than 0% could be achieved in many different ways, each of which could result in dramatic changes to each fishery compared to previous years.

Unfortunately there was no agreement or even consensus among the fishing sectors on how these allocations should be made in 1998. For the purpose of further discussion, and to provide an idea of what fishing plans would be required to achieve the exploitation rates in these ranges, the following theoretical scenarios were developed.

4.1.1 SOUTH COAST FISHERIES MANAGEMENT SCENARIOS

In the South Coast, coho salmon are harvested by First Nations, commercial and recreational fisheries in the Strait of Georgia, Johnstone Strait, the West Coast of Vancouver Island (WCVI) and in the Fraser River. Since 1989, progressive management measures to reduce the exploitation rate on South Coast coho stocks have been taken. A chronology of management actions taken to conserve coho provides a history of actions taken in the past (Appendix 5.2)**.** These measures have been increasingly more severe in the past two years, but as recently as 1996, over one million coho were harvested in South Coast fisheries. Beginning in 1997 there were no targeted commercial fisheries for coho, however, the recreational fishery was allowed to retain a reduced daily limit of coho.

Due to a number of factors, South Coast coho stocks have reached a critical level, particularly Thompson River stocks. A series of comprehensive management measures are now required to reverse this trend and rebuild stocks. Coho stocks can be effectively rebuilt only through the co-ordinated actions of all fishing sectors, more favourable marine survival conditions and careful stewardship and restoration of habitat. The wide distribution of coho stocks, and the sequential nature of many of the fisheries involved in their harvest, mean that management measures taken in one fishery need to be complemented by measures in adjacent fisheries if more fish are to reach the spawning grounds.

Generally First Nations, stakeholders and other interest groups in southern B.C. advised the Department to develop tentative fishing plans for 1998 based on total

exploitation rates of wild coho ranging from 0% to 10%. For the purpose of further discussion, and to provide an idea of what fishing plans would be required to achieve the exploitation rates in this range, the following two theoretical scenarios were developed to illustrate the potential management actions which might be required to achieve 0% and 10% exploitation rates:

SCENARIO #1: ZERO MORTALITY OF WILD COHO The objective of this management action would be to achieve zero fishing mortality of all wild coho stocks for the entire season. The overall coho exploitation rate would be almost 0%. This management action would provide maximum possible protection to all coho stocks in southern B.C.

Potential Management Actions:

First Nations: No First Nations fisheries anywhere in the marine coastal waters of south coast B.C. Some limited First Nations fisheries (food, social and ceremonial only; no pilot sales fisheries) would be permitted in a few terminal areas, subject to close monitoring to detect any incidental catches of coho. When coho were detected these fisheries would also be completely closed. For example, these terminal opportunities might include a fishery at the mouth of the Nimpkish River, very early season sockeye fisheries in the Fraser River, Somass River and other such terminal areas before coho are present.

There might also be some opportunities for First Nations to harvest hatchery coho in extreme terminal areas under Excess Salmon to Spawning Requirements (ESSR) to meet food, social and ceremonial needs. However, these fisheries would only be permitted in cases where there would be no incidental catch of wild coho.

Commercial Sector: No net or troll fisheries anywhere in the South Coast.

Recreational Sector: No recreational fisheries for any salmon species would be possible anywhere in the South Coast. The only possible exceptions might be very localised fisheries in terminal areas targeted on surplus hatchery coho (e.g. Chilliwack, Chehalis and Capilano Rivers), when there was no possibility of encountering wild coho.

SCENARIO #2: 10% EXPLOITATION RATE OF SOUTHERN B.C. COHO

This scenario would allow fisheries to be conducted by all sectors. All fisheries would be managed to a coho Total Allowable Mortality (TAM) ceiling, similar to the management approach in 1997. It would allow First Nations fisheries to operate as they did in 1997, recreational fisheries to be conducted largely according to the plan

proposed by the SFAB for 1998 (with some modifications) and commercial fisheries to operate according to a very stringent set of measures to conserve coho.

Potential Management Actions:

First Nations: First Nations fisheries would proceed as they did in 1997 (this would include closures in the Upper Thompson system where conservation measures would still be required to conserve coho in terminal areas).

Pilot Sales could be permitted on both the Fraser and Somass Rivers subject to coho by-catch measures in both areas.

Commercial: No troll fisheries for:

- Fraser sockeye on the WCVI (Area G).
- chinook on the WCVI (Area G)
- chinook in the Strait of Georgia (Area H)

- No net fisheries for Fraser sockeye in San Juan (Area B & E)
- Net and troll fisheries could be conducted for:
  - Fraser sockeye in Johnstone Strait (Area B, D, G & H).
  - Somass sockeye in Barkley Sound if surpluses available (Area D & G).
  - Fraser sockeye in Area 29 with fisheries operating off the mouth until the third week of August or in the river until the fourth week of August subject to monitoring to detect movement of coho into the Fraser River
  - non-retention of coho by seine and troll, using brailing and sorting by seine fisheries in all cases where this is possible.
  - Nitinat chum (Area B, E & G).
  - Nootka chum (Area D & G).
  - Mainland pink if surpluses are available (Area B, D & H).
  - Johnstone Strait, Georgia Strait, and lower Fraser River chum if surpluses are available (Area B, D, E, H).

This scenario assumes a high diversion rate (>75%) of Fraser sockeye through Johnstone Strait. If diversion was high to the outside instead, management approaches to harvest Area D and Area G allocations would have to be revised and given priority as these fishermen would not have the ability to move to the mouth of the Fraser River to fish. If there was a high outside diversion Area B seines would have to attempt to harvest most of their catch off the mouth of the Fraser River. WCVI, Johnstone/Georgia Strait and Lower Fraser chum fisheries may have to be delayed. Mainland pink opportunities may have to be foregone if coho encounters are too high.

Recreational Sector: This scenario would require non-retention of coho throughout the area from Juan de Fuca Strait to outer Barkley Sound, in the

Strait of Georgia and Fraser mainstem, with a ban on the use of bait in the Fraser River.

A limit of 2 coho/day would be permitted in northwest Vancouver Island, Johnstone Strait and terminal hatchery areas.

4.1.2 NORTH COAST FISHERIES MANAGEMENT SCENARIOS

North Coast coho salmon are harvested in First Nations, commercial and recreational fisheries from Dixon Entrance in the north through to Queen Charlotte Strait at the north tip of Vancouver Island in the south. In addition, First Nations and recreational fisheries occur in the all major river systems (Nass, Skeena, Kitimat and Bella Coola).

Beginning in the early 1980s management actions were initiated to address bycatch concerns for Upper Skeena coho and other non-target species. A chronology of management actions taken to conserve coho provides a history of actions taken in the past (Appendix 5.2).

In the late 1980s net fishing times in the Area 4 gillnet fishery were reduced in August during the peak timing of upper Skeena coho stocks. Also at this time trolling in Area 4 and some of the approach areas was closed for specified periods of time when stocks of concern were most abundant. As upper Skeena coho escapements continued to decline through the 1990s actions implemented have continued to expand and now include all harvesters of these stocks with the only exception being commercial, recreational and native fisheries in southeast Alaska.

In 1997 upper Skeena coho stocks reached a critically low level resulting in a complete closure of the Areas 3, 4 and 5 gillnet fisheries on July 31, the earliest date on record. Troll closures were progressively increased during August eventually ending with a complete closure on September 1 from Dixon Entrance through Area 5, and from 101 through 105. In addition the recreational fishery operating in tidal waters experienced daily bag/possession limit reductions from 4/8 to 2/4 in mid-August.

Indications are that marine survival was extremely low in 1997; however the primary problem with upper Skeena coho stocks is a combined exploitation rate in the Canadian and Alaskan fisheries which is much higher than the lower productivity interior stocks can withstand.

Lower Skeena and other North Coast coho stocks in general are healthier than the upper Skeena stocks. Although they experience similar exploitation rates as upper Skeena stocks they tend to be more productive. However, in 1997 most if not all of these stocks also experienced significantly lower escapement levels than normal. Indications are that marine survivals for these stocks was also well below average.

In 1998 there are serious concerns that the poor marine survival conditions experienced in 1997 may be repeated. In order to prevent a recurrence of the extremely low escapements for all North Coast stocks and the upper Skeena in particular, significant conservation measures need to be implemented in all fisheries in 1998.

Generally First Nations, stakeholders and other interest groups in northern B.C. advised the Department to develop tentative fishing plans for 1998 based on total exploitation rates of wild coho ranging from 0% to 6%. For the purpose of further discussion, the following two theoretical scenarios were developed to illustrate the potential management actions which might be required to achieve 0% and 6% exploitation rates:

SCENARIO #1: ZERO MORTALITY OF WILD COHO

Potential Management Actions:

First Nations: First Nations Food, Social, and Ceremonial (FSC) on the Skeena and approaches would be closed for most of the year. A limited FSC/ESSR fishery could occur at the Babine Fence and in Babine Lake in front of the enhancement facilities of Pinkut Creek and Fulton River.

Commercial Sector: Would require closure of all commercial salmon fishing in the north coast (troll, gillnet, and seine).

Recreational Sector: The recreational fisheries that occur on the north coast would be closed for much of the year, whenever coho are present.

SCENARIO #2: 6% EXPLOITATION RATE OF NORTHERN B.C. COHO

Potential Management Actions:

First Nations: ESSR Pilot sales could either be reduced or eliminated, due to sockeye harvest in the commercial fishery.

Commercial Sector: This scenario would allow for commercial seine and gillnet in all traditional areas, with measures taken to reduce the exploitation rate of coho (i.e., daylight only fisheries, mandatory brail and sort, etc.) to an overall level of about 3%. Troll fishing would take place in a reduced area of the north coast (specifically, west coast Queen Charlotte Islands and Central Coast), with non-retention and non-possession of coho.

Recreational Sector: The large recreational fisheries that occur out of Prince Rupert and on the Skeena would be open and allow for retention of coho at a reduced bag limit of 2 daily, 4 in possession.

4.1.3 POSSIBLE IMPLICATIONS FOR OTHER SALMON SPECIES OF A ZERO FISHING MORTALITY OPTION

Under a zero fishing mortality option it would not be possible to harvest stocks of salmon for which there is a projected surplus in 1998.

4.1.3.1 Escapement Impacts

Should all returning salmon be allowed to spawn, there is the possibility that future production could be reduced due to factors such as over-spawning (i.e. spawners digging up fertilized eggs laid by other spawners) and rearing habitat limitations. There are also potential benefits to many stocks that have been chronically under-seeding in the past or where the optimum spawning level is unknown and requires testing. In these cases future production could be higher under a zero fishing scenario. Furthermore, there may also be benefits of increased productivity due to large contributions of marine-derived nutrients to freshwater ecosystems. The likely impacts of a zero fishing mortality in 1998 on future production are speculated on below, but it should be noted that in all cases where spawning levels might result in lost future production, there are terminal locations where some removal could occur to mitigate these impacts.

4.1.3.1.1 Coastwide Chinook

The estimated response in production to "zero fishing mortality in 1998" is highly speculative given the lack of conclusive data with which to define optimal spawning levels. The Department currently has “interim” escapement goals; however, testing of these goals requires larger escapements that would be facilitated by this 1998 scenario. This could lead to new insights into escapement goals for chinook.

The major benefits would be to the coastal fall chinook stocks and the Thompson summer chinook. The fall runs are likely to benefit, especially the Puntledge and Quinsam/Campbell, Nanaimo, etc. but we should also anticipate some large escapements to some Thompson drainage systems and the Chilliwack white fall chinook run. Reduced fishing mortality would also benefit the Nimpkish, central BC wild chinook, and some areas of the Skeena and Nass rivers.

4.1.3.1.2 Fraser Sockeye

1. Early Stuart/Early Summer - zero fishing option should not result in reduced future production at the forecast levels of 175,000 Early Stuart and 642,000 Early Summer runs.

2. Summer Runs

Forecast return for 1998 is above the interim escapement goal for all Summer groups. Chilko/Quensel forecast is 5.7 million and the interim escapement goal is 3.0 million. Chilko and Quesnel sockeye escapements would exceed previous recorded levels by 35% and 65% (at the 50% probability forecast level) for 1998 under a zero harvest. Both these stocks are showing signs of diminished returns at the high levels of escapements previously observed. The effect on future production is very uncertain and depends on a number of factors. Production losses may occur under average survival conditions and may even be large for Quesnel Lake. Stellako/Late Stuart forecast is 938,000 and the interim escapement goal is 600,000. The upper range policy for escapement has been 30% over the interim goal or 3.9 million and 780,000 for Chilko/Quesnel and Late Stuart/Stellako, respectively. There is some evidence for density dependence on Chilko with production levelling out at escapements over 600,000. Quesnel, on the other hand, is not as clear cut. There would probably be some loss of future production at escapement levels of 5.7 million and 938,000 for Chilko/Quesnel and Late Stuart/Stellako, respectively.

3. Late Runs

The forecast return is for 3.0 million Adams/Shuswap sockeye and the interim escapement goal is 3.5 million. There is some evidence for density dependence, but only based upon 1982 and 1958 brood years. The data point from 1958 is suspect as well. Escapements in the range of 2.0-2.4 million (1954,1978 and 1982) have produced good returns of 9.4 -15.6 million. Escapement levels on the order of 3.0 million would appear to be productive; for example in 1982, and escapement of 3.1 million produced 9.7 million returns. For the Late Run stocks, zero fishing would not result in future production losses at the forecast levels.

4.1.3.1.3 North Coast Sockeye, Pink and Chum

No adverse effects are anticipated beyond the immediate loss of harvest and fishing opportunity. The strongest freshwater compensatory mortality typically occurs in sockeye, especially in the enhanced Babine sockeye run. However, all Skeena sockeye (including Babine), Rivers Inlet sockeye, and Smith Inlet sockeye are forecast to return at levels near or below target escapement, so that the loss of harvest in 1998 would likely be offset entirely, or in large part, by improved freshwater production in the next generation, (i.e., low harvest rates are desirable generally).

We have no reliable information with which to assess the implications of not fishing in 1998 on future pink and chum salmon production. However, very large spawning escapements of these species have occurred in the past, and the resulting stock-recruitment functions are more nearly linear than for species like sockeye or coho, that reside in freshwater as juveniles (i.e., more spawners have on average produced more returns). Again, larger escapements are likely to be beneficial.

4.1.3.1.4 Inside Chum (Strait of Georgia/Johnstone Strait/Fraser River)

The pre-season forecast is for 3.7 million chum returning to inside waters in 1998. Of this total, 1.7 million wild chum are forecast to return to the Fraser River and 1.5 million wild chum for other inside systems, for a total wild return of 3.2 million. Given the declines in marine survival rates experienced in the last four years the forecast may be optimistic.

Looking at past years, there have been wild spawning escapements of about 2.5 million in three years (1985, 1994 and 1996), but an escapement of 3.2 million would be the largest on record. It is uncertain whether this would create a problem for future production? The 1985 return produced about 3.9 million or slightly above the average recruit/spawner. It is too soon to tell what the return rate will be for the other two years of large escapements. Density dependence has been noted in Fraser River chum returns, due mainly to the large 1995 escapement. The 1985 escapement to the Fraser River (the highest level on record) was about 1.2 million. PSARC recommended higher escapement levels be tested to better define the stock-recruit relationship.

From the available information it appears that allowing the total return to spawn in 1998 would not result in serious production losses for inside chum in future years given that the brood will probably experience low marine survival and that there is little if any evidence of density dependent effects at least at spawning sizes up to 2.5 million wild spawners.

4.1.3.1.5 West Coast of Vancouver Island Chum

The Department cannot quantify loss of future production for these stocks since we do not have definitive stock-recruit relationships to project compensatory effects on the spawning grounds/rearing areas/etc. In fact, the lack of evidence for "large" compensatory effects at the expected escapement levels (given the below average runs expected in 1998) under a zero fishing option, would suggest this scenario would provide increased future production and provide useful information on stock-recruitment relationships.

Certainly, projected escapements would not likely exceed the historic range, or in many cases even meet current goals. The greatest potential for "negative" effect on future production would likely be for Nitinat River chum salmon. No fishing could result in a large (4 to 6 times) increase above the target escapement in the river. Compensatory effects would likely occur. Natural stocks near other hatcheries would not be affected to the same extent (e.g. escapements would be near and up to 2 time the escapement goal).

SUMMARY

The four fisheries management scenarios discussed in the previous sections are provided simply to illustrate the potential types of management actions that would be

required to achieve total fishing exploitation rates of coho in the range of 0% to 10% in southern B.C., and 0% to 6% in northern B.C. As noted previously, any exploitation rate greater than 0% could be achieved in many different ways, each of which could result in dramatic changes to each fishery compared to previous years.

Any exploitation rate above 0% also requires decisions to be made on allocation of coho catches or coho mortalities between the various fishing sectors. Unfortunately there was no agreement or even consensus among the fishing sectors on how these allocations should be made in 1998. Therefore, the above management measures should be considered as theoretical approaches only, and do not reflect (and should not be interpreted by the reader as) any decisions or plans which have already been made by the Department for management of the B.C. salmon fisheries in 1998.

The various fisheries management scenarios discussed above are based on the assumption that salmon fisheries would continue in 1998 and future years using the same conventional fishing gears, methods and approaches which have been used in previous years. As the above scenarios illustrate, under this assumption conservation of coho could be achieved mainly only by reducing fishery opportunities.

However, the Department was also advised to consider alternate approaches to fisheries management in 1998 and future years that would ensure conservation of coho (and other salmon species when required), but also allow continued and possibly even increased fishing opportunities. The two alternate approaches which were recommended were Selective Harvesting and Selective Mark fisheries, which are discussed in the following section.

4.1.4 SELECTIVE HARVESTING

4.1.4.1 Introduction

Selective harvesting for the purposes of this discussion refers to methods of selectively harvesting coho by release methods and associated types of fishing gear, including but not limited to, weirs, traps and beach seines. It does not include more traditional fisheries management methods to control troll, seine and gillnet fisheries such as time and area closures. Selective ***mark*** fisheries, the selective retention of marked, mainly hatchery, fish, are discussed separately in this paper.

Management measures in mixed stock fisheries to reduce the incidental catch of coho, chinook and steelhead salmon have usually meant reduced fishing opportunities. Reductions in fishing opportunities can be countered with implementation of more selective harvesting methods. Conservation concerns for less abundant stocks, particularly coho, have increased the need and interest in recent years to move to more selective harvesting methods.

The concept of selective fisheries may, over time, significantly re-shape the way some fisheries are conducted. Recognition by fishermen that fishing opportunities in the absence of selective harvest techniques will likely continue to diminish, has prompted strong creative interest in developing new techniques. Fishing interests have responded with new ideas and proposals for development.

4.1.4.2 Background

Some selective fishing techniques are designed to avoid incidental catch of stocks/species of concern, while non-retention/non-possession requirements in commercial and recreational fisheries are directed at live-release of salmon. Although there is some mortality associated with live-release programs being introduced are intended to ensure release mortality is minimized.

Mortality rates of coho released from existing fisheries are currently estimated to be: recreational 7-15%; troll 31%; gillnet 35-70% (depending on the condition of the fish when released); and seine 20-30% (small sets) or 50% (large sets).

Experimental fisheries such as fishwheels in the Skeena River, an intertidal trap at Sooke, B.C. and the chum tangle nets (“tooth-nets”) and beach seines in the lower Fraser River have been underway for the past couple of seasons with mixed results.

Gillnet fishermen have experimented with net depth, mesh size and hanging ratios, weedlines and mesh type such as the “Alaskan twist.” For example, specifying a lesser depth (gillnet or seine) may reduce the catch of salmon species which may be present

lower in the water column. Gillnet mesh size can be varied to target certain species but there is always an unavoidable bycatch of other species.

Seine fishermen have increasingly practised brailing and sorting of the catch to reduce release mortality, and were regulated to do so in Area 4 in 1997. The introduction of recovery boxes may further aid in the survival of released fish in some net fisheries.

4.1.4.3 Current Status

Building on past successes and discussions with industry representatives during the 1997 post-season reviews on selective harvesting, and with wide recognition of potentially very serious restrictions in the 1998 fishery due to coho conservation concerns, initiatives are well underway to improve and expand the use of selective harvesting methods for the 1998 season.

The Department intends to establish a policy framework which allows for both the technical development of more selective harvesting and the incorporation of these into the fishery.

As part of this initiative, individuals wishing to investigate selective harvesting methods have been invited to submit proposals for the 1998 season. The objectives of the approved pilots will be:

- Development of new or improved selective fishing technology or equipment
- Improved knowledge contributing to more selective fisheries (i.e. fish behavior, harvest timing, location, etc.)
- Contribution to achievement of specific 1998 conservation objectives
- Promotion of partnerships and coordination
- Sensitive to allocation issues

4.1.5 SELECTIVE MARK FISHERIES

4.1.5.1 Introduction

A selective mark fishery is one in which coho with an identifying mark are harvested at a higher rate than unmarked coho. All, or some, of the unmarked fish would be released by fishermen. Unmarked coho would be from wild stocks or hatchery stocks that are rebuilding and not yet abundant enough to permit selective harvest without causing spawner shortages.

There are three essential components in a selective fishery:

- Mass marking of hatchery fish for identification purposes;
- Implementation of regulations defining the catch limits for marked and unmarked fish in specified fisheries; and
- Assessment, including catch and escapement sampling and enumeration for both wild and hatchery stocks.

Selective mark fisheries are effective when a high proportion of unmarked fish survive after being caught and released, and where the marked proportion of fish available to the fishery is high. In some circumstances, where there are serious conservation concerns, a selective mark fishery may not be an option if the number of unmarked fish (i.e. wild) killed due to release mortality is too high.

4.1.5.2 Background

In 1998 two types of mass-marked coho adults will be available in southern British Columbia waters: pelvic clipped fish released from Strait of Georgia/Fraser River hatcheries; and adipose clipped fish from U.S. Puget Sound hatcheries. There will also be a much smaller number of adipose-clipped coho from Canadian hatcheries which have been marked for stock assessment purposes.

Pre-season estimates based on 1997 tagging data suggest that of all the coho present in the Juan de Fuca Strait area approximately 10% will be Canadian pelvic clipped and 5% will be American adipose clipped. A higher proportion of coho in the Strait of Georgia will likely have a pelvic clip but coho abundance in this area is expected to be much lower than in Juan de Fuca Strait.

Thompson River hatchery adipose clipped coho containing a coded wire tag (CWT) which were marked before the decision to mass mark British Columbia hatchery coho with pelvic clips, will be mixed in with the hatchery mass marked fish. The adipose-clipped Thompson River stocks, though hatchery produced, are all (except for Spius Creek) stocks in rebuilding status. Furthermore, selective harvest of these adipose clipped coho will impact on our ability to use the coded-wire tag data to evaluate the

effectiveness of management measures which has been a significant concern of PSARC.

4.1.5.3 Current Status

- In 1998, adipose-marked coho from Washington State hatcheries, and pelvic-clipped coho from Canadian hatcheries will be present in the waters of Juan de Fuca and the west coast of Vancouver Island.
- The recreational fishing community has promoted a selective mark fishery in these and some terminal areas. They are also recommending a pelvic-clip fishery in the Fraser River mainstem.
- First Nations and the environmental community are currently opposed to the implementation of selective mark fisheries. They contend that there will be an unacceptable release mortality of unmarked coho and an unacceptable incidental catch retention of adipose-clipped Thompson River coho (in 1997, with a 2 per/day retention of all coho, approximately 244 adipose-clipped Thompson River coho were caught and retained by recreational fishermen).
- The low ratio of marked fish to unmarked fish, if a selective mark fishery is implemented in 1998, will result in about 6 to 8 coho being released for every one that is allowed to be retained. The number of unmarked coho that are killed depends on the number that are encountered by anglers. If the fishing effort response to the selective fishery is high, as predicted by recreational advisers, then the number of encounters, and therefore the mortality of released coho, would be much higher than in a non-retention fishery. However if fishing effort does not respond significantly then the mortality of unmarked fish in a selective fishery would be only slightly higher than in a non-retention fishery. The expected mortality would also depend on the compliance of anglers to the selective fishery regulations and the accuracy of the estimated 10% mortality rate for coho which are released.
- Currently, regulations define hatchery-marked fish as having any one of a number of fins missing. A regulation change describing hatchery coho as having the pelvic fin missing is being prepared. Implementation of this regulation change may pre-empt opportunities to retain American adipose clipped coho.
- PSARC advises that implementation a selective mark fishery for adipose clipped fish in 1998 may have serious impacts to the CWT data base which could impair stock assessment capabilities in 1998. This, and the conservation concerns noted above, will be the subject of a proposed technical review process involving stakeholders.
- Implementation of a selective mark fishery would require a vigorous and extensive education an awareness campaign coupled with appropriate monitoring and enforcement programs.
- Though there are concerns about coho release mortalities and the impacts on stock assessment in 1998, the selective mark fishery remains a potentially effective management option for the future that will allow the benefits of a viable fishery while conserving wild coho stocks.

4.2 ENFORCEMENT, STOCK ENHANCEMENT AND HABITAT PROTECTION OPTIONS

To develop a plan that would counter the rapid decline in coho abundance, it was recognized early that such a plan, to be successful, must address the issue on a number of fronts beyond harvest management. The Coho Response Team was therefore comprised of a cross-section of experts from within the Department, each representing a different area of expertise. The section below provides potential options from those areas.

4.2.1 ENFORCEMENT

4.2.1.1 Overview

Conservation of coho and protection of coho habitat are two of the Department's highest priorities. In 1998 the Department will improve the monitoring and enforcement of coho fisheries and coho habitat by re-directing patrol resources (Fishery Officers, Canadian Coast Guard (CCG) Marine Enforcement Officers, Aboriginal Fishery Guardians and Charter Patrol Operators) and supplementing patrol resources to focus on coho issues.

Elements of the enforcement plan may include:

- Improving monitoring and enforcement in all fisheries to ensure compliance with the fishing plan;
- Strategically deploying resources and targeting key problem areas;
- Developing rapid-response enforcement strategies, including quickly dispatched and highly mobile enforcement teams utilizing vehicles, patrol vessels, high speed rigid hull inflatable boats, river boats, and aircraft (both fixed-wing and helicopter);
- Utilizing both high-profile and covert enforcement on the water and ashore to address the complex management strategies of the fishing plan, which may include such measures as:
    - brailing and resuscitation boxes in the seine net fisheries
    - reduced limits in the recreational fishery
    - catch reporting and sales slip requirements in commercial fisheries
    - gear restrictions in all fisheries
    - non-retention and closed areas in all fisheries
- Increased coho habitat monitoring and enforcement to address water quality issues and physical habitat degradation caused by urban, industrial, forestry and agricultural activities;
- Cooperative work and arrangements where possible with other agencies such as RCMP, Parks Canada, DND and province of B.C.

4.2.1.1.1 Specific Options for Increasing Coho Enforcement Capability

The following are options that may vary, depending upon what fishing plans are implemented.

Short Term - 1998 Season:

1. Re-assign Fishery Officers, Marine Enforcement Officers, vehicles, vessels and aircraft from other programs or locations (this could include the short term transfer of Fishery Officers from other parts of Canada to Pacific region) to supplement existing coho monitoring and enforcement capability. Note: this action would have a negative impact on the other programs.
2. Reactivate inshore patrol vessels for the peak of the season (June through October) to focus on coho monitoring and enforcement.
3. Reassign Charter Patrol Vessels (CPVs) from other programs or hire additional CPVs to supplement the existing catch and escapement monitoring capability (recognizing that CPVs have limited authority to conduct enforcement).
4. Increase the Department's habitat enforcement presence by creating specialized "Habitat Enforcement Fishery Officers" to focus on areas where coho habitat is under acute pressure from industrial, forestry, urban or agricultural activities (Morice and Thompson systems, and the Lower Mainland, Sunshine Coast and East Coast Vancouver Island).
5. If non-retention seine net fisheries are conducted, "Observers" could assist the Department in monitoring compliance on fishing vessels, on packers and at fish plants. If non-compliance is encountered the Department will need to respond quickly.
6. Utilize Department of National Defence patrol platforms (vessels and helicopters) to enhance the Department's patrol capability.
7. There may be an opportunity to have provincial Conservation Officers work with federal Fishery Officers to enhance coho monitoring and fisheries and habitat enforcement. Under the Canada/B.C. MOU provincial assistance is currently being discussed between Fisheries and Oceans Canada and provincial fisheries agencies to determine ways in which we can jointly increase our effectiveness.

4.2.2 STRATEGIC STOCK ENHANCEMENT AND HABITAT RESTORATION

4.2.2.1 Overview

The enhancement plan includes two components; short-term supplemental enhancement of severely threatened wild stocks, and restoration of habitat. Many coho stocks throughout B. C. have experienced declining abundance and may benefit from stock enhancement and habitat restoration. This plan would focus on enhancement facilities and strategies that could be employed in two of the most seriously affected systems, the Thompson and the Upper Skeena.

4.2.2.2 Supplemental Stock Enhancement

4.2.2.2.1 Background - Existing Enhancement

On average, B.C. hatcheries annually release 9-2 million coho smolts (reared for one year) and 7-11 million coho fry (reared for a few weeks to a few months). Annual releases have not changed significantly since 1987. Coho are enhanced to contribute to marine catches, to provide terminal fishery opportunities and to assist in the rebuilding of wild stocks.

In the Thompson area, there are four sizeable enhancement facilities, enhancing 8 stocks. Enhancement goals for this area include smolt releases to contribute to fisheries and fry releases to assist in the rebuilding of wild spawning populations. As well, until 1997, a portion of the marked adult returns that were surplus to Thompson hatchery requirements were harvested at adult enumeration fences for local First Nations food, social and ceremonial use. Such harvests began to decline in 1994 and terminated after 1996, as there were insufficient coho returning.

In the Upper Skeena, there are two main facilities enhancing 3 coho stocks. The goals of these facilities are to rebuild area stocks using smolt and fry releases and to release coded-wire tagged smolts to provide assessment data on survival, distribution, and exploitation rates.

In both the Thompson and Skeena areas, several smaller Public Involvement facilities produce additional coho fry and smolts.

4.2.2.2.2 *General Approach*

Enhancement may assist in the rebuilding of severely depressed coho stocks. The proposed strategic stock enhancement plan would encompass short-term supplementation (one to two cycles, 3-6 years) of threatened wild stocks. Supplementation is not intended to maintain existing fisheries but would be focused instead on assisting to rebuild stocks. The fundamental reason to consider such

enhancement is that wild coho stocks will be at such low population levels during the next few years that serious loss of genetic diversity could result. Rebuilding stocks as quickly as possible is the best way to conserve genetic diversity. However, supplementation can be effective only if coupled with harvest restrictions in fisheries and protection of habitat for the natural production of wild coho salmon.

During consultation with stakeholders, both smolt and fry releases were discussed as enhancement options. Smolt releases can be more effective at rebuilding stocks quickly as the percentage of eggs that survive to be released as smolts averages 70 - 75% in a hatchery, as compared to 1-4% for natural spawners. For a fry release, about 90% of the eggs taken would survive to be released as fry, compared to 10-20% survival for natural spawning. Released hatchery fry are then subject to natural freshwater mortality until they migrate to the ocean as smolts. However, for fry releases any genetic selective effects that might occur from hatchery rearing are minimized.

The proposed enhancement strategy for 1998 for Thompson and Skeena supplementation would employ a fry release. This would entail collecting spawners from candidate stocks and transporting them to existing hatcheries for spawning, egg incubation and short term rearing of juveniles. Stocks would be maintained separately from each other throughout hatchery rearing. Juveniles would be released as fry to their stream of origin at a size and time comparable to wild fry, into areas that were assessed as under-utilized by wild fry. There would be no transplants from one river to another. Although a fry strategy is suggested in 1998, more specific production planning in subsequent years may identify stocks which may better benefit from a smolt strategy.

Post release assessment may include monitoring for juvenile presence in the fall, and subsequent spring. Assessment of spawner returns of enhanced stocks will be undertaken and will be coordinated with the overall stock assessment for the area.

For 1998, it is premature to consider transplants of juveniles to systems with no observed returns in 1997. However, during consultation, it was suggested that the Department develop a policy on transplants to barren systems, should such action be deemed necessary in the future. This policy will be prepared in 1998.

Broodstock collection and spawning protocols will be used. The broodstock collection protocol specifies that no more than 30% of returning spawners may be collected for broodstock. and that fish from throughout the run timing and of all body sizes should be used. This ensures that genetic representation is maintained in the population from a variety of run components. The spawning protocol stipulates that for populations of less than 50, eggs from each female will be divided into groups, with each group fertilized by milt from a different male. Males will not be re-used for fertilizing eggs from additional females. This protocol is designed to maximize genetic variability by using genetic material from as many animals as possible in the spawning pool. Males

will only be used to spawn one batch of eggs to ensure that the genetic material from a particular male is not over-represented in the spawn.

4.2.2.2.3 *Enhancement Issues*

Although the scientific evidence is not conclusive, some of the issues associated with an enhancement program of this nature are:

- Maintenance of genetic diversity: when dealing with small populations, there must be rigorous control over every aspect of the fish culture process to ensure maintenance of genetic diversity. Broodstock collection, spawning and hatchery rearing may change the genetic characteristics of hatchery fish from those of wild fish. Broodstock collection and spawning protocols will be utilized to minimize such effects and hatchery rearing will be of short duration. Nonetheless, in some cases, broodstock collection may be difficult and collection protocols may be exceeded simply because of the logistical difficulties in collecting spawners. It should be noted that because many populations are now so small, there may also be genetic in-breeding in natural spawning populations.

- Impact on wild stocks: release of hatchery fry into habitat occupied by wild fry could displace them or force them to compete with hatchery fish for resources. In order to ensure that such interactions do not occur, habitat would be assessed and monitored to ensure that it was currently under-utilized by wild fry.

- Catastrophic loss: there is a remote possibility that there could be mortality of some or all of the adults or juveniles of a candidate stock during the hatchery process. In order to safeguard against such events, facilities which are utilized for such work will have experienced staff, and a good operational history with no record of unusual mortalities at any stage of the culture process. Again, it must be recognized that for small wild populations, a catastrophic in-stream event could also decimate a natural stock.

4.2.2.2.4 *Area Specific Supplemental Enhancement Plans*

Thompson Watershed

Spius hatchery and Shuswap hatchery (Figure 1) are best suited for this program as they have appropriate containers for stock separation, suitable water temperature regimes and good operational histories. Depending on the number of stocks slated for enhancement, there may be a capital expenditure requirement to modify some equipment at Spius or Shuswap facilities either this year or in future years.

Given the low return levels of coho expected in 1998, it is difficult to select specific stocks in advance. A flexible plan would include selecting, in consultation with local stakeholders and First Nations, a set of potential stocks with sufficient returns to allow

brood stock collection that might benefit from enhancement. Specific stocks could then be selected in-season from this set depending on actual returns. Brood stock collection could probably best be accomplished in conjunction with stream enumeration efforts underway in some streams.

A limited number of stocks may be selected for enhancement in 1998 but assessment and feasibility work undertaken in 1998 may identify more candidate stocks for subsequent years.

Upper Skeena

Two to three upper Skeena stocks have been identified as potential stocks for supplemental enhancement in 1998. Work would be undertaken at the Toboggan hatchery facility (Figure 2), which is near all potential stocks. As for Thompson facilities, capital expenditures may be required for minor modifications to this facility. More stocks may be identified for supplemental enhancement after local consultation and monitoring in 1998. Fry salvage opportunities have also been identified, as have changes in enhancement production strategy.

4.2.2.2.5 Supplemental Enhancement - Long Term

If, in subsequent years, there is a broader requirement for enhancement than can be provided at the facilities specified above, other existing or new portable facilities may be considered for inclusion in this program. It is anticipated that existing facilities would also require some capital expenditures on equipment modifications.

Although this plan is specific to the Thompson and upper Skeena, there will be review and potential re-profiling of production targets for coho and other species at existing facilities throughout B.C. to better meet local production planning requirements.

In the longer term, it may also be necessary to consider a gene banking or a captive broodstock program. Examination of the potential application of these methods for Thompson or Skeena stocks will be also be initiated in 1998.

4.2.2.3 Habitat Restoration

Habitat restoration projects also play a role in the maintenance and rebuilding of wild populations by improving the productive capacity of degraded habitat. Methods may include techniques such as removal of obstructions, fishway installation, stabilization of stream banks to reduce erosion, and creation of off channel habitat for spawning or rearing. Though not a complete list, Table 1 summarizes commonly used procedures and their application.

It must be recognized that habitat restoration opportunities should be identified and prioritized based on watershed assessment and planning to determine the limiting

factors to fish production (i.e. lack of spawning gravel, flow problems, shortage of over-wintering habitat, water quality problems, etc.). Watershed planning would include activities such as mapping of fish habitat, gathering of habitat and fish information, undertaking reconnaissance and feasibility studies, surveying potential sites, and recording and analysing river flows. This preliminary work must be done well in advance of any new construction.

Preliminary work has been done to allow a mixture of projects to begin this year. Projects in subsequent years could be selected from a prioritized projects list.

It should also be noted that a major obstruction at Little Hell's Gate on the North Thompson River has blocked fish passage since 1994 to many kilometers of spawning and rearing habitat in the upper North Thompson and its tributaries. Provision of fish passage at this obstruction is considered a high priority by the Department and local First Nations and stakeholders.

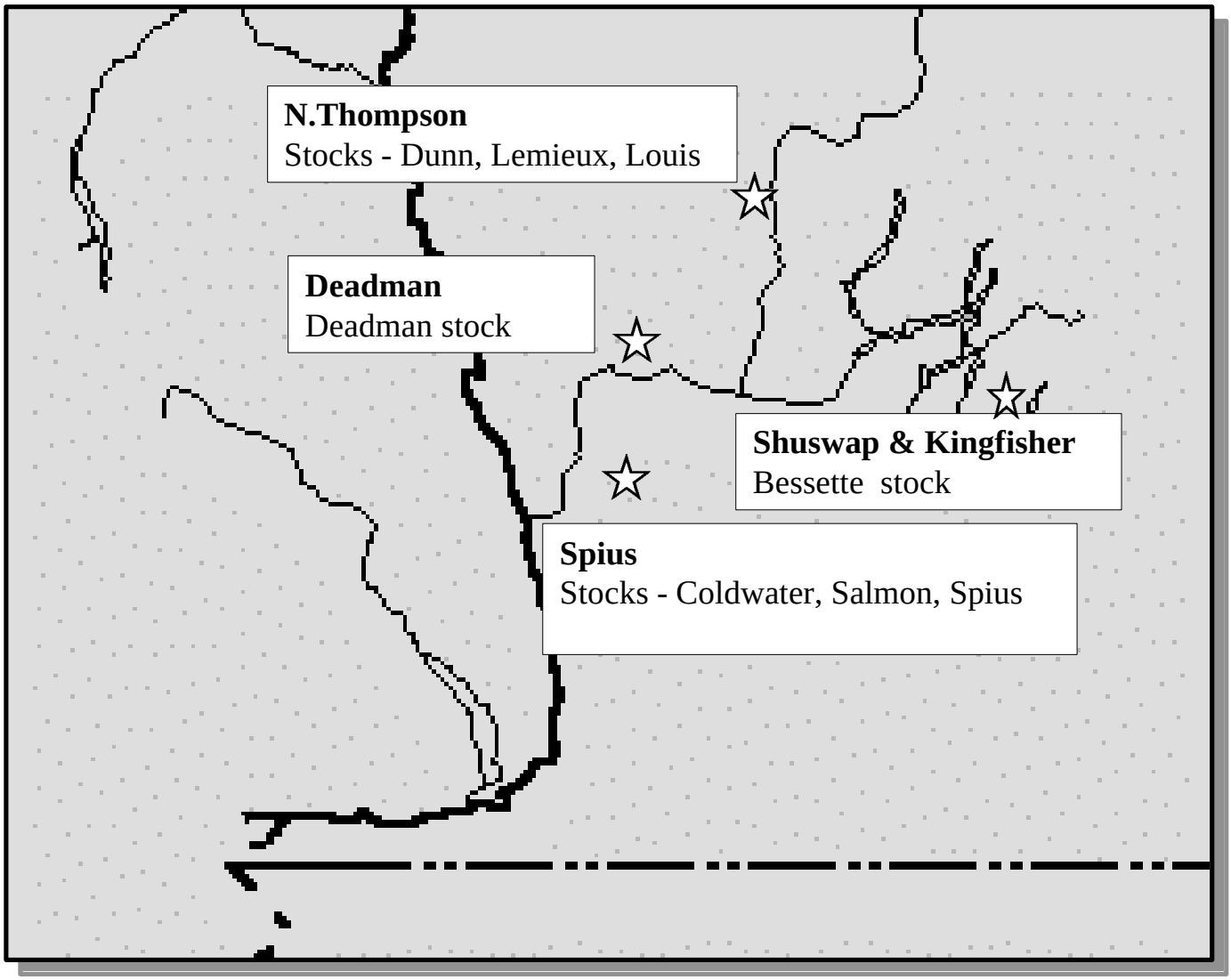

Figure 1: Thompson River coho enhancement sites.

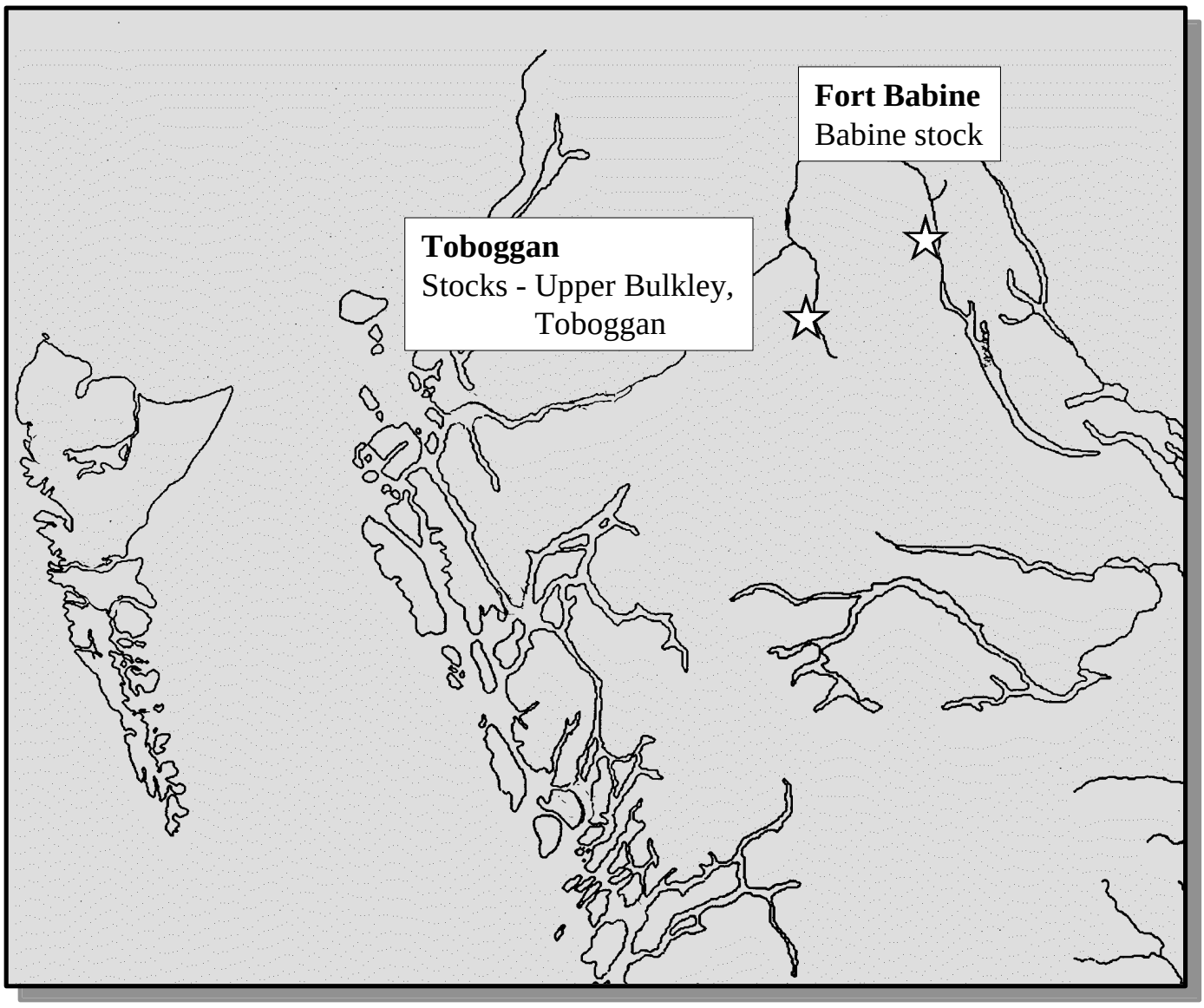

Figure 2: Upper Skeena coho enhancement sites.

Table 1. Habitat restoration techniques.

Technique	Methods Included	Application
Stream Bank Rehabilitation	rock and vegetative methods to stabilize banks	reduces erosion, adds desirable complexity to the bank and increases suitable rearing area
	streambank exclusion fencing	reduce livestock related impacts on streams
Off-Channel Development	side-channels, over-wintering ponds or pools, and riffles	function as spawning or rearing habitat, restores complex habitat to channelized or uniform streams by providing cover, protection from peak high flows and provide stable over-wintering habitat
Rearing Habitat Complexing	off channel or in the main river channel; includes boulder clustering and large woody debris placement	provides shape and stability to the stream channel to store sediment, create pools, dissipate stream energy and provide diverse habitat for spawning or rearing
Minor Obstruction Removal	excavating gravel bars, removing barriers such as debris jams or poorly installed culverts and creating velocity refuges	restores access to spawning or juvenile rearing areas
Major obstruction removal or fishway	removing major barriers such as Little Hell's Gate rockslide on the North Thompson	restores fish access to spawning areas above major barriers
Spawning Habitat Restoration	gravel cleaning or addition, and creation of gravel catchment structures	restores spawning area
Flow augmentation or control	water storage structures at lake outlets	increases useable habitat, reduces fish stranding and de-watering of spawning areas

4.2.3 HABITAT ISSUES AND POTENTIAL ACTION PLAN

4.2.3.1 Introduction

Habitat protection is a fundamental conservation principle which strongly supports the conservation priority of the Department. Given that significant coho habitat losses and impacts have occurred (and are continuing to occur) throughout BC and specifically in the Thompson and localized areas of the Skeena drainage (i.e.; Bulkley, Morice and Kispiox watersheds) stakeholders felt there is a need to embark on an aggressive habitat protection and restoration plan to address these concerns. Throughout consultations there was widespread concern expressed that too little is being done to protect fish habitat. In response the CRT produced the following habitat action plan which was widely distributed and discussed during consultation. While there was not unanimous endorsement of all elements of the plan the approaches were widely supported by all stakeholders.

Factors Affecting Coho Habitat

Fisheries and Oceans Canada is responsible for the management of fish habitat throughout Canada as mandated by the *Fisheries Act* and guided by the National Policy for the Management of Fish Habitat. The Province of B.C., and in some cases municipal governments, are however responsible for permitting land and water use that impacts fish habitat, including forest harvest, agriculture, industrial development, hydro-electric facilities and dams, urban development and other activities. Sensitivity and protection of fish habitats and water quality during the planning and operation of all developments that affect fish habitat is crucial for long-term protection of the lakes, streams and estuaries vital for the production of coho salmon and other fish species.

Even with strong legislation and effective implementation of regulations by all levels of government it is clear that erosion of the habitat base will continue unless all citizens are aware of fish habitat and of the fact that things they do can harm these habitats. On the other hand informed citizens can contribute to the protection and improvement of fish habitat. There is a need to nurture and expand the stewardship ethic that is exemplified by the ranks of streamkeepers and salmon enhancement volunteers throughout the province.

Based on past experience and knowledge of the nature and magnitude of habitat impacts throughout the region there was considerable concern and some skepticism expressed by stakeholders that the Habitat Action Plan would not receive adequate attention or resourcing by the Department. Stakeholders noted that the Auditor General's 1997 report "**Pacific Salmon: Sustainability of the Resource Base"** identified that losses of fish habitat were continuing, although much of the damage

occurred prior to the 1980s. The Auditor General also recommended changes in the delivery of the habitat management function in Pacific Region.

General Coho Habitat Requirements

After emergence coho salmon spend between one and two years in freshwater before smolting. Although this period of freshwater residency is similar to sockeye and some chinook, and is less than steelhead, coho utilize a greater diversity of freshwater habitats than any of those species. Many of the essential habitats, such as small and complexed streams, off channel habitats, lakes and contiguous wetlands are particularly vulnerable to damage and fragmentation due to agriculture, logging and urbanization.

In general freshwater habitat requirements for coho are well known. Optimal coho habitats have low gradients (<3%) with abundant debris and cover and cool water. In larger systems coho are usually found in side-channels, off-channel habitats and sloughs. In interior streams beaver ponds are especially important as summer and winter habitat. Coho juveniles can also be abundant in the littoral areas of large lakes and a distinctive lake ecotype has been described in the Cowichan system on Vancouver Island.

Spawning: Ideal spawning gravel for coho is stable and remains in the channel following freshet flows. Optimum gravels ranges in size from 1-20 cm that has < 30 percent fines (<3mm). The minimum area of gravel of this size that generally provides suitable spawning is $2m^2$ and is located within the winter low-flow boundary of the channel.

Early rearing habitat: As juveniles, coho prefer to occupy shallow (<30 cm deep) quiet areas (<10 m^2/s) usually associated with backwater pools, dam pools, beaver ponds, side-channels, undercut banks and along the margins of other types of habitats

Summer rearing habitat: Pools of all types, beaver ponds and complexed off channel habitats including contiguous wetlands are preferred for summer rearing. Glides and boulder-cobble riffles are also used but are less preferred. Juvenile rearing coho are generally associated with areas of abundant instream and bank cover. Summer water temperatures are a major factor in determining quality of summer rearing habitats. Summer rearing water temperatures which approach or exceed 20 ^{o} C for 2 weeks or more during summer low flows will severely limit the productive capacity of habitat for summer rearing.

Winter rearing habitat : In winter rearing areas with mean winter water temperatures of 7 ^{o}C, coho prefer to occupy deep (> 80 cm), quiet (<10 cm/s) areas usually associated with abundant cover. Beaver ponds, backwater pools, deep lateral scour pools, dam pools and side channels are preferred habitats. Also used but somewhat less preferred are lateral scour pools and plunge pools.

In areas with mean winter water temperatures < 7 ^{o}C, coho are typically found in beaver ponds and off-channel areas associated with an abundance of cover, primarily large woody debris; as well as steam margins with concentrations of large woody debris and boulders that form pockets of deep (>0.5 m at winter base flow), slow (0.3 m/s) water.

In summary critical coho habitats include:

- Low gradient habitats with adequate year round flows and moderate water temperatures.
- Unobstructed stream channels for migration and rearing.
- Riparian vegetation which: complex streams and create a variety of instream habitat features (pools, runs, riffles, undercut banks); provide critical cover features; stabilize banks; provide food sources (insect drop); mitigate non point source pollution and provide canopy for temperature regulation.
- Off channel habitats such as side-channels, contiguous wetlands, wall ponds, remnant oxbows for summer rearing and over-wintering.
- Clean, sorted, well distributed spawning gravel that are free of fines.

4.2.3.2 Status Of Coho Habitat

There has been significant erosion of freshwater coho habitats throughout the province. While (with certain exceptions) we cannot quantify the coho habitat losses that have occurred over the last century it is well known that coho habitat has been reduced in both quality and quantity from historic levels.

Throughout the region development of mines, highways, railways, dams, cities and ports (with all of their attendant infrastructure) and harvesting of trees, mineral resources, cash crops and livestock have resulted in significant impacts to the freshwater habitat base.

In many developed areas in the region (i.e. Lower Fraser Valley, East Coast Vancouver Island, Sunshine Coast, Thompson-Shuswap) there are very significant, widespread and permanent impacts to coho habitat, many of which occurred decades ago as these areas were settled. In these areas the historic impacts are now accompanied by new and enormous growth and development pressure.

The landscape transformations in these areas generally follow the same pattern of conversion from pristine forested watersheds to extensively logged watersheds, dyked and drained floodplains, intensive agricultural use of low relief ALR lands and heavily developed settlement areas (often established at confluences of major river systems). Each of these transformations have been accompanied by significant habitat impacts.

As a result of the significant growth the province is experiencing and the current provincial interest in economic development opportunities there are also many large

scale water and land use proposals which are expected to have additional and residual habitat impacts. While these large scale development projects are where the greatest attention has generally been focused, it is the numerous, small (often unregulated) activities in watersheds which continue to insidiously erode habitat productive capacity and are perhaps the most alarming, and difficult to manage.

Beyond the rapidly growing and developing centers the most significant land use that has impacted coho habitat (and continues to represent the greatest ongoing risk to coho habitat) is forestry. This is certainly the case in much of the North and Central Coast, Mainland Inlets and west coast and northern Vancouver Island. Forest harvesting, conducted prior to the 1980s, frequently removed all the timber from streamsides and included such practices as cross-stream yarding. These types of forest harvesting practices led to destabilization of stream banks and stream channels, reduction of large wood debris used for cover, and infilling of pool habitat used by coho for overwintering. Poor road design, improper use of culverts, and other construction activities also frequently resulted in increased sediment introduction and blockages to fish migration.

In the absence of data on habitat productive capacity and empirical models which link productive capacity to production (particularly for interior coho stocks) the cumulative effect of habitat alterations on coho production cannot be quantified. Furthermore natural variability in populations can mask the impact of small and incremental habitat perturbations. Despite this it is widely acknowledged that loss and erosion of the freshwater habitat base has occurred and represents a significant but unquantifable long term contribution to reduced viability and production of certain coho stocks.

With respect to habitat quality, habitat condition summaries do not exist for all parts of the region but have been developed for the Skeena and the Thompson where the greatest conservation concerns for coho presently exist (Appendices 5.7.3 and 5.7.2). For the balance of the region a narrative on the state of coho habitat has been provided (Appendix 5.7.1)

4.2.3.3 Contribution Of Freshwater Habitat To Present Crisis

It is clear that the present coho crisis is the product of many complex and interacting factors including: poor recent marine survival; over-exploitation during periods of high ocean mortality and long term freshwater habitat deterioration.

With an upturn in marine survival and dramatic and immediate reductions in harvest, several stock assemblages may be restored to escapement levels reported a decade ago. However, many of the wild coho populations in developed areas like the Thompson and Georgia Basin may never rebuild to historic levels due to the nature and magnitude of the habitat loss these areas have already experienced, and the inability to reclaim lost productivity despite significant restoration efforts.

In areas of the province where forest harvesting has been the most significant (and often only) major habitat issue, the advent of the Forest Practices Code and Forest Renewal BC Watershed Restoration Program may improve salmon habitat protection and accelerate restoration activities, but the effectiveness of these programs has yet to be demonstrated. Furthermore, even if effective the benefits of restoration activities may take many years to be fully realized.

The habitat productive capacity of many North and Central Coast areas on the other hand has not yet been significantly diminished. In fact many systems are considered to be in relatively pristine condition. The present productive capacity of the Skeena for example is estimated to still be more than 80% of historic levels. As a result rebuilding coho runs in the Upper Skeena to historic levels would not constrained by freshwater habitat capacity or productivity.

Any effective rebuilding effort for wild stocks will require considerable effort be directed at maintaining the integrity of the remaining freshwater habitat base. It is therefore very important that any recovery strategy include provisions for vigorous and renewed protection of remaining freshwater coho habitats and aggressive restoration of damaged habitats.

4.2.3.4 Advice On Habitat Protection Received During Consultations

During consultation a draft habitat action plan that explored specific short, medium and long term habitat protection opportunities and actions were discussed with stakeholders. The advice received respecting habitat management included recommendations and support for;

1. **Dedicated long term funding for habitat protection.** Several stakeholders expressed concern that worthwhile programs initiated under short term funding programs such as the Green Plan could not be maintained, and there was therefore a need to explore ways to increase present the Department's capacity to deliver its legal mandate, and to establish a dedicated habitat conservation fund, that could provide long term support for other important elements of a habitat program such as training, certification, community outreach, habitat information collection, watershed planning, education/awareness programs etc.

2. **Proactive land and water use planning.** Stakeholders recommended improved Fisheries and Oceans Canada participation in land and water use planning processes that can lay the foundation for more effective or proactive fish and fish habitat protection.

3. **Stewardship.** Stakeholders generally agreed that decisions taken by private citizens and actions on private property have significant implications to habitat, and that a range of stewardship initiatives needed to be supported to improve public compliance

with legislation, to provide information/education and to provide financial incentives for protection of fish and fish habitat.

4. **Improved information base.** Stakeholders often stated that in order to make informed and persuasive arguments good science and information is required. This includes improved information on location and extent of fish habitats (inventory and stream classification), information on how fish use habitats (life history data), and how important various habitats are to fish (productive capacity work).

5. **Impact assessments and project reviews.** Stakeholders generally felt that the Department should improve its capacity to review and assess all projects which have the potential to harm fish habitat.

6. **Compliance monitoring/enforcement**. Generally stakeholders expressed the opinion that compliance with agency prescriptions to protect fish and fish habitat appeared to be poor and the Department needed to increase its monitoring and enforcement capabilities and enhance existing enforcement tools to improve compliance with the Federal *Fisheries Act*.

7. **Communications.** There was unanimous support for a broad based communications strategy (TV, radio, printed media) aimed at a large public audience. There was also support for sector specific communications materials which summarize relevant habitat sections of the Fisheries Act, identify mitigation measures that can protect habitat during development, clarify the roles the public, proponents and others can play to protect habitat, and indicate where to get additional information and advice on habitat protection.

8. **Policy/Tax and Regulatory Reform.** Many stakeholders expressed the opinion that there is no apparent coordination amongst levels of government with respect to land and water use policies, taxes and regulations. In fact some policies, regulations and tax/ assessment processes run contrary to protection of fish and fish habitat and there was therefore a need to reform and revise land and water use, as well as tax policies and legislation, to promote protection of fish and fish habitat.

9. **Restoration/Habitat Enhancement.** Stakeholders stated that significant habitat losses and impacts have already occurred and renewed efforts are required to restore damaged habitat and enhance productivity of existing habitats.

10. **Consultation.** Many stakeholders appreciated the opportunity to consult with the Department on the direction and focus of the habitat program and stated that ongoing discussions respecting departmental habitat policy, programs and issues was required, and could be accommodated through establishment of a habitat conservation advisory council.

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6. APPENDICES

6.1 APPENDIX - BACKGROUND INFORMATION SUPPLEMENTAL TO THE CONSULTATION PROCESS

The following Appendices contains additional information that responds to some of the key issues raised by stakeholders during consultation.

6.1.1 SOCIO-ECONOMIC IMPACTS

6.1.1.1 Introduction

This section examines the potential socio-economic impacts associated with the different salmon management options designed to reduce coho mortality for 1998. The document begins with a brief overview of each sector, Aboriginal, commercial and recreational. This is followed by a discussion of the potential impacts the new coho management measures may have in 1998, and concludes with some considerations for the long term.

The information contained in this report has been developed by analyzing trends and identifying key factors that will affect the fishery during the next several years. Predicting events over the coming few years is not a precise science, but rather an exercise in compiling the best information available to help decision makers.

6.1.1.2 Overview

6.1.1.2.1 Commercial

The Pacific Region seafood industry is export-oriented and a price taker in world markets. As B.C. produces only a small share of the total world salmon supply, the industry does not have the power to dictate market prices.

In recent years, the commercial salmon industry has been significantly affected by two factors. First, changing ocean conditions have led to lower productivity levels and reduced salmon runs, and second, shifts in world seafood markets have caused salmon prices to plummet. The combined result has been some of the lowest salmon catches and landed values on record. For the first time since the 1950s, the commercial fleet has caught less than 50,000 tonnes in three consecutive years (1995, 1996 and 1997).

Harvesting Sector

There are currently 3,635 commercial salmon licences and just over 3,000 licensed vessels as many salmon fishermen have more than one licence attached to their vessel (they have "stacked" additional licences in order to fish another area or gear type). This translates into direct employment of approximately 7,300 people as skippers and crew members if all licensed vessels are active.

COMMERCIAL SALMON LICENCES BY GEAR AND AREA

	A	B	C	D	E	F	G	H	SubTotal
Seine	171	323							**494**
Gillnet			1,082	397	657				**2,136**
Troll						314	468	221	**1,003**
Other									**2**
								Total Licences:	**3,635**

While salmon fishermen and crew members live in all areas of British Columbia, the majority of vessel owners are concentrated in the Lower Mainland region. Based on 1997 data, individuals holding valid Fisher Registration Cards (FRC) appear to be concentrated on Vancouver Island. It is not possible to break the FRC numbers down to salmon only jobs, however, the data serve to illustrate the wide geographic dispersion of commercial fishermen.

	Salmon Vessel Owners	Fisher Registration Cards, 1997
Area 1	**697**	**2,247**
Queen Charlotte Islands	59	218
North Coast	508	1,774
Central Coast	130	255
Area 2	**2,021**	**5,069**
Lower Mainland	1,840	4,296
Sunshine Coast	181	773
Area 3	**1,415**	**6,747**
Northern Vancouver Island	281	861
Mid-Vancouver Island	585	2,856
Southern Vancouver Island	328	2,001
Victoria - Sooke	221	1,029
Area 4	**164**	**875**
Upper West Coast Vancouver Island	31	197
Lower West Coast Vancouver Island	133	678
Area 5	**70**	**505**
Other B.C.	51	345
Non - B.C.	19	148
Unknown	-	12
Total	**4,367**	**15,443**

Note: Some vessels have more than one owner, so the number of owners exceeds the number of vessels.

Significant expenditures are made by the salmon harvesting sector. The salmon fleet requires a wide variety of goods and services to operate. As in any business enterprise, the salmon fleet's expenditures are funded by the revenues generated from the operation, namely from the sale of the catch.

For the 1991 to 1994 period, commercial salmon landed value (fleet

revenue) averaged $211 million. Over the last three years, 1995-97, landed value has fallen dramatically and hovered around the $100 million level. This decline in revenue has created much hardship for the commercial salmon harvesting sector.

Reduced revenues mean less money is available to be spent in coastal communities by the salmon fleet. To further exacerbate matters, these fisheries impacts are being felt at a time when the forestry sector, a significant contributor to many B.C. rural economies, is also experiencing upheaval. As discussed in the British Columbia Job Protection Commission (B.C. JPC) Interim Report *"Fishing for Money - Challenges and Opportunities in the B.C. Salmon Fishery"*, the B.C. forestry industry is currently in a slump due to depressed world pulp prices, high inventories of pulp logs, increasingly complex forestry regulations and high stumpage rates.

Processing Sector

The Pacific Region fish processing sector provides a wide variety of salmon, herring, halibut, groundfish and shellfish products to domestic and world markets. Four large companies buy and process more than 65% of the total B.C. salmon supply. Prices for wholesale salmon products have declined since the late 1980s due to increases in the world supply of wild salmon from Alaska and farmed production from Norway, Chile and Scotland. Processors have tried to compensate by closing non-viable operations, sharing facilities and embarking on joint ventures.

Salmon is processed into a variety products at over 100 plants along the coast. The wholesale value of B.C. salmon products averaged over $400 million annually in the 1991 to 1994 period. For the same period, approximately 4,000 people were employed in plant jobs processing salmon on a seasonal basis. Over the last three years, processing revenues have fallen and averaged about $300 million on an annual basis. Due to the lower salmon harvests, the number of people directly employed in plant jobs has also fallen to about 2,400.

The processing sector has tried to compensate for recent low B.C. harvests by importing U.S. salmon to supply their plants. The amount of salmon imported impacts processor revenues and levels of employment. The magnitude of such action is hard to determine as the levels of imports can vary substantially from year to year. For example, B.C. processors processed approximately 18,000 tonnes of U.S. salmon in 1996, but less than 5,000 tonnes in 1997.

Imports of U.S. salmon were much lower in 1997 for two reasons. First, Alaskan salmon harvests were below forecast levels and, second, a blockade of an Alaskan packing vessel and state ferry by B.C. commercial fishermen at Prince Rupert prevented fish from being imported. The result was reduced processing volume and fewer processing plant jobs which severely impacted the already-fragile Prince Rupert economy.

6.1.1.2.2 Recreational

The recreational fishery is an important activity for Canadian residents and tourists. Approximately 300,000 individuals annually purchase recreational fishing licences for B.C. tidal waters. While chinook and coho are still the most important species for the recreational sector, interest in other types of finfish is growing, particularly for other salmon species and bottomfish such as rockfish.

Anglers do not fish only to harvest salmon, but rather to enjoy the broader recreational experience. The common thread to all angling activity is the "expectation and opportunity" of catching a fish. To many anglers, the daily catch limit, or "bag limit" is a strong signal as to the availability of fish. Changes in bag limits, therefore, can affect anglers' perceptions on the quality of the angling and can influence both their desire to fish and subsequent levels of expenditure.

Recreational fishing takes place all along the coast of British Columbia. Direct employment in the recreational fishery can vary by region. It has been estimated there are over 127 fishing lodges and 1,000 charter operations along the coast of British Columbia. These operations directly employ about 3,200 people in seasonal jobs.

SEASONAL JOBS
1994

	Lodges	Charters
Area 1	**250**	**165**
Queen Charlotte Islands	35	50
North Coast	115	100
Central Coast	100	15
Area 2	**635**	**105**
Lower Mainland	550	85
Sunshine Coast	85	20
Area 3	**875**	**765**
Northern Vancouver Island	175	100
Mid-Vancouver Island	335	465
Southern Vancouver Island	115	35
Victoria - Sooke	250	165
Area 4	**175**	**165**
Upper West Coast Vancouver Island	25	35
Lower West Coast Vancouver Island	150	130
Area 5	**65**	**0**
Other	65	0
Total	**2,000**	**1,200**

The value of the recreational fishery is difficult to estimate as market prices do not exist for a day spent fishing for salmon. However, the recreational fishery generates significant expenditures and attendant spin-off benefits throughout the B.C. economy. A recent comprehensive study estimated that angling expenditures in British Columbia were $611 million in 1994.

In 1996, new angling regulations and confusion over chinook conservation measures, in combination with other factors, led to a decline in angling activity in British Columbia. The direct impacts were a decline in angling expenditures of almost $136 million and over 1,000 seasonal jobs at lodges and charters were lost. Recreational salmon fishing

businesses in all regions of the coast were affected by the 1996 season, but the Queen Charlotte Islands and the West Coast of Vancouver Island felt the largest impacts.

6.1.1.2.3 Aboriginal

There are over 196 Aboriginal bands and 90,000 status Indians in Pacific Region. Aboriginal fisheries for food, social and ceremonial purposes have first priority after conservation requirements are met. However, salmon are important to First Nations commercially, as well as culturally.

It is difficult to place a value on salmon caught for cultural benefit. The activity of fishing performs several functions in Aboriginal communities and fishing is a bond that ties the community together. Such cultural benefits are hard to capture and convey in terms of economic value.

Commercially, salmon provide an important source of revenue and employment to the First Nations community. For example, the B.C. JPC interim report estimates that, in 1995, almost 30% of commercial salmon harvesting employment was comprised of Aboriginal persons. While the salmon fleet today is smaller than it was in 1995, this point serves to illustrate that Aboriginal participation in the commercial fishery is quite significant.

First Nations pilot sale and excess salmon to spawning requirements (ESSR) fisheries are a source of revenue to many Aboriginal individuals and Bands. An evaluation of the 1993 pilot sale fisheries gives an indication of the importance of this fishery to First Nations.

For 1993, it was been estimated that fish caught under pilot sale agreement had a market value of $5.2 million and generated $2.4 million in net revenue for participants in the Alberni Inlet and on the Fraser and Skeena Rivers. These fisheries also provided employment for over 1,270 native people in harvesting, processing, administration and enforcement and monitoring capacities.

6.1.1.3 Potential Impacts Of Coho Management Measures

6.1.1.3.1 Commercial

Even in the absence of any additional management measures to protect coho stocks, it is anticipated that 1998 will be a very difficult year for the commercial salmon sector. Potential coastwide landings for 1998 have been forecast at up to approximately 40,000 tonnes. Further, there is a much smaller proportion of higher-valued sockeye available to be harvested compared to 1997. The B.C. JPC interim report not only predicts a gloomy outlook for the commercial salmon sector in 1998 but for the years 1999 to 2000 as well.

The poor stock outlook will have serious implications for both the harvesting and processing sectors, particularly given current salmon price levels. Management

measures to protect coho stocks are expected to further reduce fishing opportunities and subsequently impact harvest levels as well as fleet and processor revenues and employment.

	1991 - 94 Average	1995	1996	1997
Harvest (tonnes)	75,600	46,700	33,800	48,600
Fleet Indicators:				
Fleet Revenues ($million)	211.4	79.8	97.5	105.6
Crew Shares ($million)	88.4	33.6	39.7	41.2
Crew Jobs	10,585	10,288	7,220	7,360
Processor Indicators:				
Processor Revenues ($million)	425.0	345.8	276.0	294.0
Plant Wages ($million)	39.5	n/a	22.6	24.0
Plant Jobs	3,950	n/a	2,260	2,400

Harvesting Sector

Depending on the management measures chosen, the employment impacts on the harvesting sector could be significant. Management measures to protect coho stocks have the potential to directly impact up to 7,360 people employed as skippers and crew members. This is based on the assumption that, given the opportunity, the entire fleet would participate in the 1998 fishery. Further, wages to crew in 1998 are expected to be well below historic levels.

As illustrated in the above table, landed value has averaged almost $100 million annually over the past three years. Further, any reduction in landed value would also mean that some, or all, of the normal spin-off benefits to the B.C. economy would be lost. For example, fleet expenditures would be reduced below already low levels. There could also be long term market implications if reduced salmon landings result in a further erosion of B.C.'s share of world salmon markets.

Processing Sector

The B.C. JPC interim report indicates that there has been poor processor financial performance in recent years. Measures to protect coho in 1998 may have a significant impact on the processing sector, i.e., low salmon harvest levels would negatively impact revenues and levels of employment. Processing employment has ranged between 2,300 and 2,400 seasonal plant jobs in recent years. This range is already substantially below the historic levels observed for this sector.

6.1.1.3.2 Recreational

Depending on the management measures pursued to protect coho in 1998, the potential decline in angling expenditures in British Columbia resulting from these actions could be severe. Angling expenditure is sensitive to management measures or public mis-perception.

An area closure would obviously have serious impacts on all recreational fishing businesses for that region; however, it is likely all areas of the coast would be affected by such an action due to the perception it would create on the quality of tidal water angling in B.C. As with the commercial fishery, many enterprises involved with the recreational fishery are currently in a fragile state. Businesses are trying to rebuild those client relationships that were damaged by the 1996 season.

6.1.1.3.3 Aboriginal

Additional management measures to protect coho are also expected to impact First Nations. The implications for harvests of salmon for food, social and ceremonial purposes are unclear. However, levels of Aboriginal participation in other fisheries could be impacted by new management measures to protect coho stocks. For example, there is significant Aboriginal participation in the commercial fishery, as vessel owner/operators and crew. New management measures could impact a number of Aboriginal individuals who have seasonal jobs in the commercial salmon harvesting and processing sectors.

Any impacts on Aboriginal pilot sale or ESSR fisheries will affect First Nations in terms of employment and income. Further, many Aboriginal communities are located in remote areas with few alternate employment opportunities should the number of salmon jobs be impacted. For example, data from the 1993 study of pilot sale fisheries indicates that 1,155 Aboriginal individuals were involved in the harvesting aspect and 118 in monitoring and enforcement. Any measures to protect coho that affect these fisheries could impact some or all of these 1,273 individuals. As mentioned above, in 1993, these fisheries had an estimated market value of $5.2 million and a net revenue of $2.4 million for participants.

6.1.1.4 Long-Term Implications

This analysis has focused on the short-term impacts of the different coho management measures. Catches of all salmon species may be foregone in 1998 (and beyond) to protect the weaker coho stocks. All stakeholders would feel the impacts of these measures. However, it is expected additional benefits will be realized in the future as salmon abundance increases due to conservation efforts undertaken in the short term.

Unfortunately, our ability to predict these future benefits is limited due to uncertainties surrounding future salmon abundance. Much of the variability in salmon abundance cannot be predicted accurately as many questions about how stocks interact and

depend on their environment remain unanswered. Further, changes in the freshwater and marine environments used by salmon create additional uncertainty.

*6.1.2 CURRENT STATUS OF BRITISH COLUMBIA HERRING STOCKS*Error! Bookmark not defined.

Throughout the consultation process the question of impacts on coho of the herring fishery was raised. To respond to those concerns, the following additional information is provided.

Herring And Coho In Georgia Strait

The relationship between herring and coho in Georgia Strait is not very clear. The majority of herring found within the Strait of Georgia represent adult migratory fish which enter the Strait in early November and leave again in the following April after spawning. During this time period there are no adult coho in the Strait. The majority of the herring found in the Strait during the summer when they are accessible to coho are the progeny of the migratory herring and are either herring that were spawned in the current year or those spawned the previous March. However, the 1 year old herring appear to leave the Strait by mid-July leaving only the young of the year herring as feed for coho. Young-of-the-year herring have been very plentiful during the past decade, with 8 of 10 year-classes being of average or better strength. If herring are an important food source for coho it is surprising that they have been absent from the Strait in recent years when herring have been so abundant.

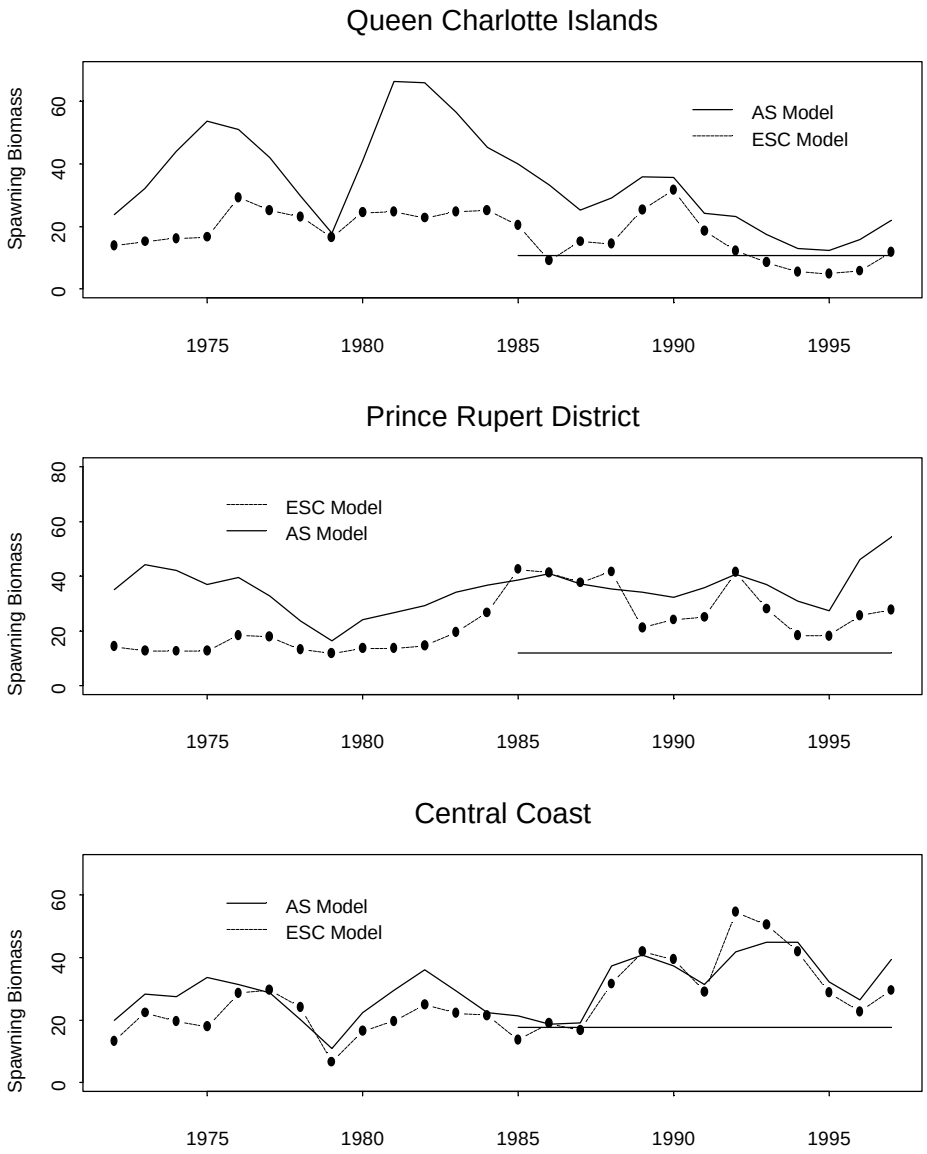

Figure 1. Estimates of pre-fishery spawning stock biomass (tonnes x 1000) from age-structured and escapement model analyses for northern B.C. herring stock assessment regions, 1972-1997. The solid horizontal line indicates the Cut-off level.

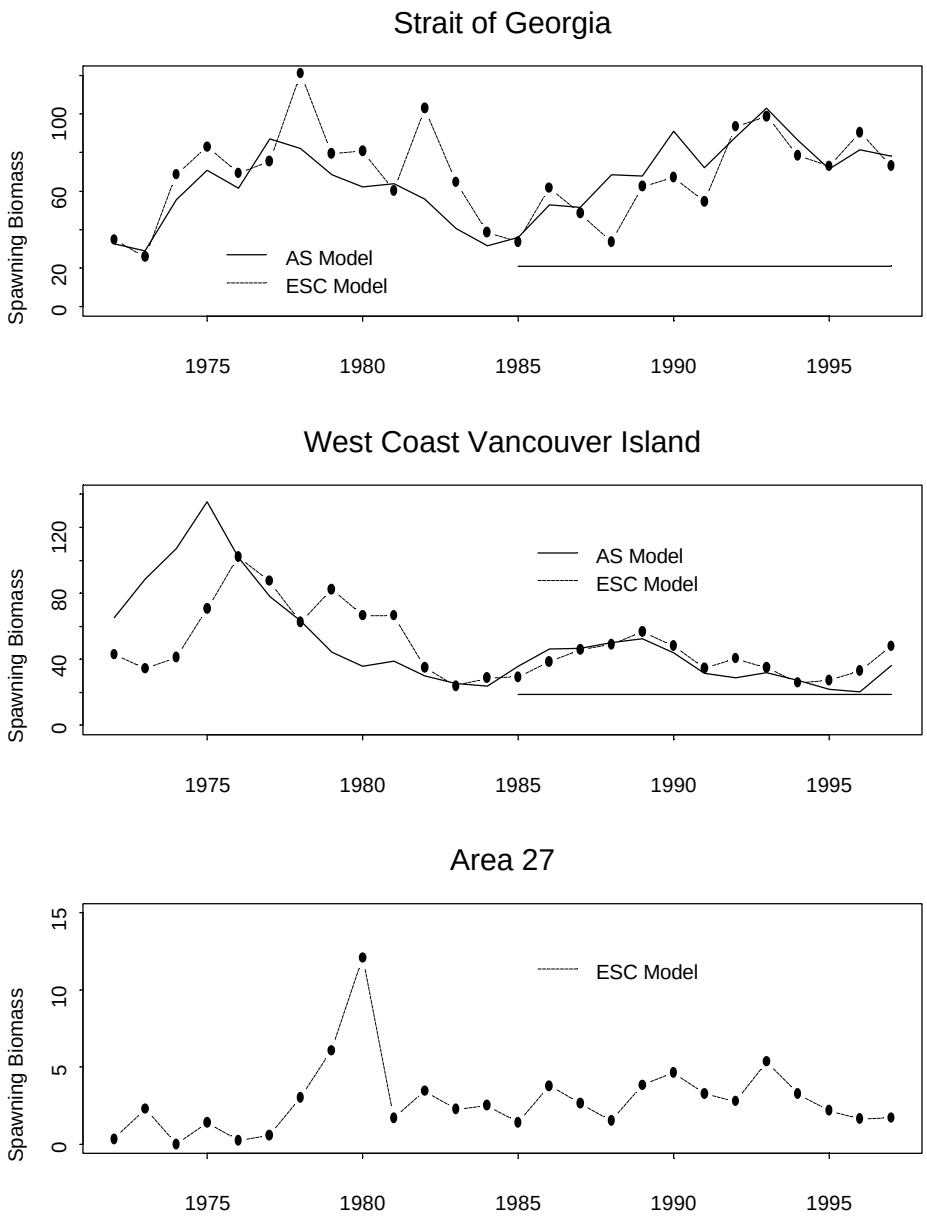

Figure 2. Estimates of pre-fishery spawning stock biomass (tonnes x 1000) from age-structured and escapement model analyses for southern B.C. herring stock assessment regions and Area 27, 1972-1997. The solid horizontal line indicates the Cut-off level.

6.1.3 STATUS OF SEALS AND SEA LIONS IN THE STRAIT OF GEORGIA AND THEIR ESTIMATED IMPACTS ON SALMON

As with herring, the issue of seals and sea lions came up often in the consultation process. The following provides additional information on this topic.

Harbour seals are non-migratory and breed throughout their range. During the 1970s and 1980s, harbour seal populations throughout B.C. increased at an annual rate of about 12.5%. Since 1990 the rate has slowed to about 7%. Their abundance in the St. of Georgia, which supports the highest density in B.C. and perhaps the world, is estimated to have increased from less than 4,000 when the species was protected in 1970 to about 40,000 by 1996. The increase represents the recovery of populations that had been severely depleted by control programs and commercial hunting.

In the St. of Georgia, salmon constitute a relatively minor component (about 4%) of the overall diet of harbour seals, and salmon mortality due to seal predation represents a relatively small part (about 3%) of total salmon escapements. Harbour seals feed mainly on hake, which are predators on juvenile salmon, and herring. Although the overall importance of salmon in the diet is relatively minor, consumption is not uniformly distributed but rather concentrated in estuaries and at river mouths when salmon are spawning. Localized salmon stocks that are depleted can thus be more severely impacted. In the most extreme and best documented case - Comox Harbour and the lower Puntledge River - seals consumed an estimated 36% of endangered chinook runs. Predation on coho was estimated at 18%. The Department is presently developing and evaluating various strategies for dealing with such localized conflicts, such as the use of acoustic or physical barriers to exclude seals, the identification and culling of nuisance animals that habitually prey on salmon, and habitat complexing to reduce the vulnerability of fish.

Another source of mortality is experienced in the sport fishery where seals target “hooked” fish or fish that are disoriented when released. This problem is more difficult to resolve than the river/estuarine concern.

Sea lions were relatively uncommon off southern Vancouver Island (SVI) prior to 1970, but began appearing regularly in the early 70s. The number wintering off SVI increased dramatically during the 1970s and early 80s, but has since stabilized at about 3,500. The increase was primarily due to the influx of California sea lions, which breed off California and Mexico during summer months and disperse in winter to feed, as opposed to the increases in local breeding stocks of Steller sea lions. The northward range expansion of California sea lions is probably attributable to the recovery of breeding populations off California, which by the turn of the century had been decimated by hunting. Animals arrive in B.C. in September-October and depart in April-May. Preliminary assessments indicate that salmon constitutes about 10% of their diet and that total salmon consumption is probably comparable in magnitude to

that of harbour seals. Sea lions, much more so than harbour seals, concentrate in areas of high prey concentration, and therefore consume mainly chum salmon.

6.1.4 STATUS OF COASTAL B.C. MARINE CLIMATE

6.1.4.1 Recent Conditions

Average coastal water temperatures along the British Columbia coast have been increasing at a rate of about 0.2 degrees C per decade since roughly 1960. This trend could be the greenhouse gas, global warming signal, although there is still some uncertainty about this. When this trend is removed, the remaining natural variability in coastal water temperatures is cyclical. This natural cyclical component has been decreasing since the early-1980s. Over the last 15 years, the warming trend and the rate of cooling due to the natural climate variability component have been about the same. Consequently, B.C. coastal temperatures have remained above average, but have not increased very much, except for upward spikes in 1983 and 1997 caused by the strong El Nino conditions in those years.

6.1.4.2 Current Conditions

The 1997/98 El Nino is one of the strongest events in this century. It produced record (or near record) high annual temperatures just about everywhere along the B.C. coast in 1997 except in the Strait of Georgia, where temperatures were above average but not extreme. Recent satellite images indicate that El Nino conditions began to weaken in the tropical Pacific in January 1998. By mid-March this region was nearing its normal state. Some forecasting models are predicting that this El Nino will end around June 1998, and the tropical ocean will enter a cooler than average state called La Nina. Off the lower west coast of Vancouver Island, coastal water temperatures peaked about mid-February then began to decline. If the recent rate of cooling continues, ocean temperatures in this region could return to normal by early June.

6.1.4.3 Outlook

For the next few years, ocean conditions in coastal B.C. are uncertain. It would be precautionary to assume they will remain warm. However, recent research has pointed out that large changes in windstress, water temperatures, and other atmospheric and oceanic conditions in the NE Pacific have occurred roughly every 25 to 35 years in this century. If history repeats itself, the recent warm period which has prevailed since 1977 could end sometime in the next 4 to 10 years. Coastal B.C. temperatures could then decline, for a while at least, before they start rising sharply during the next warming cycle, particularly if the apparent greenhouse warming trend reinforces the natural climate variability.

6.1.4.4 Implication For Coho Survival

It is not clear exactly how coho survival is linked to ocean conditions. However, the recent warm period, and correlated climate conditions, have resulted in generally poor marine survivals particularly of southern B.C. inside coho stocks. It would be precautionary to assume that poor marine survivals are likely to continue for at least the next few years until oceanic conditions change and become more favourable for coho.

6.2 APPENDIX - CHRONOLOGY OF MANAGEMENT ACTIONS TAKEN TO CONSERVE COHO

Skeena River

1970's	Gillnet mesh restriction of 137mm
1982	Maximum of four fishing days per week
1987	Commercial fisheries restricted slightly to assist escapement of coho and steelhead
1988	Mid-August commercial fisheries restricted Restrictions implemented in Section 35 fisheries - non-retention of coho
1989	River and tributaries closed to coho sport fishing all year above Terrace, and until September 1 below Terrace Restrictions implemented in commercial net and Section 35 fisheries First year of selective brail only seine fishery in Skeena estuary
1990	Closures for Aboriginal in river fisheries and for troll in Northern Hecate Strait. Net fisheries restricted in mid August Began weekly coho in-season management target index with a desired index of 66 pts by August 24
1991	Recreational fishery closed to wild coho all year above Terrace and until August 31 below Terrace Aboriginal - no closures Troll - closures in Northern Hecate Strait August 6-21 Net fisheries restricted in mid-August
1992	Same as 1991 plus 121mm mesh restriction in Area 4, effective August 9
1994	First year of Skeena Kitimat Sustainable Fisheries Program three-year fishing plan. Target harvest rates set: 21% coho. Two 24-hour coho fisheries September 11/18 targeting late timing lower Skeena stocks. The 121mm mesh restriction dropped.
1995	Second year of above program. Restrictions implemented in 1994 continued
1996	Third year of Skeena Kitimat Sustainable Fisheries Program. All restrictions continued

1997 Skeena Kitimat Sustainable Fisheries Program discontinued. Harvest rate management expanded to include Areas 3 and 5. Fisheries designed to reduce total exploitation rate on coho from three-year average of 65% to 53%. Accomplished by changing net and troll fisheries. NR/NP of coho by seines. No August gillnet fisheries.

Fraser River Commercial fisheries

early 1980's No directed net fisheries for coho since the, although coho are harvested incidentally in sockeye, pink and chum fisheries.

In recent years, commercial net fisheries have been closed since the first week of September until the end of October to protect steelhead, Harrison chinook and coho.

1997 A new mesh size of 158 mm or 6 1/4 inch, was instituted in the gillnet fishery to minimise coho by-catch and reduce steelhead by-catch.

Fraser River In-River Coho Recreational Fishery

early 1980's Bag limit reduced to two coho per day.

1997 Non-retention of coho and a 10-day angling closure (October 21-31) implemented.

Fraser River Aboriginal Fishery

1989/1990 Fishing times were restricted in October from 3 to 1 day/week from Mission to North Bend to reduce steelhead catch.

1992 Coho allocations were established for the first time - 6,500 for bands below Sawmill Creek. Allocations were not set for bands above Sawmill Creek. Below Sawmill Creek, the fishery was closed from mid-August to mid-October and opened for very restricted times, beginning in late October, for one week below Port Mann Bridge and for three weeks from Port Mann Bridge to Sawmill Creek.

1993 Coho allocations for bands below Sawmill Creek were 17,000 and approximately 10,00 for bands above Sawmill Creek. As in 1992, fishing times were restricted from years prior to meet allocations.

1994 Coho allocations for bands below Sawmill Creek were 2,500 and 3,800 for bands above Sawmill Creek. The fishery below Sawmill Creek was closed

for three weeks in October and opened for restricted periods in late October and early November.

1995 Coho allocations for bands below Sawmill Creek were 2,500 and 3,500 for bands above Sawmill Creek. The fishery below Sawmill Creek was closed for five weeks (six weeks for Musqueam/Tsawwassen) from mid-late September to mid-late October, opened for restricted times for three weeks beginning in late October and thereafter, closed.

1996 No coho allocation was established for bands below Sawmill Creek. The allocation for bands above Sawmill Creek was 2,500. The fishery below Sawmill Creek was closed from late August until late October, and opened for restricted times for three weeks beginning in early November.

1997 No coho allocation established for bands below Sawmill Creek. The allocation for bands above Sawmill Creek was 395. The fishery below Sawmill Creek was closed from early September until late October, and opened for restricted times each week in November. Above Sawmill Creek, the fishery was closed from Sawmill Creek to Deadman Creek after September 28. In addition, a number of Shuswap bands voluntarily agreed to zero coho allocations.

South Coast Net - Johnstone St. (Area 12/13) & Juan De Fuca St. (Area 20)

1977 Permanent area closures Parson Bay, Goletas Channel and Mainland Inlets (except for pink surplus) in Johnstone Strait (Area 12/13), gillnet mesh size restriction.

1978 Permanent closure of Loughborough Inlet and Phillips Arm.

1979 Reduced fishing season (delayed opening until July). Permanent closure Bute Inlet (except for chum surplus).

1980 Coastwide (except Area 20) gear restrictions - maximum seine depth 52m

1981 Area 12/13 closed to all commercial fishing April 14 - June 17. Permanent closure Deepwater Bay. Area closure “Ribbon Boundary corridor” from Hanson Island (Area 12) to Discovery Passage (Area 13) Gear restrictions Juan de Fuca seine (100 mm mesh size).

1982 Permanent closure Lower Knights Inlet and Growler Cove. Gear restriction “fall bunts” implemented earlier in season.

1983 Reduced fishing times (days) under “Clockwork Chum Strategy” Area 12/13

1985-86 Compliance boundary 30 fathom contour – Area 20 seine, By-catch monitoring program 1986 to 1990 (Area 12/13).

1987 By-catch monitoring program 1987 to 1990 (Area 20).

1989 Reduce fishing time (Area 12/13).

1994 Reduced fishing times – Area 20. Coho catch ceiling - monitoring program. Gear restrictions in Area 12/13. Voluntary non-retention of coho.

1995 Reduced fishing times - Area 20 - no gillnet fishing. Coho catch ceiling - monitoring program. Reduced fishing areas and gear restrictions in Area 12/13. Voluntary non-retention coho in the seine fishery

1996 Reduced fishing times - Area 20. Reduced fishing areas and gear restrictions - Area 12/13. Voluntary non-retention of coho in the seine fishery

1997 In-season monitoring and closure of coho sensitive areas. Mandatory non-retention of coho in all seine fisheries. Implementation of coho mortality ceilings for each net fishery. "Yellow line / Red line" strategy for managing coho mortality rates. Sorting and live release in seine fisheries in Juan de Fuca and Johnstone straits. Voluntary non-retention for gillnet.

South Coast Troll

The west coast Vancouver Island (WCVI) troll fishery in Area G coho has undergone major changes to address the severe coho conservation concerns. In summary the fishery has gone from a 1.75M WCVI troll fishery for coho in 1985 to 1.3M in 1993 to 1.0M in 1996 to no troll fishery in 1997. The management actions since 1990 were:

1990 Implement the red line / green line management strategy to extend the season and minimize shaker mortality
Selected conservation areas closed
Monitoring catch in-season via the hail-in program
Non retention of coho after ceiling reached

1991 Implement the red line / green line management strategy to extend the season and minimize shaker mortality
Selected conservation areas closed
Monitoring catch in-season via the hail-in program
Non retention of coho after ceiling reached

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1994	Implement the red line / green line management strategy to extend the season and minimize shaker mortality Selected conservation areas closed Monitoring catch in-season via the hail-in program Reduced fishing time Non retention of coho after ceiling reached
1995	Selected conservation areas closed Time area closures to reduce exploitation rate Monitoring catch in-season via the hail-in program Reduced fishing time Non retention of coho after ceiling reached
1996	Closure of chinook sensitive areas off WCVI to address severe conservation concerns for WCVI chinook stocks. This action minimized access to other salmon species Area closures reduced exploitation rate on coho Catch monitoring program in season along with the hail-in program to record catch in-season. This enabled managers to conduct in-season changes to time and area openings. Non retention of coho after ceiling reached
1997	No directed commercial fishery for coho in southern BC Non retention / non possession of coho in the WCVI troll fishery Closure of coho sensitive areas off WCVI to address severe conservation concerns for southern BC coho stocks. This action minimized access to other salmon species. Catch monitoring program in season along with the hail-in program to record catch in-season. This enabled managers to conduct in-season changes to time and area openings to minimise coho encounters.

Recreational Fishery

1995 In the recreational sector, reduction of the daily catch and possession limit in Juan de Fuca Strait to two and four from four and eight,

1997 Effective July 2, reduction of the daily catch and possession limit for coho to two and four from four and eight on the west coast of Vancouver Island, from Port Renfrew to Cape Scott, effective July 2 maintaining the daily bag limit in the Strait of Georgia, already at two and four non-retention of coho, in the mainstem Fraser River, including the mouth, tidal and non-tidal waters, effective July 2 maintaining existing area closures in the majority of Vancouver Island, Sunshine Coast and southern mainland streams expanding area closures in-season in a number of areas to increase the protected area for coho.

6.3 APPENDIX - COMMUNICATIONS SUMMARY

Coho Summit – Feb. 26/98
- News release announcing Coho Response Team and outlining coho problem.
- Follow-up interviews with media given by Paul Sprout.

Coho Response Team Website – Feb. 26/98 – ongoing
- Development of comprehensive Intranet and Internet websites as one method of information distribution to both internal staff and the public.
- Feedback loop through e-mail.

Media Summary Distribution – Feb. 26/98 …… ongoing
- Daily media package sent to CRT members on coho issue and related stories.

Communications Plan – March 26/98
- Communications plan recommending actions for the period up to and including May 1/98.

Technical Briefing – March 30/98
- Media briefing to outline scientific data and answer any technical questions by media.
- Follow-up interviews with media given by Paul Sprout.

Multi-Stakeholder Coho Summit Meetings – Apr. 25,27/98
- News release and backgrounder giving an update on the progress of the CRT.
- Media interviews at both summits given by Paul Sprout.

Media Relations – ongoing
- Interviews arranged with media for Minister Anderson/Paul Sprout.

Follow-Up – ongoing
- Final summary *media analysis* document due May 4.
- *Ministerial brochure* developed to be mailed to 1.43 million households in B.C. outlining the current situation with coho and the actions taken to date by Fisheries and Oceans Canada – May 8.
- *Op-Ed piece* – roll-up of CRT with an introduction of the departmental vision for the Fishery of the Future to go to community newspapers – May 8.
- *Public polling* – following the wrap-up of the CRT, public polling will be conducted to gauge public opinion on the coho situation and the current state of the pacific fisheries – May 1-15.

6.4 APPENDIX - INFORMATION PACKAGES PROVIDED FOR CONSULTATION MEETINGS

6.4.1 MARCH 30, 1998 PACKAGE

Selective Harvesting

It is well recognized that Pacific salmon fisheries are often conducted coincidentally on stock of mixed productivity. Thus, conservation concerns can be high for many weaker and non-targeted stocks. The “by-catch” of coho during commercial net fisheries on the productive sockeye or chum stocks clearly demonstrates this point. If fishing methods were able to release, unharmed, the non-target salmon stocks, greater conservation benefits could be attained. It is the intent of the Department of Fisheries and Oceans to work with all stakeholders and interested harvesters to increase the selectivity of salmon fisheries and to better protect weaker stocks or species.

In recent years, efforts have been made to improve the selectivity of all fisheries in a variety of ways. This has involved both adjustments to the conduct of the fishery (for example, the time and location of harvesting) and harvesting methodology or techniques.

Currently, no established policy framework exists which allows for both the technical development and its incorporation into existing fisheries. The Department of Fisheries and Oceans will be releasing a comprehensive discussion paper on selective fishing in the near future. This would be followed by widespread consultation to examine how improved selective harvesting can be achieved.

Pilot projects will again be considered in 1998 to promote technical developments, and to contribute to specific conservation objectives. It is expected that the commercial industry will participate directly in any arrangements in their fishery.

Fisheries and Oceans Canada Contact List - Pacific Region

Catch Statistics Line	*(604) 666-2716*
Commercial Fishing - Regulations	(604) 666-2828 *(24-Hour Recording)* (604) 666-3160 *8AM-4PM*
Aboriginal Fishing - Regulations	(604) 666-2107 *8AM - 4PM*
Sport Fishing - Regulations	(604) 666-2828 (*24-Hour Recording)* (604) 666-6331 *8AM - 4PM*
Sports Fishing Guide	(604) 666-6331 **http://www.pac.dfo.ca/pac/comm/pages.sfg97/sfghome.htm**
Fresh Water Fishing Guide	(250) 387-4573
Recreational Fisheries Division	
◊ South Coast (Nanaimo)	(250) 756-7192
◊ North Coast (Prince Rupert)	(250) 627-3409
◊ Fraser River (New Westminster)	(604) 666-6512
Shellfish Information	(604) 666-2828 *(24-Hour Recording)*
ORR-Fish and Wildlife Violations	1-800-465-4336 **http://www.pac.dfo.ca comm**
Pacific Region Communications Home Page	**http://www.pac.dfo.ca/comm**
Coho Response Team Home Page	**http://www.pac.dfo.ca/pac/comm/pages/cohoresponse/cohoresp.htm**
General Information	666-0384

Selective Mark Fisheries as a Management Option to Conserve Wild Coho Stocks

Introduction

Sustaining fisheries for B.C. coho stocks in the face of current low abundance presents a tremendous challenge for the Department of Fisheries and Oceans. The Department is currently considering fishery management options that would meet conservation objectives for valuable wild coho stocks while maintaining the benefits realized from the various fisheries. A selective mark fishery for hatchery coho could permit harvesting of hatchery coho while protecting wild stocks.

The successful development of a selective harvesting program depends on the willingness of fishermen and their communities to support the marking and monitoring programs. Decisions on implementation of selective fisheries for coho will be determined through consultation with stakeholders.

What Is A Selective-Mark Fishery?

A selective mark fishery is one in which coho with an identifying mark are harvested at a higher rate than unmarked coho. All, or some, of the unmarked fish would be released by fishermen. Unmarked coho would be from wild stocks or hatchery stocks that are rebuilding and not yet abundant enough to permit harvest without causing spawner shortages.

There are three essential components in a selective fishery:

- Mass marking of hatchery fish for identification purposes;
- Implementation of regulations defining the catch limits for marked and unmarked fish in specified fisheries; and
- Assessment, including catch and escapement sampling and enumeration for both wild and hatchery stocks.

Selective mark fisheries are effective when a high proportion of unmarked fish survive after being caught and released. In some circumstances, where there are serious conservation concerns, a selective fishery may not be an option if the mortality of the released (i.e. wild) fish is too high.

Implementation of a selective mark fishery would require significant changes not only in the management of the fishery but also in the hatchery programs, stock assessment and catch sampling programs. Fisher education and awareness of the changes would need to be elevated.

Mass Marking Of Hatchery Coho

The Mark

Removal of the adipose fin has been endorsed by the Ad-Hoc Selective Fishery Evaluation Committee of the Pacific Salmon Commission and the Department's Pacific Stock Assessment Review Committee (PSARC) as the mark of choice for selective fisheries. Clipping of the adipose fin causes very little mortality, is easily identifiable by anglers, is inexpensive to apply and has little regeneration compared to the clipping of other fins. However, changes would have to be made to assessment programs.

Stock Assessment

Use of the adipose fin as an indicator of hatchery coho would have an impact on the coded wire tag (CWT) program that currently provides much of the assessment and management information for coho. This would necessitate a number of changes to the existing program.

Since the adipose fin clip currently indicates the presence of a CWT, an alternative means of recognising the presence of a CWT is required. Specifically, the use of electronic detection for catch sampling will be required to detect CWT's in commercial and recreational fisheries. Existing creel surveys will have to be expanded in time, area and proportion of anglers contacted to maintain the proportion of the catch that is currently sampled under the Voluntary Head Recovery Program. Interviewers will be required to identify tagged fish using wand detectors, and remove and process the heads of fish with tags. The Voluntary Head Recovery Program for coho would no longer be effective since the vast majority of adipose-clipped fish would have no CWT.

The Voluntary Head Recovery Program for chinook salmon will continue for the time being, but may be discontinued in the future. If so, marking rates for chinook will need to be increased.

Electronic detection equipment will also be required to sample escapements returning to hatcheries and streams and possibly to sample some aboriginal fisheries.

The states of Washington and Oregon embarked upon a coho marking program in the spring of 1996 with the intention of implementing a selective fishery for hatchery coho in 1998. Some of these fish will be caught in Canadian fisheries and will require electronic monitoring in Canadian catch.

The Department marked 5.0 million 1995 southern B.C. brood coho with a ventral fin clip in 1996. These fish will also appear in Canadian fisheries in 1998. Additionally, the adult coho from approximately 6.8 million adipose-clipped smolts released from southern B.C. hatcheries in the spring of 1998, along with American-marked coho, will appear in the 1999 fisheries.

Conservation

A selective mark recreational fishery in the Strait of Georgia could result in reductions in overall stock exploitation rates by 50% or more over conventional retention fisheries when a high proportion of coho stay in the Strait. This means that, with a selective mark fishery, the potential exists to put twice as many wild fish on the spawning grounds than a conventional fishery.

These estimates allow for hooking mortality and angler error in identifying marked fish. The degree to which escapement to the spawning grounds would increase is highly dependent upon a) the proportion of marked fish to unmarked fish in the selective fishery; b) the proportion of the wild stock present in the fishery and; c) the harvest rate in non-selective fisheries that occur subsequent to the selective fishery. In the case of the Strait of Georgia, the catch of wild coho in fisheries subsequent to the sport fishery is very small, which means that a high proportion of unmarked fish in this fishery would escape to the spawning grounds.

There are, however, uncertainties with respect to angler effort response that must be considered. Work is needed to better predict and evaluate angler response under different harvesting scenarios.

Impacts On Stock Assessment Capability

The coastwide CWT system in the U.S. and Canada represents a long-term, multi-million dollar investment that is an integral part of management and assessment programs for coho salmon. The CWT program is the only method currently capable of providing the information required to evaluate the effectiveness of coho salmon fishery management actions and stock status. Changes to the CWT program would result in greater uncertainty in assessing these stocks. There would be a greater dependence on hatchery data and other means of assessing wild stock status which would require increases in wild stock assessment programs (e.g., expanded spawner surveys or juvenile assessments). It should also be noted that if the U.S. continues mass-marking and releasing marked coho, ongoing CWT programs will be severely disrupted unless electronic detection programs are implemented in most south coast B.C. fisheries.

Mass marking of hatchery fish and selective fisheries would also result in some benefits to stock assessment. The proportion of hatchery fish in the catch would be known with greater precision because all major hatchery fish stocks will be marked. Since recreational fisheries would be directly sampled for coded-wire tags, estimates of tag recoveries would be more accurate and reliable than the voluntary method currently used. Electronic detection for coded-wire tags should also be more reliable than visual detection in both fishery and escapement sampling.

Fishery Benefits

Fishing for coho is a highly prized activity in B.C. The expectation of catching coho attracts thousands of tourists each year resulting in millions of dollars in spending. Angler activity has generated significant employment and income in surrounding communities. In the face of poor wild stock status, a selective mark fishery program could mean the difference between a thriving recreational coho fishery and a more heavily regulated and constrained fishery.

It is estimated that with a selective mark fishery in the Strait of Georgia, for example, 80% of angler effort would be retained. With a non-retention fishery perhaps only 20% of this effort would remain. However, more work is required to better estimate the economic benefits and impacts of the various management scenarios.

Benefits of selective mark fisheries to aboriginal and commercial fisheries are expected to emerge through meaningful consultation where opportunities and ideas will be sought. For example, there may be some potential benefits in fisheries directed at other species where marked coho as an incidental catch could be retained. Increased selective harvesting techniques would likely make these fisheries more conducive to selective mark fisheries.

Program Costs

The Department currently budgets $10.6 million for the enhancement and assessment of coho salmon in the Pacific Region. Estimated incremental costs required to implement selective fisheries in the Strait of Georgia would include start-up costs of $2.0 million and annual operating costs of $1.6 million. The start-up costs include the purchase of electronic detection equipment and tagging machines and installing sampling tables in fish plants. The ongoing costs are for marking, sampling and awareness programs. Mass marking will cost about $300,000 each year.

Industry participants and communities may be able to contribute labour and resources to support the on-site sampling that would be required. Identifying and exploring other avenues and creative partnerships would be an important part of the proposed program.

In Summary:

- There are considerable advantages for Canada in piloting a selective mark fishery. Pressure on wild coho stocks can be reduced without sacrificing an economically viable fishing industry. A pilot selective mark fishery could also afford opportunities to improve catch sampling in both recreational and commercial fisheries.

- In 1998, the returns from 5.0 million ventral-clipped coho from Canadian hatcheries and 11 million adipose-clipped coho from American hatcheries will show up in the fisheries.

- The adult coho from approximately 6.8 million adipose-clipped smolts released from southern B.C. hatcheries in the spring of 1998, along with American marked coho, will appear in the 1999 fisheries.

- Changes to sampling programs may begin in the 1998 fishing season. There may be electronic detection of CWT fish in processing plants and creel surveys.

- At boat ramps and marinas, recreational fishermen will be interviewed, their coho catch scanned with an electronic wand device to detect CWT's. If a CWT is detected, the sampler will request to remove the head for tag reading.

- The contribution of heads from adipose-clipped coho salmon to the Voluntary Head Recovery Program will no longer be necessary.

- The Voluntary Head Recovery Program for chinook salmon will continue for the time being, but may be discontinued in the future. If so, marking rates for chinook will need to be increased.

- Consultation with client groups and the public on potential implementation and funding of future selective-mark fisheries will continue through early 1998.

- The key factors associated with a selective fishery are: stock abundance, migration patterns and the proportion of marks in a given fishery.

Next Steps

Preliminary discussions on a selective mark fishery for hatchery coho were initiated late last year. Decisions on implementation of selective fisheries for coho in the future will be determined through consultations with stakeholders.

6.4.2 APRIL 3, 1998 PACKAGE

A. Overview

- Conservation of coho stocks and their habitat is our first priority. Fisheries and Oceans Canada is currently conducting consultations with First Nations, commercial and recreational fishing groups, environmental and community organizations and the public to reach a consensus on an integrated action plan to address coho conservation concerns for 1998.

- Fisheries management plans for 1998 will look at all options, through the consultation process, on a fishery by fishery basis, to ensure conservation of coho and provide fishing opportunities if possible.

- The depressed status of coho stocks, particularly in the Upper Skeena and Thompson River systems is the result of complicated and interrelated events. Poor marine survival rates due to changing ocean conditions, overfishing, and Alaskan interceptions of Canadian-bound stocks in the north are the main factors which have contributed to the decline of coho stocks in B.C. If any fishing that results in coho mortality is approved for 1998, every effort must be made to minimize impacts on Upper Skeena and Thompson River coho.

- Low marine survival patterns continue to be the primary factor affecting the abundance of coho stocks in 1998. Survival rates in 1997 were very low (1% to 4%) relative to historical levels.

- Abundance levels for Strait of Georgia coho are expected to be similar to levels in 1997. For this aggregate of stocks which includes the Fraser River, abundance is forecast to be 364,000, with a 50% chance that the actual abundance will fall between 278,000 and 475,000. This represents a significant decline from abundance levels of 1 to 2 million coho estimated for this same area in the decade prior to 1996. For West Coast Vancouver Island coho, a slight improvement in abundance is expected with the extent of improvement being highly uncertain. This means we must proceed with extreme caution when planning 1998's conservation strategy.

- There have been substantial reductions in exploitation rate on southern B.C. coho since 1994. Significant management actions to conserve coho were implemented beginning in 1995 and 1996. Last year, unprecedented conservation measures were implemented in several areas. Exploitation rates on south coast coho were reduced from 60% to between 15 and 40%.

- Habitat loss and degradation is common throughout the region and "hot spots" exist in the Thompson and Skeena, however, most habitats in these areas are underseeded. These problems are long-standing and do not explain the recent

decline. Furthermore, although coho habitat needs to be protected and restored where possible, addressing these problems alone will not conserve coho in the short term.

- The United States is experiencing similar problems for coho in Washington, Oregon and California. Planned fisheries in these areas will be limited by the need to conserve coho. Alaska, on the other hand, has relatively healthy coho stocks. It has been, and will continue to be, extremely difficult to convince the U.S. that reductions in the catch of Canadian coho are warranted. Nevertheless, Canadian negotiators will continue to press for these reductions within the framework of the Pacific Salmon Treaty principles of conservation and equity (i.e. interceptions of salmon bound for the other country should be in balance)

- The Department will continue to work cooperatively with the Province through the Canada/B.C. Memorandum of Understanding to protect the salmon resource and its habitat.

- Not all salmon species or other fin fish are experiencing conservation problems. Although the total B.C. salmon catch is expected to be low in 1998, this is largely a production problem due to lower than average marine survival rather than a conservation problem

B. South Coast Coho Consultation Framework

The Fisheries and Oceans Canada is entering into comprehensive consultation with First Nations, stakeholders and the public at large on management options for south coast coho. This will include seeking advice on coho conservation measures, fishing exploitation rates, habitat protection and restoration activities and enhancement opportunities. In order to emphasize the gravity of the current status of south coast coho stocks, particularly Thompson River coho, it is important to realize that the coho conservation measures that are established by the Minister following this consultation will likely govern conduct of all salmon fisheries in 1998. There is considerable uncertainty associated with the 1998 forecast for inside Strait of Georgia (including Thompson) coho stocks due to a continuing downward trend in marine survival. Actions taken in 1998 must be more restrictive in total than those taken in 1997.

Fishery Management Advice Being Sought

1. The Department is seeking advice on the level of mortality that should be used in 1998 which could range from zero up to 25%. For planning purposes, the Department is proposing to use an inside forecast of 278,000 coho (75% probability that this number or more will return) and an outside forecast of 176,225 coho (50% probability that this number or more will return).

2. The Department is seeking advice on approaches for management of south coast fisheries to address the overall conservation requirements of the southern B.C.

coho salmon stock complex, but taking additional measures to conserve Thompson River coho, where appropriate.

3. The Department is committed to monitoring all fisheries for catch of coho and other species. The Department is soliciting advice on effective ways of conducting such monitoring programs

4. Depending on the exploitation rate chosen for 1998, and if total allowable mortalities (TAM) are established, the Department is seeking advice on rules to manage TAM's; for example, transfers of TAM's within and between sectors, gear, and area.

Habitat and Enhancement Advice Being Sought

1. The Department is seeking advice on enhancement, and habitat restoration options and habitat protection priorities.
2. The Department is seeking advice on using enhancement for rebuilding wild stocks. If enhancement is to be used, advice is sought on identification of stocks for short term supplemental enhancement of wild stocks particularly in the Thompson.
3. Enhancement will not be used solely to maintain catch levels during wild stock rebuilding.

Stock Assessment Advice Being Sought

1. The Department would like to solicit advice on the following stock assessment related issues:
    - Are there opportunities for collecting additional spawning escapement or juvenile abundance information from programs being operated by non-government groups?
    - Are there opportunities for establishing additional wild stock key stream programs where complete adult enumeration and smolt tagging are possible? This would give us much needed information on marine survival and exploitation rate. We are particularly lacking in this type of data for the mainland inlets of the Strait of Georgia, Johnstone Strait, the northwest coast of Vancouver Island, the central coast of B.C. and the Queen Charlotte Islands.

2. For non-government groups that are interested in becoming more involved in coho assessment work what can the Department do to facilitate and encourage this involvement?

C. Possible Harvesting

Fraser Sockeye

The total 1998 Fraser sockeye run size forecast based on the 19 stocks considered in this report at the 50% probability level is 11.2 million sockeye. Fraser sockeye fishing plans are uncertain at this time, due to the lack of a Canada – US agreement, domestic allocations and diversion rate estimates. However, the general perspective for the 1998 season is as follows. Opportunities will not be available for commercial harvest of

Early Stuart. Fraser sockeye harvests will be focused on Summer run stocks, with a limited harvest of overlapping Late run stocks.

Johnstone/Georgia Strait, Lower Fraser Chum

The total Johnstone/Georgia Strait, Lower Fraser return is expected to be 3,694,000 (50% probability of a lower return). This is substantially less than the 1997 forecast of 4,865,000. While the 1997 Johnstone/Georgia Strait, Lower Fraser chum salmon run has not yet been reconstructed, the preliminary in-season estimate of abundance is 2.6 million. Chum fishing in Johnstone Strait would be dependent on stock abundance returning in the fall. Chum fisheries maybe modified depending on coho mortality concerns. Terminal fisheries would be assessed in-season for any surplus.

Nitinat Chum

Forecasts of chum salmon returns are prepared for two areas on the WCVI with potential commercial chum fisheries, namely Nitinat (Area 21/22) and Nootka Sound (Area 25). For Nitinat, the recommended forecast is approximately 1.2 million total return to Nitinat River and Hatchery. The anticipated catch is 600,000 to 1.0 million. Test fisheries (using 8 gillnets) are anticipated to begin mid September. Commercial net fisheries are anticipated to follow in early October.

For Nootka Sound (Area 25) the recommended forecast is approximately 300,000 chum salmon total return to Nootka Sound. Commercial net fisheries within Nootka Sound (inside the surf line), and are expected to catch up to 50,000 in Nootka Sound. An additional 50,000 catch is expected in the extreme terminal area.

Barkley Sockeye

The probability distribution of the forecasts is as follows: 75% probability of a run larger than 384,000; 50% probability of a run larger than 451,000 and a 25% probability of a run larger than 615,000.

Early season commercial gillnet fisheries in Barkley Sound are expected 1 - 2 days per week, to provide assessment information. Actual fishing time has not been determined and will depend on negotiated allocations and in-season run re-forecasts

Chinook

The forecast for chinook is currently not available, however some surplus is expected.

Mainland Pink

A Mainland Inlet pink forecast is unavailable at this time however there is a possibility of surplus.

D. 1997 Coho Mortality

The following is the total coho mortality of each fishery with the estimated stock composition of three aggregate stocks.

Fishery	1997 Mortality	1994 Stock Composition			1997 Est. Mortality by Stock Aggregate		
		INSIDE	OUTSIDE	US	INSIDE	OUTSIDE	US
Troll							
NWVI	10952	0.374	0.387	0.239	4096	4238	2618
SWVI	7312	0.520	0.109	0.371	3802	797	2713
Johnstone St.	4603	0.701	0.156	0.143	3227	718	658
St. of Georgia	692	0.860	0.000	0.140	595	0	97
Net							
Johnstone Strait	23984	0.701	0.156	0.143	16813	3742	3430
St. of Georgia	0				0	0	0
Fraser Gill Net	164	0.980	0.000	0.020	161	0	3
Juan de Fuca	7368	0.538	0.050	0.412	3964	368	3036
Sport							
Juan de Fuca	98722	0.447	0.352	0.201	44129	34750	19843
WCVI	37515	0.282	0.467	0.251	10579	17520	9416
N.. St. of Georgia	2445	0.897	0.000	0.103	2193	0	252
S. St. of Georgia	3192	0.916	0.000	0.084	2924	0	268
Johnstone St.	6500	0.701	0.156	0.143	4557	1014	929
Fraser River	650	1.000			650	0	0
Aboriginal							
Fraser	276	1.000			276	0	0
WCVI	661	0.282	0.467	0.251	186	309	166
Total	205036				98152	63456	43429

E. Possible Coho Mortality For 1998

Based on the current salmon forecasts and coho mortality associated with last year, estimates of coho mortality for 1998 are presented in the following tables:

Recreational - Tables 1 to 3
Commercial - Tables 4 to 9
Aboriginal - Table 10

These tables and estimates are for only for discussion purposes.

F. Coho Stock Assessment

Coho in southern British Columbia are comprised of many different stocks, which follow similar migration routes during comparable time periods. Thompson stocks are of particular concern. Figure 1. (enclosed) shows the catch distribution of Thompson coho from various fishing areas for 1996 and 1997.

TABLE 1. 1998 Coho Mortality Options Decision Table

SPORT FISHERY	POTENTIAL MORTALITIES BY MANAGEMENT OPTION					
	2/day	1/day	non ret	sel-pelvic	sel-pelvic/ad	no fishery
GEORGIA STRAIT Area 28 Only	1,309	1,100	70	1,073	1,073	0
GEORGIA STRAIT Minus Areas 28 and 19	4,328	3,700	432	1,601	1,795	0
JUAN DE FUCA (AREA 19 TO 21)	104,538	87,451	5,676	15,499	20,859	0
WCVI Area 23A (Alberni Inlet)	529	500	53	54	100	0
WCVI Area 23B (Outside Alberni Inlet)	18,988	16,000	950	3,338	3,960	0
WCVI Areas 24 to 27	12,182	10,350	1,218	1,006	1,070	0
JOHNSTONE STRAIT (AREAS 11 TO 13)	6,500	5,500	650	1,900	2,000	0
FRASER RIVER (LOWER RIVER)	12,000	10,200	250	1,600	0	0
FRASER RIVER (UPPER RIVER)	0	0	0	0	0	0
TOTAL:	160,374	134,801	9,299	26,071	30,857	

TABLE 2. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

Sport Fishery - Page 1

FISHERY	1997 RESTRICT	1997 MORT	1997 COMMENTS	1998 OPTIONS	1998 RESTRICTIONS	1998 MORTALITY	1998 COMMENTS
GEORGIA STRAIT Area 28 Only	2/day		GEORGIA STRAIT -	#1	Daily Bag Limit 2	1,309	assume 1997 abundance plus
			(EXCLUDING AREA 19)	#2	Daily Bag Limit 1	1,100	
			97 morts = 5637 for 2/day	#3	non retention	70	
				#4	selective only - pelvic	1,073	Catch = 1050 plus Release Morts = 23
				#5	selective only - pelvic + ad	1,073	Catch = 1047 plus Release Morts = 26
				#6	no fishing	0	
GEORGIA STRAIT	2/day		GEORGIA STRAIT -	#1	Daily Bag Limit 2	4328	assume 1997 abundance plus
Minus Area 28 and Area 19			(EXCLUDING AREA 19)	#2	Daily Bag Limit 1	3700	
			97 morts = 5637 for 2/day	#3	non retention	432	
				#4	selective only - pelvic	1601	1298 marked catch and 303 release mortality
				#5	selective only - pelvic + ad	1795	1514 marked catch and 281 release mortality
				#6	no fishing	0	
JUAN DE FUCA (AREA 19 TO 21)	2/day	98722	JUAN DE FUCA (AREA 19	#1	Daily Bag Limit 2	104538	
			AND 20-5)	#2	Daily Bag Limit 1	87,451	
				#3	non retention	5676	release mortality only
				#5	selective only - pelvic	15499	9783 marked catch and 5716 release mortality
				#6	selective only - pelvic + ad	20,859	15234 marked catch and 5625 release mortality
				#7	no fishing	0	
WCVI Area 23A	2/day		Total for WCVI was 37515,	#1	Daily Bag Limit 2	529	
			Areas 23ab =529	#2	Daily Bag Limit 1	500	
				#3	non retention	53	
				#4	selective only - pelvic	54	1 marked catch and 53 release mortality
				#5	selective only - pelvic + ad	100	53 marked catch and 47 release mortality
				#6	no fishing	0	
WCVI Area 23B	2/day		Total for WCVI was 37515,	#1	Daily Bag Limit 2	18988	
			Areas 23ab =529	#2	Daily Bag Limit 1	16,000	
				#3	non retention	950	
				#4	selective only - pelvic	3338	1600 marked catch and 1738 release mortality
				#5	selective only - pelvic + ad	3960	2300 marked catch and 1660 release mortality
				#6	no fishing	0	

TABLE 3. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

Sport Fishery - Page 2

FISHERY	1997 RESTRICTIONS	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 RESTRICTIONS	1998 MORTALITY	1998 COMMENTS
				#6	no fishing	0	
WCVI Areas 24 to 27	2/day		Total for WCVI was 37515,	#1	Daily Bag Limit 2	12182	
				#2	Daily Bag Limit 1	10,350	
				#3	non retention	1218	
				#4	selective only - pelvic	1006	6 marked catch and 1000 release mortality
				#5	selective only - pelvic + ad	1070	70 marked catch and 1000 release mortality
				#6	no fishing	0	
JOHNSTONE STRAIT	2/day	6500		#1	Daily Bag Limit 2	6,500	
AREAS 11 TO 13				#2	Daily Bag Limit 1	5500	
				#3	non retention	650	
				#4	selective only - pelvic	1900	1400 marked catch and 500 release mortality
				#5	selective only - pelvic + ad	2000	1500 marked catch and 500 release mortality
				#6	no fishing	0	
FRASER RIVER (LOWER RIVER)	non-retention	650	release mortality & illegal fish	#1	Daily Bag Limit 2	12,000	2500 adults and 9500 jacks
				#2	Daily Bag Limit 1	10,200	2200 adults and 8000 jacks
				#3	non retention	250	
				#4	selective only - pelvic	1600	1500 marked catch and 100 release mortality
					selective only - pelvic + ad	0	no pelvic jacks
				#5	no fishing	0	
FRASER RIVER (UPPER RIVER)	closed	0		#1	closed	0	

TABLE 4. **1998 Coho Mortality Options Decision Table**

FISHERY	POTENTIAL MORTALITIES BY MANAGEMENT OPTION						
	1	2	3	4	5	6	7
TROLL							
Area G							
WCVI APR/MAY CHINOOK	500	0					
WCVI EARLY JULY CHINOOK	18,000	10,400	0				
AREA 23 BARKLEY SOCKEYE	50	0					
FRASER RVR SOCKEYE	2,000	28,000	2,000	0			
WCVI CHUM	200	0					
Area H							
STRAIT OF GEORGIA CHINOOK	100	0					
AREA 12 MAINLAND INLET PINK	100	0					
FRASER RIVER SOCKEYE	200	200	0				
INSIDE CHUM FISHERY	100	0					
NET							
Area B Seine							
JOHNSTONE STRAIT FRASER R. SOCKEYE	5,900	10,900	6,400	6,000	0		
AREA 20 SAN JUAN FRASER R. SOCKEYE Y	0	1,800	0	0	0		
MAINLAND INLET PINK	1,000	0					
BARKLEY SOUND SOCKEYE	50	0					
JOHNSTONE STRAIT INSIDE CHUM	1,500	1,500	1,000	1,000	0		
TERMINAL CHUM FISHERIES	100	100	75	75	0		
Area D Gillnet							
JOHNSTONE STRAIT FRASER R. SOCKEYE	3,500	7,100	3,500	5,600	0		
MAINLAND INLET PINK	500	0					
BARKLEY SOUND SOCKEYE	50	0					
JOHNSTONE STRAIT INSIDE CHUM	400	300	0				
TERMINAL CHUM FISHERIES	1,100	300	0				
Area E Gillnet							
FRASER RVR/AREA 29 SOCKEYE	80	80	0				
AREA 20 SAN JUAN FRASER SOCKEYE	0	50	50	0			
FRASER RIVER/AREA 29 CHUM	200	0					
NITINAT CHUM	50	0					
JUNE CHINOOK	10	0					

Notes: All 1998 Commercial fisheries by troll and seine gear will be mandatory non-retention of coho and voluntary release of coho for gillnet gear
Coho mortality rates applied on released coho are:
Seines -a range from 20 % to 50% and for troll 31%.
Gillnets 35 % on coho released (only coho judged to be in good condition were released)
Mortality estimates include mortalities from released coho and retained coho catch

SPORT (ON SEPARATE SHEET)							TOTAL SPORT
ABORIGINAL							
SOUTH COAST	300	0					
FRASER	700	0					

TABLE 5. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

COMMERCIAL - AREA G TROLL

FISHERY	1997 DAYS OPEN	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 DAYS OPEN	1998 MORTALITY	1998 COMMENTS
WCVI APR/MAY CHINOOK	0	0	No fishery	#1	28	500	18 test bts for 4 wks
				#2	0	0	no test fishery
WCVI EARLY JULY CHINOOK	7	18264	2600/DAY	#1	7	18000	2600/DAY
				#2	4	10400	2600/day
				#3	0	0	no fishery
AREA 23 BARKLEY SOCKEYE	3	19	10K ceiling	#1	3	50	dependent on TAC&allocation
				#2	0	0	no fishery
FRASER RVR SOCKEYE	55	4603	High diversion -J.S.	#1	14	2000	80% diversion-J.S.:WCVI Closed
			Catch from Area 12				140 mort/day
				#2	14	28000	40% diversion-J.S.:majority of effort
							on WCVI: 2000 mort/day. Also,
							includes 980 morts for Area12 (27020+980=28K)
				#3	14	2000	40% diversion-J.S.:Fishery in
							Area 12 only, WCVI closed
				#4	0	0	no sockeye fishery
WCVI CHUM	23	20	very liitle effort	#1	14	200	dependent on TAC&allocation
				#2	0	0	no fishery

Estimated Total Coho Mortality Range: low - 0 high - 46,750

WCVI Chinook Fishery - Range: low - 0 high - 18,500

Barkley Sockeye Fishery - Range: low - 0 high - 50

Fraser Sockeye Fishery - Range: low - 0 high - 28,000

WCVI Chum fishery - Range: low - 0 high - 200

TABLE 6. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

COMMERCIAL - AREA H TROLL

FISHERY	1997 DAYS OPEN	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 DAYS OPEN	1998 MORTALITY	1998 COMMENTS
STRAIT OF GEORGIA	0	0	No directed fishery	#1	7	100	Assuming high coho outside migration
CHINOOK FISHERY							Directed chinook fishery needs approval
				#2	0	0	no directed chinook fishery
AREA 12 MAINLAND INLET	0	0	No fishery	#1	5	100	dependent on stock abundance
PINK FISHERY				#2	0	0	no fishery
FRASER RIVER SOCKEYE	53	692	High diversion -J.S.	#1	14	200	80% diversion - J.S.: 15 mort/day
			15 mort/day				Effort mainly in J.S.
				#2	14	200	40% diversion - J.S.
							Effort could increase in Areas18&29
				#3	0	0	no sockeye fishery
INSIDE CHUM FISHERY	0	0	no surplus	#1	4	100	dependent on in-season stock estimate & TAC
				#2	0	0	no chum fishery

Estimated Total Coho Mortality Range: low - 0 high - 500

Strait of Georgia Chinook Fishery - Range: low 0 high - 100
Area 12 Mainland Pink Fishery - Range: low - 0 high - 100
Fraser Sockeye Fishery - Range: low - 0 high - 200
Inside Chum Fishery - Range: low - 0 high - 100

TABLE 7. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

COMMERCIAL - AREA B SEINE

FISHERY	1997 DAYS OPEN	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 DAYS OPEN	1998 MORTALITY	1998 COMMENTS
JOHNSTONE STRAIT FRASER R.	11	15959	High diversion-J.S.	#1	3	5,900	80% diver - J.S.: 1500 mort/day and 25% gear transf, 5% depletion/timing
SOCKEYE FISHERY			1450/mort/day	#2	6	10,900	40% diver - J.S.:1500 mort/day & 15% gear transf, 5% depletion/timing
				#3	3	6,400	diversion uk - 1500 mort/day JS, 500 mort-A29 Fish portion of TAC in A 29?
				#4	0	0	no sockeye fishing
AREA 20 SAN JUAN FRASER R.	8	7279	High diversion-J,S.	#1	0	0	80% diversion - J.S. harvest TAC from JS, gear transferred to JS
SOCKEYE FISHERY			910 mort/day,small fleet	#2	2	1,800	40% diversion - J.S. (910 *2 days)
				#3	0	0	Harvest TAC from J.S. or Area 29
				#4	0	0	no sockeye fishing
MAINLAND INLET PINK FISHERY	0	0	off cycle	#1	1	1,000	In 1990 was 1300catch for 2.5 days, no forecast, fishing opportunity possible.
AREA 12				#2	0	0	no fishery
BARKLEY SOUND SOCKEYE	0	0	insufficient run size	#1	1	50	fishing opportunity very unlikely, coho bi-catch minimal
AREA 23				#2	0	0	no fishery
JOHNSTONE STRAIT INSIDE	1	760	assessment fishery only	#1	3	1,500	1 day sn assess fishery in late Sept and fishing as per Clockwork
CHUM FISHERY				#2	2	1,000	delay assess. fishery to early Oct. and fishing as per Clockwork
				#3	0	0	no chum fishing
TERMINAL CHUM FISHERIES	15 - Nitinat only	50	Nitinat only	#1	2+	100	Qualicum (50), Nitinat(50) - depend on abundance, Qualicum bycatch minimal late in season
				#2	2+	75	Qualicum (25), Nitinat(50)- increase boundary restrictions ??
				#3	0	0	no chum fishing

Estimated Total Coho Mortality Range: low - 0 high - 15,350

Fraser Sockeye Fishery - Johnstone Strait - low - 0 high 10,900

Fraser Sockeye Fishery - Juan de Fuca: low 0 high 1,800

Mainland Pink Fishery: low 0 high 1,000

Barkley Sound Sockeye Fishery: low 0 high 50

Terminal Chum Fisheries: low 0 high 1000

TABLE 8. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

COMMERCIAL - AREA D GILLNET

FISHERY	1997 DAYS OPEN	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 DAYS OPEN	1998 MORTALITY	1998 COMMENTS
JOHNSTONE STRAIT FRASER RVR	13	7264	High diversion-J.S.	#1	6	3500	80% diversion - J.S.: 560 mort/day & 5% timing/depletion
SOCKEYE FISHERY			559 mort/day	#2	12	7100	40% diversion - J.S.:560 mort/day (less diversion = more fishing time)
				#3	6	3500	? cannot do much except forgo sockeye allocation
				#4	10	5900	? cannot do much except forgo sockeye allocation
				#5	0	0	no fishery
MAINLAND INLET PINK FISHERY - AREA 12	0	0	off cycle	#1	2	500	Estimate a 2 days fishery at 250morts/day
				#2	0	0	no fishery
BARKLEY SOUND SOCKEYE - AREA 23	10	50	< 5 mort/day	#1	2+	50	minimal by-catch of coho
				#2	0	0	no fishery
JOHNSTONE STRAIT INSIDE CHUM FISHERY	0	0	no assessment fishery	#1	2	400	no gillnets during assessment fishery, and Clockwork fishing
				#2	2	300	additional reduce boundary and time
				#3	0	0	no fishery
TERMINAL CHUM FISHERIES	12 - Nootka	100	Nootka only, no Qualicum	#1	2+	1100	Nootka - 100 mort; Qualicum start Mid Oct for 2 days - 500 mort/day
				#2	2+	300	Nootka - 100 mort; Qualicum start-late Oct, - 100 mort/day
				#3	0	0	no fishery

Estimated Total Coho Mortality Range: low - 0 high - 7100

Fraser River Sockeye - Johnstone Strait: low 0 high 7,100

Mainland Inlet Pink Fishery: low 0 high 500

Barkley Sound Sockeye Fishery: low

Chum Fishery - Johnstone Strait: low 0 high 400

Terminal Chum Fisheries: low 0 high 1,100

TABLE 9. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

COMMERCIAL - AREA E GILLNET

FISHERY	1997 DAYS OPEN	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 DAYS OPEN	1998 MORTALITY	1998 COMMENTS
FRASER RVR/AREA 29	10	164	High diversion-J.S.	#1	4	80	80% J.S. diversion: 20 mort/day
SOCKEYE FISHERY			18 mort/day	#2	4	80	40% J.S.diversion: 20 mort/day
				#3	0	0	no fishery
AREA 20 SAN JUAN FRASER	4	89	High diversion - J.S.; small fleet	#1	0	0	80% diversion - J.S.; harvest TAC in Area 29
SOCKEYE FISHERY				#2	2	50	40% diversion - J.S.; majority of harvest from Area 29 (25mort/day)
				#3	2	50	80% or 40% diversion - majority of harvest in Area 29
				#4	0	0	no fishery
FRASER RIVER/AREA 29 CHUM	0	0	poor return	#1	2	200	delay fishery to early Nov: dependent on run size - 100/day
				#2	0	0	no fishery
NITINAT CHUM FISHERY	20	100		#1	10	50	dependent on stock abundance, - 5 coho/mort per day
				#2	0	0	no fishery
JUNE CHINOOK FISHERY				#1	2	10	dependent on stock abundance, - 5 coho/mort per day
				#2	0	0	no fishery

Estimated Total Coho Mortality Range: low - 0 high - 390

Area 29 Fraser River Sockeye Fishery: low 0 high 80

Juan De Fuca Fraser River Sockeye Fishery: low 0 high 50

Area 29 Chum Fishery: low 0 high 50

Area 29 Chinook Fishery: low 0 high 10

TABLE 10. ***1998 FISHING PLAN OPTIONS - COHO MORTALITY ESTIMATES***

Aboriginal Fisheries

FISHERY	1997 RESTRICTIONS	1997 MORTALITY	1997 COMMENTS	1998 OPTIONS	1998 RESTRICTIONS	1998 MORTALITY	1998 COMMENTS
Fraser River	minimize coho catch	276		#1	as per '97	300	
				#2	no fishery	0	
South Coast / WCVI	minimize coho catch	661		#1	as per '97	700	
				#2	no fishery	0	

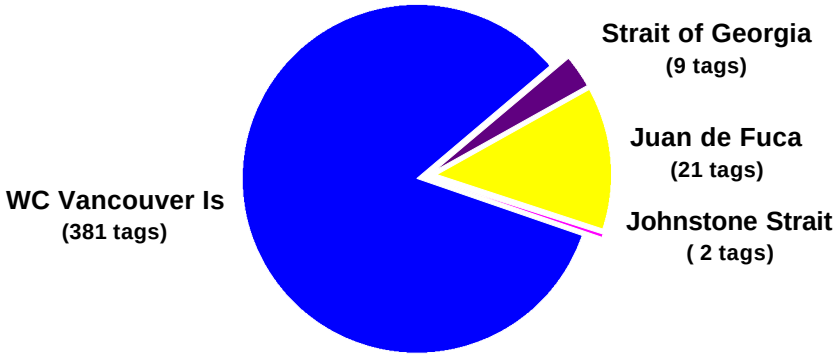
Estimated Total Coho Mortality Range: low - 0 high - 935
Fraser - Range: low 0 high - 275
South Coast - Range: low 0 high - 660

Figure 1.

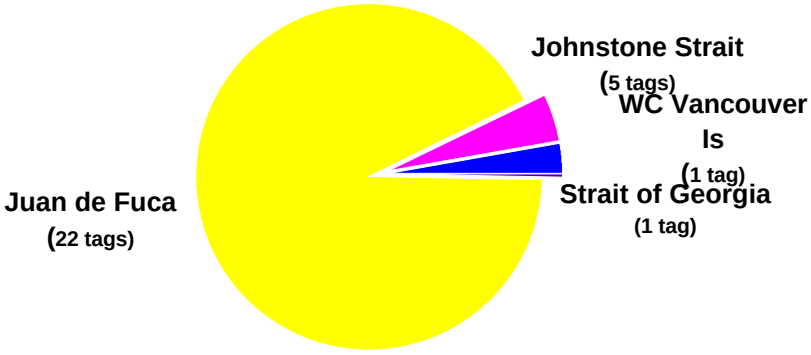
Catch Distribution for COHO from *THOMPSON* Production Area By Fishing Area For 1996 and 1997

(Observed Tags in Brackets)

1996



1997



Post Season Estimates of the 1997 COHO
Total Mortality by Fishery
Including Total Allowable Mortality (TAM) Range

FISHERY	1997 TAM Range		FISHERY
	Low	**High**	**TOTAL**
Troll - North West Vancouver Island	15,000	20,000	10,952
Troll - South West Vancouver Island	30,000	35,000	7,312
Troll - Johnstone Strait			4,603
Troll - Georgia Strait			692
Total Troll	**45,000**	**55,000**	**23,559**
Net - Area D Gillnet Johnstone Strait			7,264
Net - Area B Seine Johnstone Strait			16,720
subtotal (Area B,D) Johnstone Strait	*20,000*	*30,000*	*23,984*
Net - Area B Seine Juan de Fuca / Nitinat	63,000	72,000	7,279
Net - Area E Gillnet Fraser / Georgia Strait	2,000	3,000	164
Net - Area E Gillnet Juan de Fuca / Nitinat	2,000	3,000	84
subtotal Fraser, Georgia Strait, Juan de Fuca	*67,000*	*78,000*	*7,527*
Total Net	**87,000**	**108,000**	**31,511**
Sport - Georgia Strait (excluding Area 19)	30,000	40,000	5,637
Sport - Juan de Fuca (Area 19 + 20-5)	50,000	70,000	98,722
Sport - WC Vancouver Island (Areas 20-1 to 27)	40,000	45,000	37,515
Sport - Johnstone Strait (Areas 11, 12, 13)	7,500	9,000	6,500
Sport - Fraser River	500	1,000	650
Total Sport	**128,000**	**165,000**	**149,024**
Aboriginal - Fraser	2,500	3,000	276
Aboriginal - South Coast / WC Vancouver Island	7,500	10,000	661
Total Aboriginal	**10,000**	**13,000**	**937**
Test Fisheries and Experimental Gear			2,476
Total Test/Experimental Gear			**2,476**
Trawl - WCVI Midwater Hake			36
Total M/W Trawl			**36**
TOTAL ALL GEAR	**270,000**	**341,000**	**207,543**
Note: update March 13/98			

6.4.3 Other Material in Consultation Packages

British Columbia Salmon Fisheries:

Stock Outlook 1998-2001

Prepared by the Stock Assessment and Ocean Science Divisions, Science Branch, December 1997

Salmon abundance in British Columbia varies from year to year. Some of this variability is caused by natural cycles in the abundance that can be forecast with reasonable confidence. For example, returns of pink salmon to the Fraser River are substantially larger during odd than even years. However, much of the variability in salmon abundance cannot be predicted accurately. Many questions about how salmon interact with and depend on their environment remain unanswered. Changes in the freshwater and marine environments used by salmon create additional uncertainty.

All forecasts are based on current estimates of abundance, and further uncertainty in those forecasts is introduced if our estimates of current abundance are themselves uncertain. For some species and for many areas of the coast, estimates of abundance are derived from measured catch, or expanded from local indices or escapement counts in a small number of streams. These approaches to estimating abundance introduce uncertainty that becomes part of the uncertainty in our forecasts.

In general, the reliability of salmon forecasts declines as the forecast period is extended into the future. For example, we are more certain about the probable number of sockeye returning to the Fraser River next year than we are about the number returning in 2006. Because of better data collection, we are also more certain about large populations, such as Fraser River and Skeena River sockeye, than for small populations in remote areas, such as the Central Coast. For purposes of this report, projected returns in 1998 are termed forecasts. Projected returns for 1999 through 2001 are termed expectations and are less reliable than forecasts.

The anticipated El Niño event serves to highlight the rapidly changing conditions in the marine environment. We must emphasize that the effect of these changes on salmon production is very uncertain. In particular, actual returns may be considerably lower than the expectations described below.

Northern Transboundary Rivers
Species outlook 1998-2001

SOCKEYE

Transboundary Rivers: Average to Above Average

PINK

Transboundary Rivers: Average

CHUM

Transboundary Rivers: Below Average

Yukon River: Above average

CHINOOK

Transboundary Rivers: Above Average

Yukon River: Above Average

COHO

Transboundary Rivers: Below Average

Comments

Transboundary sockeye production, particularly on the Stikine and Taku rivers peaked between 1990 and 1996. Sockeye production is expected to be average to above average.

Transboundary fall chum salmon production, particularly on the Taku River, has been below average for a number of years. This trend is expected to continue resulting in below average returns for the 1998-2001 period. A fall chum salmon rebuilding plan is in place for the Yukon and Porcupine rivers for the 1998-2001 period. The general trend is towards increased production with above average returns.

Favourable marine conditions are expected to continue resulting in above average transboundary and Yukon River chinook salmon production. A rebuilding plan is in place for Yukon River chinook salmon for the 1998-2001 period which should result in above average spawning escapement.

Transboundary coho production peaked between 1990 and 1995 and there has since been reduced marine survival and declining spawning escapement. The outlook for the 1998- 2001 is a continuation of this trend.

The transboundary and Yukon River expectations are highly speculative and will likely be affected by a number of poorly understood mechanisms including global warming trends, El Nino events and changing marine conditions including the influence of

dominant weather conditions such as Aleutian Low pressure systems in the North Pacific Ocean.

North and Central Coast
Species outlook 1998-2001

SOCKEYE

Nass: Average

Skeena: Below Average

Central Coast: Below Average

PINK

North Coast: Odd Year Below Average , Even Year Average

Central Coast: Odd Year Below Average , Even Year Average

CHUM

North Coast: Below Average

Central Coast: Average

CHINOOK

North Coast: Average

Central Coast: Average

COHO

North Coast: Below Average

Central Coast: Below Average

SOCKEYE

Three forecasting models were used for Skeena sockeye. A model based on the observed smolt runs in 1995 and 1996 (endorsed by PSARC) indicates a poor return in 1998, with a continuing poor outlook in 1999. An independent model based on sibling returns (jacks in 1996, age-4 returns in 1997) was in close agreement with the smolt model. The third model based on average returns over the past five years indicates

continuing returns above the long-term average and was rejected in light of observed smolt outputs and sibling returns. The poor returns appear associated with a wide-spread disease outbreak in Babine Lake and a subsequent loss of smolt production. No disease was observed in 1996, and fry production in 1997 was above average; smolt output from this brood is not yet known. Consequently, the outlook for Skeena sockeye in 2000 and 2001, while optimistic, will remain guarded until jack returns in 1998 can be determined. The forecast and outlook for Nass sockeye are for average returns in 1998 (0.6 million) through 2001. Returns to Rivers and Smiths Inlet are forecast at 0.17 and 0.10 million sockeye, respectively, in 1998 (50% probability) with a 25% probability that the returns will not exceed 0.095 and 0.047 million sockeye in the two areas. Target escapement in both areas is 0.2 million. These below average returns are expected to persist over the outlook period.

PINK

The even year pink return to the Nass and Skeena is anticipated to be average for the years 1998 (4 million) and 2000. The odd year pink return to the Nass and Skeena is anticipated to well below average for the years 1999 (2.0 million) and 2001. The central coast pink returns over the next four years are expected to remain below average for odd years and average or better for even years in Area 8, but below average in areas 9 and 10. The Queen Charlotte Island even year pink returns are expected to be above average. The Queen Charlotte Island pinks have natural cycle of very low abundance in odd years.

CHUM

Chum production from the Skeena Nass areas will remain well below average for the period 1998 to 2001. The central coast chum returns are expected to be average but variable for the period 1998 to 2001. Queen Charlotte Island chum are expected to be variable, but below average over the next four years.

CHINOOK & COHO

Forecasts of abundance are generally not prepared for chinook and coho since these species are managed on a harvest rate basis. However, marine survival trends, jack escapements and historic escapement patterns do allow the formulation of generalized expectations.

Chinook production from northern B.C. is expected to fluctuate around recent average levels.

Expectations for all Queen Charlotte Island, North and Central Coast coho are below average for the foreseeable future. The situation for mid- and upper-Skeena coho is particularly bleak because of already poor and now declining marine survivals and poor brood-year escapements. Escapements to most mid- and upper-Skeena tributaries fell

to record lows in 1997, and generally poor escapements were recorded throughout the region in 1997.

South Coast
Species outlook 1998-2001

SOCKEYE

Barkley Sound sockeye returns are projected to be average in 1998, 2000 and 2001 and below average in 1999 based on brood year spawning escapement and average marine survival.

CHUM

Chum escapements have generally been above average in recent years. Assuming long term average marine survivals, returns in the next four years can be expected to be average to above average.

CHINOOK

Production of west coast of Vancouver Island wild chinook stocks has been at very low levels through the mid-1990s. Spawning levels have been very low in recent years, even with very restrictive fishery management actions. The outlook is for continued below average production with very poor returns in 1999 and 2000.

In the Strait of Georgia, chinook returns remain below average and the prognosis under the expected marine conditions is for continued below average production.

COHO

The outlook is for continued poor returns of coho to southern B.C. streams for the 1998 to 2001 period. Low spawning escapement levels combined with poor marine survival have resulted in very low returns in the previous four year period. Stringent management actions have been implemented, particularly in 1997 to address this situation.

Fraser River
Species outlook 1998-2001

BACKGROUND

The Fraser River basin represents just about every type of climatic zone and ecosystem in British Columbia. As such, the Fraser River supports six species of salmon and a diversity of stocks. Each species is made up of hundreds of different stocks, which have unique characteristics such as where they spawn, the timing of their migrations, their productivity and their contributions to various fisheries.

In recent years, the system has produced an average of nearly 14 million Pacific salmon of six types: sockeye, pink, chinook, chum coho, and steelhead. When compared to their average historical abundance, all six species declined considerably from the 1950s until the beginning of the past decade.

Sockeye, however, have been rebuilding rapidly and are currently at the highest level since early in the century. Pink and chum are also increasing, although less dramatically. Most Fraser chinook stocks have responded positively to management measures to increase the size of spawning populations. At the same time, however, wild coho stocks are generally declining and would benefit from the additional measures implemented, starting in 1995, to protect their habitat and reduce catch rates.

Fraser River sockeye salmon demonstrate a pattern of cyclic abundance where the dominant year is followed by two or three years of much lower abundance. Also, Fraser River pink salmon demonstrate a pattern of "on and off" years. Fraser River pink salmon spawn in odd numbered years, hence with a two year life cycle, the production occurs on the odd numbered year. Following are details of these patterns and recent year abundance.

Sockeye Salmon

Year	Total Run Size
1990	22.0 Million
1991	12.3 Million
1992	6.4 Million
1993	24.3 Million
1994	15.0 Million
1995	4.5 Million
1996	4.3 Million (preliminary)
1997	17.0 Million (preliminary)

Pink Salmon

Year	Total Run Size
1990	Off Year
1991	16.5 Million
1992	Off Year
1993	17.4 Million
1995	12.5 Million (preliminary)
1996	Off Year
1997	13 Million (preliminary)

SOCKEYE

Detailed forecasts for the 1998 return will not be available until February 1998. However preliminary forecasts were made available earlier in 1997 as follows:

Year	Preliminary forecast
1998	9.2 Million
1999	7.4 Million
2000	5.1 Million

The 1998 return is the second largest of the four year cycle. The forecast of 9.2 million is less than the brood year return of 15.0 million but it is similar to the recent year average for this cycle.

PINK

1998 is an off year for pink salmon returning to the Fraser River.

CHUM

Detailed forecasts for the 1998 return will not be available until February 1998. However brood year escapements in 1994, the main contributing brood year, were very good. Based on the brood year escapements, a good return in 1998 is indicated.

COHO

For management and assessment purposes, Fraser coho are generally separated into those spawning in the lower Fraser, and those spawning in the Thompson. Marine survivals continue to be very low for coho returning to the Fraser watershed. Because of continuing concerns about Fraser and other southern BC coho stocks, the Department has implemented numerous fishery management measures with the most restrictive being in 1997

CHINOOK

Fraser chinook are divided into four major stock complexes: those returning to the upper Fraser (upstream of Prince George and including Nechako), middle Fraser (downstream of Prince George but excluding the Thompson), the Thompson, and the lower Fraser (primarily fish returning to the Harrison River). In recent years, numerous fishery management changes have been made to increase the size of chinook spawning stocks in the Fraser and other rivers. In general, these measures have been successful for most Fraser chinook stocks (especially early returning stocks) with the

exception of the Harrison. The outlook for most non-Harrison chinook stocks is promising.

The Harrison River supports one of the largest populations of naturally spawning chinook salmon in the world. Harrison River chinook are a white fleshed, fall spawning stock with a southerly near shore marine distribution. It appears that these fish are in a period of low marine survival. Under anticipated marine conditions, it is expected that this stock will remain depressed.

State of the Ocean
A brief Review of 1997, Current Conditions and an Outlook

Prepared by Howard Freeland, Institute of Ocean Sciences, February 1998

Events of 1997

Ocean conditions were dominated in 1997 by the occurrence of a very large El Niño event. Sea surface temperatures were already above normal at the beginning of the year.

The El Niño began on the equator in March 1997 with a series of massive "westerly wind bursts" this created unusual sea-level conditions and anomalous weather patterns that injected a massive amount of heat into the northern north Pacific. At lighthouse stations around the coast temperature records fell in August and September and at stations well exposed to the open Pacific we observed the highest sea-surface temperatures ever observed in 65 years of observations. High precipitation in the Georgia Basin area caused salinities to drop and in late summer 1997 the lowest salinities ever observed in the Georgia Basin were reported uniformly at all sampling locations.

Sea level began to rise steadily in late summer and by the end of the summer sea levels very typically 25 cm above normal causing Hydrographic Services to issue warnings about increased flooding risks should high tides coincide with an intense low pressure disturbance.

It is well known that the northern diversion of Sockeye salmon is closely related to sea-surface temperatures off the west coast of Vancouver Island. In response to the highest temperatures ever recorded we also observed the largest northern diversion ever recorded.

Current Conditions

Through the winter typical winter storms occurred and caused the near-surface temperature anomalies associated with the 1997 El Niño to be mixed with cooler deep water. Thus the sea-surface temperature anomalies off the west coast declined and

presently are about 1½°C above normal. Note that anyone in Pacific Region can examine the current real-time temperature anomalies by displaying the current data being recorded by the weather buoys. This is done by clicking on a program DispWx.exe on the regional drive at r:\science\osap\dispwx\DispWx.exe. After the program is started many things can be displayed, pressing the letter "a" will cause sea-surface temperature anomalies to be displayed.

The patterns displayed are typical of the whole Gulf of Alaska. Sea surface temperature anomalies are not as high as they were in the summer, but for winter conditions are exceptional. This excess heat has penetrated deeply into the Pacific Ocean and will take a long time to dissipate. If the El Niño forcing disappeared completely these anomalies would continue to affect the ocean at least through September 1998 and so they will likely affect fishing in 1998.

As of writing the sea-level anomalies have risen to record levels. Off Vancouver Island sea-level is about 35 cm above normal. Fortunately we have passed the period when major winter low pressure systems might move onto the coast, so storm surges are not likely and so flooding is not a significant risk any more.

The Outlook

It was widely believed my climatologists that the 1997 El Niño was essentially over by mid-December. The forcing of El Niño had vanished by that time and indeed for a short period the indicators even suggested the opposite tendency. All computer models were forecasting a return to normal conditions through 1998.

On January 10th we saw a sudden change on the equator towards El Niño-like forcing. The strength would be considered to be fairly moderate, but certainly a significant event. For most of the next 2 weeks the "Southern Oscillation Index" hovered near -2, which is just a significant El Niño-like event. The abruptly on January 29th a major "westerly wind burst" began with daily southern oscillation index values reaching a peak of -7.6. This was a major event that caused a reversal of the trade winds near the equator. All of these items can be followed in real-time because of an array of 70 weather buoys maintained in the equatorial regions, called the TAO array.

As of writing the major burst appears to have ended, but conditions are still indicative of a moderate to strong El Niño forcing on the equator. Most climate forecasters are shy about making predictions, because the community performed so poorly in 1997, but without doubt we have to recognize that we MAY be witnessing the birth of an entirely new El Niño event. If this did take place, then we would receive another pulse of heat input to the Alaska gyre and likely we will be setting new records for high temperatures in August and September 1998.

The 1998 El Niño may come to pass or it may not. Irrespective, in 1998 we will see anomalously high ocean temperatures in the Gulf of Alaska and northern N. Pacific.

The only outstanding issue is, how warm will it be and will it be hot rather than warm? With a high level of confidence I can predict today that the northern diversion will be high in 1998.

A Longer Look

There is evidence to suggest that El Niños are becoming more frequent. Indeed the suggestion has been mooted that the "normal" state of the ocean has not changed in response to greenhouse gas forcing, rather the apparent trend to higher temperatures is a result solely of more frequent El Niños, and nothing more. This is highly speculative, but it would indicate that the El Niño state of the Ocean may with increasing frequency become the "normal" state of the ocean.

We are seeing apparent warming trends in most parts of the world and we can only anticipate that this trend will continue. The basic physics associated with the greenhouse effect is extremely secure, arguments really only circle around the details of how this will be manifested and how strong the response will be. El Niño does represent an anomalous warm state of the ocean and almost certainly when we look at the ocean under the influence of an El Niño we are looking at the future. Some might argue for that future being very close to us, some think that that future is still 20 to 40 years away.

Coho Consultation Meetings

- Our intention is to consult with a wide range of people who are interested in the coho resource. These groups include first nations, recreational fishermen, commercial fishermen, environmental groups, and city, town, and village councils.
- We will be presenting a status report on coho, the current habitat status, and the current state of enhancement.
- The purpose of these meetings are to bring attention to the facts in this matter, and ask for advice on our course of action, both in the short term and the long term.
- After a series of these meetings that will take place throughout April, we intend to conduct a multi-sector meeting in Prince Rupert on April 25, to discuss the problem and possible solutions with all the sectors.
- A coho action plan will then be developed, incorporating the advice received, to be submitted to the Minister for his consideration. Any issues that remain unresolved after the multi-sector mtg. will be summarised for his decision.
- In keeping with our policy of maintaining transparency in these matters, we will be summarising each of these meetings in a half to one page summary of the coho advice received, and posting it on our web site so all interested parties can follow the course of these discussions.

1. What can be done in your sector's fishery to help us out of the problem we find ourselves in regarding coho?

2. In 1997, the Canadian total exploitation rate of upper Skeena coho has been calculated at about 12%. Given the continued decline of these stocks, what level of risk is acceptable to the Canadian public? 0%? 5%? 10%?

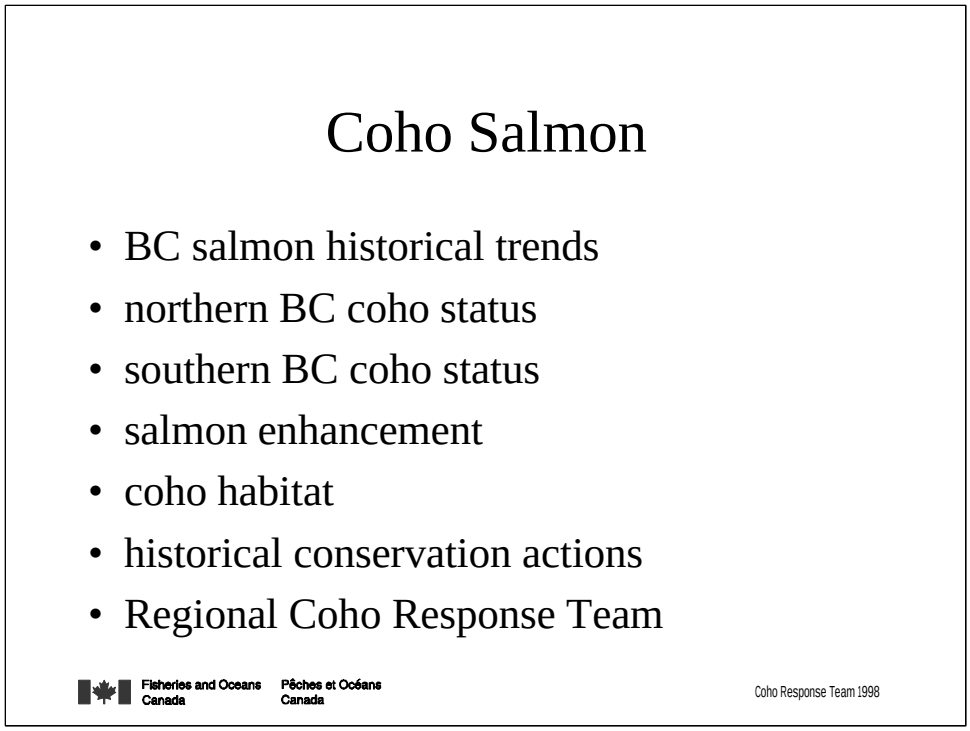
3. The area that includes coho in the North Coast is vast. Is there anything your group can contribute to help us work at improving our assessment of all the streams that are important for these fish?

4. What are the long and short term strategies that should be used for enhancement of coho?

5. What are the habitat prescriptions that the Department should apply?

6.4.4 1998 Coho Backgrounder Presentation Slides

The following section provides a copy of the background information which was presented by the Coho Response Team in the consultation meetings. The purpose of these presentations was to provide sufficient detailed information for all participants to clearly understand the coho conservation problem in both southern and northern B.C. The “slides” below summarize the consultation process and schedule, and information on current and historical status of coho, including stock status, escapement trends, exploitation rates, enhancement, habitat, forecasts of abundance, enforcement, etc.

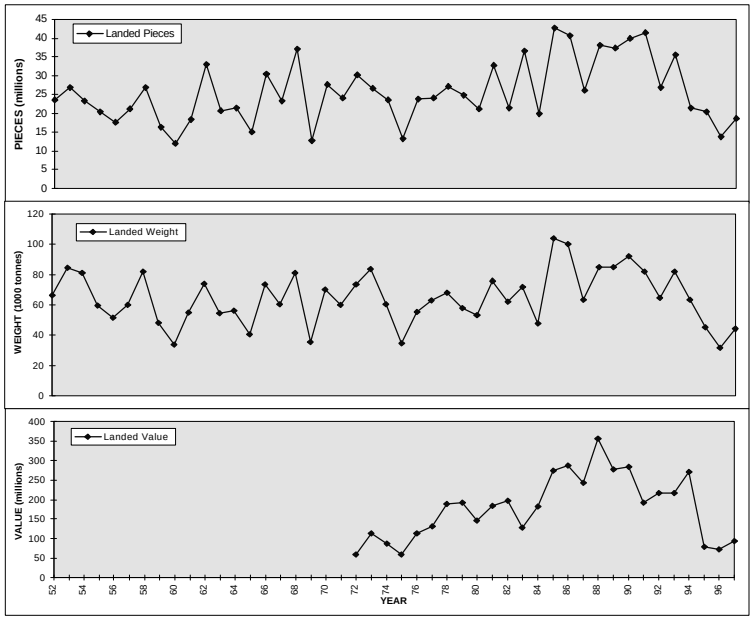


Summary of the main topics in the presentation.

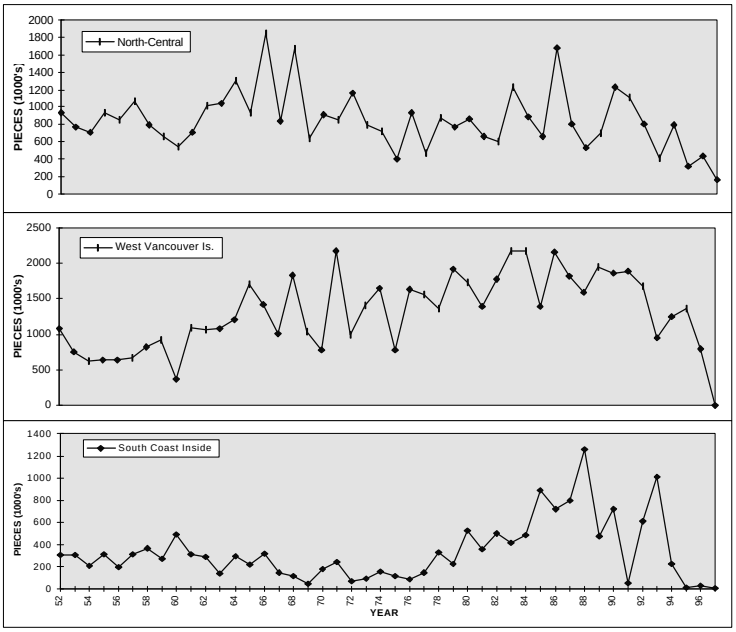
BC Salmon

Historical Trends

Total B.C. Commercial Landings: All Species



Coho Commercial Catch: Troll Gear



<u>important things about coho</u>

•southern coho spend 2 winters and 1 summer in freshwater

•most spend 2 summers and 1 winter in coastal areas of the ocean

•caught throughout second year in the ocean

•coho from many streams spread over hundreds of miles are mixed together in the ocean

⇒southern coho spend approximately equal duration in FW and ocean

⇒are aggressive feeders in the ocean and can be caught on a hook in the first summer in the ocean, especially jacks, but are usually not legal size until into the second year in the ocean

⇒ the previous point is the most significant because it leads to the "mixed stock" fishery problem

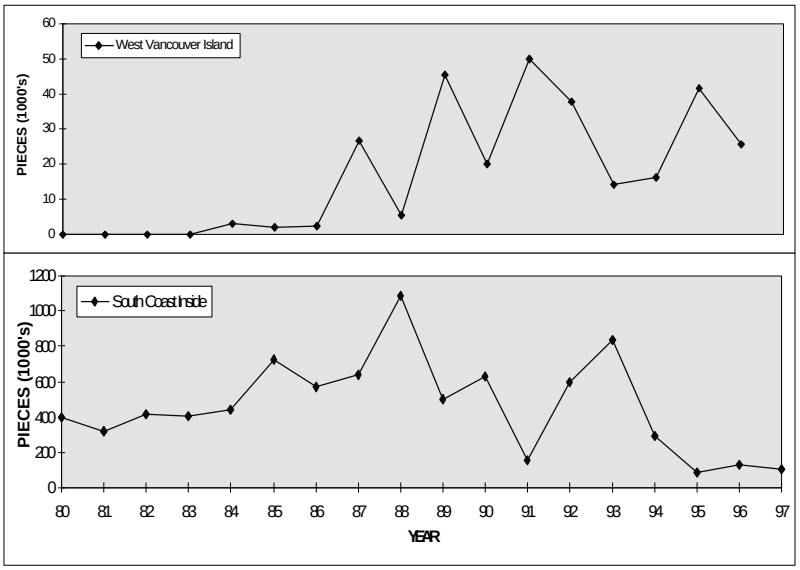
⇒ because it is usually not feasible to estimate how many fish are in a fishing area and what their composition is it is not possible to manage fisheries by setting a "quota" (an allowable catch) like other salmon fisheries where the fish are caught in terminal runs

⇒ instead DFO manages coho by establishing what proportion of the adult fish can be harvested

⇒ that proportion is termed the "exploitation rate"

⇒ the exploitation rate has typically been 60-80% for Strait of Georgia, current rates for Strait of Georgia are quite varied and in 1996 ranged between ~40% and 75%

Coho Sport Catch



Northern BC Coho Stock Status and Outlook for 1998

Coho Response Team 1998

Prepared by:

Blair Holtby, North Coast Salmon Stock Assessment

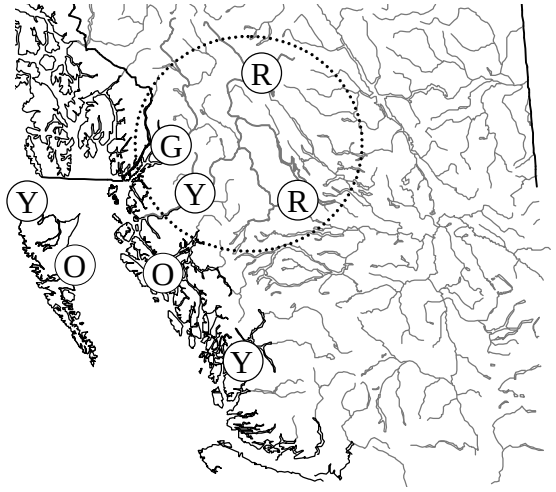
Pacific Biological Station, Nanaimo

phone: 250-756-7221

fax: 250-756-7053

email: holtbyb@dfo-mpo.gc.ca

Northern Stock Status Summary



The northern region extends from Smith Inlet to Nass and includes Haida Gwaii.

The color of the dot indicates in a general way coho status in this area:

RED: severe conservation problem - upper Skeena which includes the high interior (e.g. the Kluatantan, Motase, Slamgeesh), the Sustut and Bear Rivers, the Babine, and the upper Bulkley River (above Houston)

ORANGE: uncertain status but some indicators of conservation problem - Principe, Grenville and Kitimat areas and east coast of Haida Gwaii

YELLOW: conservation concerns - in the lower Skeena, the remainder of Central Coast, north and west coasts of Haida Gwaii, the concern focuses on consequences of consecutive recruitment failure (i.e. another year of poor marine survival).

GREEN: no concerns - although survival was below average in 1997, status is well above conservation levels.

Presentation will focus on area within the dotted circle: the Skeena and the northern indicator stream on Work Channel

Description of the Problem in the North

I. Severe conservation problem in upper Skeena (upper Bulkley, Babine, Sustut-Bear, high interior)

Conservation problem caused by a combination of factors:

A. chronic over-fishing ➔ poor stock status in interior Skeena

B. poor marine survivals ➔ critical escapement situation

C. increasing AK exploitation

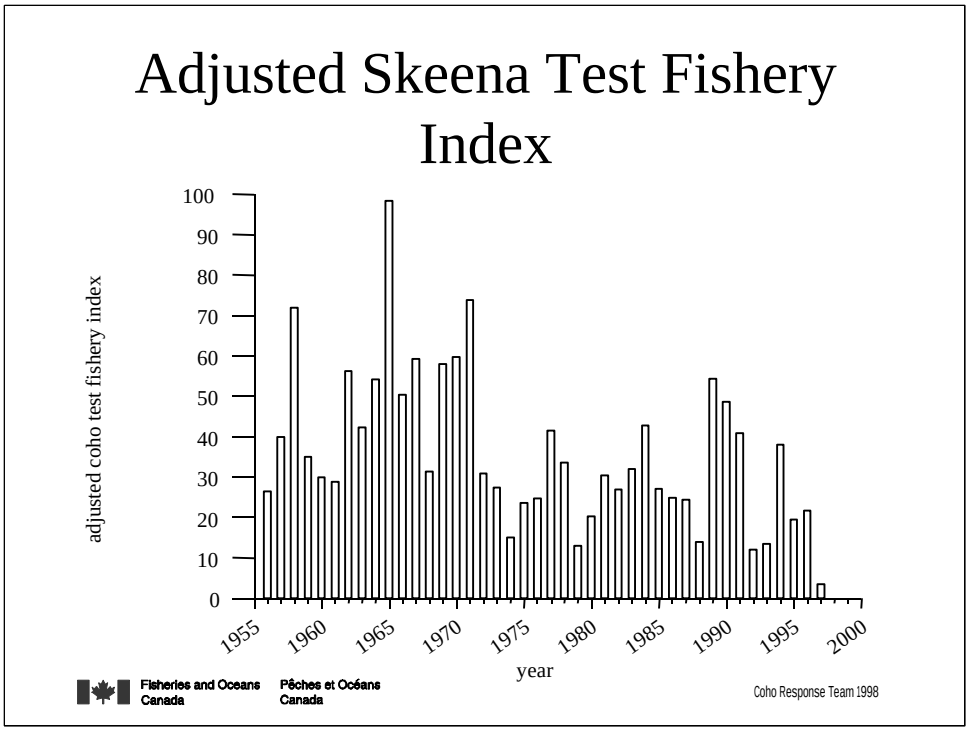
II. concern in remainder of Skeena over consequences of second successive recruitment failure

Fisheries and Oceans Canada Pêches et Océans Canada

Coho Response Team 1998

The presentation will proceed by

- first, presenting information on status (abundance levels and trends)
- second, building the case for our current explanation of why we now have a conservation problem, emphasizing how there are three factors which have acted together



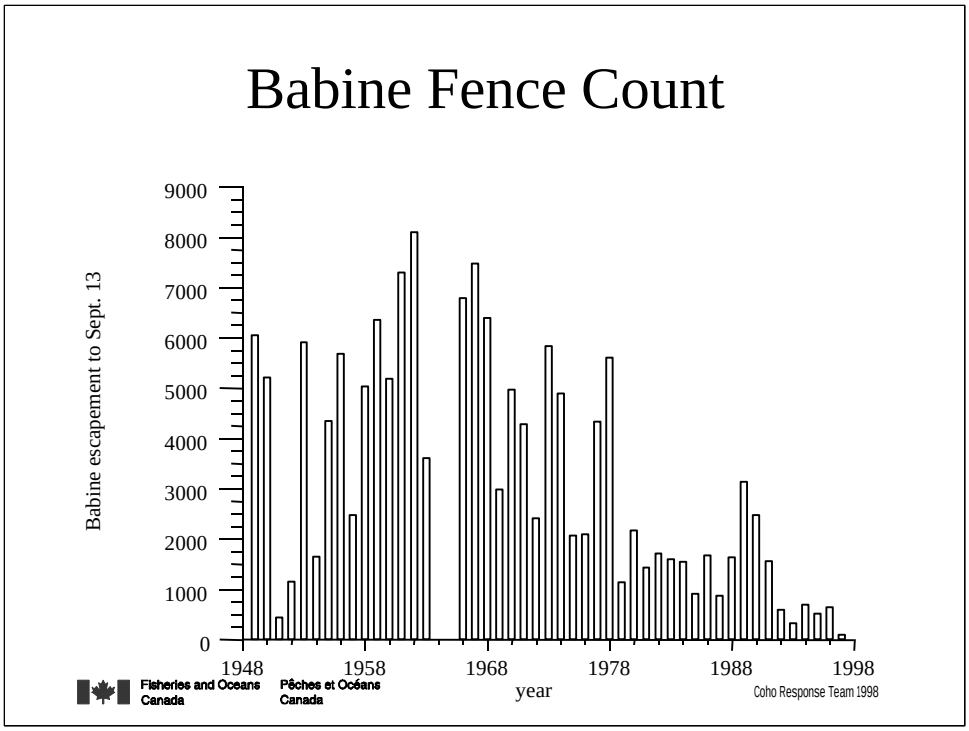
There are a number of indicators of aggregate status. The first is shown above and is a test-fishery index, which is essentially a “Catch-per-unit-effort”. The test-fishery is held at Tyee at the mouth of the Skeena from late June to August 25th. It began in 1956 and has continued to the present. The index (number of coho caught per 1000 fathom-minutes) has been adjusted for “sockeye catchability” or the efficiency of the net in catching sockeye.

The index shows three important features:

• first, the increase in the index value from 1956 to the early 1970’s;

•second, the decline in 1972 followed by a period of relative stability at the lower level, which persisted until 1997

•third, the unprecedented low value in 1977



A second index of abundance is the count of coho passing through the fence at the outlet of Babine Lake. This is only a partial count because the fence is operated to count sockeye which are through by early September. This is the count to Sept. 13th.

This index has four features of interest.

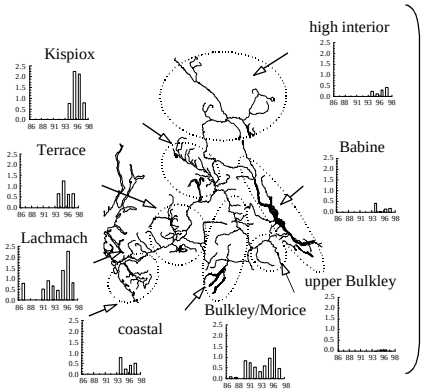
• First, numbers increased from 1949 to the late 1960's. There are two years not shown on the plot. In one of the years the fence did not operate, while in the other year the count was 20,000 and could not be shown on the graph.

• Second, numbers in 1951 were very low because of a slide on the lower Babine River that partially blocked fish migration. The recovery of coho can be seen in the following cycles (3, 6, 9 and 12 years following), illustrating the ability of coho to rapidly recover after natural disasters.

•Third, from the early 1970's to present and nearly continuous decline in abundance

•Fourth, the index count in 1997 was 99 with a total population size of <500. This is probably two orders of magnitude (1/100th) of the pre-1970 population size.

Juvenile Densities in the Skeena River Drainage



Area of conservation concern

Fisheries and Oceans Canada / Pêches et Océans Canada

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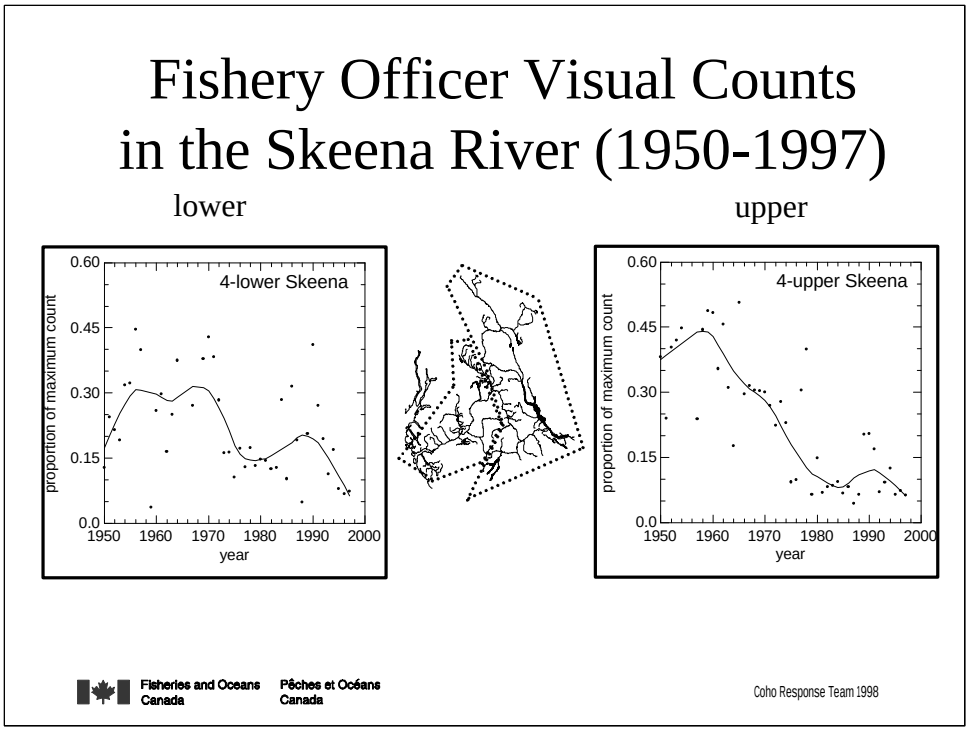
Juvenile densities are measured in small streams throughout the Skeena in late August. In most areas this work, which was funded by the Skeena Green Plan, began in 1994. In some areas of the Bulkley/Morice and in the Lachmach earlier data are available. The graphs show the average densities (number of fish per square metre of habitat) over time. All of the graphs have been plotted on the same scale.

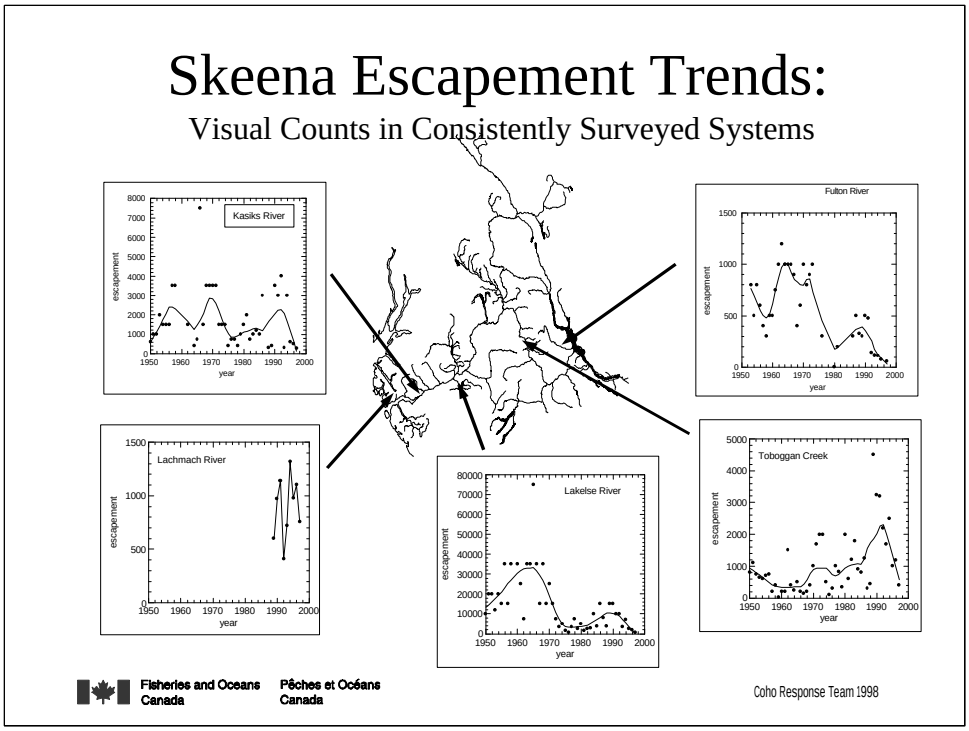
The areas where there are conservation problems are to the right of the figure. Densities are obviously very low. In 1997 only 12 coho were caught in the upper Bulkley. Juvenile densities in the lower Skeena are at levels that indicate adequate escapements up to 1996. The effects of the poor escapements in 1997 will be seen in juvenile densities in 1998.



Another indicator of adult abundance are the visual counts made of spawners by Fishery Officers and other DFO and non-DFO staff. These counts are made using a wide variety of techniques, often undocumented, and are usually expanded into estimates of whole system escapement. The number of systems and the particular systems counted vary a lot between years. Counts of individual systems are fragmented. To generate these graphs counts in individual systems were divided by the maximum estimate for that system. The resulting “proportion of the maximum count” was averaged over all of the streams within the two areas indicated.

The trends are similar in many respects to the two aggregate indices, from which it might be concluded that the Skeena test-fishery is an index of the lower Skeena, while the Babine fence count is an index of the upper Skeena.

We believe that the visual counts are insensitive at low population abundances. Because the means of expanding counts to abundance in a stream are undocumented, it may be that low counts are over-expanded and high counts are under-expanded. This has the effect of compressing the range of counts in individual systems but also of masking very low escapement levels.



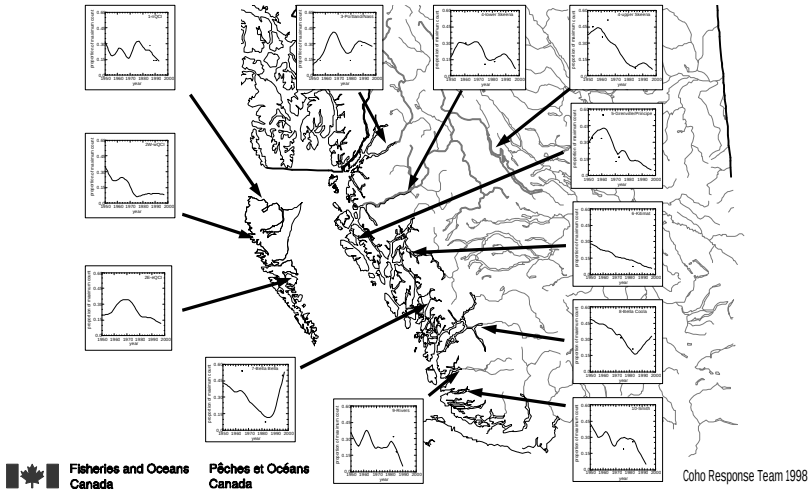
These are selected visual counts for four systems in the Skeena and a fence count from the Lachmach River in Work Channel. The four visual counts are the most complete for the Skeena. There are some interesting trends shown by these counts.

First, the count in the Fulton River shows the same trend as the Babine Fence count and the entire upper Skeena averaged visual count (previous slide). The Lakelse River count, which is in the lower river shows nearly the same pattern. The Lakelse was probably the single largest producer of coho in the Skeena, and importantly, most of the production likely originated from the lake. It is probably not a coincidence that the most marked declines in coho have occurred in systems where production was lake-based. A parallel situation may exist in the Cowichan and within the Thompson. In the latter case, the severest declines have been observed in the South Thompson where production may be based in Shuswap Lake.

Second, Toboggan appears to be an exception, but this is actually an enhanced site where fish production is being supplemented by a hatchery. The wild stock in Toboggan has declined steadily over the last 8 years.

Finally abundance in the Lachmach River, although lower in 1997 than in most preceding years is trending upwards. In other words, abundance in our indicator stream is trending in the opposite direction to the majority of Skeena populations.

Standardized Fisheries Officer Escapement Estimates



This slide summarizes trends in visual counts for the entire north and central coasts, and is the origin of the status summary presented in an earlier slide. Of particular concern are the steep declines seen in the upper Skeena, and in Statistical Areas 5 (Principe/Grenville) and 6 (Kitimat) [the three graphs to the upper right.] Trends in the lower central coast have been upward over the last decade, although escapements were poor in 1997. No counts were made in the two southernmost areas (9-Rivers Inlet & 10-Smith Inlet) after 1990 so their current status is unknown. Populations appear to be stable in Area 3 (Portland/Nass), the northern most region. The Lachmach indicator is in this region.

Reason for the Problem in the North

I. Severe conservation problem in upper Skeena (upper Bulkley, Babine, Sustut-Bear, high interior)

Conservation problem caused by a combination of factors:

A. chronic over-fishing ➔ poor stock status in interior Skeena

B. poor marine survivals ➔ critical escapement situation

C. increasing AK exploitation

II. concern in remainder of Skeena over consequences of second successive recruitment failure

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Will now describe the explanation of why this conservation problem has arising.

The argument is:

1. There is a productivity difference between interior and coastal coho which means that coastal populations can withstand a higher level of fishing than interior one

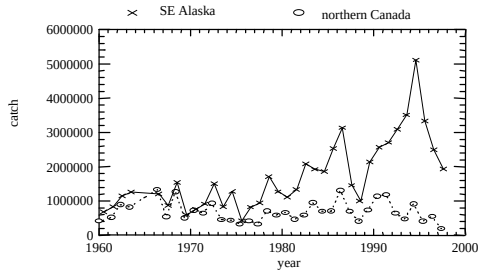
2. The coho from all populations within the Skeena (actually much of the entire region) are caught in ocean mixed-stock fisheries, i.e. they are caught in the same fisheries at the same times.

3. The applied exploitation rates have been considerably greater than the interior populations can withstand. This has led to declining abundance throughout the interior. That has made those populations increasingly vulnerable to poor marine and freshwater survivals

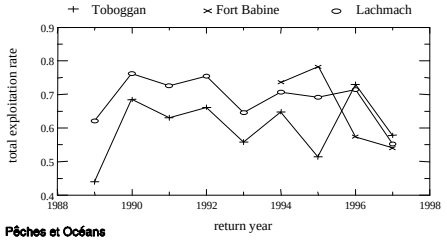
4. Ocean survival in 1996 (1997 return) was extremely poor (and unpredicted) which in combination with chronic poor status produced a critical escapement problem.

5. The majority of the harvest is now in Alaska, limiting the ability of fishery management in Canada to address the situation.

Catch in Northern BC and SE Alaska



Exploitation Rates (All Fisheries)



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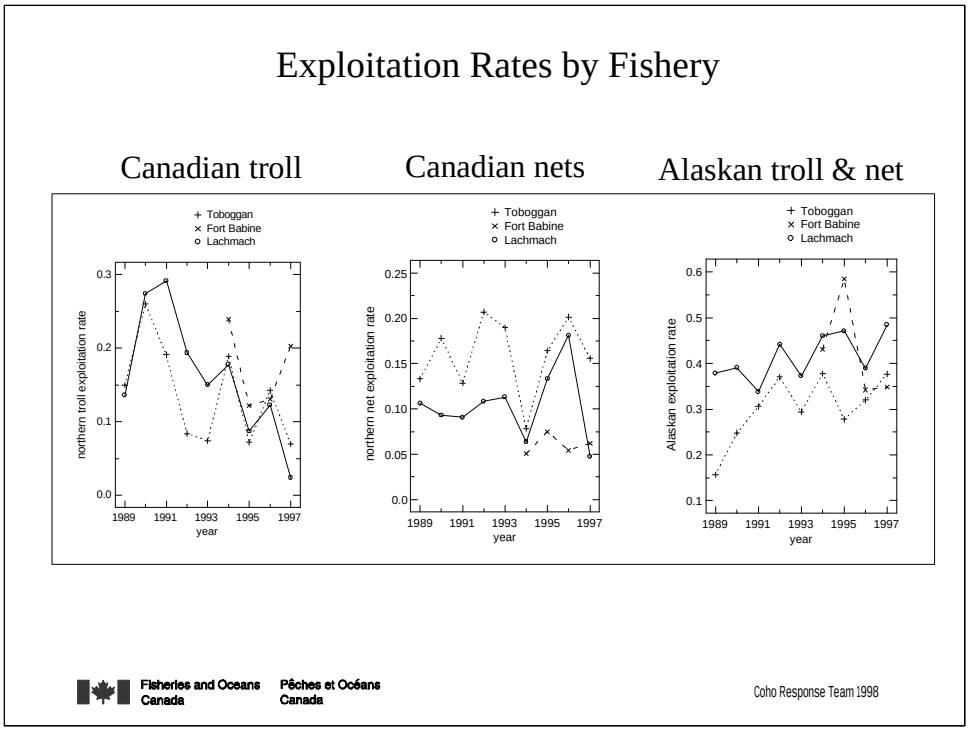
The upper plot shows catch (all sectors) in SE Alaska and in northern Canada. This catch includes coho from SE Alaska and entire north and central coasts and Haida Gwaii. Note the expansion of Alaskan catch to 1994 and declines over past three years. Catch also expanded in Canada over the same period but to a far lesser extent. Canadian catch also began to decline sooner.

Exploitation rate or the fraction of available adults that were caught has been declining slowly over time for the three populations where it can be measured (Lachmach on Work Channel, Fort Babine and Toboggan Creek in the Skeena.)

Exploitation rate has averaged well over 60% for all three populations.



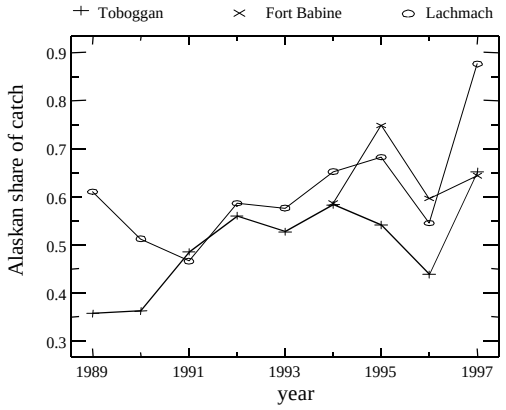
Exploitation rate can be partitioned between the major fisheries. This is shown above for the Canadian troll fishery (left), the Canadian net fishery (middle) and for all Alaskan fisheries combined (right, mostly troll).

Exploitation rates in the Canadian troll fisheries have been steadily declining as a direct result of management actions.

Exploitation rates in the Canadian net fisheries have been variable but not trending. This absence of a reduction masks considerable management actions that have occurred because of the countervailing effects of record sockeye returns in the Skeena. There are no directed coho net fisheries: all of the net harvest is incidental to sockeye fisheries. The incidental coho catch would have been much greater had effort in August not been severely curtailed and then eliminated.

Exploitation rates in Alaska have steadily increased and have entirely offset Canadian conservation efforts.

Alaskan Share of the Catch for Three Northern Indicator Stocks



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This graph shows the Alaskan share of the total catch. Alaska now harvests over 60% of the coho produced by the Skeena, and nearly 90% of the coho from the Portland Canal area (Lachmach).

Productivity differences: coastal vs. interior

		Lachmach		Toboggan
smolts/spawner	*a measure of freshwater productivity*	28.7		20.4
adults/smolt	*a measure of ocean productivity*	0.09		0.11
adults/spawner	*a measure of overall productivity*	4.87		2.00
exploitation rate for sustained production	*consequence of productivity*	81%		57%

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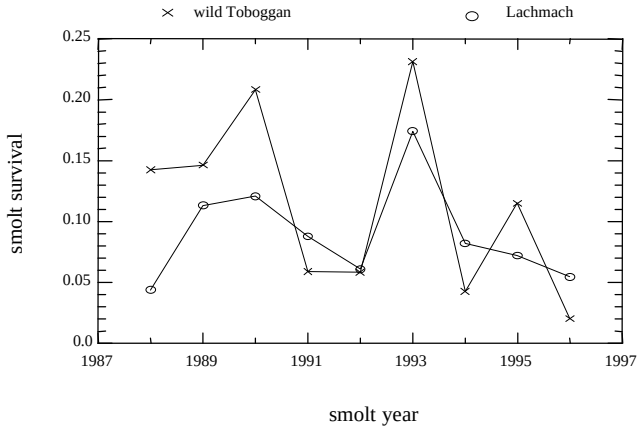
This diagram summarizes what we know about the productivity of coho stocks in the north. The bottom line for productivity is shown in the bottom line of the table which is one estimate of the sustainable exploitation rate. (In fact, these rates are almost certainly over-estimates but the relative magnitudes are approximately correct). The interior population can sustain a considerably lower exploitation than the coastal population. This lower productivity appears due to lower freshwater productivity measured here by the number of smolts produced on average by each spawner. Marine productivity measured here by smolt survival (the average number of adults produced by each smolt) is about the same. We suspect that Toboggan is among the most productive of interior populations, which, if so, makes the mismatch of productivity and exploitation rate even more severe.

Ocean Survivals for Wild Coho at Two Northern Indicator Streams



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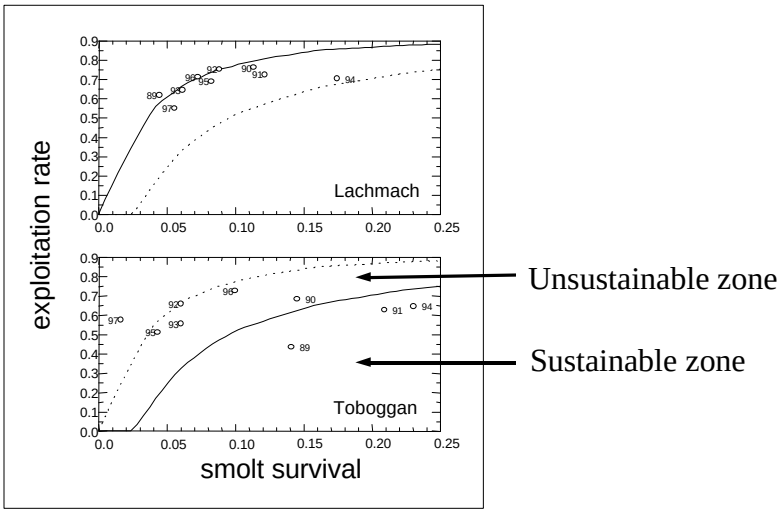
This is a plot of marine survival rates for Toboggan and Lachmach. Survival rates in 1996 (1997 return) were lower at both sites but the decrease relative to 1996 was much greater at Toboggan. The survival rate was significantly over-predicted at Lachmach however. Few populations in the productive coastal areas can persist with marine survivals of 2%. Smolt survivals for other populations in the Skeena, the Central coast and eastern Haida Gwaii were as low and possibly lower (judging by escapements). If the survivals seen in these areas continue this low or worsen, then conservation problems will quickly expand to encompass the whole of the region.

Two additional factors complicate the situation. First, the downturn in survival was unexpected. Although probably related to ocean conditions in some way the possible linkages have not been identified. Second, the survival decline was not predicted for Lachmach coho. This prediction failure greatly adds to the uncertainty for the coming year.

Consequence of Mixed Stock Fisheries and Differing Productivities



There are several approaches that can be used to further illustrate the consequences of the productivity differences between the coastal and interior coho populations. In the above graphs a constant escapement policy has been assumed. It is also assumed that the populations are healthy. The solid line on each graph shows how the exploitation rate (y-axis) should be altered to keep escapements constant as smolt survival varies (x-axis). Ideally fisheries management should track the solid line for each population. A precautionary approach would be to keep well underneath the solid line. The zone above the solid line is over-fishing and in the long run unsustainable. The observed smolt survival-exploitation rate pairs have been identified.

Fisheries have been managed to track the solid line for the productive coastal coho (Lachmach top panel). For most of the time the Toboggan coho have been in the unsustainable zone. The consequence of failing to predict the extremely poor survival for Toboggan coho in 1997 can be clearly seen in that the population was exploited at 60% when a near-zero exploitation would have been more appropriate.

Conclusions

I. severe conservation problem in upper Skeena (upper Bulkley, Babine, Sustut-Bear, high interior)

conservation problem caused by a combination of factors:

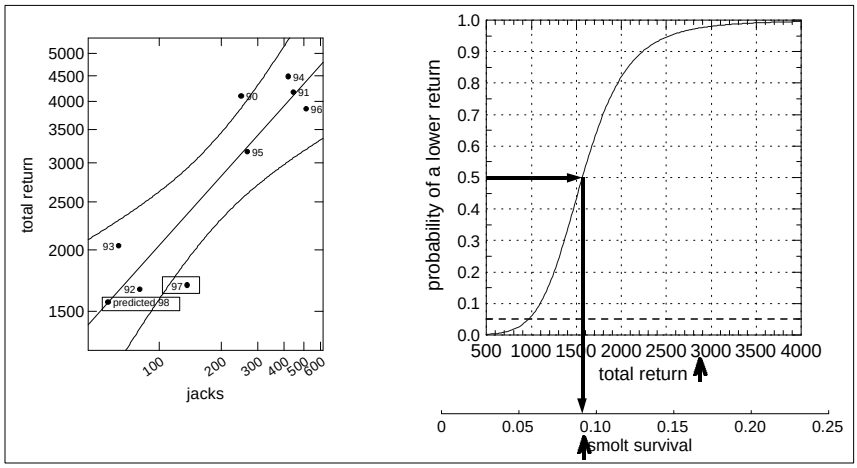
A. chronic over-fishing ➔ poor stock status in interior Skeena

B. poor marine and freshwater survivals ➔ critical escapement situation

C. increasing AK exploitation

II. concern in remainder of Skeena over consequences of second successive recruitment failure in face of uncertain marine survivals and high AK interceptions

1998 Forecast for Lachmach Coho



•The Lachmach River is used to generate a forecast for coho in the Skeena. The Lachmach is located at the head of Work Channel, so it is not in the Skeena. Currently there are no capabilities for generating forecasts local to the Skeena or to the Central Coast.

•The forecasting tool used is a “sibling-regression” shown on the left above. Some proportion of male smolts mature after 6 months in the ocean or 1 year in advance of the remaining males and all of the females. These early maturing males are called “jacks”. Under the assumptions that that proportion remains constant, that most of the yearly variation in smolt survival occurs in the first 6 months in the ocean (prior to the return of the jacks), and that fishing mortality on jacks is low and constant, returning numbers of jacks are used to predict the total abundance of adults in the following year. The relationship for Lachmach coho is shown (on left) and, statistically is highly significant.

•On the right is the probability distribution for the forecasted total return (the number of adults in the ocean prior to the commencement of fishing) and the forecast of smolt survival. The green arrows show how to determine the forecast return and smolt survival for the mean prediction (50% of observations less than the forecast)

•The forecast survival for 1998 is approximately 9%, which is nearly identical to the average observed survival (averages are shown by arrows under the graphs). The forecast return however of 1550 is well below the average return of 2960. This difference illustrates the importance of population status and smolt production. Smolt production in 1997 was well below average at Lachmach probably because of poor over-winter survival of the juveniles. Smolt production in the upper Skeena was probably very poor because escapements have been extremely depressed and there were very few juveniles in many areas. Even if smolt survival was average the expected return of upper Skeena coho is going to be very poor.

•There is also uncertainty about the reliability of the survival forecast. The 1997 return was well below the predicted value (highlighted on left graph), and we have no explanation. It could be a chance event or it could reflect the beginning of a persistent decrease in survival similar to what has been observed in southern BC, WA and OR.

1998 Outlook for Northern BC

1. STATUS: the number of smolts produced falls as status deteriorates.

   Escapement levels & juvenile densities are critically low throughout the upper Skeena (high interior, Sustut-Bear, Babine, upper Bulkley), so smolt output was probably very low.

2. MARINE SURVIVAL: the number of adults that return depends on how many smolts there are, and on their marine survival.

   Marine survival is predicted to be average for Lachmach coho but the same prediction for 1997 was a significant over-estimate with no apparent reason. Survival must be assumed uncertain.

3. ESCAPEMENT TARGET: determines how many fish must be passed through the fishery to spawn.

   Because of the chronic nature of the problem, expected returns to the upper Skeena are so poor that many populations will fail to reach conservation targets even in the absence of fishing.

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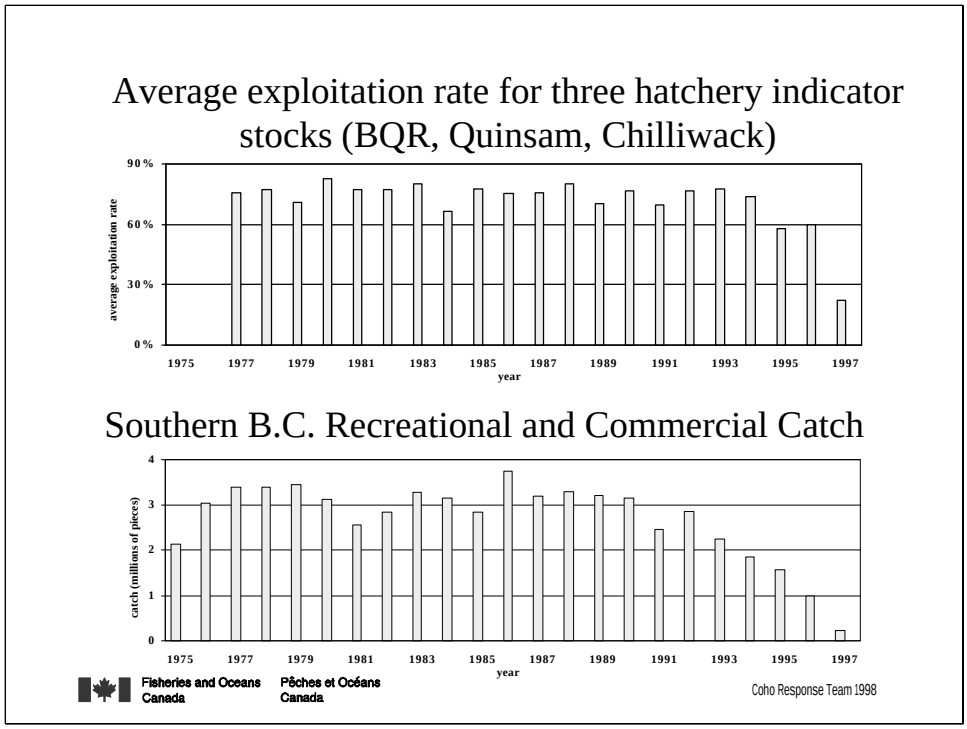
Essentially, advice on fishing is predicated on the three facts presented above.

Conservation targets fall in the range of three to 15 females/km of stream.

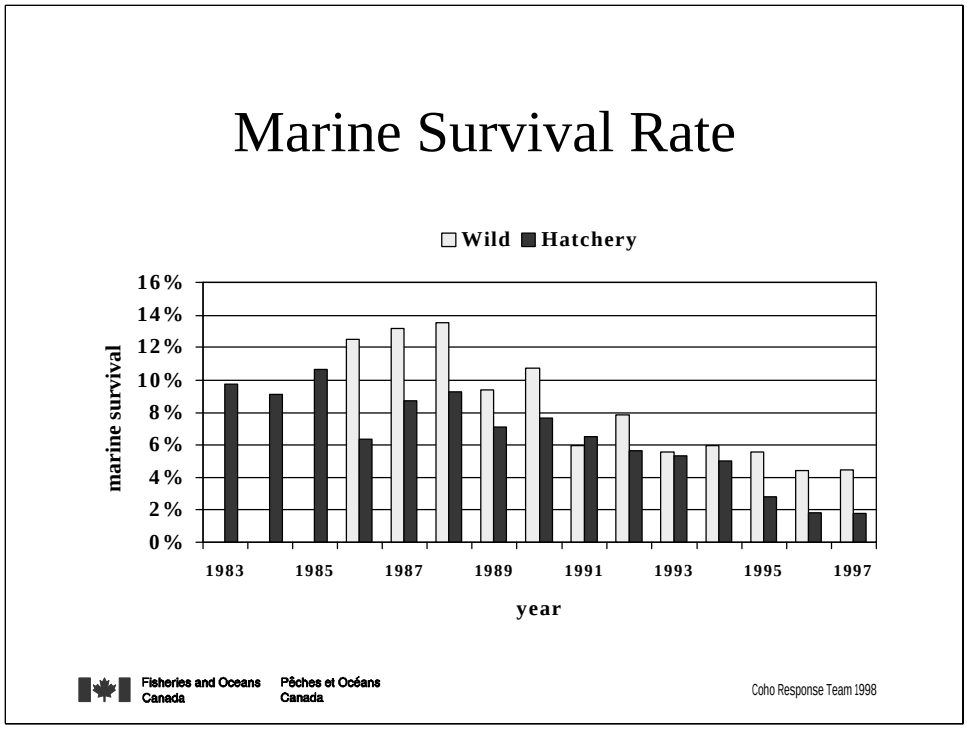
Very few streams in the upper Skeena would approach these levels even with no fishery mortality. Alaskan exploitation alone is more than enough to insure a worsening of the conservation crisis in the upper Skeena.

Southern BC Coho Stock Status and Outlook for 1998

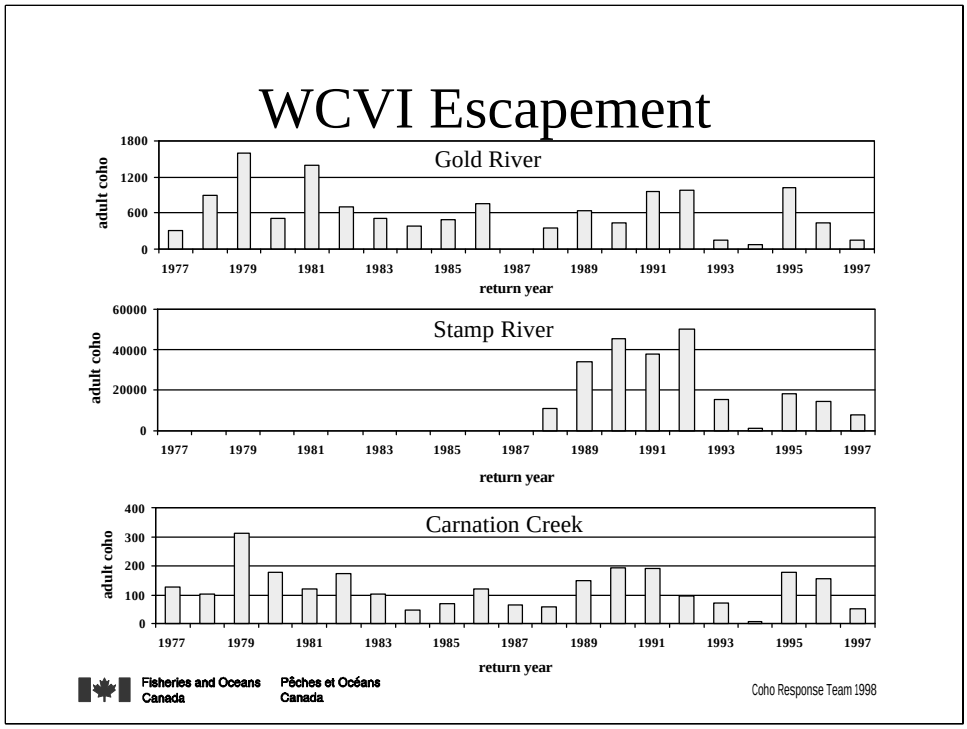


a) Exploitation rates were in the 70-80% range on southern B.C. coho prior to 1995. In 1995 and 1996, average exploitation rates dropped to 60%. The target for 1997 was 20-25%. Information to date suggests that exploitation rates were in the 15-40% range.

b) Total recreational and commercial coho catch in southern B.C. ranged from 2.5 to 3.5 million prior to 1993. Catch began to decline in 1993 as a result of declining marine survival and more recently reduced wild smolt production due to reduced spawning escapement. Reduced exploitation rates in 1995 and 1996 were also contributing factors. The target mortality range (catch plus release mortality) for 1997 was 270K to 341K. Actual mortality was about 225K.



Average marine survival rates (smolt to adult) for Strait of Georgia coho have declined sharply since the late 1980's from the 8-14% range to the 2-5% range for coho returning as adults in 1996 and 1997. Data from the late 1970's indicate that marine survivals were in the 15-25% range. Marine survival rate declines are the major factor affecting coho abundance in recent years.

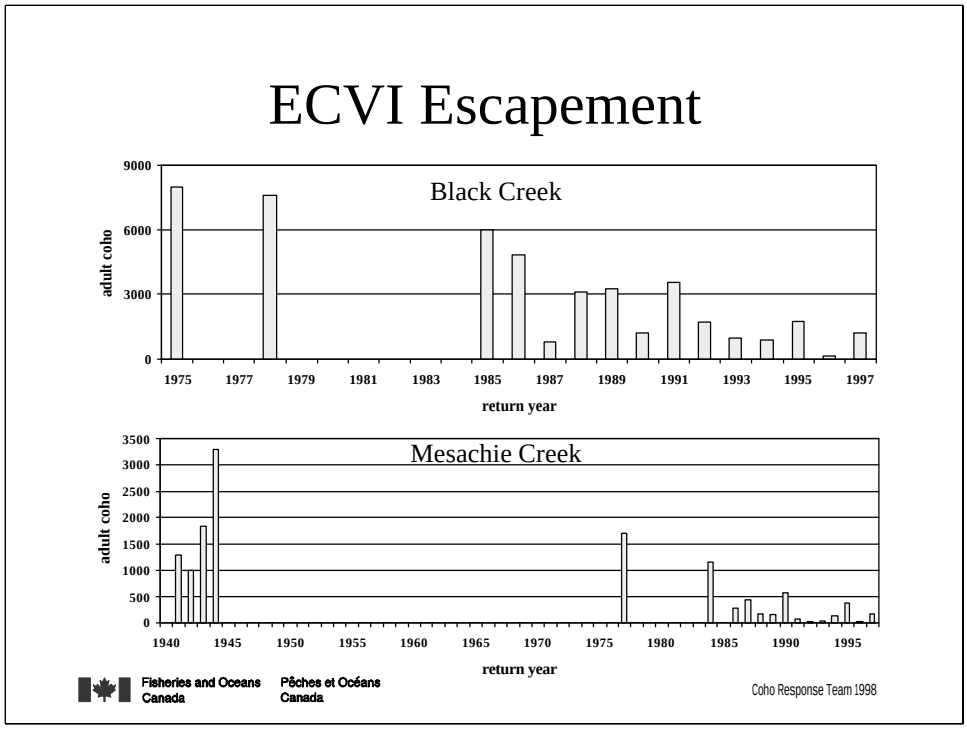


The 1997 coho escapements to 3 west coast of Vancouver Island (WCVI) indicator stocks were much improved over the disastrous 1994 brood year, although not to average levels. Other WCVI streams appeared to have rebounded in a similar manner. Reduced fishery exploitation rates and relatively good marine survivals for WCVI coho were the main reasons for this improvement.

Gold River - This is a count of a summer run coho population made during river swims by Provincial staff to count summer steelhead. The data are indicative of coho abundance and not total counts.

Carnation Creek - This is a fence count from a long-term study into the effects of logging on an outer coastal stream and its fish populations. This project was previously funded jointly by DFO and the Province but has been funded entirely by the Provincial government in recent years.

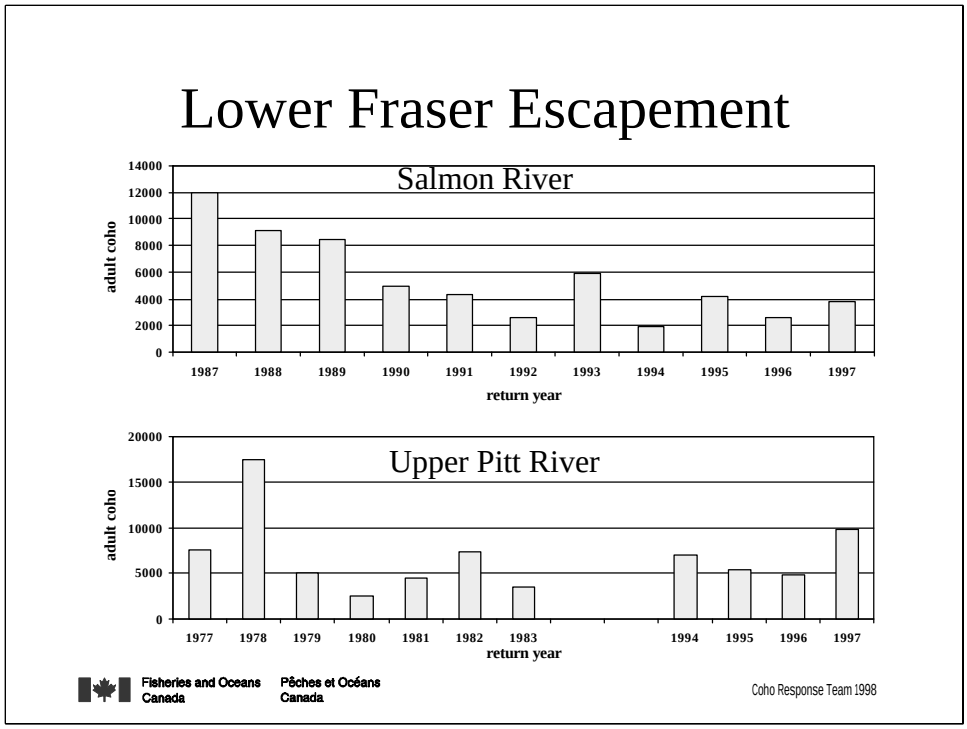
Stamp River - This is the fishway count at Stamp Falls and includes coho bound for the Robertson Creek Hatchery and wild spawning locations in the Somass River watershed



1997 spawning escapement to Black Creek (on Vancouver Island between Courtenay and Campbell River) and Mesachie Creek (Lake Cowichan tributary) were improved over 1996 levels but remain well below historical levels. The escapement to Black Creek of about 1,000 fish is about one-third of the number required to achieve maximum smolt production.

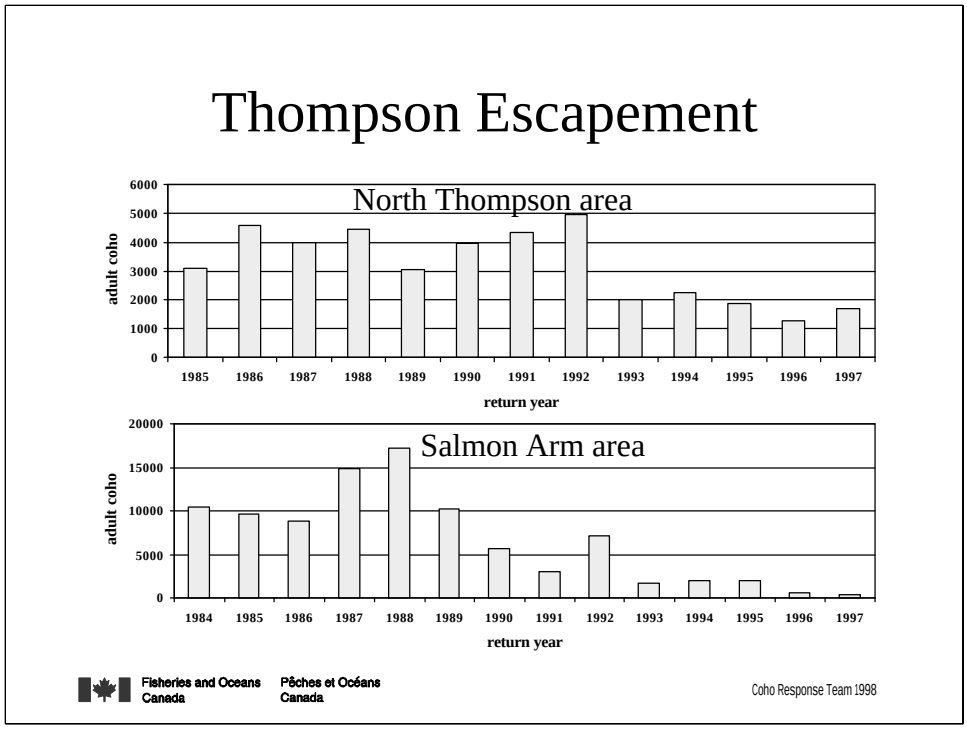
There is a coho enumeration fence on Black Creek but most estimates are made using a mark-recapture procedure since the fence washes out for some period of time in most years.

The Mesachie Creek count is a combination of fence counts and expanded visual survey counts based on fence run timing.



For the Salmon River near Langley and the Upper Pitt River on the north side of the Fraser River, 1997 escapements were an improvement over 1996 and the 1994 brood year. For the Salmon River, where we have the most confidence in our time series of data, the 1997 escapement is still well below late 1980's levels.

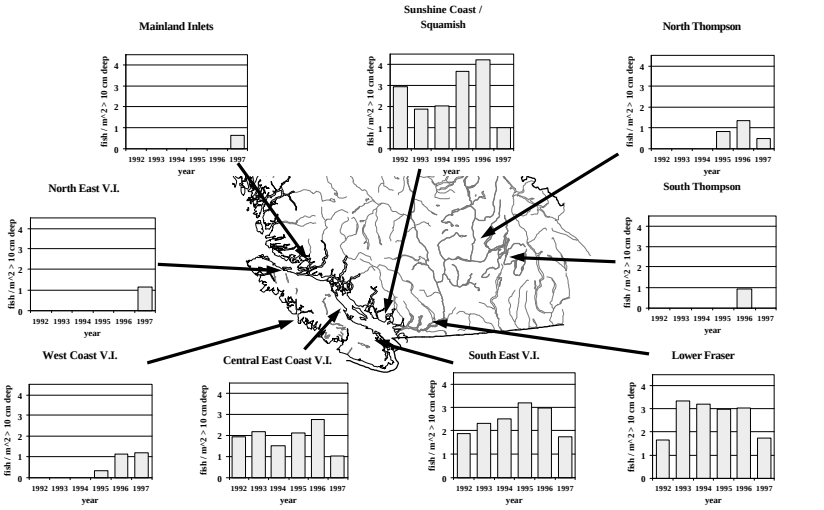
The Salmon River estimate and the upper Pitt River estimate since 1994 are made using a mark-recapture methodology. Upper Pitt River estimates from 1977 to 1983 are from repeated visual surveys.



North Thompson spawning escapement in 1997 showed a slight improvement over 1996 levels but is still well below levels recorded up until the early 1990's. Streams included in this index have been consistently surveyed at least since 1984 and include Avola Cr., Cook Cr., Dunn Cr., Lemieux Cr., Lion Cr., Louis Cr., N. Thompson River, Reg Christie Cr., Tumtum Cr., Wirecache Cr. Dunn, Lemieux and Louis are enhanced and have a fence. The remaining estimates are by visual survey methods. Lion Creek is the stream immediately below the Little Hells Gate slide and may contain spawners bound for streams above the slide. Cook Cr. is above the slide.

South Thompson escapement remains extremely poor. No coho were observed in many streams that previously reported coho present. In particular, the Salmon River and Eagle River stocks (both supplemented by hatchery production) are extremely depressed. Streams included in this index of escapement are, Eagle River, Adams River, Blurton Cr, Canoe Cr., Johnson Cr, Kingfisher Cr., Salmon R., Scotch Cr., Shuswap R. (lower), Shuswap R. (mid). Eagle R. stopped taking brood in 1995, therefore 1997 was the last year of hatchery returns. Salmon River still producing hatchery fish. Fences on both Eagle and Salmon R.

Juvenile Densities - Southern BC



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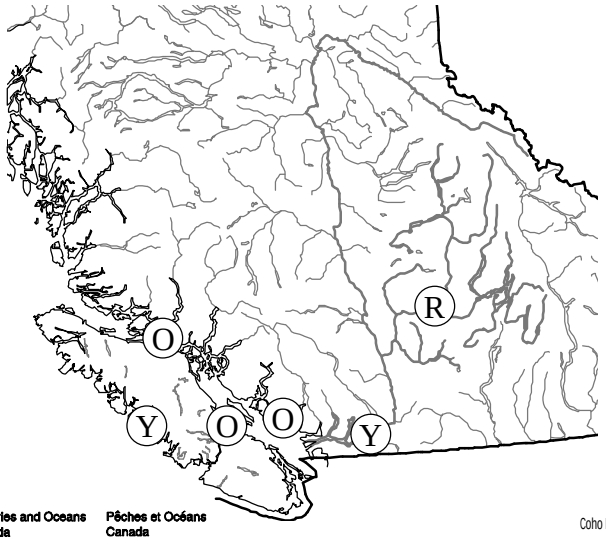
1998 Outlook for Southern BC

- formal forecasts of marine survival, distribution and abundance to be available in late March
- very low marine survival in 1996 and 1997 and expected continuation in 1998
- very low spawning escapement in many areas in 1996 and 1997 means cautious approach is required in 1998
- some early indications of outside migration again

early indications of outside distribution are Dick Beamish's trawl survey catches - 1 coho caught in 44 sets in the St. of Georgia in Feb., 1254 coho caught in 47 sets in Juan de Fuca and west coast of Wash. and VI., also very low salinity in St. of Georgia in Feb.

Southern Stock Status Summary



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Conservation summary

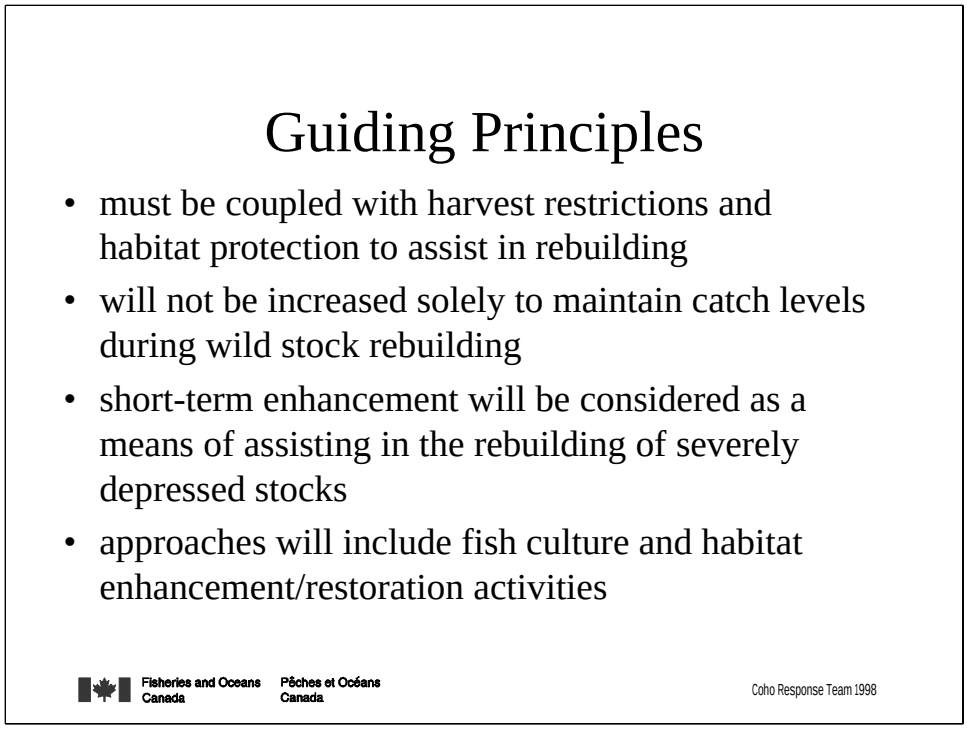
Critical - Thompson

Poor - Sunshine Coast, East Coast of Vancouver Island, Johnstone St.

Fair - lower Fraser, West Coast of Vancouver Island

Good - none

Salmon Enhancement



Enhancement cannot replace the need to restrict harvest rates in fisheries or protect and restore habitat essential for natural production of coho salmon. Enhancement will not be increased solely to maintain catch levels as the goal is conservation of wild fish stocks. Harvest restrictions will have the most direct and widespread impact toward accomplishing rapid rebuilding.

However, a short term enhancement program using fish culture techniques may be a means of assisting in the rebuilding of severely depressed wild stocks. If undertaken, every component of the fish culture operation must be managed to ensure the maintenance of genetic diversity.

As well as enhancement using fish culture techniques, we will also be identifying opportunities for the restoration and enhancement of habitat.

For existing facilities, enhanced production will be maintained at current levels. There has not been a major change in hatchery coho production levels for several years.

We will, however, assemble a list of potential wild stocks in the Thompson and Skeena that could be considered for short term supplemental enhancement. There will also be development of strategies for broodstock collection, spawning, and releases that maintain genetic diversity and are specific for small, threatened populations. A preliminary plan of candidate stocks and strategy options will be prepared for consultation, with the final implementation plan based on the results of those consultations.

Habitat Enhancement / Restoration

- prioritize known habitat enhancement / restoration opportunities, with particular emphasis on Thompson and Upper Skeena
- prepare preliminary options plan identifying short, mid, and long term opportunities
- recommend final implementation plan after consultation

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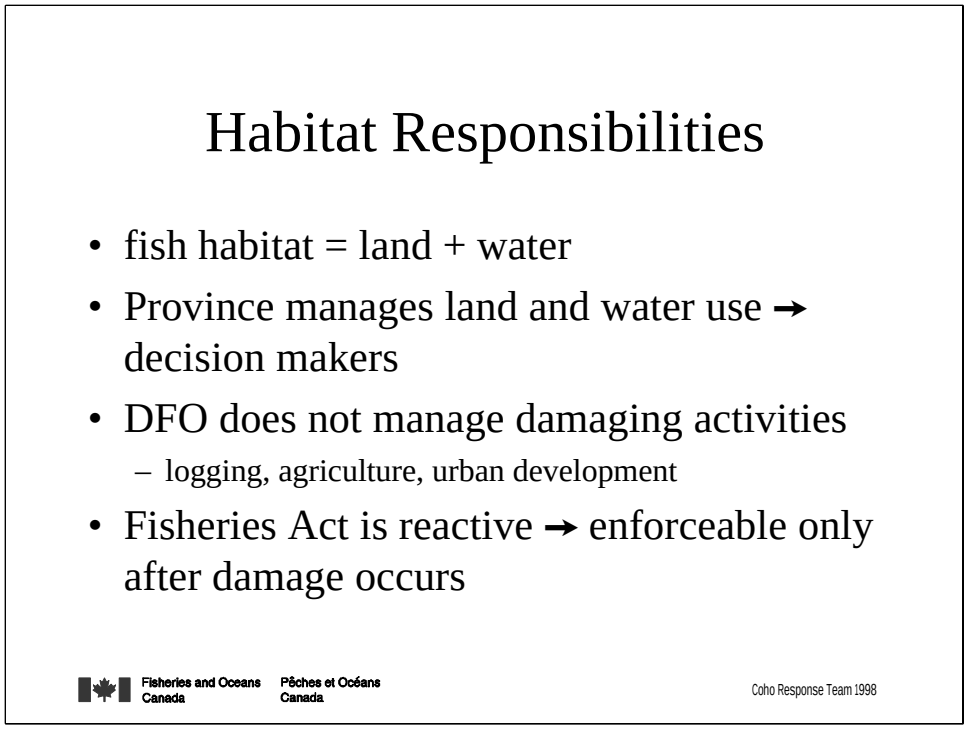
Although there have been no major changes in hatchery production levels for the past several years, there have been many new projects directed at habitat improvement such as the development of groundwater side channels, off channel rearing ponds, and stream bank protection. New and previously identified opportunities for further work of this nature will be prioritized and a preliminary options plan prepared, with emphasis on the Thompson and Skeena areas. After consultation, a final implementation plan identifying short (such as streambank protection), mid (such as side channel development) and long term projects(such as removal of major adult migration barriers) will be developed.

Coho Habitat

Relationship Between Freshwater Habitat And Present Coho Crisis

- relationship between habitat components and fish production is complex and poorly understood
- habitat limiting factors or “bottlenecks” often change



Freshwater habitat includes all aquatic features (lakes, streams, rivers, wetlands) plus the riparian lands adjacent to them. The riparian provides fish food, temperature control, bank stability, large organic debris, buffers against non point source pollution and a host of other critical habitat functions and features.

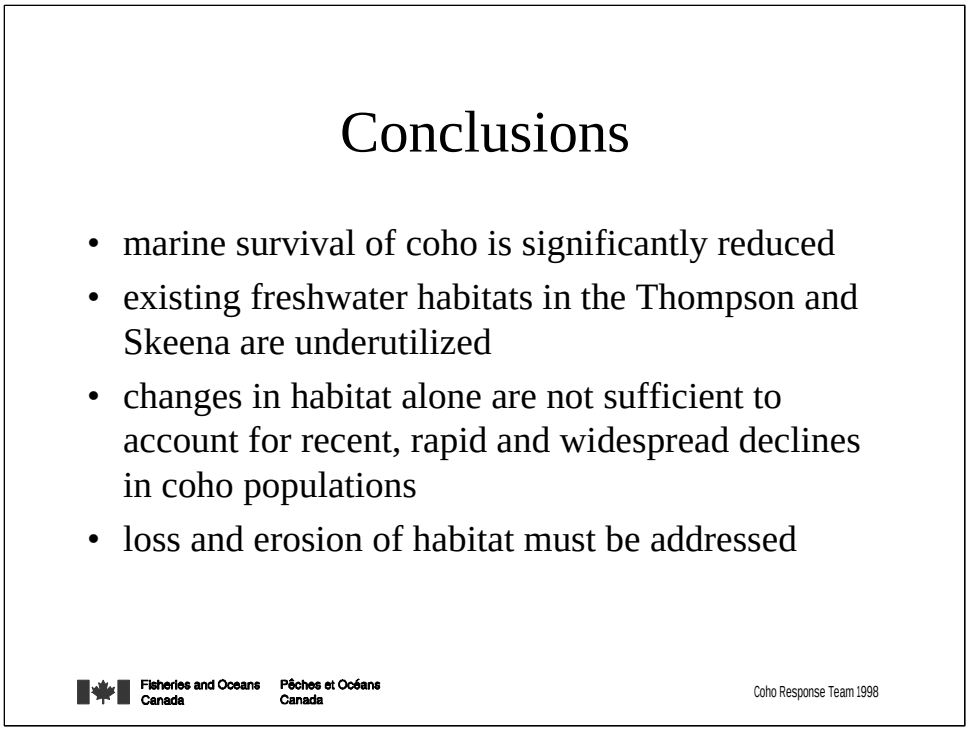
Management responsibilities for habitat are fragmented. Under the constitution DFO manages fish and fish habitat but the province manages land and water. This provincial authority has also been delegated in some cases (i.e.: in settlement areas to municipal and regional governments)

Approving authority for alterations to land and water rest with provincial ministries (i.e. MOF, MoTH, MAFF) or resides with local gov’ts. DFO does not permit, approve or manage land or water resources

Federal Fisheries Act is strong environmental legislation but only applies after there has been a harmful alteration of habitat or the deposit of a deleterious substance. As the Province manages, controls and plans land and water uses they can legislate proactive planning and preventative measures.

Improved Protection Requires:

- increased conservation ethic
- provincial land and water use legislation that emphasizes conservation
- policies/regulations at all levels of government which are consistent with fish habitat protection
- improved stewardship by private landowners
- improved financial incentives to landowners



Marine survival and ocean productivity has changed significantly and has resulted in poor smolt to adult survivals

Of the surviving adults too few are escaping the fisheries to return and adequately seed the available freshwater habitats

Most existing freshwater habitats in the Upper Skeena and Thompson are capable of supporting both more spawners and more juveniles than they do presently, based on current habitat capacity and juvenile densities.

Access to some productive habitats have been eliminated by both natural (Little Hells Gate) and anthropogenic influences (Highway 16) however the available habitats are still not adequately seeded.

While there are significant coho habitat concerns throughout the region which must be addressed in order to sustain rebuilt populations- there has not been a collapse in the habitat base in the Thompson or Skeena that is concomitant with and can account for the dramatic, significant and recent decline in coho populations in these areas.

While there is no evidence at this time to suggest that freshwater habitat in the Thompson and Skeena is responsible for the present coho crisis, the loss of productive capacity in the freshwater environment will ultimately contribute to reduced production.

The ceiling or the ability of freshwater habitats to produce wild fish throughout the region has been reduced over time and we will never be able to rebuild wild populations to historic levels. However we must protect the remaining habitats and restore damaged habitats in anticipation of reestablishing and rebuilding coho stocks.

Historical Conservation Actions

Actions Taken Before 1997

- catch ceilings
- area closures
- reduced fishing season
- fishing gear restrictions
- reduced bag limits
- increased size limits
- restricted incidental catch

stock decline - started in 1980’s and continuing

Actions Taken in 1997: Commercial

- no directed commercial fishery on coho
- area closures
- delayed openings
- gear restrictions
- mandatory release from troll and seine
- voluntary release from gillnet

Actions Taken in 1997: Recreational

- reduction of the daily catch and possession limit - extended to Juan de Fuca and WCVI
- non-retention in freshwater fisheries
- maintained restrictions in Strait of Georgia

Action Taken in 1997: Aboriginal (Fraser River)

- no allocation for native bands below Sawmill Creek and fishery closure from early September to late October
- above Sawmill Creek, fishery closed to Deadman Creek after September 28
- some Shuswap bands agreed to zero coho allocation

Regional Coho Response Team

- objective:
  - to develop an integrated Action Plan for coho for the entire Pacific region.
- organization:
  - includes key staff from all affected Branches of DFO
- time frame:
  - initiated in February 1998
  - external consultations during March-April
  - final report from CRT completed in early May
  - Minister's decisions and announcement by end of May
  - final revisions of fishing plans by DFO by mid-June

Approach

- Working Groups formed to develop each component of Action Plan:
  - Consultation
  - Communication
  - Science
  - Habitat
  - Enhancement
  - Economics
  - Fisheries Management
  - Selective Fisheries
  - Enforcement

Consultation Schedule

February 26, 1998: multi-sectoral Coho Summit Meeting (north and south)

March 17, 1998: wide distribution of background information package

Mid-March - mid-April: focused consultation meetings with each group

April 25, 1998: multi-sectoral Coho Summit Meeting, North Coast

April 26, 1998: multi-sectoral Coho Summit Meeting, South Coast

6.5 APPENDIX - ADVICE AND COMMENTS FROM CONSULTATIONS

6.5.1 Written Submissions Received

The following documents were received by the Coho Response Team in hardcopy (printed) format. In order to simplify electronic transmission of this complete document these submissions were scanned into electronic format and collated into several large graphics files. An optical character recognition (OCR) process was then performed on these graphics files. The advantage of this is approach is that the OCR process converts the graphical image of each document into an actual text version, and in doing so reduces the file sizes by up to 90%. The disadvantage is that the OCR process may introduce errors when the graphics image is converted into text. Every effort was made to proof the OCR documents against the original printed submissions, but some errors may still remain. These are not intentional and the CRT sincerely apologizes to the original authors for any errors that were accidentally introduced through the OCR process.

Due to the poor quality of some of the hardcopies which were received (particularly faxed documents), some documents could not be converted into text by the OCR process. Where this occurs, the graphical image of the document was retained so that no information would be lost by the OCR process.

AREA D SALMON GILLNET ASSOCIATION

Box 375
Quathiaski Cove, BC
V0P 1N0
Tel: (250) 285-3258 - Fax: (250) 285-3268

April 26, 1998

Summary of Area D Coho fishing plan for 1998 as developed by the Board of Directors in Campbell River on thurs April 23rd 1998.

A comprehensive coho plan is required, that deals with all aspects of the coho problem:

-habitat problems
-seal problems
-juvenile coho interception and mortality rates of all user groups
-validation of coho harvest numbers and catch and release mortalities of all user groups

If there is a complete plan in place that everyone can see will work then the extreme conservation moves being considered will be justified. If the guide lines imposed for this years fishery are not consistent across all user groups and real benefit to the coho is not being achieved, it will be very difficult to get the support needed to make any improvement.

The strength of any program put in place, to reduce coho mortalities, will be catch monitoring. A validated and credible monitoring program is required by all user groups. The way to achieve allocations and reduce coho mortalities is by having accurate knowledge of your harvest rates and your coho interception rates, at any given point.

The following are suggestions for an Area D monitoring program:

-There needs to be some form of ongoing coho stock assessment in each area. We need to know where the coho are, before we fish, in order to conduct a successful fishery
- The cost should come out of the TAC
-The cost of the program could be met by revenues raised from fish caught in small area test fisheries prior to a fishery. These tests would be aimed at determining coho abundances and stock composition.
-A log book program for fishermen is reasonable as long as the log book is simple and the means of providing the catch numbers is easy and fast.
_If we were unable to get compliance on a voluntary basis, then logbooks could be a condition of license.
-Th e directors approved the concept of trying to develop a joint catch monitoring program for seines, gillnets and trolls, in Johnstone Strait, for 1998. We will be meeting with the other gear types, D and D Pacific Fisheries and Tana Plewes, of Logical Business Solutions On Monday April 27th, in Vancouver to explore the possibilities of such a

program.

The following ideas were put forward as possible actions that could be taken by Area D gillnets if the coho interception rate was affecting our ability to achieve target species allocations:

-Blue boxes or revival boxes should be mandatory in all catch and release fisheries. Accurate mortality rates for each fishery could then be determined.
-Recommendations could be made to the gillnet fleet as to an appropriate length of time for a set in order to maximize coho steelhead or chinook survival rates. Also recommendations on the optimum amount of web to be used in a gillnet.
-Industry should be more involved in providing scale samples in order to determine which coho stock is currently in an area.
-Catch monitoring should provide a timely and accurate assessment of the amount and location of coho interceptions. Hot spots can temporarily be closed to all user groups. Weekly pre-fishing tests would determine status of each area each week. In most cases it was felt that less fishing area would require more fishing time.
_If coho interception was too high but equal in all areas, the most contentious time of each day could be closed. We would recommend that if this was the only alternative that closures start at a certain time and end at a certain time.
-Area D gillnets could fish below Lewis point, in certain circumstances but in these cases would recommend an extension of our southern boundary to include area 14, which at the moment is barren of coho.
-If each gear type was responsible to meet their own mortality limits then realistic effort would be required by all gear types. A commercial fleet coho slush fund could be used in Johnstone Strait to help ensure that all gears achieve their allocation, as long as it wasn't abused and allowed the least cooperative group the most fish.
-If the mortality rate allowed the commercial fishery became so low that they couldn't fish, then obviously fishing should be closed to everyone.

Proposed Coho Management Plan for the Southern B.C. Recreational Fishery for 1998. (Areas 11 - 29 and Lower Fraser River)

Submitted by the South Coast sub - committee, S.F.A.B.
April 25, 1998.

The Sports Fishing Advisory Board (S.F.A.B.) has long been aware of the declining health of wild stock coho in southern B.C. Research in the minutes of board meetings for well over a decade will show that the recreational fishery has been fully engaged in an effort to reduce the exploitation rate of these fish.

The recreational fishing sector has made a sincere effort to be responsive to the coho conservation imperative in 1998, while at the same time attempting to maintain some opportunity to keep a small number of unendangered coho, which are primarily of hatchery origin. It should be noted that a percentage of B.C. hatchery origin coho from the 1995 brood year are unmarked, and will be treated as wild fish under this proposal

One of the principle ways that the recreational fishery has sought to achieve this goal is through the implementation of a selective mark fishery. This enables the angler to differentiate between wild and hatchery origin coho by the presence or absence of a designated fin, making possible separate limits on the two broad stocks of the same fish. Since 1993 this has been the official management option of the S.F.A.B. for Strait of Georgia/Fraser River origin coho, and the board has been recommending implementation by D.F.O. of this strategy ever since.

We note that a substantial percentage of both Canadian and U.S. hatchery origin coho of the 1995 brood year have had one fin clipped and will be present in the southern B.C. fishery this season. Once again the recreational fishery, through the S.F.A.B., is urging D.F.O. to start using the selective mark fishery as a management tool, for the situation faced by managers and fishermen alike in 1998 is exactly that which it is designed to address. We further note that the proposed management regime presented here is predicated upon use of this scheme in certain areas of the southern B.C. coast

The recreational fishing sector accepts the need to reduce the harvest rate yet further from last years already unprecedentedly low levels. The proposed plan has been crafted to fall within the 10 - 15% harvest rate that was indicated by D.F.O. to be required to meet the conservation goals for coho in 1998. Our understanding is that this translates to a total harvest in southern B.C., by all users, in the range of 60 - 90,000 coho salmon.

Using data provided by D.F.O. staff, the South Coast S.F.A.B. Coho Working Group proposes a plan that is anticipated to result in a mortality of approximately 36,000 fish not identifiable as hatchery coho, by both permitted harvest and release mortality . Through extensive review of coded wire tag (c.w.t.) data and other past catch information, every effort has been made to restrict the harvest of Thompson River coho in particular to as close to zero as is possible. Where there is evidence that these fish may be present, because of geographic and timing information, the retention of wild coho, regardless of river of origin, is precluded in our proposal.

The proposed management plan for the recreational fishing sector in southern B.C. for coho in 1998 was approved unanimously by the south coast S.F.A.B. Coho Working Group on April 21. The Working Group requests a response to this proposal from D.F.O. as quickly as possible, and expects to have the opportunity to modify this proposal further if need be.

One concern that the Working Group has is that, by its own admission, D.F.O. has made a very conservative forecast of abundance of coho in southern B.C. waters this coming season. The department has also indicated it does not have an "in - season" abundance monitoring mechanism. Should this conservative forecast be too much so, and the abundance is somewhat higher than D.F.O. anticipates, then the possibility exists that the recreational catch may exceed the proposal presented here. Other than requesting additional consultation in a timely fashion "in - season", the Working Group does not have an answer to this potential situation, but wishes to flag it for consideration by the managers so that a "good news" situation doesn't become "bad news" without good cause.

To achieve the proposed management regime, the Coho Working Group has separated the south coast region into what it considers to be workable areas based on geographic considerations, and utilizing D.F.O. catch and c.w.t. data from past years. As mentioned earlier the proposal is based on the implementation of the selective mark fishery for coho, at 2 marked only coho per angler per day. In areas where particular stocks of concern are not present and there is a probable (as demonstrated by past c.w.t. returns) low number of hatchery fish present, it is proposed that the daily bag limit remain at 2 coho per angler per day, marked or not. Some explanatory notes follow to help understand how the Working Group developed the proposal.

* A hatchery coho is considered to be any fish having a fin missing with a healed scar in it's place.

* Area 23A (inside the Alberni Canal) and Area 28 (inside Pt. Atkinson) were, after consultation with D.F.O. staff, considered to be terminal exclusion zones because in excess of 90% of the coho catch in these areas is from hatchery stocks.

* Areas 19 - 21 (Strait of Juan de Fuca), the proposal is based on the move to 2 coho per day from the selective mark fishery on September 15 as the stocks of concern will have moved through these waters by this time.

* The recreational coho fishery in the lower Fraser River is not scheduled to start under this plan until October 10th. Prior to that date there would be a non retention of coho regulation in place. After that date only the retention of ventral fin clipped coho would be allowed. Such a regulation is felt to be workable because the vast majority of coho present in the river at that time are from lower Fraser tributaries and much of the coho production from the hatcheries on those rivers were ventral fin clipped.

* The recreational fishery has always had a very high level of compliance with management regulations. Because regulations specific to coho will not be decided until after the season has started, in order to ensure sufficient understanding of the new regulatory regime there needs to be a pro - active program to promote awareness of the coho management strategy decided upon for this season. Recreational fishing sector interests have offered to assist D.F.O. in some form of education and communications strategy once a decision has been made.

PROPOSED 1998 COHO RECREATIONAL FISHERY MANAGEMENT PLAN,
AREAS 11 - 29 PLUS LOWER FRASER RIVER.

AREA	MGT. PRESCRIPTION	TOTAL	INSIDE
13 -18 STRAIT OF GEORGIA	2 PER DAY	4328	3809
28	2 PER DAY	1309	1309
19 - 21 STRAIT OF JUAN DE FUCA	MARK ONLY 2 PER DAY	20859	12987
23A	2 PER DAY	529	0
23B	MARK ONLY 2 PER DAY	3960	1108
24 - 27	2 PER DAY	12187	3410
11 AND 12	2 PER DAY	6500	4550
LOWER FRASER RIVER	MARK ONLY 2 PER DAY	1600	1600
TOTAL MORTALITIES		51272	28773
LESS HATCHERY FISH RETENTION		15368	15239
CATCH AND MORTALITY OF COHO OTHER THAN HATCHERY ORIGIN		35904	13594

Additional Notes to the Area by Area table.

* Included in the total mortalities for areas 19 - 21, Strait of Juan de Fuca, are an estimate of 5625 mortalities from the release of non - marked fish.

* Included in the total mortalities for area 23B, outer Barclay Sound and adjacent coastline, are an estimate of 1660 mortalities from the release of non - marked fish.

* The total mortalities south coast wide have been expanded to include a total of 200 Thompson River fish (Salmon River facility) which could possibly be retained due to their having been adipose fin clipped in the 1995 brood year. This is a very high estimate, due to the fact that D.F.O. data shows only 244 of these fish were taken in the 1997 fishery when a far greater number of marked Thompson fish were present, and it is expected that the effort in recreational fishery will be somewhat lower in the 1998 season.

April 24, 1998

Mr. Colin Masson,
A/Director, Client Consultation,
Fisheries and Oceans,
Pacific Region,
3190 Hammond Bay Road,
Nanaimo, B.C.,
V9R 5K6

Dear Sir:

Re: 1998 Fishery

In response to the key questions and issues for Coho consultations, the following answers relate as per the questions posed,

1. Coho abundance for 1998 should be zero.
2. The exploitation rate for Coho should be zero.
3. There should be no directed Coho fishery for any group in 1998.
4. Regarding Coho enhancement, please see the writer's response under No. 8 below.
5. Regarding habitat action, please consider the answer to No. 8 below.
6. There should be a selective-mark fishery for hatchery Coho for the recreational fishery only once stocks are determined to be "healthy".
7. The 1998 salmon fisheries should be managed to account for the overall abundance of southern B.C. salmon species.
8. The writer proposes a target closure for Coho, coast wide for all groups, in 1998. Furthermore, in terms of management, the writer feels strongly that:

- Chinook and Coho should be allocated to the recreational fishery only in terms of highest economic benefit to the citizens of Canada.

- Sockeye, pink and Chum should be allocated to commercial and native fisheries only until such time as the commercial fishery is wound down.

...2...

- Commercial fishermen should continue to participate in the fleet buy back program. The Federal Government should provide retraining programs for those commercial fishery participants in the areas of aquaculture and/or habitat enhancement This would mitigate the economic impact on coastal communities who presently reply (RELY) on the commercial fishery. By transform ing from one commercial aspect (i.e., the historic commercial fishery for salmonoids as we know it), to the commercial aspects of aquaculture, those citizens who wish to remain in commercial fishery can do so.

  The recreational fishery should be subject in 1998, and beyond if necessary, to a barbless hook, catch and release fishery for Coho and a minimum two per day allocation for Chook (CHINOOK) salmon.

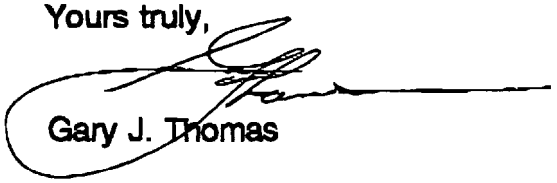
There is no mystery that our Federal Government has known for a long time that there is no economic justification for a commercial fishing fleet on Canada's west coast. The future is in the aquaculture industry for farm raised salmon and other species. The argument that the elimination of the commercial fishery as we presently know it would mean eliminating a way of life, resulting in an negative impact to coastal communties is in fact a fallacy if those displaced were offered retraining and participation in the acquaculture industry and/or salmon enhancement programs if we truly wish to tackle the problem and enhance the stocks on this coast. In this manner jobs would be retained and the resource enhanced.

These are quickly changing times and commercial fishers must realize there are better technologies available for meeting the world demand for fish consumption. It is also apparent DFO knows very well the highest and best use of a Chinook and/or Coho salmon is by allocating same to the sport/recreational fishery. The future on this coast, including the coastal communities who fear they are threatened, is tourism, and we must capitalize on this opportunity while we still have the ability to save and enhance our stocks and in doing so, enhance the recreational fishery, which in turn can play a major component within the tourism industry which in effect has the beneficial spinoff and positive economic impact on the communities in which the recreational fisheries are found.

...3...

9. In terms of a follow up I would simply appreciate an acknowledgement that the minister has heard the views which I have expressed.

Yours truly,



Gary J. Thomas

Masson, Colin

From: Sharon Chow [scbc@islandnet.com]
Sent: Friday, April 24,1998 9:48 AM
To: Masson, Colin
Subject: Your questions re: coho

Hi Colin:

With respect to the 9 questions, the Sierra Club of BC takes the position that we must be as conservative and cautious as possible in order to protect the genetic components of salmon stocks. Our response would attempt to reflect that view.

1. Forecast of coho abundance for 1998: We recommend 75% or more.

2. Exploitation Rate: We recommend aiming for 0%, particularly for specific endangered stocks.

3. Directed Coho fisheries: We recommend NO directed fisheries by any group. We would even balk at "indirect" fisheries.

4. Coho Enhancement: The Sierra Club requires more information before supporting Coho Enhancement. It should not be seen as the solution to our problems.

5. Habitat Action: The first thing DFO should do is go after the Forest Practices Code as the Code has actually been weakened, and does not protect the riparian zone of fish. We can't allow further logging to destroy habitat. DFO should ask for sign -off on all forest cutting plans.

6. Selective - Mark fishery: We don't support marking, until the wild stocks have been rebuilt.

7. Salmon fisheries should be managed to account for everything, particularly the endangered stocks, and the southern and northern BC coho.

8. Benefits: Naturally, we want to see total conservation benefits, but recognize the need to ensure that fishermen are looked after through retraining.

9. Additional followup: Keep us posted via email, internet, fax. Possibly have a meeting if DFO plans a different approach, or there is some further crisis.

Possibly, provide us with a budget of how much is being set aside for the coho fishery would be useful. If you don't have the budget for implementation, then we, as stakeholders should press for additional funds.

****

Sierra Club Mission:

To explore, enjoy and protect the wild places of the earth;

To practice and promote the responsible use of the earth's ecosystems and resources;

To educate and enlist humanity to protect and restore the quality of the natural and human environment; and

To use all lawful means to carry out these objectives."

****

1998 COHO ACTION PLAN

A DRAFT WORKING PAPER

Prepared by

Ad Hoc Coho Alliance

PLEASE SEND COMMENTS TO:
Eric Tamm, coordinator
e-mail: coastcom@island.net
fax: (250) 726-2268
tel: (250) 726-4683

DRAFT No. 2--April 23, 1998

PREFACE

This document is the product of a consensus-building process developed by members of the *Ad Hoc Coho Alliance* which first met on February 27. Subsequent meetings were held between commercial fishermen, communities, First Nations, recreational fishermen and environmentalists who participated in the Alliance process. Appendix 'A' contains a list of individuals involved in the various meetings.

This Draft Working Paper represents our work to date. **It is not yet a consensus document**; considerable work still needs to be done in gauging the views of groups and individuals who haven't participated extensively in this process. We encourage all groups and individuals to add their views and ideas to this process. **The document should not be read as the final position of groups, but a reflection of the discussions we've had.**

Members of the Ad Hoc Coho Alliance recommend to DFO that this document be used as the basis for further discussion and consultation with the department on its 1998 coho conservation plan.

The following groups have agreed to use this Draft Working Paper as the basis of discussion to build common ground on a 1998 Coho Action Plan. We recommend that the Department of Fisheries and Oceans hold a meeting with members of the Coho Alliance and other interested stakeholders to further develop a consensus on 1998 coho conservation measures.

NAME	TITLE	ORGANIZATION

INTRODUCTION

British Columbia's coho salmon stocks have been in decline for more than 10 years. As the death of a canary indicates the presence of poisonous gas for underground miners, the death of the coho salmon marks the advance of destructive economic development—a lethal combination of domestic fisheries government mismanagement, habitat degradation, declining ocean survival rates and Alaskan over-fishing.

In particular, the Upper Skeena and southern Thompson River wild coho are facing extinction. Most other coho runs are in poor shape. Only a few are at adequate escapement levels.

After monitoring the decline of the coho for 10 years, the Department of Fisheries and Oceans has declared a conservation crisis. In 1997, DFO implemented a moratorium on all directed commercial coho fishing in the South Coast. The commercial catch declined from 1.8 million to zero in only a few short years. In 1998, the moratorium will be extended to the North Coast. Fishermen will be faced with some of the most stringent conservation measures ever implemented in the West Coast fishery. The Minister of Fisheries has also appointed a Regional Coho Response Team and a stakeholder consultation process to deal with the immediate crisis this summer.

BUILDING A COMMON AGENDA & ACTION PLAN

This Coho Action Plan is a grassroots, stakeholder response to DFO's "consultation process." With harsh conservation measures impacting all fishing sectors, there's enormous potential for conflict among groups. The allocation of coho by-catch to commercial sectors will determine whether they can prosecute their abundant sockeye and chinook fisheries and be economically viable. According to DFO, Alaskans continue to harvest between 60 to 90 percent of North Coast coho and the Treaty still isn't settled. Aboriginal and environmental groups have tried to get a federal court injunction to stop the directed sports fishery on coho in 1997.

Despite the potential for conflict, DFO has not developed a process to resolve disputes between sectors or increase dialogue or awareness of each others' interests and mutual concerns. DFO held a multi-stakeholder information session on Feb. 25 and a concluding meeting of all groups on April 27. No substantial process was developed to facilitate the development of common ground for a coho action plan. DFO maintained its status quo, sectoral process—often referred to as its "divide-and-conquer" strategy to keep groups apart and the department in control.

Realizing that the department was unable or unwilling to facilitate dialogue between potentially conflicting interests, the *ad hoc* Coho Alliance was formed at an initial meeting on Feb. 27, to resolve potential disputes and to develop a common ground action plan, both short-term and long-term, to save B.C.'s coho stocks. Representatives of the commercial, sport, aboriginal, environmental and community sectors attended ad hoc Coho Alliance meetings almost every second week for the past two months, on March 11, March 25, April 9, April 14 and April 23. (Please see Appendix 'A' for attendance list for meetings).

The diverse group came to a consensus that while there is an immediate crisis to conserve coho in 1998 fisheries, any real strategy to conserve and rebuild these endangered coho stocks, and other salmon species facing a similar situation, must be done through a multifaceted, short- and long-term, strategy that takes into account fisheries management, habitat destruction and the human face to the decline of the stocks. First Nations will be denied the cultural activities associated with coho harvesting, and fishermen and fishing communities will have economic activity severely curtailed because of the commercial moratorium.

The Coho Action Plan has been divided into four chapters: Long-term habitat strategy, mid-term fishing community investment strategy, a short-term coho-safe fishing strategy for 1998, and the Pacific Salmon Treaty.

1. LONG-TERM STRATEGY HABITAT PROTECTION AND RESTORATION

In the long term, the coho crisis will intensify unless immediate steps are taken to alleviate the erosion of healthy coho habitat. The experience of Washington, Oregon and California is compelling evidence of what can go wrong when habitat concerns are ignored. The main threats to habitat are well known, and include damage from logging, urbanization, loss of estuary habitat, water extraction, hydroelectric development and agriculture.

Habitat and Stock Assessment

Protecting coho habitat requires a full inventory of habitat conditions for all stages of the coho lifecycle: spawning habitat, rearing habitat and estuary habitat. Assessing the impacts on that habitat requires baseline information and monitoring of changes from various kinds of development. It also requires detailed spawner and juvenile enumeration to have a clear view of the effects of habitat impacts on coho populations. This information is simply not available to any degree necessary to conduct an adequate analysis of habitat conditions or population trends on the vast majority of coho streams. Of the 2,500 coho stocks

in B.C., about half of them, almost 1,300, have no current information-on stock status. For known coho stocks, the information is spotty at best. Compounding the problem is the fact that little is documented on the condition of spawning or rearing habitat. Of these stocks, DFO admits that they have habitat information on a few hundred systems, with probably 90 percent or more of the province's coho streams having no current information on habitat status.

RECOMMENDATIONS

1 .1 Funding and staffing levels at DFO and MELP must be returned to levels that will allow adequate habitat assessment and monitoring, and adequate impact in the development approval process and various land and water use processes.

1. 2 A major stock assessment program should target firm enumerations of the majority of streams within five years. Such a program should include the combined forces of DFO and MELP staff, non-profit stream-keeper groups and fishing industry workers to assist in habitat and stock assessment on all parts of the coast. Funds should be made available to non-profit groups and fishing industry groups to ensure a core of paid, trained stream assessment personnel can augment and coordinate volunteer efforts.

Forest Practices

The Forest Practices Code has not stopped the steady loss of coho streams or their riparian habitat, for several reasons. First, the Code allows clearcutting up to the banks of small coho streams and side channels. For streams less that 1.5 metres in width, there is no riparian buffer reserve zone. Some reports indicate that up to 80 percent of these small streams are being clearcut to the stream bank. Second, an alarming number of streams are being mis-classified (as smaller, or non-fishing bearing streams) by logging companies, or are simply not being identified. This is due, in part, to the fact that company foresters are responsible for stream assessments, not professional fish biologists. Third, the Code is not being adequately enforced. Enforcement capacities of the Ministry of Forests, the Ministry of the Environment and the Department of Fisheries and Oceans have been severely cut back. Finally, major revisions to the Code in March 1998 will further weaken the Code's ability to prevent habitat damage, as the government's own watchdog has recently confirmed.

RECOMMENDATIONS

1.3 Forest practices should be reformed in the following manner:

- Mandatory retention of trees in buffers along all streams, including class 4, 5 and 6 streams under the Forest Practices Code.
- No logging on slopes having an identified "high" likelihood of landslides after logging.

- No logging on slopes having an identified “high” or “moderate” likelihood of landslides after logging in coho-supporting watersheds.
- Strict controls for road building on sensitive slopes.
- Strict erosion and sedimentation control on all logging roads.
- Stronger protection for wetlands, marshes and off-channel habitat.
- Mandatory and binding watershed assessments in all coho-supporting watersheds where the level of cut is greater than 20 percent.
- A strict requirement for detailed fish and fish habitat inventory assessments, approved by registered, professional fisheries biologist in coho-supporting watersheds.

Urbanization/ estuary protection

Many streams, both in the Lower Mainland and on Vancouver Island, have been paved over and otherwise destroyed by housing and industrial development, culverting and road building. Over 80 percent of the lower Fraser estuary marshlands have been destroyed. Many storm-drain systems empty directly into urban streams and some combined sewage stormdrains continue to pollute the Fraser River and Burrard Inlet.

RECOMMENDATIONS

1.4 The riparian protection provisions being negotiated under the auspices of the Fish Protection Act need to be scientifically defensible, and implemented with effective outreach, education, incentives (tax and other) and where necessary regulations.

1.5 Remaining marshlands need strict protection, and a major rehabilitation program is needed to restore marsh areas. Strict wood debris controls are needed to keep wood off of Fraser marshlands. Log salvaging regulations should be amended to provide incentives to clear logs off marshes. Dredging should be controlled to avoid times of coho migration and rearing.

Agriculture

Agriculture has destroyed coho habitat through run-off, cattle grazing, water extraction for livestock and irrigation, and loss of riparian vegetation.

RECOMMENDATION

1.6 Meaningful regulations to control manure application and storage, tile drain discharge, pesticide use, irrigation and cattle access where impacts are shown on coho habitat.

1.7 A combination of education, incentives and regulation is necessary to

overcome this aspect of the problem. Most farmers and ranchers embrace conservation efforts once sufficient information is provided to them.

Water Extraction and Hydro Development

Some water licences in B.C., primarily those issued for the purpose of generating power, do not make adequate provision for the needs of fish. As a result, many major salmon runs have suffered precipitous declines, such as on the Cheakamus and Alouette Rivers. Unfortunately, water for fish remains a discretionary consideration for the Water Comptroller when issuing water licences, even under the provisions of the Fish Protection Act. This represents no change from the status quo that has failed us so badly for the last fifty years.

RECOMMENDATIONS

1.8 Water for fish should be made mandatory, and independent scientific tribunals should determine adequate levels.

1.9 The provincial Fish Protection Act should be fully implemented on an emergency basis with priority on designating coho streams in danger, with waterflow protections on threatened streams. Expand Fish Protection Act coverage to include a ban on hydroelectric development on tributaries of significant salmon rivers.

1.10 Water Act amendments should ensure minimum flows for salmon before any new water licences are issued on threatened streams

1.11 Review possibilities for decommissioning inefficient or unused hydro electric dams to restore coho habitat.

Pollution

Coho are impacted my multiple pollution sources during their migration to open ocean, impacting their survival rate and causing stress. Pollution problems include pulp mill effluent, municipal sewage, storm drain run off and industrial discharges.

RECOMMENDATION

1.12 Pollution permits should be strictly enforced. Accumulative pollution effects should be taken into account in order to put a cap on overall pollution impacts. Acceptable pollution levels should be determined by all health affects on all stages of the salmon life cycle, not simply mortality indicators. The governments must maintain its commitment to zero pulp mill organochlorine

discharges. Move to secondary treatment of all municipal sewage with adequate provincial and federal funding for municipal infrastructure.

Enforcement

Severe budget cuts to habitat protection at DFO and the Ministry of Environment, Lands and Park (MELP) has made it very difficult to maintain any level of credibility in enforcing any environmental standards or provisions of the federal Fisheries Act.

RECOMMENDATIONS

1 .13 Return to 1980s field staffing levels for DFO and MELP.

1.14 DFO should be taking a tough approach to enforcement and prosecution of Fisheries Act habitat offenses and should be making major use of the Fisheries Act provision allowing directives on minimum waterflows in streams. Strict enforcement of provincial environmental regulations to protect coho habitat

2. MID-TERM STRATEGY
INVESTING IN FISHING COMMUNITIES & FISHERMEN

INTRODUCTION

Fishermen and fishing communities are facing one of the bleakest years in recent memory as a result of a number of factors:

- depressed salmon prices
- low abundances in some fish stocks, particularly in the North Coast
- declining ocean survival rates and El Nino
- federal fisheries licensing policy and regulations
- stringent conservation measures as result of the coho crisis

The commercial fisheries and the communities dependent on those fisheries will be especially hard hit. The closure of commercial coho fisheries will have significant impacts on the incomes of many fishermen and communities. The table below outlines the sever reduction of coho catches by trollers as a result of the conservation crisis. Historically, trollers harvested more than 80 percent of coho on the B.C. coast. The stringent conservation measures may also curtail trollers access to abundant chinook stocks.

Reduction in commercial coho catch			
	1983-94	**1997**	**1998 Expected**
North Coast Troll	877,000	167,000	0
South Coast Troll	1,905,000	0	0
Total	2,782,000	160,000	0
Reduction in chinook catch because of coho by-catch concerns			
North Coast Troll	209,000	84,000	?
South Coast Troll	365,000	52,000	?
Total	574,000	136,000	?

SOURCE: DFO Pacific Roundtable on the Revitalization of the Salmon Fishery, Area Licensing Data, 1995, and DFO 1997 catch estimates.

The decline of B.C. coho stocks has also had a detrimental effect on B.C.'s sports fishing industry. The disappearance of coho in the Inside Passage has reduced the sports catch from a high of more than one million coho in 1988 to around 100,000 in 1997, a 90 percent decline in less than 10 years. Coho represent about 35 percent of all angler expenditures in the B.C. sports fishery, according to the B.C. Jobs Protection Commission 1996 Report, *Fishing for Answers*. The Commission also estimated that the sports industry lost 25 percent of its revenues because of the increased conservation measures on chinook salmon in 1996 and the misinformation and alarming headlines in North American daily newspapers about the decline of the chinook salmon which scared aware potential anglers. Similar impacts may occur in 1998 as a result of the coho conservation crisis.

Clearly, there's a human face to the coho crisis which will harm troll-fishing landing ports like Masset and Ucluelet, small-boat fishermen, small-business charter operators in coastal communities and all related service industries. There must be a strategy to re-invest in these fishing-dependent communities to rebuild their fisheries for the future.

PRINCIPLES OF SUSTAINABLE DEVELOPMENT

In order to create economic viability and sustainable development in the salmon resource, fishermen and communities need stability which can come from consistent and balanced policy principles and criteria. Any overall investment strategy or policy reforms must be based on those principles.

RECOMMENDATIONS

2.1 The DFO and Province must apply the "Sustainable Development Criteria" of the Auditor General of Canada to all its policies and operations to ensure mistakes aren't repeated. The DFO and Province must also review the present situation in the fisheries to see how they are meeting those criteria.

NORTH COAST AND SOUTH COAST SITUATIONS

The dire social and economic situation on the North Coast can not be overstated. Over the next two years, North Coast fishermen and communities will have severely reduced incomes, so low that most won't even break even. This is, in part, a result of the following factors:

- sockeye over-escapements in 1994 and 1995 in the Babine system resulted in stock collapse and extremely low abundance in sockeye fisheries for all sectors in 1998 and 1999. This mismanagement must be prevented in future fisheries.
- Alaskan over-fishing of North Coast sockeye and coho have reduced opportunities for Canadian fishermen.
- Northern fleets will be especially hard hit because the DFO has restricted their access to the more abundant Fraser River sockeye stocks. The DFO has broken a commitment to northern fishermen which was made by past Fisheries Ministers.

The situation for South Coast fishermen is particularly bad for the troller, like in the North Coast, because of this sector's traditional dependence on coho. Also, a high diversion rate of sockeye through the Inside Passage because of warm water El Nino conditions on the West Coast of Vancouver Island will mean that communities on the West Coast will be facing economic devastation similar to communities on the North Coast.

The following recommendations should be implemented as an interim "bridge" for fishermen and communities, while the fisheries resources are rebuilt and conserved over the next couple of salmon cycles.

RECOMMENDATIONS

2.2 LAY-UP PACKAGE: The DFO should immediately implement an annual lay-up package for commercial fishermen over the next three years, including waiving commercial licence fees and providing fishermen with training and work in stock assessment, habitat protection and restoration, and other conservation projects (described in more detail below). Fishermen would be provided a livable income in return for working on renewal and conservation strategies. Training should also be provided for the professionalization of fishermen and developing entrepreneurial marketing skills for independent small-boat fishermen who want to develop value added and niche markets.

2.3 There should be no consideration of a license buy-back without the input of the Provincial Government as part of the Canada-B.C. Agreement on Fisheries and the input of stakeholders, communities and First Nations

INVESTING IN HABITAT, STOCK ASSESSMENT AND ENHANCEMENT

There exists a tremendous amount of work that needs to be done in habitat mapping and inventory, stock assessment in remote streams and enhancement work as described in Chapter 1 of this report. DFO has been downsized so significantly that the department knows very little about most fish-bearing streams. A multi-year funding commitment needs to be made to habitat protection and restoration, guardianship programs and enhancement.

RECOMMENDATION

2.4 FISHERIES REBUILDING STRATEGY: The Government of Canada, working with the provincial government agencies, should make a 3-5 year commitment of $350 million dollars in habitat protection and restoration, mapping and inventory, guardianship programs and enhancement. The projects would be designed and delivered through community-based regional partnerships of local government, First Nations, fishermen, volunteer groups and conservation/environmental groups. Jobs and training would be provided for fishermen and First Nations in communities who've suffered from declining stocks.

INVESTING IN FISHERIES CONSERVATION

Responsible fisheries should provide economic incentives for fishermen to improve conservation. Unfortunately, the off-loading of management costs and conservation onto fishermen already suffering from depressed incomes has turned conservation into a significant burden for many. While many fishermen have innovative and energetic ideas to promote conservation, few have the financial resources or capacity to fulfill them.

RECOMMENDATION

2.5 CONSERVATION FUND: The DFO should invest $5 million over the next three years to help fishermen develop selective harvesting techniques, implement an on-board observer program to monitor by-catch and develop "test fisheries" for stock assessment. Funds should also be provided through Human Resource Develop Canada to train crews in data collection, monitoring and fish handling for selective harvesting purposes (one significant factor in fish mortality is crew handling of by-catch). Fishermen on the lay-up package would work as observers and guardians.

INVESTING IN TRAINING AND ENTREPRENEURSHIP

While fish prices paid to fishermen in B.C. have declined considerably over the

past two years as a result of industry restructuring and global markets, there's considerable potential for value-added processing and niche marketing for many small-boat independent fishermen, who've traditionally sold their fish to company processors.

RECOMMENDATION

2.6 Human Resource Development Canada and the Ministry of Education, Skills and Training should develop a program to train fishermen in all aspects of small business development and marketing. Loan funding should also be available established to help fishermen develop value-added processing and business plans.

INVESTING IN NEW FISHERIES AND SEAFOOD DIVERSIFICATION

Both Canada and British Columbia are currently in the process of establishing policy principles and guidelines for new fisheries and seafood diversification, including the creation of a board to implement the policy principles and develop new fisheries.

RECOMMENDATION

2.7 DFO and the Province should develop new fisheries and seafood diversification policies, in accordance with the U.N. Fisheries Agreement, that will increase the economic viability of the small-boat fisherman in coastal communities, including establishing a Seafood Diversification Fund to develop fish harvesting techniques, processing and marketing initiatives for new fisheries.

INVESTING IN FISHING COMMUNITY INFRASTRUCTURE

The DFO is off-loading many docks and harbours to local communities, without the appropriate funding. The move to full cost recovery on docks and harbours will mean that many rural docks will be closed or privatized, which will have a detrimental affect on communities who see docks as part of a vital marine highway. Many other communities are also in desperate need of infrastructure funding for water and sewer to support local industry. As well, communities like Ucluelet need investments in environmental technologies to increase local fish processing.

RECOMMENDATION:

2.8 The Government of Canada should provide adequate and on-going funding to support docks and harbours in coastal communities and provide investment funding to up-grading docks, introduce secondary treatment of sewage, and new

technologies for more environmentally friendly fish processing. Fishermen suffering from depressed incomes could be employed on many of these infrastructure projects.

3 SHORT-TERM STRATEGY DEVELOPING COHO-SAFE FISHING PLANS IN 1998

Coho stocks in some systems, notably the upper Skeena stocks and the Thompson stocks are at critical levels. This has resulted from high coho exploitation rates set by DFO for the commercial and sports fisheries, over-exploitation by Alaskan and Washington fisheries and chronic habitat destruction. Low marine survival in recent years led to the final decline. To stabilize and rebuild coho stocks, the following general principles should drive fisheries management in 1998:

- comprehensive fisheries management plans should be developed and published for all fisheries, aboriginal, sports and commercial;
- the burden of conservation should be shared in a fair and consistent way;
- there should be no directed commercial fisheries on coho;
- there should be no directed sports fisheries on wild coho;
- There should be a discussion about the economic and biological viability of a marked-hatchery coho fisheries;
- commercial bycatch of coho should be reduced on all fisheries with measures taken to improve upon the selectivity of fisheries in 1997;
- variable exploitation rates, not aggregate rates, should be established on an area basis to take into consideration the distribution of endangered stocks
- observer programs in fisheries to ensure accurate catch data for in-season management;
- programs should be immediately implemented to improve training of commercial crews and test fisheries should be expanded to provide more accurate and timely data for informed in-season fisheries management; and
- programs should be put in place to give commercial fishery workers alternatives to fishing for the 1998 season, including habitat assessment and restoration work sports fishers on fish identification and proper fish handling for effective live release.

In the upcoming 1998 salmon season, while taking a precautionary approach to coho conservation, there are some salmon stocks providing viable fisheries for many sections of the fishing fleet. These stocks include:

- Fraser River sockeye
- West Coast Vancouver Island chums
- mainland inlet pinks

- Central Coast chums
- North Coast pinks
- Nass River sockeye

On the North Coast, the Skeena sockeye run, the major contributor to the northern fishery, will return in very low numbers and is not expected to recover until the year 2000. Sockeye fishing must take into account the seriousness of the upper Skeena coho problem. Constructing a conservative fishing management plan for 1998 will be made more difficult by the continuing high interception rate of coho in Southeast Alaskan fisheries.

On the North Coast, the total commercial coho catch in 1997 was less than 200,000. Most of these fish were caught by the North Coast troll fleet during the only directed commercial coho fishery last season. This year coho mortalities will be further reduced through time and area closures and selective fishing techniques in seine, troll and gillnet fisheries.

Last year according to DFO estimates, commercial fisheries on the South coast accounted for 55,000 coho mortalities — about one-third of the forecast maximum allowed in pre-season planning, and also about one third of the 165,300 mortalities estimated for recreational fisheries targeting coho. The low impact on coho in commercial fisheries for 1997 must be repeated and improved on in 1998.

Salmon fisheries management for 1998 should be based on an approach that designs fisheries openings and area boundaries that minimize the bycatch of coho. Fisheries management should utilize the combined experience of fishermen and DFO data and science. Avoiding coho bycatch can be greatly enhanced with better in-season information on abundance, timing and distribution, something that test fishing and catch monitoring can provide. The selectivity of fisheries improves as the quality of information improves. Further fishing selectivity can reduce coho bycatch on all three gear types. Further testing of the impact of gear modifications for seines and gillnets should be pursued.

For gillnets, the breaking strength of the web, mesh size, the hang ratio, panelling, weedlines and set time can greatly improve selectivity of gillnets. With seines, depth, bunt size, pre-bunt mesh, and surface mesh size, as well as brailing or lifting the bag can increase the selectivity of the gear or improve the effectiveness of live release. These measures should be used in all areas where they have been shown to be effective at reducing coho bycatch. With respect to live release in the seine fishery there should be training for crew members in the identification and handling of fish.

For all fisheries, there should be a vastly expanded test fishery program to

provide accurate in-season information for targeted time and area fisheries openings. Increased costs associated with coho conservation measures should not be borne by the fishing fleets. There should also be a government buy back of fishing gear made redundant by coho conservation measures (i.e. 90 mesh Alaska twist nets in the Area 3, 4 and 5 gillnet fishery). The following specific coho bycatch reduction measures should be implemented for 1998:

Fraser River Gillnet

- no gillnet fishery during times of coho pass through
- complete closure of gillnet fishery Sept. 5 when coho, steelhead and Harrison River springs begin to show in the river
- no re-opening of gillnets for chums until late October, if chum abundance warrants 12 hour openings (6.5 inch mesh restrictions)
- mesh restrictions to protect coho and steelhead should apply to all fisheries including aboriginal
- mandatory live release blue box recovery tanks for all gillnet fisheries

Skeena and Nass Gillnet

- gillnet fisheries on the Skeena and Nass restricted to mid-June through late July
- eliminate deep nets
- close coho “hot spots”
- daylight fisheries only in outside areas
- short sets in inside areas
- mandatory live release blue box recovery tanks for all gillnet fisheries
- minimum 10 percent observer program

North Coast Seine

- mandatory brailing for inside terminal fishery
- mandatory half tote circulating water recovery tanks for all North Coast fisheries
- minimum 10 percent observer program

North Coast Troll

- no directed North Coast troll fishery for coho
- non-possession and non-retention of coho
- coho “hot spot” closures

Juan de Fuca Seine

- red/yellow daily by-catch triggers to move fishing effort to more restricted areas.
- ribbon boundaries
- training program for crews on safe live release techniques
- brailing if needed to reduce bycatch
- 100 percent observer program

- mandatory half tote circulating water recovery tanks for all North Coast fisheries

Johnstone Strait Seine
- close coho "hot spots"
- mainland shore ribbon boundary
- training program for crews on safe live release techniques
- brailing if needed to reduce bycatch
- minimum 20 percent observer program
- mandatory half tote circulating water recovery tanks for all North Coast fisheries

Johnstone Strait Gillnet
- close coho "hot spots"
- summer timing for openings to avoid increased by-catch in later timing fisheries
- mandatory live release blue box recovery tanks for all gillnet fisheries
- minimum 10 percent observer program

West Coast troll
- no directed coho fishery (non-possession/non-retention)
- variable exploitation rates on coho to reflect the distribution of the stocks of concern within the WCVI fishery and provide fishing opportunities on available chinook and sockeye stocks
- testing and assessment for distribution of stocks of concern (DNA sampling)
- closure of coho "hot spots" and develop fishing plans for the safest areas (i.e. northwest Vancouver Island and Area 12)

OCEAN SPORTS FISHERIES
- no directed coho sports fisheries, except where specific surpluses are identified in terminal areas (eg. Capilano)
-The federal and provincial governments should develop a sports fishing communications strategy that highlights to the public the positive, long-term benefits of the 1998 conservation measures and emphasizes the opportunities to fish other more abundant species.
- There should be a discussion about the economic and biological viability of a marked-hatchery coho fisheries
- full closures in coho "hot spots"
- introduce landing sites and a landing slip program to provide a paper trail for better monitoring and enforcement as recommended by John Fraser in his 1995 report on the missing fish.
- ban on all treble and stainless steel hooks--barbless hooks only
- once the total allowable mortality is reached fisheries should be closed

4. PACIFIC SALMON TREATY

Resolution of the Pacific Salmon Treaty dispute is important for the future of British Columbia's coho stocks, but it is absolutely essential for the survival of northern coho. A treaty is essential to develop balanced conservation plans for B.C. and U.S. coho., but it is also needed to provide a broader range of fisheries management tools and more flexibility for B.C. fisheries.

We need a Pacific Salmon Treaty based on the International Law of the Sea that respects Canadian sovereignty and allows conservation of all Canadian and U.S. salmon. The Canadian government should:

1. Show leadership on the treaty issue, based on Canada's strong legal position under the International Law of the Sea Convention.

2. Initiate a public education campaign to inform Canadians and U.S. citizens about the state of coho stocks and impacts on coastal communities, and on Canada's position on the treaty.

3. Work with fishing industry groups and other concerned organizations to develop an immediate non-fisheries action plan to help move past the present treaty impasse

APPENDIX 'A'

Ad hoc Coho Alliance
DISTRIBUTION AND ATTENDANCE LIST

N.B.: (Attendance at meetings does not suggest endorsement of Alliance)

Name	Group	tel:	fax:	e-mail	Feb27	Mar11	Mar25	Apr. 9	14	23
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Mitch Anderson	Sierra Legal Defense	604-685-5618	604-685-7813			X	—			X
Mary-Sue Atkinson	Seymour Salmonid	604-986-6710	604-986-6710			X	—	X		
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Daniel Bernier	CCPFH—Ottawa			ccpfh@fox.nstn.ca			—			
Tom Bird	SportFishing Institute	604-608-4434	604-640-4343			X	—			
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Bob Brown	SFU			brown@sfu.ca			—			
Edgar Burch	UFAWU	604-255-1336	604-255-3162		X	X	X	X		
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Rose Davison	Alberni-Clayoquot	250-726-7445	250-726-2122				—			
✓ Dan Edwards	WCSA	250-726-7083	250-726-4734	sustain@island.net	X	X	—		X	
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Name	Group	tel:	fax:	e-mail	Feb27	Mar11	Mar25	Apr.9	14	23
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Russ Hellberg	CCN/Port Hardy	250-902-1234	250-949-8481	coastcom@island.net	X	X	X			
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Marcel LeFebvre	CFDC	604-254-8845	604-255-3162	paquette@smartt.com	X	X	X	X	X	
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Vivian Narcisse	Merritt	250-378-7196				X	—			
Chris Newton	Pacific Salmon All.	604-925-9121	604-925-9121		X	X	—			
Craig Orr	Habitat Conser. Trust	604-936-9474	604-936-5150			X	—			
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Name	Group	tel:	fax:	e-mai		Feb27	Mar11	Mar25	Apr 9	14	23
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Eric Tamm	CCN	250-726-4683	250-726-2268	coastcom@island.net	X	X	X		X	X	X
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Wendy Turner	FV Coalition/FBC	604-738-9305	604-738-9305			X					
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Carol Lynn Wallace	CEDF	416-323-9521	416-323-9301	ecocl@interlog.com							
Ross Wetzel	T. Buck/CFDC	604-574-4412	604-596-1476			X	X			X	X
Karen Wristen	SLDF/Eagle Project	604-536-6261	604-536-6282	eaglelaw@intergate.bc.ca	x	X	X				alter
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OTHERS:

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Ken Connolly	C-E Gillnet	465-7651								X	
Joe Domjan	UFAWU	538-7358								X	
Bob Rezansoff	FVOA	583-3431						X		X	
Don Hurson	UFAWU	538-6034								X	
Emil Sumn	UFAWU	951-1976	951-7276							X	X
John Stires	UFAWU	946-9902		~~phone~~						X	X
Peter Panek	SFU	291-3062	291-5716	ppanek@sfu.ca						X	X

THE TSXMSHIAN TRIBAL COUNCIL

737 - 2nd Avenue West Prince Rupert B.C. V8J 1H4

PHONE **(604) 627-8782**

FAX **(604) 627-1938**

Head Office:
206 Shashak Street
Lax Kw'alaams, B.C.
V0V 1H0

Fax Cover Sheet

DATE:	April 24, 1998	TIME:	4:14 PM
TO:	Colin Masson A/Director, Client Consult.	PHONE: FAX:	250-756-7001 250-756-7162
FROM:	Bob Hill President	PHONE: FAX:	250-627-8782 250-627-1938
RE:	South Coast Multi-Stakeholder Coho Summit Meeting April 27, 1998		

Number of pages including cover sheet: 1

Message

Bob Hill will be attending a Coho meeting here in Prince Rupert April 25, 1998 but would like a copy of the Minutes/Summary from April 27, 1998 meeting that unfortunately he cannot attend. Please remit at your earliest convenience.

Thank you.

CHARLES H. McKEE
Suite 160l-700 West Pender Street
Vancouver, B.C.
V6C lG8

Home: (604) 263-7365
Office: (604) 713-4019
Fax: (604) 713-4015
Email Wildfish@direct.ca

By Fax: 9-l-250-387-3291

April 23, 1998

Mr. Bill Valentine
Deputy Minister
Department of Fisheries
Victoria BC

Dear Mr. Valentine:

The Federal Department of Fisheries and Oceans is a corrupt organisation.

DFO - Pacific Division is being run from Bay Street and Oak Bay for the exclusive benefit of three Federal Liberal Party insiders.

The Mifflin Plan was simply a part of a well organized long term plan to turn the west coast fishery over to Federal Liberal Party insiders. The small boat fleet must go. Trollers first, gill and independent seines second, sporties third. DFO have almost succeeded with the troll fleet. The deliberate design of the Areas to make one licence uneconomical, closures when DFO knew there was not a shortage of fish or exposure to threatened stocks, allowing the processors to conspire with each other to drive down prices, appointing quislings like Ron Fowler, Mike Medenwaldt and Stan Watterson to "advise" Toy and Kelleher have almost broken the will of the troll fleet.

What is stopping the Liberal Party insiders from a total river mouth industrial fishery? The small boat fleet and independent fishers don't have enough votes. The UFAWU doesn't care. The 300,000 votes of the sports fishermen get in the way. Solution, let the Alaskan's, the commercial sporties and natives take the blame for wiping out the Fraser and Skeena Coho, Chinook and Steelhead.

Even DFO's well muzzled science has warned of Coho extinction. Attached is a copy of DFO produced Coho mortality statistics. DFO recently mailed these statistics to all licensed commercial salmon fishermen. It also appears on their Web site

and is being distributed at their Dog and Pony shows (Coho Response Team) across the province.

EVERY STATISTIC IN THE ENCLOSED REPORT HAS BEEN DELIBERATELY FALSIFIED

This report will undoubtedly be used by DFO in their attempt to bankrupt the small boat fleet for the benefit of the Federal Liberal Party insiders. This report is corrupt DFO science at its worst. Scientists are forced to compromised there scientific ethics just as they were in the Cod fishery. Coho are facing extinction and DFO publish false statistics.

One of the main objections and frustrations of our Alaskan friends is with respect to DFO "science". DFO either lie or distort or withhold information entirely.

SPORTIES

Coho mortalities shown for the commercial fleet are DFO **estimates** of mortalities based on encounters.

On the other hand the sports fishery statistics are **recorded kills** only and for only part of the season. These phony sports statistics do not include fish released after being gill and gut hooked on herring using tiny barbed trebles. Anyone who has fished for Coho in this manner knows that the mortality rate is more likely to be 200% to 300% higher than the reported kill rate. No gill or gut hooked Coho survives. Catch and release of dead and dying fish is not the way to practice conservation. In fact, current policy is designed to increase mortality of salmon in the sports industry. Reducing the limit increases the kills. More fatally injured small fish are released by the "sporties" in the hope of keeping two large Coho.

NOT A SINGLE RELEASED COHO BEEN RECORDED AS A MORTALITY IN THESE "SPORTS" STATISTICS.

In addition DFO in their own publications have admitted that they did not have a budget for monitoring the sports fleets for the month of October in the San Juans or for most of the year in the rest of the province. September/October is the time of the year when the San Juans have a high concentration of endangered Fraser river and Thompson river Coho.

NATIVE

The native kill was reported at 267 on the Fraser. The StoLo band were selling Coho all through the fall to anyone who wanted to buy it. The StoLo did not reach their secret allocation over the summer because of the massive numbers of sporties watching from the river bank. In order to accommodate the StoLo, DFO closed the river to sports fishermen so that the StoLO could gill net as many Coho as possible.

The aboriginal mortality of 267 for the lower Fraser was exceeded in the first 10 minutes of a two day 50-60 boat opening for "chum" at the height of the Thompson upper Fraser Coho migratory season. Political correctness prevents DFO and the Pacific Salmon Commission from taking these and the millions of poached salmon into account in their "scientific" analysis of salmon returns.

LICENCED COMMERCIAL

Lets look at the commercial net statistics. Weston's/BC Packers own Great Canadian Super Store and Super Valu. All have had Canadian canned Coho for sale since last fall. The only source of that Coho was the net fleets and the Fraser river natives. 31,511 reported kills and mortalities, which equates to about 20,000 delivered, doesn't support months and months of sales of no name brand wild Coho canned by BC Packers.

Based on years of experience commercial trollers report that the troll encounters are estimated at the high end and estimated mortalities are probably double actual. Our troller had NO Coho mortalities last season.

It is clear from the above that DFO are deliberately falsifying statistics on Coho just as they did on East Coast Cod.

"What about Bob Wright?" you might ask. Why would he let them get away with killing off his living?

If you do not know who Bob Wright is, the following is a brief resume. Bob Wright, head of the Oak Bay Marine Group, is the king of BC's commercial sporties. Velma McColl was head of the Sports Fishing Institute the commercial sporties lobby group. McColl reported to Wright. David Anderson is the Canadian

Federal Minister of Fisheries. Bob Wright is David Anderson's chief financial and political supporter. Velma McColl took a sideways move from lobbyist to special advisor to the Minster and is now paid by the taxpayers. Federal scientists say Coho are in danger and Minister Anderson says let Bob Wright have as many as he wants.

A senior officer of Canada's military was recently court martialled, found guilty and sentence to a demotion and a $10,000 fine. His crime, a free ride for his family from Haiti to Mexico from a travel agent contracted by the government. Bob Wright had his Fisheries Act charges dropped. Minister Anderson has had many a free holiday at Bob Wright's various fishing lodges.

Bob Wright does not need Fraser or Skeena stocks for his business. If he can get rid of the troll fleet then Columbia river (most Langara Lodge large springs) and other Washington State and West Coast of Vancouver Island stocks will be available exclusively to him. The Alaskan's having being blamed for the demise of the sports species will be denied access to them. Painters and April Point will be used for convention business and can target the 3 commercial species and the occasional east coast of Vancouver Island Coho and Chinook. Since there will be no net fishing north of Campbell river these sports stocks should recover dramatically.

Yours truly

Charles H. McKee

CHM/st

Enc.

Cc Dishonorable David Anderson P.C. M.P. 613-990-7292
Ms. Velma McColl 666-1847
Mr. Bob Wright 250-598-3014
Media
Commons

Post Season Estimates of the 1997 COHO Total Mortality by Fishery Including Total Allowable Mortality (TAM) Range				
FISHERY	**1997 TAM Range**		**FISHERY**	
	Low	**High**	**TOTAL**	
Troll - North West Vancouver Island	15,000	20,000	10,952	
Troll - South West Vancouver Island	30,000	35,000	7,312	
Troll - Johnstone Strait			4,603	
Troll - Georgia Strait			692	
Total Troll	**45,000**	**55,000**	**23,559**	
Net - Area D Gillnet Johnstone Strait			7,264	
Net - Area B Seine Johnstone Strait			16,720	
SubTotal (Area B,D) Johnstone Strait	*20,000*	*30,000*	*23,984*	
Net - Area B Seine Juan de Fuca / Nitinat	63,000	72,000	7,279	
Net - Area E Gillnet Fraser / Georgia Strait	2,000	3,000	164	
Net - Area E Gillnet Juan de Fuca / Nitinat	2,000	3,000	84	
SubTotal Fraser, Georgia Strait, Juan de Fuca	*67,000*	*78,000*	*7,527*	
Total Net	**87,000**	**108,000**	**31,511**	

Sport - Georgia Strait (excluding Area 19)	30,000	40,000	5,637	
Sport - Juan de Fuca (Area 19 + 20-5)	50,000	70,000	98,722	
Sport - WC Vancouver Island (Areas 20-1 to 27)	40,000	45,000	37,515	
Sport - Johnstone Strait (Areas 11, 12, 13)	7,500	9,000	6,500	
Sport - Fraser River	500	1,000	650	
Total Sport	**128,000**	**165,000**	**149,024**	
Aboriginal - Fraser	2,500	3,000	276	
Aboriginal - South Coast / WC Vancouver Island	7,500	10,000	661	
Total Aboriginal	**10,000**	**13,000**	**937**	
Test Fisheries and Experimental Gear			2,476	
Total Test/Experimental Gear			**2,476**	
Trawl - WCVI Midwater Hake			36	
Total M/W Trawl			**36**	
TOTAL ALL GEAR	**270,000**	**341,000**		**207,543**

Note: update March 13/98			

/pac/comm/pages/cohoresponse/presenta.htm
/pac/comm/pages/cohoresponse/presenta.htm

LEE STRAIGHT
1375 West 57th Avenue
Vancouver, B.C. V6P lS7
Phone (604) 261-5951
Fax (604) 261-5921

April 21, 1998

Mr. Colin Masson, A/Dir.,
Client Services,
South Coast Division, DFO,
3225 Stephenson Pt. Rd.,
Nanaimo, B.C. V9T lK3.

By facsimile message. to (250) 756-7020
Hard copy to follow by mail

Dear Mr. Masson,

Following is my response to your list of:

KEY QUESTIONS AND ISSUES FOR COHO CONSULTATIONS,
received from you by facsimile this morning:

1, Presuming that the recently reported DFO data are the best obtainable, the most conservative level of coho abundance should, of course, be used for 1998 management.

2, It seems obvious at this juncture that none of the recent customary marketing or aboriginal sustenance levels of the kill of coho (or steelhead or chinook) should be considered tolerable, in view of the fact that the situation for that (or those) species appears so critical. Supplies of salmon of the more copious species, as substitutes, are readily available.
(This decision is as much political as biological. DFO scientists absolutely must be the authorities, and allowed to guide us in this matter. It's acknowledged that DFO managers always have been sensitive to the policies of the Minister of Fisheries and our federal government cabinet. That's democracy. But DFO scientists should, for the common good, continue dedicated to logical fishery management, encouraged always to speak out. There has appeared far too much caution about "making waves".)

3, The only logical, directed coho fisheries at this time, posing a minimal risk to stocks, is catch-and-release fishing, and only with artifical lures, allowing retention of only adipose-fin-clipped ("hatchery") cohoes. If that threatens to be too cumbersome or expensive to patrol or monitor, the outstanding tourist and and recreational values justify general catch-and-release sport fisheries on all cohoes.

4, Based on our current knowledge of salmonid culture and on costs, the discontinance of coho "enhancement" or stocking is recommended.

5, River habitat restoration appears more than justified, but only in waters free of massive developmental influences, such as logging, real estate, river-damming, land-fills and farming.

6, If stocking of hatchery coho appears safe in waterways that have become almost barren of coho, the practice should be continued only as research and development, and not as a political gesture.

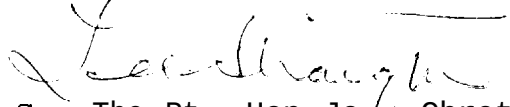
7, In consideration of various geographical coho densities, optimistically termed "abundances", note the replies to the foregoing questions. Improper is the term, "managing to account for various abundances." What abundance? The dictionaries say that "abundance" means bountiful or overflowing, hardly the problem here!

8, As in the answer to question 3, kill fisheries restricted to fin-clipped cohoes, or even total catch-and-release on sport-caught salmon, outranks the value of any other fishery allocation -- whether market or subsistence -- rather than abandoning our waters to total closure. Good models for salmonid resource management are offered by the management regimes on the Dean and Babine rivers, or any other river where market fishing in the nearby sea doesn't exert too high a toll. Basically uncontrollable is the "by-catch" from the market-netting of the three "commercial" (pink, chum and sockeye) species of salmonid.

9, As for any "additional follow-up" that you invite, I will send copies of this letter to the Prime Minister and the Minister of Fisheries, though I fear they may be curbed or muted by their cabinet, or their political caucus.

Thanks for expediting this questionnaire.

Sincerely,



c.: The Rt. Hon Jean Chretien, Prime-Minister.
The Hon. David Anderson, Minister,
Department of Fisheries and Oceans.
General Distribution.

Recd from EMSO (Ruth Madsen).
20/4/98

THOMPSON BASIN FISHERIES COUNCIL

AN AGREEMENT AMONG FISHERIES INTERESTS IN THE THOMPSON BASIN "RESPECTING CONSERVATION AND EDUCATION"

The Thompson Basin Fisheries Council (TBFC) is an organization of aboriginal and recreational fisheries interests in the region, including the Shuswap Nation Fisheries Commission, the Nicola Watershed Stewardship and Fisheries Authority, the Steelhead Society of BC, the BC Wildlife Federation, the BC Federation of Fly-fishers, and the Kamloops Naturalists Association. Recent participants include Wilderness Watch Kamloops, Spences Bridge Community members, and the BC Federation of Drift Fishers.

These parties to a letter of understanding signed in 1996 share a mutual concern for the decline of wild Pacific salmon populations in the Fraser watershed, and in particular the Thompson River and its drainage.

The enclosed list of principles were articulated from a January 6, 1998 workshop in Kamloops directed at the development of consensus positions on the management of the Pacific salmon fishery. These principles were prepared as a collective regional contribution to the planning of federal and provincial salmon revitalization programming, in particular Fisheries Renewal BC and the consultations on "Inter-sectoral Allocation".

For further information on the Council, please contact the host representatives of the TBFC agreement:

Fred Fortier, Shuswap Nation Fisheries Commission: (250)828-9837
Arnie Narcisse, Nicola Watershed Stewardship and Fisheries Authority: (250)378-4235
Kevin Church, Steelhead Society of BC: (250)376-4334

RECOVERY OF PACIFIC SALMON IN THE THOMPSON BASIN - CONSENSUS PRINCIPLES FROM THE THOMPSON BASIN FISHERIES COUNCIL. JANUARY, 1998.

1. BC Interior communities see themselves as caretakers of the salmon and their freshwater habitats, as well as recipients of benefits arising from wise use practices and good stewardship. Therefore, a greater emphasis on including inland communities in associated planning is desirable when discussing fisheries renewal or inter-sectoral allocation of related fisheries benefits.

2. The conservation and rebuilding of salmon stocks in the Thompson basin must be better reflected in risk averse harvest management in the downstream and approach fisheries. This can be supported by fisheries policy that encourages selective fishing by incorporating a system of conservation incentives (ie. increased fishing time and allocations for selective fisheries) and dis-incentives (ie. allocation demerits for by-catches, reduction of associated fishing time, and outlawing non-selective fisheries and gear, like gill nets).

3. Protecting salmon escapements to meet conservation and biological diversity objectives must be a policy priority that is addressed before entrenching potentially unsustainable allocation shares. This must be coordinated with habitat protection and recovery.

4. The concentration of salmon fisheries in the ocean or inland is undesirable for risk averse allocation management, regional socioeconomic benefit sharing, or for the maintenance of quality food, cultural, societal and recreational fisheries. The incorporation of a system of allocation zones, building on existing licencing policy in BC, would not limit access to the fishery for any sector, but would distribute harvest effort in support of selective fisheries, regional economic development and sustainable food cultural, societal and recreational benefits.

5. The accounting of catches and by-catches in the Pacific salmon fishery is fundamental for the success of conservation and stock rebuilding efforts. Aboriginal catches have received a great deal of attention in recent years. There is a significant need, however, to develop better catch reporting systems in recreational and commercial fisheries, and to standardize reporting mechanisms among all sectors.

6. There is significant opposition by inland fishers to the allocation of fish to private ownership.

7. The policy for allocation of Pacific salmon, after conservation and Section 35.1 needs are met, should emphasize the best sustainable economic value for the catch

8. Commercial fishing privileges should not be compensated by recreational fishing privileges for the redistribution of related allocation benefits. Alternatively, a system of sustainable allocation management should be allowed to evolve with proper management guidelines based on wise use.

9. The principal of salmon conservation requires a clear and concise definition by managing agencies.

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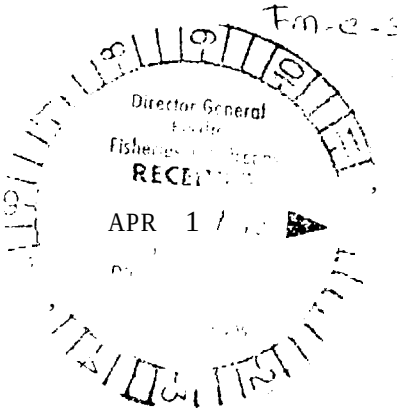


3719 Roblin Place
North Vancouver, B.C.
V7N 2C5
April 17, 1998

Fisheries and Oceans
Regional Director General

Dear Ms. Petrachenko:

I wish to thank you for having the "FOCUS COHO CONSULTATION" for streamkeepers and other interested citizens on April 15, 1998. This is a very positive step and truly appreciated by us. I am pleased to have the Department of Fisheries and Oceans show a new willingness to give us the information we require to help make intelligent decisions regarding preserving our salmon stocks and to ask our advice. Thank you to your Coho Response Team for their presentations.

I am excited about the opportunity to complete a questionnaire and respond to the various important issues affecting our coho stocks. Thank you for releasing the PSARC document in such a timely manner this year to us. It certainly is very clear about the state of our coho stocks I hope the recommendations form the basis for all management decisions this year. The District of North Vancouver Council voted UNANIMOUSLY on April 9,1998 that :
"THE DEPARTMENT OF FISHERIES AND OCEANS BE URGED TO UNDERTAKE WHAT-EVER MEASURES NECESSARY TO PROTECT COHO SALMON INCLUDING CONSERVATION MEASURES AND CLOSURE OF THE COMMERCIAL AND RECREATIONAL COHO FISHERIES"

Thank you again for including us in your stakeholder process. Looking forward to faxing out questionairres to the Coho Response Team. Let us not let the coho slip through our fingers!

Yours very truly,

M. Atkinson

Ms Mary-Sue Atkinson
Phone (986-6710)
FAX (986-6710)

cc: J. C. Davis
P. E. Sprout
B. Hargreaves ✓

KEY QUESTIONS AND ISSUES FOR COHO CONSULTATIONS.

1. WHAT FORECAST OF COHO ABUNDANCE SHOULD BE USED IN 1998? 50%

(A CONSERVATIVE LEVEL WHICH WOULD OCCUR AT LEAST 75% OF THE TIME, OR A LESS CONSERVATIVE LEVEL WHICH WOULD OCCUR AT LEAST 25% OF THE TIME?)

2. WHAT EXPLOITATION RATE (HARVEST KILLS) SHOULD GUIDE THE DEVELOPMENT OF FISHING PLANS IN 19987 No Targeted Sho fisheries

(0% FOR NO HARVESTING, OR SIMILAR TO 1997 @ APPROX. 25%, OR SOME LEVEL BETWEEN THE TWO?)

3. SHOULD THERE BE ANY DIRECTED COHO FISHERIES BY ANY GROUP IN 1898? IF SO, BY WHICH GROUP(S)? No

4. WHAT, IF ANY, ADDITIONAL COHO ENHANCEMENT SHOULD BE IMPLEMENTED IN 1998 AND OVER THE LONG-TERM?

5. WHAT HABITAT ACTION(S) SHOULD BE RECOMMENDED FOR THE 1998 AND FOR THE LONG-TERM?

6. SHOULD THERE BE A SELECTIVE-MARK FISHERY FOR HATCHERY COHO IN 1898 AND/OR FOR 1999 AND BEYOND? No

7. SHOULD THE 1898 SALMON FISHERIES BE MANAGED TO ACCOUNT FOR;
   - THE OVERALL ABUNDANCE OF SOUTHERN EC SALMON SPECIES?,
   - THE OVERALL ABUNDANCE OF SOUTHERN BC COHO SALMON?, ← ★
   - THE ABUNDANCE OF ENDANGERED SOUTH THOMPSON COHO STOCKS?

8. SIMILARILY, WHAT GUIDANCE WOULD YOU PROVIDE, IF SALMON WERE MANAGED TO ACHIEVE A BALANCE OF ECONOMIC AND CONSERVATION BENEFITS? TELL THE TRUTH ABOUT MORTALITIES

8. WHAT ADDITIONAL FOLLOW-UP DO YOU RECOMMEND TO ENSURE THAT YOUR VIEWS ARE PROPERLY CONSIDERED?

CHARLES H. McKEE
SOLICITOR
#1601, 700 WEST PENDER ST.
VANCOUVER, B.C. V6C 1G8
TEL: (604) 713-4019

TSAWWASSEN FIRST NATION

April 16, 1998

Francis Dickson, Manager
Fraser River Fisheries
Department of Fisheries and Oceans,
555 West Hastings Street,
Vancouver, BC

Dear Francis:

Re: Tsawwassen First Nation Response to Coho Fishing.

Southern BC coho stocks have declined severely over the last 20 years. Conservation measures were adopted in aboriginal fisheries during this period, particularly in terminal areas while many other fisheries continued to exploit coho stocks at high levels. First Nations now harvest only a tiny fraction of the coho killed on the south coast each year. Tsawwassen First Nation has not fished for coho for many years, yet we are required to forego fishing opportunities sockeye, pink and chum salmon to conserve coho while others continue to fish for and kill these same coho. Our Aboriginal right to fish is being infringed upon in order to provide fishing opportunities for non-aboriginal fishermen, and this can no longer be tolerated.

In 1997, the Pacific Stock Assessment Review Committee (PSARC) confirmed that serious conservation problems with Southern BC coho salmon persist, and that declining ocean survival and DFO's failure to reduce fishing pressure in response to these declines are the primary causes. It is clear from DFO's own technical work presented to PSARC that the situation for Thompson coho is not expected to improve in 1998. Every Thompson coho is required on the spawning grounds in 1998, and every Thompson coho killed this year will increase both the risk and the rate of extinction, as well as the magnitude and duration of the disruptions to our Aboriginal fisheries.

Tsawwassen First Nation rejects the concept of transferable total allowable mortalities (TAM) for governing the 1998 south-coast salmon fisheries, on the basis that every Thompson River coho is required on the spawning grounds. Severe conservation concerns leave no room for the in-season reassignment of mortalities between fisheries. Transferring "allowable mortalities" between fisheries will only serve to ensure that every fish identified as an allowable mortality is killed. In managing south coast fisheries in 1998 we should strive not to kill a single Thompson coho. In practical terms this means no fishing for coho, and managing and monitoring all other fisheries to ensure that coho impacts remain within the limits agreed to.

/2.

APR-17-98 08:54 FROM:TSAWWASSEN FIRST NATION

The Tsawwassen First Nation joins with other Fraser First Nations in calling for a transparent, public management process for Southern BC coho in 1998. We call for all south-coast fisheries to be managed to achieve as close to zero mortalities of Thompson River coho as possible. Maximum allowable mortalities should be established for all by-catch and non-retention fisheries. These should be monitored and enforced in-season. We recommend:

No directed coho fisheries in areas where Thompson coho or other threatened coho stocks may be intercepted.

An agreed-to public joint technical process that will forecast Thompson coho mortalities by time, area and fishery (including the impacts of Aboriginal fisheries)

A joint public management board that will, based on this technical advice, establish maximum allowable coho impacts for each fishery, develop monitoring plans to ensure compliance, and oversee the preparation of a post-season review of the plan.

If you would like to discus these recommendations further I can be reached at (604) 948-5212.

Sincerely,

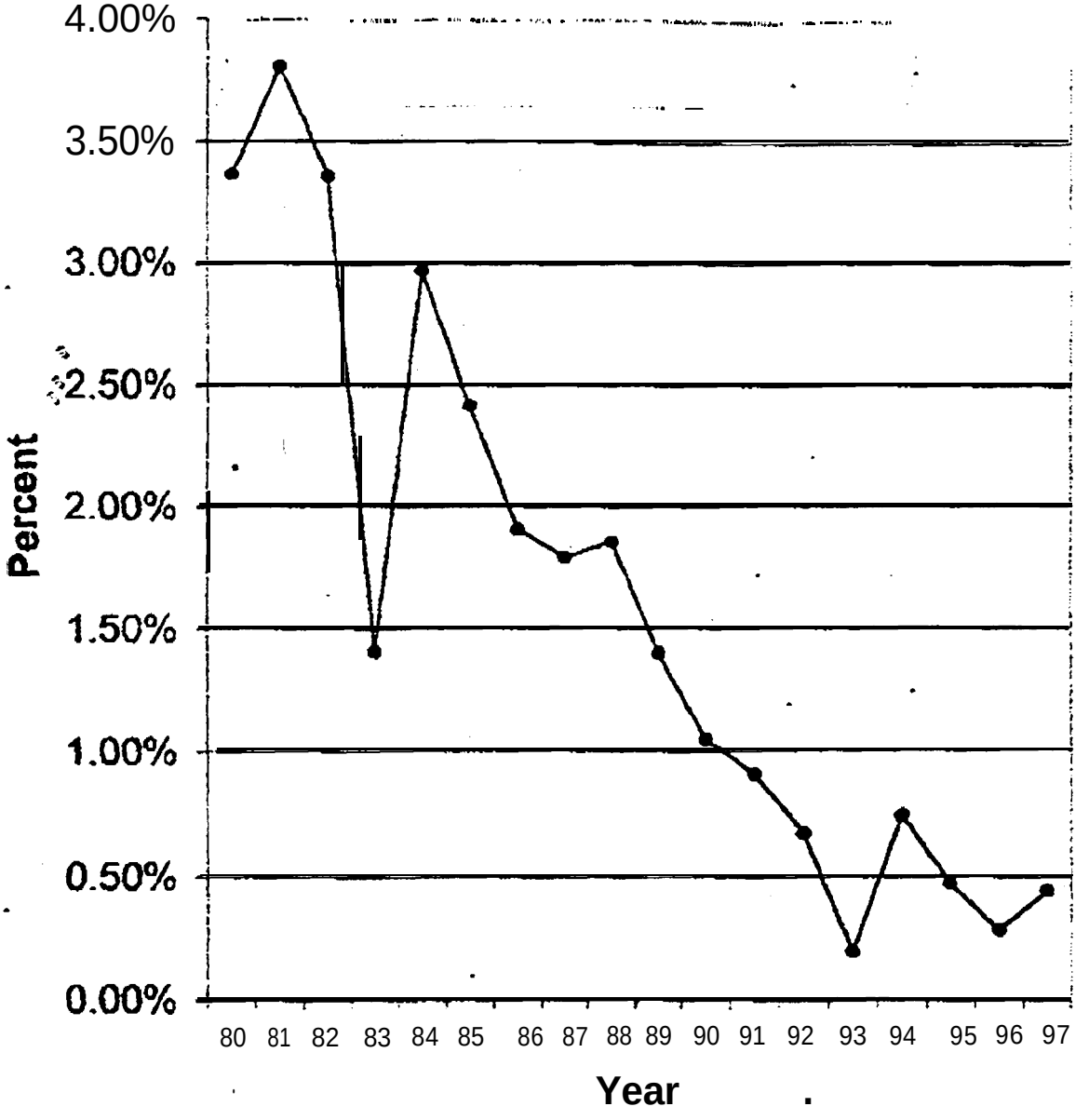
Tsawwassen First Nation

Mike Baird, Director
TFN Fisheries Department

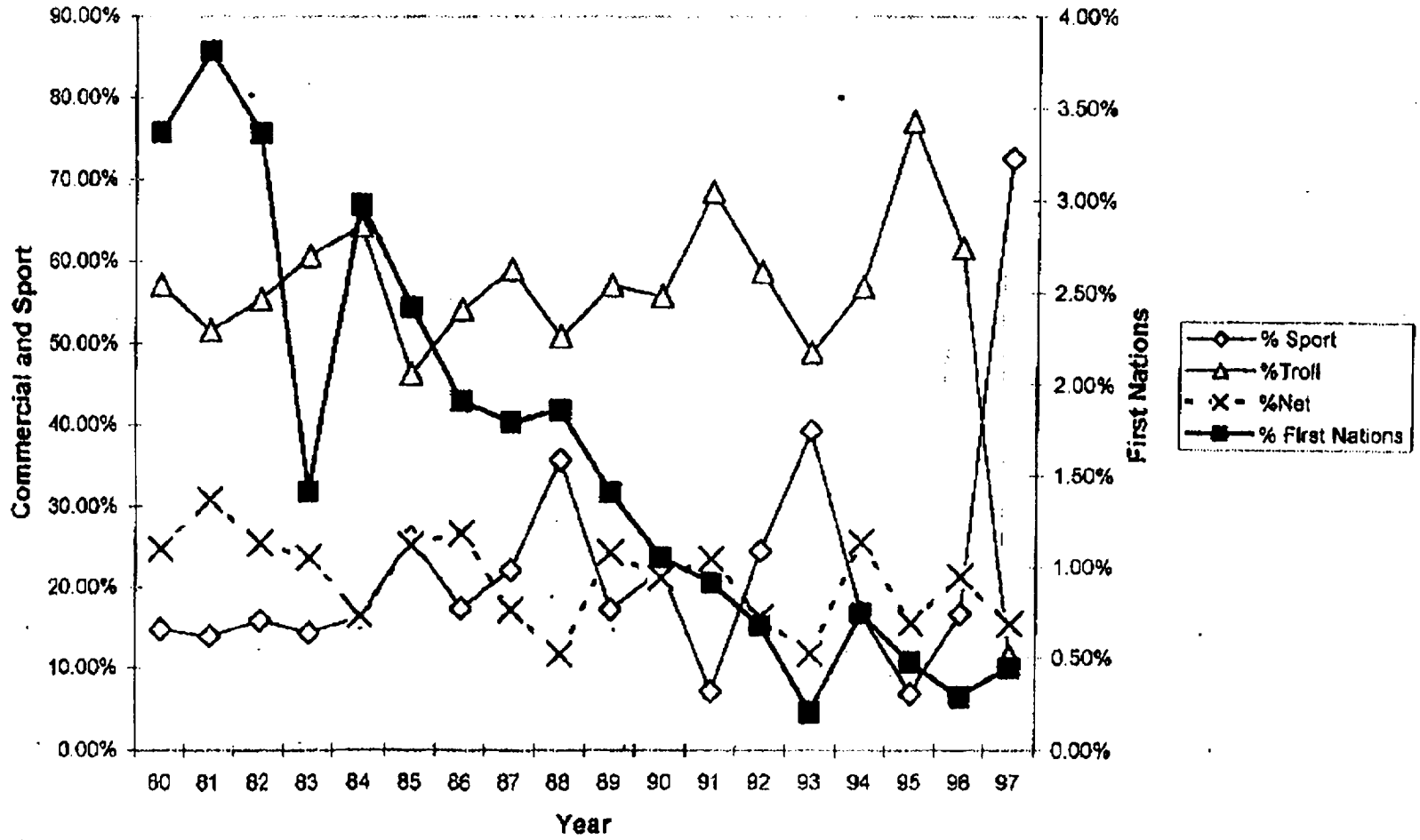
Attach.

/tb

First Nations Coho Catch as a Percentage of Total South Coast Coho Catch



APR-17-98 08:55 FROM:TSAWWASSEN FIRST NATION TO: PAGE 4/5


South Coast Coho Mortalities
Commercial and Sport
First Nations
Year
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
4.00%
3.50%
3.00%
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
% Sport
%Troll
%Net
% First Nations

SHUSWAP NATION FISHERIES COMMISSION

Room 215,355 Yellowhead Hwy, Kamloops B.C. V2H 1Hl Phone: (250) 828-9791 Fax: (250) 828-9787

RECOMMENDATIONS REGARDING MANAGEMENT OF 1998 SOUTH-COAST COHO FISHERIES

April 1998

Background

Among the South-coast coho salmon stocks, the Thompson River stocks have declined severely over the last 20 years. Conservation measures were adopted in the aboriginal fisheries during this period, particularly in the terminal areas while many other fisheries continued to exploit Thompson coho stocks at high levels. Escapements of all wild Thompson coho stocks has declined sharply, leading to the extirpation of some stocks and diminishment of food, social and societal coho fisheries of many of the Shuswap Indian Bands. No coho fisheries occurred in 1997 in the Shuswap Nation and none are planned for 1998 because of conservation concerns.

In 1997, the Pacific Stock Assessment Review Committee (PSARC) confirmed that serious conservation problems with Thompson coho stocks persist, and that declining ocean survival and DFO's failure to reduce fishing pressure in response to these declines are the primary causes. What is clear from DFO's technical work presented to PSARC is that the situation for Thompson coho is not expected to improve in 1998. Every Thompson coho is required on the spawning grounds in 1998, and every Thompson coho killed this year will increase both the risk and rate of extinction. DFO's technical analysis shows that even with no fisheries on Thompson coho, some stocks will continue to decline.

PROPOSED THOMPSON RIVER COHO CONSERVATION AND MANAGEMENT STRATEGY, 1998

The Shuswap Nation Fisheries Commission recommends that the public reject the concept of total allowable mortalities (TAM) for governing the 1998 south-coast coho salmon fisheries, on the basis that every Thompson River coho is required on the spawning grounds. Severe conservation concerns leave no room for an allowable number of Thompson coho mortalities, or for the in-season reassignment of these mortalities between fisheries. Transferring "allowable mortalities" between fisheries will only serve to ensure that more Thompson coho encountered will be killed as an allowable mortality this summer.

The Commission further recommends that all south-coast coho fisheries be managed to achieve as close to zero mortalities of Thompson River coho as possible, and that DFO address aboriginal fisheries impacts associated with the 1998 fishing plan. Maximum allowable mortalities should be established for all by-catch and non-retention fisheries. These should be monitored and enforced in-season and reviewed post-season. The recommended approach is as follows:

- No directed coho fisheries in areas where Thompson coho may be intercepted.

- Establish an agreed-to public joint technical process that will forecast Thompson coho mortalities by time, area, and fishery (including impacts on aboriginal fisheries).

- Establish a joint public management board that will, based on technical advice, establish maximum allowable coho impacts for each fishery, develop monitoring and reporting plans to ensure compliance, and over-see preparation of a post season review of the plan.

- Invite the US, Canada and the regions Tribal/First Nations Governments to develop a west-coast coho conservation and recovery plan in association with the Pacific Salmon Treaty.

****

FOR FURTHER INFORMATION ON THE PROPOSED CONSERVATION AND MANAGEMENT STRATEGY OR ON THE SHUSWAP NATION FISHERIES COMMISSION

Fred Fortier, Chair: (250)371-3103
Lilly Johnson, Co-chair: (250)398-0598
Dave Moore, Director: (250)828-9837

FAX TRANSMISSION
Sustainable Fisheries Foundation

To: Colin Masson
DFO

Date: April 23/98

Fax No: 604-666-7369

Pages (including cover): 1

From: Don MacDonald

Notes: Colin: Thanx for the invite to the Coho Summit meeting. While I would desperately like to attend, we will be convening our Castegua meeting on that date. However, we must do everything possible to get coho to the spawning grounds this year — this will undoubtedly require area closures & non-retention.

Cheers

Sustainable Fisheries Foundation
1733 Idaho Place
Nanaimo, British Columbia, V9X 1C6
Phone: (250) 753-1583 Fax: 753-1563
email *sff-mesl@island.net*

Sustainable Fisheries Foundation
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COHO CONSULTATION RECOMMENDATION

proposed by Eric Tamm

Be it resolved that under the B.C.-Canada Agreement on Fisheries and protocol agreements with the Aboriginal Fisheris Commission, DFO, the B.C. Ministry of Fisheries and the Aboriginal Fisheries Commission co-host a multistakeholder process at the beginning of the second week of May (11-13) to try to forge common ground on a 1998 coho action plan. The process would have the following characteristics:

- it would be representative of the broad cross-section of stakeholders involved in and concerned about Pacific Fisheries;
- The process would be independently facilitated by a professional with experience in conflict resolution in the resource sector;
- The process would use as the basis for discussion the *Ad Hoc* Coho Alliance Draft Working Paper for a 1998 Coho Action Plan; and
- The process would last from 1 to 3 days, with a consensus document outlining agreements and disagreements among sectors and interests which would be presented directly to Minister Anderson along with DFO's Coho Response Team's Report to the Minister.

Masson, Colin

From: The Pacific Streamkeepers Federation [pskf@direct.ca]
Sent: Sat, 1998 Apr 18 20:43
To: Masson, Colin
Subject: April 16th meeting

Colin: Just a quick note as I did not receive a faxed copy of the questions from Wednesdays night meeting and I'm leaving the country in the early am

1) What forecast...
Please use the smallest number of expected returns when considering the fate of these few fish. Best to err on the low side then end up on the no side. If the Alaskans look at your #'s they may feel it's not worth fishing.

2) What level of...
It's real easy to write down 0% but can this be realistically be acheived? What is the cost to tax payers? (although I believe the fish are worth it) If there's ANY chance that a Thompson River or any other low return river fish are running with others please give them a chance to return to spawn. What's the safest way to catch only those fish that are being sought? ie: no incidental bycatch. Fancy term for "00ps sorry your dead, meant to catch your friend." $ value per "piece" should be those "pieces" that are available (surplus) that bring in the highest cash value to our economy. Take for instance the fact that I've spent MANY thousands of dollars sports fishing and have yet to keep a salmon.

3) Habitat issues
Keep up the good work being done in the streams around BC. We enjoy the work and the fish enjoy their new homes.

4) Enhancement...
Keep it up and in the natural ways that were stated in the comments from the speaker. NO QUICK START PROGRAM !!!!!

5 & 6) I think I answered this in #2

7) No idea what this means.

All the best, stay the course, remember that the decline or the rise in fish populations depends on you!

Take care Zo Ann Morten
The Pacific Streamkeepers Federation and Morten Creek SEP

Masson, Colin
From: Lochbaum, Ed
Sent: Friday, April 03, 1998 8:47 AM
To: Masson, Colin
Subject: FW: Open Letter on Commercial Coho Moratorium

—Original Message—
From: coastcom@island.net [SMTP:coastcom@island.net]
Sent: Wednesday, April 01, 1998 3:30 PM
To: crbarnes@sol.uvic.ca; davisj@ios.bc.ca; ladouceur.marie@ic.gc.ca; jas@mdi.ca; jotruscott@galaxy.gov.bc.ca; jgarrett@islandnet.com; cori@mail.islandnet.com; jpsecter@islandnet.com; Michael.Dunn@ec.gc.ca; wilson@bc.sympatico.ca; Graham, Bud; XNCR, Min; Lochbaum, Ed; Collicutt, Lorne; Stocker, Max; StatUnit; Saito, Wayne; arthbull@TARTANNET.ns.ca; coastal.network@north.nsis.com; ar427@chebucto.ns.ca; Shackell@phys.ocean.dal.ca; maccallr@scc-csc.gc.ca; swarburt@gov.ns.ca; Cadman.C@parl.gc.ca; Anderson.D@parl.gc.ca; stoffp@parl.gc.ca; acastledine@galaxy.gov.bc.ca; bctvnews@wic.ccom; mirror@island.net; cmontgomery@pacpress.southam.ca; letters@globeandmail.ca; record@goldrvr.island.net; jpaterson@victoriatimescolonist.com; pfmag@aol.com; milewski@vancouver.cbc.ca; gparsons@thezone.net; lbrown@thezone.net; ccda@nfld.com; economic@cancom.net; tperry@cancom.net; wade.brake@thezone.net; emerald@nf.sympatico.ca; exploits@nf.sympatico.ca; HEDBinc@thezone.net; y.fontaine@thezone.net; ggillard@nf.sympatico.ca; cindy.robbins@thezone.net; LRREDB@thezone.net; travis.g@thezone.net; StGeorge@thezone.net; Bertha.Brophy@thezone.net; schooner@thezone.net; sdawe@thezone.net; jpardy@thezone.net
subject: Open Letter on Commercial Coho Moratorium

Coastal Community Network
OPEN LETTER

April 1, 1998

The Hon. David Anderson,
Minister of Fisheries and Oceans
555 West Hastings Street, Vancouver B.C.
by facsimile: 604-666-8956

RE: Open Letter on commercial coho moratorium and fishing communities.

Dear Mr. Minister,

As everyone is aware, this summer fishermen and coastal communities will feel the effects of some of the most stringent conservation measures ever put in place in the West Coast salmon fishery to protect endangered stocks of Upper Skeena and Southern Thompson coho. In fact, in 1997 southcoast commercial fishermen had a moratorium on all directed coho fisheries. Also your department has forecasted a commercial coho allocation in the Kelleher allocation process at zero for four years. This amounts to a four-year moratorium on directed commercial coho fishing, not unlike the Atlantic cod moratorium which has had devastating impacts for coastal communities and fishermen in Newfoundland.

In 1998, the moratorium will be most likely extended to all areas of the coast, North and South, for commercial fishermen. During the period from 1983-94, commercial troll fishermen harvested on average 2.8 million coho and 570,000 chinook annually. This represented about 80 percent of the commercial harvest of these species. This year the coho allocation will be reduced to zero because of a coho moratorium. There'll also be severe curtailment, if not an outright ban, on chinook fishing because of coho by-catch problems. (DFO has already nixed the development of a winter chinook fishery for West Coast trollers.)

The net fleets will also feel the brunt of conservation measures, which your department is currently developing. This coupled with a severely low cycle year for North Coast sockeye and Alaskan over-fishing will result in considerably depressed incomes for fishermen, especially in North Coast communities.

In short, there's a human face to the coho crisis which needs to be addressed at the community level. Infrastructure, service industries and fishermen in communities like Masset, Port Hardy and Ucluelet have traditionally relied on coho and chinook fishing which is being severely curtailed. Whether the finger is pointed at DFO for mismanagement or Mother Nature for ocean survival rates, the implications of the conservation measures in 1998 are clear: fishermen and communities are going to suffer.

You have recently publicly floated the idea of another buy-back in the salmon fishery. Any adjustment program or fleet buy-back will have tremendous implications for B.C. coastal communities. While not opposed to a buy-back program per se, the objectives of any program must be developed in consultation with coastal communities, First Nations and fishermen. Moreover, the communities have a number of ideas for lay-up programs, community licence banks and investment strategies that can be undertaken by the federal government to mitigate the disaster in our West Coast fishery and start to rebuild the resource. It is our view that short- and mid-term measures need to be put in place during this low cycle salmon season.

In Atlantic Canada, the government of Canada provided transition dollars as a result of the cod moratorium. In Quebec and Ontario, emergency funds were given to communities and individuals hard hit by the ice storms, caused by El Nino and climate change. Now, on the West Coast we have fishing communities devastated by El Nino and a moratorium on fishing coho, yet there's no emergency response from Ottawa. There's no recognition that communities are being socio-economically devastated.

In fact, in a telephone conversation with one of your officials in the Economics and Planning Branch, the official said that DFO will be assessing the impacts of the conservation measures once the fisheries management plans are developed in May. I then express to him how ludicrous this statement was when viewed from a community like Ucluelet, Ahousaht, Alert Bay or Masset. For instance, traditionally coast communities relied on a commercial troll harvest of 2.8 million coho and 570,000 chinook. In 1996, the numbers were cut to 160,000 for coho and about 136,00 for chinook. This year you have promised even tougher measures. There's no need for assessments and studies; there is a need for programs and projects. Yet, I get the sinking feeling that DFO wants to study to death the coastal communities.

There needs to be a 3-5 year Federal Fishing Community Investment Strategy to help communities during these low cycle years and rebuild the resource. The strategy can have a number of components, but must be developed at the community/regional level and be implemented immediately. To suggest more studies and assessments at this time is absurd, given the crisis apparent in communities.

The components of the strategy could include, but not be limited to,:

· Seafood Diversification Fund which would provide communities with monies to develop new and underutilized fisheries to supplement existing incomes of rural fishermen and processing in small communities.

· Infrastructure Fund: Many coastal docks and harbours need to be up-graded before being divested to communities Jobs for fishermen repairing and upgrading docks and harbours, which they use, could be developed. Also, hake processing plants in Ucluelet need help to invest in environmental technologies to increase their production. This type of funding should be provided to Ucluelet and all other communities which are trying to maintain their industrial base.

· Skills Training: Depressed fish prices mean that small-boat, owner-operator fishermen need to innovate and develop niche markets. Training and loans need to be provided to fishermen to develop strategies to get more value from their fish.

· Habitat and Enhancement work: Considerable work can be provided to supplement fishermen's incomes for habitat and enhancement projects. The Community Fisheries Development Centres and related partnerships in other regions should be provided 3 to 5 year funding commitments to continue this valuable work.

A serious financial commitment needs to be made by Ottawa to re-invest in remote fishing communities on the B.C. coast. There must also be a commitment that any socio-economic strategies for fisheries, be it buy-back programs or labour adjustment, must be developed in partnership at the community and/or regional level.

Once again, there's a human face to our fisheries crisis and Ottawa can not continue to deny its existence. Communities are developing projects and strategies to weather these low-cycle salmon seasons. We seek the federal government's assurance that the needs and interests of fishing-dependent communities and First Nations will be met in its programs and policies relating to fisheries. This is an obligation that the Government of Canada has made in numerous international agreements, including the U.N. Convention on the Law of the Sea, and communities expect you to respect these commitments.

Sincerely yours,

Eric E. Tamm
Executive Director
Coastal Community Network

cc: Federal Government
Provincial Government

B.C. Coastal Communities
B.C. First Nations
B.C. Fisheries Stakeholders

April 29, 1998

To: Mr. Colin Masson
Area Director, Client Services
South Coast Division
Department of Fisheries and Oceans
Fax: (250) 756-7020

C: D. Petrachenko, Regional Director General, DFO
P. Sprout, Operations Manager, DFO
A. Tautz, Research Head, Prov. Fisheries

From: Peter Broomhall
Fax: (604) 327-5354

Re: My responses to the Key Questions identified at the July 15 coho meeting

Question 1: What forecast of coho abundance should be used in 1998?

Response: Management should be based on the most conservative estimate of coho abundance. That much is explicit in the DFO's own guidelines--conservation first, then . . .

Elaboration: The question raises concerns about the DFO's ability to manage Pacific Coast salmon Among then that:

a. The DFO has yet to learn that questions reveal a great deal about the questioner.

b. No matter what it might say, the DFO does not subscribe to its own conservation-first policy, but to a people- or consumer- or harvest-first policy.

c. The DFO fears protest and confrontation, but is ignorant about the sources of the anger directed against it and about the cures for the distemper.

Question 2: What exploitation rate should guide the development of fishing plans in 1998?

Response: There should be no directed kill fisheries for coho, and none which are expected to indirectly harm coho.

Elaboration: The question raises several unintended reactions. Among them, that:

a. As necessary as it might now be, a total ban on salmon fishing in 1998--as per a zero-exploitation-rate policy--could have been avoided.

b. Many of today's salmon-harvesting problems are rooted in the DFO's entrenched refusal to genuinely oppose salmon-endangering, mixed-stock fisheries.

c. The DFO's role claim to salmon stewardship must be weighed against its failure to shift market harvesting to live-capture, selective, terminal facilities.

Question 3: Should there be any directed coho fisheries in 1998?

Response: Directed coho fisheries should occur only on robust stocks, and only where those stocks do not intermingle with depleted stocks.

Elaboration: Among the reactions this question raises are the following:

a. Were the DFO less timid and less self-absorbed, this question would never have seen the light of day. The most-to-best, least-to-worst principle suggests as much.

b. That sport fish species--steelhead, coho, and chinook--are still harvested by commercial market fishers underscores the DFO's collective lack of judgement or skill.

c. It's time the DFO thought seriously about the recreational fisheries: about what sport-fishing means, about the skills and arts involved, the role and impact of technology, the growing acceptance of catch-and-release, and about the imprecations spawned by various commercial interests within the recreational fishery sector.

Question 4: What, if any, additional coho enhancement should be implemented in 1998 and over the long-term (sic)?

Response: By way of analogy, the best and cheapest way to create electrical energy is not by constructing new power plants, but by conserving power. Likewise, the best and cheapest way to enhance coho--or any other anadromous salmonid--is not by producing more hatchery coho, but by preventing inappropriate coho harvests and by protecting coho habitat.

Elaboration: Conservationists and others concerned about sustainable use of natural resources such as salmon have good reason to view "enhancement" as a code word for job-creation schemes with poor cost-benefit returns. Thus, the question might provoke reactions such as these:

a. Governments should not mislead the public about the deterioration of salmon habitat–which is what salmon "production" hatcheries do. Research hatcheries are an entirely different matter.

b. Activities contrary to the public interest should not be subsidized. That subsidized activities might serve the short-term interests of politicians and bureaucrats is insufficient justification for squandering tax dollars.

c. Much more of the DFO's time, energy and budget should be directed toward enforcing the Fisheries Act, monitoring fishing activities, and securing and safeguarding riparian habitat.

Question 5: What habitat action(s) should be recommended . . .?

Response: Get serious about studying, policing and reporting habitat issues; about protecting fresh-water (upland), estuarian (inter-tidal), and salt-water (marine) habitat against despoliation; and about expropriating privately-owned riparian property.

Elaboration: Recent battles over Fraser Valley riparian zone policies and practices suggest that, no matter what happens elsewhere, salmon will not survive unless riparian habitat is protected against anti-salmon activities. Buck-passing and finger-pointing accomplish little. It's time the DFO redirected some of its human and financial resources from science and technology to communications and law, and from hatcheries, say, to riparian initiatives. Here are three obvious steps:

a. First, establish workable riparian regulations, laws, law enforcement, understanding, and cooperation between the public, industries and all levels of government. All this plus prompt and thorough disclosure of land-use decisions and activities means that the DFO would be obliged to overhaul its communications system.

b. Second, guard against feel-good programs that, over the long term, could do more harm than good. For example, when thinking of stream restoration schemes, consider Roderick Haig-Brown's verdict on salmon hatcheries--that they signify our failure to save the salmon. Similarly, restoration schemes signify our failure to save salmon habitat? It's time to put prevention ahead of cure, and to stop fueling the notion that human ingenuity and technology can correct whatever goes wrong.

c. Third, organize habitat data in easily-retrieved and comprehensible forms. I recommend GIS mapping, and three main habitat classifications: marine (salt water), estuarian (brackish water), and stream (fresh water).

Question 6: Should there be a selective-mark sport fishery for hatchery coho in 1998 and/or 1999 and beyond?

Response: No.

Elaboration: That someone wonders if it's okay to kill coho when coho perch on the brink of extinction says that there's a paucity of concern for and understanding of coho--and a bleaker future for salmon or for salmon fishing of any kind. Three related thoughts:

a. It's too late for a hatchery-versus-wild coho comparison. It's too late for compromise. Crisis and compromise are unhealthy bedfellows. Wild and hatchery coho swim in the same water. Allowing a harvest of hatchery coho will harm wild coho. Next is to prohibit random harvests of chinook, coho, or steelhead.

b. If the DFO produces coho because rivers can no longer do so, then hatchery-produced coho are too valuable to be targeted. If the DFO produces coho to

satisfy sport fishers who want to kill their quarry, then the DFO should long ago have figured out how to retrieve hatchery costs from those who kill the fish. Generalizing the costs throughout the fraternity of anglers demonstrates a serious misunderstanding of what's best for either the sport-fishing community or the public.

c. Given the present realization that it's best to live within our financial means. living within our ecological means is a sensible goal. Coho hatcheries contradict that goal.

Question 7: Should the 1998 salmon fisheries be managed to account for:

i the overall abundance of southern B.C. salmon species,

ii the overall abundance of southern B.C. coho salmon,

iii the abundance of endangered south Thompson coho stocks?

Response: The abundance of endangered south Thompson coho.

Elaboration: "To account for"? "Abundance"? The wording of this question reveals a considerable discomfort, and raises several questions:

a. Is the DFO prepared to abandon its conservation claims at the drop of a salmon hook?

b. Does the DFO realize that selective terminal fisheries would almost eliminate the need for this question?

c. How much longer are we going to dance the mixed-stock jig?

Question 8: How can salmon fisheries be managed to achieve a balance of economic and conservation benefits?

Response: The salmon fisheries should be managed according to a simple principle: most to best, and least to worst.

Elaboration: If the DFO views the economy and conservation as divisible, we might save ourselves a whole lot of time and effort, not to mention taxpayer money, by shutting down the DFO. The exploiter mentality separates economy from conservation in order to disregard the future. Don't ecology and economy stem from the same Greek word? Several thoughts on economics:

a. Modern-day capitalism is a system whereby people individualize their gains and socialize their losses.

b. When acquiring wealth, the challenge is to avoid acknowledging or paying for the damage done in the process.

c. Conservation is merely ethical economics.

Question 9: What additional follow-up could ensure that participants' views are properly considered?

Response: None.

Elaboration: Given that the Pacific salmon resource has been mismanaged for so long, that astute observers have vainly attempted to right the wrongs, and that the DFO's main--and predictable--reaction has been and still is merely to rearrange the deck chairs, there's little hope of "ensuring" that any "views" will be "properly considered". To DFO employees, "risk-free" means risk-free to themselves, not to salmon--just as, to most fishers, conservation means that someone else kills fewer fish. I sympathize with the realists who argue that it's impossible to save wild salmon, but I nonetheless believe we should try to stem the rate of loss. The DFO has many highly capable and dedicated employees, but their intelligence and their efforts are sabotaged by a collective indifference and incompetence.

One last matter. I'm the malcontent who complained, after the DFO had frivoled away five-sixths of the scheduled April 15 meeting, that the attendees hadn't yet given the advice they'd been summoned to give. Later, 1 reported on the evening to She Who Must be Obeyed. Her succinct summary: "They [the DFO] came to talk, not to listen."

SPECIAL COHO CONSULTATION MEETING FOR ENVIRONMENTAL, NON-GOVERNMENTAL ORGANIZATIONS AND OTHER INTERESTS.
Meeting organized by Department of Fisheries and Oceans
April 15, 1998- SFU Harbourside Campus

Respectfully submitted by: Terry Slack and Wendy Turner

It is important at the outset to express appreciation for the opportunity to be included in these proceedings. It is recognized by our community that we are deeply challenged by the condition of our fishery and that we must move towards better management of this very important resource not only for our human use but as a measure of how we are doing in our care for the environment on which we all depend. Thankyou for including the broader public and let us hope that there will be many more such opportunities.

To be most useful for this consultation the focus of these comments will be on Section B. South Coast Coho Consultation Framework. The three sections will be addressed where advice is sought:

1. Fishery Management

a. Level of mortality- We urge that the department move in a most conservative way when establishing the numbers for the catch. We recognize the difficulty of getting the numbers. We ask that there be respect for the Washington State coho and chinook and and a recognition that they are threatened. These are trans-boundary matters between the U.S. and Canada and we know that we need to protect the natural coho stock. We must work together on solving the problems.

b. Approaches for management- The key factor is 'timing'. It is critical that we get a better handle on timing. All Canadian and United States research from Department of Fisheries and Oceans, universities, and independent researchers must be acknowledged and considered. The science done by researchers must be respected and emphasis must be placed on more research work to be undertaken. We need much more work done on the data re 'timing" on fish movements. We need more data to protect the stocks in 1998 . Data should be available to consider this year. We are emphasizing that this is an area that needs more focus now and in the future.

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c. Monitoring- We recommend that the fishery opening be only a ten hour ratification period. This is important since a longer period allows too much slippage in the numbers from the time of opening to the actual catch period and we do not know enough about the "timing" of the fish movement. More data is needed on the "test set" fisheries for the timing. We need an extensive test set to predict where endangered stocks are and their strengths. We recommend that there be only "daytime" fishing. More money should be spent on tagging of the returning migrants so we can better understand the timing back to the spawning grounds better. There are new changes in timing migration because of El nino and more research should be done on this. eg. Stewart lake sockeye are extremely late because of El nino and river water conditions. We should paritcipate with the U.S. in their fisheries' management especially in Juan de Fuca and Point Roberts commercial, sport and native fisheries. We insist that there be no more fish wars.

d. Exploitation rate- Catch and release should be extensively monitored throughout the sports, commercial and native fisheries. We need more people to monitor the situation and more financial resources are needed for this aspect of the work. We urge an increase for monitoring and protection of stocks.

2. Habitat and enhancement advice

a. DFO must take a stand on protection of the environment for fish. The department must be front and centre when urban development conflicts arise and advocate the best decisions for the survival of fish. 800 km. of coho spawing streams are already culverted in the lower mainland. It is critical that the DFO be promoting protection despite the controversy. We must take the long term view and realize that we need a strategy for rehabilitation of the riparian habitat. Cumulative problems must be addressed including siltation, gravel removal, urbanization, stream loss, nutrient loading, pollution. It is important to recognize that many of these problems will not be solved in the short term but the big picture must be the focus.

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There is an urgent need for planning and these plans must be prepared vigorously not in a piecemeal fashion and the work must be based on the most careful of considerations.

b. Get 'wild' stocks back to the Thompson

c. We must depend on "wild" stocks coming back. It is most important to maintain the gene bank of the wild coho. The emphasis should be on retention by making use of the natural approach not genetic engineering through our problems.

3. Stock Assessment Advice

We recommend that more focus be placed on the volunteer streamkeepers' program and that advice be sought from these people. More appreciation must be expressed for this work. More money should be spent on this program. We cannot expect the voluntary sector to undertake all the assessment. It needs to be recognized that the volunteer is just that. Trained workers are needed for this work.

There is need for a program to provide more professionals i.e. formally trained people in this field.

Much more emphasis needs to be placed on research and support must be provided financially for this important work.

We need more scientific work on the downstream migration of salmon fry and smolts. There is much more work which needs to be done.

DFO should work along with other government and non government agencies and the public to maximize the talents of our community to deal with these important matters. We call for more public involvement in these problems.

General Comments

1. Keep politics out of the fishery. Management must be handled by independent scientific analysis and the analysis should speak to the directions and decisions taken.

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2. There is terrible confusion currently about the roles of the Federal and Provincial governments about the management of stock. This must be clarified.

3. Numbers as they relate to considerations about our view of fish. Numbers are data and they can be manipulated to the ends of the user. It is critical that there be proper analysis of numbers as they relate to our fishery so that the interest of the public is clearly addressed in the use of the numbers. A clear example of our huge mistake is the fact that we have known for 12 year's that the near extinction of coho was coming. We have blown it. The managers must do better.

4. We must have the guts to protect our endangered Canadian and U.S. (Washington State and Alaska) salmon stocks.

5. We support the concept of the Pacific Fishery Conservation Council and that we get on with it "yesterday" or immediately. It may become urgent if there are conflicts over the resource this year.

In conclusion we appreciate the opportunity to provide input to these considerations. Further comments will be sent as a result of information which was put forth at the public meeting on April 15, 1998- Special coho consultation meeting for environmental groups, non-governmental organizations and other interests.

meeting

Greg S. Gordon
4248 Spurraway Place,
Kamloops, B.C. V2H 1L2
phone/fax (250) 578-8476
ggordon@wkpowerlink.com

April 24,1998

Honourable David Anderson, P.C., M.P.,
Minister of Fisheries and Oceans,
House of Commons,
Ottawa, Ontario K1A 0E6
Fax to (613) 952-1458
Email to Min@dfo-mpo.gc.ca

Dear Minister:

As one who lives in the Thompson Region of British Columbia, I'm taking this opportunity to express my concern about the depleted and endangered status of Thompson River coho stocks and to also urge for the conservation of these stocks above all other considerations.

I recognize that conservation of these stocks will likely result in significant socioeconomic upheaval in coastal communities throughout British Columbia and I'm sympathetic with their precarious economic position. I'd like to point out, however, that the Thompson Region has shouldered the brunt of the socioeconomic disruption to this point, while others downriver have, with some exception, continued to exploit these stocks at risk. As you likely know, many local aboriginal communities have willingly foregone the harvest of these fish and it has been years, perhaps decades, since interior communities have been allowed the privilege and the resulting economic benefits of a sports fishery for Thompson coho.

Within the Salmon Arm Subdistrict, coho populations have plummeted from 11,530 coho in 1985 to just 488 coho in 1997. North Thompson coho stocks appear to be in slightly better condition, but escapement has dropped to less than one third of early 1990's levels. More descriptively, in 1988 an estimated 9,355 coho returned to the Clearwater Subdistrict, in 1997 only 1891 coho. Clearly, we are at a crossroad where strict adherence to the conservation ethic must extend beyond the boundaries of our region in order to halt the growing coho deficit and further extinctions. Other stakeholders must now share in out sacrifice.

Mr. Minister, it's time to stop the salmon wars with the United States in which fish always lose, it's time to listen to the science that tells us that we're facing coho extinctions on a massive scale and it's time to shut down those fisheries that take from the numbers of endangered coho stocks.

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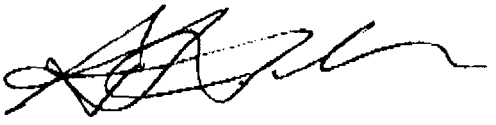
Furthermore, let's use this opportunity to more expeditiously develop industry harvesting methodologies that can selectively live-harvest our fisheries resources while enumerating and safely releasing non target and endangered stocks to continue their spawning migration. The benefits of such a strategy have never been more obvious and compelling, particularly to those of us who live on the Thompson.

I appreciate that you have some difficult decisions to make in the days and months ahead in this regard and thank you for your time and consideration in this very important matter.

Yours truly,



c.c.:

Ms. Donna Petrochenko, Regional Director General, Department of Fisheries and Oceans
Mr. Dennis Streifel, British Columbia Minister of Fisheries
Ms. Iona Campagnolo, Fraser Basin Council
Ms. Cathy McGregor, Minister of Environment, Lands and Parks
Mr. Brent Hargreaves, DFO Coho Response Team
Mr. Jamie Alley, Ministry of Fisheries
Mr. Clifford Branchflower, Mayor, City of Kamloops
Thompson Nicola Regional District
Mr. Barry Rosenberger, Interior Manager, DFO Kamloops
B.C. Wildlife Federation
Mr. Parzival Copes, SFU Institute of Fisheries Analysis
Greenpeace
Sierra Club
Sierra Legal Defense Fund
Outdoor Recreation Council
Steelhead Society of B.C.
B.C. Federation of Fly Fishers
B.C. Federation of Driftfishers
Sport Fishing Institute
Shuswap Nation Fisheries Commission
B.C. Aboriginal Fisheries Commission
United Fishermans and Allied Workers Union
Media

Salmon River Watershed Roundtable

c/o Dennis Lapierre, Chair
R. R. 1, Comp. 4, Shaw Road
Falkland, B.C. V0E 1W0

April 23, 1998

The Honourable David Anderson, P.C., M.P.
Minister of Fisheries and Oceans
Ottawa, Canada
K1A 0E6

Dear Mr. Anderson:

This letter is written in support of the Coho Habitat Action Plan recommendations, compiled by members of your ministry and being delivered to you Friday, April 24/98.

First, however, I wish to thank you on behalf of the Salmon River Watershed Roundtable for your letter of February 9/98 in which you acknowledged the goals and mandate of the Roundtable, our long standing dedication to the fisheries resource through our watershed restoration and stewardship projects, and that you awarded $100,000.00 for the 1997 fiscal period to us for the purpose of continuing our conservation efforts.

The Department of Fisheries and Oceans has been the key supporter, greatest source of technical advice and support, and principal funding source for our community-based watershed initiative from the outset in 1992. From such support, this community has developed a strong awareness about the relationship between fish needs, human, and all other environmental needs. During the course of my involvement with the Roundtable, I've seen the attitudes of many in this agricultural community shift from one of fish needs versus farming needs when it came to water issues, to a realization that these are not issues on opposite sides of the coin, but issues where the presence of one, the fish, are important indicators of the immediate and future health of the other. Evidence of this realization has come in the form of ever increasing numbers of streamside agricultural landowners seeking to participate in fish habitat restoration initiatives along the Salmon River, which in each case demands a 25% landowner cost contribution and in most cases a sacrifice of agricultural land without compensation for the establishment of riparian areas. It is a pleasant dilemma for the Roundtable to have more landowner applicants than there is money from the various funding sources to accommodate

../2

Community awareness has been one of the outcomes, and so is there heightened community concern. It's a result of such concern that the Roundtable has had a full presence at the Okanagan-Shuswap Land and Resource Management Planning process: a process, incidentally, in which our watershed approach to sustainability, using the salmon as a barometer of system health has not only been very well accepted by all participants, but one that has been looked upon with envy by other communities. It's out of recognition of such concern that the Federal Ministry of Environment recently published a technical analysis of the Salmon River that was given to the provincial Ministry of Environment, Lands and Parks. This analysis, this report, included a recommendation that the Water Management branch adopt a regional approach to water management in this area; the beginnings of a proactive way of operating, in my view, and a recommendation that the community be involved in ongoing water quality measurement responsibilities.

The Salmon River once rivalled the famed Adams River for salmon spawning populations. While we are all aware of the many influences on the fish resource populations that are out of our control, we in this community have become most aware of the local influences: forest overharvesting, harvesting methods, ill considered agricultural practices, and the like that have no doubt contributed to a diminishing salmon presence in this river. We are making concerted efforts to make changes that will result in better water and habitat conditions and a better salmon spawning environment here for whenever the fish return.

Each one of the short, medium, and long term recommendations incorporated in the draft Coho Habitat Action Plan reflects in one way or another the interest this community has in seeing salmon habitat restoration efforts being given a high priority by you. For that reason the Salmon River Watershed Roundtable wishes to add our strong endorsement in support of the recommendations.

Yours truly,

Dennis Lapierre/ Chair/ Salmon River Watershed Roundtable

NICOLA TRIBAL ASSOCIATION

NICOLA WATERSHED STEWARDSHIP & FISHERIES AUTHORITY

#202-2090 COUTLEE AVENUE

P.O. BOX 188, MERRITT, BC V1K 1B8

Phone (250) 378-4235 Fax (250) 378-9119

e-mail: ***haljam@mail.nicolavalley.com***

April 21, 1998

"Via fax only: 250-851-4951"

Michael Crowe
Habitat Biologist
Dept of Fisheries and Oceans
1278 Dalhousie Drive
Kamloops, BC V2C 6G3

Dear Mike:

Thanks for the opportunity to review your draft document; "Coho Habitat Action Plan". I have some general observation/suggestions, and a few comments specific to points within the document itself.

A. Observations/Suggestions

1. The document does not reflect the rapidly evolving nature of the First Nations – DFO relationship, nor the reality of land claims and Treaty settlements. The only references to First Nations are in "Long Term" #5 (where First Nations are lumped in with displaced fishers) and "Long Term" #7 (where First Nations are a possible source of money to help out DFO). This is unacceptable. Remember; if DFO does not build this initiative *in concert with First Nations*, there is potential for failure. I know you have an extremely tight deadline but I suggest you find a way to give this whole document an entirely different flavour that reflects the importance of First Nations in relation to their rights and title to the land, water, and other resources – not to mention their capability to implement much of the actual project work.

2. This document is extremely wide-ranging in an effort cover "all the bases". Its complexity may characterize it as another bureaucratic-building exercise that receives serious and earnest discussion by many serious people for a long enough time for coho to be replaced by another political flavour-of-the-month. In concert with my Observation #1 I suggest it be streamlined to focus on the following:

   Secure sufficient A-base funding from within DFO to adaquately staff your division; many of the activities and tasks identified in the document will naturally flow as a result;

   - Legislation: bolster the Federal legislation as you suggest, and lobby the Provincial Government to ensure their Fish Protection Act complements the thrust of the habitat section of present and upgraded Federa1 legislation;

   On-the-ground projects: the AFS is an excellent vehicle to use as many groups are in place, doing at least some aspects of the necessary work, they are local community and watershed based organizations, and they are in the best position to coordinate local projects in partnership with the two other Governments.

3. The document gives the impression of an expansion of the Public Service with more government employees doing more managing and controlling. (This is natural, as it is government employees who are the authors). In today's reality of the trend toward community and watershed-based management involvement and control, expansion of DFO is going to meet with resentment and resistance. Focus on having a relatively small group of DFO habitat employees to proactively be involved in the referral prosess, and who can evaluate and monitor habitat health in concert with the locally-based groups who are (should be) carrying out the work.

B. Specific Comments

- "Short Term" #l: specify First Nations as the other partner. Also, this is where you should begin discussions, through the local groups, with landowners re-acquiring "tenure" for coho (and other species).

- "Medium Term" #2; through the DFO/Province MOU, request the Provincial Government to write "no net loss" into the Fish Protection Act (if it is not already there).

- "Medium term" #5: this is a big fat NO. Such a proposal would: create a quasi-Public Service result in sole-sourcing: create a privileged elite in the "private sector"; and abuse the concepts of fair end open business and contract practices." Niche consultants may lose their ability to make a living if they do not have the resources or opportunity to participate, or choose not to participate. Consultants are already educated, certified, and experienced in the areas specified. Furthermore, the Province already has an excellent database of qualified contractors.

- "Medium term" #7; too much Government and no first Nations in the "team".

In conclusion, despite your very tight in-house deadline, I urge you and your colleagues to have another look at this in light of the comments I have listed. If you focus on, and achieve, the three main areas of endeavor that I suggest in my paragraph A.2, many of the tasks/activities that are listed in your Action Plan regarding agency interactions will be made possible.

Sincerely,

Norma Todd

for **Neil Todd**
Technical Advisor
NWSFA

/nh

CC A. Narcisse, Program Manager
NWSPA

SHUSWAP NATION FISHERIES COMMISSION

Room 215, 355 Yellowhead Hwy, Kamloops B.C. V2H 1H1 Phone: (250) 828-9791 Fax: (250) 828-9787

April 24, 1998

Honorable David Anderson
Minister of Fisheries and Oceans
Room 133, East Block
House of Commons
Ottawa, Ontario
K1A 0A6

Re: Coho Habitat Action Plan initiative outlined by the Dept. of Fisheries and Oceans Habitat Enhancement Branch (HEB), Pacific Region.

Dear Honorable Minister Anderson:

I am writing to express the Shuswap Nation Fisheries Commission's (SNFC) strong support for the Coho Habitat Action Plan presented to us by representatives of HEB. As you are aware, coho stocks in B.C., particularly those returning to the traditional territories of the Shuswap People (Thompson) as well as those returning to the Upper Skeena River are in crisis. We at the SNFC believe it is urgent that recruitment shortfalls in returning adult coho must be immediately addressed by curtailing directed harvests of coho in Canadian waters and targeting a 0% by-catch of Thompson coho by both Canadian and U.S. fishers. Unfortunately, we also realize that curtailing exploitation of coho is only the starting point towards the task of recovering our endangered coho stocks.

Ensuring the survival of coho, let alone the successful recovery of coho stocks to historical levels for the benefit of future generations, will require a comprehensive, multi-pronged approach, co-ordinated between all branches of the DFO, including stock assessment, habitat and science. This approach must include a strong mandate to protect existing coho habitat while also ensuring that the necessary resources are available to recover coho habitat that has been lost or impacted due to urbanization, industrialization, and resource extraction. We believe HEB's Coho Action Plan initiative addresses a number of key issues, particularly federal provincial co-operation towards increased education and public awareness, implementation of effective water licensing/ground water legislation laws and establishment of minimum flows guidelines to name a few.

First Nations can play a significant role supporting HEB in their mandate to protect coho habitat and in the implementation of the Coho Action Plan outlined in HEB's document. Recognizing that First Nations represent a level of government committed to active participation as stewards

of their salmon resources is a necessary requirement for HEB's plan to be effective. We feel this can be best achieved through provision of a Coho Conservation biologist dedicated to working with both First Nation governments and section representatives within the DFO and the Ministry of Environment, Lands and Parks to facilitate co-ordination of a comprehensive coho recovery plan. The SNFC looks forward to working closely with HEB in a Coho Action Plan that involves the Shuswap people. To this end, we strongly endorse HEB's proactive approach towards toward our mutual goal of protecting and recovering Thompson River coho stocks.

Respectfully,
Shuswap Nation Fisheries Commission

Dave Moore
Director

CC Donna Petrachenko RDG-DFO, Pacific Region
Melody Farrell, Habitat Biologist, DFO, Vancouver, B.C.
Michael Crowe, Habitat Biologist, DFO, Kamloops, B.C.

B.C. Federation of Fly Fishers

May 4,1998

Honourable David Anderson, PC., M.P.,
Minister of Fisheries and Oceans,
House of Commons,
Ottawa, Ontario K1A 0E6
Fax to (613) 952-1458

Dear Minister;

The British Columbia Federation of Fly Fishers (BCFFF) would like to take this opportunity to express concern for threatened stocks of B.C. coho salmon.

Please be advised that at the most recent Annual General Meeting, held May 2, 1998, a motion was passed in favour of advocating for "zero exploitation on endangered coho stocks". The BCFFF therefore joins with the Steelhead Society of British Columbia and others in urging you to do your utmost to preserve remaining stocks of coho for future generations.

The BCFFF wishes to thank you for your time and consideration in this very important matter.

Yours truly,

for Arthur J. Lingren,
Acting chairperson

c.c.
Ms. Donna Petrachenko, Regional Director General, DFO
Mr Dennis Strelfel, B.C. Minister of Fisheries
Steelhead Society of B.C.
Shuswap Nation Fisheries Commission
Mr. Brent Hargreaves, DFO Coho Response Team
B.C. Wildlife Federation

Attention Sport Fishermen

The Department of Fisheries is presently deciding on a fish management plan for WCVI Coho. The following position has been put forward by the Sport Fish Advisory Board (SFAB);

Area 23 (Alberni Inlet, Barkley Sound)
Bag Limit- 2 per day, 4 possession, Clipped Coho Only

Area 24-27 (Long Beach to Cape Scott)
Bag Limit - 2 per day, 4 possession, All Coho

As this proposal creates major competitive discrepancies between businesses in the region, we are circulating this proposal for review by the WCVI recreational fishing community. Please fax responses to 250-724-7168 Attn: Darren De Luca

Potential WCVI Sports Fishing Plan

- Due to the fact that the WCVI coho stock composition will contain a lower proportion of stocks of concern than any other area of the coast, a directed coho fishery is conducted in this area.
- The bag limit in Areas 1-25 to 1-27 should be two a day, four in possession
- The bag limit in Areas 1-23 to 1-24 be two a day, four in possession, where only one unclipped fish would be allowed to be kept per day. The rational for keeping 1 wild fish is to minimize the release mortalities as a result of fishing for a second clipped fish.
- Gear restrictions such as barbless hooks and the banning of treble hooks should be reviewed. (What about bottom fish?)
- Possible closures of Swiftsure and other identified rearing areas where stocks of concern may be congregating may need to be implemented.
- Landing station capacity for all wild coho caught should be made available in order to take scale and DNA samples to identify stocks of concern.
- That in terminal areas where healthy runs exist, such as 1-23a, the bag limit is 2 a day, 4 in possession.
- A public education program identifying bag/area restrictions and proper catch and release methods should be implemented.

ALBERNI VALLEY SPORTFISHING ASSOCIATION
A.V.S.F.A.
Local Advisory Group to D.F.O.

April 24 1998

Attn Jeremy Maynard
Chairman, South Coast Advisory Committee
Sport Fish Advisory Board

Dear Mr. Chairman

Following please find our resolutions as a result of our local meeting on April 23, 1998.

1. Based on the Data provided to us from D. F.O. that area 23/24 are not the leading concern with regards to conserving the stocks which are in danger (upper Thompson/Skeena runs). Data prove through coded wire tag recovery that only a maximum of 30 fish from this system would be potentially harvested in the Barkley Sound (area 23) on the West Coast via the recreatlonal fishery. In fact, area 123 to the surfline is the region where harvesting of inside stocks have occurred.

2. An "Inside Coho Safe fishery" can exist with the sport fishery being able to retain wild west Coast and US Coho, and that no management decisions should be made using TAM, since stock composition is the only relative data to the present inside coho Crisis.
e.g./ (based on D.F.O. data, Apr 1,98) including area 123

Area 23/123 bag limit 2 Coho/day, 4 possession
mortality 19,000 Coho consisting of :
47% US fish
5354 Coho from inside stocks (based on stock composition of 282 %
5 Coho from the Thompson/Skeena region

RECOMMENDATION:
Whereas DFO data indicates that less than 30% inside stock composition is present in this region
and,
DFO CWT data indicates that less than 30 Thompson stock will be harvested
and,
Area 1-23 is the approach way to the Juan De Fuca Strait
That
Areas 23 A/B remain at 2/4 bag/posession limit
and that
Area 1-23 restricted to 2/4 clipped bag/posession limit

We also recommend,
Whereas.
stocks of concern have left the region by Aug 1
that
The area 1-23 clipped restriction is removed to allow opportunity to harvest strong terminal Stamp River Coho

Respectfully submitted,

Alberni Valley Sport fishing Association

cc: Tery Gjeurnesse, DFO
Bill Otway, DFO
Paul Sproat, DFO
Tom Bird, SFI
Laurie Gordon, DFO

Jay Rowland, 1070 Riverside Drive, North Vancouver, B.C. Canada V7H 1V5
E-mail: rowland@bc.sympatico.ca **Phone # (604) 929-8833**

April 29, 1998

Mr. Paul Sprout,
Director of Operations,
Fisheries and Oceans,

Dear Sir:

As a sport fisherman I feel I must express my views concerning the Task Force on endangered Coho salmon stocks. I pray that something positive and dramatic will come from this initiative. The time for endless study and discussion has past. The people of British Columbia, and our threatened salmon, need bold decisive action to be taken immediately.

Past Fisheries past management solutions to declining stocks have been to place increasing restrictions on existing methods of harvesting. The real problem is the ability of the commercial fleet to harvest too many fish in an indiscriminate manner. The dire predictions of environmentalists have been ignored, leaving us in the present desperate situation.

The Atlantic Cod fishery in Newfoundland collapsed due to over fishing and its loss tore the heart out of Newfoundland. We are pursuing a similar path in B.C. with our once abundant salmon stocks now in serious decline. The thought of our beautiful coast devoid of wild salmon is a crime against nature, too horrible to contemplate. The seriously threatened Coho is just the most prominent species. Steelhead and Chinook are also in jeopardy as stocks are dangerously low.

It is imperative that radical new solutions be implemented. Desperate times require desperate measures. Here are some suggestions:

- Place a moratorium on net fishing for all salmon in the ocean. The standard non-selective net fishery has proven to be a disaster and threatens the weak stocks of fish. There is no way to tell which type of salmon the nets are killing.

- Consider selective terminal fishing methods on the salmon spawning rivers. Proven historical techniques, such as fish-wheels, allow for the release of threatened species while harvesting non-threatened fish stocks in numbers that maximize natural spawning.

- An immediate ban of commercial fishing for herring and herring roe. I can not believe this destructive fishery is allowed to continue. It threatens the whole in-shore food chain. Many species, particularly salmon, utilize herring for the majority of their food.

- Buy out commercial fishermen or have them participate in the selective river fisheries.

- Sports fishing should have fish possession limits reduced, with catch and release methods encouraged. Sport fishing is economically viable and contributes ten times the amount that

commercial fishing does to our provincial economy and yet accounts for only 6 % of the fish taken. This is a key component to our vital tourist industry and must be encouraged and can still be done in the context of a no-kill fishery.

Repeated studies have demonstrated that commercial fishing for salmon is an unsustainable 'sunset' industry, which persists, in using damaging harvesting techniques. We must act now rather than blindly supporting this failing industry, which will operate with the status quo until the last salmon is canned. Many displaced commercial fishermen have already made the successful switch to the thriving sports fishing sector. More should be encouraged to seek alternate work.

Commercial fishing has been reduced to a glorified welfare industry where the participants work as little as three weeks a year and then become eligible to receive Employment Insurance benefits. Fisheries and Oceans seem to routinely allows late season openings for low commercial value salmon species, seemingly for the purpose of providing fishermen with extra days to qualify for insurance benefits. These openings are often at the expense of endangered stocks, such as the Thompson River Steelhead, which are caught inadvertently in the same nets.

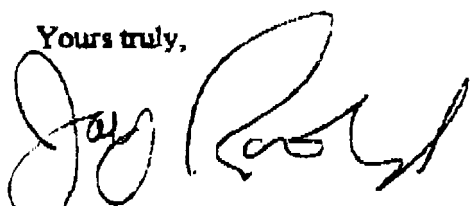
The survival of wild salmon stocks must be the primary concern. Without the fish there will not be employment of any kind in this sector.

Passenger pigeons, once the most abundant bird species in North America, became extinct in my father's lifetime. It is entirely possible that Pacific salmon could suffer a similar fate during mine. I do not want to be asked by my son "Why didn't someone do something to save the salmon when we had the chance?" Why indeed!

Corrective action needs to be taken immediately. We should not blame the decline of B.C. salmon on American over fishing when we persist in destructive practices ourselves. A total no kill fishery seems to be the only solution to save B.C. salmon from extinction in the wild.

Dare to be great! Take steps to ensure a lasting legacy of wild salmon for the people of British Columbia.

Yours truly,



Jay Rowland

cc: Dan Burns, The Steelhead Society of British Columbia

FISHERIES COUNCIL
OF BRITISH COLUMBIA
Suite 1400 -1188 West Georgia Street
Vancouver, B.C. Canada V6E 4A2
Telephone (604) 684-6454
Fax (604) 684-5109

1998 COHO SALMON MANAGEMENT

Harvesting Surplus Sockeye, Pink and Chum Salmon

Introduction

The Fisheries Council of British Columbia (FCBC) is an association of companies that are in the business of purchasing fish from harvesters in BC, and processing that harvest into food products available for domestic and export sale. **In 1997, FCBC companies purchased 67% of the salmon harvested in BC. The member companies of FCBC have the largest group of investments in the commercial fishing industry, including plants and equipment, and are the largest employers of shoreworkers in the Province.**

From this perspective, FCBC argues that the 1998 salmon season can be managed so as to conserve stocks of coho and to ensure the harvest of surplus stocks of other species. Indeed, opportunities to harvest coho may exist in some areas of the Central Coast.

We believe that what has been described as the "zero option" is, from Canada's economic perspective, not an option at all. The absence of Canadian product from world markets for a year or more, would create irretrievable losses. From a conservation viewpoint, we argue that irretrievable losses of coho populations need not be a consequence of the harvest of other, more abundant, salmon species.

Moreover, we would argue that the science of fisheries management is sufficiently imprecise, especially in light of changing climatic and oceanic conditions, that to move to a zero exploitation rate on coho is not justified by any reasonable risk analysis. **Coho is not like Northern Cod - it's protection can be assured while we pursue benefits from the harvest of other abundant stocks of other salmon species.**

Fishing Options

While we generally support the need for a consistent and predictable system of deciding allocation of resource use, the circumstances posed in 1998 warrant special treatment. We believe that the seine fishery should be the preferred method of harvest of surplus stocks in 1998, where there is a risk that mortalities on coho would be higher than acceptable.

Troll fishing opportunities exist in certain areas for the harvest of chinook salmon without coho by-catch, and limited gillnet opportunities will exist in the early part of the season and in certain areas, prior to the arrival of coho, or where coho by-catch is not a problem.

If coho abundance is as low as predicted, then by-catches will be correspondingly small, as long as fisheries by the main coho harvesters are limited.

The seine fishery has the potential, if properly managed, to provide an economic and management solution in 1998. The Area 4 Selective seine fishery has, over the past two years, provided information and experience to allow for improvement in the techniques employed. It's general approach is one that we urge now be applied in other areas where coho by-catch has occurred in the past.

We agree with the basic outline for fishing practices in 1998 as outlined by the FVOA (see attached).

Compensation Issues

FCBC would offer the reminder that, should the Minister decide that he will permit no fishing in 1998, then any financial compensation package offered to harvesters must also be extended to plant workers and to processing companies which have already invested heavily in acquiring goods and services to handle 1998 harvests of other salmon species.

In this regard, we note that, in the Prince Rupert area, independent studies conducted annually since 1985 show that annual shore payrolls in the region range between $20 and $30 millions. In the major processing plant in Prince Rupert, an estimated 65% of employees are aboriginal persons.

It is our view that the current crisis mode in which we are operating was completely avoidable. DFO has recognized that some coho stocks have been in difficulty for years and did little to introduce fundamental change into the fisheries. In fact, DFO studiously ignored suggestions made by FCBC in 1996 to introduce new harvesting methods on the Skeena, as an example.

That suggestion has been withdrawn; FCBC now believes that the seine fleet (smaller after another round of licence buyback) should be managed as a tool to harvest major surpluses in approach fisheries, and as mobile "fish traps" in the more terminal areas. Coupled with the application of selective fishing techniques, and further refinement of them, the seine fishery can be an efficient and safe harvester of surplus salmon stocks.

Allocation Issues

FCBC is concerned that the 1998 management plan not turn on the issue of allocation amongst commercial gear types, or on allocation between commercial and sports fisheries.

We believe that conservation measures can apply in both commercial and recreational fisheries, allowing both to generate business and jobs for Canadians. Fair and flexible allocation approaches are required to get through the coming season.

We do not want to see commercial fishing opportunities forgone because of inter-gear allocation arrangements that might have been developed (here we are anticipating the report of Stephen Kelleher to the Minister) based on past experience and shares that bear no relation to the current problems that we are trying to address.

FCBC
May 1998

1. That the FVOA, NBBC, UFAWU, FCBC member companies and other willing companies, and the DFO develop an education program on proper sorting, handling and identification techniques and make this a mandatory requirement for this year.

2. A license moratorium for those fishermen willing to relinquish the ability to fish this year.

3. Implement a pilot tagging project modeled on the Northern Seiners project in cooperation with DFO.

4. A further feature of the Toy Report was timely and accurate monitoring of catch statistics for ALL SECTORS. All sectors, sports included, design such a program taking into account the fiscal constraints facing industry.

5. In Juan de Fuca we follow 1997's yellow line/red line approach which was developed in cooperation with fishermen.

6. The same type of approach be designed for Johnstone Straits by a group of representatives and knowledgeable fishermen in cooperation with DFO.

7. Mandatory 1/2 tote survival boxes should be required for the seine fleet.

8. Information developed by the tagging study and the monitoring proposal be the property of the "Fleet" so that we may apply peer pressure to anyone that does nor adhere to the intent of the measures.

9. To encourage widespread acceptance of these measures it will be necessary for DFO to support reasonable levels of bycatch as the coho stocks rebuild. The more plentiful the stocks the more difficult it will be to avoid the bycatch.

No doubt, there will be other suggestions that will be incorporated into the final fishing strategy, however, in the absence of concrete allowable mortality numbers this is as good a starting point as can be expected.

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RFA.1

Campbell River Tourism Promotion Society

Box 482, Campbell River, B.C. Canada V9W 5C1 Ph: (250) 286-1616 Fax: (250) 286-8336

E-mail: crtour@vquest.com Web site: http://www.vquest.com/crtourism/

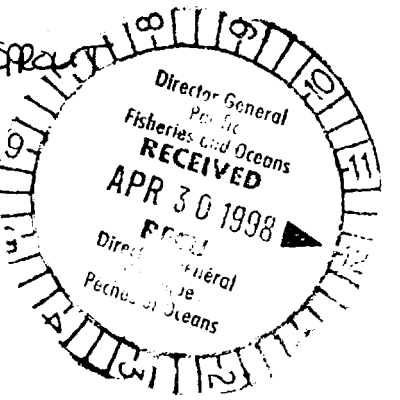
April 29, 1998

Honourable David Anderson
Minister of Fisheries and Oceans
200 Kent Street
Ottawa, Ontario
K1A 0E6

FAX 613 990 7292

cc: P.E. Sprout

cc Coho team



Re: Salmon Fishing Regulations for 1998

Dear Minister,

On behalf of the 180 business members of Campbell River Tourism we would urge your office for an immediate clarification of the sport fishing regulations for 1998 for the British Columbia coast.

As you are aware, the credibility of the British Columbia tidal water sport fishery was severely damaged in 1996 as a result of media speculation on impending closures and by then Fisheries Minister Mifflin's poorly presented Chinook closure announcement. The sport fishing industry in our community is still trying to recapture lost anglers from 1996 and regain lost credibility in the tourism marketplace abroad.

We are very aware of the data indicating expected poor returns of south coast coho and can appreciate the Department of Fisheries concern for conservation. However, we must point out how deeply troubled we are with the comments attributed to Mr. Paul Sprout that a total salmon closure was still on the table (Vancouver Sun/April 28). With the experience of 1996 so close in our minds surely more care should have been put into one of your most senior D.F.O. official's comments. I need not remind you of how quickly the media can move with such comments and I can assure you that our office and members fielded many calls yesterday from concerned guests inquiring about deposit monies.

We couldn't imagine a more discriminate fishery than the sport fishery and would trust that you will take this into account in your decision making. Further, we would ask for your consideration in clearly separating the sport fishery from other fisheries (where applicable) when making similar statements in order to maintain the perception of the

opportunities and expectations required of visiting anglers and their ability to be able to continue to fish for salmon despite whatever measures may be required to reduce coho by-catch. As your own data would indicate, the Area 13 sport fishery is not expected to have any significant impact on south coast coho conservation. We trust that in your decision and future comments you take into account the loss of $200 million dollars and 2000 jobs to the B.C. economy in 1996 as clearly outlined in the Job Protection Commissioner's report.

Sincerely,

per Jim Douglas
President

c.c. Director Generals Office Ms. Donna Petrachenko
B.C. Minister of Fisheries Honourable Dennis Streifel
District of Campbell River Mayor Jim Lornie

Dr. Craig Orr

1037 Madore Avenue, Coquitlam, BC, V3H 3B7
Tel: (604)936-9474
Fax: (604)936-5150
email: OrrCurtis@aol.com

April 16, 1998

Acting Editor
BC Outdoors
780 Beatty Street
Suite 300
Vancouver, B.C.
V6B 2M1

Attn: Roegan Lloyd:

via facsimile only

As Bill Otway knows (April *Guest Opinion*), 600 words and a graph cannot do justice to the problems facing coho. Depending on who grinds what axe, he, too, could be accused of deliberately misleading or omitting.

I did leave out details of a January 17 coho workshop in which DFO admitted that 1997 exploitation rates of aggregate Thompson coho "might have exceeded 30%." One might quibble whether this is a "lot" over targets of 20-25%. More refined estimates may now be available. But they surely won't prove that the '97 fishing plans met coho conservation needs. And quibbling can't change the fact that 99 out of 100 Thompson coho smolts no longer return home.

What **is misleading,** is to suggest that a comparison of 1997 and 1996 escapements shows that DFO did the right thing by coho in 1997. **As a DFO employee (contractor), Otway knows that's bogus. To** give an accurate sense of the "trend," the '97 **spawning escapement must be compared to the** brood-year escapement.

What *BC Outdoors* readers need to know is that there were only half as many Thompson coho in '97 as there were in '94. That's the message.

It's time to stop misleading ourselves. Today's solution is the same no matter how we got here: reduce the coho harvest. We have to buy time for coho, and pray their survival rates improve.

Sincerely,

Craig Orr

Colin Masson
Please add to
your coho
file. Thanks
Craig Orr

909 18/58
KF-A.1

Seascape Waterfront Resort

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CAMPBELL RIVER
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V9W 4Z9

April 30 1998

Ms. Donna Petrachenko Fax l-604-666-8956
Director Generals Office

Re: Proposed Salmon Fishing Closure.

Let me introduce myself, my name is David Saunders, my wife Shirley and our 3 school age children own and operate Seascape Waterfront Resort located on Quadra Island British Columbia.

We are very concerned about the possibility of a total salmon fishing closure for 1998. Our phones are already ringing with concerned customers, most of whom have already booked their 1998 holidays. With all the rules, regulations and spot closures already in affect for us personally (and many more like us) even one year with no fishing, WERE BROKE!!

We are not so blind as to realize there is a problem with our fisheries, we would support a closure on all coho stocks. As sport fishers we are more able to target the spieces we intend to catch and any incidental catch could be released. I know for a fact that commercial seine and gill net boats cannot do this!

We have just started to recover from all the bad press from the 1996 season, please consider the HUGE impact on the entire B.C. coast before before making any rash decisions, even talk of closures is devastating in coastal communities.

Thank you for your consideration.

Sincerly,

David C Saunders

Winds of Change

A
Discussion Paper to
Revitalize and Renew
Coastal Communities of the
Nuu-chah-nulth/West Coast Vancouver Island
Region

Submitted to:
Minister of Fisheries and Oceans – Canada
Minister of Fisheries – BC

May 1998

Winds of Change

This document is being used as a basis for a regional salmon fishing plan for the West Coast of Vancouver Island. It is founded on the twin principles which guide the Regional Aquatic Management Steering Committee: Hishtukish ts' awalk (Everything is One) and Respect. These principles recognize that healthy communities and healthy ecosystems are interdependent and that we must respect different views and approaches in order to create positive change.

This document is currently being vetted through the various members of our Regional Aquatic Management Committee. Some associations have approved it in its entirety, others have approved it in principle. We will include with our submission those who support as well as those who have criticisms of specific issues within the document.

The Consultation Process

The Department of Fisheries and Oceans called a multi-sectoral coho response summit on February 26th 1998 to give some background on the state of the coho stocks in BC and to ask for input on consultative process in response to this situation. They received a number of different opinions on methods of consultation. The Regional Aquatic Management Steering Committee (RAMS) of the West Coast of Vancouver Island stated that we wanted to have consultation develop at the regional level with our existing cross-sectoral process. Others suggested that there be few changes to the current coast-wide sectoral process. The Department, in response to the mixed messages of that meeting, have attempted to satisfy both requests.

The DFO arranged a number of sectoral meetings within the fishing community to develop fishing plans from a positional sectoral framework and then asked the groups to meet once their positions have been developed in a multi-sectoral process on April 27th The adoption of this form of consultation mirrors past consultative processes. This process has lead to adversarial positional negotiating that has proven over time not to work in the best interests of the fish, communities, or the vast majority of fishermen. Groups continue to work against each other in a divisive and competitive management environment.

As an alternative to this process, RAMS has met three times with DFO personnel specifically in relation to coho concerns. One of these meetings was between the Nuu-chah-nulth Tribal Council and Messrs. Greg Savard and Ron Kadawaki as part of the sectoral process devised by DFO. The Nuu-chah-nulth Tribal Council decided that rather than meet alone with DFO (as suggested by DFO), that they would rather meet

as one of the partners of RAMS and opened their bi-lateral meeting to all RAMS members. Greg Savard also attended a RAMS meeting in Port Alberni at the invitation of the Committee to discuss specific issues concerning coho management concerns. The final meeting was with Ron Kadawaki at PBS in Nanaimo to discuss technical issues surrounding the coho management regime.

The consultative process proposed by RAMS is for the sectors within this geographic region to meet within an interest-based negotiating process to work out solutions. The solutions are based on a common understanding of the effects of the various fishing regimes on the fish, each sector, and the communities in the region. The solutions are framed within a common vision of healthy ecosystems and communities.

This consultative approach is based on the understanding that dealing with change in a positive manner means finding creative new solutions to problems. The best way to find new solutions is for all groups to get together in a positive environment and contribute ideas and experience. Fighting to maintain the status quo or advancing one agenda will not produce the highest quality solutions and will lead to implementation problems. The approach is also based on the principle of interconnectedness: that solutions that work only for one group will not work in the long-term because of their negative impact on other groups and ultimately the fish. Finally, the approach is based on the critical need for groups to start working together towards common goals in a respectful manner. This is the only solid foundation for developing and implementing successful long-term plans.

The attempt by the Department to work with both processes has shown that it is difficult to develop regional consensus while a larger competitive sectoral process is occurring.

For instance, in the sports fishing sector, groups who would normally be willing to sit down and discuss fishing plans regionally are presently being pressured not to because it is perceived that such discussions will weaken the positional arguments in the larger competitive sectoral process.

On the commercial side, groups such as the Area G Troll Association are committed to the regional process and refuse to develop positional arguments outside of this process as they see this as leading to a coastwide inflexible fishing plan where specific fisheries such as the summer chinook troll fishery will be lost.

Despite this difficult background situation, the Regional Aquatic Management Committee has spent a considerable amount of time trying to find solutions. We have struck a subcommittee of Aboriginal, sports, commercial and environmental interests to work through the issues in order to get to regional solutions.

The DFO Decision Process

The DFO has designed its coho plan for 1998 based on two criteria: 1) the scientific model adopted in 1996 to forecast coho abundance, and 2) the balance between weak stock management and mixed stock fisheries.

The Scientific Model

As the coho management regime adopted in 1996 is the scientific basis for current coho concerns, we have decided to examine the foundations of this model. We have done this not out of denial that there are serious concerns with many coho stocks on the B.C. coast, but out of concern that the management regime implemented in 1996 has created such inflexibility that ocean fisheries on any stocks of Pacific salmon will be impossible to conduct in the future.

Some of our preliminary findings suggest the following:

1. That prior to 1996, the use of the Black Creek indicator stream to develop ocean harvest levels was statistically flawed and allowed overharvesting of a significant amount of weak stocks.

2. That poor ocean survival--which suggests that somehow the unknown factors connected to el Nino have had a major impact on coho survival at sea--are highly suspect due to the differences between the survival rate of the west coast Vancouver Island coho and those originating from the Strait of Georgia. It would appear that complications in ocean survival are more directed at fish originating from the Strait of Georgia.

3. That the preliminary number of coho in southern BC waters predicted by the model as a baseline to begin the present management regime has little basis in fact. DFO has very poor data on coho and very little funding to monitor and assess in-stream stock abundance. For instance, if the numbers are accurate, 35 % of the total Inside Stock biomass predicted by the current model would be hatchery fish (based on a 2% ocean survival of the 5 million Canadian hatchery clipped stocks returning in 1998).

4 That the forty eight indicator streams analysis adopted in 1996 to develop the present harvest rates is flawed. Evidence from experienced biologists demonstrates that fry trapping extrapolations on some streams have given inaccurate data, that the use of volunteers to count fry survival is extremely suspect, and that some indicator

streams have suffered major blockages and have become useless as indicators, yet are still added into the statistical base.

To develop fishing plans founded exclusively on the information of this model is inappropriate. It should be considered a planning tool to guide decision making--not as certified numerical calculations of coho abundance to be used for fish allocation decisions.

Weak Stocks and Mixed Stock Fisheries

We are aware that some groups feel that any mixed stock fisheries where extreme weak stocks may be damaged should not be allowed to proceed. It should be clear that we are aware this situation now exists in most of BC. We agree with the concern over inflexible management regimes that do not allow adaptability and site-specific planning. We are similarly concerned with the 'strong-stock' management approach that DFO has taken for years and the impact this has had on smaller stocks.

We feel it is possible to build responsive regional management plans that address underlying concerns about weak stocks. More importantly, we understand that this is the only means of addressing the numerous problems facing salmon.

Water diversion for agricultural use, urban development, and hydro development have permanently damaged some coho systems and will continue to do so unless there is a strong community stake in fisheries. Similarly, major habitat damage by logging, mining and other industrial activities have permanently damaged many coho systems in BC and continue to do so at an alarming rate. The effects of 'fishing down the food chain' are also impacting salmon survival. Stocks such as the South Thompson are one of many that have either gone extinct or are on the verge of going extinct. Many others will be destroyed unless we try to address these numerous problems in a well-thought process involving many different groups.

Without a diverse rural economy that includes fishing activity, pressures on coho habitat will increase. Without a cross-sectoral regional management process to connect and address these activities, there will be no mechanism to deal with them in a concerted and comprehensive manner. Our critical task is therefore not to stop all activity immediately everywhere, but rather to jointly develop creative ways to reach our common goal of protecting weak stocks on a regional basis. This is the only solution that will work for the long-term survival of *all* coho.

Alternative Management Regimes

One of the alternate management regimes available is to shape risk averse fisheries in regional areas to minimize bycatch of known stocks of concern. Unlike the inflexible

low exploitation management regime developed by the Department, this regime recognizes that on the west coast of Vancouver Island, during the summer months, there are aggregates of coho from BC, Washington and Oregon swimming together in abundances that can sustain viable fisheries.

Accepting the Minister's announcement that there will be no directed commercial fisheries on coho during 1998 as being an effective conservation measure, we would design fisheries that minimize impacts on recognized coho stocks of concern. During ocean fisheries on chinook, sockeye, chum and pink, and coho salmon for recreational fishermen, this technique is viable due to the low incidence of stocks of concern in the overall aggregate biomass of the WCVI region. It is possible to create, green, yellow, and red "coho" zones to indicate areas that have coho stocks of concern and manage accordingly.

This regime would be more difficult to implement as fisheries moved closer to areas where stocks of concern congregate in higher numbers. It is not our place to design those fisheries. It is up to those areas to design risk-averse fisheries for their area. Our management regime, because it minimizes coho bycatch of stocks of concern, should have minimal impact on other areas as they design their fisheries.

The following plans are contingent on the Minister of Fisheries allowing more than a zero percent exploitation rate in the B.C. fisheries this summer. If the zero percent is decided upon, then the socio-economic side of our plan becomes more urgent and more expensive.

Aboriginal 35-1 fisheries

Catching coho for food, social and ceremonial purposes on the west coast of Vancouver Island will be taken either out of the large aggregation of coho feeding in the outer coast areas, or from the WCVI stocks which are considered to be in fair condition. First Nations knowledge of the state of different local stocks should be used in determining where and when to fish. Many of the First Nations have placed their own restrictions on terminal river areas where there are local stocks of concern. Some Nuu-chah-nulth First Nations have considered the idea of using their food fish to help with the scientific assessment needed to determine areas where stocks of concern congregate. These ideas will be further explored by the Regional Aquatic Management Society before the season gets underway.

Troll Plan

- Develop a 12 month fishery for app. 120,000 to 150,000 chinook, for 1998, a number developed by the DFO which they consider to be risk-averse. Try to

develop fishing opportunities during July and August to take some part of this catch using selective gear, area closures and test fisheries to minimize coho-bycatch and determine percentages of stock of concern that will allow flexible bycatch numbers in "clean areas."

- Plan an August sockeye fishery on the agreed upon number of Fraser sockeye previously committed to the troll fleet.

- Use effort controls, coho monitoring programs, and coho hot spot closures to minimize coho encounters.

- Use an in-season test fishery to collect samples of coho on the West Coast of Vancouver Island to determine percentage of stocks of concern in the various areas of the west coast. A test fishery is presently being conducted in a partnership with WCSA, HRD, and DFO under the auspices of the RAMS .The WCSA has already applied to have this test fishery extended until the end of June and possibly into July.

This test fishery would take a pre-determined statistical sample of coho from both in-shore and off-shore areas and determine the percentage of coho stocks of concern in this area. This data would then be used to determine the amount of bycatch that would be allowed in each area. A number of factors have to worked on to make this a viable fishery. Funding has to be found to do the statistical analysis, as well as lab capacity found in order to do the testing in a timely manner, particularly if in-season fishing plans are to be conducted. We have been informed that if all the elements could be brought together, that it would be possible to have five-day turn-around reporting on the percentages in each area.

This would in turn allow possibly up to three five day openings on Chinook off the West Coast of Vancouver Island. Presently the troll fleet is going to lose app. 120,000 chinook from its catch unless this method is utilized. This data will also be used to help design the sports fishery for the West Coast of Vancouver Island.

- Recognize that troll sockeye fisheries in the upper Queen Charlotte Straits during times of high diversion do not pose a threat to coho stocks.

- Allow flexibility in Area 11 and l-111 as per the troll consensus.

- Allow clipped coho to be retained in all troll fisheries. This is not to be perceived as a directed coho fishery but only an incidental catch which will help in the recovery of coded wire tags as well as give information on distribution of hatchery stocks.

- Recognize that due to the high degree of uncertainty in DFO science, the higher incidence of coho encounters is a signal for possible higher abundance than anticipated pre-season and will not precipitate an immediate shutdown.

- Do not use an upper limit of catch calculated coastwide to drive the fishery, recognizing that this management regime does not have a proper statistical base.

- Recognize that the fishery is being managed to minimize impacts on known stocks of concern and that those areas where those fish are known to be in high abundance will be closed, namely specific southern areas of the West Coast of Vancouver Island. (Green, yellow and red zones)

- Continue the troll observer monitoring program throughout the summer specifically to take scale and DNA samples from coho to help with the statistical mapping of coho stocks of concern.

WCVI sports fishing plan

- Due to the fact that the WCVI coho stock composition will contain a lower proportion of stocks of concern than any other area of the coast, a directed coho fishery should be allowed in this area.

- The bag limit in Areas l-25 to l-27 should be two a day, four in possession (Green zone)

- The bag limit in Areas l-23 to l-24 be two a day, four in possession, where only one unclipped fish would be allowed to be kept per day. The rational for keeping 1 wild fish is to minimize the release mortalities as a result of fishing for a second clipped fish.(yellow zone)

- Gear restrictions such as barbless hooks and the banning of treble hooks should be reviewed.

- Possible closures of Swiftsure and other identified rearing areas where stocks of concern may be congregating may need to be implemented.(red zone)

- Landing station capacity for all wild coho caught should be made available in order to take scale and DNA samples to identify stocks of concern.

- That in terminal areas where healthy runs exist, such as l-23a, the bag limit is two a day, four in possession. (Green zone)

- A public education program should be implemented on proper catch and release methods.

SOCIO-ECONOMIC PLAN

It has been recognized that the Department of Fisheries responsibilities go beyond counting fish, and that the management of the fishery includes addressing the impact of management on fishermen and their communities. We feel that any fishing plan must have an integrated socio-economic component that considers long term solutions to chronic fish management problems.

The potential fishery we have outlined above is what we consider a viable fishery considering the problems identified with coho. For the troll communities alone, this is a decrease in total coho catches from a Pacific Salmon Treaty amount of 1.8 million to near zero in the space of three years. This reduction has placed extreme hardship on the fishery dependent communities of the West Coast of Vancouver Island. If the above fishing plans are not adopted, and the Department continues with its existing management regime, the socio-economic hardship to First Nations, troll and sports communities will be compounded.

When comparing to the impacts in the East Coast groundfishery disaster, impacts to our coastal communities is similar. The 1996 report "Fishing for Answers" prepared for the BC Job Protection Commission indicates that 54% of the fishing related employment in the WCVI region was lost in 1996 as a result of the poor salmon season and the Mifflin Plan. Fisheries related employment comprised about 14% of the local labour force.

Our coho plan hinges on the principle of integrated ecosystem management, which includes fish and human communities in the region. As such, our plan makes recommendation for a multi-year habitat renewal and salmon enhancement program, a licencing buyback and abeyance program, a new fisheries program, and an economic development and diversification plan.

Habitat Renewal / Salmon Enhancement Program

We view the coho crisis as an opportunity to undertake a comprehensive multi year approach to stream rehabilitation and salmon enhancement work in our region. We are in the process of developing the management capacity to carry out the numerous functions necessary to implement the habitat renewal and salmon enhancement program delivery tasks.

In March we struck a Conservation Committee consisting of biologists, GIS personnel, researchers, guardians, technicians, planners, volunteers, First Nations and fishermen to prioritize and review habitat and enhancement efforts. The committee has met twice and is undertaking a review of all work completed and proposed for the Region. Based on the analysis of this information, activities will be prioritized and short, mid and long term objectives will be identified.

The committee is in the process of organizing a conference with government agencies, academics, NGOs, consultants, and others to develop tools and a program for implementing a long-term conservation strategy for the region. We are also submitting a proposal for a regional information database using 21st Century information management technology.

A part of this also involves identifying "one time" requirements for bridging programs versus ongoing career work for transitional job opportunities. We feel that fishermen who participate in the licence buyback programs should be offered assistance in developing new careers while fishermen who participate in abeyance programs should be provided bridging assistance until new or existing fisheries are available.

Licence Retirement and Abeyance Program

As indicated above, our plan also addresses the need for a licencing buyback requirement for the commercial fleet. We do not accept the rational used by the department to promote a buy-back. This rationale states that another 18% of the fleet must be bought out in order to cut the fleet by fifty percent. There has never been a statistical analysis done to justify this number and the removal of the small boat fleet has done nothing to deal with the real over-capacity problems identified by John Fraser in his report, that of the overbuilt and technologically efficient seine fleet in Johnstone Straits during times of high diversion.

Our rationale for the buyback or license retirement is based on two premises:

1. That serious mis-management of the salmon resource has resulted in a situation where the resource is at a low point other than in a very few strong runs such as Fraser sockeye and this has made many fishing businesses unviable in the short-term or until the runs are rebuilt .
2. That federal licensing policy (specifically area and single gear licensing) has destroyed the flexibility of the small boat fleet to the point where many fishermen are economically unviable. To quote the Roundtable documentation on single gear licensing, " This policy change may hurt the economical viability of the individual fishermen." It has certainly done that, specifically in coastal areas where gillnet fisheries were being developed by SEP as shoulder fisheries or replacement fisheries while other fisheries were in decline and in need of rebuilding.

It is our view that buyback licences should be held in abeyance in a Community Licencing Bank for use by communities to develop terminal fisheries and benefit from the efforts of improved habitat and increased local spawning capacity. We would also like to see a licence abeyance program for commercial fishermen who elect not to fish this season.

The buy-back would not result in reallocation of fisheries between areas or gear sectors, but would instead retire licences in to community licence banks. The banks would be regionally based and administered by the RAMS. The banks would re-activate licences to community based fishermen in future years of abundance when stocks rebuild. Licences could be leased or sold to the next generation of fishermen or used to develop new terminal fisheries on specific runs.

A lay-up package for commercial fishermen for the next three years, including waiving commercial licencing fees and providing fishermen with training and work in stock assessment, habitat protection and restoration, and other conservation projects should also be adopted. Fishermen would be provided a livable income in return for work on renewal and conservation strategies while awaiting the development of new fishing opportunities.

New Fisheries Program

We are well aware that "business as usual" is not an option for West Coast communities. We are working hard to develop new opportunities and new fisheries for our coastal communities.

One such recent project is the winter troll test fishery, which was originally conceived as an opportunity to get small independent trollers back on the water before coho stocks of concern entered the region. However, the project was reduced by the DFO from an open fishery with committed niche markets to an 18 boat and then a 7 boat test fishery. The underlying reasons for this decision are unclear.

Despite the much needed requirement for stock composition data to conduct ocean fisheries on the West Coast of Vancouver Island now and in the future, there has been considerable resistance by DFO staff to support the project and work in honest partnership. We require that the Minister deliver a directive to his staff to work in more open cooperation with RAMS in developing new catch and stock monitoring programs and new fisheries in the future.

In conjunction with habitat renewal and enhancement initiatives, we are developing and supporting new fisheries in the region focused on terminal runs. Presently the Uchucklesaht First Nation is conducting a long-term enhancement project to restore Henderson Lake sockeye to historic levels.

Through enhanced terminal returns, opportunity for a small-scale commercial fishery for the Band is available with an allowance for cost recovery to develop other communal fisheries in other areas of the region. Another similar fishery initiative being developed is the Ucluelet Harbour chum fishery at Thornton Creek Hatchery.

New selective harvesting involving weirs, traps and other live release techniques are being developed to conduct weak stock management regimes on terminal runs.

Opportunity to explore new fisheries and techniques requires the clear policy direction from the Minister to develop such fisheries. An improved working relationship with the Department will be required if our new fisheries projects are to be successful in developing new economic activity for the region.

Economic Development and Diversification

The fourth component of our socio-economic plan deals with the necessity of developing new and innovative approaches to regional economic decline. While we are hard at work on habitat and enhancement initiatives, and new fisheries are being explored, we are also reviewing and prioritizing our economic needs.

Using seed funding from Community Futures Development Corporation, we have struck an Economic Development Committee to assist our plans for economic prosperity. Working in coordination with the habitat renewal, salmon enhancement, and new fisheries programs, development and diversification requirements will be identified within the region. For example, reviewing costs of monitoring fisheries and assessing the potential of value-added processing infrastructure will assist in defining the requirements of habitat, enhancement and new fisheries initiatives. Our goal is healthy communities, healthy ecosystems and sustainable development.

The Economic Development Committee will dovetail with other existing and developing processes like the Fisheries and Seafood Diversification Board and the Fish Renewal BC Development and Diversification Program.

Conclusion

We recognize that one hundred percent consensus is an impossible goal in any planning process and we understand there will be dissenting views. However, the plan as presented, has been built on what we feel is a solid foundation of fishing experience, local knowledge, and science. It is also an important part of developing the capacity in the region to operate the empowered regional co-management process currently being negotiated.

We submit this document with respect and hope the hard work and drive for community consensus that created this document will be recognized by the Minister of Fisheries and his Department.

For more information please contact:

Mr. Darren De Luca Tel 250-724-6244 Fax 250-724-7168	Mr. Dan Edwards Tel. 250-726-7083 Fax 250-726-7434	Mr. Andrew Day Tel. 250-726-7083 Fax 250-726-7434

6.5.2 Summaries From Consultation Meetings

SOUTH COAST

Summary Of Initial Coho Summit Meeting
February 26, 1998

Paul Sprout, Director, Fisheries Operations Branch, chaired the meeting and welcomed attendees and those participating via conference call.

The purpose of the meeting is to look at the approach today on how we will manage conservation in 1998. There is serious concern over conservation in BC and this is our highest priority. We need to look at how we will consult, how can we move forward over the next few months. how do we develop input and how we can work together so that the Department fulfils its responsibility in an appropriate manner towards improved conservation. We need your views on mechanisms, points of view in order to pull together. No decisions have been made yet but we will be proceeding within the next few months. Conservation concerns are coastwide. Handouts confirm serious concerns in the Skeena. We have formed a Regional Coho Response Team to develop an overall coho plan.

Donna Petrachenko, Director General, Pacific Region followed by stating that the purpose of this meeting is threefold. She emphasized the continuation in 1998 of serious concern for coho conservation in BC and identified this as the most immediate and highest priority for the Department in the Pacific Region. The formation of the Department's Coho Response Team to address coho concerns and to obtain ideas and advice on how to consult with all interest groups in the development of an 1998 Action Plan. Further, this was not a decision-making forum on coho harvest and management specifics simply an opportunity to work together towards an appropriately managed coho resource in 1998 and a longer term consultation and rebuilding plan. We cannot wait any longer to move the planning process forward this year. Stringent measures in 1997 to conserve coho strongly impacted all harvest sectors and we have waited until now to ensure the effectiveness of these measures was assessed and understood as well as possible before developing a fishing plan for 1998. Most of the 1997 coho data are now available and the first PSARC advice has now been received. Some additional analysis of this data and PSARC advice are still expected but not likely to substantially alter the basis we now have for initiating development of a comprehensive coho for 1998. Looking to the lessons from 1997, the significant conservation measures which were implemented were successful in halting or even reversing the long-term downward trend in escapements in some coho populations, particularly in coastal areas. There was no significant improvement in the Upper Skeena River or the Thompson River. We must continue to increase our efforts to ensure more coho make it back to the spawning grounds in 1998. No decisions have been made yet, the

department will be looking on a fishery-by-fishery basis, by time and location, to identity options which will protect and conserve coho. This will include the option of no fishing in some areas. We face a significant challenge again in 1998, one that will truly only be met by a continued commitment to work together.

An overhead presentation was provided by Brent Hargreaves, Stock Assessment Division, Science Branch on the following: (Attached).

Overall Goal the Response Team
Specific Terms of Reference
Some Key Questions and Decisions for 1998
Coho Response Team Members
Status of Coho Response Team
Technical Working Groups

Status of Coho Response Team - The Team was created two weeks ago. Additional meetings will be held until the end of April. The Deadline for the Action Plan is May 1 with presentation to the Minister by mid May. Extensive communication and consultation as well as a Fish. Management Plan is needed and we will look at all options. Options of no fishing or all fishing is still on the table. No decisions have been made yet.

Other series of additional presentations on Coho Stock Status and Outlook for 1998 were made by Blair Holtby, Stock Assessment Division, Science Branch for the North Coast & Ron Kadowaki., Stock Assessment Division, Science Branch. (handout provided and available on INTERNET).

A question and answer period followed on the previous presentations.
Discussion then focused on what kind of consultation process would be most appropriate given the limited time frame and the need to gain advice from all interested groups, including those not traditionally involved in fisheries consultations, such as environmental organizations.

Many emphasized the importance of ensuring that all associated information was made available and accessible to anyone who wanted it. Others suggested that regular updates and information be made available on the internet.

Individuals from the commercial and recreational sectors and First nation participant suggested ongoing consultations with individual groups . Many supported suggestions for follow-up multi-sector meetings to comment on various options.
The importance of communicating the coho crisis to the public was noted.

Summary by Paul Sprout

Diverse views. Appears to be a lot of support for information to public. Strong arguments for more open process. Sectors should be allowed to meet. We will go back and consider advice we have received and will factor in when formulating Action Plan to Minister.
Meeting concluded at 12.12 PM.

Nanaimo Local Committee of the SFAB.
April 2 1998

Ian Beverage
Pete Roboti
Denis Popplestone
Don Robinson
Dan Hunter
Norm Carreck
Dick Maughan
Bob Meyer
Craig Brezden
Bob Mayes
Willi Jansen
H.L. Brown
K Cutbert
G Scott
Norm Coughtry
David Fogtmann
Randy Brahniuk

Randy talked about the projected runs of returning coho for the 1998 year. He explained the poor ocean survival rate.

Summary of the report put together of which estimates numbers of fish which may be potentially caught given different sets of circumstances.

The group was informed that the South Coast Coho working group would be meeting of the 4th of April. The groups objective would be to start putting together a proposal for the management 1998 sport fishery which would reduce or minimize the catch of coho. members were invited to submit their ideas.

FRASER RIVER PANEL - PACIFIC SALMON COMMISSION
INTEGRATED MANAGEMENT TEAM MEETING
MEETING DATE: April 3, 1998
LOCATION:
ATTENDEES:
Debbie Halyk DFO 666 0383
Terry Lubzinski Fraser Panel 535 2197
Murray Chatwin Fraser Panel 254 5751 / 986 4829
Bill Otway Fraser Panel 942 7316 / fax: 942 4262
Larry Wick Fraser Panel 582 8268 / fax: 588 9680
Al Macdonald DFO 666 8616 / 666 7112
Gordon Nelson DFO 666 0752
Michael Griswald Fraser Panel 250 285 1702
Al Cass DFO 250 756 7279
Paul Ryall DFO 250 756 7279
Diane Bailey Fraser Panel 465 8961 / fax: 465 5949
Wayne Saito DFO 666 0497
Christine Hunt Fraser Panel 250 380 8191
Bert Ionson DFO 666 2032
Barry Rosenberger DFO 250 851 4953
Gordon McEachen DFO 250 851 4953
Greg Savard DFO 250 850 5753
Bridget Ennevor DFO 666 6608
Neil Schubert DFO 666 8452
Mike Staley Fraser Panel 261 7068
Frances Dickson DFO
Leroy Hopwo DFO

IMT on Conference: Bill Shaw, Don Aurel, Don Anderson, devona Adams, Dave Fotner, Randy Brahniuk, Laurie Gordon, Bary Huber.

Agenda:

- Review of Coho Initiatives - Coho Response Team
- US/Canada Treaty Negotiations Discussions

Review of Coho Initiatives

- Panel members received the briefing material that is being broadly distributed to interested parties.
- Aspects of the Coho Initiative having the potential to affect the management of Fraser River sockeye salmon were identified.
- As the consultation process develops, the Panel will be asked to participate and offer their expertise to the implementation of potential options.
- Panel member participation in the multi-stakeholder meeting April 27 was discussed.

U.S./Canada Negotiations

- Panel members were provided with an update of recent government to government discussions.
- Panel members were provided with a schedule of negotiations involving the National Section and Fraser River Panel
- The 1998 Fraser River sockeye forecast was presented to Panel members. The process to develop escapement goals was discussed. There will be an expanded discussion on this issue concurrent with the PSC discussions.

LOWER FRASER RIVER HARVEST COMMITTEE

MEETING DATE: APRIL 6, 1998
LOCATION: SANDMAN HOTEL, LANGLEY

ATTENDEES:

Mike Staley Chairperson

Ken Wilson FRAFS

Ernie Crey Sto:lo Nation

Lester Ned Sto:lo Nation

Mike Baird Tsawwassen First Nation

Lyle Sparrow Musqueam First Nation

Rick Sparrow Musqueam First Nation

Ronald Charlie Chawathil Band

Frances Dickson DFO

Bridget Ennevor DFO

Bert Ionson DFO

Terry Bedard DFO

First Nation Issues:

- Lower Fraser River First Nations may have different concerns/issues than some of the upper Fraser River First Nation groups.
- Concerns were raised with 1997 fisheries of other user groups relating to coho catches - enforcement and catch monitoring issues.
- If DFO permits any coho total allowable mortality (TAM), then the lower Fraser River First Nations would like a share of the coho TAM for their fisheries (by-catch during chum fisheries). In 1997, lower Fraser River First Nations did not achieve their pink allocation because of coho conservation closures, yet other approach fisheries were able to conduct fisheries with directed or associated coho TAM.
- Some First Nations may indicate a need and assert a right to directed coho harvests ahead in priority to other sectors who may have directed fisheries or allocated incidental moralities.

- Catch and release fisheries for the Sport Sector are unacceptable if First Nations are closed.
- **ACTION ITEM** - The TAM table prepared by DFO needs to have a 0% Exploitation Rate option included (the 5% to 25% options are not sufficient).
- **ACTION ITEM** - DFO needs to document the assumptions used to generate the TAM projections for each of the fishery options presented.

Questions Arising:

- What % of the expected coho return are marked with fin clips?
- What is the daily limit for the sport selective fisheries options (1/day or 2/day)?
- What were the assumptions used for the catch and release mortality rate? Was consideration given to increased stress induced by searching for a pelvic fin clip (due to increased handling)? How about multiple catch and releases?
- What are the assumptions and how were they arrived at for effort response?
- This is not an exhaustive list and more questions will likely emerge with closer review.

DFO Requested Advice On:

- The coho forecast options;
- % TAM;
- Management options for South Coast coho;
- Catch monitoring options; and
- TAM management options - i.e. transfer of unused TAM to other fisheries.

Next Meeting:

- Days Inn, Kamloops

April 17, 1998 10:00 am

NORTH VANCOUVER ISLAND LOCAL COMMITTEE
SPORTS FISHING ADVISORY BOARD
DFO OFFICE, PORT HARDY B.C.
April 14, 1998
1930 hrs

ATTENDEES:

Gordie McEachen – (Co-Chair) DFO
Tom Makinson
Ken Jenkins
Ken Kolman
Graeme Bull
Bill Otway - DFO

AGENDA ITEMS:

- Review minutes of the Nov 5th , 1997 meeting
- 1998 salmon stock forecasts
- Discussion on coho work to date in 1998 and consultation framework
- Other (sport fish boundaries)

Review of Nov 5th minutes – no changes, the minutes were accepted

Stock forecasts:

- Fraser Sockeye 11.2 m run size with 3.5 to 4 m surplus mostly in the summer run stock group. Sport closures may be required to protect Early Stuart stock group.
- Southern bound Chum forecast 3.7 m . this forecast may be optimistic. The
- index fishery may be an issue with coho catch
- Pinks Fraser River off yr.
- Mainland pinks is forecasted at 1m surplus in late July and early August.
- Chinook similar abundance's as last year. West Coast troll fleet is conducting a 7 boat test fishery for spring chinooks.
- Coho – Bill Otway made a presentation on state of coho abundance's expected for 1998 with poor sea survivals that have dropped from a high of 10-12% to 1-4%
- Inside stock - 278,000 coho, Outside stock - 176,225 coho

Discussion of coho options and concerns. The following issues were discussed

- Coho TAM's = a discussion of total allowance moralities and what it meant last year at 20 to 25 % exploitation rate. This was compared to what it means for 1998 at 0 to 25% exploitation rate.

- a discussion concerning triple hooks and barbless hooks – the studies indicate that hook location and hook size are the main causes of mortality
- Bill Otway explained a series of possible options to reduce TAM's in the sport fishery. **The group thought a limited fishery (such as one coho per day) should be permitted from mid June to mid July.** This proposal was to be carried forward to the South Coast Sport Fish Meeting on April 21,1998.
- no in season assessment was also discussed and was a concern that DFO should work on.
- the impact of annual limits less than 5 coho was discussed
- concerns were expressed over late time frame of management designs concerning coho plans. This could have a very negative impact on the sport industry.
- concern over DFO's lack of positive press coverage
- Members form this group were asked to attend South Coast Sport Fish Meeting on April 21,1998, PBS Nanaimo and were alerted to the Final Coho Summit April 27, 1998

Other (boundaries)

Mceachen is to check on and review the following sport fish boundaries

- Scott Cove Boundary (is this same as 1997?)
- Keogh River Boundary (work George Bates)
- Beaver Cove Boundary

Meeting adjourned 2230 hrs

MINUTES OF MEETING
SPECIAL COHO CONSULTATION FOR COMMUNITIES, ENVIRONMENTAL AND NON-GOVERNMENT ORGANIZATIONS, AND THE PUBLIC
SFU - VANCOUVER, 7:00-10:00 PM , APRIL 15, 1998

Chair: Brent Hargreaves

The meeting commenced at 7:10 with the chairperson informing participants that the main comments from this meeting (as with other meeting summaries) will be posted on the internet together with slides, summaries and attendance lists.

DFO has never consulted with non-government groups before. The purpose of this meeting is to inform you of the serious conservation concerns with coho in B.C. We invite your comments and advice as to how we should proceed for inclusion in the final report to the Minister.

In February a Coho Response Team was struck and a summit meeting was held with representatives from all the key groups in the Province. The meeting provided direction to consult with each sector separately and then finalize the report May 1998. Two upcoming Summit meetings are also to be held, one in Prince Rupert on April 25 and the other in Vancouver April 27. A final report is to go to the Minister by May 1, 1998 and he is expected to announce a decision in mid May. To date, 14 meetings in the North have taken place and by the time we finish that number will be 50. 6,500 copies of the backgrounder have been mailed out.

Q What will the format be of the Summit on Apr. 27?
A We are uncertain at this point.

Presentation by Frances Dickson

Review of 1997 South Coast Fisheries

A brief summary was given on the 1997 fishery. 1997 was based on expected abundance of “inside” (Georgia Straight and Thompson stocks) coho. The forecast was based on marine survival rates. The targeted exploitation rate was 20-25% on inside stocks conglomerate. South Coast stocks came back far less than forecast. 1997 Coho Mortality table was handed out. 1994 stock composition information was used to arrive at these figures. Majority of seine fishing was conducted in Johnstone Straight in order to avoid bycatch in Strait of Juan de Fuca. Fraser Gillnet closed early on Sept. 25 because of expected Thompson River coho presence. Majority of morts were in the sport fishery in Juan de Fuca or West Coast of Vancouver Island.
Majority of inside coho and Thompson River coho are typically caught in Juan de Fuca and West Vancouver Island. Aboriginal fishery had very small coho catch in 1997, reported at 276 within the Fraser River FN fishery.

Q Does Stock Assessment produce abundance forecasts and how do they do this, and how do they get the escapement numbers? Exploitation rates of 20-25 and 15 - 20 seems a big difference. Can you explain?
A Fishery Officers visually do the key streams. Some stocks were hit harder than others, wide range of fishing impact. There were also unexpected US fisheries at Point Roberts, operating 7 days per week at times, catching more Canadian Coho.

Q What time frame are the coho present in Juan de Fuca?
A July - Sept.

Q Can run size be determined in-season?
A No, there is a problem in interpreting in-season.

Q How are the recreational catch figures determined?
A Creel surveys were conducted last year from April – Oct, combined with overflights to determine number of boats fishing. There was an estimated 250,000 boat trips done. A technical report is being prepared on this information.

Presentation Stock Status and 1998 Forecast - Ron Kadowaki

The Upper Skeena long term coho decline is most serious problem in Northern B.C. There is a conservation problem in Kitimat.

Q What does escapement mean?
A Means what isn't killed - the fish that made it back.

In 1997 60-90% of Skeena coho were caught in Alaskan fisheries. 30-50% exploitation rate. Caught in S.E. Alaska before they get back to Canadian fisheries. Exploitation means proportion of the number of fish caught and killed.

Thompson River Watershed severe conservation problem in Southern B.C. Sharply declining escapements in South Thompson. Conservation problems also exist in Strait of Georgia where stocks are at low levels. West Coast Vancouver Island, doing better but not healthy like in the 1980's.

Southern B.C. Coho Forecasts – with marine survival at Black Creek down to 2 1/2% compared with 8% in the 1980's. Dropped from 8-15% to 1-2%. Marine survival is so critical.

Q Have we always had this problem?.
A In the early 1990's we were talking about cutting back on coho. Marine survival was declining on a continual basis and got more severe in the last few years but we have not responded fast enough and that's why we are getting in front of it today.

Due to the record low salinities, the predicted distribution of Strait of Georgia Coho is for migration to the outside waters.
Estimated Abundance of Inside and Outside Coho - Sharp drop since 1993 corresponding with survival rates which have dropped since early 1990s.

Southern B.C. Coho Forecast Summary - expecting continuation of extremely poor marine survival.

Q What do commercial fishermen get for a coho?
A $1.50 per pound.

Q Is there an estimate in the PSARC document as to the abundance of wild coho?
A Yes, about 150,000 to 200,000 in B.C.

Q. 1997 Mortality Chart is incomplete. Are you deliberately falsifying the info or was it negligence?
A The tables include all of the available information.

Q Do we have any information on the status of wild coho in mainland inlets?
A Very little as those area tend not to be rigorously surveyed. Seymour Inlet more healthy than others.

Presentation Coho Habitat - Melody Farrell

Good habitat is the foundation for all wild stock production. There are insufficient coho to utilize the productive habitat.
Habitat Responsibilities - Fed. Govt. authority comes from the Fisheries Act.

Q Will more funding and staffing be made available for habitat enforcement and enhancement?
A The recommendations put forward in our report will indicate costs.

Q Was DFO invited to participate in the revisions of the Forestry Practices Code? .
A No.

Q DFO comes under the Fisheries Act but not for land and water does this means DFO and Province .are not working together and if so will they in the future.
A Yes, co-operation is not all that it might be, however, under a New Memorandum of Understanding we expect significant improvements.

Presentation by Carol Cross - Enhancement

A short presentation was given on releases, coded wire tagging and what will be done for the restoration and enhancement of habitat. (Handout given).

Q Survivors are the gene pool. Most should go to less, less should go to most. If Sport fishery should be approved shouldn't angling be curbed, shouldn't catch
and mortality be curbed?
A We will get to those and other questions we would like your advice on some of them.

Q How long have there been spawning facilities in Thompson/
A Many years, 15-20.

Q Does enhancement include the establishment of marine protected areas?
A No

Closing comments by Chairperson - There are two main purposes for this meeting. One is to bring you up to date on the issues. Secondly, we are tasked to provide advice to the Minister and one of the purposes in bringing you here is solicit some of your advice. The following questions were displayed.

Q What forecast of abundance should be use in 1998 e.g. 25-75%?

Q What exploitation (harvest kills) rate should we use in 1998? (0% - 25%).

Q What habitat actions should be recommend for the short and long-term?

Q What coho enhancement actions should we be taking?

Q Should there be any directed fisheries by any group if so my whom?

Q Should be have a selective mark hatchery for hatchery coho?

Q Should the management of all salmon fisheries be dictated by: the abundance of all Southern BC salmon; Southern BC coho; or Thompson River coho stock groupings only?

Q What follow-up is required from this meeting?

After some debate it was suggested that these questions could be faxed with enough space between each for comments and the answers could then be faxed back. This was accepted. A second meeting to reach a consensus was voted against.

Individuals were also advised to submit suggestions in writing to Colin Masson @ (FAX 250756-7020) .

The Meeting adjourned at 10.20 PM.

FRAC/Area E Coho Consultation Meeting
Fraser River Division Boardroom
15 April 1998
9:00 am -12:30 PM
SUMMARY MINUTES
Attendees:

Devona Adams (chair)
Diane Bailey
Tom Brennan
Pierce Carlson
Laurie Gordon
P. Gallagher
Paul Kandt
Terry Lubinskiy
Barry Manuck
Nancy Manuck
Barry Marcotte
Mark Petrunia
Laurie Ronneseth
Todd Strukoff
Melanie Sullivan
Art Tautz
Dal Triggs

Introductions were made and then Devona Adams reminded members of the interim modified advisory board structure for 1998 which would add members from a newly formed Area E organization, MAFF and the Vietnamese Fishing Association. Devona provided a brief overview of the Pre-season Coho Consultation meeting with South Coast Commercial Salmon Advisory Boards held in Nanaimo on April 8th. Devona said the meeting today was dedicated to 1998 coho management planning and that discussions would be guided using the documents previously distributed: Coho Backgrounder and Coho Consultation - South Coast She thanked attendees for participating at such short notice especially those travelling from Vancouver Island. She informed members that all discussions with advisory boards regarding coho would be made available to the public on the DFO communications webpage. Minutes and recommendations from this meeting would be forwarded to the Regional Coho Response Team and would be put forward at the April 27 multi-stake holder meeting.

1998 COHO PLANNING

Considerations/Comments:

need to design fishing plans to minimize/eliminate coho by-catch

need to identify where/when coho were caught in the Fraser in Aug. 1997

historically some Thompson coho have been in the river by early July; last year there were no coho caught at Albion until the first week of Sept.; limited CWT information indicates that 90% of Thompson coho are through the lower River by 1st week of October

Fraser river gillnetters are continually conserving coho stocks due to the timing of the fisheries.

probably no San Juan fishery this year (not worth the risk)

does not appear that there will be a Barkley Sound sockeye TAC for seine

preliminary sockeye forecast indicates a high diversion through Johnstone St. - this limits options to avoid coho

runs have been very late the last few years: be careful about establishing deadlines for ending fishing

any September fishing will be a very tough sell this year; Harrison chinook and steelhead as well as coho are problematic

need Sept window/option in case Adams River run has late fishable surplus

how does coho affect Areas D & B: expect less coho around and less sockeye, will have fewer fishing days and therefore less coho catch

need to balance overloading sockeye spawning grounds to save few coho

WCVI chinook troll experiment - need more observers if project goes ahead, currently only 8 days worth of observers budgeted

tools to manage fisheries: net mesh size, live boxes (mandatory, no retention, collection vessel), : mortality ceilings: yellow line, red line: concerns: boxing in, targets/transfers of TAMs (TAMs include U.S. catches).

need confidence in coho mortality numbers for any fishing to go ahead: therefore need monitoring program that is timely, accurate and transparent e.g. independent observers

Nitinat Chum (Laurie Gordon)

expecting surplus of 1 million chum

implementing by-catch monitoring and test fishery as per last year but starting 1 week later

trying Alaska twist nets this year

usually not much coho by-catch but will be monitored especially in the early part of the run

Area E Fishing Plan Recommendations

Front end loading - in order for Area E fishermen to achieve their sockeye allocation by 3rd week of August (to avoid coho) they will need concessions from Areas D & B to allow access to front of summer run.

Mandatory live tanks - it was felt that in-river fisheries conducted in July and August have very little if any coho by-catch but the use of live tanks should be mandatory during all openings.

Want access to late run in September - acknowledge concerns about coho, chinook and steelhead. Suggest: using a larger (5.5 inch) mesh - this is expensive and may increase steelhead and chinook interceptions; no night fishing.

Need to develop separate guidelines for conducting a September fishery.

Move San Juan fishery to Sabine in August (open same time as Fraser River); concerns: Sabine may be a coho problem area, boundary enforcement problems, night time fishery (may increase coho by-catch), Aug. fishery, maybe 90 mesh

If no San Juan fishery, move the San Juan TAM to River and add to Fraser TAM.

Concerns about how DFO will manage fisheries to stay within their TAM's; do not want other areas/gears impacting on other "responsible" fisheries.

Voluntary no fishing for one (or more years) without losing license

DFO needs to address the impacts of seal predation immediately

Commercial sector should get recognition and credit for 1997 efforts; the sport fishery catch has to be reduced. The 1997 bag limits were not reasonable in comparison to the conservation measures implemented in commercial fisheries last year

Catch monitoring: fish slip reporting should be clearly outlined through licence conditions and enforced; implementation is a DFO responsibility.

In-Season Catch Monitoring

need combination of catch/effort data on-grounds and at dockside

COSTS are a major consideration

consider options that were used in Area D in 1997 and the Washington State monitoring system

options for consideration include: firming up landing slip requirements (licence conditions), observer coverage, designated landing stations, hails.

need to outline and resolve funding options (Fisheries Renewal B.C. may be source) and determine the most effective collecting funds.

need to explore how collaborative agreements are set up

need to know the acceptable level of observer coverage required for the in-river fleet (1-10%?).

Are there enough trained observers available and what level of training is required?

Need DFO to provide a landing profile summary (# landings, who, where, when, how much) for the Advisory board to assist in developing catch monitoring options.

Fraser River Chinook Fishery

DFO has received two letters requesting an in-river chinook fishery; Devona passed these requests to MELP, StAD, and Fish. Mgmt for comments.

MELP has expressed concerns about the bycatch of steelhead kelts.

StAD has uncertainties about the stock status of spring and early summer stocks and are not confident there is an available surplus for a directed fishery.

contention that June-July chinooks always in surplus

minimum 8" mesh - reduces by-catch

historically peak catches were in the 10-20/day range; estimate less than 2,000 fish would be caught in an opening of 200 boats

want DFO to determine if there is a correlation of stocks in Albion test fishery and Aboriginal fishery

ACTION: FRAC/AREA E request a meeting in early May with Stock Assessment staff and MELP to deal strictly with chinook issue

MEETING WITH AREA D (GILLNET)
April 15, 1998
CAMPBELL RIVER DFO OFFICE
CAMPBELL RIVER, BC

ATTENDEES:
Gordon McEachen – DFO
Les Rombough - Area D Association
Harold Hansen - Area D Association
Hugh Watson - Area D Association
Jim McVie - Area D Association
Agenda:

Introduction

Salmon expectations

Coho issue

Options for addressing coho conservation

Final Coho Summit April 27

1300 hrs

Introduction – the purpose of the meeting was explained, that being to explore options for coho conservation.

Salmon expectations:

Stock forecasts:

- Fraser Sockeye 11.2 m run size with 3.5 to 4 m surplus mostly in the summer run stock group.
- Southern bound Chum forecast 3.7 m . this forecast may be optimistic. The
- index fishery may be an issue with coho catch
- Pinks Fraser River off yr.
- Mainland pinks is forecast at 1m surplus in late July and early August.
- Chinook similar abundance's as last year. West Coast troll fleet is conducting a 7 boat test fishery for spring chinooks.
- Coho –A presentation on state of coho abundance's expected for 1998 with poor sea survivals that have dropped from a high of 10-12% to 1-4%
- Inside stock - 278,000 coho, Outside stock - 176,225 coho

Options for addressing coho conservation:

These options were discussed but no approach could be determined until after the Final Coho Summit meeting

- Timing of fisheries can reduce TAM's (i.e. avoid mid to end of Sept.)

- Location of fisheries can reduce Tam's (i.e. below Lewis Pt)
- Chum fisheries should be in early Oct to reduce TAM's
- Avoid fishing during the night (i.e. 1100 hrs to 0300 hrs)
- Daylight only fisheries
- Hot spot management (i.e. closing of areas)
- It is recognized that a catch monitoring program with a observer program will probably required for 1998 and into the future. The issue is who pays and fairness across all fleets. Area D is willing to talk to Area H and Area B in regards to a joint program

Next meeting

- Fishing plans will be developed with a small meeting of advisors prior to South Coast Meeting. A meeting will be called once more information on the coho plan is available.
- Area D should also make a presentation at the Final Coho Summit April 27, 1998
- No date planed probably late May or early June

The meeting concluded at 1600 hrs

COHO CONSULTATION MEETING - FRASER RIVER FIRST NATIONS
DAYS INN HOTEL, KAMLOOPS - APRIL 17, 1998 10:00 am to 4:00 PM

ATTENDEES:

Name	Affiliation	Telephone #	Fax #
Dwayne Finlay	USBFA	679-3203	679-3220
Bridget Ennevor	DFO	666-6608	666-7112
Carol Cross	DFO	666-8598	666-0417
Jim Irvine	DFO	(250) 756-7065	(250) 756-7138
Allan Casimir	Kamloops Indian Band	828-9700	372-8833
Joe Seymour	Lakahahmen First Nation	(604) 820-8869	(604) 820-4661
Craig Orr	Consultant	936-9474	936-5150
George Antone	Kwantlen	888-2488	
Lester Ned	Sumas	824-5310	824-5326
Ernie Crey	Sto:lo Nation	824-5309	824-5326
Robert Ignatius	Esketemc	(250) 440-5611	(250) 440-5712
Darren Hebert	VCC	372-3619	851-0848
Phyllis Rosette	Cariboo Tribal Council	392-7361	392-6158
Wendy Alphonse	Esketemc First Nation	440-5611	440-5721
Grant Scott	AFS	851-4849	851-4951
Mike Galesloot	SNFC	(250) 828-9836	(250) 828-9787
Barry Rosenberger	DFO	(250) 851-4953	(250) 851-4951
Bert Ionson	DFO	666-2032	666-2336
Pat Matthew	SNFC	(250) 828-9764	(250) 828-9787
Mike Brad Armouse	Neskonlith Band		
Bonnie Adolph	Cayoose Creek Fisheries	(250) 256-4136	
Priscella Frank	Cayoose Creek Fisheries	(250) 256-4136	
Mike Staley	FWSC	(604)889-7465	(604) 261-7065
Ken Wilson	FRAFS	(604) 301-0417	(604) 301-0438
David Coutlee	NWSFA	(250) 378-4235	(250) 378-9119
Lillie Johnson	SNFC - Co-Chair	(250) 398-0598	(250) 440-5686

David Moore	SNFC-Director	(250) 828-9837	(250) 828-9787
Thomas Hewitt	SNTC-member	(250) 828-9837	(250) 828-9787
Neil Todd	NWSFA	(250) 378-4235	(250)378-9119
Lorraine Aspen	Secwepemc News	(250) 828-9783	
Art Anthony	Neskonlith Band	679-5356	
Michael Crowe	DFO - Kamloops	851-4963	851-4951
Melody Farrell	DFO - Vancouver	666-4609	666-0417
John Jules	Kamloops Indian Band	828-9813	
Byril Kurtz	DFO - Salmon Arm	832-8037	832-9373
Frances Dickson	DFO - New Westminster	666-6509	666-7112
Diane Bailey	Katzie	465-8961	465-5949
Lyle Sparrow Jr.	Musqueam	263-4649	
Florence Deneaut	Adams Lake Band	679-8841	679-8813
Barry Huber	DFO - Prince George	(250) 561-5966	(250) 561-5534

Meeting Format:

Presentations made by DFO staff in the first 1.5 hours:

Review of 1997 South Coast fisheries - F. Dickson

Stock Status and 1998 Forecast - J. Irvine

Coho Habitat - M. Farrell and M. Crowe

Enhancement - C. Cross

Enforcement - B. Kurtz

Presentations made by First Nation representatives

Question and Answer period followed by general discussion and recommendations

Recommendations (Questions Provided By DFO):

What forecast of abundance should we use in 1998? A conservative level which would occur at least 25% of time or less conservative at 75% of time)

SNFC - 90%

Staley (watershed steering committee chair) - Not 50%, either 75% or 90%

NWSFA - 90%

What exploitation (harvest kills) rate should we use in 1998? No fishing or 0% or similar to last year at 25%)

SNFC - as close to 0% TAM for Thompson coho; no transfer of TAM

Tsawwassen - 0% TAM; no transfer of TAM

Staley - need biological risk assessment

NWSFA - 0% TAM; no transfer of TAM; US mortalities unavoidable

What habitat action should be recommended for the short and long term?

SNFC - need recommendations on what are the next steps (**ACTION** - M. Crowe to contact NWSFA and SNFC to discuss further)

NWSFA - keep supporting and strengthen habitat action initiatives in the short term; joint Provincial legislation needed in the long term

What coho enhancement should we be taking?

SNFC - enhancement is part of the problem previously, need to rebuild diversity, need to look at effects on wild stocks

Staley - if there will be no fishing, then why enhance if there is any suspicion that enhanced fish are part of the problem

NWSFA - need stock restoration/recovery instead of enhancement, need protocols for transplants of juveniles to vacant habitat

Should there be any directed fisheries by any group? If so, by whom?

SNFC - none

Tsawwassen - none

Staley - none

NWSFA - none

Should we have a selective mark fishery for hatchery coho?

SNFC - no, need angler education

Staley - not this year and not if we're talking about a decade of poor returns

NWSFA - no, unacceptable to have any catch and release mortalities on wild fish

Should we manage salmon fisheries for best economic benefit to Canadians, or for conservation benefits or a mix of these? How would you balance these?

SNFC - manage for conservation of Thompson coho

Staley - yes, if appropriate economic values are attached to conservation

What follow up is required from this meeting for this group?

SNFC - joint technical committee, public mechanism to oversee implementation, coho conservation plan coast wide (including US), more consultation, more detailed discussions with communities, monitoring/reporting/post season review of strategy

Tsawwassen - joint technical committee, public mechanism to oversee implementation, monitoring/reporting/post season review of strategy

Staley - Concern that while Minister is making the decision, need to engage in concomitant process (technical process), need to have concurrent public debate, can't afford a 3 to 4 week delay

NWSFA - Define TAM - quantifiable mortality from US fisheries

Questions Arising:

Answers were provided to all questions asked during the meeting

Next Meeting:

April 27, 1998

Lower mainland location to be announced

Main Fraser River Sport Fish Advisory Board Meeting
April 19, 1998
Sandman Inn, Langley
9:00 am
co-chairs: M. Grover, G. Smith, D. Adams
AGENDA
SUMMARY MINUTES

Attendees:

D. Adams (co-chair)	D. Denney	J. Schleimer
J. Barr	M. Grover (co-chair)	G. Smith (co-chair)
R. Brunt	J. Marliave	M. Sullivan
E. Carlisle	L. Milligan	F.Wardroper
S. Coultish	S. Roxburgh	J. Wright

COHO RECOMMENDATIONS
Two motions were put forward and passed:
1. Recognizing the need to conserve the wild Thompson system coho in the Fraser River, the Lower Fraser subcommittee of the SFAB recommends for the mainstem Fraser River downstream from the Alexander Bridge to the Mouth including that portion of Area 29 known as the Banana, that there be non-retention of coho salmon from August 15 to October 9 at 2359 hours.

- from October 10th, the mainstem Fraser River downstream from the Alexander Bridge to the Mouth be open to the retention of 2 coho per day which must be marked with a pelvic fin clip if over 35 cm.

- after October 10th, that portion of Area 29 known as the Banana, would be open to the coho limits in place for the rest of Area 29 (marine portion).

2. The Board will consider the merits of a bait ban on the lower Fraser River mainstem (CPR Bridge at Mission to the mouth of the River) during the proposed non-retention time period of August 15 to October 9th.

SPECIAL COHO CONSULTATION MEETING FOR COMMUNITIES, ENVIRONMENTAL AND NON-GOVERNMENT ORGANIZATIONS, AND THE PUBLIC
9:00 a.m. Monday April 20, 1998
Days Inn, Kamloops

9:00-9:15	**Introduction** General Process	**Brent Hargreaves** **Chairperson**
9:15-9:45	**Review of 1997 South Coast Fisheries** Questions and Comments	**Frances Dickson**
9:45-10:15	**Stock Status & 1998 Forecast** Total Allowable Mortality Options Potential Fishery Actions in 1998 Questions and Comments	**Richard Bailey**
10:15-10:45	**Coho Habitat** Backgrounder Proposed Action Plan Questions and Comments	**Melody Farrell**
10:45-11:15	**Enforcement** Overview Questions and Comments	**Byril Kurtz**
11:15-11:45	**Enhancement** Options Questions and Comments	**Carol Cross**
11:45-12:30	**Wrap-Up** Discussion	

Comments:

- There were few people at the meeting because there is no coho harvesting by sport fisherman in this area.
- The group would like another meeting in Jan./ Feb. 1999. to follow up.
- Sport catch and release mortality should be included in management stats.
- Habitat restoration costs could be excessive to local government.
- Federal, provincial and local governments are not working together.
- There is little awareness of interior coho.

Questions:

- Why are coho affected more than chinook?
- Are there any studies into the effects of pesticides in the watersheds?
- What about selective harvesting in the commercial fishery?
- Who controls riparian zones and erosion problems?
- What will be the impacts to coho with the chum and sockeye fisheries?
- Does Alaska take southern coho?
- What are the mortality rates for non retention of coho in the commercial fishery?
- How accurate is the incidental catch of coho in commercial fishery?
- What is the mortality of the seine netting with brailing versus over the stern?
- Is there good enforcement with the U.S. and aboriginal groups?
- Are fecundity and fish size decreasing?
- Why not transplant coho to under used streams?
- What is the predictions of El Nino continuing?

Suggestions:

What forecast of abundance should be used in 1998?

Total agreement that the forecast should use the 90% confidence limit option.
The reasons were that the El Nino effect may still be there. Coho are facing possible extinction.

What exploration rate should be recommended for the short and long term?

The exploitation rate should be set at 0 %-10 %. Comments included:

- Use 10 % for this year and see what happens;
- There should only be terminal or weir fishery; and
- There should be an extra reduction in sport coho directed fisheries on Thompson stocks.

What habitat action should be recommend for the short and long term?

Reports will be made to Michael Crowe before Friday. Comments included:

- Do all 27 recommendation in the habitat action plan; and
- Use public involvement in habitat watch and projects.

What coho enhancement should we be taking?

Comments were a range of ideas from no fish culture to start fish culture immediately to do a little fish culture. Other comments included:

- Let public involvement help;

- Enhance wild coho by management with an emphasis on assessment of management results before fish culture; and
- See what happens this year with conservative management and use fish culture next year if no improvement.

Should there be any directed fisheries by any group?

The consensus was that there should be no directed fisher for coho. The only exception would be a well defined terminal fishery.

Should there be a selective mark fishery?

The consensus was no. The catch and release mortality would be unacceptable.

Should we manage for:

1) Southern B.C. salmon
2) Southern B.C. coho
3) Thompson River coho only

3) Thompson River coho only

MEETING WITH AREA H (TROLL)
April 20, 1998
COMOX DFO OFFICE
COMOX, BC

ATTENDEES:
Gordon McEachen – DFO
John Wright – UFAWU
Ray Silvey – UFWAU
Rick Norstrom – PTA
Ron Parke – GTA
Mike Griswold – GTA
Dave Silvers – GTA

AGENDA:

Introduction

Salmon expectations

Coho issue

Options for addressing coho conservation

Fishing plan development

Next meeting

Introduction – the purpose of the meeting was explained, that being to explore options for coho conservation.

Salmon expectations:

Stock forecasts:
Fraser Sockeye 11.2 m run size with 3.5 to 4 m surplus mostly in the summer run stock group.
Southern bound Chum forecast 3.7 m . this forecast may be optimistic. The index fishery may be an issue with coho catch
Pinks Fraser River off yr.
Mainland pinks is forecasted at 1m surplus in late July and early August.
Chinook similar abundance's as last year. West Coast troll fleet is conducting a 7 boat test fishery for spring chinooks.
Coho –A presentation on state of coho abundance's expected for 1998 with poor sea survivals that have dropped from a high of 10-12% to 1-4%
Inside stock - 278,000 coho, Outside stock - 176,225 coho

Options for addressing coho conservation:

Timing of fisheries can reduce TAM's (i.e. avoid mid to end of Sept.)

Location of fisheries can reduce Tam's (i.e. below Lewis Pt)

Chum fisheries should be in early Oct to reduce TAM's

Pink fisheries in the mainland islet may require some closed areas to avoid coho, a 2-4 boat test fishery could be used to located Pinks and avoid coho.

Chinook fisheries in St of Georgia could be considered if abundance of chinook can be found and no coho are present . Need to look at chinook forecast, gulf tagging program and trawl survey.

It is recognized that a catch monitoring program with a observer program will probably required for 1998 and into the future. The issue is who pays and fairness across all fleets. Area H is willing to talk to Area D and Area B in regards to a joint program

A fall grilse problem was also discussed.

Fishing Plan Development:

Fishing plans will be developed with a small meeting of advisors prior to South Coast Meeting. A meeting will be called once more information on the coho plan is available. All five fleets should have a chance to review the final plans, in order to reduce gear conflicts etc.

Area H should also make a presentation at the Final Coho Summit April 27, 1998

Next meeting

No date planed probably late May or early June

The meeting concluded at 1200 hrs

SUMMARY OF AREA G ADVISORS MEETING
APR 20/98 13:00 HRS PBS NANAIMO
In attendance:
Wilf Caron (Area G)
Art Powell (Area G)
Peter Sakich (PTA)
Errol Sam (NTC)
Stan Watterson (PTA) – passed on comments by telephone
Randy Brahniuk
Bill Shaw
DRAFT
Summary of discussions relating to 1998 Area G fishing plan options and coho conservation for April 27 multi-stakeholder meeting:
Objectives
Prosecute Area G fisheries where available that are low risk where coho by-catch is minimal:

Barkley Sound Sockeye troll fishery in Area 23, Barkley Sound.

WCVI troll chum fishery in October.

Fraser River Sockeye Area G troll fishery in Area 12. Consideration should be given to extending the boundary into a portion of Area 11 to provide more sockeye fishing opportunity in an area where coho by-catch will be minimal and will assist in reducing gear conflicts in Area 12 (mainly with the GN fleet)

WCVI winter chinook fishery.

Higher risk fisheries where coho by-catch could be significant:

WCVI July chinook fishery, this option may not be available this year, it will be dependant on the level of assigned coho TAM's. Options should be left open for consideration of opening only portions of the WCVI where coho by-catch is known to be low. This could be determined through a test fishery.

Fraser River sockeye fishery off the WCVI, it would be desirable to harvest the TAC in Area 12 where coho by-catch is low. If the sockeye diversion rate is significant down the WCVi and it is not possible to harvest all the TAC from Area 12, options should be left open to harvest sockeye on the WCVI in addition to Area 12. This would require fishing in areas of low coho abundance and ensuring that the fishery is conducted during peak sockeye abundance, this would also reduce the coho by-catch. A sockeye test fishery would be required on the WCVI prior to opening to identify areas of coho concern and sockeye abundances.

It was discussed that specific details on fishing plan options could not be identified until the total TAM's were known and what restrictions or plans were being considered by other users.

South Coast SFAB Coho Working Group
April 21, 1998
Nanaimo, B.C.

Draft Minutes

IN ATTENDANCE:
FROM SFAB:
WAYNE HARLING - B.C.W.F.
IAN BEVERIDGE - MID ISLAND SFAB
BOB GALLAUGHER - SOUTH VAN ISLAND SFAB
BOB ANSTEAD - SUNSHINE COAST SFAB
DEANE STRONGITHARM - SFAB
BRENT MCCALLUM - LOWER FRASER SFAB
MARTIN PAISH - TOFINO/UCLUELET SFAB
GRAEME BULL - NORTH ISLAND SFAB
TOM COLE - SOUTH VAN ISLAND SFAB
LAURIE MILLIGAN - LOWER FRASER SFAB
GARY SMITH - LOWER FRASER SFAB
JOHN SCHLEIMER - B.C.W.F. LOWER MAINLAND B.C.W.F.
JEREMY MAYNARD - CHAIR - SOUTH COAST SFAB
HARLEY ELIAS - CAMPBELL RIVER SFAB
TOM BIRD - SFAB EXECUTIVE - SFI

FROM THE DFO:
TERRY GJERNES
GREG SAVARD
DEVONA ADAMS
BILL OTWAY

The meeting was called to order at 09:45 with Jeremy Maynard in the chair.

Terry Gjernes advised those present that there would be an all sector meeting scheduled for April 27th in Vancouver. Time and location were not available at this time. Also there was no agenda available as yet.

The meeting will be to hear the proposals from each group and request comments on all segments of the Coho issue. If there is consensus on any items these will be taken to the Minister as agreement.

Terry advised that his latest information was that they now expected and announcement from the Minister in late May or early June.

Jeremy provided copies of his submission to the Copes process on behalf of the SFAB. He reported that Copes had questioned him regarding barbless hooks and banning bait. Jeremy advised him that his information was that there was no measureable difference in mortality from barbed or barbless hooks and between artificial lures and bait for salmon.

Martin Paish advised he had attended the meetings in Tofino and Nanaimo.

Tom Bird and Brent McCallum attended the meetings in Vancouver.

Bill Otway advised that at the weekend meeting of the North Coast SFAB they had been advised that the date for submissions to Cope had been extended until April 22.

DFO staff re-affirmed the information provided at the previous meeting and regarding the allowable mortalities. It was anticipated that the maximum harvest rate allowed would be 10% and this would provide for a maximum mortality on "inside stocks" of 28,000 and a total overall mortality of 60,000. These numbers are applicable for all fisheries not just for the recreational fishery.

A good deal of discussion ensued over the balance of the day regarding various fishing options.

Members were appraised of the fact that the DFO had no method of "in season" abundance assessment so that the allowable mortalities were the maximum. If stocks were stronger and this resulted in a high catch by the sport, the maximum could be reached quite quickly and the whole fishery would be closed. It was made very clear that the intention of the DFO was to close any and all fisheries, if a fishery was allowed, when the TAM (Total Allowable Mortality) was reached.

After much discussion the following plan was put forward by the group.

PROPOSED SPORT FISHING PLAN FOR COHO FOR 1998

AREA:	FISHING PRESCRIPTION:	TOTAL MORTS:	INSIDE MORTS:
13-18 ST. GEORGIA	2 PER DAY	4328	3809
AREA 28	2 PER DAY	1309	1309
19-21 JUAN DE FU	MARK ONLY 2 PER DAY	20859	12987
AREA 23B	MARK ONLY 2 PER DAY	3960	1108
AREA 23A	2 PER DAY	529	0
AREA 24-27	2 PER DAY	12187	3410
AREA 11-12	2 PER DAY	6500	4550
FRASER	VENT MARK ONLY 2 PER DAY	1600	1600
		---	---
TOTAL MORTALITIES		51272	28773
Less hatchery retention and termin. exclusions		15368	15239
		---	---
CATCH & MORTALITY		35904	13594

The fisheries in Area 23 A - That area inside the boundaries of the Port Alberni Harbour and Area 28, Inside Point Atkinson, were, after consultation with DFO staff taken as terminal exclusions because in the case of 23A there were no inside (Strait of Georgia and Fraser River) stocks taken in this fishery and in Area 28, well in excess of 90% of the stocks taken there are hatchery production from hatcheries where there is no concern.

The total mortalities in Juan de Fuca 19-21, includes 5625 mortalities from release of non marked fish. Further the plan is predicated on this fishery, in that area North of Sheringham Point reverting to 2 per day no mark requirement on September 15th.

The total mortalities for Area 23B includes 1660 mortalities from the release of non marked fish.

The fisheries in Areas 19 to 21 and Area 23A are proposed to allow the retention of marked hatchery fish only. The mark to be used is any fish having any fin missing with a healed scar in it’s place will be considered to be a hatchery fish.

The fishery in the Lower Fraser is not scheduled to start under this plan until October 10th. Prior to that date there would be a non retention of Coho restriction in place. The fishery would be restricted to retention of Ventral clipped Coho only. Such a regulation is felt workable in this area because of the fact that the vast majority of the fish in the system at this time are from the Lower Fraser systems and all of the hatchery production from those systems were marked with a ventral clip. The mortalities from this fishery area also charged with a total of 100 mortalities from the release of unmarked Coho.

The total mortalities have been expanded to include a total of 200 Thompson fish which could be possibly retained due to their having been adipose clipped in this brood year. This is a very high estimate due to the fact that the DFO data shows only 244 of these fish taken in the 1997 fishery when a far greater number were marked and further there was a much greater effort expended than is expected for the 1998 season.

MOTION - SCCMC - COHO-198-1 -It was moved by Brent McCallum, seconded by Gary Smith, that the proposal as noted above be put forward as the South Coast sport fishing plan for Coho and sent to Paul Sprout for the April 27th meeting. The plan to include a credit for any hatchery fish retained in selective mark fisheries. MOTION CARRIED UNANIMOUSLY.

The members also agreed that they were prepared to review this on an area by area basis if necessary. They requested specific feedback from the DFO on the plan.

AREA B - SEINE ADVISORY MEETING
Location - Campbell River - Anchor Inn
Date - April 21, 1998 - 9:00am - 4:30pm
Attendance:
Name Organization

Darnel Engor UFAWU

Ben Lagos UFAWU

Shirley Wiebe Pacific Faith Fish. Co for Mike Heavenor

Bob Charlie Nicole Joy

Gary McGill Oceanaire

James Walkus Pacific Joy

Chester Lewis Tara Lynn

Ralph Dick Star Wonder

Elmer Dick Campbell River

William Dick Western Queen

Bob Pollard Campbell River

Peter Gallagner Canadian Fish Co.

Tom MacMaster B.C. Packers

Rick Frey UFAWU

Brian Assu NBBC

Ritchie Quocksister

G. Quocksister Laich. Nation

Jason Quocksister

Don Heron FVOA

Chris Cue Canfisco

Bill Fitzgerald Canfisco

Terry Kueber Seafood Prod Co

Bill Wilson Kynoc

Mark Recalma Qualicum Producer

Gordie McEachen DFO

Leroy Hop Wo DFO

INTRODUCTION - G. McEachen - discussion of goals and agenda of today's meeting
1998 SALMON EXPECTATIONS - G. McEachen reviewed forecasts of Fraser sockeye, Johnstone/Georgia Strait,Lower Fraser chum, Nitinat and Nootka chum, Barkley Sound sockeye, chinook and Mainland Inlet pink.
COHO PRESENTATION - L. Hop Wo - reviewed briefly BC historical trends, Northern BC coho status, Southern BC coho status, salmon enhancement, coho habitat, historical net conservation actions, Regional Coho Response Team - goals and proposed meetings.

COHO DISCUSSION

- Discussion on need of fishermen to receive information. Sending information to companies which own many licenses not required, better to send to skippers of the company vessels. E-mail has broad base for distribution
- Mortality estimate discussion, citing Northern brail and ramp studies - need for more information on this
- Resuscitation boxes "blue boxes" Agree and recommendation of half totes for seine vessels,. Discussion on deck hoses with spray nozzle for circulation water.
- coho tagging and release suggested to acquire addition information of coho movement.
- discussion of brailing versus ramping sets, more information is required to evaluate reduction of mortality on incidental salmon species.

AREA B ADVISORY PROCESS

Discussion of forming one group to represent all Area B seine license holders. Several groups currently exist with UFAWU, Native Brotherhood, FVOA. Several areas exist, Port Hardy, Sointula, Alert Bay, Campbell River, Vancouver etc. Agreed to exchange information between groups. Groups agree to meet together with DFO in one location.

EXPLORE OPTIONS FOR COHO MANAGEMENT

Agree on the need for conservation on coho stocks.

- coho hotspots would be reviewed and actions would be implemented when required, this may include brailing or complete closure of area

- explore beach tie ups to provide equity between individual areas throughout the fishing area
- agreed on the need for timely, accurate catch information of all salmon species (including encounters of coho, chinook steelhead)
- explore requirement for vessels to report when entering and leaving an area
- agreed on half tote (holding box for fish revival) requirement
- review Round Island boundary for coho
- agreed on requirement for education of both skippers and crew, possibly through beachman's course and special skippers meeting
- identified problem with preseason coho forecast fluctuating during the season - changing abundance not reflected in Total Allowable Mortality (TAM). An unforeseen high abundance of coho would not be reflected in the TAM and may unexpectedly limit fishing.

CATCH MONITORING PROGRAM - discussion of monitoring and log book type programs and equity/fairness between all commercial groups. A meeting between Area B, H and D to be organized in mid May to discuss possible program savings.
FINAL COHO SUMMIT MEETING - April 27 - discussion of format. Discussion of need for more "lead" time to prepare for this meeting. Unknown where this meeting is to occur.
WHERE TO NEXT - agreed to meeting of this type after minister announces coho plan and likely prior to SCAC meeting.

AGENDA
AREA B - SEINE ADVISORY MEETING
CAMPBELL RIVER
APRIL 21, 1998
0900 HRS TO 1200 HRS:
OPEN FORUM
1) INTRODUCTION:
2) 1998 SALMON EXPECTATIONS:
3) COHO PRESENTATION:
4) QUESTIONS/COMMENTS REGARDING COHO
1300 HRS TO 1630 HRS
ADVISORS MEETING

INTRODUCTION:

AREA B ADVISORY PROCESS – (ONE VOICE)

EXPLORE OPTIONS FOR COHO MANAGEMENT

CATCH MONITORING PROGRAM

TARGET SPECIES VS NON TARGET SPECIES

PARTNERING

FINAL COHO SUMMIT MEETING – APRIL 27

6) WHERE TO NEXT ?

FISHING PLAN DEVELOPMENT

CATCH MONITORING

7) OTHER

MEETING WITH THE F.V.O.A.
April 27, 1998
VANCOUVER, BC
ATTENDEES:
Gordon McEachen - DFO
Leroy Hop Wo – DFO
Wayne Saito - DFO
Brent Melan
Bob Rezansaff
Glenn Budden
Larry Wick
John Legate
Don Heron
Mitch Ponak
Jim Frame
Jim Erickson
Michel Jutras

1330 HRS - No Formal Agenda

- Informal coho update...answering a few questions as most of the members had been updated or have heard the coho presentation

The following issues/topics were discussed

- Resuscitation boxes - half totes were suggest with a mandatory program in place
- For Johnstone Strait...recommend the yellow / red line approach similar to San Juan be used with coho
- Recommend a tagging of release coho for this year.
- Recommend if area closures occur (i.e.: Johnstone Strait) that other areas be open to alleviate gear congestion.
- Management actions this year be stated explicitly connected to very low abundance and when abundance increase to a fishable level, the seine fleet not be trapped with a very unworkable TAM on coho.
- Request retention of Chinooks if conservation not an issue as other commercial gear will be retaining Chinooks.
- Suggest catch and release instruction/training course is very important.

FVOA and UFAWU proposing an education program for fisher persons.

- Maybe in conjunction with beachman course , input into company fishing manual and/or in a company meeting with vessel masters.

- Agree to work with us on C/R pamphlet and video.
- The requirement for catch monitoring was discussed. Partnering and the use of TAC for funding was also discussed. Some members were concerned about the increased costs to fishermen.
- The consultation process with Area B seines were discussed. A joint meeting with other organizations and Johnstone Straits fishermen was proposed by the DFO members for next week. Dates and times to be announced. This meeting was a coho update and a proposed forum for building a better advisory process for AREA B seines.
- Brailing vs. ramping was also discussed at length.

The meeting concluded at 1500 hrs

SOUTH COAST MULTI-STAKEHOLDER
COHO SUMMIT MEETING

Date: **April 27, 1998**
Time: **0930 - 1630**
Location: **Fletcher Challenge Theatre,**
SFU, 515 W. Hastings St.,
Vancouver, B.C.
Chair: **Paul Sprout**

MINUTES

The primary purpose of the meeting was to provide an opportunity for attendees to confirm the advice that DFO has received with respect to the management of coho and their habitat and to provide an opportunity for further presentations and discussions prior to the Coho Response Team finalizing its report to the Minister.
The meeting opened with DFO staff providing a brief overview of the status of coho stocks including the extremely poor state of Thompson coho stocks. The biological risk assessment on Thompson River and North/South Coast coho which is currently being reviewed through the Pacific Stock Assessment Review Committee(PSARC) was briefly described. The risk is the probability or chance of loss of the stocks and involves the examination of past stock trends and the use of population dynamic models to predict future stock condition under various scenarios; the risk of loss is defined as continued population declines and local extinctions. The PSARC review is being fast tracked and the PSARC advisory document is expected to be available by May 8, 1998.
Preliminary economic analysis information was also provided. In addition, Departmental staff provided an overview of advice provided by First Nations and stakeholder groups and highlighted areas of agreement and areas where different advice was provided. The synopsis of coho advice presented will be available on the coho internet site and, as such, is not included in these minutes.
The following represents a synopsis of information and advice received at the meeting.

Biological Risk Assessment:

- concern that this information is not yet available to assist in properly assessing the risk of various exploitation rates on south coast coho
- there were some calls for seal and sea lion control programs due to their rapid population growth and predation affects on outgoing smolts and incoming spawners (particularly female coho)
- there was also a call for reduced herring catch on the assumption that herring stocks are reduced in abundance (not the case according to DFO stock assessment)

Economic Analysis:

- concern and dissatisfaction with the preliminary and incomplete nature of the information and analysis done to date
- a request for more specific analysis of potential impacts including impacts on fleets and the communities that service these fleets as was done with the sport sector
- a call for a full-cost accounting

Habitat Restoration and Enhancement:

- full consensus that there is a need to conserve and rehabilitate habitat
- the Habitat Action Plan was distributed and received favourable review providing that there is a plan to provide funds to deliver on the program

Exploitation Rate/Selective Mark Fisheries:

- advice from First Nations, Environmental Groups and the Steelhead Society of B.C. that they oppose all fisheries where there will an associated mortality to endangered coho stocks and as such to manage to a zero or near zero coho exploitation
- advice from commercial fishing representatives that 10% or less exploitation on coho should be a target and that there is room for some directed salmon fisheries in time windows and areas where coho stocks of concern can be avoided
- advice from sport fishing representatives that 10% or less exploitation is acceptable particularly if selective hatchery mark fisheries were conducted that target hatchery fish
- the selective mark fishery was strongly opposed by Fraser First Nations who have not been able to conduct food fisheries for coho or other salmon species because of coho-by-catch concerns. Fraser First Nations also pointed out that due to the endangered status of Thompson coho stocks and the mortalities being exerted on south coast coho in Washington State fisheries, that there is no room for catch and release moralities on Thompson coho in these fisheries. They also made it clear that First Nations have priority access after conservation, and that no other sector should be allowed access before stocks are restored to sufficient abundance to allow First Nations' harvest in the upper Fraser/Thompson River areas
- there was a call from the UFAWU for the Department to treat the coho situation as a crisis and demonstrate such by taking an aggressive approach to habitat and enhancement funding, and in negotiations with the U.S. on the Pacific Salmon Treaty
- overall there seemed to be a willingness by stakeholders to cooperate and accept stringent measures if the pain was equal

Consultation:

- there was considerable support for development of a multi-stakeholder cross sectoral consultation approach to coho management and proposals were tabled by the Shuswap Nation Fisheries Commission and the Coastal Communities Network to establish such processes

- there was general discussion about the need to conduct an immediate multi-stakeholder cross sectoral meeting but after some discussion the support seemed to shift to a request the Minister to provide policy direction (exploitation rate for 1998) and then to provide for a multi-sector meeting to work out fishing plans. This would possibly be a smaller group
- some groups felt that they had not adequately been consulted -B.C. Fisheries Council, Environmental Network, West Coast Sustainability Association

Urgency for an early decision from the Minister:

- there was consensus that there are compelling conservation and economic reasons why an early decision on the 1998 coho management plan is required from the Minister:
    1. coho are now reaching legal size in the sport fishery and are being kept
    2. some recreational and commercial interests have significant investments at risk
    3. families and communities will be impacted by the 1998 coho plan
- there is a need for the Minister's decision to be accompanied by an action plan that addresses coho recovery, habitat conservation and restoration, and an economic recovery plan for affected communities.

Meeting adjourned at 4:30 p.m.

LIST OF ATTENDEES: COHO MULTI STAKEHOLDERS CONSULTATION MEETING
SFU, VANCOUVER - APRIL 27, 1998 (9:30 - 4:30)

NAME	AFFILIATION	TEL	FAX
Farrell, Melody	DFO-HEB	604-666-4609	604-666-0417
Paterson, Dale	DFO-Habitat	604-666-0315	604-666-6627
Lane, David	T. Buck Suzuki Foundation	255-8819	255-3162
Hopkins, Chris	Power Squadron	604-943-3478	604-943-8014
Manuck, Barry & Nancy	Fraser River Fishermen Society	604-820-4544	604-820-4844
Seymour, Joe	Lakahahmen First Nation	604-820-8869	604-820-4661
Tautz, Art	B.C. Fisheries	222-6763	660-1849
Davis, John	DFO-Science	250-363-6515	250-363-6479
Dickson, Frances	DFO-Fish Mgt.	604-666-6509	604-666-7112
Kadowaki, Ron	DFO-Science	250-756-7229	250-756-7138
Savard, Greg	DFO-Fish Mgt.	250-756-7288	250-756-7162
McCallum, Brent	SFAB-Fraser River	604-420-2323	604-420-8176
Ellis, David	Fish For Life Foundation	604-222-8394	604-222-1152
Straight, Lee	BCWF, SSBC, B.C.F.F.F. PAC, SALMON FOUNDATION	261-5951	261-5921
McGarra, Scott Baker	SSBC-Dir. SFAB F.R. Retailer Sportfishing	322-5031	273-5980
Gibbons, Dan	Geogria Strait Sportfishing Guides Assoc.	856-3633	856-7753
Smith, Gary	S.F.A.B. Lower Fraser	680-6696	582-2771
Carlisle, Eric	B.C. Federation of Drift Fishermen, Steelhead Society of B.C.	922-6224	
Milligan, Laurie	SFAB - Fraser River	987-3865	981-0032
Schleimer, John	SFAB - BCWF	985-5009	
Drouin, Michel	Selective Research	253-8572	
Caron, Wilf	Area/G T.F. Association	250-724-4237	
Ross, Ernie	Area/G	536-1829	536-1829
Sofo, Cristina	Simon Fraser Univ.	255-7537	
Fiamengo, Sinie	F.V.O.A.	604-433-9577	
Wilson, Ken	Fraser River Aborginal Fishery Sec.	301-0417	301-0438
Gallagner, Peter	Canadian Fishing Co.	681-0211	681-3277
Cuk, Chris	Canadian Fishing Co.	681-0211	681-3277
Reid, Bruce	DFO-Habitat Enhancement	604-666-0514	604-666-6622
Crowe, Michael	DFO-Habitat	250-851-4963	250-851-4951
Carpenter, Bob	Pacific Packers Association	250-758-7531	250-756-1210
Branson, Tom	Canadian Fishing Co.	604-681-0211	604-681-3277
Cadman, David	Society Promoting Environmental Conservation	604-736-7732	604-736-7115
Gjernes, Terry	DFO	604-666-3271	604-666-7369
Harvey, Brian	World Fisheries Trust	250-380-7585	250-380-2621
Lawseth, Don	DFO	250-756-7003	250-756-7162
Kehl, Ron	DFO	250-724-0195	250-724-0658
Huber, Barry	DFO	250-561-5966	250-561-5534
Loucks, Laura	Simon Fraser University	604-876-5537	SFU
Pinkerton, Everyn	Simon Fraser University	604-224-3797	604-224-3797
Zealand, Gordon	DFO	867-393-6719	867-393-6738

NAME	AFFILIATION	TEL	FAX
Dragseth, Chris	DFO	250-756-7280	250-756-7162
Shaw, Bill	DFO	250-756-7152	250-756-7162
Masson, Colin	DFO	756-7001	756-7020
Hartting, Jay	DFO	604-666-7013	604-666-1847
Lauder, Susan	Hupacasath 1st Nation	250-723-5890	250-723-5159
Sutchiffe, John	Lifawli	255-1336	255-3162
Tamm, Eric	CCN	726-4683	726-2268
Triggs, Dal	U.F.A.W.U.	463-8408	
Harling, Wayne	B.C.W.F.	250-753-1864	753-1864
Maynard, Jeremy	S.F.A.B.	250-286-1456	250-286-4640
Nicell, Mike	S.E.H.A.B.	250-335-1804	250-335-1806
Otway, Bill	Rec Fish	604-942-7316	250-942-4262
Slack, Terry	Member Fraser River Coalition	224-5730	
Chow, Sharon	Sierra Club	386-5255	386-4453
Friedman, Shawna	B.C. Wild	604-669-4802	604-669-6833
Emes, Mike	Salom For Canada	732-6853	255-3162
Atkinson, Mary-Sue	Seymour Salmonid Soc.	986-6710	986-6710
Dunn, R	B.C. Packers Ltd.	946-8498	275-8153
Chatwin, Murray	Ocean Fisheries Ltd.	254-5751	254-0957
Lindquist, Gord	J.S. McMillan Fisheries	255-5191	255-4600
Hunter, Mike	FCBC	684-6454	684-5109
Willow, John	B.C. Fisheries	356-5408	356-5798
Kristianson, Gerry	SFAB	250-656-5829	250-656-5829
Strongithanm, Deane	S.F.I.	250-592-3022	250-598-3014
Panek, Peter	S.F.U.	291-3062	291-5716
Watterson, Stan	Pacific Trollers Assn.	278-2642	276-8803
Parke, Ron	Gulf Trollers Assn.	339-5567	339-5567
Werring, John	Sierra Legal Defence Fund	685-5618	685-7813
Ennener, Bridget	DFO	666-6608	666-7112
Cross, Carol	DFO	666-8598	666-0417
Elliott, David	Steelhead Society	931-8288	931-5074
Broomhau, Peter	Independent	327-5355	327-5354
Hutchinson, Johnathan			
Johnson, Stephanie			
Johnson, Lillie	SNFC-Co-Chinu	250-398-0598	250-440-5080
Gulesloot, Mike	SNFC Tribal Fisheries Biologist	250-828-9836	

Port Alberni Local SFAB committee meeting

April 27 1998

DFO Staff
David Fogtmann
Laurie Gordon
Wilf Luedke
Jim Robson
approximately 15 members present

Group was informed of the estimated numbers of returning coho to South coast waters. it was explained the numbers were 75% probability 278K coho returning on the inside and 50% probability of 176K coho returning on the outside..

Update on what had happened at the Coho Summit which took place earlier in the day. The proposal which the Coho Working Group of the SFAB had submitted at the Summit meeting was discussed.

One of the members who is a working member of the Port Alberni Regional Aquatic Management board passed around a draft plan on a potential WCVI sport fishery plan which he said he would like some feed back on before he submitted it the following week.

Nootka Sound Local SFAB committee meeting

April 28 1998

DFO staff

David Fogtmann
Laurie Gordon
Wilf Luedke
Roger Douglas
approximately 12 members present

A Summary of last years Coho catch in the sport and commercial fisheries were discussed

Group was informed of the estimated numbers of returning coho to South coast waters. it was explained the numbers were 75% probability 278K coho returning on the inside and 50% probability of 176K coho returning on the outside.

Update on what had happened at the Coho Summit which took place earlier in the day. The proposal which the Coho Working Group of the SFAB had submitted at the Summit meeting was discussed.

One of the members who is a working member of the Port Alberni Regional Aquatic Management board passed around a draft plan on a potential WCVI sport fishery plan which he said he would like some feed back from the group before he submitted it the following week.

NORTH

BABINE LAKE FIRST NATION

MEETING DATE: 08:30 AM, March 30, 1998

LOCATION: Telkwa Village Office

ATTENDEES:

BABINE LAKE FIRST NATION: Von Serac, Frank Patrick, Leanne Olynik, Bill Spenst, Sarah Charlie, Joe Michelle,

DFO: Dave Peacock(STAD), Brenda Donas(HEB), Blair Holtby(STAD), Terry Turnbull(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Gary Cardinal(AFS), Les Jantz(FM), Trace Joe(contract with DFO),Pierre Lemieux(HEB).

CHAIR: Dave Peacock

Following the introductions and presentations on stock status(Blair Holtby), habitat(Pierre Lemieux) and enhancement(Brenda Donas) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder" and attachment for local enhancement initiatives.

Questions:

1. Can we estimate the productivity rates for Babine coho? **A**. Don't have the smolt information needed to do the calculations. Likely similar to Toboggan.

2. Are there identification problems with coho during enumerations and in catch and release fisheries? **A**. Misidentification does occur but likely not a large problem.

3. What kinds of mortalities and what level of participation is there in catch and release fisheries in the commercial and sport fisheries? **A**. Several studies in recent years with seines in northern B.C. have shown good survivals of released coho but participation is critical.

4. What is the exploitation rate on upper Skeena coho in the Skeena river sport fisheries from tidal waters up to the upper watershed? **A**. Low, likely less than 5 %.

5. What actions were taken in the tidal sport fishery in 1997 and how many upper Skeena coho were saved by these actions?

6. What impact does industrial development have on coho?

7. What is the status of habitat in general in the Skeena. **A**. Has declined somewhat but not the major problem with the coho issue. Upper Bulkley an exception as major habitat alteration has occurred.

8. Has water quality testing been done in the Babine? **A**. Samples taken last year in the hatchery area at Fort Babine but no unusual readings were noticed. The sewage system at Fort Babine is currently being repaired. There have been high fecal counts in recent years above and below the outfall.

9. What impacts has flooding had on coho? **A**. In some instances very high impacts depending on the river system and timing of the flood.

WET'SUWET'EN FIRST NATION

DATE: 13:30 PM, March 30, 1998

GROUP: Wet'suwet'en First Nation

LOCATION: Moricetown Hall

ATTENDEES:

WET'SUWET'EN FIRST NATION: Marvin George, Walter Joseph, Peter David, Alphonse Gagnon, Amos Naziel, Sam Wilson, Herb Naziel, Charlie Pete, Ray Morris, Robert H. Morris, Vernon Joseph, Ron Mitchell, Lillian Naziel, Joseph Michelle, Laurena Morris, Arne Clausen, Ron Austin, Leonard George, Kneekap Nikal, Tereca Tait, Betty Joseph, Ken Morris, Gordon Green, Peter Bazil, Myron Wilson, John Mitchell, Mel Dennis, Helen Nikal, Mary Jim, Kathryn Naziel, Lillian Naziel, Doug Pete, Hank Michell

DFO: Dave Peacock(STAD), Brenda Donas(HEB), Blair Holtby(STAD), Terry Turnbull(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Gary Cardinal(AFS), Les Jantz(FM), Trace Joe(contract with DFO), Pierre Lemieux(HEB).

CHAIR: Marvin George/Dave Peacock

Following the introductions and presentations on stock status(Blair Holtby), habitat(Pierre Lemieux) and enhancement(Brenda Donas) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder" and attachment for local enhancement initiatives.

Questions:

1. Has there been a disease problem with coho? **A**. Not that we are aware of.

2. Estimates of coho escapement to the Bulkley, why the high variation? **A**. Due to the techniques utilized. In 1994 radio tags, in 1997 anchor tags applied at Moricetown for marked/recapture .

3. Why was the sportfishery open at Toboggan Creek but not Moricetown? **A**. Fishery targetting on Toboggan enhanced coho.

4. Where were the radio tagged fish from? **A**. Caught by seine vessels at the mouth of the Skeena River.

5. How do identify a radio tagged fish? **A**. Each fish has a separate radio frequency you can track.

6. Why was the return of coho so low? **A**. Started in the early 1970's with the increase in commercial fishing effort in Alaska and northern B.C..

7. What kind of returns for 1998? **A**. Difficult to say for interior stocks. Using coastal stock(Lachmach) sibling relationship predicts a return of 1,600 for Lachmach for 1998 with average marine survival but a lot of uncertainty around estimate. Interior stocks likely get returns well below required levels.

8. What sort of policies are we looking at for the coming years for all user groups, native, sport and commercial? What about habitat? **A**. We are here to talk about all options available from zero harvest to marginal harvests. Clearly a need to reduce harvest rates though. We want to hear your comments.

9. Do we know the distribution of coho in the ocean? **A**. Through CWT programs we have been able to track Skeena coho in the ocean. They mix with other coho stocks throughout northern B.C. and SSE Alaska and are harvested in all fisheries down the coast from the Alaskan panhandle to the rivers of their origin.

10. Do the Canadian and US scientists communicate? **A**. We do talk but how far up the system the comments go in Alaska is uncertain. They have been slow to accept our conservation concerns. Likely not to take actions as Canadian coho make up 20 percent or less of their total coho catch.

11. Do we do any water quality surveys? **A**. Some have been done but not extensive program due to analysis costs.

12. Can we put out public notices in the aboriginal communities about closures in the commercial and sport fisheries? **A**. Yes. Need to inform all of what is being done.

13. Channel problem for juveniles in Owen Creek/Morice River? **A**. Not enough water was a major problem. Have been working on problem.

14. Has Alcan got anything to do with lower water levels in recent years? **A**. Not Alcan but likely related to past logging activities, snow pack and temperatures which have been changing resulting in less productive habitat.

15. Any studies on the impacts of bears, eagles and other predators on spawning coho? **A**. No studies but impacts can be high under certain conditions.

16. Instream incubator in Gitanyow. Is there a plan to do this in the Morice? **A**. It is an option to consider. Salvage programs are also a possiblity.

17. Is there a plan to reroute Lake Kathlyn Creek to improve water quality of Kathlyn Lake and Creek? **A**. Has been an ongoing problem in the lake and things are being looked at to solve the problem.

18. Is the water quality affecting the health of the fish as they travel upriver causing them to not be able to reach upper reaches of many tributaries? **A**. Don't know.

19. How do we nominate the Bulkley as an endangered river? **A**. We have nominated the Bulkley but decision hasn't been made yet.

20. Do we get involved in the decisions regrding grazing rights? **A**. Have tried but don't seem to get the kind of response thats required. Need a better relationship with Provincial representatives.

21. Are there any plans for large spawning channels? **A**. No. May be some small projects.

22. Is the timing of the coho runs different for each stock and other species or do they all overlap? **A**. Large amount of overlap but some separation in timing. We try to take advantage of the differences in designing fishing patterns to avoid coho bycatch.

23. What kind of fishing times are likely for us in 1998? **A.** All options should be explored that would result in reduced coho catch.

24. Concerned that trollers taking bulk of coho. Are they going to be shut down in 1998? **A**. Additional actions to what has been implemented in previous years are being considered to reduce impacts on coho returns, possibly as far as complete closure.

25. What is going to be done to the sport sector? **A**. They will also be looked at to help with the coho problem through consultations with the SFAB.

Comments:

1. Doesn't agree with the stock status report on overfishing in the Bulkley system.

2. Old mine in Owen Creek area leaking something into water killing the fish.

3. Agriculture has had significant impacts on coho production in many tributaries along the Bulkley River.

4. CN have been major pollutor of local Smithers streams ie. Chicken Creek which they are trying to deal with. Also others areas that CN has caused problems.

5. Pollution from many sources (highways, CN, mining, logging) a big issue in Bulkley River drainage.

6. Now is the time to deal with the Beaver problems. Trapping and fur quality is best now, in spring.

7. Should study bear and eagle predation.

8. Need to make sure that all groups including Alaska and Washington get involved so all are aware of each others actions and efforts to address coho problem.

9. Need some sort of an exchange program with Americans.

10. There is some evidence of liver damage in juveniles in Toboggan and other systems perhaps from pollution.

11. Need a meeting of fishermen to determine what can be done to address coho problem.

12. Might want to retain CWT coho from Toboggan Creek at Moricetown.

13. Past efforts at Moricetown have been appreciated by both the DFO and Province.

GITKSAN FIRST NATION

DATE: 09:00, March 31, 1998

LOCATION: Hudson Bay Lodge, Smithers

ATTENDEES:

GITKSAN FIRST NATION: Chris Barnes, Aubry Jackson & Ed Green

DFO: Dave Peacock(STAD), Brenda Donas(HEB), Blair Holtby(STAD), Terry Turnbull(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Gary Cardinal(AFS), Les Jantz(FM), Pierre Lemieux(HEB).

CHAIR: Jim Steward

Following the introductions and presentations on stock status(Blair Holtby), habitat(Pierre Lemieux) and enhancement(Brenda Donas) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder" and attachment for local enhancement initiatives.

Questions:

1. What kind of a recovey plan does the department have? **A**. Options are being looked at with all sectors in the Skeena and its approach fisheries.

2. What is the GWWA expectation for returning Kispiox enhanced stocks? **A**. No plans at this time but want to improve the knowledge base of Kispiox fish.

Comments:

1. Given the J J J decisions and Delgaamut decisions the native groups come first.

2. Gitksan does not want a kill fishery on coho.

3. Need to be more clear as to the severity of the problem.

4. Need to develop a rebuilding program and how the benefits of the rebuilt stocks should be shared in order to get people to buy into the plan.

5. GWWA is looking for the re-establishment of the multi-sector process to deal with these kinds of issues.
6. Need for better coordination between GWWA and department for field work as both are sampling at the same times in the Kispiox, both for adults and juveniles.

7. A wild coho indicator stock is desirable for the upper Skeena watershed.

8. Selective harvest techniques need to be emphasized.

SMITHERS ENVIRONMENTAL/MUNICIPAL GROUPS

DATE: 14:00 March 31, 1998

LOCATION: Hudson Bay Lodge, Smithers

ATTENDEES:

SMITHERS ENVIRONMENTAL/MUNICIPALITY: Ev Person (Angler/SFAB), L. Shervill(Driftwood Foundation), Peter Wheatley(Nadina Community Futures), Al Mecracken(Nadina Comm. Futures), Kathleen Yates(Bulkley Valley Naturalists), Ken Belford(Northwest Committee BCFROA), Mike Young(Angler), Judy Stratton(Northern Ecology Action Committee), Gord Wolfe(Steelhead Society), Bob Haslett(Angler), Mike O'Neill(BCWF), Lynn Christy(Angler), Dave Bustard(Consultant), Virginia Soehl(Biologist), Joe DeGisi(Biologist), Gord Wadley(BCWF), Stephen Hidber(Business Person).

DFO: Dave Peacock(STAD), Brenda Donas(HEB), Blair Holtby(STAD), Terry Turnbull(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Les Jantz(FM), Elmer Fast(REC), Pierre Lemieux(HEB).

CHAIR: Dave Peacock

Following the introductions and presentations on stock status(Blair Holtby), habitat(Pierre Lemieux) and enhancement(Brenda Donas), the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder" and attachment for local enhancement initiatives.

Questions:

1. Has DFO looked at upper Nass coho stocks? **A**. Haven't the kind of information as we have in the Skeena but what information is available suggests the stocks are depressed.

2. Lachmach used as an indicator of Skeena stocks. Why? **A**. It's not used an an indicator of interior Skeena stocks but used for forecasting ocean survival and health of coastal north coast stocks.

3. Age data for Skeena coho, is there a trend and is it for forecasting? **A**. Use sibling relationships for forecasting.

4. Why is habitat not considered to be a major problem with coho? **A**. It's not the major problem with present coho abundance as streams in pristine condition are also void of coho. It is a concern though and in some instances may be a driving factor.

5. Is there any correlation between the loss of coho and the enhancement at Pinkut and Fulton? **A**. No. Major impacts are currently not the net fisheries directed on sockeye but are the Alaskan and northern BC troll fisheries. Increased nutrient levels have from increased number of sockeye carcuses likely have a positive influence for coho. Net fisheries do catch coho but not the biggest harvestor.

6. Why is Kispiox lumped in with lower Skeena? **A**. Juvenile densities indicate well seeded habitat. May have similar habitat conditions and productivities to lower stocks.

7. How comfortable is DFO with Moricetown mark recapture estimate? **A**. There were low levels of tag recovery which is not a surprise with coho but feel comfortable with the estimate.

8. What is the percent of kill by fishery? **A**. Sport and native small in comparison to the commercial fishery.

9. What is the current abundance compared to historical levels in the early 1900's? We tend to focus too much on recent levels. **A**. Alaskan trap information suggests abundances have declined by a significant amount since the 1920's for all species. Believed to perhaps be due to a large scale environmental alteration.

10. How many coho are caught in high seas and other fisheries? **A**. Very few, they are more coastal oriented than most other salmon species.

11. If monitoring of development is not done how do you achieve your goal of no net loss? **A**. We have guidelines prepared to do things properly but they are not being followed entirely. Monitoring is needed but not being done by Min. of Forestry and Agr.. DFO needs to participate in the monitoring and enforcement. Training and education programs might help. Enforcement actions have been increased in recent years.

12. Most of regulations only as good as the district manager. Who has ultimate authority over infractions? **A**. District manager has the final responsibility. We only have the ability to do anything when an infraction has occurred.

13. Where do you get involved in review of forestry plans? **A**. Very little now, do some strategic planning in LRMP's. We focus on roads and crossings and areas of hydrological concerns. Provide direction at higher levels.

14. Coho outplanting to Maxan area. Are you doing sampling before it occurs? **A.** Yes, we do assessments as a function of the transplanting process.

15. Will there be a final report mailed out to interested people? **A**. Not sure whether a formal document will be distributed but proceedings from all meetings

will be posted on an internet page for public consumption and hard copies will be made available upon request.

Comments:

1. Cranberry coho also down in recent years.

2. Need wild indicators in the Skeena for forecasting and productivity estimation.

3. Toboggan not an ideal indicator stream for numerous reasons but it is all we have at this time.

4. Habitat protection is more important now than ever if these stocks are to be rebuilt.

5. Jack chinook do not show the same pattern for future returns. They have been declining in recent years whereas adult abundance has been rising. Age at maturity is changing for many species under the recent environmental conditions.

6. Moricetown info. suggests coho may be earlier than DFO says.

7. Juvenile data may be misleading for the Morice and lower Bulkley as the sample sites are in prime areas. **Response**. Densities much lower now throughout upper Skeena than what they were 15 yrs ago.

8. Assessment procedures for coho have been quite variable over the years. Need to develop strategic plan for assessment.

9. Joint ventures with natives and public interest groups will be important in future assessment programs for coho with need for ongoing funding.

10. DFO developing a model to assess impacts of all users on the coho resource and what impacts future management changes will have.

11. There are many systems in northern BC that receive adequate escapement levels to maintain juvenile production. There are many upper Skeena, Area 5 and 6 streams that are not.

12. Concern that habitat alteration is not considered a major impact. **Response**. Has been significant in some areas due to CN(side channel separtion), agriculture(water removal, stream course alteration). Don’t mean to understate the importance of habitat and its protection.

13. Need to be more proactive with habitat issues instead or reactive. Response. We try to provided proactive advice on all habitat activities in the Skeena but also have to monitor the activities which limits time.

14. Have formed an upper Bulkley Roundtable group during last season to discuss problems with local people. Others groups forming as well. Process is working.

15. If there are no changes to Alaskan fisheries there is nothing we can do that is going to save Skeena coho.

16. Need to quit playing politics with respect to coho issue and Alaska. If we want to save Skeena coho then zero should be caught or let us all kill them again. Interior people have foregone coho catch for a decade now. Multi-stakeholder process will likely go nowhere.

17. We need a new way to deal with the Alaska/Canada conflict to resolve this problem.

18. Need an estimate of associated mortality for all fisheries to assess the impact of any fishing plan. **Response**. We are attempting to address that through the computor model being prepared.

TERRACE/KITIMAT ENVIRONMENTAL GROUPS & MUNICIPALITIES

DATE: 19:00, April 1, 1998

LOCATION: Terrace Inn, Terrace

ATTENDEES:

TERRACE/KITIMAT ENVIRONMENTAL & MUNICIPALITIES: Bruce Hill(Steelhead Society of BC), Louis Schillinger(Environmentalist), Don Coburn(Angler), Gary Mouland(SFAB), Murray Bromley(Charter Operator), Phillip Williams(Commercial), Rusty Doane(Commercial), Rob Adams(Angler), Chris Culp(TSES), Glenn Grieve(consultant), Jim Culp(SFAB), Greg Ross(SFAB), Brenda Ramsay(citizen), Val George(City of Terrace), Richard Wozney, Mario Feldhoff, Trafford Hall and Bob Corless(District of Kitimat)

DFO: Tom Pendray(HEB), Blair Holtby(STAD), Dennis Burnip(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Les Jantz(FM), Barry Peters(HEB), Mitch Drewes(HEB), Martin Forbes(Kitimat Hatchery), Elaine Antilla(AFS).

CHAIR: Barry Peters

Following the introductions and presentations on stock status(Blair Holtby), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. Is data collected on size of fish? Noticed smaller fish in sport fishery last year. **A**. Do collect this in various areas. Indications in different areas of small fish but not consistent everywere.

2. Exploitation rates were high for 7 years or so above the levels indicated to be sustainable. Why was it allowed? **A**. Recently rates have been lowered based on the available data. Before data wasn’t there and coho were virtually unmanaged with little assessment work being done.

3. How did you estimate the 1997 exploitation rate in the net fishery? **A**. Have estimates of harvest rates in the net fishery from 1994, 95 and 96, actually an estimate of catchability. Used cwt data prior to 1997.

4. How do we catch sockeye while avoiding coho? **A**. This is the problem at hand for nets. If there were no targetted fisheries on coho in other areas probably could maintain net fishery on sockeye and sustain the bycatch on coho.

5. Has any work been done on the food web in the waters of the Skeena where these fish live? **A**. There has been work done on this but likely not enough.

6. Why do we not fertilize streams in the north like they do in the south? **A**. The most productive stream currently studied is the Lachmach yet it is very nutrient poor. Fertilization is not required. Keogh R. is where fertilization has been done in the south.

7. Where are the reductions in fisheries going to take place? Skeena alone or all areas. What are the solutions? **A**. The most severe concerns are upper Skeena hence fisheries impacting those stocks will be the most affected, northern troll and net fisheries. Other stocks are believed to be depressed to varying degrees. Still need to be conservative in these areas. In areas where stocks are well separated from others and are healthy then actions will be less.

8. What proportion of catch taken by user? **A**. Sport 5% or less, native less than sport and commercial rest.

9. Why is Alaska increasing their catch? **A**. They manage their fishery based on total coho abundance and their coho stocks have been very productive in recent years. Also the distribution of northern BC coho stocks has been further to the north in recent years making them more accessable to Alaskan fisheries.

10. If the coho stocks increase through reductions in fisheries in the years to come what strategies will be adopted to begin harvesting those stocks when they can support it? **A**. In Washington ocean net and troll fisheries capped at 15%. Any additional harvest to occur in terminal areas where stocks are separated again restricted by a 15 percent exploitation rate. We may decide to adopt a similar approach to management for coho in BC.

11. Is there going to be more monitoring/assessment? **A**. We are not doing enough. We need more indicator stocks and studies on the biology of coho. There have been no indications of additional funding forthcoming.

12. Herring are a major food source of coho. Why do we still have herring fisheries with the severity of this problem? **A**. Coho do eat herring but not major food source which is euphasids.

13. Noticed more cutthroat trout in the Kitimat R. Do they eat coho and if so why do we continue to enhance them? **A**. They do eat coho but we don’t know full impact.

14. Seal abundance has increased. Do they pose a problem? **A**. Studies to date indicate salmon is a small part of their diet in most instances but are causing problems with fishermen and stocks which are more susceptible to predation.

15. If we target streams in the upper Skeena for immediate enhancement and begin assessment work in the spring could we get backing to do such a thing? **A**. There are some proposed projects already. Need the funding and approval from this process to go forward.

Comments:

1. Some people have problem with cwt data base.

2. Could catch sockeye more terminally in rivers or use more selective techniques where incidental species could be reduced.

3. Many gillnetters are prepared to stop fishing entirely to get coho through. Alaska still the major problem.

4. Most of the exploitation on upper Skeena coho is in the troll fisheries in Alaska and northern BC.

5. Alaskans refuse to do anything to aid with this problem.

6. Copper river has a summer run of coho which have declined over the last 3 decades.

7. Alaska is not the sole cause of problem but need to be a part of the solution. May require a decade or more to rebuild these stocks.

8. All of the fishing groups have been a part of the problem to varying degrees and will all have to participate in the rebuilding process.

9. There appears to be a need for reduction in fisheries(all sectors) to address conservation. Alaska takes 60 percent hence without them helping we may still not be able to rebuild these stocks.

10. Move the opening date on Skeena for coho retention in the Skeena River non-tidal sport fishery to Sept. 15th.

11. Commercial fleet will just move to another area which will cause problems there.

12. Need more emphasis on the biology and less on the politics.

13. Seals in the Kitimat estuary are becoming more of a problem with steelhead and other species.

14. Pollution in Kitimat estuary is increasing and needs to be addressed as it is a major rearing area for juveniles.

15. Habitat problems are more than just isolated instances and it's not getting better. Need to be careful about how we refer to habitat and impacts on fish stocks. Have to acknowledge that enormous habitat damage has been done in the past.

16. Need to work better together - DFO/Province/communities.

17. Selective fishing paper out and needs to be looked at to harvest salmon in future.

18. Need to get more coho up the river and keep what little habitat we have left in good condition.

19. No monitoring of restoration work being done. **Response**. There is some auditing being done but nowhere near enough actual monitoring of the impacts the restoration is having.

20. You are not going to enhance your way out of this problem and Steelhead Society of BC does not support futher enhancement. Current enhancement is not being done properly and needs to be cleaned up.

21. Enhancement in the form of habitat improvement instead of hatcheries might be an approach to take.

22. Skeena Watershed Committee type forum needs to be reinstituted.

GITANYOW FIRST NATIONS

DATE: 13:00 April 1, 1998

LOCATION: Terrace Inn, Terrace

ATTENDEES:

GITANYOW FIRST NATIONS: Harry Daniels, Greg Rush, Valbert Williams.

DFO: Tom Pendray(HEB), Blair Holtby(STAD), Dennis Burnip(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Gary Cardinal(AFS), Les Jantz(FM), Barry Peters(HEB), Scott Trent(C&P).

CHAIR: Jim Steward

Following the introductions and presentations on stock status(Blair Holtby), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. Would it not benefit Canadian stocks by having the Alaskan troll fleet moving to inside areas? **A**. Yes, but likley not to happen.

2. Has there been any corelation with seal abundance? **A**. Not sure but likely not a big issue with Skeena stocks.

3. Is there a difference in rearing patterns between coastal and interior stocks? **A**. No.

4. How do we know systems are not adequately seeded? **A**. Based of juvenile density studies conducted in summer.

5. Do we have winter rearing studies? **A**. Not much work done in winter in previous years. May be a bottleneck.

6. Are the Gitanyow expecting to operate a fence this year? **A**. Yes if funding there.

7. Outplanting programs and beaver dams, should we be using them instead of destroying them? **A**. Prefer to just leave fish alone, they seem to be able to do fine on their own. Enhancement hasn’t proven to be very successful to date in the Skeena from the science view.

Comments:

1. Maximum percent of Canadian coho in Alaskan fishery is 20%. Average about 10%.

2. Skeena coho found in Alaskan fishing areas throughout all fishing areas.

3. Meziadin escapement and sport catches down significantly this past year.

4. Marine survival had a big role in the 1997 returns but overfishing still remains biggest problem for upper Skeena stocks.

5. WCVI coho stocks rebounded quickly from low levels in 1994.

6. Stream surveys on Kitwanga recently show more males than females. **Response**. Some have more males than females and others have the opposite. Relates to mating behavior. Females reproductive success relates to number of eggs laid which is a function of fish size. Hence females tend to feed more to grow larger to produce more eggs. Males can successfully mate at all sizes hence don't need to feed as much. If ocean feeding conditions are poor males may return as jacks instead of remaining at sea for one more year. Tend to get higher percent males in years of low productivity.

7. At low population levels you often see more jack coho.

8. During fry salvage operations in Kitwanga find 80 percent of fish are coho.

9. Beaver problems have affected systems above Kitwancool Lake. Coho can’t enter many streams now. Logging activities and removal of beaver predators(wolves) have compounded problem.

10. Expansion of logging and development in 1960’s and 70’s may also be a factor in the decline in upper Skeena coho during that time period.

11. Water temperatures due to riparian removal and water removal has reduced rearing habitat in some systems like the upper Bulkley.

12. Transportation conduit along Skeena has destroyed large portions of the rearing habitat, isolating side channels, culverts blocking access, etc.

13. Need more wild indicator streams in north and central coast.

14. Milfoil problem in Kitwanga Lake. Water temperature much warmer this past year.

15. Kitwancool Creek has erosion problem from a bank failure.

16. Beaver harvest low due to low price right now. Need some incentive to harvest more.

17. Logging activity increasing and may be silting problem in future.

18. Incubation boxes may work well in the Kitwanga system.

19. Need to develop manual for juvenile sampling for use by native or local groups to help out with overall juvenile program.

20. Good fence site has been identified on the lower Kitwanga for assessment. may be other options available such as partial weir, fishwheel etc.

21. Mark/recapture approach may be a suitable approach to estimate coho population.

22. Concern was expressed about the growing sport fishery at the mouth of the Kitwanga River and the number of coho caught and killed.

HAISLA FIRST NATIONS

DATE: 08:30 April 2, 1998

LOCATION: Kitimaat Band Office, Kitimat

ATTENDEES:

HAISLA FIRST NATIONS: Harvey Grant, Russell Ross, Kevin Dobbin, Morris Amos, Louise Barbetti, Mark Bowler, Pat Metz, Kelly Williams, David Show, Renzo Furkinetto.

DFO: Tom Pendray(HEB), Blair Holtby(STAD), Dennis Burnip(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Elaine Antilla(AFS), Les Jantz(FM), Barry Peters(HEB), Mitch Drewes(HEB).

CHAIR: Renzo Furkinetto/Barry Peters

Following the introductions and presentations on stock status(Blair Holtby), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. Is there any relation with the stock being so low and Hennegia(external parasite)? **A**. Not aware of high incidence in local stocks. Seems to be more prevelent in Kitimat stocks. Sea lice can be a problem as well.

2. Decline in Babine area. Is Granisle mine seapage a possible reason for problem with Babine fish? **A.** We are aware of the leakage problems but Province has done little to fix problem. We do not know if this is a part of the decline.

3. Mandatory release. Does it work? **A**. Studies on hook and release mortality show roughly a 15 percent mortality is hook and line fisheries but does vary.

4. What happened to the Kitimat portion of the Greenplan funding? **A**. Fence on Kildala was being explored but is now on hold. Some work on Kitimat side channels.

5. How many active fisheries act violations are there now in the Kitimat estuary? **A**. Six at present.

6. What does habitat think of log booming? **A**. The information we have suggests impacts are quite localized and likely not a major problem.

7. Are we looking at new proposed log dumping sites(Eagle Bay)? **A**. Yes.

8. Are there any wild coho left in the Kitimat River? **A**. Yes.

9. Are runs with fewer fish a more serious problem as far as predators are concerned? **A**. Varies from stock to stock but could be major problem.

10. What is going on in the high seas? **A**. Not a problem for coho.

11. Ozone depletion. What is it doing to plankton abundance?

12. Is there any indication in recent juvenile studies that in areas where no juveniles were found that there were in fact juveniles in past years? **A**. Not specific studies in previous years but were a lot of adults in those systems in previous years.

13. Is there some sense of wild coho to the Kitimat? **A.** Yes there are some streams that haven't been touched by enhancement with adults coming back.

14. Where are coho being enhanced and who decides which stocks should be worked on?

15. Is there going to be consideration for coho closures? Who is going to decide what the closures are going to be and which users it will impact? **A**. This process is be conducted to allow everyone to provide inut to answer those very questions.

16. Why not increase coho production from Kitimat hatchery by three or four times its current production? **A**. Likely have some impact on wild Kitimat fish and other stocks depending upon how they are harvested.

17. Zero mortality is this for all groups? **A**. If minister opts for zero mortality option, then no one goes fishing.

18. How do you determine rod days and considerations for aboriginal rights and first access to fish stocks? **A**. It is a process that is coordinated by the provincial government with input from the federal government.

Comments:

1. Concerned about lack of information on coho stock status in Haisla territory. That information is required for Haisla to develop recommendations. Concerned that DFO continues to focus only on Nass and Skeena stocks and ignore others. Haisla concerned about mixed stock fisheries in Laredo and impacts on local Haisla stocks.

2. Concern expressed about Federal/Provincial lack of cooperation in habitat management and protection. DFO should use their federal clout to deal with issues that Province is not addressing. Need to incorporate first nations into the process with the federal and provincial agencies.

3. In gillnet fisheries mortalities are higher than other fisheries and released fish have the likelihood of being recaptured in other nets.

4. Minette Bay and log booms. Study proposed and needs to happen. **Response**. Has been lots of work done in past relating to log booming but more in relation to larger operations than in Minette Bay. Indicate minimal impacts from those studies but impacts are site specific. Work has just begun in this area.

5. Kitlope River and lake system might be a good indicator for wild coho stocks in a pristine habitat.

6. Coho enumeration has changed with budget cuts. We don't look in the fall anymore. Could be a cooperative opportunity with the Haisla.

7. Good work being done in Pine Creek by local people, not DFO.

8. Warmer ocean waters causing problems for salmon.

9. Summit in Rio Digenaro, Canada signed an agreement that it doesn't seem to be living up to.

10. Need to develop a change in attitude towards coho and the problem at hand.

11. Needs to be better training program for employees.

12. Want a map of where coho are being enhanced in the Kitimat area.

13. Concerned about the Dala and Kildala River and who had authority for licensing guide outfitter from Alberta for fishing coho in those systems. **Response**. Provincial matter. They issue the licenses.

14. Concerned about warmer water temperatures and mackerel in Douglas Channel. Should start up fishery on mackerel. **Response**. Fishery has been established and is expanding.

15. Concern about provincial jurisdiction over the guiding policies with respect to salmon.

16. Haisla traditional law is that they do not play with animals. Opposed to catch and release(Nuyen). Should be stopped in Haisla territory.

17. Haisla position do not dispute there is a problem. Take a reasonable approach to management.

PRINCE RUPERT ENVIRONMENTAL/MUNICIPAL GROUPS

DATE: 08:30, April 3, 1998

LOCATION: Crest Hotel, Prince Rupert

ATTENDEES:

PRINCE RUPERT ENVIRONMENTAL/MUNICIPAL: Bryce Barnewall(SQCRD), Jennifer Nelson(Lodge Owner), Ken Franzen Jr.(BCWF), Ken Franzen Sr.(SFAB), Ed Wampler(SQCRD & Mayor Pt. Ed), Ed Woode(Village of Masset), Jan Lemon(Oona River SEP), Bart Proctor(Oona River), Doug Paterson(SFAB), Barry Drees(Pr. Rup. Salmon Enhancement Society), Bill Simard(SFAB), Jim Hellman(SFAB), Bernie Egan(SFAB-CSCBA), Des Nobels(T. Buck Suzuki Society), Mike Wallden(Charter boat).

DFO: Barry Peters(HEB), Blair Holtby(STAD), John Inkpen(C&P), Seigi Kriegl(C&P), Elaine Antilla(AFS), Les Jantz(FM), Tom Pendray(HEB), Elmer Fast(REC).

CHAIR: Barry Peters

Following the introductions and presentations on stock status(Blair Holtby), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. What percent of smolts are cwt in Lachmach? **A**. Up to last three years almost all were tagged. In last three years roughly 20 percent.

2. Any information for Aboriginal fisheries in Skeena and what they catch? **A**. relatively low coho catches.

3. How do you go about getting another indicator stock and what additional stocks assessment needs to be done? **A**. An indicator stock requires the ability to tag smolts as they leave the system and be capable of accurately counting adults(fence) and determining component that is marked and unmarked.

4. Do you think Lachmach is a good indicator of northern coho stocks? **A**. No. It is a good indicator for coastal Area 3/4 stocks but may be quite different than other northern BC coastal and certainly interior stocks. Oona River might be a good candidate as well as Thorston Creek in Bella Coola for central coast stocks.

5. What exploitation rates are being recommended, in particular for the sport sector? **A**. Stock Assessement recommendation is that no mortality for upper

Skeena stocks should occur in 1998. Anything above that level increases the risk that these stocks may be lost.

6. Is 50 fish being killed an accepatable risk? **A**. It is a risk and some of these stocks are so low that 50 might be a problem. Even if there is no fishing mortality it is likely that some upper Skeena stocks will not attain minimum escapement requirements.

7. Do you know that the early run is upper Skeena and later run coastal? **A**. Info. to date suggests that upper Skeena stocks are present in coastal commercial fisheries from the opening of fisheries in late June through September. Peak of abundance in Area 4 is in early August.

8. If you have zero mortality for commercial and sport how long would it take to rebuild those stocks? **A**. It's not a short term problem. May take two or three cycles. With Alaska taking such a large proportion and fisheries likely to continue, will take longer. When rebuilt need to take new approach to fisheries management perhaps similar to Oregon, restrict marine exploitation rate to 15 percent. Terminal exploitations where stocks are separated will be restricted to 15 percent. Beginning at zero exploitation and as stocks rebuild have clockwork system which allows harvest initially for native groups followed by terminal fisheries, followed by marine fisheries with a total exploitation rate capped at 30 percent.

9. Is it recommended that the Skeena test fishery be shut down? **A**. No, it is required for assessment purposes.

10. Lachmach slide is it going to be a problem? **A**. Likely a small influence on production from one tributary of the Lachmach.

11. Seal problem. Is it going to be addressed? **A**. Problem has been brought up a lot, but likely a small part of the problem with a few exceptions.

12. What is the effect of increase in ultraviolet rays and drop in ph levels and what is been done to address decline in herring stocks in some localized areas? **A**. Ultraviolet light increases have detrimental affects on stream plankton but don't know total impacts. pH levels in rain is acidic but don't know if levels recently are any different than normal. Impacts on salmon are likley low. Decline in herring and smelt stocks may not be happening. They tend to move on a fairly regular basis but large changes should be a concern.

13. Is there a corridor that could be closed that would allow for fishing on other stocks than upper Skeena coho? **A**. Possibly but it looks as though they are present in all waters west of Work channel.

14. Any significant changes to Lakelse Lake or Babine Lake which would result in poorer survivals? **A**. Nothing that is obvious.

15. Is there any obligation for pulp mill to maintain water levels in Kloiya River? **A**. Yes, but not sure what their flow requirements are. Intake screens are also a concern for the department.

16. Is in possible to trap juveniles in upper Skeena and seed beaver ponds? **A**. Densities so low it would be very difficult and expensive.

17. How many populations of upper Skeena coho are there? **A**. 50 or so of which most are endangered.

18. Are you able to estimate what optimal production from these stocks? **A**. Yes.

19. Is there a target for what level of rebuilding is desired? **A**. No concensus at this time but this process is working toward that end.

20. Definition of ICK and is it common to all fish? **A**. ICK is a small external parasite which causes problems with hemerraging on the gills. Population explodes in higher temperatures and perhaps stress. Affects all salmon species. Another parasite (Loma) along with ICK may be affecting fry survival as well.

21. Why are Alaskans not accepting our ascertion of the problem? **A**. There is nothing in it for them. Their stocks are healthy coastal type coho.

Comments:

1. It is ironic that no CWT Lachmach coho were recovered in 1997 sport fishery. **Response**. May be due to low sampling rates.

2. Need for a timely decision on this matter. Bookings are being made and we need to know soon.

3. Every fifth coho caught in the Skeena last year had seal bite marks on them. **Response**. Document what you see and send to mammal coordinator in Nanaimo.

4. Have recently seen large krill kills. **Response**. Krill is the major food source of adult coho and decline in krill abundance in southern areas has been a major concern with the decline in southern coho stocks. The life cycle of krill often has a large winter dieoff.

5. Hearing a lot of assumptions and uncertainties about what would result from different actions being suggested. Economic impacts are substantial to different sectors and could be devastating to the sport and commercial sectors. Further investigation of all factors discussed today should occur before serious actions are taken. Should make it manadatory for sport fishermen to record and turn in licenses annually. Need better catch information. **Response**. Not ignorant of impacts on northern communities. We are not panicing or blaming anyone in

particular. The department has not responded soon enough to prevent problem from getting to the extreme levels they are at now.

6. Limited entry for sport fishery may be an option in future.

7. Assessment levels need to be increased and help from volunteers could help.

8. Concerned about amount of limits on salmon. No annual limit for coho. Should be a cap. Monitoring of the sport fishery is totally inadequate. **Response.** Enforcement does occur throughout northern area and the sport fishery is monitored regularly but can't be everywere all the time.

9. Pulp mill and Ridley Island terminal pollution is becoming a real concern.

10. pH levels are already lower in some Skeena tributaries than what the literature suggests is suitable for fih habitat. **Response**. Many systems have naturally lower pH levels which individual salmon stocks have adapted to.

11. Happy to put money into a fund to deal with issue. Like for like. In favour of local community involvement in fish management process.

12. Even without fishing there will be some stocks that disappear over time.

13. Important to set an example in a sacrificial way. We are too often concentrating on what we can get for ourselves. We need some serious hardships to get the message through to the Alaskans. We have to get the message across.

TSIMSHIAN TRIBAL COUNCIL

DATE: 13:00, April 3, 1998

LOCATION: Tsimshian Tribal Council Boardroom, Prince Rupert

ATTENDEES:

TSIMSHIAN TRIBAL COUNCIL: Heber Clifton, Doug Brown, James Nelson, Steve Roberts, Ric Miller, Stephen Riley, Clyde Smith, Larry Golden.

DFO: Barry Peters(HEB), Blair Holtby(STAD), Jim Steward(FM), Seigi Kriegl(C&P), Elaine Antilla(AFS), Les Jantz(FM), Tom Pendray(HEB), Elmer Fast (REC).

CHAIR: Barry Peters

Following the introductions and presentations on stock status(Blair Holtby), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. How many coho are caught in the local sport fishery? **A**. In Areas 3, 4 and 5 the catch ranges from 5 to 15,000 of which it is comprised of stocks going throughout the northern and central BC areas.

2. How do we know who is catching these fish? **A**. Through the cwt program for indicator stocks - Lachmach/Toboggan/Fort Babine.

3. When are the upper Skeena stocks present in the commercial fishery? **A**. They are present throughout the fishing season from late June through September with the peak in early August.

4. Is there a correlation between decline in survival in the north and ocean food sources? **A**. Don’t know in the north but in the south abundance of euphosids has declined which is the major food source of coho. El Nino has changed ocean circulation affecting things like upwelling which is important for plankton production.

5. What do we know about genetic differences in coho? **A**. All are tightly related for Skeena coho. There has not been a single population that is entirely unique in the Skeena identified yet.

6. How far out into the ocean do coho go? **A**. Not as far as most salmon species. they tend to remain in inshore areas.

7. How long have we had this problem? **A**. First time management was alerted to this problem in mid-1980's through the PSARC process. Coho began to be managed in the late 1980's.

8. What about the bluebox program and coho? **A**. Compliance has been a problem but of those fish that get to the vessel alive they could be useful in reviving fish and returning them to the water alive.

9. What are we going to do from here? Is there a plan? **A**. Stocks are at high risk and any fishing is a risk. Range of possibilities from no fishing to fine scale management with minimal harvests for some fishermen. Will be determined through this consultation process and what the people have to say. Minister will make a decision on what information is provided to him at end of this process.

10. What portion of farm fish are coho? **A**. Not sure but believed to be small in Canada. Chile produces lots though.

11. Jet boats, what damage do they have on spawning grounds? **A**. Don't know.

12. What is meant by selective harvesting? **A**. There are varying degrees of selective harvesting. Fishwheels, traps, seines and alterations to gillnets and troll gear.

13. Are there any applications in for fish traps? **A**. Yes there are two specific to fish traps proposals and several other proposals using different techniques. DFO policy regarding selective fishing proposals is currently being developed.

14. are there any plans for expanded monitoring? **A**. Through AFS or other programs we are hoping for help to increase the information on coho stocks throughout the north.

15. Spoke about restriction in 1998, how severe will it be? A. This process is to address that very question. We want to know what level of risk is acceptable.

Comments:

1. Commercial net fisheries in Area 4 have been significantly reduced to the point where in 1997 there was not even one gillnet opening in August.

2. Since the mid-1970's we(Canada and Alaska) have been collectively overfishing the upper Skeena coho stocks which are much less productive than coastal stocks.

3. Look at trends in sport and commercial exploitation rates over the years.

4. Concern about impacts of catch and release of coho and what it does to the spawning of fish that have been caught several times.

5. We agree that something has to be done about this problem. Seals are becoming a bigger player now that stocks are down.

6. We need to broaden our scope to deal with the coho problem.

7. Common sense has to prevail.

8. Habitat has been altered due to logging activities with huge changes to the riparian vegetation and increase in beaver populations creating access problems for both adults and juveniles.

9. Beavers have taken away huge portions of spawning habitat in some systems like the Kitsumkalum.

10. We are in a crisis this season similar to the East coast. There should be compensation similar to the East coast situation for those who will be impacted by the decisions for the 1998 season.

11. North Coast fishermen are already in dire straits as a result of the "Mifflin Plan".

NORTH COAST ADVISORY BOARD

DATE: 08:30, April 6, 1998

LOCATION: Coast Prince Rupert Hotel, Prince Rupert

ATTENDEES:

NORTH COAST ADVISORY BOARD: Rick Haugan(Sn-NCAB), Peter Haugan(Gn-NCAB), Greg Taylor(Northern Processors Assoc.-NCAB), John Murray(Gn-NCAB), Kevin Smith(Sn-QCIAB), Sverre Haukness(Troll-NCAB), Bill Harrower(MAFF), Des Nobles(Gn-NCAB), Heber Clifton(Gn-NCAB), Brian Reader(GWAII HAANAS N.P.R.), Ken Wilson(Gn-NCAB), Percy Williams(Gn/Tr-QCIAB), Paul Pearson(Haida Fisheries), Kim Olsen(Gn-NCAB), Gerry O'Connor(NPA), Joy Thorkelson(UFAWU), Richard Morgan(Gitksan), Taka Nakatsuka(UFAWU), Gord Wadley(BCWF), Bill Forbes(Sn-NCAB), Marty Hall(Haisla), Russ Jones(Haida Fisheries).

DFO: Dave Peacock(STAD), Barry Peters(HEB), John Inkpen(C&P), Jim Steward(FM), Seigi Kriegl(C&P), Randy Barnhart(AFS), Les Jantz(FM), Dave Einarson(FM), Tom Pendray(HEB), Wayne Saito(FM), Victor Fradette(FM), Brian Spilsted(STAD), Dave Rekdal(FM), Denise Zinn(FM), Steve Cox-Rogers(STAD),Ken Bedard(AFS), Dan Wagner(FM).

CHAIR: David Einarson

Following the presentations on stock status(Dave Peacock), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. What is a proportion of maximum count? **A**. It is a method to account for the trend in reduced escapement observations in recent years.

2. What is the exploitation rate in the sport fishery? **A**. 1994 to 96 ocean exploitation rate was two percent in the sport fishery from creel surveys. Skeena model being reconfigured to estimate exploitation rates for commercial, sport and native fisheries directed on Skeena and Nass stocks.

3. In 1997 what was the estimated coho catch in the sport fishery in Areas 3 and 4? **A**. No estimate generated for 1997. The model will attempt to estimate coho catch when monitoring is not being done in future years.

4. What time of year do Upper Skeena stocks pass through the fishing area? **A**. Present in Areas 1 and 3 from late June through August, tapering off in

September but still present. Aren't found in Area 4 in larger numbers prior to late July.

5. Babine recovery, could enhancement help to get depressed stocks up quicky? **A**. Could be but there are indications from work currently being done that are not very positive as far as past enhancement in the Skeena is concerned.

6. If there were to be twice as many coho or more than being predicted for 1998 would you achieve desired escapements? **A**. For Upper Skeena stocks likely wouldn't even be close even with the highest survival rates ever.

7. What happens if Alaska stays at 40 percent exploitation rate and we continue to fish and ocean survival remains average? **A**. The Upper Skeena stocks will all continue to decline. There is concern that survival rates will be below average again in 1998.

8. If survivals remain low what will be the outcome? **A**. The upper stocks would become extinct over time.

9. Do carcasses help? **A**. Addition of nutrients from carcasses is important for food production.

10. What about competition with other species in the rearing areas? **A**. Tend to utilize different portions of the streams for rearing than other species with some overlap.

11. Beavers and impacts. What has changed from historical times? **A**. Logging has increased beaver populations considerably.

12. Why are we going to do anything if Alaska isn't going to reduce their exploitation rate?

13. Can we focus enhancement on one system and do an extensive study to see what best approach to enhancement is? **A**. Might be an option.

14. Are we going to be compensated for the reduced fishing time likely to occur in 1998?

Comments:

1. Just because last years return was so poor it does not mean there will be a poor return this year.

2. Sport fishery not being adequately sampled to get CWT recoveries. Don't believe the catch numbers generated for the sport sector.

3. Comment from local head depot that heads collected last year have not been picked up yet by DFO from his store.

4. Mifflin plan has resulted in larger fleet sizes in late July and August which has increased coho problem.

5. Saw lots of juveniles(more than ever before) last year in Dixon Entrance which as a fisherman means there will be a good return of adults next year. Doesn't agree with Lachmach smolt data in 1997.

6. It will likley take two or more cycles to rebuild upper Skeena stocks.

7. South Coast coho problem as bad or worse than northen stocks.

8. Province responsible for managing habitat with respect to both fish and wildlife. A new ministry is being created to deal with this but is not completed at this time. It is unclear as to representation with advisory processes as well.

9. Comment about impacts of alder growing back in logged watersheds as opposed to those that have been reforested with conifers.

10. Upper Bulkley has been mugged by mans activities.

11. There are several things that need to be adressed. Water quality, increasing productivity by improving rearing conditions, etc.

12. Doesn't make sense to put more adults up if they aren't producing juveniles due to habitat problems.

13. Water flows are down considerably in summer which is a bottleneck period for rearing.

14. Side channels in lower Skeena have been reduced lessening amount of rearing areas.

15. No data on invertebrates and there is an increase of fine sediments in logged systems.

16. Rebuilding cannot be restricted solely to reduced fishing. Habitat also needs to be seriously considered. Need a plan to be developed. **Response**. There are a number of initiatives underway to deal with many of the concerns. Water quality, beaver control, water removal for agriculture, access problems from culverts and restoration of riparian areas. Need to work more with the Province to deal with habitat utilization and management.

17. Reason upper Skeena stocks are less productive because of increased stress from catch and release in the sport fishery. Want sport fishery shut down whenever the net fishery is closed.

18. Predators are a problem as well. Dolly varden, steelhead, trout, mergansers and seal populations have increased significantly in the last two decades.

19. Lots of beaver dams in central coast preventing access to the streams.

20. To date hatchery smolt releases in Upper Skeena systems have had much poorer survivals than wild smolts. Fry releases might be a better option.

21. Should be looking at Alaska style hatchery production for future harvest opportunities instead of coho enhancement in the upper Skeena which likely won't result in additional commercial fishing.

22. Coho and chinook are not money makers in Alaskan enhancement.

23. If central coast areas get up to step as far as salmon production goes, further reductions in fleet size will result in huge wastage in the form of overescapement.

24. Have not got a lot of choice. Need to enhance coho in a big way to allow for the sockeye harvest to continue.

25. In 1997 the Canadian fishing pattern resulted in a Canadian exploitation rate less than the 57% that Upper Skeena stocks can withstand. With average survival rates should be able to maintain stocks.

Coho Discussions at the Regular Meeting of the SFAB Bella Coola Local Committee

DATE: 17:00, April 6, 1998

GROUP: Bella Coola Sub-committee of the Sport Fish Advisory Board

LOCATION: Cedar Inn, Bella Coola, B.C.

CO-CHAIRMEN: Rob Stewart(Advisor) and Lyle Enderud (DFO)

ADVISORS: John Mansell, Ken Corbould, Ray Glebe, Jim Knudsen, Al Purkiss, Darwin Unrau, Harvey Thommansen and David Hall

DFO: Sandie MacLaurin, Russ Hilland, Henri Ragetli

MOELP: Jack Leggett, Mike Ramsay, Barry Farynuk

MIN. OF FISHERIES: Ron Ptolemy

BC PARKS: Pat Singer

GUESTS: W.R. Tallio (Nuxalk), Nelson Tallio (Nuxalk), Marshal Hans Jr (Nuxalk, DFO), Harvey Mack (Nuxalk), Wally Webber(Nuxalk), Chief Archie Pootlass (Nuxalk), Blair Mack (Nuxalk, DFO), Donald Mikkelson (Rod and Gun), Lawerence Michaelchuck (Rod and Gun, DFO), Greg Radstaak (LGL contractor)

Coho Discussions:

Coho was one of the topics of discussion at this regular meeting. Lyle Enderud and Sandie MacLaurin gave a summary of the stock status, habitat projects and past management actions. The group focused on the status of Coho in the Bella Coola River and after much discussion arrived at the following consensus:

There has been inadequate Coho Stock Assessment conducted in the Central Coast as is evident in the Coho Background document provided to the group by DFO. DFO must rectify this situation and put in place a program to adequately assess the status of Coho stocks on the Central Coast.

Coho Code Wire Tagging must continue in the Bella Coola River with the funding coming from DFO.

The consensus of the group is that if inseason indicators suggest that the Coho return to the Bella Coola and Atnarko Rivers is poor, as was experienced in 1996, retention of Coho should be prohibited. There was a difference of opinion between advisors whether a catch and release fishery should be permitted or if the river should be closed to all Coho fishing. This issue was not resolved. It was

agreed that Coho Catches in outside fisheries as well as the Lower Bella Coola River Aboriginal Fishery will be used as indicators. If inseason Coho conservation measures are required in the Bella Coola and Atnarko Rivers, as much notice as possible should be given to the angling community (It was pointed out that this may only be a matter of weeks).

COHO DISCUSSIONS AT THE REGULAR MEETING OF THE SMITHERS LOCAL ADVISORY COMMITTEE OF THE SPORT FISH ADVISORY BOARD (SFAB)
Date: April 6, 1998 - 1700 Hours

Group: Smithers Local Advisory Committee (Sfab)
Location: Alpenhorn Inn - Smithers, B.C.
Chairman: Mr. Ev Person - Smithers, B.C.
Advisors: Ev Person - Independent Angler
Gordon Wolfe - Steelhead Society
Mike O'neil - Bcwf
Ken Driedger - Independent Angler
George Schultz - Independent Angler
Mike Young - Tackle Shop (Business)
Pierce Clegg - Angling Guide
Keith Douglas - Angling Guide
Steve Hidber - Tackle Shop (Business)
Mary Lou Burleigh - Steelhead Society
DFO: Elmer Fast - Rec Fish Division
Peter Woloshyn - C & P
Brenda Donas - Heb
MOELP: Bob Hooton - Head - Fisheries Section

COHO DISCUSSION:
Coho was one of the topics of discussion at this regular meeting. Elmer Fast provided an update with respect to stock status of skeena river coho and management actions to date. A review of some of the key points in the coho overview paper prepared by dr. Blair Holtby was undertaken. The group focused on the status of coho in the skeena river and after much discussion arrived at the following consensus:

1. That upper Skeena River coho were in a clearly depressed situation and significant fishery management actions were deemed necessary to rebuild this stock.
2. That a plan of action be implemented in 1998 to adequately address the need to dramatically improve escapement of coho to upper Skeena River watershed streams.
3. That existing data relating to run timing of the upper river coho stocks needs to be reviewed to insure that management actions designed to protect these stocks are implemented at the correct time periods in the various fisheries.
4. That if some mortality of coho was going to be approved in the development of fishing plans for the 1998 season, then some mortality of coho in the recreational fishery in the upper Skeena River system should be approved.

NORTHERN TROLLERS ASSOCIATION

DATE: 08:30, April 7, 1998

LOCATION: Coast Prince Rupert Hotel, Prince Rupert

ATTENDEES:

NORTHERN TROLLERS ASSOCIATION: Gerry O'Connor(Northern Processors Association), Sverre Haukness(NTA), Dave Prosser(NTA), Will Soltau(NTA).

DFO: Dave Peacock(STAD), Barry Peters(HEB), John Inkpen(C&P), Seigi Kriegl(C&P), Les Jantz(FM), Dave Einarson(FM), Tom Pendray(HEB), Wayne Saito(FM), Dave Rekdal(FM), Victor Fradette(FM), Brian Spilsted(STAD).

CHAIR: Dave Einarson

Following the introductions and presentations on stock status(Dave Peacock), habitat(Tom Pendray) and enhancement(Barry Peters) the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. Was logging or habitat alteration a possible cause for decline in Babine stocks? **A**. Doesn't appear to be the main problem as other Upper Skeena stocks where no logging or other activities have occurred show the same pattern of decline as the Babine and Upper Bulkley.

2. Where are Skeena coho caught in Alaska? **A**. They are distributed throughout the fishing areas in southern Alaska from June through September.

3. Are Alaskan coho stocks in trouble as well? **A**. Not that we can tell. They are all coastal types like the Lachmach stock.

4. Can we significantly improve the health of some of the streams that need help? **A**. The Upper Bulkley can be improved through riparian work and other systems can be improved through restoration programs.

5. Is it possible the problem is due mainly to ocean survival? **A**. Not likely. The ocean survival of coastal vs interior stocks is quite similar. Evidence suggests that the combined Canadian and Alaskan exploitation rate is too high for the productivity of interior stocks.

6. Has flooding in recent years been a problem? **A**. It is a factor in some systems but to what degree is uncertain.

7. Is there an increase in funding to deal with this coho crisis? **A**. Not yet.

8. Is it true that local stream clearing proposals have been turned down by watershed restoration? **A**. There have been some programs that have been refused however many have been funded. It depends on the particular situation.

9. What are we going to do if coho show up in great abundance? **A**. Could design pulse fisheries to give an indication of coho abundance or use Alaskan CPUE data to estimate overall coho returns.

10. Will funding be available to monitor the troll fleet in the event it may be used as an indicator of coho abundance? **A**. Funding proposals have been submitted but no response yet.

11. What does the monitoring proposal look like? **A**. Similar to the WCVI program. Relationship between pinks in the ABline strip and coho encounters. Should include chinook catch estimation for inseason management.

12. How does the proposed fishery for chinook in 1998 in 2W impact southern chinook stocks? **A**. Uncertain but likely not a significant increase in the impacts on southern stocks as they are also caught in other north coast areas.

Comments:

1. The Babine coho rebuilt quickly following the slide but since the early 1970's the decline has been dramatic. The Alaskans didn't fish coho to the same degree then as they do now.

2. With the warm water events in recent years there has been declining survival rates with coho due possibly to a combination of increase in predation and reduction in food(Euphasids).

3. Canadian exploitation has been decreasing in recent years while Alaska has been increasing pushing the interior stocks past the level of acceptable exploitation rate.

4. If Canada cannot rebuild these stocks without the help of Alaska and the belief that they will not alter past practices enhancement needs to be looked at to help with this situation.

5. Fry outplanting may be the better option for coho enhancement as smolt surivals from previous enhancement has not been very successful. In the past there were concerns about fry releases due to competition with other stocks or species but due to low juvenile abundances in many systems this concern may no longer be there.

6. We have been continually reducing our harvest rate yet no increases have occurred in enhancement. **Response**. There are too many stocks to effectively

enhance all of them and with past enhancement performance it is questionable as to whether that would be a wise course to take.

7. Transplanting should be done in streams where there are no stocks present. **Response**. There is a huge amount of evidence that transplants are not that successful. In some instances it has worked but that is not the norm.

8. The sport fishery is the only sector which has grown in the last decade and coho is one of their main target species. **Response**. The sport sector is currently estimated to have an exploitation rate of roughly two percent. The sport sector is being told that they will be a part of the solution as well.

9. There are plans for more sport lodges to move north due to coho concerns in the south coast.

10. Troll exploitation rates in 1997 were 21 percent on Babine, 7 for Toboggan and 2-3 for Lachmach.

11. Problem with closing central coast to trolling in 1998 if stocks are not a serious conservation concern as the sport sector will move in an take the fish we don't harvest. In essence a reallocation from commercial to sport. **Response**. There are concerns for some central coast stocks but the information is not available to determine the severity of the problem.

12. Could use the Tree Point cpue information as an inseason indicator of north coast coho abundance to use as a trigger for allowing relaxation of coho restrictions in some north coast trolling areas. Need to develop a fishing plan that responds to these indicators but would still not impact upper Skeena stocks.

13. If reallocations do occur from the commerical sector to the sport sector than fair compensation must occur.

14. If there are to be additional meetings on this issue there must be funding for travel and accomodations as costs are causing a problem with participation in this process.

NISG'A FIRST NATION

DATE: April 7, 1998

ATTENDEES:

DFO - Blair Holtby, Carol Cross, Melody Farrell, Gloria Point

Nisg'a - Haary Nyce, Carl English (LGL)

SUMMARY:

Presentations were made on stock status, habitat and enhancement issues.

Major comments were that this was not a complete North Coast presentation as it did not include any Nass material, the third largest river in B.C. There are also Nass tribs that were showing declining coho returns but it was suggessted that these declines may not be as dramatic as those of the Upper Skeena. Concerned that with greater fishing restriction in the Skeena there may be transfer of effort to Nass; so greater enforcement will be required. Concerned that if there is to be any proposed compensation or financial incentives for conservation of riparian zones on private land that this also be applicable to First Nation's land. Noted that this plan should include assessment, habitat, and enhancement strategies for whole north coast, not just Skeena.

COHO DISCUSSIONS AT THE REGULAR MEETING OF THE QUEEN CHARLOTTE ISLANDS LOCAL SPORTFISH ADVISORY COMMITTEE (SFAB)
Date: April 8, 1998 - 1900 Hrs.

Group: QCI Local Sportfish Advisory Committee Of The Sport Fishing Advisory Board
Location: DFO Boardroom - Queen Charlotte City, B.C.
Chairman: Mr. Alex Ross
Advisors: Doug Daugert - Port Clements
Al Frick - Masset
Les Jensen - Masset
Brian Hillier - Masset
Brian Fitzpatrick - QCC
Steelhead Society Of B.C. Member
Urs Thomas - Port Clements
Chris Mars
DFO: Elmer Fast - Rec Fish Division
Victor Fradette - Fish Management
Ross Jones - C & P
Don Radford - Area Manager - North Coast
Brian Pearce - Heb - Vancouver
Brian Anderson - Heb - Vancouver
Guests: Russ Jones - Haida Fisheries Program

Coho Discussions:
Coho was one of the topics of discussion at this regular meeting. E. Fast provided an overview of the north coast coho situation from a stock status perspective. Information for this overview was obtained from the north coast coho stock status paper prepared by dr. Blair Holtby of the Department's stock assessment division in nanaimo, B.C. the group focused discussion on the status of qci coho stocks. A general consensus of discussion at this meeting was as follows:
1. DFO should continue to use a precautionary approach to managing coho stocks in the Queen Charlotte islands and other areas of the north coast.
2. That specific management actions for coho salmon in recreational fisheries should be discussed at the next meeting of the North Coast Co-Management Sub-Committee scheduled for april 17 - 20, 1998 in Terrace, B.C. no recommendations with respect to management of local coho stocks were made at this meeting.

COHO RESPONSE CONSULTATION PROCESS

DATE: 09:00, April 8, 1998

GROUP: Prince Rupert City Council

LOCATION: Prince Rupert

ATTENDEES:

PRINCE RUPERT CITY COUNCIL: Jack Mussallem, Paul Kennedy, Paddy Green, Jack Rudolf.

DFO: Dave Peacock(STAD), John Inkpen(C&P), Tom Pendray(HEB), Barry Peters (HEB).

CHAIR: Dave Peacock

Following the introductions and presentations on stock status(Dave Peacock), habitat(Tom Pendray) and enhancement, the following topics were discussed and points made by the participants. For specifics on the above presentations see "Coho Backgrounder".

Questions:

1. Aboriginal included in overall catch of NE BC & Alaska. **A**. No, only a small component.

2. Increase in CPUE all gear times or only troll. **A**. All gear types.

3. GN CPUE on Skeena coho for Area 4. **A**. 1 in a thousand fish, small % of total catch.

4. Would 10yr exploitation graph look different. **A**. Only had CWT date since late 80’s, but would not look much different.

5. How much aboriginal catches in numbers, location/ adjacent to spawning grounds, ie Kitwanga. **A**. Cleaner now, less food fish gillnets in water now. In selective fishery coho have shown high survival rates.

6. Observers present to insure? **A**. Most of food fishermen involved in

ESSR fisheries. Policing self, great improvements in accounting and co-operation.

7. Predation? Seals very selective, like coho rather than a pink. Fishermen very concerned about seals, Mayor has sent letter of concern to Anderson, people are killing seals because they are a problem. Will anything be done? **A**. Unsure what is feasable, but DFO has appointed

Ed Lochbaum as Marine Mammal Co-or, full time to address this problem. Contact him, keep pushing for action. Abundance is documented in this area. Maybe 1st Nations, controlled harvest could be considered.

9. Who do you contact for a permit to kill. **A**. If operating a wier etc. you could get at permit , otherwise not.

10. Seals reported to be in upper Skeena as high as Kispiox? **A**. Rare above tidal area, some up to Terrace.

11. If only few coho, small catch may be okay, need to weigh economic benefit. Need to boost/enhance, use other measures as well.

12. Who makes decision? **A**. Minister. He sets the standards. We are providing all information to him so he can make an informed decision.

13. If conservation problem, all have to share in addressing problem. **A**. Yes, but recently there has been a shift in policy towards recreational. Catch numbers show less overall impact.

14. ICK attack more than just sockeye. **A**. Severe outbreak due to alot of fish and water temperature, smolts/fry seem to be affected, could be relation to lowest smolt output in last few years? Unsure if correlation.

15. Here only 5 to 7 days fishing for Skeena. **A**. Only 3 days forecasted. Pink strong but coho run at same time as coho. One fishing day = 1% exploitation rate.

Not convinced that many coho there. **A**.cwt data shows a peak at that time.

16.What about soft enhancement? **A**. Enhancement shows lower survival rates, if fish left wild do better. Too many variables, holding smolts longer could help, costly and unknown if beneficial. 6 times better survival from egg to fry from wild stock. Upper Skeena enhancement not successful, only at Tobbogin Creek, better survivability from lower streams. Enhancement can be an effective tool but only in some streams.

17. Cleaner/selective fisheries what DFO wants but examples such as W coast QCI were Fraser Sockeye can be caught is not done and its left to Alaska to catch.

18. Studies show Skeena river fish are closely related which is to our advantage. SC coho have variety of genetic material, ie Thompson coho related to Columbia coho, much more difficult to work with.

19. Is Pallent Creek hatchery shutting down? **A**. Russ Jones, CHN currently contracted to operate, training local Haida to eventually take

over all operations actively seeking funding to continue and eventually want to increase productivity.

20. Our district is fragmented, difficult to see what is being done for enhancement/restoration, what is available? **A**.Tsimshian working on watershed resoration with Interfor through FCBC, funds are available for soft enhancement on local creeks.

21. For such as Oldfield? **A**. Yes, coho do use the stream, health rates are surprisingly good. Stream is regularly flushed by rain which seems to help balance.

22. Difficult to point a finger at anyone, logging and habitat practices are improving, but don't things like ditching roads. Enormous recreational potential for this area, don't want to destroy natural beauty.

23. Norwegin traps on Skeena, a potential for harvest? What is happening with alternative selective harvest methods. **A**. Need policy on selective/alternate fisheries, 1st Nations have concerns about these methods as well but DFO is examining several different proposals.

24. Does DFO have a problem with Mcdonald's having a car wash. **A**. DFO suggested a differn't site incase of soap discharging into a stream, Charles Hays goes into the ocean instead of a stream.

Points:

1. Seal predation a major concern for local fishermen.

2. If conservation a concern, all sectors must share equal reductions.

3. Recommend balance between concervation measures and economic benefits.

COHO DISCUSSIONS AT THE REGULAR MEETING OF THE PRINCE RUPERT LOCAL SPORTFISH ADVISORY COMMITTEE (SFAB)
Date: Tuesday, April 14, 1998 - 1900 Hours

Group: Prince Rupert Local Sportfish Advisory Committee (Sfab)
Location: DFO Boardroom - Prince Rupert, B.C.
Chairman: Mr. Ken Franzen
Advisors: Don Intermela - Independent Angler (Freshwater)
Doug Paterson - Independent Angler (Saltwater)
Jodie Goffic - Independent Angler (Freshwater)
Ken Franzen Snr. - Independent Angler (Saltwater)
Dwayne Walsh - Prince Rupert Charterboat Association
Debbie Dudley - Prince Rupert Charterboat Association
Bill Simard - Business (Boat Repair Shop)
Clayton Vanier - Sportfish Lodge Rep
Jim Hellman - Steelhead Society Of B.C.
Dfo: Elmer Fast - Rec Fish Division
Dan Wagner - Fish Management
John Inkpen - Conservation And Protection Section

COHO DISCUSSIONS:
Coho salmon was one of the topics of discussion at this regular meeting. E. Fast and D. Wagner provided an overview of coho stock status for the north coast area referencing information provided by Dr. Blair Holtby of the DFO stock assessment division in Nanaimo, B.C. The group focussed discussion on Skeena River coho stocks and the various fisheries that harvest these stocks in the Skeena River and approach waters. The group felt that the existing exploitation rate exerted by recreational fishermen (2%) on upper Skeena River coho stocks was very low and much lower than the existing commercial fishing exploitation rate on these stocks. Accordingly, the group felt that the existing 2% recreational exploitation rate was within the sustainability of the coho stocks in the Skeena River. Recommendations pretaining to 1998 recreational fishing plans submitted by this group were as follows:

1. DFO develop more wild coho salmon indicator sites in the Skeena River watershed.
2. DFO develop more effective means of providing accurate pre-season forecasts on returning stocks of coho salmon to the north coast.
3. DFO continue juvenile synoptic surveys for coho in the Skeena River watershed.
4. Strategies have to be developed to encourage the state of alaska to initiate fish management actions in their fishery to reduce Alaskan exploitation of upper Skeena River coho salmon.
5. Implement observer programs in the 1998 commercial net fishery that is prosecuted in the approach waters to the Skeena River.
6. Coho daily catch limits of 4 fish / possession 8 in area 5 and most of area 3 (tidal waters).

7. Coho catch limits of 1 fish daily / 2 possession be implemented in the lower Skeena River sportfishery (non tidal waters).
8. Coho daily catch limit be set at 2 fish / 4 possession in tidal water area 4 and specific portions of tidal water area 3.
9. DFO initiate regulatory changes to allow for the implementation of monthly and annual quotas for recreational fishermen for coho.

COHO RESPONSE CONSULTATION PROCESS
DATE: 13:00, April 15, 1998.
GROUP: Central Coast Advisory Board/Nuxalk, Heiltsuk, Kitasoo, Oweekeno First Nations.
LOCATION: Cedar Inn, Bella Coola, B.C.
ATTENDEES:
Nuxalk: Wally Webber, Nelson Tallio **Kitasoo:** Norman Dale **Oweekeno:** Wayne Jacob, Frank Hanuse **Heiltsuk:** Cyril Carpenter, Gary Housty, Kim Gladstone, Alvin Dixon, **UFAWU:** Clay Young, Brian Lande, **Fisher:** Crydone Landesdown **SFAB:** Rob Stewart **Provincial Ministry of the Environment:** Mike Ramsay
DFO: Lyle Enderud (FM), Sandie MacLaurin (HEB), Ron Goruk (FM), Ken Bedard (AFS), Dale Gueret (AFS), Dave Einarson (FM), Brad Koroluk (HEB), Barry Finnegan (STAD), Russ Hilland (HEB).
CHAIR: David Einarson
Introduction: DFO has identified problems with coho stocks. DFO has taken measures to decrease harvest rates. Some successes, but the problem is getting worse coast-wide. Minister formed a coho response team which is a multi-disciplinary group to come up with a coho action plan. The focus is not just harvest management but also other factors with a view to short and long term solutions. There have been multi-sector meetings in Vancouver and wide ranging consultations in the Skeena with town councils, stakeholders and First Nations. It will culminate with a meeting on April 25th, 1998 where DFO will be discussing the results of these meetings and looking for consensus. A number of options will be developed - enhancement - harvest plans. A decision will be reached on the measures to be taken in mid-May.
Presentations on stock assessment (Barry Finnegan), habitat status (Brad Koroluk) and enhancement (Sandie MacLaurin). For specifics on the above mentioned presentation see "Coho Backgrounder".
Questions

1. Why is the decision being made by the Minister? **A.** The range of options is so great that the Minister will be given the input from these meetings in order to make a decision.

2. Commercial fishermen have not impacted on coho stocks in this area for years. **A.** Central coast coho stocks are not as impacted on as much as other areas.

3. What is the impact of human activity on coho stocks? **A.** Habitat destruction is a concern but it is not the main reason for the problem with coho stocks. There is lots of pristine habitat that could support coho but there aren’t any coho in these pristine systems. The main problem is that the exploitation rate for coho is too high.

4. Are there increased enhancement efforts? **A.** DFO enhances Babine coho as well as the Toboggan River, but coho stocks are still declining. Enhancement is only slowing down the trend.

5. DFO isn't conducting escapement studies in some areas of the Central Coast. How can DFO tell what the trends are there? **A.** DFO reduced coho escapement studies in 1990 but the trends up to then were that coho stocks were declining.

6. Has DFO noticed cycles on coho and other salmon stocks? **A.** Cycles do happen. There are time of good ocean survival and other long term trends.

7. DFO states that hatcheries aren't the answer, but there should be some enhancement. **A.** While you can't enhance every stock on the coast, it is likely that there will be an enhancement component in the action plan.

8. How much does DFO know of the timing of coho? **A.** Not very much. We have stream walk data. For instance, DFO knows that some of the early coho stocks are not getting hit as hard as later runs but there aren't that many early coho stocks.

9. Are sea run cut-throat and steelhead being impacted on in the same way? **A.** Steelhead stocks have declined but have stabilized recently. Sea run cutthroat don't range as far so they are probably not impacted on by fisheries. In some respects, steelhead have benefitted from the reduction in coho stocks as there is a corresponding reduction in competition.

10. The Alaskans are calling us liars and they say that the information we have is not correct. **A.** Canada is preparing the information necessary to counter Alaska's position.

11. Can DFO get coho catch date information from the mark recovery program? **A.** That type of data is hard to get, because the fishermen don't always land their catch on the day they catch it.

12. DFO is not doing enough to stop habitat destruction. **A.** DFO does what it can and the Habitat Enhancement Branch works with Conservation and Protection to carry out enforcement. As stated earlier coho spawning habitat is under utilized. However, loss and erosion of habitats must be addressed and there are some problems which DFO is trying to correct. We would like to do more monitoring but there isn't enough budget.

13. We need to talk about the Alaskans. We need to pinpoint the problem and then find out how to deal with it. **A.** Canada is getting some support from Washington and Oregon in this. However, Canada didn't respond to Washington and Oregon when they had a coho concern and we

continued to fish their stocks. Our actions at that time may come back to haunt us.

14. The commercial fishery has been closed out of the coho fishery and doesn't have an impact on coho. Maybe a catch and release can be instituted. Without pointing fingers, the biggest impact is the sport fishery. Don't know what the seines and gillnets can do. **A**. There are a number of proposals to harvest fish selectively. DFO currently doesn't have a policy on this but the Minister wants more selective fisheries. There is not as much in the Central Coast. However, there are major concerns for the Skeena fishery. We have talked about some options for sport like reduced bag limits etc. We have talked about survival boxes in the commercial fishery.

15. Concerns were expressed over catch monitoring. Does DFO have sufficient catch monitoring information to make a decision on coho catches in the respective fisheries. **A.** DFO's position is that we do have good numbers on catches.

16. Concerns were expressed about the use of drop nets in the gillnet fishery. **A.** If a more selective method was developed for the gillnet fishery, DFO would be willing review the requirement for drop nets.

17. Will there be non-possession/non-retention of coho for the sports? **A.** At this time, there are a variety of options being discussed including status quo/non-possession non retention and bag and catch limit reductions.

18. What impact will there be to the troll fishery? **A.** There may be non-retention of coho.

19. Many fishermen are concerned that the decisions regarding coho will be a political decision. **A.** DFO has clearly defined priorities. Conservation is first. The food social and ceremonial requirements for first nations must then be met.

20. What are the coho numbers caught in the inland fishery? **A.** The Skeena ESSR fishery is selective and is just for sockeye and pink. There is some catch of coho for food, social and ceremonial requirements. Primarily, this fishery is a result of coho reductions and for concerns over the wild sockeye stocks.

21. If coho come back stronger, what will be the trigger to return to normal fisheries? **A.** There has been a lot of discussion about this. Information will be obtained from the tree point fishery in Alaska. This fishery provides consistent information. From this fishery, we can get a good feel for coho abundance.

22. Commercial fishermen expressed continued concern over weed line nets. **A.** DFO has studied drop nets in the Skeena. It is voluntary in the Skeena fishery. There has been lots of discussion. There is no question from DFO studies in the Skeena that the weedline protects steelhead.

23. Could the same results be obtained using a 7 inch net rather than a weedline? **A.** DFO is open to any solution that works in Dean Channel but we have to have some way of protecting steelhead. There are consequences to not conserving Dean steelhead stocks.

24. There was concern that fishing on steelhead in the Dean has increased. **A.** There has actually been a decrease in sport angling in the Dean.

25. Will DFO consider controlling seal populations? **A.** Conducting a seal cull is a politically sensitive activity. Based on DFO experience, there has been a limited cull in the Puntledge and we have yet to see if this worked. However, the problem is not seen as a predation problem.

26. If the seines were required to brail, would more time be allotted to the fishery? **A.** When a seine fisher brails, it slows him down. Consequently, those who try to make an effort to brail get penalized and their fishing time is decreased while they brail. DFO could consider going to a mandatory brail system. In this case everyone would have to brail and sort the fish before the fish go into the hold. This may necessitate increasing time for the seine fishery.

Comments:

1. Sport fishery needs to be restricted.

2. There is support for strategies like survival boxes similar to those used in the Skeena fishery.

3. There still is concern over the effects of logging and that resource harvesting like forestry still need to be brought in. If we are going to bring coho back, then we need to have habitat.

4. There is support for increased enhancement and some action on seal predation. While seals are not responsible for the present coho crisis, a decrease in the seal population would increase any savings. Some First Nations might take a certain percentage. The harvest would be done in a meaningful way and not just to kill them.

5. Some commercial fishermen say that coho fishing is big during Adams runs. In 1994, there was a big chum fishery and thus a big coho fishery because the chum fishery happens later in the year when the coho stocks are coming in. In the Skeena, DFO has actually increased harvest rates on sockeye without fishing in August. Problem is that there is a big gillnet

fleet and gillnets are not selective. The seines can release fish in pretty good shape and with good survival rates.

6. The impression is that the commercial fishery is not a problem. The areas where there have been commercial closures are areas where spring and coho harvesting occurs. The people who benefit from these commercial closures are yachts and foreigners who sport fish. One option is for DFO to raise the licence fees and put the money raised from increased fees towards enhancement.

7. There were some concerns expressed that if seine boats were required to brail and sort their fish, then there would need to be some training done to ensure deckhands had the knowledge to identify species.

8. Concerns were expressed from the participants that the sport fishery employs pressure groups and uses pressure politics to influence decision making in DFO.

DFO does not have enough information on coho stocks. There is a need for increased funding for stock assessment work in the Central Coast. There was concern expressed that DFO is cut back so much, fishermen may be denied further opportunities to fish. There is additional concerns that what is left of DFO's budget will be directed to the coho crisis and this could further impact DFO's ability to identify and conduct fisheries in the Central Coast. There is a great deal of frustration over the continuing spiral of decreased funding for DFO

COHO DISCUSSIONS AT THE REGULAR MEETING OF THE KITIMAT LOCAL SPORTFISH ADVISORY COMMITTEE (SFAB)
Date: Wednesday, April 15, 1998 - 1900 Hrs.

Group: Kitimat Local Sportfish Advisory Committee (Sfab)
Location: Kitimat Town Council Chambers - Kitimat, B.C.
Chairman: Mr. Ron Wakita
Advisors: Ron Wakita - Tackle Shop Owner (Business)
Brian Kean - Independent Angler
David Ward - Independent Angler
Ray Hepting - Kitimat Charterboat Association
Murray Bromley - Kitimat Charterboat Association
Al Anhiller - Independent Angler
Gary Mouland - Independent Angler
Duane Herbert - Charterboat Association
Colin Light - Tackle Shop Owner (Business)
Bob Johnston - Rod And Gun Club
DFO: Elmer Fast - Rec Fish - Prince Rupert
Jim Steward - Fish Management - Prince Rupert
Mark Westcott - Heb (Kitimat Hatchery)
Ricardo Correia - Conservation & Protection
Haisla Fisheries - Mark Bowler

Guests: approximately 20 people from the community of kitimat attended this meeting as observers but several participated in discussion of agenda items at the concurrence of the committee as a whole.

Coho Discussions:
Coho was one of the topics of discussion at this regular meeting of the local sportfish advisory committee. E. Fast provided an overview of north coast coho stock status using information provided by Dr. Blair Holtby - head of north coast salmon stock assessment. The group focussed on the status of coho stocks in area 6 tidal waters and the non tidal waters of the Kitimat River. These are the areas where this local advisory committee provides advice to dfo respecting sportfish management actions. The advisory committee accepted the information presented regarding the status of coho stocks in the north coast. The committee was cognizant of the fact that the stock assessment information for central coast areas was less reliable than for areas such as the skeena river watershed.
The recommendations regarding coho management in the sportfishery for the 1998 season were as follows:
1. The recreational harvest limit in the non tidal waters of the kitimat River be reduced from 2 fish daily to 1 fish daily. Possession limit is twice the daily limit.
2. The coho sportfish derby held annually in september in the Kitimat area will be restructured to take the emphasis away from coho catch. Derby rules will be changed to significantly restrict the number of coho salmon that can be entered in this derby and

the thrust of this derby will be directed towards other species such as chum and pink salmon.
3. The committee supported the need to acquire necessary funding to undertake more detailed stock assessment studies of coho stocks in north and central coast areas as a whole.
4. The local committee decided not to make a specific recommendation on coho sportfish management actions in saltwater areas as this recommendation would be made by the North Coast Co-Management Sub-Committee of the sportfish Advisory Board. This Board is an umbrella organization comprised of members from local community sportfish advisory committees throughout the north coast.

COHO DISCUSSIONS AT THE REGULAR MEETING OF THE TERRACE LOCAL SPORTFISH ADVISORY COMMITTEE
Date: Thursday, April 16, 1998 - 1900 Hrs.

Group: Terrace Local Sportfish Advisory Committee Of The Sportfish Advisory Board
Location: Coast Inn Of The West - Terrace, B.C.
Chairman: Mr. Steve Nickolls
Advisors: Steve Nickolls - Angling Guide
Greg Ross - Independent Angler
David Haddad - Independent Angler
Jim Culp - Steelhead Society Of B.C.
Doug Webb - Steelhead Society Of B.C.
4 Members Absent
DFO: Elmer Fast - Rec Fish Division - Prince Rupert
Scott Trent - Conservation & Protection - Terrace

Coho Discussion:
Coho was one of the topics of discussion at this regular meeting of this local sportfish advisory committee. E. Fast provided a summary overview of the status of north coast and Skeena River coho salmon stocks in particular. This group focused discussion on Skeena River coho stocks. The group agreed that the Skeena River coho stocks in the upper watershed areas were at very low abundance and actions should be taken in all fisheries to reduce exploitation on these stocks. The group felt that the existing exploitation rate on these stocks by the north coast sportfishery (2%) was very low in comparison to other fishery exploitation rates and in light of this situation, some harvest opportunities for coho should be maintained for the 1998 season.
This local advisory committee provided the following recommendations respecting sportfish management of coho for the 1998 fishing season:

1. Catch limit for coho in the lower Skeena River downstream of terrace should be maintained at 1 fish daily - 2 possession after september 1. The local committee felt that the majority of coho destined for the upper reaches of the Skeena River watershed were through the lower river by september 1.
2. Existing sportfishing regulations should be amended to provide legal provisions for implementation of monthly and annual coho salmon catch limits in tidal and non tidal waters.
3. Recommendations respecting recreational catch limits for coho salmon in tidal water approach areas to the skeena river for the 1998 fishing season should be developed in concert with the north coast co-management sub-committee of the Sportfish Advisory Board.
The North Coast Co-Management Subcommittee of the Sportfish Advisory Board is a committee comprised of members of each local community sportfish advisory committee in the north coast.

COHO DISCUSSIONS AT THE BI-ANNUAL SPRING MEETING OF THE NORTH COAST CO-MANAGEMENT SUB-COMMITTEE OF THE SPORTFISH ADVISORY BOARD

Date: April 17,18,19, 1998

Group: North Coast Co-Management Subcommittee Of The Sportfish Advisory Board (Sfab)
Location: Terrace Inn - Terrace, B.C.
Chairman: Mr. Jim Culp
Asst. Chairman: Mr. Steve Nickolls
Advisors: Alex Ross - Chairman - Qci Local Committee
Doug Daugert - QCI (North Island)
Ken Franzen - Chairman - Prince Rupert Local Committee
Brian Kean - Asst. Chairman - Kitimat Local Committee
Steve Nickolls - Chairman - Terrace Local Committee
Jim Culp - Chairman - North Coast Co-Management Subcommittee
Ev Person - Chairman - Smithers Local Committee
Rob Stewart - Chairman - Bella Coola Local Committee
George Ardley - R.I.H.P.S.F.A.
Tom Bird - Sportfish Institute Of B.C.
Bruce Hill - Steelhead Society Of B.C.
Mike O'neil - B.C. Wildlife Federation - Northwest Region
David Hall - B.C. Wildlife Federation - Central Region
John Brockley - SFAB Provincial Executive
1 Member Absent - Pst - Northern Panel
DFO: David Einarson - Chief - North Coast Fish Management
Elmer Fast - Rec. Fish Coordinator - North Coast
Seigi Kriegl - Conservation And Protection
Dave Peacock - North Coast Stock Assessment
Moelp: Dana Atagi - Fisheries Biologist - Smithers, B.C.
John Willow - Sportfish Manager - Mof (Provincial)
Guests: Gordon Wolfe - Steelhead Society - Smithers, B.C.

Coho Discussion:
Coho was one of the topics of discussion at this spring meeting of the co-management subcommittee. David Einarson and David Peacock provided an update on north coast coho salmon stock status and consultation exercise to date to the members present. The first day of the meeting (april 17) was used to provide a review of the coho stock status information and address specific areas of concern related to the information. Over the course of the remaining 2 days of this meeting, the co-management subcommittee members developed a recreational fishing plan for the 1998 fishing season (proposal only) for presentation to DFO. The recreational fishing plan proposal will be introduced at the multi-stakeholder meeting scheduled for april 25, 1998 in Prince Rupert, B.C.

A summarized version of the proposed recreational fishing plan for coho in the north coast (areas 1 to 10 inclusive, including the Skeena River) as developed by this committee is as follows:

1. Reduced daily and possession harvest limits in area 1 & 2 (QCI)
2. Reduced daily and possession harvest limits in area 3 & 5. A 1 week coho species closure to be implemented in immediate tidal water approach areas to the Nass River (i.e. subarea 3-12) during peak migration of early Nass River coho stocks. Reduced daily / possession limit in subarea 3-12.
3. Reduced daily and possession harvest limit in area 4. Implement a 1 week coho species closure in area 4 during peak migration of upper Skeena River coho stocks.
4. Reduced daily and possession harvest limit in central coast areas 6 thru 10 inclusive, conditional upon implementing an effective monitoring and enforcement program within the commercial salmon fishery in these areas.

The co-management sub-committee members agreed that the above plan proposal would be the proposal presented at the multi-stakeholder meeting scheduled for April 25, 1998 in Prince Rupert, B.C.

The members of this subcommittee also provided a number of other recommendations related to the management of coho salmon in north coast areas. These recommendations were as follows:

1. DFO obtain funding to undertake more detailed stock assessment studies for coho salmon stocks in central coast areas (i.e. areas 6,7,8,9, & 10). Coho salmon stock assessment information is very limited for these areas.
2. DFO obtain funding to mark all hatchery releases of coho salmon into north coast waters (i.e. coded wire tags).
3. DFO obtain funding to develop more wild coho salmon indicator streams in the north coast to assist in providing more accurate forecasts of coho returns each year.
4. DFO continue to undertake coho juvenile synoptic surveys in the skeena river watershed and expand this program to include other river systems in the north coast as deemed appropriate.
5. Develop a strategy to encourage the state of Alaska to be more conservation oriented to coho salmon stock concerns in canadian waters during the conduct of alaskan fisheries.
6. DFO obtain funding to increase the level of ‘observer’ coverage to assess by-catch and related mortality in the north coast commercial fisheries for the 1998 fishing season.

COHO RESPONSE CONSULTATION PROCESS
DATE: 08:30, April 20, 1998
GROUP: North Coast Advisory Board
LOCATION: Crest Hotel, Prince Rupert
ATTENDEES:
NORTH COAST ADVISORY BOARD: Rick Haugan(Sn-NCAB), Peter Haugan(Gn-NCAB), Greg Taylor(Northern Processors Assoc.-NCAB), John Murray(Gn-NCAB), Kevin Smith(Sn-QCIAB), Sverre Haukness(Troll-NCAB), Paul Paulson(Gn-NCAB), Paul Pearson(Haida Fisheries), Joy Thorkelson(UFAWU), Nelson Clayton(NTC), Taka Nakatsuka(UFAWU), Howard Gray(GN), Jim Dopson(NNFC), Des Nobles(UFAWU), Martin Hall(Haisla), Heber Clifton(GN), John Newton(SN), Ted Sheppard(NPA), Frank Wesley(Lax-kw-alaams), Jack White(Lax-kw-alaams), Rusty Doane(Lax-kw-alaams).
DFO: Dave Peacock(STAD), Seigi Kriegl(C&P), Randy Barnhart(AFS), Les Jantz(FM), Dave Einarson(FM), Dave Rekdal(FM), Elmer Fast(REC).
CHAIR: David Einarson
Following introductions, review of the process to date and exploitation rate options being prepared ranging from zero mortality to rates similar to 1997(Dave Einarson), and the presentations on updated run timing(Dave Peacock) and net fishing scenarios and resulting impacts on coho(Les Jantz) the following topics were discussed and points made by the participants.
Questions:

1. How many pinks would be forgone by the zero mortality option? It is more than the 2.0 million for Skeena. **A**. Yes, the total would be much more than that when one factors in the foregone catch of Alaskan and other northern BC stocks.

2. Is District 101 a useful indicator of Skeena coho strength? **A**. It could be a good tool however further work needs to be done to assess the usefullness.

3. Was the Area 1 sport fishery closed under the zero option like the commercial sector? **A**. Under the proposal here the sport fishery in Area 1 is restricted to non-possession/retention of coho(later corrected).

4. If the sport fishery does occur with the commercial sector closed, will there be compensation for foregone catch in the commercial sector as was stated in the Art May report. **A**. Department has not officially responded to that recommendation.

5. What is DFO's intent on rebuilding these stocks seeing as how if we never caught another coho on the coast these stocks would not rebuild? **A**. This process is aimed at determining what the people of Canada want done for these stocks. We will be developing options based on the recommendations from this process which will be presented to the Minister who will make the final decision on what should be done in 1998.

6. Do we need to fish with a weedline in 1998 in the 90 mesh or Alaska twist nets? **A**. The current restrictions do not permit the use of 90 mesh nets without the weedline.

7. What is the plan? **A**. There will be habitat, enhancement and management components of the final plan.

8. What happens from here on as far as the NCAB is concerned? **A**. Once the minister makes a decision regarding acceptable exploitation rates we need to get together to develop a fishing plan that achieves those goals.

9. What is the exploitation rate for the sport sector? **A**. For 94 to 96 range from 1.5 to 3 percent for upper Skeena coho.

10. What is the required rate of rebuilding for upper Skeena coho? **A**. Don't have a specific schedule yet. Need to develop a long term approach to deal with the coho problem.

11. Is it possible to develop stepped exploitation rates depending on the level of ocean survival? **A**. Will look into it.

12. Does the DFO have the power to shut down the freshwater fishery in the Skeena? **A**. Not sure as both federal and provincial governments are involved in managing sport fisheries in fresh water.

13. For clarification will the Area 1 sport fishery be allowed to keep fishing under the zero mortality option? **A**. No. Area 1 would be closed as well.

Comments:

1. With the sport fishery we should make it mandatory that they report what their catch is as well as release similar to the big game reporting system.

2. Sport fishery should be mandatory single barbless hooks. Shouldn't allow treble hooks. **Response**. Mortalities of released fish are factored into the calculations.

3. The biggest fleet operating in the Langara area is the sport fleet which should face similar restrictions as the commercial sector in Area 1.

4. Sport fishery in inside Area 3 should be closed as well as Nass coho stocks need protection too.

5. Local native communities rely heavily on salmon for food and income and are very concerned about the growth in the sport fishery which is consuming the same fish we are and we are the ones constantly faced with restrictions while they aren't.

6. With respect to aboriginal foodfish we will not starve especially if the sport fishery is going to continue.

7. When the commercial fleet fishes so do the sport fishermen. When the commercial sector is closed so is the sport fishery. This is the only logical way to conserve fish which is DFO's first mandate.

8. Haisla people will fight to remain in the commercial fishing industry. They will go fishing if the sport fishery is open. Concerned about the low mortality rates used for sport sector.

9. Need to enhance upper Skeena coho to deal with problem in addition to reducing harvest.

10. There has been a constant reallocation of coho from the commercial sector to the sport sector by past management actions. This needs to be stopped if not reversed.

11. Needs to be inseason adjustments made to address abundances of different species. As in 1997 there were no coho around until mid- to late August while there were lots of sockeye still. In el nino years the coho tend to be later than average.

12. When there is a closure for conservation the sport sector needs to be dealt with in a similar manner.

13. Will not provide an exploitation rate that will trap the commercial fisheries for future years when sockeye stocks have rebuilt.

14. Ocean survival rate will be the biggest factor in determining the level of return in 1998.

15. Concern about the level of monitoring in the sport fishery. The DFO does not know how many coho are being caught in the Area 3/4 sport fishery. **Response**. Creel surveys in 1994 to 1996 are considered to be reliable estimates of sport catch.

16. Concern that there is not enough information available to recommend an acceptable exploitation rate.

17. Charter operators down south will move north if they are closed in southern areas.

18. Drastic actions required to save coho.

19. Want to use subarea closures as a means to deal with coho problem in Area 4.

20. Should use this coming season as a means of exploring all options of selective fishing by all gear types so that in two years when sockeye stocks are rebuilt we can prosecute the fisheries to harvest the available surplus.

21. Need for increase in observers in the fisheries to verify areas that actions could benefit coho conservation. Also need for more enforcement on the fishing grounds.

22. Recommend that we would like to see an exploitation rate similar to the last 10 year average that would achieve an average sockeye harvest.

23. Want to prevent sport and commercial fleets from transfering to other areas under the zero option.

24. Disease problems in Babine. **Response**. Currently sampling juveniles from the spawning channels and have plans for sampling of adults.

25. Recommends a cold water release option for Fulton River spawning channels.

26. Extremely concerned about the points Blair made regarding Oregon approach to managing once the coho stocks are rebuilt.

27. The Alaskan harvest remains key to rebuilding upper Skeena coho. If they continue to harvest in the same fashion the liklihood is these stocks will not rebuild.

28. Need to reestablish the sport creel survey in Areas 3 and 4.

COHO RESPONSE CONSULTATION PROCESS
DATE: 13:00, April 22, 1998.
GROUP: Kitasoo First Nation.
LOCATION: Community Hall, Klemtu, Bella Coola, B.C.
ATTENDEES:
Kitasoo: Percy Starr, Archie Robinson, Ross Neasloss, Ben Robinson, Larry Greba & other community members.
DFO: Dale Gueret (AFS)
CHAIR: Dale Gueret
Introduction: DFO has identified problems with coho stocks. DFO has taken measures to decrease harvest rates. Some successes, but the problem is getting worse coast-wide. Minister formed a coho response team which is a multi-disciplinary group to come up with a coho action plan. The focus is not just harvest management but also other factors with a view to short and long term solutions. There have been multi-sector meetings in Vancouver and wide ranging consultations in the Skeena with town councils, stakeholders and First. It will culminate with a meeting on April 25th, 1998 where DFO will be discussing the results of these meetings and looking for consensus. A number of options will be developed - enhancement - harvest plans. A decision will be reached on the measures to be taken in mid-May.
Presentations on stock, habitat status and enhancement (Dale Gueret). For specifics on the above mentioned presentation see "Coho Backgrounder".
Comments:

Generally, there is a lack of trust in DFO because DFO does not live up to its fudiciary responsibility to First Nations.

The Kitasoo Band's catch statistics show a catch of about 500 coho. The catch can range from 300 to 800 coho. While coho is not the primary food fish, it is an important part of the Kitasoo's diet.

Most of the catch of coho is done in Kitasoo Bay on enhanced coho from the Kitasoo Bay hatchery. There is also some harvesting of coho from the outer areas.

The Kitasoo are concerned that large fishing company interests will influence DFO's decision making.

There is concern DFO only consults when there is a crisis.

The coho problem is seen as the result of mismanagement by DFO.

There is concern that measures taken to reduce the coho catch for the Skeena will increase commercial fishing pressure in the Central Coast. This will adversely affect the Kitasoo.

The Kitasoo recommend a moratorium on further fishing for non-Kitasoo members in the Kitasoo claimed traditional territory.

Whatever is decided by DFO, the Kitasoo want to be excluded from any restrictions. The Kitasoo should be allowed to continue to harvest coho for food, social and ceremonial purposes.

There is concern that predation from seals and dogfish are damaging coho stocks.

The Kitsoo are concerned that DFO lacks the data to properly manage the fishery. Funding for quality enumerations and research on coho streams is lacking.

NORTH COAST MULTI-STAKEHOLDER
COHO SUMMIT MEETING.

Date: April 25, 1998
Time: 08:30 –16:30
Location: Highliner Inn – Prince Rupert
Chair: Paul Sprout.

Minutes:

Paul Sprout thanked everyone for making the effort to come out on a weekend and participate in this important process. The agenda was then reviewed and it was noted that the primary objective of the meeting was to provide an opportunity for participants to confirm the advice given to DFO regarding the 1998 management of coho salmon and their habitat, and to provide an opportunity to voice additional concerns or advice on the matter.

The meeting opened with a brief overview by Dave Peacock, Senior North Coast Stock Assessment Biologist, in which he described the coho problem and the North Coast specific considerations. Critical factors such as the Canadian and US harvest rates over the past few cycles, the recent downturn in ocean survival rates, and the long-term consequences of mixed stock fisheries where various coho stocks have been harvested with other stocks and species with different productivity's were all discussed. The biological risk assessment paper on Upper Skeena (Baboon) coho which is currently being reviewed by Pacific Stock Assessment Review Committee was briefly described. Such a risk assessment describes the probability or chance of loss of the stocks , based on looking at past trends and predicting future stock conditions under different scenarios.

Preliminary economic analysis was then provided. This was followed by DFO staff providing an overview of the advice heard from each sector consultation meetings. Areas of general agreement were highlighted as well as where alternate views were expressed.

Throughout those presentations many points were made, some focused on elements to include in an integrated management plan , while others were of more specific concern within a sector. The following represents a summary of the information and advice received at the meeting.

Biological Risk Assessment :

- A suggestion was made that the Biological Risk Assessment Paper for the North Coast should have been available for this meeting/discussion. Without it, doubt about the "transparency" of the process was voiced.

Economic Analysis:

- A point was raised that the analysis was superficial and did not include any values for First nation fisheries above Terrace, where it is expected that approx. 2000 F.N. jobs exist with significant local economic benefits.
- There were several calls for more detailed economic analysis to consider impacts by gear sector and between the recreational and commercial sectors.
- It was noted that the economic value derived from chinook and coho is huge and that a high proportion of those benefits can be maintained with access to only a portion of the resource.
- Others noted that you cant/shouldn't put an economic value on an extinct stock.
- After further discussion regarding Alaska interception of Skeena coho stocks, a suggestion was made that a local delegation of fisherman should travel to Alaska and communicate directly to the fisherman on their own turf. Further elaboration's suggested that Alaskan fisherman should come and look for the spawners with Canadian fisherman.

Habitat and Enhancement:

- Advice from First Nation reps that many of them are currently engaged in enhancement programs which are not utilized to their full capacity due to cut-backs. Proposed that a significant increase to enhancement of coho be undertaken.
- Advice from a recreation rep to set up a technical workshop to review the actual benefits of enhancement in the Skeena.

Fisheries Management Advice:

- Advice from commercial rep that a greater spawner enumeration and enforcement capability could be achieved by hiring back increased numbers of charter patrolman.
- First Nation participant advised that the salmon resource should be managed more locally, using local benefits to help pay for improved local management.
- Advice from commercial representatives and others that with severe restrictions on various fisheries that government should be prepared to provide income and employment adjustment programs.

- Many advised that seal predation was a significant factor on already depleted salmon stocks and management measures such as a cull program should be reinstated.
- Troll fisherman emphasized that they can implement a clean fishery, avoiding coho by-catch if given enough lead-time to plan a fishery.
- Several participants advised that smaller groups could work together on a fishing plan and others on a recovery plan.
- A general call for the Minister to make an early decision so that some collective process could be attempted.

Meeting wrapped up at 4:30 pm.

6.6 APPENDIX - PACIFIC STOCK ASSESSMENT REVIEW COMMITTEE (PSARC) ADVISORY DOCUMENTS

6.6.1 PSARC ADVISORY DOCUMENT 98-2 PACIFIC SALMON MARCH 1998

I. STEERING COMMITTEE REPORT

The Steering Committee met March 20, 1998 in the Conference Room at the Pacific Biological Station to review the Salmon Subcommittee report. The report was accepted, with the following comments and recommendations. The Steering Committee thanked the Subcommittee Chair for a useful and well organized report.

Major Subcommittee Discussion and Concerns

Steering Committee notes the large uncertainty in the South Coast coho forecast and recognizes the serious coho conservation concerns for coho stocks originating from the Strait of Georgia, Fraser River and Johnstone Strait.

Steering Committee notes that there have been improvements in the chum forecast for South Coast inside chums that now incorporates the retrospective analyses.

Steering Committee recommends that advice on requirements for frequency and need of forecasts be referred to the Stock Assessment Coordination Committee.

S98-1 Run size forecasts for Fraser River sockeye.

The Steering Committee endorses the recommendations. The Steering Committee notes that the forecast includes only 4 and 5 year old sockeye, but not jacks.

S98-2 WCVI chum salmon forecasts for 1998.

The Steering Committee endorses the recommendations. Steering Committee notes that in 1997 the coho bycatch in prosecuting west coast of Vancouver Island fisheries for surplus chum was 300-800.

S98-3 1998 forecasts for Johnstone Strait, Georgia Strait and lower Fraser River chum salmon.

The Steering Committee accepts the recommendations, but notes that due to continuing declines in ocean survivals, the forecast remains uncertain.

S98-4 An update on the 1997 stock status and 1998 forecasts of Barkley Sound sockeye.

The Steering Committee accepts the recommendations in the working paper and supports the use of the SStM model generated forecasts.

S98-5 1998 forecasts of marine survival rate, marine distribution and pre-fishery abundance for southern B.C. coho salmon.

The Steering Committee accepted the working paper recommendations.

The Steering Committee is extremely concerned with forecasts for extremely low abundance of coho originating inside (Strait of Georgia, Fraser River Johnstone Strait) and outside (west coast Vancouver Island) in 1998.

The Steering Committee notes that there is a 10% probability that the abundance of coho originating from inside areas will be less than 216,024 and abundance of coho from the outside areas will be less than 92,994. There is a 25% probability that the abundance of coho originating from the inside areas will be less than 278,126 and from the outside areas less than 126,818. There is a 50% probability that the abundance of coho originating from the inside areas will be less than 363,607 and abundance of coho originating from the outside areas will be less than 176,225.

The Steering Committee notes that due to large uncertainties in the forecast, there is a significant chance that the abundance of the inside aggregate will be lower in 1998 than in 1997. The Steering Committee also notes that marine survival and the abundance of the inside aggregate are trending downwards. For this reason, extreme caution should be exercised in the application of the forecast.

II. SALMON SUBCOMMITTEE REPORT

1. Introduction

The PSARC Salmon Subcommittee met March 18, 1998 at the Pacific Biological Station, Nanaimo. The purpose of the meeting was to review salmon forecasts. Five working papers were presented to the Subcommittee. Meeting participants and reviewers of working papers are listed in Appendices 1 and 2, respectively.

2. General Subcommittee Discussion and Concerns

The Thompson coho stock status and forecast paper, scheduled for the spring PSARC meeting is an important component of the coho assessment package, since it is

anticipated this stock may be the greatest conservation concern and have the poorest survival and abundance forecast.

The Subcommittee notes a lack of compliance with previous PSARC recommendations that specified a minimum standard for forecast papers, to include retrospective analysis (including model performance evaluation methods as outlined in Welch et al., PSARC S94-16), and estimates of uncertainty in the forecasts.

The Salmon Subcommittee requests clarification of the relative priority of stock forecasts that PSARC review each year. The Subcommittee understands the need to review Fraser sockeye and southern coho forecasts annually, but questions whether mainland chum or the WCVI chum need to be reviewed annually once the methods are accepted.

3. Working Paper Summaries, Reviews and Discussion

S98-1 Run size forecasts for Fraser River sockeye. A. Cass ***Working paper accepted subject to revisions***

Run size forecasts for 1998 Fraser River sockeye returns are based on methods previously approved by PSARC. Forecasts are made for 19 individual sockeye stocks and four migratory timing/management groups. Based on escapements in the brood year, the major stocks anticipated in 1998 are the Late Shuswap (Adams River), Quesnel, and Chilko runs. The 1998 cycle year is noted for the dominant Adams River run that has historically been the single most important sockeye run on the 1998 cycle line. As reflected in the present forecast, the importance of the sub-dominant Quesnel Lake run now rivals the Late Shuswap run. The sub-dominant Quesnel run has increased exponentially since the mid-1970s. Together, the Late Shuswap and Quesnel runs accounted for 59% of the spawning escapement in 1994.

For most stocks, forecasts are based on regression models that use spawning escapement to predict adult abundance of age-4 and age-5 sockeye. Additional explanatory variables are available for some stocks and include fry, smolt and sibling adult run size estimates. Also evaluated is a method that incorporates attributes of escapement-based and juvenile-based models by pooling results from individual forecast models where time series of different life stages are available.

All years in the available time series of data were used in the analysis for each stock. Run size and escapement data are approximately log-normally distributed and for all models a log-normal error structure was assumed. The simplest forecasting models used are all-year mean and the cycle line mean returns. Historical means serve as benchmarks to judge the information content of models that incorporate explanatory variables. The next level of model includes time series of adult spawning escapements

to forecast future generations of adult returns. The third levels are models that use abundance estimates measured at different ages of the same generation. These include sibling models that use adult returns to explain older returns from the same cohort. Also, included in this category are estimates of fry (Nadina, Gates and Weaver sockeye), fall fry (Quesnel and Shuswap) and smolts (Chilko sockeye) as well as a significantly correlated precipitation/environmental index used to explain ocean survival effects on run size of Chilko sockeye.

Model performance was evaluated in a retrospective analysis by comparing run size forecasts to estimated (observed) run sizes for years that estimates are available. Starting with the most recent year that estimated returns are available (1997), a retrospective forecast for that year was made from the time series of explanatory variables by leaving out the most recent return data. In this way, retrospective forecasts for each year are based only on the time series available prior to the year being forecast. For stocks with >40 years of data retrospective comparisons were made for years 1970-94. Forecast data for most major sockeye stocks are sufficient to assess performance during that period. Stocks with fewer years of data (subsets of early Stuart, Scotch and Fennell sockeye) and other stocks recently supplemented by hatcheries (late Nadina, Gates and Weaver) were only evaluated for the 1980-1994 period.

The time series of fall fry data for Quesnel and Shuswap Lakes are short ($n \leq 10$) and of insufficient length to compare their performance in the retrospective analysis described above. Instead, a leave-one-out cross validation method that retrospectively forecasts every year in the time series was used to compare forecast performance among models.

Forecast errors were quantified using the root mean square error (RMSE) criteria. The model with the lowest RMSE was judged to be the ‘best’ forecast. If the RMSE criteria failed to differentiate among competing models then the model with the smallest variance was selected.

The ‘best’ forecast by stock and timing group at various probability levels are presented in Table 1. For all models the uncertainty associated with stock-specific forecasts are large (Table 1). Sibling models that use jacks to forecast age-4 returns are unlikely candidates for reliable prediction of age-4 returns in 1998 (jack returns in 1997). The proportion of jacks in many stocks underwent a long-term decline since the 1960s as somatic growth rates declined. Except for Stellako sockeye, correcting for the trend in jacking rate by using jack standard length as an additional explanatory variable was unsuccessful. Furthermore, anomalous migratory behaviour in 1997 resulted in high rates of straying of Fraser bound sockeye to non-Fraser systems and non-natal Fraser systems at unprecedented levels. Although still being investigated, the high rate of straying appears to be negatively correlated to body size (S. McKinnell, DFO, personal communication). If smaller fish were more likely to stray in 1997 then spawning ground estimates of jacks are likely biased low. The number of jacks estimated to have

returned to Fraser River spawning locations in 1997 (1998 brood) dropped dramatically compared to returns in 1993 (1994 brood). For example, the estimated return of Late Shuswap jacks was 19,000 in 1993 compared to 600 in 1994. Except for Chilko and Birkenhead sockeye, jack returns in 1997 were in the 100s of fish. Most runs in 1997 were comprised of < 1% jacks. Based on preliminary 1997 estimates, the only stocks with escapements >1% jacks were Birkenhead (4%), Gates (20%), Shuswap (42%) and Chilko (1.4%). At jacking rates experienced by most stocks in 1997, the effects of measurement error alone are likely to render jack-based sibling models unreliable. For these reasons, jack-based forecasts are not considered in this analysis. To accept the alternative hypothesis whereby the jacks in 1997 are representative of age-4 sibling abundance in 1998 is to assume unprecedented and catastrophic low survival of the 1994 brood.

The total 1998 Fraser sockeye run size forecast based on the 19 stocks considered in this report at the 50% probability level is 11.2 million sockeye (50% chance the run will exceed this forecast), and 6.8 million at the 75% probability level (75% chance the run will exceed this forecast). Forecasts by management group are 175,000 (50%) and 97,000 (75%) for Early Stuart, 640,000 (50%) and 300,000 (75%) for early summer stocks, 6.6 million (50%) and 3.9 million (75%) for summer run stocks and 3.8 million (50%) and 2.6 million (75%) for late run stocks. Results presented here concur with previous analyses that forecast models of Fraser sockeye perform poorly. No single method, including sibling models that theoretically account for most of the natural mortality incurred by a cohort, has performed consistently better than any other.

The most important stocks in 1998 based on forecasts presented here are Quesnel (summer run) at 4.3 million and Shuswap (late run) at 3.0 million sockeye (50% chance the run will be higher or lower). Forecasts for Quesnel and late Shuswap sockeye will form the basis for the early season management strategies of sockeye fisheries in 1998. Table 2 shows the uncertainty in forecasts. For Quesnel sockeye there is only a 50% chance the run will be within 2.5 million and 7.5 million sockeye. For the late Shuswap run the range is narrower at 2.0-4.0 million sockeye. These are large ranges for only a 50% chance of the run occurring within these levels.

The major impediment to improvements in accuracy of pre-season run size forecasts is related to our inability to model variations in ocean survival. Much of the information on survival predictions from ocean climate studies is qualitative in content and difficult to consider in the statistical framework of forecasting models. The environmental index used to explain variation in Chilko ocean survival has worked to some extent, whether spurious or not, and is the only variable examined (to my knowledge) that is correlated to smolt survival.

Low-frequency climatic changes that are implicated in turn to cause autocorrelated recruitment patterns in fish population (low and high survival regimes) are not evident in the time series of Chilko smolt ocean survival data. Chilko ocean survival based on age-1 smolts to adult age-4 survival have ranged from 1.2% in brood year 1957 to 23%

in 1986 and above average in 1992 and 1993 at 13% (long-term mean = 9.2%). The trend in smolt survival reveals little discernible recruitment pattern and the autocorrelation is insignificant at a lag of 1 year (r=0.18). The low correlation in inter-annual recruitment for at least Chilko sockeye (the only stock with smolt-return data) suggests that ocean survival in 1998 cannot be reliably predicted from recent survival or climatic trends. There is certainly no evidence based on the most recent two years of data to indicate sockeye are in a regime of low ocean survival. However, it is important to note that ocean temperatures in 1997 were extremely high. The impact of high temperatures on sockeye returning in 1998 is not known but managers may opt for a conservative management approach until in-season run size estimates become reliable. In-season indications of small fish size and low fecundity that may result from recent high ocean temperature should be considered to temper target escapement projections.

Subcommittee Discussion

The Fraser forecast paper represents a thorough and complete review of the forecasts using well established methods. The Subcommittee discussed the utility of the hydroacoustic fry data and noted that technology exists to improve the data if the expenditure is warranted. The authors will explore with the Fraser Lakes Production Group to more clearly evaluate the merits of supplementing the current surveys. The Quesnel forecasts using fall fry abundance is much lower than the other methods. The fry data is less certain than the data used for other forecasts. The Subcommittee asked the author to revisit the fry data to see if the fry size corroborated the low fry abundance (this was done and there was not an indication of the large fry size expected for a low fry abundance). The Subcommittee believes the fry data accuracy is suspect and does not endorse the forecast using fry data alone.

The Subcommittee also noted the very unusual climate conditions in 1997-1998 and the potential for lower than normal Fraser sockeye survivals. The author noted survivals in recent years have been average and there is no technical basis to evaluate potential effects of the unusual temperate regimes on the 1998 returns.

Subcommittee Recommendations

1. The Subcommittee recommends Fraser sockeye forecast probability distributions as outlined in Table 1. The total 1998 Fraser sockeye run size forecast based on the 19 stocks considered in this report at the 50% probability level is 11.2 million sockeye (50% chance the run will exceed this forecast), and 6.8 million at the 75% probability level (75% chance the run will exceed this forecast). Forecasts by management group are 175,000 (50%) and 97,000 (75%) for Early Stuart, 640,000 (50%) and 300,000 (75%) for Early summer stocks, 6.6 million (50%) and 3.9 million (75%) for summer run stocks and 3.8 million (50%) and 2.6 million (75%) for late run stocks.

S98-2 WCVI chum salmon forecasts for 1998. W. Luedke, and D. Bailey. ***Working paper accepted subject to revisions***

Forecasts of chum salmon returns are presented for two areas on the WCVI with potential commercial chum fisheries, namely Nitinat (Area 21/22) and Nootka Sound (Area 25). For Nitinat, the recommended forecast is approximately 1.2 million total return to Nitinat River and Hatchery. For Nootka Sound (Area 25) the recommended forecast is approximately 300,000 chum salmon total return to Nootka Sound.

The authors state that these forecasts are meant as a guide in pre-season planning, to help resolve allocation and economic issues regarding these fisheries. Forecasts of west coast Vancouver Island (WCVI) chum salmon adult returns are not used in the actual determination of fishing opportunity and should not be construed as obligations on the part of Fisheries and Oceans Canada. Instead fishing opportunities are based on application of in-season management and assessment regimes specific to each area.

Subcommittee Discussion

Data are limited for preparing forecasts, in particular, the quality of escapement data are poor and age composition is not available for many stocks.

With respect to the methodology used, advice was provided to authors to generate estimates of uncertainty for forecasts, to describe the environmental scalar used in Model 3 in more detail, and for the future, develop an environmental scalar that is reproducible by others. Advice was also provided to modify how Model 1 (long term average) was analyzed in the retrospective analysis; i.e. the years from 1991 to the year prior to the forecast year should be included in the average.

Subcommittee Recommendations

1. The Subcommittee recommends that the point estimate forecasts of 1.2 million for Nitinat chum and 0.3 million for Nootka Sound chum be adopted as WCVI chum forecasts for 1998.

S98-3 1998 forecasts for Johnstone Strait, Georgia Strait and lower Fraser River chum salmon. D. Bailey, V. Palermo, and P. Ryall. ***Working paper accepted subject to revisions***

The 1998 return forecast is comprised of four separate components: wild non-Fraser (wild chum include the progeny of both wild and enhanced chum which spawn in natural spawning areas); wild Fraser River, enhanced non-Fraser River and enhanced Fraser River. Existing major facilities in the Strait of Georgia and the lower Fraser River

have the capacity to produce 1.3 million chum at favourable marine survival rates. The major facilities on Vancouver Island include Big Qualicum, Little Qualicum spawning channel and the Puntledge Hatchery. They have a production potential of about 650,000 adults. Major facilities on the Fraser River include the Chehalis, Chilliwack and Inch hatcheries; these have a production potential of about 250,000 (not including habitat restoration). An additional 400,000 production occurs from various minor facilities and habitat restoration projects within the Study Area.

The authors compared the forecasting performance of seven models. The models used are similar to those documented in Wood et al. (PSARC S95-12). Model 1 is the long-term average return by calendar year (AVGCY). The next model examined used the average of the most recent 5 calendar year returns as the forecast (5YAVGCY). Model 3 (5YAVGBY) is similar to Model 2, except the abundance was totalled from brood year returns using the long term average return-at-age of 3, 4 and 5 year olds to determine the contribution from each brood year. The remaining four forecasting models are linear relationships between recruits and spawners. The independent variable is spawning escapement (S_t) in brood year t and the dependent is recruits (R_t). Models 5 through 7 use three through five most recent year averages of the “a” parameter rather than the long term average used by Model 4. Models 4 through 7 were termed LSRESC, 3YLSRESC, 4YLSRESC AND 5YLSRESC, respectively.

The results of the retrospective analysis are not conclusive, no one model outperformed the others. The RMSE and MAD was lowest for the 5YLSRESC model. However, the RMSE and MAD ranges among the models were quite small. Plots of the AVGCY, 5YAVGCY and 5YAVGBY reveal that they follow the general upward trend in Study Area,Lower Fraser chum salmon returns over the period 1965-96 but, do not capture the wide fluctuations seen in chum returns. On the other hand the linear spawner/recruit relationships better captured the wide fluctuations in chum returns over the period 1965-85 they were less successful in more recent years. It would appear that the best model out of the seven examined may be the 5YLSRESC for predicting returning runs based upon the RMSE and MAD criteria.

However, the authors were not completely satisfied by this conclusion for two reasons. Large forecasts were generated for return years 1996 and 1997 (4.1 and 4.9 million, respectively) from the large escapements of 1991 through 1994. The actual return in 1996 was only about 1.5 million and while a final run size estimate is not yet available for 1997 the in-season estimate is only 2.6 million total return.

Plots of survivals from enhanced facilities at Big and Little Qualicum, Puntledge, Chehalis, Chilliwack, Inch, Stave and Blaney covering brood years 1978-92 show a large decrease in marine survivals since the 1988 or 1989 brood year (Figs. 1 and 2).

Given the large decreases in marine survivals as observed at all major Study Area facilities in recent years and the equivocal results from the retrospective analysis, the authors decided to use the 3YLSRESC model to predict the 1998 return for the wild

component of Study Area chum salmon and average of most recent 3 year marine survival for enhanced component.

The 1998 forecast returns are shown in Table 2. The total return is expected to be 3,694,000 (50% probability of a lower return). This is substantially less than the 1997 forecast of 4,865,000. While the 1997 Study Area chum salmon run has not yet been reconstructed, the preliminary in-season estimate of abundance is 2.6 million. Forecast uncertainties are provided for the wild component of the returning chum stock only (Table 2).

Subcommittee Discussion

The working paper was accepted, noting Subcommittee recommendations for additional analysis required for subsequent year forecasts.

The Subcommittee noted that the forecast models used were previously accepted by PSARC in 1988. These forecasts allow fishery managers and industry to initiate pre-season management planning and allocation. The in-season management plan is based on in-season assessments of return abundance. The Subcommittee noted the RMSE for all models were high, that is that all models were poor predictors and there is no clear choice of a preferred model. The Subcommittee suggested exploring the use of the Mission Downstream chum fry data for the Fraser River component of forecasts. In recent years there has been a downward trend in marine survivals as shown in Figs. 1 and 2.

It is noted that the forecast of return for 1998 (based on the most recent 3 year average Ricker a value) may be optimistic given the downward trend in marine survivals for return years 1993-96.

The validity of the escapement data used in this report (particularly for the Fraser River) needs to be evaluated as recent data collection methods have been significantly altered from previous approaches.

Subcommittee Recommendations

1. The Subcommittee recommends adopting the 1998 return forecast as shown in Table 2. The total Study Area return is expected to be 3,694,000. This is substantially less than the 1997 forecast of 4,865,000.

S98-4 An update on the 1997 stock status and 1998 forecasts of Barkley Sound sockeye. K.D. Hyatt and W. Luedke. ***Working paper accepted subject to revisions***

Recent years returns of Barkley Sound sockeye have been gradually increasing from a low of only 200,000 fish in 1995 to 380,000 in 1996 and 465,000 in 1997. Although moderate, recent increases were anticipated by two independent forecasting procedures first developed in 1987 and applied annually since 1988 to predict returns of Barkley Sound sockeye. The forecast gradual recovery of the stock provided aboriginal, recreational and commercial fisheries opportunities in 1997. Recent year stock increases represent a continuation of a pattern of predictable variations in ocean climate states that have lead to repeated "crashes" (1978, 1985-86, 1989-90, 1994-95) followed within 1-3 years by recoveries (1979-81, 1987-88, 1991-93, 1996-97) of WCVI sockeye returns. The small surplus for commercial catch in recent years is directly attributable to the combined effects of: (i) a shift of conditions in the marine environment that supported near average survival of sockeye smolts migrating seaward between 1994 and 1996 and (ii) management to protect escapement as a basis for increases in future year returns.

Over the past 10 years, four independent techniques have been tested annually for their utility in generating reliable pre-season forecasts of Barkley Sound sockeye returns for harvest managers. The four techniques are known as the Salinity Survival Method (SSM), the Survival Stanza Method (SStM), the Sibling Age Class Method (SACM), and the Salmon Enhancement Program Biostandard Method (SEPB). Updates on the performance of three of these techniques to 1997 are as follows:

(1) The SStM forecast exhibits the best overall performance with a Mean Absolute Percent Error (MAPE) value of approximately 27% over the most recent 10 years of forecasting. Further, SStM forecasts account for the majority of variations in returns if the extreme observation associated with the 1991 return year is omitted from the analysis (returns= 1.17 SStM forecasts - 66.35, r^2=0.82, p<0.01).

(2) The SSM forecast exhibits the next best performance with a MAPE value of 37% over the most recent 10 years of forecasting. SSM forecasts also exhibit a statistically significant association with returns if the 1991 return year is omitted from the analysis (returns= 0.83 SSM forecasts + 35.28, r^2=0.77, p<0.01).

(3) SEPB forecasts have performed well over some return intervals but not others. During the 1988-1997 testing interval SEPB forecasts exhibited a substantially higher MAPE value (58%) than that displayed by both SSM and SStM forecasts (27-37%). Large magnitude deviations between SEPB forecasts and actual returns tend to occur in consecutive years which seriously erodes the confidence of harvest managers as well as the fishing industry in their utility.

SStM and SSM forecasts (451,000 and 771,000 sockeye respectively) indicate that returns of Barkley Sound sockeye will remain below the 20 year average (880,000) in 1998 but are likely to represent an improvement over both the 1996 and 1997 return years. SEPB suggests returns of 902,611 sockeye which would exceed the 20 year average return. Comparative performance of the various forecast options along with DFO's recent pursuit of a more risk averse approach to management recommends the SStM forecast range of 384,000 (75% probability) to 615,000 (25% probability) sockeye as the preferred, pre-season forecast for 1998.

Subcommittee Discussion

The paper was accepted by the Subcommittee. Barkley Sound forecasts have been relatively accurate and are an important component of the Barkley Sound management plan for sockeye. The Subcommittee suggested using all four of the model performance evaluation methods as outlined in Welch et al. (PSARC S94-16) and Wood et. al. (PSARC S95-12) rather than only the Mean Absolute Percent Error (MAPE) used in this report. The reporting of uncertainty in this report is inconsistent with the preferred probability distribution approach because of inherent differences in the approach used to forecast Barkley sockeye. The Subcommittee suggested an alternate approach to make the evaluation of uncertainty more consistent. The authors completed a revision and the probability distributions for the 1998 Barkley Sound sockeye forecasts are outlined in Table 3.

Subcommittee Recommendations

1. The Subcommittee recommends the SStM approach for Barkley Sound sockeye forecasts in 1998. The probability distribution of the forecasts is: 75% probability of a run larger than 384,000, 50% probability of a run larger than 451,000 and a 25% probability of a run larger than 615,000.

S98-5 1998 forecasts of marine survival rate, marine distribution and pre-fishery abundance for southern B.C. coho salmon. R. Kadowaki and B. Holtby.
Working paper accepted subject to revision

Forecasts of marine survival rate, marine distribution and pre-fishery abundance for southern B.C. coho in 1998 were generated using methods similar to those used in previous years. However, abundance forecasts were for two stock aggregates (INSIDE - Strait of Georgia, Fraser River, Johnstone Strait; OUTSIDE - west coast of Vancouver Island) rather than for the WCVI troll fishing area as contained in previous working papers. The stock aggregate forecasts are now required by fishery managers to plan fisheries throughout the range of southern B.C. coho stocks and not just for the WCVI troll fishing area.

Four methods of producing marine survival rate forecasts were presented; a sibling regression (SibR) model, a ratio method (RAT1: ratio of survivals is constant, so any change observed will continue), a 3-year running average (3YRA) model, and a Like Last Year (LLY) model (note - This model simply says that the coming year will be like last year). Retrospective analysis indicated that the RAT1 and LLY models provided the best forecasts for Strait of Georgia coho because of the trending nature of coho survival in this area. For Robertson Creek coho (WCVI), the RAT1 and SibR models worked best. Results for the best models are summarized in Table 4.

Four methods were also examined to forecast marine distribution of catch; a salinity model (SAL), a ratio model, a 3YRA model and an LLY model. The salinity model worked best using February salinity at the Chrome Island light station. This model predicted a moderately strong outside distribution of Strait of Georgia coho. Qualitative information from research trawl and troll programs and from sport fishermen indicates a very strong outside distribution pattern. Results for the best models are summarized in Table 4.

A 10% reduction from the 1996 reconstructed abundance for INSIDE and OUTSIDE aggregates was used to arrive at the 1997 abundance forecast. The abundance of these stock aggregates in 1996 was reconstructed by dividing catch by stock aggregate by an estimate of the mean exploitation rate applied to the stock aggregate. Stock composition data for the 1994 return year were used to partition the 1996 catch. The partitioning was based on a Pacific Salmon Commission model using CWT recoveries. A range of observed abundance for the 1997 return year was generated using mean exploitation rate values of 0.20, 0.25 and 0.30 and by supplementing CWT based stock composition estimates with DNA based estimates for the WCVI and Juan de Fuca sport fisheries. Three methods were examined for forecasting 1998 abundance; a 3YRA model, an LLY model and a ratio model that forecasts the coming year based on the ratio of last year to the previous year multiplied by last year. The LLY model worked best and results for it are summarized in Table 4.

The following points summarize the authors conclusions and recommendations:

1. The authors recommend that a forecast of marine survival in 1998 for Strait of Georgia hatchery indicator stocks using either the LLY or the RAT1 model be adopted. Both models perform well when marine survival is trending. The RAT1 model gives a more conservative and more precise forecast for Chilliwack, the most strongly trending of the hatchery indicators. The range of marine survival forecasts for these two models for Big Qualicum River, Chilliwack River and Quinsam River are 0.012–0.014, 0.015–0.024, and 0.012–0.014, respectively.

2. The sibling regression and RAT1 models worked best for Robertson Creek coho and produced a marine survival forecast of 0.030–0.044 (50% probability) for 1998.

3. The marine distribution of Strait of Georgia coho is likely to show a high outside pattern again in 1998. A salinity correlate (February at Chrome Island) indicates a moderately high outside distribution, while more qualitative information (research trawl and troll catches, observations by sport fishermen) suggests a strong outside distribution as we saw in 1995, 1996 and 1997.

4. The authors recommend an LLY approach to forecasting the abundance of Strait of Georgia coho based on the fishery mortality reconstruction applied to the 1997 return. This produces a Strait of Georgia (including Fraser River) coho forecast of 363,607 (50% prob.) in 1998. Caution should be exercised in applying the 50% probability forecast since a similar approach for 1997 produced an over-forecast of the return, and the RAT1 model predicted considerably lower abundance for the INSIDE aggregate.

5. For the west coast of Vancouver Island, the LLY model produced a forecast of 176,225 (50% prob.). Returns might be higher than this because returns in 1998 are from a much greater spawning escapement than the return in 1997.

6. Reconstructions of abundance used in forecasting analyses would be greatly enhanced by more timely and stock specific estimates of fishery stock composition. Coded wire tag data are deficient for this purpose. A carefully designed DNA sampling program could provide this information for both domestic management and Pacific Salmon Commission purposes.

7. Please be aware that all forecasts of coho survival, distribution and abundance have high statistical uncertainty. The authors would urge that during periods of low abundance and marine survival such as now experienced, extreme caution (conservatism) be exercised in fishery management applications of these forecasts.

Reviewers' Comments

Reviewer #1

Reviewer 1 indicated that the paper reviews the available information to generate forecasts of total coho salmon abundance in southern BC. The reviewer noted that the paper is generally quite comprehensible, although there is lack of detail in certain areas that makes it difficult to assess the uncertainty in some of the estimated quantities. The poor performance of the abundance forecasts for 1997 is reason to be cautious about the use of the methods. It is suggested that in the future, formal time series methods be used for marine survival forecasts, and that all of the various sources of uncertainty be formally incorporated into the forecasts, possibly using Bayesian methods.

Reviewer #2

Reviewer 2 concluded that forecasts presented in this working paper satisfy the four general requirements of scientific forecasts: first, the quantities being forecasted (here survival of indicator stocks, P_{inside}, and abundance by stock aggregate) can be measured; second, the procedures used are documented well enough to allow others to reproduce the analyses in future assessments; third, the performance of alternative methods is compared in fair, retrospective analyses; and finally, forecasts are provided as probability distributions or with quantitative estimates of their uncertainty.

This reviewer also noted that confidence intervals for the 1998 forecasts are likely too narrow because not all sources of possible error were considered. However, he also pointed out that this deficiency should have little impact on the utility of advice presented because confidence intervals presented in the paper were already very wide. The reviewer had difficulty understanding (from the description in the working paper) how the standard deviation for the LLY estimates had been computed, but once explained by the authors, he agreed that the method used was reasonable, but suggested that the description in the working paper should be improved. He also recommended that in developing future forecasts such as these, where no biological data or insights are available to guide analysis, the authors explore more conventional time series analyses instead of the LLY method. The reviewer suggested using all four of the model performance evaluation methods as outlined in Welch et al. (PSARC S94-16) and Wood et. al. (PSARC S95-12, but acknowledged that the MSE criterion used by the authors ought to be similar, or intermediate to the other approaches.

Reviewer #3

The third reviewer focused on the relevance of the forecasts for setting up pre-season management strategies for southern coho. He concluded that the forecasts are reasonable, and that they provide a credible basis for the management of these stocks. The reviewer identified a number of issues that warrant consideration. The first issue relates to the forecasting methods. The forecasts may be optimistic. Since there is a downward trend since the mid to late 1980s the methods used may overpredict the survival for 1998, as occurred for Strait of Georgia stocks in 1997. The second issue relates to stock composition data. Based on DNA sampling, the catch of West Coast of Vancouver island stocks of coho would fall to less than half the catch estimated by CWTs, and the interceptions of U.S. origin stocks and inside stocks increase substantially. The third issue is related to distribution. The evidence that Strait of Georgia coho will be on the West Coast of Vancouver Island again in 1998 is reasonable. However, the reviewer cautions that during strong El Niño years (e.g. 1992 and 1993), significant numbers of coho remained inside. The reviewer points out that we are currently in an other intense El Niño event and recommends that the coho distribution be closely monitored in 1998.

Subcommittee Discussion

The Subcommittee discussed the issue raised by the reviewers that survival forecasts may be overestimated. The possibility that the best model may be a linear regression of recent years because of the downward trend in survival was discussed. The authors pointed out that actually there was not a declining trend for Robertson Creek coho since 1991, the Big Qualicum trend was downward for the last four years. The Subcommittee noted that survivals of the Quinsam and Chilliwack indicators had declined over the last decade. A suggestion to use time series methods was made to address this issue (this should be available for inclusion in this report). The Subcommittee noted that if the trend of decreasing survival for the inside indicators continued in 1998 the coho forecasts would be over estimates, and is grounds for a cautious approach.

Stock composition estimates were derived using a methodology developed by the Pacific Salmon Commission, Coho Technical Committee. The most recent composition data available was from the 1994 fishery. The 1994 data were applied to estimate the 1995, 1996 and 1997 abundance. This introduces more uncertainty into the estimates but is the best approach currently available. Other difficulties with the abundance estimates were related to exploitation estimates only from three hatchery stocks and uncertain estimates of total mortality estimated for non-retention fisheries. The Subcommittee noted that this additional uncertainty is not captured in the model forecasts probability distributions (and cannot be estimated). For this reason the Subcommittee suggests a conservative approach to applying the forecasts in 1998.

Reconstructions of abundance used in forecasting analyses would be greatly enhanced by more timely and stock specific estimates of fishery stock composition. Coded wire tag data are deficient for this purpose. A carefully designed DNA sampling program could provide this information for both domestic management and Pacific Salmon Commission purposes.

The Subcommittee suggests that the lower range of the forecasts be used to determine coho management action for 1998 for Strait of Georgia coho. This conservative approach is recommended for three reasons: 1) there is a downward trend in survival for the inside stocks, 2) the 1997 survival has been overestimated using the same methods as for 1998, and 3) the stock composition data are uncertain for allocating catch to the appropriate stock.

The marine distribution of Strait of Georgia coho is likely to show a high outside pattern again in 1998. A salinity correlate (February at Chrome Island) indicates a moderately high outside distribution, while more qualitative information (research trawl and troll catches, observations by sport fishermen) suggests a strong outside distribution as we saw in 1995, 1996 and 1997.

Subcommittee Recommendations

1. The Subcommittee recommends adoption of a forecast of marine survival in 1998 for Strait of Georgia hatchery indicator stocks using the LLY or RAT1 model. The range (50% probability) of marine survival forecasts for these two models for Big Qualicum River, Chilliwack River and Quinsam River are 0.012–0.014, 0.015–0.024, and 0.012–0.014, respectively.

2. The sibling regression and RAT1 models worked best for Robertson Creek coho and produced a marine survival forecast of 0.030-0.040 (50% probability) for 1998, the same as the 1997 return.

3. The Subcommittee recommends an LLY approach to forecasting the abundance of Strait of Georgia and west coast Vancouver Island. The forecast probability distribution for the Strait of Georgia (including Fraser River) coho in 1998 is: 75% probability of a run larger than 280,000; 50% probability of a run larger than 365,000; and a 25% probability of a run larger than 485,000. The forecast probability distribution for west coast Vancouver Island coho in 1998 is: 75% probability of a run larger than 125,000; 50% probability of a run larger than 175,000; and a 25% probability of a run larger than 245,000.

4. The Subcommittee recommends that during periods of low abundance and marine survival such as we are experiencing, a conservative approach be exercised in fishery management applications of these forecasts. All forecasts of coho survival, distribution and abundance have high statistical uncertainty.

4. Tables and Figures

Table 1 Fraser River run size forecasts of age-4 and age-5 sockeye by stock and timing group (bolded) for 1998.

	Probability of Achieving Specified Run Sizes[a]				
STOCK/TIMING	**25%**	**50%**	**75%**	**80%**	**90%**
Early Stuart	**321000**	**175000**	**97000**	**84000**	**58000**
Driftwood	38000	13000	4000	3000	2000
non-Driftwood	283000	162000	93000	81000	56000
Early Summer	**1436000**	**642000**	**296000**	**245000**	**150000**
Fennell	57000	30000	16000	14000	9000
Bowron	38000	22000	13000	11000	8000
Raft	18000	9000	5000	4000	3000
Gates	49000	26000	14000	12000	8000
Nadina	39000	22000	13000	11000	8000
Pitt	84000	46000	25000	22000	15000
Seymour	215000	116000	63000	54000	36000
Scotch	936000	371000	147000	117000	63000
Mid Summer	**11525000**	**6647000**	**3862000**	**3376000**	**2364000**
Chilko	2269000	1411000	878000	780000	569000
Quesnel	7489000	4298000	2467000	2148000	1486000
Stellako	856000	545000	348000	311000	230000
LateStuart	911000	393000	169000	137000	79000
Late Summer	**5519000**	**3754000**	**2567000**	**2335000**	**1819000**
Birkenhead	513000	303000	179000	157000	111000
Late Shuswap	4250000	2994000	2109000	1932000	1531000
Cultus	34000	18000	10000	8000	5000
Portage	93000	45000	21000	18000	11000
Weaver	629000	394000	248000	220000	161000
TOTAL	**18801000**	**11218000**	**6822000**	**6040000**	**4391000**

[a] probability that the actual run size will exceed the specified forecast

Table 2 Total expected return of Johnstone Strait, Georgia Strait and lower Fraser River chum salmon for 1998.

STOCK TYPE	AGE 3	AGE 4	AGE 5	TOTAL
Fraser River Wild	432,000	1,221,000	83,000	1,736,000
Fraser River Enhanced	18,000	103,000	15,000	136,000
Non-Fraser River Wild	168,000	1,160,000	141,000	1,469,000
Non-Fraser River Enhanced	32,000	262,000	59,000	353,000
Total Fraser River	450,000	1,324,000	98,000	1,872,000
Total Non-Fraser River	200,000	1,422,000	200,000	1,822,000
Grand Total	650,000	2,746,000	298,000	3,694,000
Percent	18%	74%	8%	100%
WILD CHUM SALMON ESTIMATES ONLY				
Probability of achieving denoted run size or greater				
90%				623,000
75%				1,847,000
50%				3,205,000

Table 3. Barkley Sound sockeye return forecasts for 1998.

Probability of Achieving Specified Run Sizes*

Forecast	25%	50%	75%	90%
SStM	615000	451000	384000	292000
SSM	1020000	771000	436000	231000
SEPB	1019000	902611	336000	NA<0

* probability that actual run size will exceed the specified forecast.

Table 4. Summary of recommended marine survival, distribution and abundance forecasts for southern B.C. coho salmon in 1998.

	Best Models	Probability of Achieving at Least the Specified Value		
		50%	75%	90%
Marine Survival				
Big Qualicum	RAT1–LLY	0.012–0.014	0.008–0.009	0.006–0.006
Quinsam	LLY–RAT1	0.012–0.014	0.007–0.023	0.007–0.012
Chilliwack	RAT1–LLY	0.015–0.024	0.012–0.019	0.010–0.015
Robertson	SibR–RAT	0.030–0.044	0.021–0.023	0.021–0.012
Distribution (proportion inside)				
Big Qualicum	SAL	0.239	0.172	0.118
Quinsam	SAL	0.257	0.191	0.136
Chilliwack	SAL	0.139	0.076	0.033
Combined	SAL	0.226	0.173	0.130
Abundance				
Originating Inside[1]	LLY	363,607	278,126	216,024
Originating Outside[2]	LLY	176,225	126,818	92,994

[1] Abundance of stocks originating from the Strait of Georgia, Fraser River and Johnstone Strait.

[2] Abundance of stocks originating from West coast Vancouver Island.

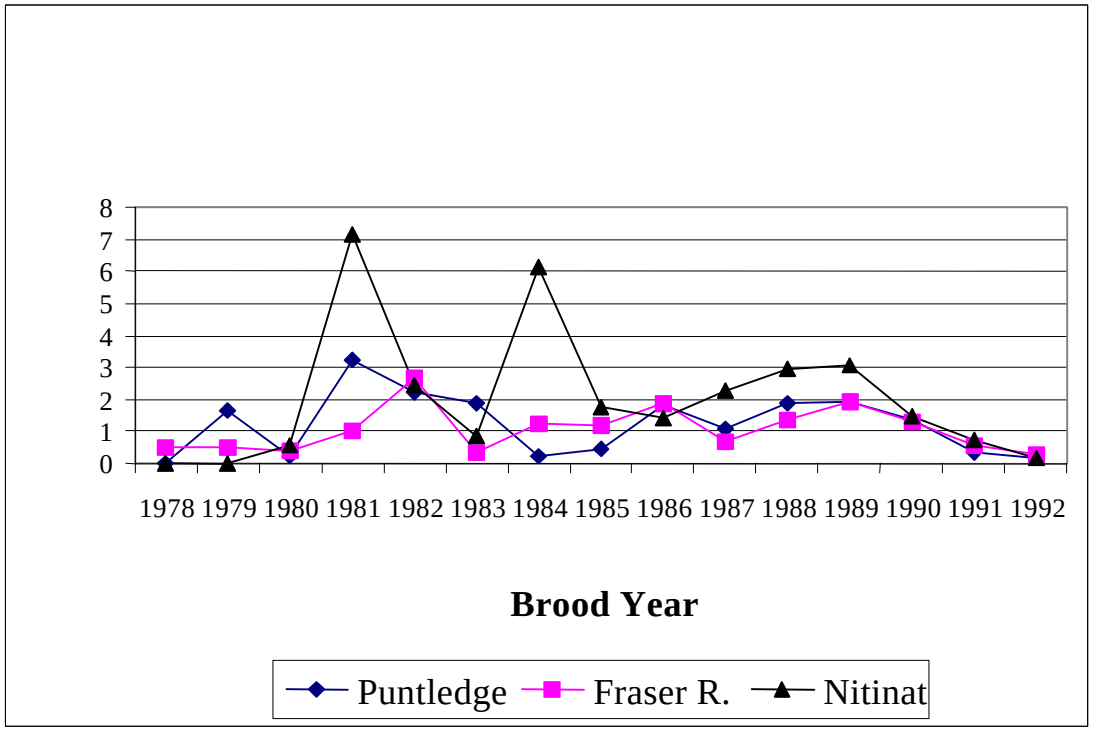


Fig. 1 Survival south coast chum fry released from enhancement facilities

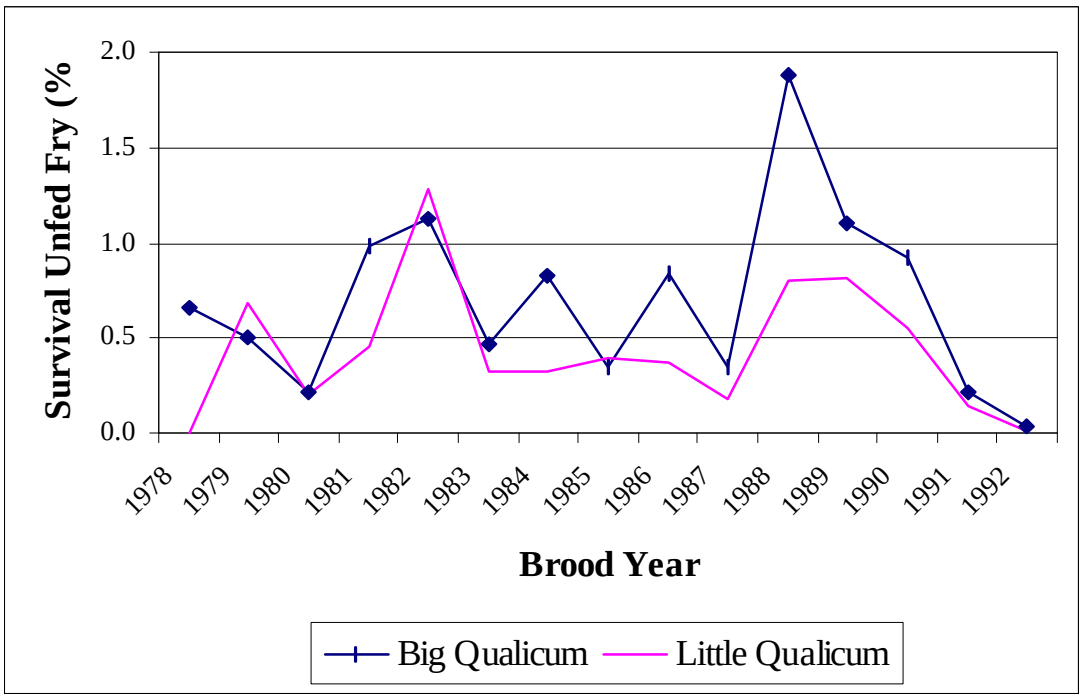


Figure 2 Survival South Coast chum fry released from enhancement facilities

5. APPENDIX 1 Participants at the March 18, 1998 meeting of the Salmon PSARC Subcommittee.

Subcommittee Chair: Dave Peacock
PSARC Chair: Max Stocker

Subcommittee Members:

D. Anderson
S. Argue
D. Bailey
A. Cass
B. Hargreaves
B. Holtby
K. Hyatt
R. Kadowaki
A. MacDonald
S. McKinnell
P. Ryall
M. Sullivan
C. Wood

Observers:

R. Beamish
G. Caw
T. Gjernes
W. Leudke
B. Otway
B. Shaw
B. Snyder
D. Welch
K. Wilson

6. APPENDIX 2 Reviewers of Working Papers

Working Paper	**Reviewers**
S98-5	Mike Bradford David Welch Chris Wood

6.6.2 PSARC ADVISORY DOCUMENT 97-6 PACIFIC SALMON DECEMBER 1997

I. STEERING COMMITTEE REPORT

The Steering Committee met January 7th 1998 at the South Coast Division, 3225 Stephenson Point Road, Nanaimo, to review the Salmon Subcommittee report. The report was accepted, with the following comments and recommendations. The Steering Committee thanked the Subcommittee chair for a useful and well organized report.

Major Steering Committee Discussion and Concerns

1. Steering Committee endorses the development of multi-stock fisheries models that combine production of all salmon species in an area. Such models can be used to examine the consequences of alternative management actions.

2. Given the Subcommittee recommendations under working paper S97-11, Steering Committee notes the need for a review of all recreational catch monitoring requirements and programs. This review should include recreational catches of both salmonids and non-salmonids. In addition, DFO should obtain and maintain electronic copies of data collected under co-management programs. For example, the recreational catch data described in S97-11 are currently maintained by the stock assessment staff only in paper copy.

S97-8 Biological Escapement Goal for Klukshu River Chinook Salmon.

Steering Committee endorsed the recommendations. However, further analytical work should be conducted to explore the potential information gains from high and low escapement levels before active probing of these levels is conducted.

S97-9 Recommended Escapements to Secondary Sockeye Nursery lakes in the Skeena River System.

Steering Committee accepts the recommendations, but notes that minimum abundance reference points are meaningful only in the context of improved production and should not be interpreted as conservation goals.

S97-10 Babine Lake Sockeye Salmon: Stock Status and Forecasts for 1998

Steering Committee accepts the 1998 forecasts and the recommendations. Steering Committee emphasizes the need for assessments of the effects of disease on wild Babine Lake sockeye. The multi-stock production/management model is very important and should be developed by Stock Assessment staff in conjunction with Operations and Habitat and Enhancement Branch staff.

S97-11: Haida Gwaii Creel Survey of Ocean Sport Fisheries in Area 1, 2E, and 2W.

Steering Committee accepts the recommendations, but expressed concern about possible duplication of effort. For additional discussion, see Major Concerns above.

Steering Committee also noted that the methodology was judged to be sound, following "well known" practices in the Strait of Georgia creel survey executed by DFO. The Steering Committee concluded that pending completion of the revisions recommended by the Subcommittee, the estimates of catch would be accepted.

S97-12 A Biological Assessment of the Coho Salmon of the Skeena River, British Columbia, and Recommendations for Fisheries in 1998.

Steering Committee endorses the recommendations and acknowledges efforts by DFO to reduce exploitation on upper Skeena coho. However, Steering Committee advises that the conservation risk to upper Skeena coho will remain high even in the absence of a Canadian fishery because of the anticipated exploitation rate in Alaska. Furthermore, if marine survival continues to be poor in 1998, then conservation concerns for coho will spread to the entire Skeena system.

II. SALMON SUBCOMMITTEE REPORT

Introduction

The PSARC Salmon Subcommittee met December 2-5, 1997 at the Pacific Biological Station, Nanaimo. Six Working Papers were presented to the Subcommittee. Meeting participants and reviewers of Working Papers are listed in Appendices 1 and 2, respectively.

General Subcommittee Discussion and Concerns

(i) The Subcommittee recommends that development of assessment frameworks for other species be initiated. The Subcommittee noted that such frameworks would be very helpful in decisions involving the allocation of assessment resources between species and sub-regions.

(ii) The Subcommittee highlights the importance of the development of production/ management models for all salmon species. These models are seen as an important tool for decision making, negotiations and generation of policy and management advice.

(iii) The Subcommittee discussed the process for reviewing forecasts for 1998. There were no forecasts for southern or Fraser stocks presented at this PSARC session. This was intentional since the final data required to make these forecasts is not available until late February. It is anticipated that a one day PSARC session will be convened in March 1998 to review Fraser, and southern coho, chinook and chum forecasts. The Subcommittee noted that for North Coast stocks forecasts had been prepared and distributed to interested parties in early December. With a few exceptions, forecasts were made using PSARC approved methods where they existed and historic management forecast methods where they did not.

(iv) The Subcommittee noted that there have been requests to produce "forecasts" or "outlooks" extending as far as four years into the future. Some of these statements of expectations were contained in the Departmental "Stock Outlook" document, which was viewed by the Subcommittee. The Subcommittee stresses that any forecasts prepared by the Stock Assessment Division should utilise methods approved by PSARC, but that the Subcommittee has not reviewed methods of long-term forecasting. The Subcommittee also expressed concerns that there are currently multiple sources of "forecasts" within the Region, which may lead to situations of conflicting stock forecasts.

Working Paper Summaries, Reviews And Discussion

S97-8 Biological Escapement Goal for Klukshu River Chinook Salmon.

McPherson, Etherton, and Clark. **Accepted Subject to Revisions**

This paper is a revision to a previous PSARC paper (S95-7) and includes all the changes requested in the previous review. This paper analysed available information on harvests, escapements and age composition of chinook salmon returning to the Klukshu River, a tributary of the Tatshenshini River on the Alsek River System, during the years 1976-1996. The analysis deals only with the Klukshu River tributary since escapements to the rest of the Alsek system are not available. The Klukshu River escapements were combined with estimated harvests of Klukshu River chinook salmon in Canadian and U.S. fisheries based upon three alternate assumptions concerning the Klukshu component of the chinook salmon harvested in the U.S. Alsek gillnet fishery. Estimated age-specific upstream runs (escapement plus Canadian harvests) of Klukshu River chinook salmon were added to the three alternate sets of U.S. harvests to estimate annual age-specific total runs for the years 1976-1996. Analyses included regression techniques, examination of measurement error and bias, tabulation of probabilities of return by spawning stock size in a Markovian approach, and calculations of loss functions given alternate spawner-recruit parameters. Spawner recruit relationships were used to estimate a range of escapements to provide near-maximum sustained yield. A biological escapement goal range of 1,100 to 2,300 chinook salmon spawners was recommended for the Klukshu River.

Reviewers' Comments

Reviewer #1

The reviewer acknowledged that the authors had included the additional information requested by the Subcommittee after the previous submission of this paper (S95-7) and had done a good job of documenting the information used in the paper. Two additional years of higher returns have increased the optimal escapement slightly, but it is still less than any observed escapement. The reviewer agreed that alternative approaches to model stock recruit data should be explored but indicated the Markovian approach would be inconclusive using 16 years of data. The reviewer believes there are possible explanations for the stock recruitment relationship other than the density dependent mortality indicated by the authors. Explanations could include catch that was unreported because some fisheries were not examined (although there is data to refute this theory) or that there had been a simultaneous decline in survival and exploitation rates. The reviewer suggests that the escapement goal should not be changed until 2001 when it is scheduled for revaluation. The reviewer also questioned the merits of a fixed escapement versus a fixed harvest rate management approach.

Reviewer #2

The reviewer agreed that the authors have provided ample data to justify revision of the escapement goal, and that the proposed goal of 1,100 to 2,300 is in the conservative range of spawning escapements. Often when salmon stocks fail to meet escapement goals there are several contributing factors such as habitat loss and degradation, high exploitation rates, and large coefficients of variation. None of these are apparent for the Klukshu. However, least squares regression of the Ricker stock-recruit equation has a well known bias, which leads to overestimation of stock productivity and underestimation of MSY spawning escapement. The bootstrap procedure used in this paper to estimate bias addresses only a small component of that bias. It is very likely that the spawning escapement that would result in the greatest average surplus production is greater than the 900 spawners indicated, and that a sustained exploitation rate in excess of 70% to achieve this would result in local extinction of less productive stocks in the Alsek system, which the Klukshu indexes. Despite these concerns, the reviewer believes that the escapement goal of 1,100 to 2,300 should be large enough to allay concerns about biological productivity and genetic integrity.

The reviewer also made the point that most of the data presented is from a time period when, in his opinion, it is now widely accepted that there has been a shift in oceanic conditions that has been less favourable for chinook and coho salmon. There is evidence, again in the opinion of the reviewer, that another shift has occurred in the 1990's. Arguing that because returns from the four largest spawning escapements on record will be enumerated over the next five years, the reviewer recommends that the escapement goal should be re-evaluated in 2002.

Subcommittee Discussion

The Subcommittee accepted the Working Paper with minor revisions but could not recommend acceptance of the revised escapement goal. The Subcommittee did acknowledge that the technical basis of the present escapement goal of 4,700 Klukshu chinook was weak, and that re-evaluation was appropriate.

There was extensive discussion about technical details of the assessments. The Subcommittee recognised that the authors had addressed comments from the Subcommittee on a previous version of this paper (Working Paper S95-7), that the assessment was based on good escapement counts to the Klukshu River and age composition data, that the authors' recommended escapement goal was now a range and that the mid-point of that range was larger than their previous recommendation.

The Subcommittee had concerns about the three assessment approaches used:

(a) All three of the assessments presented were based on 16 years of brood production data. However, the available data is clustered within a limited range (1,064 to 3,104 spawners), and escapement exceeded the present goal in only one year (1995 return) and returns from that year are yet to be observed.

(b) The Ricker stock-recruitment analysis yielded a sustainable exploitation rate of 75% for this spring chinook stock. An exploitation rate of that value would be considered extremely high for southern fall chinook stocks, which are presumed to be more productive. The authors did not comment on this result, and give no biological basis for it. Further, the Subcommittee could not agree with the assumption that this stock was not historically over-exploited since over-exploitation may have occurred many years ago and the stock has not successfully rebuilt.

(c) The Markovian assessment was based on only 16 data points, which is a very limited sample upon which to infer a non-parametric distribution for production from the observed escapements.

(d) The Loss function assessment is based on the same limited range of data and Ricker function.

The Subcommittee was also concerned that the data had been collected during a period of poor marine survival. Longer-term catch records from the Dry Bay net fishery (Table 17 in the Working Paper) imply periods of higher and lower production and, as one reviewer noted, the present data does not show evidence of increased production when the terminal harvest rates were substantially reduced. The authors' assessment implies that this is due to density dependence in spawning. However, neither juvenile production data nor marine survival rates are available to test these alternative explanations.

The Subcommittee was concerned that the current management system would be unable to maintain tributary specific escapements to the Alsek system (even if there were tributary-specific abundance forecasts and some stock identification ability).

The time series of Klukshu chinook exploitation rates looks more like the result of a fixed exploitation rate approach rather than a fixed escapement system. There is little variation in the annual exploitation rate. Prior to the last few years the Klukshu stock abundance has been relatively constant. Therefore, escapements had remained within a relatively narrow range, which failed to elucidate the existence and nature of density-dependent limits to freshwater production. The 1993 to 1996 abundance increased and the fixed exploitation approach resulted in higher escapements.

The Subcommittee wishes to note that examination of this paper has been particularly informative concerning what is required to technically assess a chinook escapement goal. The data collated for this tributary system are very good in comparison to those available for the vast majority of other chinook populations.

Concerning revision of the spawning escapement goal, the Subcommittee does not support revision of the current escapement goal to a fixed “optimal” level, in the sense of an MSY escapement calculated with a Ricker function. Instead the Subcommittee recommends the development of an assessment/management process that establishes and achieves, annually, a minimum escapement floor (consistent with the lower end of the escapement range presented in this paper) for Klukshu chinook. Within the management process, harvest rates should be set to share returns above the floor between catch and escapement. Increased knowledge of the dynamics of the Klukshu chinook can best be generated if managers actively probe low and high escapements. The assessment/ management process must also recognise the mixed-stock nature of these fisheries and protect the diversity and production from other spawning populations.

Given the importance of observing future returns, the Subcommittee supports the assessment programs recommended in the Working Paper.

Subcommittee Recommendations

(a) The Subcommittee acknowledges that the current escapement goal has a weak technical basis. However, given the deficiencies with the current data and the potential information gains to be had by observing returns from recent escapements, the Subcommittee recommends that re-evaluation of the escapement goal not be conducted until returns in 2001 are analysed.

(b) In the interim, the Subcommittee recommends the development of an assessment/ management process that results in a management plan that actively probes high and low escapement levels, while assuring a minimum escapement target is met.

S97-9 Recommended escapements to secondary sockeye nursery lakes in the Skeena River system. Shortreed, Hume, and Wood

Accepted Subject to Revisions

The main objectives of this report were to present:

1. past and present abundance and trends of adult sockeye stocks;
2. current status of juvenile sockeye stocks in the 10 largest secondary (non-Babine) Skeena nursery lakes;
3. current productivity and juvenile sockeye rearing capacity of the lakes and limiting factors;
4. recommended minimum and optimum escapements to the lakes; and,
5. suggested enhancement techniques for sockeye stocks in the study lakes.

To predict rearing capacity of and optimum escapements to the study lakes, the authors used a rearing capacity model (the PR model) which has been described in detail elsewhere (Hume et al. 1996; Shortreed et al. 1997). Data suitable for applying this model were already available from four Skeena lakes (Alastair, Bear, Swan, and Morice) (Stockner and Shortreed 1979). In 1994 and 1995 the authors collected similar data from six additional lakes (Johanson, Kitsumkalum, Kitwanga, Lakelse, Morrison, and Sustut). All 10 of the secondary lakes examined provided suitable juvenile sockeye rearing habitat but they varied in productivity. All lakes are oligotrophic except for Kitwanga Lake, which is mesotrophic. Phosphorous was the major nutrient limiting productivity. The hypolimnion of Kitwanga Lake may be anoxic in the summer months and thus limit production. Fall fry sizes(4-6 g) in Bear, Lakelse and Morrison lakes were similar to those found in other B.C. lakes, while size in the other lakes was smaller than average. Morice Lake had the smallest fall size measured (0.8g). PR model predictions were modified to account for midwater competitors, two juvenile sockeye year classes, and available spawning habitat.

The results indicate that for each study lake, except Johanson Lake, maximum reported escapement over the last 10 years was less than our estimate of optimum escapement. In aggregate, maximum reported escapement over the last 10 years was less than one-third of the optimum. The authors recommended that, optimum or target escapement to Morice Lake should be established at 110,000 sockeye and to the other secondary lakes at 200,000 sockeye. A second recommendation was that minimum (limit reference) escapement points should be set at an achievable level that guarantees stock conservation. We recommend that the mean escapement over the last 10 years be used as a future minimum level. Thus, the minimum sockeye escapement "index" (as measured by current enumeration procedures) should be 15,000 for Morice Lake and 36,000 for the aggregate of other (non-Babine, non-Morice) Skeena lakes.

Reviewers' Comments

Reviewer #1

The reviewer indicated the paper was well organised and written and should be accepted with minor revisions. A series of specific concerns about the methods employed were outlined in the review. A point was made regarding the need to access information outside of the paper to evaluate some of the basic tenants of the paper. The reviewer suggests it would have been beneficial to have an explanation of how the model used in the paper, is an improvement over using just lake surface area as an indication of productive potential. The reviewer stressed the method used by the authors was particularly sensitive to the assumption that a 4.5 g smolt is the minimum size required to assure good smolt-to-adult survival. The model estimates of the potential smolt production and the number of spawners required are particularly sensitive to this assumption. Also, how realistic is the assumption that the non-sockeye biomass is independent of changing sockeye abundance? The reviewer also cautioned that potential enhancement opportunities associated with specific lakes should not be considered as recommended approaches without considerable further documentation and assessment. The reviewer did not support setting explicit escapement targets, but did indicate that the available information does identify considerable scope to increase production from non-Babine sockeye in the Skeena system.

Reviewer #2

The second reviewer felt the paper was a credible collection and review of the limnological and juvenile sockeye data that puts the status of Skeena (non-Babine) juvenile sockeye production in perspective relative to other sockeye producing lakes. Of particular concern however, was the use of adult escapement data that is potentially unreliable. It was noted that the regression in Working Paper Figure 5a was highly influenced by a few large data points and the reviewer also did some additional analysis to demonstrate the confidence limits are much wider than indicated because uncertainty in the accuracy of the juvenile sockeye biomass and total lake carbon production estimates. Additional comments were provided on the summary and recommendations including a specific concern about stating an escapement target that has a weak foundation because of the tenuous connection to the existing escapement record, and because future escapements cannot be easily measured. Target densities of juvenile sockeye were suggested as an alternative to escapement targets.

Subcommittee Discussion

The Working Paper was accepted subject to minor revisions.

The Subcommittee acknowledges that sockeye production from Skeena non-Babine lakes are currently below potential. The Subcommittee notes the Primary Production

Rate (PR) model developed using Alaskan sockeye parameters may underestimate optimal escapement. However, the Skeena data still strongly supports the conclusion that lake production potential is under-utilised. In most lakes, it is likely higher production could be achieved with increased escapements although in some cases spawning ground capacity could be the current limiting factor. Clarification and tabulation of the factors that limit production in each lake is required to clarify potential management options for increasing production (if this is deemed desirable). Potential production increases in each lake should be portrayed in units of juvenile or adult indices with ranges that encompass the uncertainty in the analysis.

Revisions should include more detail on the effect of applying factors derived from other studies to correct periphyton photosynthetic rates, and on the different acoustic methods used to estimate sockeye fry abundance.

The Subcommittee noted that reduced fisheries (as a consequence of expected low Babine Lake sockeye returns) will result in lower exploitation rates on the non-Babine stocks in 1998 and 1999 which should provide an opportunity to observe the effects of increasing escapements on subsequent smolt production.

The development of a Skeena watershed multi-lake production/management model that includes Babine Lake was discussed. A production/management model would be useful to explore the effect of alternative policy options on sockeye production. The Subcommittee agreed that not all factors needed as input into a production model are presently understood. Initially, modelling could help identify important information requirements.

Based on the abundance of juvenile sockeye, the Subcommittee agreed that non-Babine sockeye do not appear to be at levels that pose a conservation risk. Although current escapements appear to be low, recent trends are stable or increasing. Concerns were expressed that higher recent abundances may be a transient effect of a recent regime shift. However, the use of target spawning escapement reference points are not supported because of the very high uncertainty in estimates of sockeye spawning escapement.

Subcommittee Recommendations

1. The Subcommittee recommends that current non-Babine abundance be used as a minimum abundance reference point, and that assessment tools be developed to provide lake-specific indices of juvenile or adult abundance, which could be used to monitor trends in abundance.

2. The Subcommittee notes that increases in sockeye production from non-Babine lakes are possible, and that exploration of approaches to utilise that potential production could be explored with the development of a multi-lake production/management model.

S97-10 Babine Lake sockeye salmon: Stock status and forecasts for 1998. Wood, Rutherford, and Bailey. ***Accepted Subject to Revisions***

This Working Paper provides a comprehensive assessment of sockeye production from the Babine system in that it brings together recently compiled information on trends in spawning escapements by run timing group, fry recruitment, smolt production, adult returns, harvest rate, and surplus production from Babine Lake Development Project (BLDP) facilities. Prespawning mortality at the BLDP sites in 1994 and 1995 caused by parasitic infections has significantly reduced fry recruitment and smolt production for these brood years. Consequently, adult returns are expected to be low until the year 2001. Major conclusions from the report are as follows:

1. Escapements to enhanced sites in Babine Lake continue to exceed spawning requirements such that on average, over a third of the Babine fence count is BLDP fish that are surplus to its spawning requirements. In contrast, escapements to the unenhanced Morrison River continue to be low relative to pre-enhancement levels. Recent escapements to the unenhanced early-timing and late-timing sub-populations are not statistically different from pre-enhancement levels.

2. Smolt production from the main basin of Babine Lake has increased dramatically as a result of enhancement. BLDP fry now account for about 90% of fry recruitment to the main basin. Even so, all the available data suggest that fry recruitment is still below levels required to yield maximum smolt biomass and maximum adult returns.

3. Smolt production from Nilkitkwa Lake and the north arm of Babine Lake, as inferred from enumeration of early-migrant smolts, has declined to less than a quarter of the level observed before exploitation of enhanced returns began in 1970. However, data for this system are less reliable than for Babine Lake, and further investigation is warranted.

4. Increased smolt production from the Babine-Nilkitkwa system has led to dramatic increases in adult returns. However, the relationship between adult returns and smolt abundance is non-linear, presumably reflecting competition among smolts. Recent returns have been higher than expected based on the density-dependent model, suggesting that favourable conditions have led to relaxed density-dependence after emigration. Despite density-dependence, increased adult production could be expected from increased smolt production, especially if current conditions continue.

5. The outlook for 1998-2000: Near record low smolt production and age 4 returns from the 1993 brood, together with near record low smolt production and jack returns from the 1994 brood, provide clear signals that adult returns in 1998 will be much lower than in recent years. Accordingly, the 5 year mean forecast used in

previous years (because of its superior performance under typical conditions) was deemed inappropriate for forecasting (atypical) returns in 1998. Two alternative models that utilise information about smolt production or sibling age class strength, produced almost identical forecasts for 1998 (Table 1). Of these, the smolt forecast is recommended because of its slightly superior performance in retrospective analyses using the RMSE criterion. The smolt model gives a 75% chance that adult returns to the Skeena River will exceed 820 thousand sockeye, and a 50% chance that returns will exceed 1.42 million sockeye. Because smolt production has continued to decline to 1997, forecasts for 1999 and 2000 based on the smolt model will be even lower than for 1998. Fry recruitment to Babine Lake returned to above-average levels last spring, but another outbreak of the Ich parasite caused pre-spawning mortality in 1997, so that fry recruitment is expected to be 20 - 30% below target levels in next spring. Until the sporadic problems arising from parasite infection can be addressed, the prognosis for future fry recruitment remains uncertain.

Reviewers' Comments

Reviewer #1

The first reviewer recommended acceptance with minor revisions and reported the paper was an excellent, comprehensive assessment although a few sections required clarification. The reviewer noted the lack of recommendations and suggested the section on estimating fry recruitment be rewritten and expanded for clarification. Additional minor concerns discussed in detail include: fry recruitment assumptions and definitions, environmental variables in 1998 forecasting models and low fry to smolt survival rates in the same brood years affected by parasitic infections.

Reviewer #2

The second reviewer recommended acceptance with minor revisions and reported the paper was well written and fully documented and appreciated having all the relevant data clearly tabled and appended. The reviewer felt the conclusion that increased adult production to the Babine system would be expected from increased smolt production was justified by the data, but noted the lack of a specific target escapement recommendation in the paper. The authors conclusions 1 to 4 are supported but the reviewer cautions not to lose sight of the assumptions and data constraints. The forecasts for 1998 and 1999 are also accepted.

Subcommittee Discussion

The paper was accepted with minor revisions.

The Subcommittee noted that the data presented in the Working Paper indicate the juvenile rearing capacity of Babine Lake is under-utilised.

The Subcommittee was concerned about the effects of increasing exploitation rates on non-enhanced Babine Lake sockeye. The recent decade appears to have been a period of better than average marine survivals. Total exploitation of Skeena River. sockeye has risen to 70% of the total return. Increases are in part the result of increased 'selective' fishery harvests in ocean and river fisheries. The Subcommittee noted that selective fisheries were generally only species-selective. Selective fisheries may harvest both enhanced and wild sockeye of Babine and non-Babine origin.

Further increasing sockeye production from Babine Lake could impact non-Babine Lake sockeye and wild Babine Lake sockeye if mixed stock (within or among species) fishery exploitation rates are increased. The enhanced component from the BLDP is harvested at the same time as the wild mid-timing run to the Morrison River (tributary of Babine Lake) and the stock is particularly at risk. The abundance of the Morrison River component has been low but stable in recent years.

The Subcommittee did not identify any immediate conservation issues, the Subcommittee was concerned about a range of issues affecting Babine Lake sockeye. There has been a significant drop in smolt production in recent years linked to repeated serious outbreaks of disease ('ich') at BLDP channels that caused massive prespawning mortality in 1994 and 1995 when water temperatures were high. In addition, fry to smolt survival appears to have declined in recent years. In 1995 there were reports of wild spawners with 'ich' but few details are known. The Subcommittee was concerned that although 1997 river temperatures were normal, there were again pre-spawning mortalities in the BLDP channels from 'ich' and perhaps a second pathogen. Finally, there was concern over the decreasing trend in the abundance of early migrating wild smolts from Babine Lake, as this represents the smolt production from the largest wild component, the Babine River.

The Subcommittee was concerned that the ecosystem effects of enhancing sockeye production have not been assessed, and at present it was not possible to assess how/if Babine Lake has changed in response to increased sockeye production. Limnological data indicate that primary productivity in the lake has risen by about 30% since the 1970s.

The Subcommittee noted that the heavy emphasis on Skeena sockeye production from Babine Lake (approximately 90%) created both biological and policy complexities because of concerns for wild populations within and outside of Babine Lake in the Skeena watershed. The development of a multi-stock production model as a focus for policy discussion on Skeena watershed management options was seen as a potentially important tool for decision making, negotiations, generation of policy and management advice.

The Subcommittee noted that the authors had selected a different forecasting model for Skeena sockeye in 1998. In 1996 PSARC evaluated alternative models to forecast

Skeena sockeye returns. A retrospective analysis of historical returns indicated that the model with the best performance was the simple average of the last 5 years of returns. A model based on average returns performed best when the independent variables that are used to forecast abundance (jack returns, 4 year old abundance, smolt and fry abundance) are near mean levels. In 1997, all of these indicators fell to very low levels suggesting that the preferred model would not likely be risk averse. Of the alternative models, forecasts developed from brood year smolt abundance performed the best. All indicators suggest that Skeena sockeye returns in 1998 are expected to be far below the mean. The Subcommittee accepts these Skeena sockeye forecasts.

Subcommittee Recommendations

1. The Subcommittee accepts the 1998 Skeena sockeye forecast of (50% 1,420,000; 75% 820,000; 90% 530,000) based on observed smolt production (Table 1). The Subcommittee notes that because of further declines in smolt production in 1997, forecasts for 1999 and 2000 based on smolt production will be lower than the forecast for 1998.

2. The Subcommittee recommends that additional study of the effects of disease on wild and enhanced Babine Lake sockeye be conducted to determine the extent of impacts on wild Babine sockeye.

3. Because of the complexities involved in optimising overall sockeye production while minimising risk to wild sockeye and other species, the Subcommittee recommends that a multi-stock production/management model be developed to examine production, enhancement, and harvesting scenarios that will be risk averse and offer optimum benefits.

S97-11 Haida Gwaii Creel Survey of Ocean Sport Fisheries in Area 1, 2E, and 2W 1995-1996. Searing and Bocking. ***Accepted Subject to Revisions***

This paper was submitted to PSARC by the Haida Fisheries Program through a report prepared in May of 1997 by LGL Limited (Sidney, B.C.). The paper describes systematic surveys of the recreational fisheries in Statistical Area 1, 2E and 2W in 1995 and 1996 and includes extensive appendices that include: monthly data reports, boat count survey timing, DFO estimates of catch and effort, and the methods and equations used in the analysis of catch and effort. The study area for both 1995 and 1996 included the north coast of Graham Island (a portion of Area 1); and Skidegate Inlet, Skidegate Channel and Cartwright Sound (a portion of Areas 2E and 2W). The Haida Fisheries Program creel survey is comprised of two independent surveys: angler interviews and boat survey counts. Angler interviews provide data on sport fishing catch per unit effort and daily activity patterns. Boat count surveys provide estimates of the total sport fishing effort in the study area at the time of the boat survey. These data are combined to provide monthly estimates of the total sport fishing effort and total catch of salmon and select groundfish species.

The study was concentrated between May and September to coincide with the large summer ocean fisheries that concentrate on chinook and coho salmon and halibut. There were a number of improvements to the 1996 program over 1995 and the authors anticipate that the program will continue to be refined. The report includes details on boat counts, angler interviews, angler characteristics, catch statistics and biological sampling. A summary, with specific recommendations for improving the surveys is included. The Haida survey provides estimates of chinook and coho caught and released, adipose mark rates and size and age of chinook salmon.

Reviewers' Comments

Reviewer #1

The reviewer recommended the paper be accepted with minor revisions as an understandable and credible report. The reviewer agreed with the recommendations in the paper to improve the surveys and provided a number of minor corrections and items for clarification.

Reviewer #2

The reviewer noted that the approach described in the report is similar to the one that has been used in the Strait of Georgia Creel Survey since 1980. That approach is both well documented and acknowledged to be an acceptable method for determining ocean sport catch and effort. The reviewer did call attention to some important differences in the two surveys. Surveys of fishing effort in Haida Gwaii were made from boats rather than aircraft which introduces complications into the expansion to a total effort estimate. A second concern was on-water CPUE sampling in some areas as this sampling method is known to underestimate CPUE as the trip is incomplete. A remedy used in other areas was provided. The reviewer also suggested other approaches to be considered to improve the methods used in these surveys.

Subcommittee Discussion

The Subcommittee recommended acceptance of the Working Paper with minor revisions, but limits the inferences from the paper to a description of the methods and results.

The Subcommittee was pleased to receive this description of the creel survey programs being developed by the Haida Gwaii fisheries program. It should be noted that the PSARC Chairman received a detailed report of the surveys from LGL Ltd.(Sidney, B.C.) including comprehensive appendices. Copies of the complete report were provided to the Subcommittee chair and each reviewer, but Subcommittee members did not receive the appendices.

The paper described an evolving program of sport fishery monitoring in six sub-areas of the Queen Charlotte Islands, between June 1 and September 15: Skidegate Inlet, Skidegate Channel, Cartwright Sound, McIntyre Bay, Naden Habour/Virago Sound, and Langara Island. Survey methods within these areas changed between years as these programs developed. For accurate estimation of the total catch by species, the methods require a daily effort profile (proportion of the total effort in a day that was fishing in a specific hour), an instantaneous count of fishing effort (the number of boats fishing at a specific time in the day), and the estimated catch per boat trip (by species, and average over interviews). The survey also collected information on the number of rods per boat and the numbers of chinook and coho salmon released during a trip. Effort profiles are determined from interviews with fishermen and are determined for each area and month.

The Subcommittee reviewed each survey area by year to ensure an understanding of the program and the quality of survey data.

Skidegate Inlet and Channel (sampling areas 2A and 2B):
The fishery in this area was described as small relative to other locations. The authors acknowledged two concerns in this area. There is an acknowledged catch of chinook previous to the survey beginning, and catch estimates during the survey period likely over-estimate the actual catch. The latter concern was addressed by using a roving interview survey in 1997.

Cartwright Sound (sampling area 2C):
Results of the 1995 survey were likely inaccurate due to the extended time periods during effort counts and limited interviews. However, the 1996 survey provided improved accuracy as aircraft were used for effort counts and the number of interviews were substantially increased.

McIntyre Bay (sampling area 1A):
Surveys in this area met sampling requirements and were considered accurate. Boat counts were collected over short periods (approx. 2 hr.), interviews were of completed trips and of adequate number, and the estimated effort profile was representative of the fishing patterns out of Masset.

Naden Habour/Virago Sound (sampling area 1B):
Surveys in this area also met sampling requirements and are considered accurate. There were numerous interviews, boats fishing tend to be clustered and easily counted, and effort profiles were well defined. A concern identified was that the interviews occur at one of three lodges in the area and may not be representative of the other lodges.

Langara Island (sampling area 1C):
The accuracy of the catch data for this area is uncertain. Data on catch per trip is good but effort counts were conducted from a boat and require an extended time period to survey around the Island. Further, the time of day for effort surveys was not consistent.

The combined effect of these problems is a potential for substantial under-estimation of monthly effort. The authors noted that consideration was being given to sub-dividing this area to reduce these potential problems.

Given the evolving nature of the survey methods and the need to reanalyse some aspects of the data, the Subcommittee could not endorse the catch estimates, as presented. However, the Working Paper is an important step in establishing sport catch estimation methods for QCI and the Haida Fisheries Committee is encouraged to continue to operate and refine the program. The Subcommittee encourages the authors to estimate confidence bounds on their estimates in order to represent the uncertainty in the results.

Subcommittee Recommendations

1. The Subcommittee recommends acceptance of the creel survey methods, while acknowledging improvements will continue to be made. The specific catch estimates could not be endorsed as presented because reanalyses are required.

2. The Subcommittee encourages DFO to complete a written description of their sport survey methods for the Queen Charlotte Islands and to submit this for the spring, 1998 PSARC meetings.

S97-12 A biological assessment of the Coho salmon of the Skeena River, British Columbia, and recommendations for fisheries in 1998. Holtby and Finnegan. ***Accepted Subject to Revisions***

This assessment covers coho salmon of the Skeena River. Assessing the more than 100 coho populations of the river is a formidable task. We rely on two indices of aggregate abundance, two hatchery indicator populations, two wild indicators, one associated with a hatchery and the other not actually in the Skeena but close by, and surveys of juvenile densities that were made in 45 to 52 streams throughout the Skeena watershed.

Conservation concerns for coho populations in the upper Skeena (above Terrace) were first raised by PSARC in 1986 (Stocker 1987). Coho populations throughout most of the interior zone continue to be severely depressed and heavily exploited, a combination which makes them extremely vulnerable to episodes of poor marine survival. The near-zero ocean survival that appears to have occurred in the 1996 smolt year (1997 returns) has produced a situation in the interior, particularly the upper Bulkley, the Babine and the high interior, that can only be described as perilous. Coastal populations appear to be more productive and have been stable despite high exploitation rates, probably because of a prolonged period of good marine survival. The status of Skeena coho epitomises the problems faced in attempting to manage the coho salmon of a large and varied geographic region when nearly all of the exploitation

is exerted in mixed-stock ocean fisheries. Although coastal populations may be able to withstand the prevalent exploitation rates even during episodes of relatively poor marine survival, the interior populations clearly cannot.

The marine survival rate for Lachmach is predicted to be 9.0% (95%CI: 4.5%–17.7%). For a variety of reasons, the most important being that survival was over-predicted in 1996, we recommend that the forecast for 1998 be treated with caution. Three approaches are outlined to provide recommended exploitation rate targets for 1998 fisheries. The approaches yield target exploitation rates that range from 6% to 87% for coastal populations and 0% to 88% for interior populations. The lowest recommended harvest rate came from an approach designed to protect the genetic viability of populations. The indicator populations used to generate these recommended exploitation rates are among the most productive of some 45 streams where fry densities have been routinely surveyed, and the status of the most interior systems was judged to be considerably worse than the interior indicator (Toboggan Creek).

Consequently the authors recommend there be no fisheries mortality on Skeena coho in 1998 and caution that this recommendation is likely to continue to at least 2001. They further recommend the development of additional sites in the Skeena and particularly in the interior, where wild smolt production can be measured and their survival determined, as well as the development of more effective forecasting tools for Skeena coho.

Reviewers' Comments

Reviewer # 1

The reviewer recommended acceptance with minor revisions and indicated the paper was a logical, thorough compilation of the available data on Skeena coho. The reviewer requested more detail of the components of CWT exploitation analysis, further explanation of the 1997 catch by gear and further discussion on the effects on catch of management actions versus low abundance. The need to clarify the effects of adjustments to the test fishery index were identified. The reviewer recommended clear statements concerning relative expected returns to indicator stocks depending on management actions (with the uncertainty portrayed, for fishery managers to select their own risk levels). The need for wild stock production information and the need to continue juvenile surveys was supported. The reviewer stated that the authors recommendations for no fisheries mortality in 1998 is supported by the data, however it was noted that even if net fisheries proceed as in 1997 there would be little net mortality (as long as the estimated low net exploitation rates are accurate).

Reviewer # 2

The reviewer found the paper to be a well written and comprehensive analysis of the stock assessment data available for Skeena River coho salmon. The authors have

produced a credible assessment of the status of this stock aggregate and the reviewer believes that the available data and the authors analyses support the Working Paper's recommendations and conclusions. The reviewer noted two serious reservations concerning the data available for analysis and the assessment structure. The first concern is the reliance on a number of critical assumptions regarding the applicability of the data and the uncertainty this fosters. The reviewer recommends the paper clarify what is known with certainty, what conclusions can be drawn from what is known, and that the results of other analyses while less certain, largely support these conclusions. Secondly, the reviewers impression is the Skeena coho assessments appear to be an opportunistic utilisation of available information rather than the result of an explicit detailed assessment framework which the reviewer states is required. A series of specific detail questions and suggestions were also provided.

Subcommittee Discussion

The paper was accepted with minor revisions.

The Subcommittee acknowledged there are conservation concerns for Skeena coho throughout the watershed in 1998 because off widespread low escapements in 1997 that resulted from low ocean survivals. The Subcommittee stressed the importance of avoiding back to back years of extremely low escapement that would significantly lengthen any rebuilding program.

There was consensus among the Subcommittee with respect to the serious conservation concerns for the upper Skeena area stocks (Bear-Sustut, Babine and Upper Bulkley subareas indicated on Figure 1). The Subcommittee is particularly concerned that spawning escapements have been in decline since the 1960's (Figure 2, Babine Fence escapement index) and virtually all measures of escapement in 1997 indicate a major reduction from the recent already very low spawner levels. Estimates of juvenile coho densities (Figure 1) for the upper Skeena area stocks indicate conservation concerns for coho based on juvenile densities derived from escapements to 1995 which were at levels much higher than the 1997 levels. The Subcommittee also acknowledged that the long term progressive decline in upper Skeena area escapements as indicated by the Babine Fence counts and supported by overall escapement trends, indicated that exploitation rates for these stocks has been too high for an extended period.

The Subcommittee accepted that juvenile density data up to 1996 (1995 brood year) indicated that lower and middle coho stocks of the Skeena were not conservation concerns, however the 1997 escapements to most of these areas are estimated to be a well below recent escapement levels, because of the widespread low survivals for coho that returned in 1997. Juvenile coho densities from the 1997 escapements are expected to indicate severe conservation problems in many areas of the lower and middle Skeena watershed.

The only coho forecast is from the coastal (Lachmach) indicator sibling forecast that predicts a smolt survival of 0.090, which is the average survival, but the range of uncertainty around this estimate is high (95% CI 0.045 to 0.177). Further, the 1997 Lachmach forecast overestimated survivals after a series of years of good predictions and the Skeena indicator stock smolt survivals were the lowest on record in 1997 with the upper Skeena indicators showing a much greater decline (86% for Toboggan compared to 1989 to 1996 average, and 79% for Babine from the 1994-1996 average) than Lachmach (45% decline from 1989 to 1996 average). The Subcommittee cautions that the reasons for the poor ocean survival of coho returning in 1997 are unknown and may recur in 1998.

There was a detailed discussion regarding 1998 exploitation rate targets for the upper Skeena area coho stocks. Three approaches to estimate target exploitation rate were presented in the paper, however the results were highly divergent and uncertain. The Subcommittee could not recommend a specific approach or a specific target exploitation rate.

The Subcommittee noted that the large majority of the 1997 exploitation occurred in Alaskan fisheries and to achieve significant reductions in exploitation, Alaskan participation will be required. Exploitation rates in Canadian troll fisheries have declined significantly in recent years and Canadian net fisheries exploitation dropped to a very low level in 1997 based on CWT recoveries. Further contributions from Canadian fisheries above 1997 levels would at best result in modest increases in escapement since Canadian exploitation rates are already reduced to low levels. It was noted however that Canadian seine fishery exploitation based on CWT recoveries is an underestimate since seine fisheries were non-retention for coho, and release mortalities are not included in the exploitation rate estimations for these or any other fisheries. These non catch mortalities need to be minimized in the fisheries and accounted for in the analysis.

The Subcommittee noted that a precautionary approach is in part necessitated by the lack of data, in particular a wild interior indicator stock. The juvenile synoptic surveys of the Skeena have been a key tool in evaluating subarea specific coho status and should be continued. The current low abundance creates an even greater need for this assessment information.

Subcommittee Recommendations

1. Given the continuing conservation concerns for upper Skeena area coho, the alarming further decline in abundance in 1997, and uncertainty in survival rates for coho returning in 1998, the Subcommittee cautions that any exploitation of upper Skeena area coho (Bear-Sustut, Babine and upper Bulkley subareas) poses a high risk to the viability of coho populations in this area.

2. Although conservation problems for lower and middle area Skeena coho were not indicated to 1996, because of the precipitous decline in abundance in 1997 and uncertainty in survival rates for coho returning in 1998, the Subcommittee recommends a more conservative approach to the harvest of these coho stocks.

Table 1 Skeena sockeye run size forecasts for 1998

	Probability Reference Points		
Model	0.50	0.75	0.90
5-year Mean	4,350,000	3,350,000	2,500,000
Smolt	**1,420,000**	**820,000**	**530,000**
Sibling	1,220,000	820,000	600,000

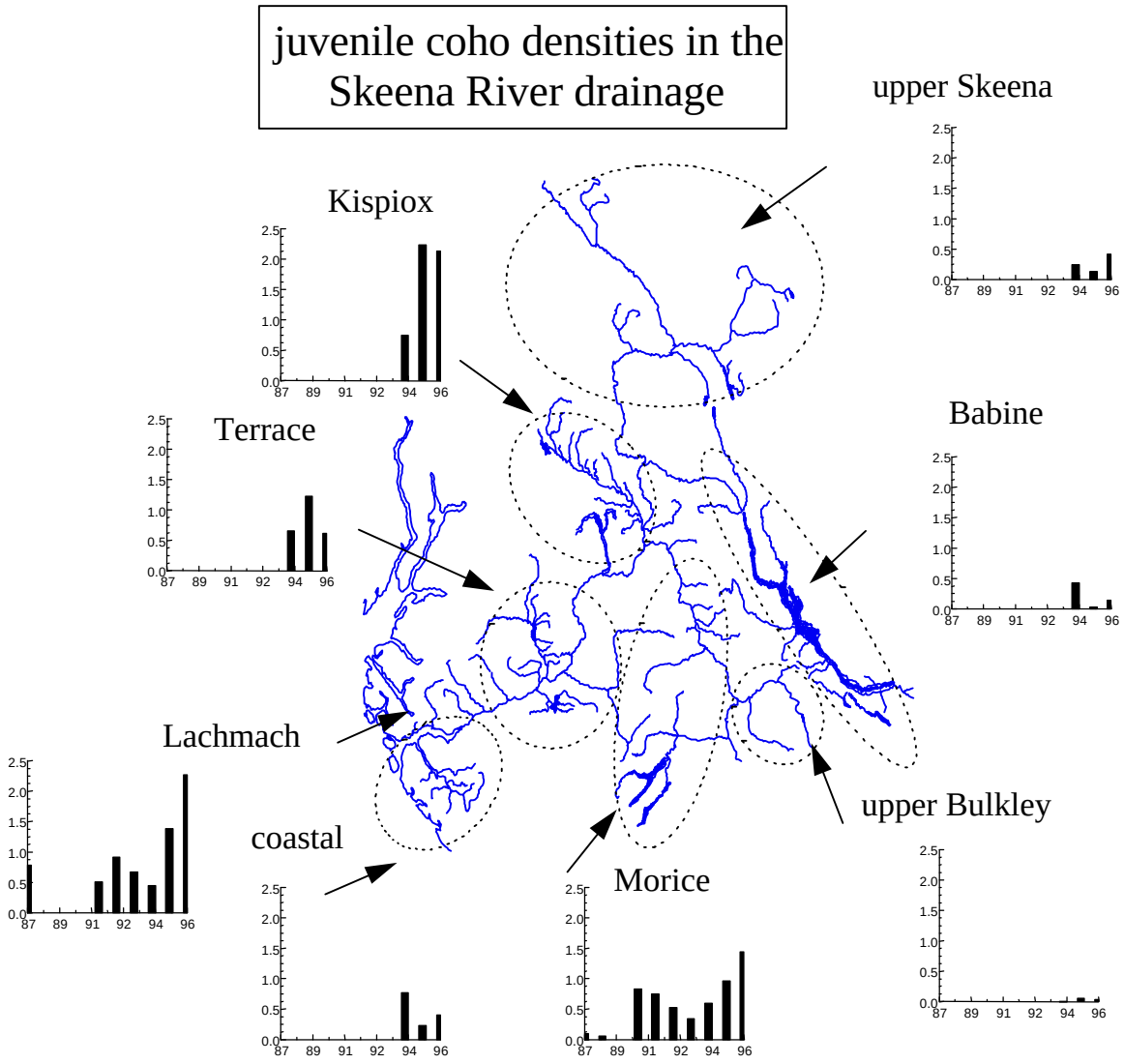


Fig. 1. Coho densities (number per square meter) over time are shown for the regions of the Skeena watershed indicated by the dotted lines. The coastal zone includes the Lachmach River, which is located at the head of Work Channel. All of the graphs are drawn to the same vertical scale to emphasise the differences in density between regions.

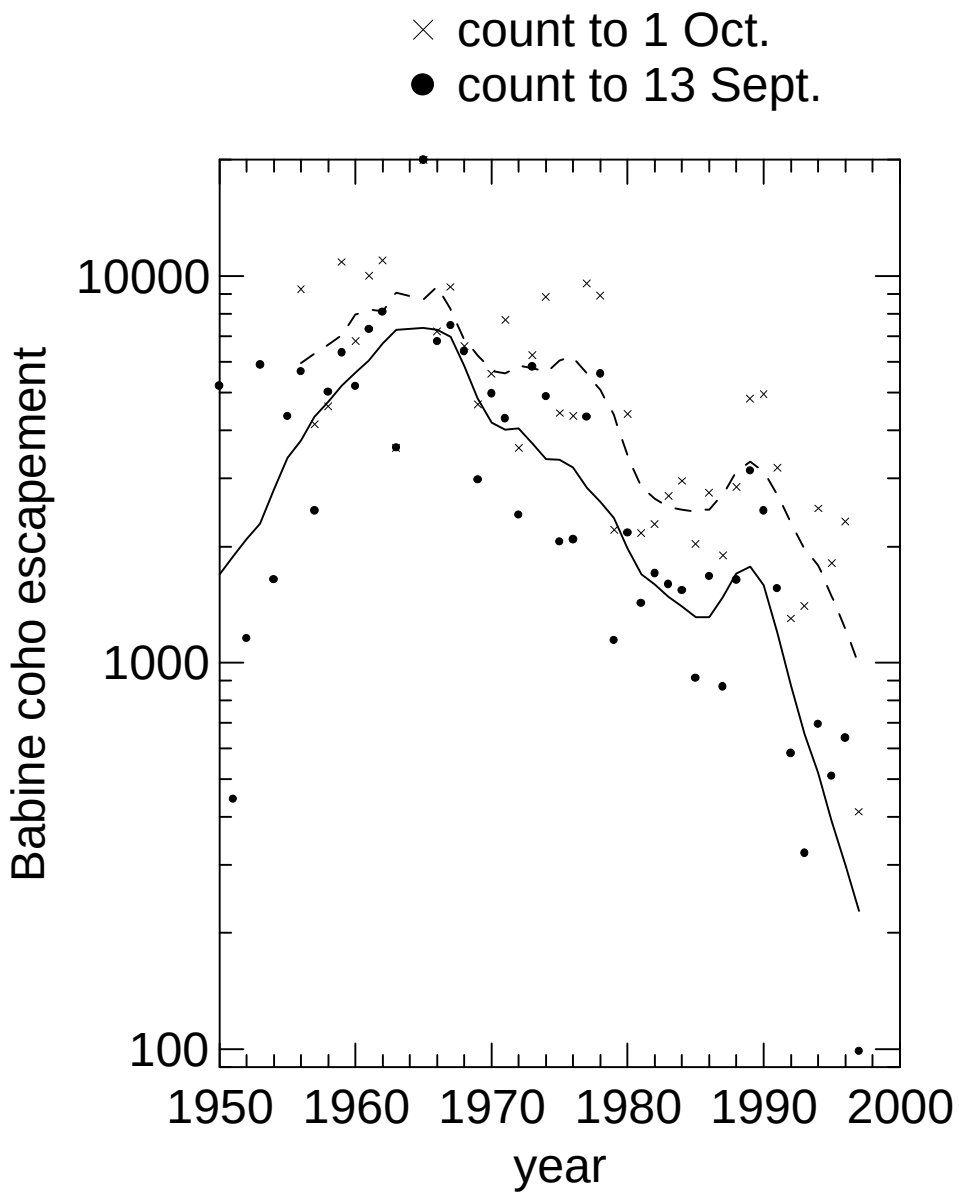


Fig. 2. Babine fence coho counts to the two index dates. The lines shown are LOWESS smoothes.

APPENDIX 1 Participants at the Dec. 2-5, 1997 meeting of the Salmon PSARC Subcommittee.

Subcommittee Chair:	Dave Peacock
PSARC Chair:	Max Stocker
Head Stock Assessment:	Laura Richards

Subcommittee Members:

Sandy Argue	Don Anderson
Don Bailey	Mike Bradford
Al Cass	Brent Hargreaves
Blair Holtby	Kim. Hyatt
Jim Irvine	Ron Kadowaki
Skip McKinnell	Dave Meerburg
Brian Riddell	Melanie Sullivan
Art Tautz	Chris Wood

Authors/Reviewers:

Dave Blackburn	Peter Etherton
Pat Fairweather	Barry Finnegan
Jeremy Hume	Scott McPherson
Dennis Rutherford	Neil Schubert
Gary Searing	Tom Shardlow
Ken Shortreed	

Observers:

Richard Bailey	Steve Baille
Susan Bates	Cole Shirvell
Kent Simpson	Barb Snyder
Dan Ware	

APPENDIX 2 Reviewers of Working Papers

Working Paper	Reviewer #1	Reviewer #2
S97-8	Al Cass	Robert Kope (NMFS, Seattle)
S97-9	Kim Hyatt	Skip McKinnell
S97-10	Dave Blackburn (Nanaimo)	Steve Cox-Rogers
S97-11	Brian Spilsted	Tom Shardlow
S97-12	Dave Meerburg	Neil Schubert
S97-13	Brent Hargreaves	Ian Perry

I. STEERING COMMITTEE REPORT

The Steering Committee met May 4, 1998 at the Pacific Biological Station to review the Salmon Subcommittee report. The Steering Committee accepted the Subcommittee report with the following comments.

Major Steering Committee Discussion and Concerns

The Steering Committee advises the application of extreme caution in applying forecasts of coho abundance in 1998. Recent trends in marine survival have been below forecasts and marine conditions during 1997 were exceptionally poor. The returns to many wild coho populations for 1998 are expected to be below 3 females/km and 2 major stock aggregates are at critical conservation levels.

The Steering Committee advises that the **Upper Skeena and Thompson River** coho stock aggregates are extremely depressed, will continue to decline in the absence of any fishing mortality under current marine survival conditions, and that some individual spawning populations are at high risk of biological extinction.

The Steering Committee advises that the forecast of marine survival for 1998 for the **Upper and Lower Skeena** may be overly optimistic and caution is advised. The Steering Committee noted with concern that the **Lachmach coho indicator stock** substantially overestimated survival in 1997. The overall Skeena problem is made more serious by the evidence that Upper Skeena survivals in 1997 were even less than those associated with the indicator (Lachmach).

The Steering Committee advises that the majority of coho streams in the **Strait of Georgia and Lower Fraser River** will not reach 3 females/km in 1998 even in the absence of fishing mortality. This stock aggregate is deteriorating rapidly under current marine survival conditions and extreme caution is warranted for this stock aggregate.

Similarly, under the anticipated low marine survival, many **WCVI** coho streams are not expected to achieve 3 females/km even in the absence of fishing mortality. In particular, conservation concerns were noted for Statistical Areas 21 and 22.

The status of **Central Coast** coho is uncertain although potential conservation concerns have been identified in Statistical Areas 5 and 6.

The Steering Committee recommends that the status of fresh water coho habitat be summarized. The PSARC Habitat Subcommittee should be tasked with identifying the

parameters to be measured and the geographic extent of the program and resources required as one of its first priorities. Results should be analysed in conjunction with results from the wild stream indicator program to better understand the role of habitat availability and trends on freshwater survival rates.

The Steering Committee notes that any non-retention fishery that catches coho (e.g., selective mark fisheries) will confound natural mortality with incidental fishing mortality in 1998; this would be a new source of unquantified fishing mortality. The Department must evaluate the potential impact of mark selective fisheries on the assessment of any threatened wild coho stocks (e.g. Thompson River coho).

The Steering Committee endorses the review of the objectives and design of the **coho fry survey programs.**

The Steering Committee endorses the addition of **wild coho indicator streams** for the highest priority coho aggregates (e.g. Upper Skeena).

The Steering Committee notes that an inter-branch team has been formed and will be conducting a review of **regional escapement needs**.

The Steering Committee supports the evaluation of the role **enhancement** might play in rebuilding small, depressed coho populations. The Steering Committee requests a thorough review of the role and potential **impact of coho enhancement on wild stocks in the Upper Skeena and Thompson River**. This is a high priority issue and is required to support the salmon policy development.

The Steering Committee notes that the **Cowichan chinook stock** is rebuilding as the result of enhancement and reduced exploitation rates. The Steering Committee recommends an evaluation of the level of enhancement utilized to sustain production in the “Cowichan River”. A full assessment of the Lower Georgia Strait (LGS) complex would require funds to undertake the assessment in the Squamish drainage.

S98-7 Assessment of west Vancouver Island coho, 1997.

The Steering Committee notes that:

- Marine survival is variable and non-trending.
- Escapement was above average in 1995, average in 1996 and below average in 1997. However, 1997 escapement was well above the 1994 brood year escapement.
- There was a significant reduction in exploitation rate on WCVI coho in 1997.
- There were conservation concerns expressed for coho stocks in Statistical Areas 21 and 22. However, further analysis is required to clarify this concern due to uncertainty in the data.

S98-8 Estimating the percentage of hatchery-reared juvenile coho salmon in the Strait of Georgia.

The Steering Committee notes that the proportion of coho of hatchery origin in the Strait of Georgia is consistent with current assessments of the extremely low abundance of wild stocks.

S98-9 Forecasting coho marine survival using the regime concept.

The Steering Committee had no comment.

S98-11 Rivers Inlet sockeye salmon: stock status update.

The Steering Committee accepts the recommended forecast and notes that:

- The low returns in 1995 and 1996 were likely the result of poor marine survival.
- Due to recent low escapements in 1995 and 1996, poor returns are expected through the year 2000.
- 1997 escapement increased but remained below the long-term average.

S98-12 A risk assessment for north coastal coho fisheries in 1998, with commentary on risk in southern inside and outside fisheries.

The Steering Committee notes that Upper Skeena coho stocks are extremely depressed, will continue to decline even in the absence of any fishing mortality and are at immediate risk of biological extinction.

The Steering Committee further notes that :

- Spawning escapement in the Babine Lake coho aggregate has declined from a range of 20,000 to 100,000 coho in the mid 1960s to 469 in 1997 (i.e. less than 1% of the historical average). In terms of females/km these numbers translate to approximately 25 females/km in the 1960s, 3 females/km in 1990-1996 period, and 0.3 females/km in 1997.
- In the Upper Skeena coho stock aggregate, 40% of the streams are not expected to achieve one female per km in 1998.

The Steering Committee agrees with the Subcommittee recommendations that if marine survival does not improve, populations will likely continue to decline even in the absence of fishing mortality. Risk of extinction increases exponentially with decline in populations size.

The Steering Committee agrees with the Subcommittee that further work should be done to clarify the escapement estimates in Statistical Areas 5 and 6.

The Steering Committee notes for Strait of Georgia/Lower Fraser River and WCVI:

- Deteriorating stock status due to poor marine survival.
- The majority of the surveyed populations will be below the minimum conservation objective (3 female/km).

In addition the Steering Committee is concerned about the very warm ocean waters that juvenile coho entered in 1997 (at least 3 Standard Deviations above average). These are the fish that will return in 1998.

S98-13 Stock assessment of Thompson River/Upper Fraser River coho salmon.

The Steering Committee notes that the total returns and spawning escapement of coho in the North and South Thompson River have declined to record low levels over the last 10 years.

The Steering Committee also notes that there has been a decline in the reproductive potential of Thompson coho. In 1997 there was a preponderance of males in the escapement, and a decline in the average size of females and their associated fecundity.

S98-15 Stock status of Cowichan chinook salmon.

The Steering Committee supports the Subcommittee's recommendations.

S98-17 Dynamic change in proportion of hatchery-reared, wild ocean and stream type chinook in their first and second years in the Strait of Georgia.

Steering Committee has no comment

S98-18 A risk assessment for Thompson River coho salmon.

The Steering Committee notes that:

- Coho salmon populations of the Thompson River drainage have been declining at a rate of 50-70% per generation since 1988.
- Escapements to the enhanced Eagle and Salmon River populations have declined to 1-2% of the 1988 escapement levels.

- Many streams have declined to ”no observed” status within three generations (1988-1997).
- The cause of the decline is a combination of poor marine survival and recruitment overfishing. A full assessment of freshwater survival has not been completed.
- This information points to a conservation crisis that includes substantial risk of biological extinction.
- Fishing mortality will increase the rates of decline in these populations and will increase the risks of extinction.

II. SALMON SUBCOMMITTEE REPORT

1. Introduction

The PSARC Salmon Subcommittee met April 27-May 1, 1998 at the Pacific Biological Station, Nanaimo. Twelve working papers were presented to the Subcommittee. Meeting participants and reviewers of working papers are listed in Appendices 1 and 2, respectively.

The previously reviewed West Coast Vancouver Island chinook forecast for 1998 is appended (Appendix 3).

2. General Subcommittee Discussion and Concerns

Concerns over Coho Stock Status

The Subcommittee recommends that extreme caution be used in 1998 Pacific fisheries that encounter coho salmon. Upper Skeena and Thompson coho are extremely depressed and under the current climatic regime are expected to continue to decline even in the absence of fishing mortality. Since extinction risk increases exponentially with decreasing population size, the Subcommittee advises that the risks associated with fishing mortality are substantial. Although the magnitude of the risk cannot be precisely quantified, the Subcommittee is certain both that the risk will increase as population sizes fall below their already very low levels and that the need for corrective action will increase correspondingly.

The status of the Strait of Georgia and Lower Fraser aggregate is also deteriorating due to continuing poor marine survivals. With current forecasts of continuing poor marine survival, fishing mortality will delay recovery. Although depressed, the majority of stocks in this area are not yet at the critically low levels prevalent in the interior. The Subcommittee emphasizes that the necessary corrective actions will become more stringent. As populations decline the likelihood of the success of these corrective actions will fall. The Subcommittee therefore advises that extreme caution is warranted for this stock aggregate.

For the west coast Vancouver Island aggregate, the Subcommittee advises that exploitation rates of less than 30% are required to ensure that escapements to most streams will reach levels of more than 3 females/km.

For the Lower Skeena aggregate the Subcommittee notes that although at 1997 exploitation rates (50%-60%) most streams would be expected to achieve 3 females/km. The Subcommittee advises that this forecast be treated cautiously since similar forecasts for 1997 did not predict the observed recruitment failure.

Selective Fisheries

The Salmon Subcommittee is concerned about a potential limitation to our abilities to evaluate management actions taken to conserve the Thompson River coho stock in 1998. Most importantly, the report by the Ad Hoc Selective Fishery Evaluation Committee (PSC 1995; review by PSARC, Rice et al. 1996[1]) notes that one of the most significant impacts of implementing mass marking and selective fisheries will be on the assessment of wild coho populations. Assessment of total exploitation rates and marine survival for a wild coho population could not be estimated *unless the population is associated with a mass-marked and double-index tagged hatchery coho stock*. This hatchery stock should be from the same geographic region and have the same ocean exploitation pattern to be representative of the associated wild population. The independence of our wild coho stock monitoring programs (i.e., independence from relying on other hatchery stocks) will be lost; but without this association, the assessment of the wild coho population will not be able to directly estimate the marine survival of the brood years, the total exploitation rate on the brood if subjected to a selective fishery, or the distribution of incidental fishing mortality between fisheries.

Such tagging and recovery programs have not been implemented. Consequently information presently derived from the coded-wire tag program will be lost if selective fisheries for mass marked coho salmon are implemented in 1998. Selective fisheries may be limited to the selective retention of ventral-fin clipped coho salmon (mass mark applied to most Canadian hatchery coho salmon from the 1995 brood year) and we would expect significant misidentification of the mass mark in the first year of the selective fishery program.

The impact of this loss of information will depend upon the exploitation rate imposed by the selective fisheries. If the harvest rate is very low or the stock is rare in the fishery, the impact will likely be minimal. However, if the stock experiences any selective fishery mortality, then the assessment of all other fishery impacts becomes more uncertain and values for survival or exploitation rates will be underestimated.

[1] Rice J., et al. 1996. Pacific Stock Assessment Review Committee (PSARC) Annual Report for 1995. Can. Man. Rep. Fish. Aquat. Sci. 2383: iv + 242p.

Selective mark fisheries have implications for wild coho assessments throughout the region. In the Thompson River opportunities for double index tagging are rare and were not implemented for a 1998 selective fishery. The Subcommittee is concerned over any erosion in our capacity to estimate marine survival for wild stocks. Double index tagging programs are required to minimise the impact of selective fisheries on the assessments of wild coho salmon populations. Monitoring of marine survival has been paramount in assessing the status of coho salmon and is a critical element of any future risk assessment.

Juvenile Surveys

The Subcommittee recommends that a review of the objectives and design of fry survey programs be conducted prior to their application in 1998 to ensure their utility within the assessment framework for coho salmon in this region.

Wild Indicator Streams

A wild indicator stream is a non-enhanced stream where adults and smolts are counted. Usually in-stream survival, growth and habitat use of juveniles are also quantified. The importance of wild indicator streams is fully discussed in S97-13[2], but there are five important reasons why these intensive projects are vital to assessment of coho salmon:

1. They provide high precision status indicators.
2. They provide smolt counts that are used to determine freshwater productivity, and separate the relative effects of freshwater and ocean climate variability.
3. They allow the application of CWTs and their recovery in escapement for measures of marine survival, exploitation rates and ocean distribution of wild fish.
4. They provide opportunities to calibrate productivity measures for application to surrounding systems in “extensive” areas, e.g. calibration of productivity measures used in juvenile work.
5. They provide the continuity that is important for the investigation of freshwater and marine productivity questions, life-history variation.

The Subcommittee notes that these kinds of information are lacking and that lack compromises the credibility of current assessments.

Currently three of the highest priority requirements are:

- Upper Skeena and the Thompson: Both of these are in the interior where there is an urgent requirement to not only provide more credible monitoring and assessment of coho but also an urgent need to improve our understanding of

[2] Holtby et al. 1997. An Assessment Framework for coho salmon in the Pacific Region. PSARC Working Paper S97-13.

coho biology and life history variation in environments very different from those on the coast.

- Central Coast: There is virtually no credible information about coho status on the Central Coast but there are concerns about the status of coho in some areas. One possibility that has been identified is Hooknose Creek in SA8 where there is past data and potential to develop a multi-species indicator (coho, sockeye, and pink).

There are other indicator stock needs as well: mainland side of the Strait of Georgia and Northeast and Northwest Vancouver Island.

Escapement Data Quality Issues

The Subcommittee is concerned with the apparent erosion of the utility of the coho escapement data for some areas because of changes in the escapement methodologies, largely due to reduced survey effort. The issue was raised with respect to Statistical Area 5, but there is a more widespread base of concern. In some cases, assessments of the data could clarify the utility of the historical data. These concerns reinforce the need for a regional review of this and other escapement data issues.

Enhancement Impacts

The Subcommittee discussed the impacts of enhancement on a rebuilding salmon stock, the Cowichan River chinook, as well as the impacts of enhancement in severely declining coho stocks, e.g. the Thompson and Upper Skeena coho. The Subcommittee suggests a PSARC paper be prepared on the role of enhancement in the conservation of salmon stocks, particularly during this period of critically low coho abundance.

3. Working Paper Summaries, Reviews and Discussion

S98-7 Assessment of west Vancouver Island coho, 1997. K. Simpson.

Working paper accepted subject to revisions*

Working Paper Summary

This is the second PSARC working paper assessing the status of coho salmon stocks on the west coast of Vancouver Island (WCVI). The first, S96-10, reviewed their status up to 1995. This report's objective was to use 1996 and 1997 data to re-examine trends in fry, smolt and escapement abundance in relation to catches, marine survivals and exploitation rates.

Over 90% of the coho in this area rear in freshwater for one year. The proportion of age 2 smolts is less in streams lacking a heavy canopy, e.g. logged watersheds, and is especially small when fry are growing well in response to low densities. Thus, the extensive logging in this region may have reduced life history variability so impacts on a year class are less buffered.

West Vancouver Island coho tend to remain in the WCVI area. The vast majority of catch was in the WCVI troll fishery until 1997 when this fishery was completely closed for coho retention to conserve southern BC coho. This action and a greater than normal northward dispersal resulted in an unusual but not unprecedented proportion of recoveries north of Vancouver Island (38% for Robertson Creek Hatchery coho). Most of the remaining recoveries were in local sport fisheries, not including the Juan de Fuca sport fishery where few WCVI coho recoveries occur.

Recent escapements are marked by the extremely low escapement in 1994, the result of near zero survival of smolts that went to sea in 1993. Although data from the northern portion of Vancouver Island are uncertain, WCVI escapements were probably above the 25 year average in 1995, about average overall in 1996 and below average in 1997. However, the 1997 return was a marked improvement over the critically poor 1994 brood year escapement. A significant regression of parental escapement on fry density from Carnation Creek was used with fry densities from an extensive sample of WCVI streams to estimate their female escapements from 1994 to 1996. Average female escapements estimated this way were 13, 30 and 31 per kilometre. However, 1994 escapements to indicator stocks were worse than to the average fry survey stream (assuming this estimation method was accurate). The decreased 1996 escapement to indicator stocks was not apparent in the fry survey streams. This report gave greater weight to the observed escapements from indicator streams, primarily Stamp River, Carnation Creek and Gold River. One reason was the coherence of data, e.g. the long time series from Gold River and Carnation Creek are significantly correlated.

Data from Carnation Creek which is the main indicator stock for WCVI suggests that the 1997 escapement was in large part due to excellent fry survival. Fry surveys showed that the sparse fry in 1995 were growing well throughout west Vancouver Island. Size and survival were positively correlated. The 1997 return can also be credited to a reduced exploitation rate, down by half to 31.5% for Robertson Creek Hatchery coho.

Marine survivals of Robertson and Carnation coho have trended down since the start of records in the early 1970's. The trend was broken by a period of relatively good survivals from 1989 to 1992. 1.7% and 3.5% of Robertson Creek Hatchery smolts returned in 1996 and 1997 compared to the long term average of 4.3%. The survival of Carnation coho, assuming an exploitation equal to Robertson Hatchery coho, was 5.3% for the 1993 brood year class and will be at least 11.2% for the 1994 brood year class. The average survival of Carnation coho is 12.6%.

Escapement data (acknowledged to be of uncertain accuracy) and low fry abundances indicate there is a continuing conservation problem in Areas 21 and 22.

Reviewers' Comments

Reviewer #1

The first reviewer pointed out the difficulty of assessing such a large aggregate of stocks with the limited data available. However, the reviewer commended the author for preparing a clear and concise document that properly described the data and methods used. The reviewer noted that the conclusions were supported by the data. This reviewer agreed with the recommendations of the author but felt that more details were needed, particularly in describing the Area 26 or 27 indicator stock program.

Reviewer #2

The second reviewer felt the paper generally accomplished the goal of assessing the 1997 return of WCVI coho stocks. This reviewer did however, raise a number of concerns which included; (a) use of Robertson Creek hatchery CWT data to represent the catch distribution of Carnation Creek coho (a wild indicator stock), (b) the effect of fishery management actions on catch distribution, (c) utility of fry estimates as surrogates for escapement data. The second reviewer supported the recommendations as written but pointed out the need for careful consideration of how Robertson Creek Hatchery CWT data are applied to Carnation Creek returns.

Both reviewers concurred with the author that a review of the design of the fry survey program is warranted given the non-random nature of site selection for these surveys.

Subcommittee Discussion

The Subcommittee accepted the working paper subject to revisions. The Subcommittee noted the rapid increase of WCVI coho populations in 1997 from the disastrous escapement in 1994 and agreed with the author that the increase was due to a favourable combination of:

High freshwater survival resulting from low seeding densities and compensatory growth of juveniles;
Near average marine survivals; and
Much reduced fishery exploitation rates.

The Subcommittee shared concerns expressed by the reviewers about the lack of random site selection for the juvenile surveys. The Subcommittee also felt that the fry survey sites should be geo-referenced to facilitate the use of the data by others. In spite of this short-coming, the fry surveys instituted in 1995 identify low fry abundances

in 1995 resulting from the low escapements in 1994 (as indicated by the escapement indicators).

There was some discussion about the completeness of the Robertson Creek Hatchery CWT escapement estimates since tagged fish are only enumerated at the hatchery with no consideration of straying to the natural spawning grounds. Natural spawning ground surveys were done in the early years of the Robertson Creek Hatchery project and virtually no tagged coho were recovered. Nevertheless, the Subcommittee felt that a repeat of these surveys was warranted given the time that has elapsed and the importance of the Robertson Creek hatchery as an exploitation rate indicator stock. Over time, Robertson Creek exploitation rates appear reasonable relative to Strait of Georgia exploitation rates, i.e. 10 to 20 percentage points lower. Tagged fish spawning in the wild is not believed to be a large problem but remains a source of some uncertainty.

The Subcommittee noted the variable, non-trending pattern of marine survival for WCVI coho which is in sharp contrast to the low downward trend for Strait of Georgia stocks. This is even more noteworthy when one considers that the situation in Washington State is the opposite; i.e. marine survival rates for Washington coastal stocks have declined to extremely low levels (1-2%) while Puget Sound marine survivals are in the 5-10% range.

Coho stocks in Area 21 were identified as a potential conservation concern in the working paper. The Subcommittee believed that there is cause for concern (although the current data is uncertain) and that a further detailed analysis of stock and habitat status, and potential fishery impacts on these stocks should be undertaken.

The Subcommittee supports the need for additional wild indicator stocks with associated CWT programs on the west coast of Vancouver Island, with the priority in Area 26 or 27.

Subcommittee Recommendations

The Subcommittee recommends that the impacts of hatchery mark selective fisheries on WCVI assessment programs (current and proposed) be evaluated. See General Subcommittee Concerns for further discussion.

S98-8 Estimating the percentage of hatchery-reared juvenile coho salmon in the Strait of Georgia. R.J. Beamish, R. Sweeting and Z. Zhang.

Working paper accepted subject to revisions

Working Paper Summary

The marking of a large number of hatchery coho in 1997 by removal of the left pelvic fin provided an opportunity to estimate the percentage of hatchery and wild coho in the Strait of Georgia. The survey of juvenile coho abundance and distribution in the Strait of Georgia and Puget Sound in 1997 provided samples that enabled estimates of hatchery and wild coho to be determined prior to any fishery. Using these marked coho and catches from surveys in June/July and in September, the proportion of juvenile hatchery coho within the Strait of Georgia ranged from 64-67%. If estimates of smolts from naturally spawning hatchery adults were included as hatchery releases, estimates of hatchery percentages in the catch could be as high as 75%. Both hatchery and wild juvenile coho remained within the Strait of Georgia until after September, several months after coho left Puget Sound. There was no difference in the length of coho with or without the left pelvic fin.

Reviewers Comments

Reviewer #1

Reviewer #1 found this paper to be straight forward in presentation of data and results but would benefit from additional analyses of the data provided and the inclusion of additional data from CWT recoveries and release information from B.C. and U.S. hatcheries. The reviewer had numerous concerns and questions regarding the catch and hatchery release data and sampling design which need to be addressed as they are potentially significant to the papers results.

Reviewer #2

The reviewer suggested that inclusion of the progeny of hatchery origin adults which spawn naturally, with the hatchery reared releases is controversial. The main issue is the high proportion of Strait of Georgia fish that originate from a few stocks, not whether they are enhanced. The reviewer noted that enhanced contributions in 1997 need to be put in the context of other years. A number of points regarding release information, mark mortality, escapement, sample size and otolith results were also provided.

Subcommittee Discussion

Subcommittee discussions considered the impacts of the lack of a detailed description of the trawl survey sampling design (S98-14) on this paper. It was noted that the data presented in this paper appeared to be robust enough that the conclusions were not as dependent on review of the sampling design. The data were limited to the percentage of hatchery composition of the samples and it was felt the data could be accepted with some additional statistical support.

The Subcommittee discussed the issue of contribution of second generation hatchery fish. The paper refers to them as enhanced fish in the calculations, which tends to

elevate the percent composition. The Subcommittee suggested that the second-generation hatchery fish remain in the calculations but be referred to as coho produced from a previously enhanced stock and not identified specifically as enhanced.

Subcommittee Recommendations

The high proportion of hatchery stocks is consistent with the current assessments of extremely low abundance of wild stocks. The Subcommittee recommends that this paper be accepted subject to minor revisions relating to inclusion of work done previously relating to this topic and additional statistical analysis such as boot strapping along with the inclusion of statements of uncertainty.

S98-9 Forecasting coho marine survival using the regime concept. R.J. Beamish, D. Noakes, G.A. McFarlane, W. Pinnex, R. Sweeting, J. King and M. Folkes.

Working paper accepted subject to revisions

Working Paper Summary

Regimes are persistent trends in a biological or physical time series that can shift abruptly from one state to another. It is this persistence that may provide a useful way of forecasting trends in a related series. There is a relationship between the cumulative sum of the standardised anomalies of survival of hatchery-reared coho salmon released into Puget Sound and the total April flows from the Fraser River. Using this relationship for the regime that started after 1989, the authors concluded that the marine survivals in 1997, 1998, and 1999 are not likely to improve. The relationship with April flows is similar for the marine survival of hatchery-reared coho in the Strait of Georgia indicating that the trend in low marine survivals in 1998 and 1999 may continue or become worse. Data on ocean survivals of coho off Oregon show trends similar to Puget Sound and the Strait of Georgia. Thus, it is forecasted that the marine survival of coho at the southern limit of their distribution may not improve until at least the catch year 2000.

Reviewers' Comments

Reviewer #1

The reviewer stated that this paper is not an explanation of trends in marine survival that has been seen in the 1990's or why they have changed, but is a useful first step in providing some advice towards managing southern B.C. coho. The reviewer felt that the paper provided fairly compelling evidence of widespread and roughly synchronous changes in coho survival from Strait of Georgia, Puget Sound and the Oregon Production Index (OPI) area. Further, the paper presented a reasonable indication of the direction of marine survival over the next few years. The paper also possibly

provides a methodology for marine survival trends a year in advance of the current forecasting methodology. The reviewer cautioned that one needs to be careful in the use of climatic time series as an indicator of survival when a mechanism that explains the link between climatic changes and survival is lacking.

Reviewer #2

The Reviewer agrees with the authors that there appears to have been a general decline in coho marine survival for all three production areas examined; Strait of Georgia, Puget Sound and OPI. It would also be relevant to speculate whether some "shift" occurred about 1990 to a different regime. The reviewer questions the use of simple linear regressions between river flow and coho marine survival. He pointed out that experience has tended to make managers skeptical about predictions based upon such simple correlations. While the reviewer found the paper stimulating, it may be mixing two themes with very different time scales; the non-linear regime concept and a linearized forecast. Both are important, but may not belong together.

Reviewer #3

This reviewer concentrated on evaluating the paper in the context that it was a forecast paper as indicated in the title. It was noted that over the last few years PSARC Salmon Subcommittee has created a set of standards that are to be used by authors of papers that concern forecasting methodologies. These standards include:

- a description of the data used;
- an explicit description of the model;
- explicit forecast with confidence limits at fixed probability levels;
- a retrospective analysis to objectively select among a set of forecast models.

The reviewer went on to state that more than one forecasting method is especially important if changes from past forecasting procedures for a stock or stock aggregate is in question. The reviewer recommended that the Subcommittee not accept the paper.

Subcommittee Discussion

The Subcommittee accepts the paper with revisions. The Subcommittee noted that the paper was not a forecast in the traditional PSARC sense, which explicitly forecasts survival with confidence limits and a retrospective analysis to allow selection among various forecast models. The authors presented a hypothesis that the downward trend in coho marine survival is linked to a regime shift that occurred in 1989. The Subcommittee expressed concern that the current version of the paper may not accurately capture that relationship and requested two main revisions to the paper. Firstly, the authors were directed to explicitly clarify the intent and purpose of the paper. Secondly, the Subcommittee asked the authors to explore the use of other models that may more accurately capture the trend in coho marine survival. One of the reviewers

noted that oscillation models rather than a step function would be a useful alternative model to explore.

The authors clarified to the satisfaction of the majority of the Subcommittee that the paper could be revised to address the concerns raised by the Subcommittee. The discussion with the authors clarified that the revised paper would not be a PSARC forecast document. The authors were encouraged to work with interested members of the Subcommittee on specific revisions, and the authors encouraged Subcommittee members to submit any further specific concerns to the authors.

Subcommittee Recommendations

The Subcommittee made no recommendations at this time.

S98-10 Abrupt declines in the recreational catch of coho salmon in the Strait of Georgia in the 1990s are related to changes in climate. R.J. Beamish, G.A. McFarlane and R.E. Thomson.

*****Working paper not accepted *****

Working Paper Summary

The percentage of Strait of Georgia coho caught in the Strait of Georgia or off the west coast of Vancouver Island was determined from coded-wire tagged hatchery-reared coho and varied from year to year**.** The variation was associated with the flow of fresh water from the Fraser River and became more extreme in the 1990s**.** In 4 of the 8 years in the 1990s**,** and in the past three years**,** most coho have been caught outside of the Strait of Georgia**.** The movement offshore was related to a lowering of the surface salinity in the Strait of Georgia, particularly in the winter**.** The change in salinity was related to an increase in the number of days of zonal (westerly) winds in October**,** November**,** and December and with an increase in relative sea level height**.** The climate change in 1989 that affected the circulation in the Strait of Georgia and behaviour of coho was associated with changes in other global climate indices which emphasise the impact that global climate events can have on the dynamics of regional salmon stocks**.**

Reviewers' Comments

Reviewer #1

The reviewer recommended that the paper be rejected. The reviewer noted that previous working papers containing survival forecasts for Strait of Georgia coho (S98-

5, S97-6, and S96-11), which would have been a logical starting point for the authors were not referenced. The reviewer found the line of argument in the paper confusing and that there were several instances where important assertions were not supported by the data presented. The reviewer suggested that a consistent format for the presentation of data, correlations and statistical analyses would have increased the clarity of the paper and noted that many assertions lacked appropriate statistical tests. The reviewer noted that in some instances alternative explanations for observations had not been considered. The reviewer concluded by encouraging the authors to develop the climate based models and to compare their performance with accepted forecast models in a future submission to PSARC.

Reviewer #2

The reviewer found that although the conclusion that there is an association between salinity and catch distribution was adequately supported, this was not a new finding. Neither the originators nor the PSARC forecasts using the relationship were cited by the authors. The reviewer found that the authors' further explorations of the associations between climate and coho behaviour were interesting but that their conclusions were not convincing. The reviewer requested clarification of terminology and noted the absence of statistical tests to support many interpretative statements. The reviewer concluded by encouraging the authors to further develop their models but noted that in their current form they have not demonstrated any improvement to the established forecasting model based on spring salinities.

Subcommittee Discussion

The Subcommittee encouraged the authors to further develop their climate-based models of coho behaviour. The Subcommittee concurred with both reviewers in noting that the proposed model offered no improvement over the established forecasting model. The Subcommittee also concurred with the reviewers that the authors had not adequately supported many of their hypotheses. For those reasons the Subcommittee could not accept the Working Paper.

S98-11 Rivers Inlet sockeye salmon: stock status update. D. Rutherford, C. Wood and S. McKinnell.

Working paper accepted subject to revisions

Working Paper Summary

This paper provides an update to PSARC S95-5 on the stock status of Rivers Inlet (Owikeno Lake) sockeye salmon. This report includes updated information on catch, escapement indices, total stock size indices, age composition, and juvenile abundance indices collected in 1995-1997. A recent dramatic drop in sockeye escapement was

observed in 1994 and persisted for three years (Fig. 1). The 1995 and 1996 escapement estimates are the lowest on record at 73,000 and 65,000 sockeye respectively. The 1997 escapement of 285,000 was a considerable improvement over the 1994 to 1996 escapements and exceeded the target. However, this escapement was still slightly below the long-term median escapement of 312,000 sockeye.

Trawl surveys that were carried out from 1960 to 1969 were reinstated in 1995. The size and number of juvenile sockeye caught in standardised trawl surveys was used to develop an index of juvenile sockeye abundance. Indices of juvenile sockeye abundance have also been inferred for years where pre-smolt size is available but not trawl survey data. Juvenile abundance indices for brood years 1991 and 1994 were above the long-term mean suggesting that the freshwater production potential for Owikeno Lake had not declined from historic levels (Fig. 2). Furthermore, the 1991 brood year had above average juvenile abundance (as inferred from juvenile data) but returned poorly as adults in 1995 and 1996 indicating a very poor marine survival. Juvenile abundance indices for brood years 1995 and 1996 are below historic levels with 1996 among the lowest on record, which is consistent with the record low parent escapements.

In summary, the Owikeno Lake sockeye stock declined to record low levels in 1995 and 1996. All available data indicate that this decline resulted from poor marine survival, not a failure in freshwater production. Analysis of juvenile data also suggest that the overall decline in total stock since the 1970s cannot be attributed to a decline in freshwater production. Future returns to Rivers Inlet (Owikeno Lake) are expected to be low through to 2001 as a result of very poor escapements in 1994 to 1996. The median forecast of total returns in 1998 is 165,000 sockeye with a 25% probability that the return will be below 95,000 sockeye.

Rivers Inlet (Area 9) sockeye forecasts:

25%	50%	75%	80%	90%
276,000	165,000	95,000	83,000	63,000

The percentage refers to the probability that actual run size will exceed the specified forecast.

Reviewers' Comments

Reviewer #1

Reviewer #1 supported the authors' conclusions and recommended acceptance of the paper with minor revisions. Concern was expressed over the problem of assessing Owikeno Lake sockeye given the unreliable nature of the escapement data. The importance of the data obtained from reinstating the juvenile trawl surveys has been

extremely valuable. The authors stated that it was difficult to fully endorse the authors' results given the suspect nature of the escapement data used in the analysis. It was recommended that the authors expand on the utility of the clear-stream escapement data and should consider adding a plot of the regression relationship between the SEDS escapement and the clear-stream index.

Reviewer #2

The reviewer reported the paper was interesting, well organised and well written. The strength of the paper was in the work done to index juvenile abundance and relating abundance to smolt size. The main concern was, much of the analyses embodied in the paper dealt with adult escapement data which by the authors' own admissions were "very unreliable estimates". The reviewer indicated that it was not possible, given the uncertainty in the data, to partition the cause of stock declines between freshwater or ocean influences. The authors were encouraged to continue their work of indexing juvenile sockeye abundance.

Subcommittee Discussion

The uncertainty in the escapement estimates is a major concern with the analyses and conclusions of the paper. The clear-stream index developed in recent years is an improvement, but extrapolations to total abundance are very uncertain. The Subcommittee concurs with the authors that the estimate of optimum escapement from the stock recruitment relationship is too uncertain (because of the escapement data) to endorse. The Subcommittee noted that the 200,000 escapement target presented in the report is a management target, and is not derived from technical assessments.

The Subcommittee discussed whether the juvenile abundance index was lower in recent years. The fact that the 1991 and 1994 juvenile indices exceeded the long-term average indicates that the potential for historical levels of smolt production continues to exist. The 1995 and 1996 brood year indices have declined reflecting reduced escapements. The relationship between escapement and subsequent juvenile indices for the four most recent years (1991, 1994, 1995 and 1996) is consistent with that observed in the 1960s. Only the inferred index for 1989 appears as a low outlier. The Subcommittee noted that additional information on hydroacoustic estimates of sockeye pre-smolt abundances referenced by one of the reviewers should be incorporated into the assessments. The authors mentioned that analysis of historical scale collections is currently underway to provide an alternative, 50-year time series of juvenile growth that indexes juvenile abundance.

The potential freshwater productive capacity does not appear to have changed given the high juvenile abundance indices in 1991 and 1994. The low returns in 1995 and 1996 are likely the result of poor marine survival. Returns are expected to remain poor through the year 2000 because of the poor brood year escapements in 1995 and 1996.

The Subcommittee noted that the current juvenile assessment program is sufficient to track juvenile abundance, but will not provide sufficient information to resolve questions of optimising production from the system. The juvenile assessment programs should be continued. The Subcommittee noted that technically feasible assessments programs could be conducted to provide accurate escapement estimates and to provide estimates of juvenile abundance.

Subcommittee Recommendations

The Subcommittee recommends acceptance of the 1998 Rivers Inlet sockeye forecasts of 165,000 (50% probability of a lower return), and 95,000 (25% chance of a lower return).

S98-12 A risk assessment for north coastal coho fisheries in 1998, with commentary on risk in southern inside and outside fisheries. B. Holtby and R. Kadowaki.

Working paper accepted subject to revisions

Working Paper Summary

The risk of further declines in abundance of the Babine Lake coho aggregate were examined using a stock-recruitment analysis of a 52 year time series reconstructed from an escapement to fixed date at the Babine River counting fence. Reconstructed total escapements and stock size have been declining at a constant rate since at least the early 1970s. Recruitment (total return) was forecast using the stock-recruitment relationship. Quasi time series forecasts based on reconstructed total stock size predict that escapements in 1998 will increase only marginally over the record low escapements observed in 1997, even in the absence of fishing mortality. Smolt outputs from Upper Skeena streams for 1997 were estimated using a population model applied to juvenile survey data collected in the fall of 1996 at sites throughout the area. Assuming forecast marine survivals for Lachmach River coho, a coastal indicator stream, are applicable to the Upper Skeena, over 50% of streams will fail to reach 3 females/km even in the absence of fishing.

Similar analyses for Lower Skeena coho were based on the juvenile production model and measured smolt output at Lachmach River. With no fishing mortality there is an approximately 2% chance that Lachmach escapement would not reach estimated MSY levels, and that 24% of streams would reach escapements of a least 13 females/km. At current exploitation rates (50%-60%) nearly all lower Skeena streams would reach 3 females/km and about 50% would reach 13 females/km. Similar forecasts were made for 1997 that did not anticipate the large-scale recruitment failure. Consequently, forecasts for the Lower Skeena should be treated cautiously.

Standardised visual escapement counts pooled over Statistical Areas suggest that conservation concerns may be developing in Statistical Areas 5 and especially SA6.

Smolt production estimates for the west coast of Vancouver Island based on the juvenile production model indicate that an exploitation rate of less than 50% would be required to ensure that escapement to all surveyed streams would reach at least 1 female/km. At exploitation rates of 30% approximately 50% of streams would achieve escapements of 9 females/km. The marine survival forecast for Robertson Creek Hatchery was used.

Observed smolt counts were available for Black Creek. Marine survival forecasts for Quinsam River Hatchery were used. With no fishing mortality there is an approximately 18% chance that escapements to Black Creek would fall below 9 females/km (total escapement of 500), but there is less than a 20% chance of achieving MSY escapements (1500-2000). Smolt production estimates derived from the juvenile production model were also available for streams around the Strait of Georgia and in the Lower Fraser. With no fishing mortality, escapement to about 7% of streams will not reach 1 female/km, while escapement to about 32% of surveyed streams will not reach 3 females/km. At 1997 exploitation levels (15%-35%) escapement to between 8% and 15% of streams would not reach 1 female/km.

Reviewers' Comments

Reviewer #1

The reviewer felt that the authors perhaps tackled too much in one paper, which limited the in-depth treatment of any one area, or approach. It was suggested the authors focus their assessments by region, preferably in separate papers and in conjunction with the authors of other working papers for these regions. He also suggested that the authors have understated the risks as they have not been able to include the added risks of data and management uncertainty, and demographic and genetic risks in their scenarios. The reviewer also recommended the authors define risk in their context, for example what is a limit reference point and how were they determined. A list of additional specific points was included for consideration.

Reviewer #2

This reviewer had difficulty in understanding the risk analysis methods employed, and did not understand the process of reaching the conclusions in the paper. The reviewer was surprised not to see an analysis of ocean survival rates using CWT analysis. A comparison of freshwater productivity, ocean survival and exploitation rate by region was also suggested. Despite reservations concerning the methods, the reviewer believes the conclusions of the paper are true.

Subcommittee Discussion

The Subcommittee recommends acceptance of this paper subject to revisions.

The Subcommittee notes that this paper builds on previous advice given by PSARC in the fall of 1997 (PSARC Working Paper S97-12). A high level of concern was expressed at that time for Upper Skeena coho stocks (principally the Bear-Sustut, Babine and Bulkley-Morice) based on low abundance estimates of adults and juveniles in these areas. In this paper, adult female spawner density escaping above the Babine River fence has dropped from almost 25 females per km in the 1960s to an average of a little over 3 females per km (range 1.4-8.1) in the 1990-96 period to a record low of 0.3 females per km in 1997. This paper identifies values from 10 to 30 females per km as being the desirable range to maximize habitat use, maximize yield and preserve ecosystem function. For the Babine stock, values above 10 females per km have not been seen since the late 1970s.

The decline in the Babine Lake coho aggregate appears to have been primarily the result of over-fishing, exacerbated by a severe decline in marine survival in 1997. Recovery is unlikely, even in the absence of fishing, unless survival improves.

The Subcommittee expressed concern with the reliability of the escapement estimates being used to consider status of coho stocks in Areas 5 and 6. Surveys in Area 5 have become more infrequent in recent years and have been most often targeted on sockeye enumeration. While the Subcommittee notes that the coho counts in these areas matches known decreasing escapement trends in adjacent areas, there is further work that should be done prior to making definitive statements on the status of these stocks. Past escapement records for streams in these areas should be carefully reviewed.

The Subcommittee notes the significant level of enhancement activity that has taken place in recent years in some Skeena tributaries (Babine and Bulkley) and that the impact of such activity has not been fully assessed.

The Subcommittee requested the authors to distill the risk assessment data into a series of summary tables.

Table 1. Summary of escapement risk plots for the **Upper and Lower Skeena** aggregates. The table entries are the proportions of surveyed streams that will not reach the indicated escapement levels with no fishing mortality. The percentiles of smolt survival are those for the Lachmach forecast (see S97-12) and are the probability that survival will be worse than the bracketed level. The survival observed in 1997 was approximately the 5th percentile of the 1997 forecast.

		percentile of smolt survival forecast			
Aggregate	females/km	50% (0.091)	25% (0.076)	10% (0.064)	5% (0.056)
Upper Skeena	1	0.40	0.40	0.40	0.40
	3	0.52	0.56	0.56	0.67
	9	0.80	0.88	0.88	0.88
	13	0.88	0.88	0.96	0.96
Lower Skeena	1	0	0	0	0
	3	0	0	0	0
	9	0.05	0.05	0.25	0.30
	13	0.25	0.29	0.45	0.45

Table 2. Summary of escapement risk plots for the **west coast Vancouver Island** aggregate. The table entries are the proportions of surveyed streams that will not reach the indicated escapement levels with no fishing mortality. The percentiles of smolt survival are those for the Robertson Creek forecast (see S98-5) and are the probability that survival will be worse than the bracketed level.

		percentile of smolt survival forecast			
Aggregate	females/km	75% (0.069)	50% (0.030)	25% (0.013)	10% (0.006)
WCVI	1	0	0	0.04	0.23
	3	0	0.03	0.25	0.65
	9	0.13	0.37	0.80	1.0
	13	0.23	0.52	0.96	1.0

Table 3. Summary of escapement risk plots for the **Strait of Georgia and Lower Fraser** aggregate. The table entries are the proportions of surveyed streams that will not reach the indicated escapement levels with no fishing mortality. The percentiles of smolt survival are those for the Quinsam River forecast (see S98-5) and are the probability that survival will be worse than the bracketed level.

		percentile of smolt survival forecast			
Aggregate	females/km	75% (0.018)	50% (0.012)	25% (0.008)	10% (0.005)
Strait of Georgia	1	0.06	0.06	0.13	0.22
	3	0.20	0.33	0.53	0.72
	9	0.66	0.89	0.97	0.98
	13	0.86	0.95	0.97	1.0

Subcommittee Recommendations

The Subcommittee recommends an extremely cautious approach to management of fisheries harvesting Upper Skeena coho stocks in 1998. For Upper Skeena coho, if marine survival does not improve, populations will likely continue to decline, even in the absence of fishing mortality. Risk of extinction increases exponentially with declining population sizes. The Subcommittee is also very concerned about the status of Strait of Georgia/Lower Fraser coho stocks. Although not in as perilous a state as Upper Skeena coho, Strait of Georgia/Lower Fraser coho also have to be managed with caution. Even with no fishing mortality, most streams will likely be underescaped. Coho stocks on the west coast of Vancouver Island appear to be somewhat better off, but a cautious approach is nevertheless required.

S98-13 Stock assessment of Thompson River/Upper Fraser River coho salmon. J. Irvine, K. Wilson, B. Rosenberger and R. Cook.

Working paper accepted subject to revisions

Working Paper Summary

The purpose of this working paper was to provide an assessment of the status of coho salmon from the Thompson River/Upper Fraser River. The paper was a first attempt at providing advice specific to Thompson and Upper Fraser coho. Much of the assessment relied upon the analysis of spawning escapement data.

Escapements to unenhanced streams in the South Thompson were at moderate levels from 1975 through 1983. For the next six years, returns were relatively high, and since then there has been a definite decline (Fig. 3). As well, the proportion of South Thompson streams inspected with no spawning coho seen (Fig. 4) generally increased during the time series, also indicative of poor recent returns. Escapements to two

enhanced South Thompson rivers (Eagle and Salmon) followed a similar pattern to unenhanced streams although the rate of decline in the last 9 years was steeper. Returns to unenhanced North Thompson streams (Fig. 5) followed a similar temporal pattern as returns to the South Thompson did, except the magnitude of temporal variations was less. A period of modest returns from the mid-1970s to 1983 preceded about 5 years of relatively good returns. Since 1989, returns have been relatively poor. Escapement data for the Lower Thompson/Upper Fraser were of shorter duration and greater uncertainty than for the North and South Thompson. Escapements in the four most recent years were generally lower than in previous years. A recent preponderance of males in the spawning escapements of some Thompson streams, a suggestion that there may be some declines in sizes of fish at return, and what appeared to be a tendency for females returning to be less fecund than they used to be, are also causes for concern. Each of these factors reduces the reproductive potential of the population.

An analysis of CWT data did not show any appreciable differences in the marine tag recovery patterns among South Thompson, North Thompson, and Lower Thompson/ Upper Fraser stocks. Although some minor differences in the marine recovery patterns of Thompson and Lower Fraser coho were seen, opportunities to separate harvests of these two stock groups appear to be rare. Possible exceptions are late September-October fisheries in Georgia Strait North and coho fisheries within the Fraser River after the end of October.

Fishery managers need to be aware of potential impacts of fisheries in Puget Sound (Washington) on Thompson coho.

The authors warn that selective mark fisheries, unmonitored fisheries, and incidental mortality will compromise our ability to evaluate the success of measures to conserve Thompson River/Upper Fraser coho.

Reviewers' Comments

Reviewer #1

Reviewer #1 found the working paper to be a useful compilation of the limited amount of information available on North, South, and Lower Thompson coho escapement, enhancement history, biology, and exploitation/survival. However, he considered that the focus on the last decade severely limited direct inferences that could be made about the overall status of these stocks from an historical perspective. Although he agreed that the authors' conclusions about recent declines in escapement were reasonable, he did not agree that the stocks had "declined significantly over the last 20 years". He suggested revisions to include a statistical analysis of the trends in all stocks, and a graph of the "zero" coho escapements for the North and Lower Thompson stocks.

This reviewer was concerned that future stock assessment capability for Thompson coho would be hampered by selective mark fisheries, a problem flagged by PSARC several years ago, and one that he felt could seriously compromise DFO's and CDA's attempts to elicit stakeholder support for large reductions in exploitation rate. Because of this, he endorsed the development of DNA sampling or alternative CWT measures to offset the problems raised by mass marking and selective mark fisheries. He also considered the present analysis of CWT catch distribution to be weak because of limited data, and suggested that an attempt be made to determine run timing using CPUE data. He pointed out an apparent discrepancy in run timing inferred from DNA stock composition data and CPUE data.

Finally, this reviewer considered that it was inappropriate to speculate about the existence, form, substance, or implications of a CDA/US fishing arrangement for 1998. He recommended, instead, that the authors simply flag the issue by stating the overall measured exploitation rate in 1997 and the proportion of the total exploitation accounted for by Washington net and sport fisheries, noting that exploitation by in-river Fraser fisheries was not measured.

Reviewer #2

This reviewer considered that the authors had made progress in the difficult task of assessing the status of Thompson River coho by collating and reviewing data that varied in accuracy and precision, and presenting their results in a form that should be useful to fishery managers. He pointed out a number of statements that needed to be clarified or made more specific. He considered that estimates of exploitation for 1997 might be very misleading without the inclusion of incidental fishing mortality. He also objected to imprecise statements about the "increase in harvest of Thompson and Lower Fraser coho in Washington State" in 1997, and the "relatively high exploitation of Fraser/Thompson coho in Washington fisheries". Finally, he thought that there was insufficient discussion of research and monitoring needs given the obvious limitations of data.

Subcommittee Discussion

The Subcommittee discussed how "zero escapement counts" should be presented and concluded that it was most appropriate to use the term "none observed" in cases where streams had been inspected but no coho had been seen. These observations are informative as an index, but do not imply that coho escapements were actually zero. Following up on the first reviewer's concerns, the Subcommittee asked the authors to express escapement trends with respect to specific time periods, to examine these trends quantitatively, and to provide additional information on the proportion of streams with "none observed" for the North Thompson stock.

The Subcommittee recognised the desirability of identifying how the run timing of Thompson/Upper Fraser coho might differ from other more productive coho stocks, and discussed whether there was any opportunity to infer run timing from the data available.

The Subcommittee emphasized that, by themselves, the stock composition proportions based on CWT analyses and DNA analyses provide no insight about run timing. The Subcommittee also considered that the average run timing curve based on CPUE data might be very misleading if fishing effort changed substantially over the time period in question, because catch was unlikely to increase linearly with effort over a wide range in effort.

The Subcommittee discussed the reliability of the exploitation rate analyses, and agreed with the second reviewer that total fishing mortality may have been underestimated significantly in 1997 because there were likely sources of fishing mortality that had not been accounted for (e.g., incidental mortality and illegal retention). Given these reasonable concerns that fishing mortality may have been underestimated in Canadian fisheries, the Subcommittee agreed with reviewers that the authors should state, but not overemphasise the proportion of the total exploitation accounted for by Washington net and sport fisheries, and avoid speculating about the implications of possible CDA/US fishing arrangements in 1998. The Subcommittee asked the authors to include the number of tag recoveries in Table 6.1 to help determine whether the discrepancy in estimated exploitation rate between Lemieux and Louis Creeks was real or simply an artifact of low sample sizes.

The Subcommittee recommended that an updated assessment of Thompson River/Upper Fraser coho be prepared for review at a subsequent meeting. The updated document should include consideration of additional data on spawning escapements prior to 1975, CWT data for other relevant stocks, implications of incidental and in-river fishing mortality, and differences in fecundity and freshwater survival that affect the relative freshwater productivity of Thompson versus coastal coho stocks.

The Subcommittee concluded that total returns and spawning escapements of coho in the North and South Thompson Rivers have declined to record low levels over the last ten years. An assessment of the implications of these poor spawning escapements given recent low levels of marine survival (<2%) is presented in another working paper (S98-18).

Subcommittee Recommendations

The Subcommittee recommends that programs be initiated to offset the loss of CWT assessment information associated with new selective mark fisheries (see General Subcommittee Discussion and Concerns). Selective mark and unmonitored sport fisheries may seriously compromise DFO’s ability to evaluate the success of measures to reduce fishing mortality on Thompson River/Upper Fraser coho.

S98-14 The use of trawl surveys to estimate prefishery juvenile abundance of coho salmon. R.J. Beamish, D. McCaughran, R. Sweeting and M. Folkes.

*****Working paper not accepted *****

Working Paper Summary

A rope trawl fished at approximately 5 knots was used to establish indices of juvenile coho abundance in the Strait of Georgia. The actual abundances were not determined, but are believed to be higher than the indexed values. The estimates of 3.6 million in September of 1996 and 2.8 million in September of 1997 indicated that the total returns in 1998 could be less than in 1997. The indexed abundances are minimal estimates as the catchability of the net is probably lower than used in this analysis. The minimal estimate of 3.6 million in 1996 compares with an estimated total return of about one million in 1997 and indicates that the amount of fall/winter marine mortality is an important component of the total marine mortality that determines the final carrying capacity for the brood year.

Reviewers' Comments

Reviewer #1

The reviewer indicated the methodology applied successfully tracks the migration of juvenile coho salmon out of the Strait of Georgia, and has the potential to provide relative indices of juvenile abundance and stock composition. The reviewer was concerned that the authors failed to explain the details of some of the methods applied. Statistical procedures were recommended to better estimate the uncertainty in the data. The reviewer agreed that "These initial surveys provide an excellent base upon which to design future investigations". However, the reviewer suggested concentrating on refining the methodology rather than focusing on some dubious abundance estimates. A series of additional specific concerns were outlined in the paper. The reviewer indicated that the estimates of total juvenile abundance are too uncertain at this stage for further discussion of the implications of this preliminary data.

Reviewer #2

This reviewer indicated major revisions were required to clarify the trawl survey design and sampling methods, which are currently inadequately described. Also, the paper required more statistical rigour. Specifically, the authors need to conduct appropriate statistical tests to support important statements and conclusions present in the paper. Some of the differences discussed in the text between the September 1996 and 1997 surveys could be caused by a "vessel effect", since a commercial fishing vessel made most of the tows in September 1997 while the DFO Research Vessel, W.E. Ricker, made all the tows in 1996. With only two net calibration measurements on the

commercial vessel, the reviewer was not convinced that the possibility of a “vessel effect” had been adequately evaluated. This is an important point because the authors concluded that the size of the returning run from the 1997 brood year could be less than the 1996 brood year, even though the difference between the September 1996 and 1997 coho estimates was not that great, and therefore would be sensitive to a potential sampling bias caused by using different vessels in the two surveys. The speculative parts of the discussion on condition factor and fall/winter mortality should be removed until supporting evidence is obtained. It was not clear why this paper was submitted to the PSARC Salmon Subcommittee at this time. Several more years of data and more critical statistical testing are required before the potential usefulness of this survey for salmon stock assessment can be evaluated.

Subcommittee Discussion

The Subcommittee discussed the lack of a detailed description of the trawl survey design in this paper. It was noted that there were no references to previous work related to trawl surveys of which there are numerous studies in the literature. Although there have been no swept volume estimates conducted on juvenile salmon previously, there are numerous reports for invertebrates, groundfish and other marine animals using this technique. Concern was expressed about the variation in sampling procedures between years, where vessels and gear were changed, which in the view of the Subcommittee could be an explanation for any variation in the results of this study. Given these concerns it was agreed that there was a need for a more detailed description of the sampling design.

With respect to the abundance estimates the Subcommittee was again concerned that the lack of a description of the sampling design does not allow for the proper evaluation of the point estimates and confidence intervals provided in this paper. It was suggested that more rigorous statistical analyses are required.

Subcommittee Recommendations

The Subcommittee recommends that the paper not be accepted as it currently stands. The Subcommittee could not accept the conclusions in this paper based primarily on the lack of a proper description of the survey sampling design. It was suggested that major revisions be done with emphasis on the survey sampling design and a more detailed description of the methodology after which it should be resubmitted and reviewed by a statistician.

S98-15 Stock status of Cowichan chinook salmon. D.A. Nagtegaal and B. Riddell.

Working paper accepted subject to revisions

Working Paper Summary

Considerable interest has been focussed toward the chinook stocks in the southern portion of the Strait of Georgia due to the perceived decline in these stocks and their importance to local fisheries. In 1985, a chinook rebuilding plan was initiated through the Pacific Salmon Treaty between the United Sates and Canada to stop the decline in escapements to naturally spawning chinook stocks and attain escapement goals in selected indicator stocks (Cowichan, Nanaimo, Squamish) by 1998. This report compiles the information available on the status of the Cowichan chinook stock, including escapement data, habitat assessment, biological data, juvenile production, ocean catch distribution, enhancement history, trends in survival and exploitation rates.

Chinook escapement to the Cowichan River had declined during the mid-1980s but have generally been increasing since 1990. Natural spawners to the system are primarily comprised of 3 and 4 year old fish. Hatchery chinook production began in 1979 and a significant expansion of the facility in 1992 increased production from less than 500,000 chinook juveniles to more than 2.5 million. Enhanced contribution to the stock, measured in terms of coded-wire tag expansion information, indicated that this contribution has increased to approximately 40% of the total return in 1997. Several factors affecting the number and distribution of natural spawners to the system were discussed including ocean fishery dynamics, in-river water flow, distribution of spawning chum salmon, native food fishery and hatchery broodstock removals, and seal predation. Exploitation rates have declined for the 1991 and 1992 brood years (the most recent complete broods) and are likely a reflection of the management implemented reduction in sport fishing effort in Georgia Strait.

The decline in escapement has been stopped and for 1995 and 1996 chinook returns to the Cowichan River have been above the original escapement goal of 12,500. It is necessary to continue monitoring this system to further evaluate the biological basis for this escapement goal. It is recommended that the Cowichan system remain a key escapement indicator stock. It is also recommended that the impact of enhancement on the natural chinook population be assessed and a review of enhancement procedures and outcomes be initiated. It would be desirable to further assess the impact of chum spawning on the reproductive success of chinook, and continue to monitor the impact of seal predation in the estuary.

Reviewers' Comments

Reviewer #1

The first reviewer commented that the working paper provided the assessment data in a summary format, often graphically or using multiple year means. While this made simple and easy reading, it was difficult to conduct a useful evaluation of the data used to make the conclusions. It was noted that although the author concluded the Cowichan chinook stock is in a rebuilding mode it was not evident that the assessment was actually based on the Chinook Technical Committee (CTC) criteria. In fact when

the reviewer applied some of the CTC criteria a status of “not rebuilding” or “indeterminate” was determined. Of particular concern was the inclusion of the hatchery contribution to the status assessment of the stock. With about 50% of the escapement of first generation hatchery origin, it is not clear whether the CTC criteria to assess naturally spawning stocks are applicable.

Reviewer #2

The second reviewer noted that the working paper provided a good account of Cowichan chinook stock including a description of the life history and the freshwater and estuarial habitat of the fish. This description and possible influences on the production and survivals is important for understanding what has influenced Cowichan production. The reviewer noted that the data presentation was confusing and that the working paper would benefit from editing and reorganising. The lack of confidence limits for any of the estimates of abundance was noted. If the calculation of confidence limits is not feasible, then some discussion on the reliability should be included. For instance, the reliability of the fence operation and its counts and the estimates derived from carcass tagging.

Subcommittee Discussion

The working paper was accepted noting Subcommittee requirements for additional analysis required to identify the enhanced component and its results on rebuilding. The Subcommittee was informed that of the Lower Georgia Strait Chinook Stock Group (LGS) which is composed of 17 rivers with the Cowichan, Nanaimo, and Squamish Rivers the main producers, the Cowichan stock is now the only stock that has an adequate assessment program. The Subcommittee, while acknowledging that the objective is to rebuild wild stocks and that the use of enhancement was established as part of the policy to assist rebuilding, notes that the stock now has about a 50% enhancement supplement. Strait of Georgia chinook stocks are all enhanced to some degree and there are outstanding policy questions regarding whether these stocks should be returned to wild status as they rebuild.

Under low water conditions, chinook tend to spawn in the mid to lower reaches of the river. These are the same areas in which chum salmon spawn later in the season. This second utilisation of the same area, may impact the chinook spawn deposition. The working paper also noted an increasing seal population in Cowichan Bay and referenced previous studies done in 1988 which estimated that salmon formed a significant part of the seal diet.

The Subcommittee concluded that this working paper does not change the previous advice provide on the LGS stocks (PSARC Working Paper S96-17). It is apparent that continued efforts to rebuild this stock and the LGS group as a whole and meet escapement goals, will require continued harvest controls. A policy decision will be

required regarding the amount and continuation of enhanced contribution to the stock as rebuilding progresses.

The Cowichan River chinook stock is an important producer and serves as the main index stock representing a stock aggregate of seventeen populations. The Subcommittee supports the current monitoring and assessment activities. Further assessment would be desirable to determine the impact of chum spawning on the reproductive success of chinook salmon. The Subcommittee notes the potential impact of seal predation on chinook salmon in the estuary.

Subcommittee Recommendations

The Subcommittee recommends that the enhancement impact on wild populations in the LGS complex be assessed relative to the results in the Cowichan system. This would include the identification of the level of enhancement component, its effect on rebuilding and the utilisation of brood stock for the various sea pen operations and release strategies.

S98-16 Intra-annual changes in the abundance of coho, chinook and chum in Puget Sound in 1997. R.J. Beamish, M. Folkes, R. Sweeting and C. Mahnken.

*****Working paper not accepted *****

Working Paper Summary

In 1997, the authors carried out joint US-Canada studies in Puget Sound on juvenile Pacific salmon. The rope trawl fished from the W.E. Ricker was an effective method of sampling salmon as indicated by the size of the catches and the size of the fish in the catch. Ocean age 0 coho were first abundant in July but not in September. Ocean age 1 coho were rarely caught. Ocean age 0 chum salmon were the most abundant of all Pacific salmon. Surprisingly, the abundance estimates of juvenile chum salmon increased dramatically over the same period that juvenile coho abundance declined dramatically.

It is proposed that the movement of coho out of Puget Sound is related to the abundance of chum as the dominant items in the diet of both species is similar and the movement of coho out of Puget sound corresponded with the movement of large numbers of juvenile chum into the feeding areas of coho. However, coho movement is not a direct result of food depletion as the large abundances of chum and chinook continue to feed and maintain condition factors through to September. The large

abundances of chum and chinook, in September relative to returns, indicates that final brood year size is determined later in the year and not in the early marine period. It is probable that coho brood year strength is determined by similar mechanisms.

Reviewers' Comments

Reviewer #1

Reviewer #1 was not convinced that this paper was appropriate for PSARC as it is dealing with abundance of US stocks in Puget Sound. It was suggested that this paper be combined with the papers dealing with the Strait of Georgia, Juan de Fuca and WCVI into one paper.

The reviewer pointed out that estimates of precision of the data were commented on but not provided, as they were so large. This prevented the reviewer from supporting the conclusion that apparent population differences between the two times are significant. It is not possible to support the main findings without additional substantiating evidence.

Concern was expressed regarding the catchability of the sampling gear with respect to the size of the fish and the lack of precision estimates around the means.

Reviewer #2

This reviewer also pointed out that there was not enough information in this paper to substantiate the inferences made by the authors. A time series of survey data would allow for a proper evaluation of the indices.

Problems with the stratification scheme for the survey were raised and it was pointed out that confidence intervals for the abundance estimates were not presented.

This reviewer raised several questions about the survey design and methodologies. As a result the reviewer could not support the authors statements although they are interesting.

Subcommittee Discussion

The Subcommittee had a very brief discussion on the data presented and methods used in this paper. Similar to S98-14 the sampling design was not described in detail which restricted the ability to determine whether the analysis of the data was appropriate. It was agreed that the data as provided were insufficient to support the conclusions made, however it was noted that the hypothesis was worthy of additional

consideration and research. Following major revisions relating to a detailed description of the survey sampling design and additional statistical analysis including statement of uncertainty this paper could be resubmitted for review.

Subcommittee Recommendations

The Subcommittee did not accept this paper. Following major revisions relating to a detailed description of the survey sampling design and additional statistical analysis including statement of uncertainty, this paper could be resubmitted for review.

S98-17 Dynamic change in proportion of hatchery-reared, wild ocean and stream type chinook in their first and second years in the Strait of Georgia. Z. Zhang, R.J. Beamish and B.E. Riddell.

Working paper accepted subject to revisions

Working Paper Summary

Otolith microstructure was used to identify hatchery-reared and wild-ocean and stream-type chinook in their first and second ocean year in the Strait of Georgia. Samples used for the analysis were collected in the early summer, late summer and late fall in 1995, 1996 and 1997. The percentage of wild fish dropped from 59.2% in late summer to 36.8% in the late fall of 1995, and more dramatically from 60.4% in the late summer to 19.2% in the late fall of 1996. The decrease in the percentage of wild chinook in 1996/1997 may have resulted from a higher mortality in the late fall and may indicate that wild chinook may be in low abundance in the 1998 and 1999 fishery. There also was a general decrease in lengths from the 1995/1996 samples to the 1996/1997 samples, suggesting that ocean conditions were less favourable for growth in 1996/1997.

It is difficult to understand all of the results as migration behaviour, sample sizes and a general poor understanding of the marine phase of the life history of chinook complicates any interpretation. However, the change in 1996/1997 to a relatively high percentage of hatchery-reared fish is noteworthy. These authors also suggest that it is time to improve our understanding of the dynamics of the various stocks, life history and rearing types that make up the Strait of Georgia chinook fishery.

Reviewers' Comments

Reviewer #1

Reviewer #1 found that the authors clearly stated the purpose of the paper to determine the proportion of hatchery-reared juvenile chinook in the Strait of Georgia. In answering this question the reviewer felt there were two major problems the authors

needed to address. The first problem being that the Strait of Georgia is not a closed system hence juveniles are able to easily migrate in and out of the sample area. Second and more importantly the paper lacks a presentation of the sampling design.

The reviewer suggested a fuller discussion of the error in classifying a fish as wild or hatchery. He felt that the identified 11% reading error is a minimum.

In conclusion this reviewer did not think the paper supplied enough information to judge the implications made by the authors that there has been large shifts between hatchery and wild proportions from September to November.

Reviewer #2

Reviewer #2 described the authors interpretations as being plausible and as good hypotheses, however in his judgement the analyses presented were not sufficiently convincing to be endorsed by PSARC.

This reviewer did not feel that the information provided was sufficient to justify the suggestion made by the authors that the fishery in 1998 and 1999 in the Strait of Georgia be closely monitored for hatchery-reared and wild percentages. One problem he identified was that it seems to be based only on the relative and not absolute abundances. There is no way of determining whether the change in percentages is due to the increase or decrease in the abundance of wild or hatchery juveniles.

The reviewer was concerned about whether the composition of the catches were representative of the Strait of Georgia as a whole. He suggested the authors need to demonstrate that their sampling design is adequate to support the analysis and inferences they make from the catch samples. In addition the authors need to justify their assumptions about relative catchablilty.

In conclusion, this reviewer felt that the purpose of the paper was not clearly stated as it did not generate advice relevant to fishery management. The data and methods were considered to be inadequate to draw the identified conclusions largely because the data and methods were not described in sufficient detail. The reviewer did not consider the recommendations to be useful for fishery managers. He suggested that the authors attempt to develop a method of estimating absolute abundance in their surveys.

Subcommittee Discussion

The Subcommittee discussed the relevance of the data presented in this paper. It was pointed out that without a longer time series of data it is not possible to determine whether the percentage of hatchery chinook in the Strait of Georgia found in this study is any different than normal or a reason for concern. As a result the Subcommittee could not agree with the authors conclusion that in 1997 the hatchery percentage was significantly different than normal and secondly, that the harvest of chinook in 1998 be

closely monitored. It was not clear to the Subcommittee what sampling the fishery in 1998 would provide in the form of management advice.

Subcommittee Recommendations

The Subcommittee recommends that this paper be accepted subject to revisions relating to additional statistical work and the inclusion of some statement of uncertainty.

S98-18 A risk assessment for Thompson River coho salmon. M. Bradford.

Working paper accepted subject to revisions

Working Paper Summary

Coho salmon populations of the Thompson River drainage have been declining at a rate of 50-70% per generation since 1988. Of a sample of 34 extant populations in 1988, no fish were observed in 11 of them (32%) in 1997. To identify the causes of these declines, freshwater production was modelled using reconstructed smolt abundances. The results of this analysis showed that: (1) interior populations are likely less productive than coastal populations, (2) Thompson coho populations are currently in the linear portions of their smolt-spawner relations, and (3) populations are well below levels required to fully seed freshwater habitats. Simulations showed that the declines in Thompson coho are due to a roughly equal effect of declining marine survivals and fishing at inappropriately high rates in recent years. Under current ocean conditions Thompson coho will continue to decline in the absence of fishing and the rate of decline will increase with fishing. Because of the current poor population status, and because the risk of extinction increases exponentially with decreasing population size, it is recommended that no fishing mortality be imposed on these population.

Reviewers' Comments

Reviewer #1

The reviewer indicates the paper was a well written, well structured assessment of Thompson coho. The data are evaluated in a new and refreshing way, the results are presented in a concise and readable format, and the recommendations and conclusions are derived logically from the presented data, analyses and discussion. The author notes that this paper is not a full risk assessment for this stock group, however, given the incontrovertible evidence of extremely low and declining spawner abundance in conjunction with the author's conclusion that *"...risk increases* ***exponentially*** *with decreasing population size"* should provide managers with a clear and succinct view of the level of risk currently faced by Thompson River coho. Escapements are now low and, regardless of the completeness of the quantification of risk, it seems unlikely that more detailed future risk assessments can reach any conclusion other than that the risk of loss of this stock group is now extreme. On that

basis alone, the conclusions and recommendations of this paper should be accepted by the Subcommittee.

The reviewer identified three areas where the paper should be improved: the "broken stick" model needs to be described more thoroughly; model performance should be evaluated against other models, and outputs such as *K* (smolt carrying capacity) should be verified against existing data; alternate sources of input data specific to the Thompson System are available and should be used. The reviewer recommends that the Subcommittee accept the paper subject to reanalyses using system-specific estimates of *MS* (marine survival) and *h* (exploitation rate).

Reviewer #2

This paper is concise and clearly articulated and demonstrates that Thompson River coho are at risk. Long-term trends in escapement to levels less than 500 animals in some population/management units in themselves provides irrefutable evidence that risk of extinction is real. The advance made in this particular paper is the attempt to quantify and distinguish between effects of ocean survival and exploitation rates on population growth rates. The use of Lande's (1993[3]) equation for estimating time to extinction reinforces the important conclusion that risk increases exponentially as populations decline. Unfortunately, there is a lack of Thompson coho assessment data that on its own does not allow an independent assessment of risk. More detail on the broken-stick model is needed if indeed the only reference is Bradford and Myers (unpublished data). The reviewer suggests that the carrying capacity *K* is poorly determined by the data. The sensitivity analysis of the effect of α on population trajectory given ocean survival and harvest rate reveals uncertainty in α is important. The uncertainty in *K* is particularly important if it is going to be linked with a threshold escapement N* upon which effects of future harvest policy will depend.

Reviewer #3

The third reviewer felt this was an excellent analysis that has serious implications for Thompson River coho. The approach is innovative and provides a powerful mechanism for performing the analysis of consequences of alternative fishing mortality rates and ocean survivals. As the analysis depends largely on the estimates of fishing mortality rates and ocean survivals it would be useful to have a fuller presentation of the data from a number of CWT data sets.

Subcommittee Discussion

The Subcommittee agreed that this paper is a good step towards a comprehensive risk analysis framework for Thompson River coho and accepted the working paper following minor revisions. In agreement with all three reviewers, the Subcommittee was

[3] Lande, R. 1993. Risks of population extinction from demographic and environmental stochasticity and random catastrophes. American Naturalist 142: 911-927.

concerned that the CWT data from non-Thompson coho stocks used to estimate surrogate exploitation rates and ocean survival rates for Thompson coho may not be representative. It was noted that time series of ocean survival and exploitation rates exist for some Thompson River stocks. The author has agreed to consider the use of these data in revisions of the paper.

The Subcommittee also agreed with reviewers' comments that more detailed description of the "broken-stick" model be included in revisions to the paper. It was noted that alternative recruitment functions to describe the relationship between spawners and smolts are possible. The Beverton-Holt model assumes higher productivity at low stock sizes compared with the broken-stick model. The author has agreed to include results using the Beverton-Holt model in the final version of the paper. Considerable discussion focused on how the uncertainty in the productivity parameter α (mean smolts/females at low stock size) and ocean survival rates could affect rates of population growth *r*. The Subcommittee concluded that the author should develop reasonable bounds on these parameters and expand upon the effects of uncertainty on population trajectories under various scenarios of exploitation. A useful analysis to pursue is a re-analysis of the South Thompson data that does not remove the effects of the hatchery production as was done in the paper.

The Subcommittee was concerned about whether the effects of fishing were overstated (or understated). The author stated that estimates of exploitation rates from CWT data tends to underestimate actual fishing mortality, therefore, the recovery of stocks under a no-fishing policy might be faster than otherwise anticipated. The Subcommittee noted that the paper does not identify biological reference points or specific conservation limits for Thompson River coho and noted that there is a need for research to identify these limits in keeping with the Precautionary Approach concept.

While there is little evidence that the 10+ years of steady stock decline is related to freshwater habitat effects, the Subcommittee recognised that a thorough analysis of freshwater effects on productivity has not been done.

The Subcommittee concurs with the author's conclusion that Thompson River coho salmon have declined since 1988 at rates of 40-70% per generation, and the Eagle and Salmon populations are currently 1-2% of the 1988 escapement levels. Many streams have declined to "none observed" status in 3 generations. The Subcommittee agrees that the cause of the decline of Thompson coho populations since 1988 appears to be a combination of declining marine survival and recruitment overfishing. If marine survival does not improve, Thompson coho salmon will continue to decline even in the absence of fishing. Fishing mortality will increase the rates of decline in these populations and will increase the risks of extinction. The Subcommittee also noted that since the risk of extinction increases exponentially with decreasing population size the need for corrective action is increasingly urgent.

The Subcommittee further notes that, as a result of very small brood year escapements, the risks and conservation concerns for Thompson coho will be even higher in 1999 and 2000, unless there is a reversal in ocean conditions.

Subcommittee Recommendations

The Subcommittee recommends a very cautious management approach in 1998. Given the forecast of low marine survival, even in the absence of fishing, Thompson coho will continue to decline further from the already low escapement levels.

Figures

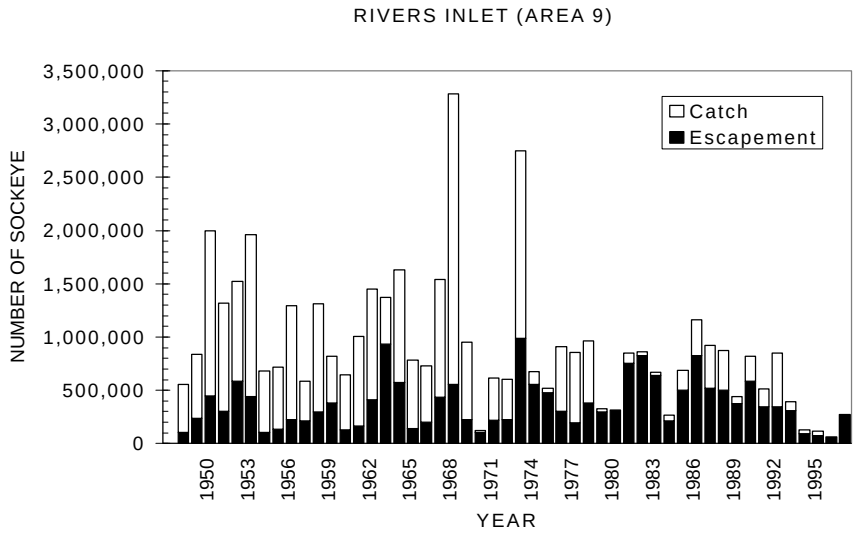


Fig. 1 Catch, escapement and total stock size for Area 9 sockeye, 1948-1997.

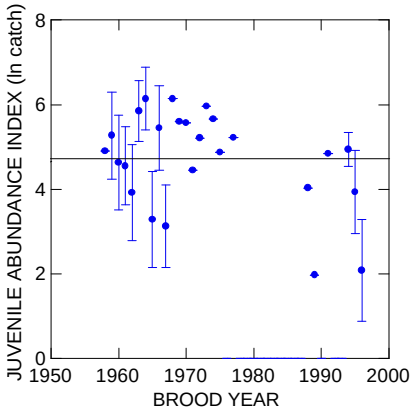


Fig. 2. Variation in juvenile abundance index by brood year. Average index indicated by horizontal line. Circles with error bars indicate index measured directly, circles only indicate index inferred from pre-smolt size.

Fig. 3 Aggregate Coho Escapement to 19 Streams in the South Thompson (trendline is a 3yr moving average)

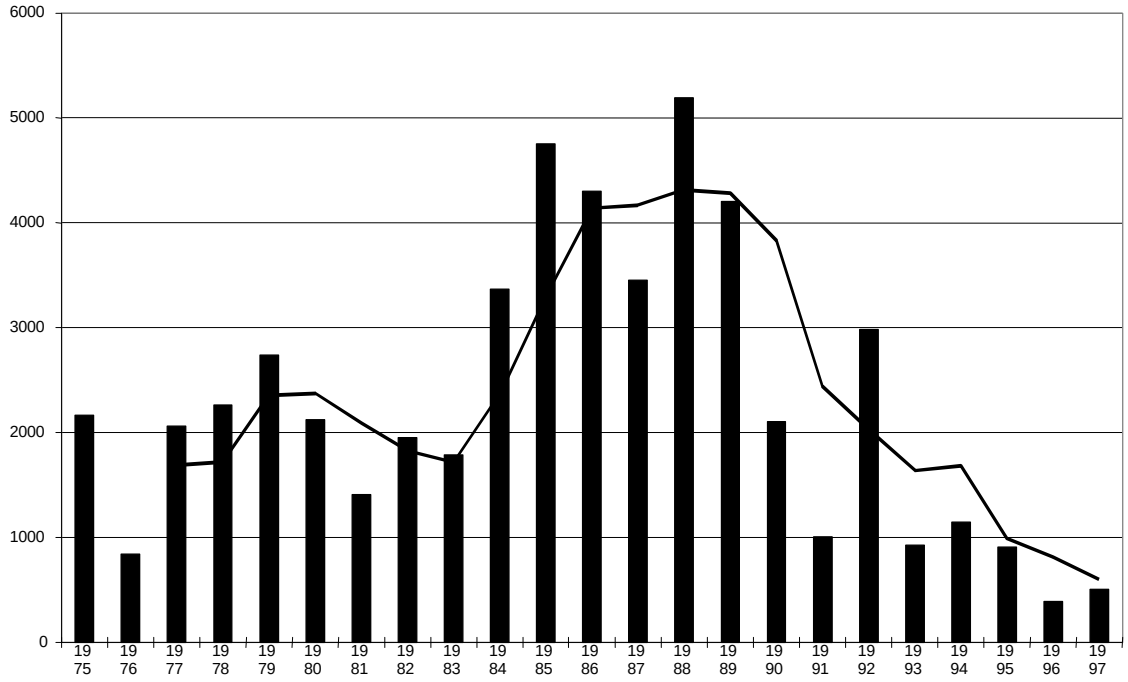


Fig. 4 Proportion of South Thompson Streams inspected with no coho escapement observed. Estimates (numbers of streams inspected each year indicated; trendline is a 3yr moving average)

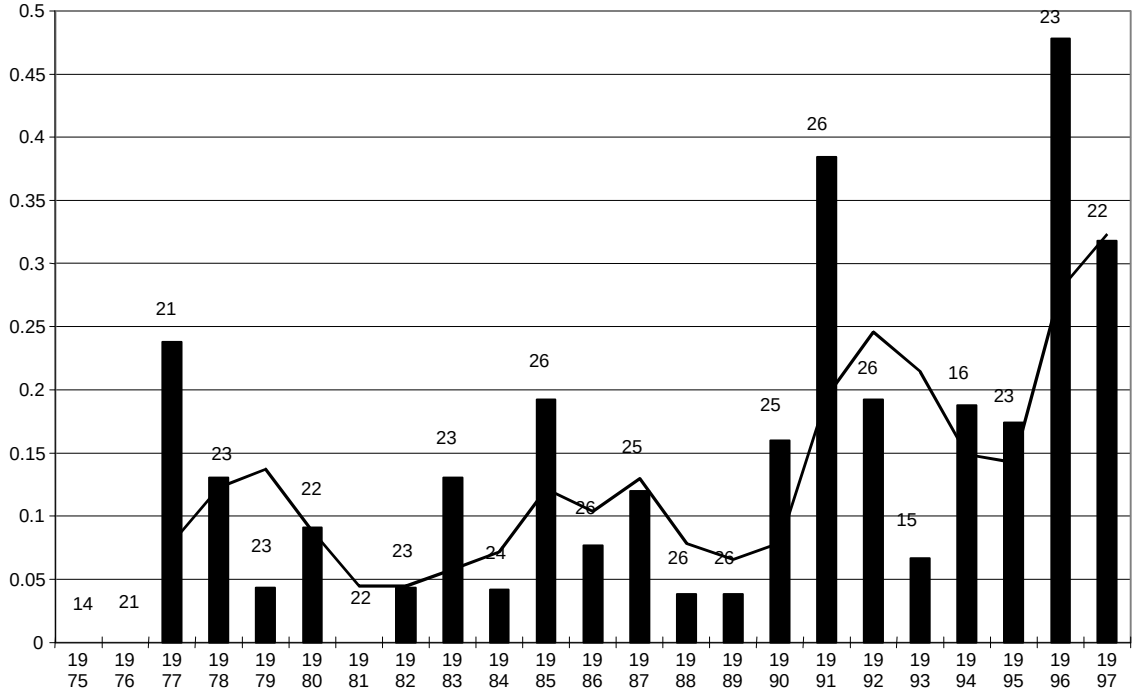
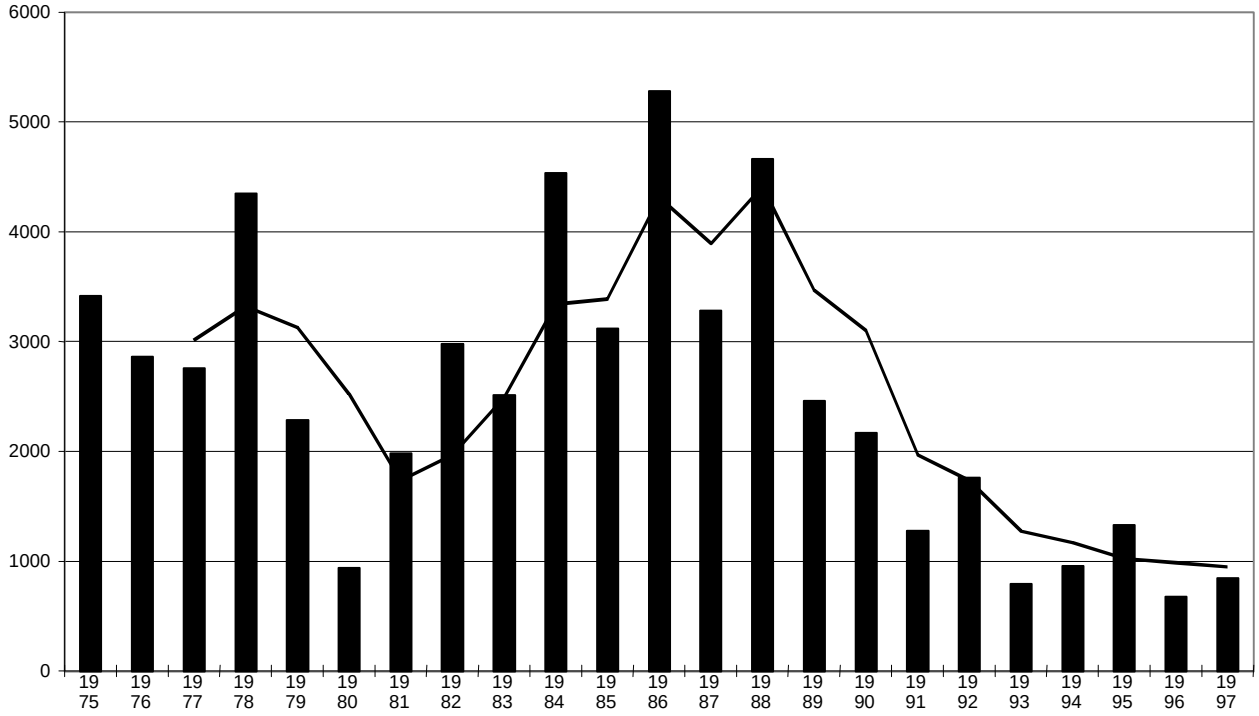


Fig. 5 Aggregate Coho Escapement to 10 North Thompson Streams (trendline is a 3yr moving average)



5. Appendix 1 Participants at the April 27-May 1, 1998 meeting of the Salmon PSARC Subcommittee.

Subcommittee Chair: Dave Peacock
PSARC Chair: Max Stocker

Subcommittee Members:

	Mon	Tues	Wed	Thurs	Fri
D. Anderson	✓	✓	✓	✓	✓
S. Argue		✓		✓	
D. Bailey	✓	✓	✓	✓	✓
A. Cass	✓	✓	✓	✓	✓
B. Holtby	✓	✓	✓	✓	✓
J. Irvine	✓	✓	✓	✓	✓
A. Tautz		✓			
R. Kadowaki		✓			
A. MacDonald		✓			
P. Ryall		✓	✓	✓	✓
M. Sullivan	✓	✓	✓	✓	✓
C. Wood	✓	✓	✓	✓	✓
D. Meerburg	✓	✓	✓	✓	
B. Riddell	✓	✓	✓	✓	
M. Bradford		✓	✓		

Observers:

	Mon	Tues	Wed	Thurs	Fri
R. Beamish	✓	✓	✓	✓	✓
L. Richards	✓	✓	✓		✓
R. McNicoll	✓	✓			
W. Leudke	✓				
S. Bachen	✓				
J. King	✓	✓	✓	✓	✓
D. Rutherford	✓	✓			
D. Nagtegaal	✓				
N. Schubert	✓	✓			
K. Simpson		✓			
R. Cook		✓			
R. Bailey		✓			
L. Jantz		✓	✓	✓	

Observers (Cont'd)

	Mon	Tues	Wed	Thurs	Fri
D. Ware		✓	✓		✓
S. Baillie		✓		✓	
K. Wilson		✓			
M. Folkes		✓	✓	✓	✓
R. Sweeting		✓	✓	✓	✓
T. Beacham	✓				
Z. Zhang			✓	✓	
S. McFarlane			✓	✓	
D. Noakes					✓
D. Welch				✓	✓

6. Appendix 2 Reviewers of Working Papers

No.	Title	Authors	Reviewers
S98-7	WCVI Coho Assessment	K. Simpson	L. Jantz
			D. Anderson
S98-8	Estimating the percentage of hatchery-reared juvenile coho salmon in the Strait of Georgia	R.J. Beamish R. Sweeting Z. Zhang	S. Lehmann A. MacDonald
S98-9	Forecasting coho marine survival using the regime concept	R.J. Beamish D. Noakes G.A. McFarlane W. Pinnex R. Sweeting J. King M. Folkes	D. Welch J. Steele B. Holtby
S98-10	Abrupt declines in the recreational catch of coho salmon in the Strait of Georgia in the 1990s are related to changes in climate.	R.J.Beamish G.A. McFarlane R. Thomson	R. Kadowaki K. Hyatt
S98-11	Rivers Inlet sockeye salmon: Stock status update.	D. Rutherford C. Wood S. McKinnell	P. Rankin S. Cox-Rogers
S98-12	A risk assessment for north coastal coho fisheries in 1998, with commentary on risk in southern inside and outside fisheries.	B. Holtby R. Kadowaki	B. Riddell R. Hillborn
S98-13	Stock assessment of Thompson River/ Upper Fraser River coho salmon	J. Irvine K. Wilson B. Rosenberger R. Cook	S. Argue J. Scott
S98-14	The use of trawl surveys to estimate pre-fishery juvenile anundance of coho salmon.	R.J.Beamish D. McCaughran M. Folkes R. Sweeting	N. Olsen D. Ware
S98-15	Stock status of Cowichan chinook	D.A. Nagtegaal	W. Luedke

No.	Title	Authors	Reviewers
	salmon	B. Riddell	T. Gjernes
S98-16	Intra-annual changes in the abundance of coho, chinook and chum in Puget Sound in 1997.	R.J. Beamish M. Folkes R.Sweeting C. Mahnken	J. Fargo J. Irvine
S98-17	Dynamic change in proportion of hatchery-reared, wild ocean and stream type chinook in their first and second years in the Strait of Georgia.	Z. Zhang R.J. Beamish B.E. Riddell	P. Ryall C. Wood
S98-18	A risk assessment for Thompson River coho salmon.	M. Bradford	N. Schubert A. Cass R. Hillborn

7. Appendix 3 1998 West Coast Vancouver Island Chinook Forecast

PSARC held an extraordinary Steering Committee meeting by teleconference on April 16, 1998, to review the Salmon Subcommittee report on Somass River chinook terminal run forecast for 1998. The Steering Committee accepted the Subcommittee report and provided the following comments.

The Steering Committee concurs with the Subcommittee concern that the natural egg deposition of 13 million was well below the established minimum requirement of 50 million for the Somass River Chinook stock. The Steering Committee is concerned over the underescapement of this stock and recommends an extremely conservative pre-season planning and in-season management approach to avoid back to back years of very poor escapements. The relatively weak Age-3 returns to natural systems in 1997 is a further reason for a cautious approach in 1998.

The Steering Committee notes that given the weak age-2 returns, and the increased probability of low survivals of the 1996 and 1997 brood years (related to El Niño predation effects) the abundance of WCVI chinook will likely drop dramatically after 1998 and conservation concerns may persist for a number of years.

II. SALMON SUBCOMMITTEE REPORT

The PSARC Salmon Subcommittee met April 7, 1998 in Nanaimo. Those in attendance included: Don Anderson, Sandy Argue, Al Cass, Skip McKinnell, Dave Peacock (Chairperson) and Brian Riddell.

S98-6 Review of 1997 Terminal Run Formulation of Somass River Chinook, and Terminal Run Forecast for 1998. B. Riddell, W. Luedke, and J. Till.

Working Paper Summary

Based on returns through 1997 and using methods previously approved by PSARC, the recommended forecast for the total terminal run of chinook of Robertson Creek Hatchery and Stamp River chinook (age 3,4, and 5) to Barkley Sound in 1998, is 57,200±20% based on averaging the two forecast models. The age structure of the return is projected to be: 8.3% Age 3, 72.3% Age 4, and 19.3% Age 5; with an expected sex ratio of 51% females. The number of chinook required to meet the minimum spawning escapement goal is 32,300. This goal is achievable if ocean harvest rates are limited as in 1997 and the terminal harvest rate is controlled to be less than about 40%.

The detailed assessments and forecasts of the RCH/Stamp chinook are undertaken annually for management of that major stock plus as an indicator of the expected

returns to the naturally spawning chinook populations along the west coast of Vancouver Island. Terminal run size and spawning escapements to the RCH/Stamp indicator stock have been similar over the past three years and are projected to be similar and relatively weak again in 1998. However, returns to some of the natural systems were better in 1997 than indicated by this stock. This is particularly true for returns to populations along the northern half of the Island (Areas 25 to 27); seven populations in these Areas are, in aggregate, used in the Pacific Salmon Commission (PSC) to indicate trends in escapement to naturally-spawning chinook along the WCVI.

While this is positive indication that the conservation actions taken by Canada to protect these populations has been successful, there are two concerns which suggest caution when planning 1998 fisheries. First, the recovery in the northern population is not evident in the more southern naturally-spawning populations (e.g., the Area 24 populations and Nahmint River). Secondly, the age structure of the 1997 returns was strongly age-4 chinook. Returns of Age-3 chinook to the natural systems did not appear as strong as the return to the RCH/Stamp indicator stock. Consequently, returns in 1998 may be reduced if survival of the 1994 brood year declined again. The only indication of brood survival for these northern populations is the return to Conuma Hatchery. Age-3 returns in 1997 to Conuma were only about 25% of the Age-4 returns observed in the sport fishery and in the escapement.

While the condition of **most** naturally-spawning chinook populations along the WCVI have improved during recent years, the above concerns and the relatively weak return forecasted for the RCH/Stamp stock indicate a continued need for conservative 1998 management plans in fisheries impacting these stocks.

Subcommittee Discussion

The working paper uses methodologies previously reviewed and accepted by PSARC. It was noted by the author that an improvement to the PSC cohort analysis results in modest changes to the 1996 estimations. There was severe flooding in the fall of 1997 and escapement estimates are more uncertain, and may be underestimates. The forecast error increased to +/-20% as a result of poorer relative performance of recent forecasts. The forecasts were made during the period of abnormal ocean conditions between 1992 and 1995.

The Subcommittee discussed the merits of including further tables of historical data in this report. While this would be useful the information is available in PSARC document X96-01. The subcommittee noted that measures of forecast performance varied among all of the PSARC forecast papers this spring and a standardized approach would be preferred. In this paper the forecast performance has been good for all models and evaluation criteria are not an important issue. A standardized approach to reporting forecast uncertainty was also recommended consistent with the RMEC advice following the review of PSARC Advisory Document 98-2. The relative merits of reporting total predicted abundance versus terminal abundance were discussed. It was agreed in this

case that both total abundance and scenarios estimating predicted terminal abundance were appropriate to meet the needs of managers. Further clarification should be provided in the report to indicate the terminal forecasts are based on assumptions of ocean harvest. PSARC is not endorsing any specific ocean harvest scenario used to generate terminal run forecast examples. The paper does note, however, that the terminal run forecast will change depending on management decisions in non-terminal fisheries.

The Subcommittee is concerned that the natural egg deposition of 13 million was well below the established minimum requirement of 50 million. The paper shows the 2 year old abundance from the 1995 brood year is extremely poor. There are concerns that the 1996 brood was heavily impacted by mackerel in the summer of 1997. Current El Niño conditions in 1998 do not bode well for the survival of the 1997 brood. This combination of circumstances indicates that after the 1998 season WCVI chinook abundance is likely to drop dramatically again, and conservation concerns may persist for a number of years. Wild stock escapements to northern WCVI are well above recent averages, while the southern WCVI wild stock escapements are similar to recent years.

Subcommittee Recommendations

The Subcommittee recommends the paper and the forecast be accepted.

6.7 APPENDIX - HABITAT STATUS AND MATRICES

6.7.1 Regional Overview Of Habitat Conditions

North Coast

Throughout the North Coast of B.C. forest harvesting (and related road development) has been and continues to be the most widespread land use activity adversely affecting fish habitat. Harvesting has been carried out throughout the past century in the water-accessible coastal areas and has expanded greatly in the Interior since the 1960's. Land-based forest harvesting has been intense in the larger accessible coastal valleys such as the Skeena, Nass, Kitsumkalum, Kitimat, Bella Coola and many other moderate-sized coastal systems. Harvesting has also been very intense on the Queen Charlotte Islands, where high value timber is generally present from tidewater to ridge-tops throughout most watersheds. On the rest of the mainland northcoast harvesting has generally not been as widespread, due mainly to inaccessibility and variable timber quality.. Forest harvesting practices have improved significantly in the past 20 years and direct impacts to fish habitat have generally been reduced over that time. There is little or no data from the North Coast which quantify actual impacts to coho populations from changes to stream habitat as a result of forest harvesting.

Impacts to fish habitat from other land use activities such as urban development, heavy industry, and agriculture can be even more damaging and permanent and tend to occur in low relief highly productive coho habitat areas. Impacts include removal of riparian cover, stream channelization, and water quality/water quantity concerns. In the North Coast area, however, these land uses are fairly limited. Urban areas are generally quite small compared to other parts of the region and are very localized. Agriculture has a significant presence only in a few area of the North Coast such as the Bulkley and Kispiox valleys in the Skeena, and the Bella Coola Valley on the Central Coast. Heavy industry (2 pulp mills, aluminum smelter, methanol plant, fish processing, port facilities) is also quite localized in the main ports of Prince Rupert and Kitimat, where significant estuarine alterations have also occurred.

Linear developments such as railroad and highway corridors have also resulted in considerable damage to fish habitat in North Coast. In the Skeena valley, for instance, the development of the CN Rail line in the early 1900's as well as highway development in the 1950's and 1960's cut off significant amounts of side channel and back channel habitat along large sections of the lower Skeena River and the Upper Bulkley River.

Transboundary / NWBC

Most coho habitat in this area (Taku, Stikine/Iskut, Unuk systems) is in virtually "pristine" condition. There are only a few very localized impacts from mining development and access roads.

Nass River

Extensive logging has taken place in the lower parts of the main Nass River valley since the 1960's. In more recent years, logging has expanded along the road corridors within the Upper Nass / Bell-Irving. In most areas, however, impacts to coho production are not thought to be severe, although localized impacts do exist. Possibly the most significant impacts to coho habitat have occurred in the Cranberry River, which has been extensively logged. Many of the most important coho habitats in the Nass River (lower river tributaries such as the Zolzap, Tseax, Seaskinish, etc.) have either not been significantly affected by logging or are very low gradient areas with very little merchantable timber . There is very little urban development, agriculture or other land uses in the Nass Valley which might affect coho habitat. Much of the coho habitat in the upper portions of the watershed is in "pristine" or virtually pristine condition.

Skeena River

Impacts to coho habitat from logging activities, road and rail corridors, and urban/agricultural uses have occurred in the Skeena, mainly along the main corridor routes and in parts of the Interior where logging has been extensive. Coho habitat in some important coho production areas is in pristine (or near pristine) condition (e.g. Ecstall River, Gitnadoix River, and other major systems in the lower Skeena and most of the Upper Skeena upstream from Babine River). In some areas there are locally very significant impacts ,- but overall human activity has reduced the productive capacity of the Skeena system by less than 20% of historic levels.

The most significant problem areas identified in the Skeena are in the Upper Bulkley System (road and rail corridor and agricultural impacts), small portions of the lower Kispiox (agricultural impacts), portions of the Kitsumkalum, Copper, and Lakelse Rivers (mainly logging impacts), and lower Skeena sidechannels (road and rail corridor impacts). Many of the habitat issues in the Skeena are summarized in the detailed habitat condition matrix (Appendix 5.7.3) which has been produced for the entire Upper Skeena watershed.

North Coastal Area

There have been numerous negative impacts to coho habitat in some of the more extensively logged watersheds in this area. The most significant impacts have been in the Kitimat River valley, where significant destabilization of the lower mainstem and its sidechannels has occurred as a result of past logging practices. A number of other major coho producers (e.g. Kwinamass, Khutzeymateen, Kitlope) have either pristine or near pristine habitat. In general, coho habitat in this area is considered to be in good condition. Studies such as those at the Lachmach River (a logged valley) have shown that North Coastal coho habitat has very high productivity relative to other study areas.

Central Coast

The overall coho habitat condition in Central Coast is similar to the North Coast. Some significant impacts have occurred in the more intensively settled and harvested valleys such as the Bella Coola Valley, while only localized impacts have occurred to date in

the remainder of the coastal watersheds. In general, coho habitat in this area is in reasonably good condition at present. The province however has recently initiated the CCLRMP (Central Coast Land and Resources Management Plan) process for this area in advance of anticipated logging. Forest inventories indicate that the only available merchantable timber exist in valley bottoms where the greatest potential concern for coho habitat also exists. There is however little or no stock assessment information and minimal coho habitat inventory information available for the Central Coast area.

Queen Charlotte Islands

Logging is the most influential land use in the Queen Charlotte Islands (QCI) and many of the coho producing systems on the islands have been impacted by logging activities that occurred before the 1970's. The resultant impacts include: single species (i.e.: alder) dominated riparian zones; extensive networks of logging roads, continued channel bank instability; overall lack of recruitable large woody debris, aggrading channel bed and loss of pool habitat

Streams in this area were historically logged to the bank and in some cases were used as yarding corridors. Most streams have a paucity of large woody debris necessary to stabilize spawning gravels as well as create pool habitat for juveniles. The predominant alder regeneration has not prevented continued bank instability with the ongoing effect of channel widening and aggradation with bedload derived from the eroding banks. Alder is also unable to supply the required stable woody debris input into the effected streams. The result is the combined loss of headwater spawning areas and critical over-winter and in particular summer rearing habitat for coho juveniles. The long-term prognosis for coho habitat in this region is poor until the streambank vegetation recreates the functions of a mature forest, a period likely in excess of several centuries. The recent Watershed Restoration Program initiatives are intended to speed the recovery of riparian areas as well as recreate deficient instream habitat features. However, these works are still considered to be experimental and are expected to have limited application to the moderate and higher gradient streams common to QCI. Realistically, many of these areas will require natural stabilization over many years to regain historical productivity.

There are other areas on the Charlottes with very significant coho production which have had little or no impacts as a result of land use activity. These include most of the low, marsh, backwater and wetland areas on the north and east coasts of Graham Island. Although there is very little coho production data for the Queen Charlotte Islands, unaffected habitats are thought to have very high coho productive capacity as coho rearing conditions are generally quite favourable.

South Coast (Vancouver Island/Mainland Inlets)

Vancouver Island

Vancouver Island coho habitat has been historically reduced in both quality and quantity. Initial impacts were related to intensive clear-cut forest harvesting and

conversion of land to agriculture on the east coast from Victoria to near Campbell River and areas within major watersheds such as the Nimpkish, Cowichan and Stamp/Somass. This early forest harvesting had (and will continue to have until suitable riparian ecosystems regenerate in 100-200 years), a detrimental effect on coho habitats. For example, there has been a significant loss of critical old growth riparian that contributes Large woody debris: an essential component of coho habitat in coastal riverine systems. Valley-wide logging, cross stream yarding and extensive road systems, that replaced the early logging railways, caused hydrological and habitat damage to many coho systems.

Recent forest harvesting over the last several decades has focused on the west coast and northern part of Vancouver Island. Many of these watersheds and coho salmon habitat have been impacted extensively by clear-cut harvesting of riparian areas and small stream habitats. In addition to initial harvesting of valley bottoms which resulted in the majority of coho habitat impacts, harvesting has now shifted to higher elevations and steeper slopes with ensuing road instabilities, failures into streams, and impacts associated with a high rate of cut. Implementation of the Forest Practices Code (FPC) is expected to reduce impacts to remaining coho salmon habitat , however it will be several rotations (200+ years) before improved forest harvesting practices permit full restoration of coho habitat in logged watersheds of Vancouver Island and Mainland Inlets. Vancouver Island also has extensive private forestry lands (E&N grant lands) where the FPC does not apply. It is not known if the proposed private forestry land riparian and harvesting standards will adequately protect coho habitats in these areas, which are predominately second growth forests on the east coast and southern end of Vancouver Island. While much of this land lies within the FLR (Forest Land Reserve), block size and rate of harvest are dependent on market conditions and forest company practices. Extensive efforts are underway through the Forest Renewal BC to restore and rehabilitate upslope areas, and deactivate old road systems. Federal and provincial agencies are working to restore habitat by stabilizing and restoring critical fish habitat, including coho salmon, through measures such as placement of LWD, rearing and side channel development and instream fertilization.

Vancouver Islands' relative isolation from the rest of B.C. also resulted in the development of several small to medium sized hydroelectric developments, initially to support mining and milling in the early part of the century, and later to provide electricity to BC Electric Co.(and now BC Hydro). Hydro facilities impact the flows in eight major river systems on Vancouver Island, however these facilities and their operations are now subject to review through current Water-Use Planning processes.

Historic mining activity has resulted in two chronic AMD (acid mine drainage) problems on the Tsolum and Jordan Rivers, and recent and proposed coal mining developments in the Quinsam River drainage and Fanny Bay area could negatively impact coho habitat. Development of water supply systems for municipal and industrial use has impacted many coho stream and river systems such as the Sooke, Nanaimo and Englishman Rivers. Many rural and agricultural water-use activities both harmfully

altered coho habitat and reduced flows in systems like Black Creek. Because of the geographic location and prevailing weather patterns, the east coast of Vancouver Island experiences low precipitation in summer months and many of the river and stream systems which are naturally low flow systems are subject to additional consumptive water extraction that has limited and reduced coho habitat quality and quantity.

Because of early historic settlement patterns on Vancouver Island, a myriad of linear developments including; road systems (Island Highway), rail development (E&N Railway); and utility corridors (Vancouver Island Pipeline) also dissect most east coast streams. Relic stream crossing structures have created historic passage and migration barriers for coho salmon on several systems. The Vancouver Island Highway Project required extensive habitat mitigation and compensation works, however habitat alterations and impacts still occurred and were generally associated with run-off and sediment generated by associated clearing and construction activities. As Vancouver Island developed, agriculture and rural/urban land development resulted in permanent habitat loss on many of the smaller, productive coho streams. Current and continuing agricultural practices and land clearing has chronically impacted coho habitats in many of these systems. Ironically however, retention of these lands within the provincial ALR (Agricultural Land Reserve) may protect these areas from the permanent alterations associated with urban redevelopment.

Vancouver Island population growth and urban development, buoyed by moderate climate, a targeted marketing program, and reasonable land prices, has resulted in significant urbanization of historically rural, agricultural watersheds. Development-oriented local governments on both the Island and the Lower Mainland have encouraged development that has resulted in direct loss of habitat or has permanently impacted the productive capacity of many coho streams and estuaries.

Sunshine Coast/Mainland Inlets

Many of the urban problems experienced on the east coast of Vancouver Island are shared by the Sunshine coast, notably Gibsons to Pender Harbour. Again, favorable land prices and climate have attracted increased development activity with considerable impacts to small stream habitats that predominate the area. The Mainland Inlets area is dominated by several large fjord systems: Jervis, Toba, Bute, Knight, Kingcome and Seymour Inlets, and associate islands in the northern Strait of Georgia and Queen Charlotte Strait. There has been extensive historical forestry activity throughout this area and log harvesting is continuing into higher elevation, steep slope terrain. The most significant future land-use for this area will probably continue to be forest harvesting, although the Sunshine Coast is experiencing significant growth and development pressure at present and this is expected to increase.

While there has been extensive historic land-use activity, coho habitat alteration and damage on Vancouver Island, there has been less permanent stream loss due to

urbanization than the Lower Mainland. There are critical water-use and land-use issues along the east coast where both agriculture and population growth are located. Forestry and related impacts will continue to dominate the landscapes along the west coast and northern end of the island, as well as the Mainland Inlets.

Fraser River

Lower Fraser Valley

Coho habitat in the Lower Fraser River has been subjected to possibly the greatest variety and severity of impacts any where in the region. The nature of impacts is similar to those on ECVI however the magnitude is greater. These impacts include: historic and current logging in the headwaters of most Lower Fraser watersheds; conversion of a significant portion of the Fraser River floodplain to farms, commercial, industrial and residential land uses; impoundment of several large watersheds for hydroelectric power generation and/or domestic water supplies; extensive alteration of the Fraser estuary to accommodate industrial, commercial port activities; thousands of kilometers of highways, roads, streets, railways, pipelines and hydro right of ways that bisect many small systems , permanent loss due to infilling or paving over of streams, wetlands and riparian areas and widespread reductions in habitat quality including in particular water quality in many streams, lakes and wetlands as a result of dramatic and rapid urbanization and growth.

This region while only 1% of the provincial land base, supports more than 55% of the entire regions population, and population growth is expected to accelerate in the GVRD, Fraser Valley, Squamish Lillooet and Sunshine Coast Regional Districts over the next 25 years**.** The development of settlement and agricultural lands on the Fraser River floodplain has been accompanied throughout this century (and particularly since the floods of 1948) by extensive floodproofing works including a vast complex of dykes, ditches, floodgates, pumping stations and river training structures that extend from Hope to the Fraser delta. It is estimated that over 80% of forest, bog and wetland habitat in the Lower Fraser has been lost in the last century. This represent a very significant loss of mainstem Fraser River and off channel coho habitats.

Many of the alterations associated with land transformation and particularly urbanization in the Lower Fraser Valley have already resulted in the permanent loss of considerable coho habitat and the continuing development pressure represents an ongoing risk.

According to research done for the Lost Streams of the Lower Fraser posters (DFO, 1995 and 1997) as many as 120 watercourses (representing over 700 linear km of streams) have been physically lost in the Lower Fraser since records first started to be kept. Many of these were salmon bearing. This represents approximately 30% of the habitat in the urban area of the Lower Fraser Valley. Of the remaining 600+ streams which were assessed 85% are considered either threatened or endangered (based on having experienced one or more significant habitat impacts) while only 15% are

considered wild (no significant habitat impacts). It is worth noting that the vast majority of the 'wild streams' are located outside and beyond significant settlement areas or above impoundments (i.e.; Upper Pitt, Upper Coquitlam, Alouette , Harrison River , Upper Chilliwack).

Thompson System

In the Thompson River system there are significant freshwater coho habitat impacts throughout the drainage particularly in the Nicola, Deadman, Bonaparte, Shuswap, Salmon and Eagle Rivers and the lower tributaries of the North Thompson. These impacts are the result of both current development and historic watershed alterations associated with logging, farming/ranching, recreational land use and urban development. Habitat in the Thompson system (particularly the South Thompson) like other growth regions are under ever increasing development pressure.

Through much of the Interior, streams are exhibiting high degrees of channel instability with pervasive lateral shift, degradation and aggradation with increasing suspended sediment levels and bed load. Riparian vegetation for the most part is in very poor condition, contributing to channel instability, lethal and sub-lethal summer water temperatures and loss of instream cover and pool habitat. Off-channel habitat has been alienated from streams through infilling and channelization. Access has been restricted or denied through the construction of physical barriers. Low flow conditions or channel aggradation; point source and non-point source pollution all contribute decreased water quality. Natural hydrological regimes have been altered by land clearing which accelerates runoff and water extraction which exacerbates naturally low flow conditions.

Forest harvesting has been fairly extensive in many of the Thompson tributaries. Intensive agriculture occurs throughout the system with concentrations in the South Thompson , Bonaparte, Deadman and Nicola subdrainages. Urban settlement areas and recreational developments are concentrated in larger centers such as Kamloops, Salmon Arm, Sicamous, Merritt, and many small communities such as Spences Creek, Westwold, Falkland, Barriere. There is also an extensive network of highways, roads, railways, pipelines and hydro right of ways throughout much of the system.

23 (37%) of the 63 regionally significant coho streams in the Thompson drainage are considered to be highly impacted from land use and in very poor condition. Another 23 (37%) have been moderately impacted and are considered to be in moderate to poor condition, while only 17 (27%) were either considered to be in good condition, or there was no information available about the streams.

The most significant impacts to forty eight (76%) of the 63 streams occurred more than 10 years ago, well before the period of recent coho stock declines. Only 10 (16%) were considered to have experienced recent habitat impacts due to land use influences. Furthermore, 33 (52%) are continuing to decline in terms of overall habitat condition while only 27 (43%) have maintained the status quo. Habitat condition was

not improving in any of the known coho drainages in the Thompson, despite considerable recent restoration efforts.

Of 46 Thompson coho streams studied in depth , 30 (65%) are bounded by private deeded land or Indian Reserves for 75% or more of their fish frequently length. Over half (24) were entirely bordered by private deeded or Reserve land. Several recent studies have found that private land use practices in these areas has significantly impacted streams and riparian areas and resulted in direct reductions in coho habitat quality and quantity. Many of the habitat issues in the Thompson drainage are summarized in the detailed habitat condition matrix (Appendix 5.7.2) which has been produced for the entire Thompson watershed.

Upper Fraser River

There are several small coho stocks in the Upper Fraser River for which there is extremely limited information. Within the Quesnel River watershed there are two known coho streams. Summit Creek which flows from the Cariboo Mountains to Quesnel Lake is almost entirely in a protected area. McKinley Creek, a tributary to the Horsefly River is currently threatened by forest harvesting.
Regular enumeration of Upper Fraser River coho stocks is hampered by winter conditions so little is known of coho stocks in the Upper Fraser, however coho juveniles have been reported as far north as the Nechako River watershed. This watershed has been the subject of considerable controversy over the last decade as it is the subject of a major diversion and water withdrawal project.

6.7.2 Thompson Watershed Matrix

Drainage	Sub-drainage	Stream	Habitat Condition											Red Coded Habitat Indicators
			Water Quality WQL	Temper-ature T	Water Quantity WQN	Access A	Off-Channel Habitat OC	Riparian Condition RC	Instream Cover IC	Channel Instability CI	Channel-ization Ch	Chronic Sedimentation CS	Overall Habitat Condition	
Thompson			3	3	1	1	2	2	1	2	2	1	2	WQL, T
(Below Kamloops		Bonaparte	3	3	3	2	2	3	3	3	2	2	3	WQL, T, WQN, RC, IC, CI
Lake)		Deadman	+	3	3	2	2	3	3	3	1	2	3	T, WQN, RC, IC, CI
Nicola Drainage			2	3	3	2	3	3	3	3	3	3	3	T, WQN, OC, RC, IC, CI, Ch, CS
		Coldwater	3	3	3	2	3	3	3	3	3	3	3	WQL,T,WQN,OC,RC,IC,CI,Ch,CS
		Nicola - Lower	3	3	3	1	2	3	3	3	3	3	3	WQL,T, WQN,RC,IC,CI,Ch,CS
		Nicola - Upper	3	3	3	3	2	3	3	3	3	3	3	WQL,T, WQN,A,RC,IC, CI, Ch,CS
		Spius	3	3	3	N.I.	N.I.	2	2	2	1	3	2	WQL, T, CS
South Thompson			2	2	1	1	2	3	2	2	2	3	2	RC, CS
	Chase		3	3	3	1	2	3	2	3	3	3	3	T, WQN, RC, CI, Ch, CS
	Adams -		2	N.I.	1	1	1	1	1	2	1	1	1	
	Lower	Hiuihill	N.I.	2	3	2	N.I.	3	2	3	2	3	3	WQN, RC, CI, CS
	Adams -		1		2	N.I.	N.I.	1	1	2	1	2	2	
	Upper	Momich	2	N.I.	2	N.I.	N.I.	2	1	1	1	2	2	
		Sinmax	3	2	2	N.I.	3	3	3	3	2	3	3	WQL, OC, RC, IC, CI, CS
	Shuswap		2	-	-	2	-	2	-	-	-	-	2	
	Lake	Anstey	N.I.	N.I.	2	2	N.I.	N.I.	N.I.	2	2	2	2	
		Canoe	N.I.	2	3	2	N.I.	2	2	2	2	2	2	WQN
		Hunakwa	N.I.	N.I.	3	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	WQN
		Onyx	N.I.	N.I.	3	2	N.I.	3	N.I.	3	3	N.I.	3	WQN, RC, CI, Ch
		Seymour	2	N.I.	1	N.I.	N.I.	3	2	2	N.I.	3	2	RC, CS
		Tappen	2	2	3	3	2	3	3	3	2	3	3	WQN, A, RC, IC, CI, CS
		Scotch	2	2	1	2	N.I.	2	N.I.	3	2	2	2	CI
	Salmon		3	3	3	3	3	3	3	3	3	3	3	WQL,T, WQN,A,OC,RC,IC,CI,Ch,CS
		Bolean	2	2	3	2	2	2	2	3	3	3	3	WQN, CI, Ch, CS
	Eagle		2	N.I.	2	N.I.	3	3	2	3	3	2	2	OC, RC, CI, Ch
		South Pass	N.I.	N.I.	2	N.I.	N.I.	2	N.I.	N.I.	N.I.	N.I.	2	
	Shuswap River - Lower		3	N.I.	1	1	N.I.	3	2	3	2	3	2	WQL, RC, CI, CS
		Blurton	N.I.	2	3	2	3	2	3	3	3	2	3	WQN, OC, IC, CI, Ch
		Johnson	N.I.	2	3	N.I.	2	2	2	3	3	3	3	WQN, CI,Ch, CS
		Kingfisher	N.I.	1	3	3	N.I.	1	N.I.	3	3	N.I.	3	WQN, A, CI, Ch
		Trinity	N.I.	1	3	3	2	2	2	3	2	2	3	WQN, A, CI
Drainage	**Sub-**	**Stream**	**Habitat Condition**											**Red Coded**

	drainage		Water Quality WQL	Temper -ature T	Water Quantity WQN	Access A	Off-Channel Habitat OC	Riparian Condition RC	Instream Cover IC	Channel Instability CI	Channel -ization Ch	Chronic Sedimentation CS	Overall Habitat Condition	Habitat Indicators
	Shuswap River - Middle		N.I.	3	N.I.	3	N.I.	2	2	2	N.I.	2	2	T, A
		Ireland	N.I.	2	3	3	N.I.	3	N.I.	3	N.I.	3	2	WQN, A, RC, CI, CS
		Noisey	N.I.	N.I.	2	N.I.	N.I.	N.I.	N.I.	3	N.I.	3	2	CI, CS
		Wap	N.I.	N.I.	2	3	N.I.	N.I.	N.I.	3	N.I.	3	3	A, CI, CS
	Bessette		3	3	3	2	3	3	3	3	3	3	3	WQL,T,WQN,OC,RC,IC,CI,Ch,CS
North	Mainstem		1	N.I.	1	3	2	2	1	2	2	2	2	
Thompson		Lemieux	2	N.I.	3	2	N.I.	3	3	3	2	2	3	WQN, RC, IC, CI
		Louis	2	2	3	2	N.I.	3	3	3	3	3	3	WQN, RC, IC, CI, Ch, CS
Thompson Plateau		Mann	2	N.I.	2	N.I.	N.I.	2	2	3	3	3	2	CI, Ch, CS
Shuswap	Barriere		1	N.I.	2	N.I.	N.I.	1	1	3	2	2	2	CI
Highlands		E. Barriere	N.I.	N.I.	2	N.I.	N.I.	2	1	1	1	1	1	
		Haggard	N.I.	N.I.	2	2	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	
		Fennel	2	N.I.	2	N.I.	N.I.	1	1	1	1	2	1	
	Dunn		1	N.I.	2	N.I.	N.I.	1	1	2	1	1	1	
		McTaggart	N.I.	N.I.	2	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	3	
	Clearwater		1	N.I.	1	N.I.	N.I.	1	1	1	1	1	1	
		Brookfield	1	N.I.	3	2	N.I.	3	3	2	1	1	3	WQN, RC, IC
		Mahood	1	N.I.	1	N.I.	N.I.	1	1	1	1	1	1	
	Raft		2	N.I.	2	N.I.	N.I.	2	2	2	1	2	2	
	Small mid river tribs	Reg Christie	2	N.I.	2	N.I.	N.I.	2	2	1	1	1	1	
		Wire Cache	1	N.I.	2	N.I.	N.I.	2	3	3	2	1	2	IC, CI
		Avola	2	N.I.	3	N.I.	3	3	3	3	3	3	3	WQN, OC, RC, IC, CI, Ch, CS
		Crossing	1	N.I.	1	N.I.	N.I.	1	1	1	1	1	1	CI
		Tumtum	1	N.I.	3	N.I.	N.I.	2	1	2	1	1	1	WQN
		Shannon	2	N.I.	1	N.I.	N.I.	2	3	3	2	2	2	IC, CI
		Finn	1	N.I.	2	N.I.	N.I.	1	1	2	1	1	1	
	Lion		1	N.I.	3	3	N.I.	1	1	1	1	1	1	WQN, A
Cariboo-Monashee		Albreda	2	N.I.	2	3	N.I.	2	2	2	1	1	1	A
		Blue	1	N.I.	1	3	N.I.	2	2	1	1	1	1	A
	Small upper	Cedar	N.I.	N.I.	3	3	N.I.	1	2	1	1	1	1	WQN, A
	river tribs	Cook	1	N.I.	3	3	N.I.	2	1	2	2	2	2	WQN, A
		Goose	1	N.I.	2	3	N.I.	1	1	1	1	1	1	A

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status over past 10 years I,D,S*	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years		
							Rate of Cut	Roads			
Thompson			2	2	N.I.	3	2	N.I.	>	S	
(Below Kamloops Lake)		Bonaparte	3	2	N.I.	2	3	2	>	D	Restoration underway, Fishway, Assessment fence
		Deadman	3	1	N.I.	1	3	2	>	D	Rest. underway, Assess. fence, Hatchery, Concerns over proposed trib. logging
Nicola Drainage			3	3	N.I.	3	3	N.I.		D	
		Coldwater	3	3	N.I.	3	3	2	>	D	Coquihalla Hwy, Enhancement, Smolt Pond, Rest. underway
		Nicola - Lower	3	3	N.I.	3	3	1	>	D	Enhancement, Rest. underway, Unscreened ditches
		Nicola - Upper	3	1	N.I.	1	2	1	>	S	Assess. fence, Unscreened ditches, Enhancement, Smolt pond, Dam passage
		Spius	2	0	N.I.	1	3	3	>	S	Hatchery
South Thompson			3	3	2	2	2	N.I.	>	D	
	Chase		3	3	N.I.	3	*2	2	<	D	IWAP underway, FRBC restoration to commence
	Adams -		0	N.I.	2	2	*3	3	>	S	Failures on Holdings Road a concern, Park protection
	Lower	Hiuihill	3	1	2	2	3	2	>	D	Obstruction to fish passage a 0.8 km
	Adams -		N.I.	1	N.I.	N.I.	2	2	>	D	Valley bottom protected area, Sockeye enhancment
	Upper	Momich	0	0	0	1	2	3	<	D	
		Sinmax	3	1	2	2	3	2	>	D	WRP Proposed
	Shuswap Lake		2	3	3	2	N.I.	N.I.	>	D	
		Anstey	0	0	N.I.	N.I.	3	N.I.	>	S?	
		Canoe	3	3	N.I.	2	2	1	>	D	
		Hunakwa	N.I.	0	N.I.	N.I.	2	N.I.	<	S?	
		Onyx	3	3	N.I.	N.I.	3	N.I.	>	S?	
		Seymour	N.I.	1	N.I.	1	*1	2	>	S?	
		Tappen	3	3	N.I.	1	3	N.I.	>	D?	
		Scotch	N.I.	2	N.I.	1	3	3	>	D	Fish habitat assess. underway
	Salmon		3	3	N.I.	2	3	2	>	D	Assessment fence, enhancement, Restoration underway,
		Bolean	3	3	N.I.	2	3	2	<	D	IWAP underway
	Eagle		3	2	N.I.	3	2	2	>	D	
		South Pass	0	0	N.I.	2	3	N.I.	>	S	
	Shuswap River - Lower		3	3	2	1	2	1	>	N.I.	
		Blurton	3	N.I.	N.I.	2	3	2	<	D	
		Johnson	2	0	N.I.	2	2	2	<	D	
		Kingfisher	N.I.	0	N.I.	2	3	2	>	D	
		Trinity	3	N.I.	N.I.	2	1	2	<	D	

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear	Forestry		Primary period	over past	
						Corridors	Rate of Cut	Roads	of Influence	10 years	
									< or > 10 Years	I,D,S*	
	Shuswap River - Middle		3	N.I.	N.I.	1	3		>	?	
		Ireland	3	0	N.I.	N.I.	2	N.I.	>	D	
		Noisey	0	N.I.	N.I.	N.I.	3	N.I.	>	S?	
		Wap	0	0	N.I.	N.I.	3	3	<	D?	IWAP requested high level of develp planned
	Bessette		3	3	N.I.	2	3	3	>	D	Assessment fence, enhancement, Restoration underway
North Thompson	Mainstem		3	2	N.I.	3	2	2	>	D	
		Lemieux	3	2	N.I.	2	2	2	>	D	Access - dry sections
		Louis	3	2	3	N.I.	2	2	>	D	Access - beaver dams
Thompson Plateau		Mann	3	N.I.	N.I.	3	3	1	>	S	
Shuswap	Barriere		2	3	N.I.	2	3	2	>	D	Leonie Creek sediment source
Highlands		E. Barriere	N.I.	N.I.	2	N.I.	3	2	<	S	
		Haggard	N.I.	0	N.I.	N.I.	2	2	>	S	Logging road culvert to be fixed in '98
		Fennel	0	0	N.I.	N.I.	3	2	>	D	
	Dunn		N.I.	0	N.I.	N.I.	*1	N.I.	>	S	
		McTaggart	3	0	N.I.	N.I.	3	N.I.	>	S	
	Clearwater		2	N.I.	N.I.	2	*1	2	>	S	
		Brookfield	N.I.	3	N.I.	2	3	2	>	D	
		Mahood	N.I.	N.I.	N.I.	N.I.	1	N.I.	>	S	
	Raft		2	0	N.I.	N.I.	3	3	>	D	
	Small mid	Reg Christie	N.I.	1	N.I.	1	2	2	>	S	
	river tribs	Wire Cache	0	0	N.I.	2	3	N.I.	>	D	
		Avola	N.I.	3	N.I.	2	1	N.I.	>	D	Restoration planned by DFO
		Crossing	N.I.	N.I.	N.I.	N.I.	2	2	N.I.	S	
		Tumtum	N.I.	N.I.	N.I.	2	1	N.I.	>	S	Maintenance of highway culvert
		Shannon	N.I.	N.I.	N.I.	N.I.	2	N.I.	N.I.	N.I.	
		Finn	0	0	N.I.	N.I.	3	2	>	S	
	Lion		0	0	N.I.	2	3	2	N.I.	S	Access - CN culvert
Cariboo-Monashee		Albreda	0	0	N.I.	2	2	2	>	S	
		Blue	0	2	N.I.	2	2	2	>	S	
	Small upper	Cedar	0	0	N.I.	2	2	N.I.	N.I.	S	
	river tribs	Cook	0	0	N.I.	2	2	N.I.	<	S	
		Goose	0	0	N.I.	2	3	N.I.	N.I.	S	

6.7.3 Skeena Watershed Matrix

Drainage	Sub-drainage	Stream	1980 to 1994 Avg. Escape-ment	Habitat Condition											Red Coded Habitat Indicators
				Water Quality WQL	Temper-ature T	Water Quantity WQN	Access A	Off-Channel Habitat OC	Riparian Condition RC	Instream Cover IC	Channel Instability CI	Channel-ization Ch	Chronic Sedimentation CS	Overall Habitat Condition	
	Bulkley	Bulkley - Upper	425	3	2	2	3	3	3	3	2	1	1	3	WQL, A, OC, RC, IC,
		Maxan	n/a	1	2	2	3	1	1	1	1	1	1	1	A, WQN
		Richfield	n/a	1	1	2	2	1	2	1	1	1	1	1	A, WQN
		Barren	n/a	1	1	3	2	1	1	1	3	2	1	2	WQN, A
		Cessford	n/a	3	3	3	2	1	3	2	1	3	2	3	WQL, T, RC. Ch
		Buck	50	2	1	1	2	1	2	2	1	3	2	2	WQL, A, Ch, IC
		Hubert	n/a	1	2	2	3	1	2	1	2	2	2	2	A, WQN, Ch
		Seymour	n/a	3	2	3	3	2	2	2	1	2	1	3	WQL, WQN, A
		Kathlyn	93	3	2	2	2	1	2	1	2	2	3	3	WQL, CS
		Canyon	n/a	1	1	2	1	1	2	1	1	1	1	1	WQN
		Driftwood	n/a	1	1	2	2	1	2	1	1	1	1	1	WQN, A
		Toboggan	1775	3	1	2	2	2	2	1	1	1	2	3	WQL, WQN, A, RC, CS
		Trout	100	1	1	1	2	1	2	1	1	1	1	1	RC
		Reiseter	15	2	1	3	3	1	2	2	1	1	1	2	WQN, A
		Station	31	2	2	2	3	2	3	2	1	3	1	3	WQN, A, RC, Ch
	Telkwa	Telkwa mainstem	520	1	1	1	1	2	1	1	2	1	2	1	
		Howson	n/a	1	1	1	1	1	1	1	1	1	1	1	
		Elliot	n/a	1	1	1	1	1	1	1	1	1	1	1	
	Suskwa	Suskwa mainstem	173	1	1	1	1	1	1	1	1	1	1	1	
		Harold Price	53	2	1	1	2	1	2	1	1	1	2	2	WQL, CS
		Blunt	n/a	1	1	1	1	1	2	1	2	1	2	1	

Drainage	Sub-drainage	Stream	1980 to 1994 Avg.	Habitat Condition											Red Coded
			Escape-	Water	Temper-	Water	Access	Off-Channel	Riparian	Instream	Channel	Channel-	Chronic	Overall	Habitat
			ment	Quality	ature	Quantity		Habitat	Condition	Cover	Instability	ization	Sedimentation	Habitat	Indicators
				WQL	T	WQN	A	OC	RC	IC	CI	Ch	CS	Condition	
	Morice	Morice mainstem	465	1	1	1	1	1	1	1	1	1	1	1	
		Nanika	217	1	1	1	1	1	1	1	1	1	2	1	
		McBride	n/a	1	1	1	3	1	2	1	1	1	1	2	A
		Thautil	n/a	2	1	1	1	1	1	1	1	1	2	1	CS
		Gosnell mainstem	310	2	1	1	2	1	1	1	1	1	2	1	A, CS
		Shea	n/a	1	1	**1**	1	1	1	1	1	1	1	1	
		Lamprey	n/a	2	1	2	3	1	2	2	2	1	2	2	WQL, WQN, A
		Fenton	n/a	2	1	1	3	1	1	1	2	1	2	3	A, WQL
		Owen	600	1	1	1	3	1	2	2	2	1	1	2	A, CI
		Houston Tommy	n/a	3	1	1	1	1	1	1	2	1	3	2	WQL, CI
	Babine	Babine - upper	3683	1	1	1	1	1	1	1	1	1	1	1	
		Tahlo	200	The only major activity in the Babine watershed impacting coho is forestry. Effects of forest harvesting is not believed be very significant. Besides the enumeration of mainstem Babine coho, there has been very little work done on coho in this system. Some of the natural conditions which may limit coho production included limited access due to beaver dams and limited rearing habitat in late summer and winter due to low flows in some of the lake Babine Tributaries. To date there has been no WRP work done on the Babine watershed with no plans to do so in the near future. There are no obvious enhancement options for this area.											
		Morrison	35												
		Sutherland	n/a												
		Four-Mile	n/a												
		Gullwing	n/a												
		Pinkut	88												
		Unnamed Creek	n/a												
		Twain	n/a												
		Pierre	n/a												
		Big Loon	n/a												
		Nine-Mile	n/a												
		Five-Mile	n/a												
		Tsezakwa	12												
		Boucher	16												

Drainage	Sub-drainage	Stream	1980 to 1994 Avg. Escape-ment	Habitat Condition											Red Coded Habitat Indicators
				Water Quality	Temper-ature	Water Quantity	Access	Off-Channel Habitat	Riparian Condition	Instream Cover	Channel Instability	Channel-ization	Chronic Sedimentation	Overall Habitat	
				WQL	T	WQN	A	OC	RC	IC	CI	Ch	CS	Condition	
	Nilkitkwa	Upper		2	1	1	2	1	1	1	1	1	1	2	WQL
		Nilkitkwa	n/a	This watershed is a known producer of coho salmon but production is limited by the turbid, cool condition of the water. Some of the tributaries and lake headed habitat is more productive. Very few impacts in the watershed. Little potential for enhancement.											
		West Nilkitkwa	n/a												
		Mero	n/a												
	Nichyeskwa			2	1	1	1	1	1	1	1	1	2	1	
		Mainstem	300	Some quality coho habitat in the upper portions of the Nichyeskwa. Generally a poorly understood and inventoried system.											
		Shelagyote	n/a												
Upper Skeena	**Sustut**			2	1	1	2	1	1	1	1	1	2	1	A
		Johanson	14	Limited impacts in this upper Skeena watershed. Logging concentrated in the Bear/Sustut area. Some impacts from road development. Significant monitoring and enforcment to rectify. Linear development including ORAR and BCRail have blocked access into some streams known to produce coho. Some sediment related concerns as well. Some WRP initiatives taken to try to fix some of the existing problems. No 'soft' enhancement planned. Area in general is underutilized however there are also some significant natural limitations including severe overwintering conditions.										
		Moosevale	50												
		Upper Sustut	103												
		Azuklotz	n/a												
		Bear	200												
		Asitka	20												
	Slamgeesh		200												
	Kluayaz		n/a												

Drainage	Sub-drainage	Stream	1980 to 1994 Avg. Escapement	Habitat Condition											Red Coded
				Water Quality WQL	Temperature T	Water Quantity WQN	Access A	Off-Channel Habitat OC	Riparian Condition RC	Instream Cover IC	Channel Instability CI	Channelization Ch	Chronic Sedimentation CS	Overall Habitat Condition	Habitat Indicators
	Kispiox	Kispiox	1435	1	1	1	1	1	1	1	1	1	2	2	
		Stephens	216	These tributaries of the upper Kispiox have not been impacted. The road network extends up to the Hodder/Footsore area but there are no plans to extend further in the near future. Some very productive lake headed systems in this upper watershed. Some beaver related access problems but generally very favorable conditions. Recent coho numbers well below the carrying capacity. Monitoring occuring through the AFS program. No WRP work as there has been no past logging.										
		Club - upper	394												
		Club - lower	257												
		Footsore- upper	567												
		Footsore	425												
		Hodder	119												
		Nangeese	448	1	1	1	2	1	2	3	1	1	2	2	IC
		Sweetin	199	1	1	1	2	1	2	1	3	2	2	2	CI
		Beaverlodge	60	These 3 tributaries are all moderate producers of coho. All have extensive productive beaver complexes that may create access difficulties. Intensive WRP enhancement activities on-going. Significant logging related riparian damage. Some road density concerns. No rate of cut concerns.											
		Steep Canyon	n/a												
		Littlefish	58												
		Clifford	267	1	1	1	3	1	2	2	1	1	1	2	A
		Skunsnat	159	1	1	1	3	1	2	2	1	1	1	2	A
		Ironside	213	1	1	1	3	1	2	2	1	1	1	2	A, RC
		Cullon	104	2	1	1	2	1	2	2	1	1	2	2	RC, IC
		McCully	50	1	1	1	1	1	1	1	1	1	1	1	
		Murder	194	1	1	1	3	1	3	2	2	2	1	2	A, RC
		McQueen	202	1	1	1	3	2	2	2	1	1	1	2	A, RC
		Date	81	1	1	1	1	1	2	1	2	1	1	1	CI
Mid-Skeena	Chicago		38	1	2	1	3	1	1	1	1	1	1	2	A
	Burdick		55	1	1	1	1	1	1	1	2	1	1	1	CI
	Comeau		125	1	1	1	3	1	2	1	1	3	1	2	A, Ch
	GlenVowel		n/a	1	1	2	3	1	2	2	1	1	1	2	A, WQN

Drainage	Sub-drainage	Stream	1980 to 1994 Avg. Escapement	Habitat Condition											Red Coded
				Water Quality WQL	Temperature T	Water Quantity WQN	Access A	Off-Channel Habitat OC	Riparian Condition RC	Instream Cover IC	Channel Instability CI	Channelization Ch	Chronic Sedimentation CS	Overall Habitat Condition	Habitat Indicators
	Kitseguecla	Mainstem	425	Significant past logging in watershed with some impacts. Watershed is generally still in good shape. Natural limitations due to high energy stream, and available bedload. Some chronic suspended sediment problems from the Kitsuns tributary. Upper end of watershed below lake more productive. WRP assessments complete. Restoration works to begin in 1999. Focus on riparian prescriptions and road deactivation											
		Kitsuns	n/a												
	Kitwanga			1	1	1	2	1	2	2	2	1	1	2	IC, A, RC
		Upper	746	Recent WRP assessments have demonstrated that there are significant forestry related problems. Access to several tributaries is blocked by culverts. There is also some channel degradation and damage to riparian areas throughout the watershed. WRP enhancement work on-going. Restoring riparian areas and reestablishing access into tributaries major priority.											
		Lower	n/a												
		Kitwancool	n/a												
	Wilson		n/a	The remaining mid to lower Skeena and its tributaries are considered to be a lower priority in terms of the immediate coho crisis as the status of these stocks are significantly better Production in these reaches is generally higher than in the upper Skeena watershed. Restoration activities are on-going through WRP and the DFO restoration program. A strategic approach to habitat protection and restoration is being developed. Some of the limiting factors that need to be further investigated are the limiited access to the lower Skeena back-channel areas, rural develop and small stream impacts in the Lakelse watershed, logging impacts in the Kitsumkalum watershed, etc. Lower tributaries like the Gitnadoix, Exchamsiks, Kasiks, Exstew have not been heavily impacted. The major activity in these watersheds has been logging. Further detailing of the impacts in these watersheds will constitute the next phase of this action plan Habitat protection and enforcement continue to be a high priority in this area.										
	Fiddler		105												
	Singlehurst		58												
	Kleanza		106												
	Zymoetz	Upper Zymoetz	911												
		Lower Zymoetz	25												
	Thornhill		317												
	Kitsumkalum	Upper Kalum	2768												
		lower Kalum	465												
		Hadenchild	n/a												
		Cedar	475												
		Clear	205												
		Nelson	n/a												

Drainage	Sub-drainage	Stream	1980 to 1994 Avg. Escapement		
		Glacier			
		Lean-to			
		Deep	106		
		Star	75		
	Zymagotitz		785		
	Alwyn		63		
	Lakelse	Lakelse mainstem	7567		
		Andalas	210		
		Blackwater	112		
		Clearwater	498		
		Coldwater	161		
		Hatchery	34		
		Schulbuckhand	263		
		Herman	98		
		Mountain	38		
		North Hatchery	28		
		Sockeye	480		
		Williams	418		
		White	43		
		North Granite	100		
Lower Skeena	Exstew		1361		
	Gitnadoix	Gitnadoix main	2336		
		Kadeen	273		
		Magar	169		
		Southend	108		
		Dog Tag	129		
		Clay	100		
	Exchamsiks		1333		
	Kasiks		1782		
	Kwinitsa		25		
	Scotia		500		
	Khyex		720		
	Ecstall		4350		
	McNeil		200		

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
	Bulkley	Bulkley - Upper	3	2	1	3	1	2	>	D	Riparian, water quality, quantity, in-stream structure and off-channel access main issues
		Maxan	2	0	1	2	1	2	>	S	Access past Bulkley Falls and beaver dams major issue, may be low flow concerns
		Richfield	2	0	0	1	1	1	>	S	Good condition, should support significantly more coho
		Barren	2	0	0	3	1	1	>	D	Channel aggredation and access associated with highways main issue
		Cessford	3	0	0	2	1	1	>	D	Channel and riparian heavily impacted by agriculture. Targetted for planting and fencing
		Buck	2	2	1	2	2	2	>	S	Lower end impacted by dyking and channelization, some beaver access problems
		Hubert	3	0	0	2	1	2	>	S	Lower end severely impacted by agriculture, some access problems
		Seymour	1	3	0	3	1	1	<	D	Poor water quality as a result of PIR leacheate, low DO, high temp, some access issues
		Kathlyn	1	3	2	3	1	1	>	S	Poor water quality below lake, high suspended sediments from Smithers storm drainage
		Canyon	2	0	1	1	1	1	>	S	Water quantity a problem during low flow years, lots of water users
		Driftwood	2	0	1	2	1	1	>	S	Stream bed occasionally dries up, some beaver dams that could cause problems
		Toboggan	3	0	1	3	2	2	>	D	High nutrient loading, CN R-O-W impacts, heavy beaver activity
		Trout	1	0	0	2	1	2	>	S	Good condition, low potential
		Reiseter	2	0	0	2	1	1	>	S	Susceptable to low flows at mouth
		Station	1	3	1	3	2	2	>	D	Major access problem being dealt with, cont'd demand for more water, beaver problems
	Telkwa	Telkwa mainstem	1	0	1	1	1	1	>	S	Upper Telkwa most productive, untouched, continued off-channel development
		Howson	0	0	0	0	2	1	<	S	Not very productive, no major concerns
		Elliot	0	0	0	0	0	0	<	S	Productive lower reach

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
	Suskwa	Suskwa mainstem	0	0	1	1	2	2	>	S	Higher gradient, lower productivity river, Level I II WRP work completed
		Harold Price	0	0	0	0	2	2	>	S	Heavily harvested, road related problems, chronic sedimentation, on-going WRP work
		Blunt	0	0	0	0	2	2	>	S	Heavily harvested, road related problems, on-going WRP work
	Morice	Morice mainstem	1	0	1	1	1	1	>	S	Very productive lake headed system, On-going WRP assessments
		Nanika	0	0	0	1	2	2	<	D	Logging moving into this area, some sedimentation concerns
		McBride	0	0	0	0	1	1	>	S	HIgh potential coho habitat, serious access problem associated with beaver
		Thautil	0	0	0	2	2	3	<	D	Highly erodible soils a constant threat to water quality
		Gosnell mainstem	0	0	0	1	2	2	<	D	Highly erodible soils and beaver activity in upper watershed may limit access
		Shea	0	0	0	1	1	1	<	S	Pristine condition, very important producer of coho, needs to be protected
		Lamprey	0	0	0	2	2	2	>	S	Significant sedimentation, ustable channel, beaver related access problems, WRP work
		Fenton	0	0	0	3	2	3	>	S	FSR culvert limits access, some sediment concerns, WRP work to address access
		Owen	0	0	0	3	3	3	>	I	Significant access issue, heavily logged in past, extensive on-going WRP work
		Houston Tommy	0	0	0	1	1	2	<	S	Steep unstable slopes are a major source of sediment
	Babine	Babine - upper	0	0	1	1	1	1	>	S	No apparent habitat problems, stable lake headed system
		Tahlo									

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
		Morrison									
		Sutherland									
		Four-Mile									
		Gullwing									
		Pinkut									
		Unnamed Creek									
		Twain									
		Pierre									
		Big Loon									
		Nine-Mile									
		Five-Mile									
		Tsezakwa									
		Boucher									
	Nilkitkwa		0	0	0	0	1	1	<	S	Heavily inflenced by glacier, high turbidity and cool temperatures, some beaver concerns
		Upper Nilkitkwa									
		West Nilkitkwa									
		Mero									
	Nichyeskwa		0	0	0	1	2	2	<	D	Heavy log building and road construction in upper watershed.
		Mainstem									
		Shelagyote									
Upper Skeena	**Sustut**		0	0	0	2	1	2	<	D	See comments in general section
		Johanson									
		Moosevale									
		Upper Sustut									
		Azuklotz									
		Bear									
		Asitka									
	Slamgeesh										
	Kluayaz										

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
	Kispiox	Kispiox	2	2	1	2	3	2	>	S	Upper watershed yet untouched, tributaries heavily impacted by logging.
		Stephens									
		Club - upper									
		Club - lower									
		Footsore- upper									
		Footsore									
		Hodder									
		Nangeese	0	0	0	0	2	2	<	S	Lack of LOD in lower river, extensive beaver activity in upper area, WRP work on-going
		Sweetin	0	0	0	3	2	2	<	S	Flashy system subject to high siltation and sediment transport, on-going WRP work
		Beaverlodge									
		Steep Canyon									
		Littlefish									
		Clifford	0	0	0	2	3	2	>	S	30 percent ECA, major beaver dam access issue, FSR culvert problem, on-going WRP
		Skunsnat	0	0	0	2	3	2	>	S	24 percent ECA, major beaver dam access issue, FSR culvert problem, on-going WRP
		Ironside	0	0	0	1	3	2	>	S	32 percent ECA, extensive riparian impacts, prolific beaver population, on-going WRP
		Cullon	0	0	0	1	3	2	>	S	36 percent ECA, road related water quality problems, on-going WRP
		McCully	0	0	0	1	1	1	<	S	Low level of impact, major avulsion on lower creek, proposed logging a little more intense
		Murder	3	0	0	2	3	2	>	S	Extensive agriculture on lower end, access and riparian problem, on-going WRP, ECA 27%
		McQueen	3	0	0	1	1	2	>	D	Significant agricultural impacts, major beaver impacts, past enhancement unsuccessful
		Date	0	0	0	1	1	2	<	D	Recent WRP work. Some channel stability concerns.
Mid-Skeena	Chicago		0	0	1	2	1	1	>	S	Extensive beaver dams, very productive, on-going enhancement, small hatchery
	Burdick		0	0	0	1	2	1	>	S	Bouldery stream, some instability concerns, moderately productive
	Comeau		3	1	0	3	1	1	>	D	CN crossing blocks access, unauthorized water withdrawals, bottom reach channelized
	GlenVowel		0	2	0	2	2	1	>	S	Water withdrawals, lower end heavily logged, uncontrolled beaver population

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
	Kitseguecla	Mainstem									
		Kitsuns									
	Kitwanga		0	11	0	2	2	2	>	S	See general watershed comments below
		Upper									
		Lower									
		Kitwancool									
	Wilson										
	Fiddler										
	Singlehurst										
	Kleanza										
	Zymoetz	Upper Zymoetz									
		Lower Zymoetz									
	Thornhill										
	Kitsumkalum	Upper Kalum									
		lower Kalum									
		Hadenchild									
		Cedar									
		Clear									
		Nelson									
		Glacier									
		Lean-to									
		Deep									
		Star									
	Zymagotitz										
	Alwyn										
	Lakelse	Lakelse mainstem									
		Andalas									
		Blackwater									
		Clearwater									
		Coldwater									
		Hatchery									
		Schulbuckhand									
		Herman Mountain									

Drainage	Sub-drainage	Stream	Landuse Influences on Habitat							Habitat Status	Comments
			Agriculture	Urban	Recreation	Linear Corridors	Forestry		Primary period of Influence < or > 10 Years	over past 10 years I,D,S*	
							Rate of Cut	Roads			
		North Hatchery									
		Sockeye									
		Williams									
		White									
		North Granite									
Lower Skeena	Exstew										
	Gitnadoix	Gitnadoix main									
		Kadeen									
		Magar									
		Southend									
		Dog Tag									
		Clay									
	Exchamsiks										
	Kasiks										
	Kwinitsa										
	Scotia										
	Khyex										
	Ecstall										
	McNeil										