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Review of Thompson/Chilcotin Steelhead Interception in 1995 and Recommendations for Future Management

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Introduction

During their spawning migration, Thompson and Chilcotin river steelhead must travel past Vancouver Island as they proceed toward the Fraser River. Their run timing is quite broad encompassing nearly an 11 week period (Figure 1) and there is considerable overlap with commercially exploited pink, late run sockeye and chum salmon stocks. The early portion of the run also overlaps with Harrison River chinook and the peak of the run roughly coincides with many Fraser River coho stocks.

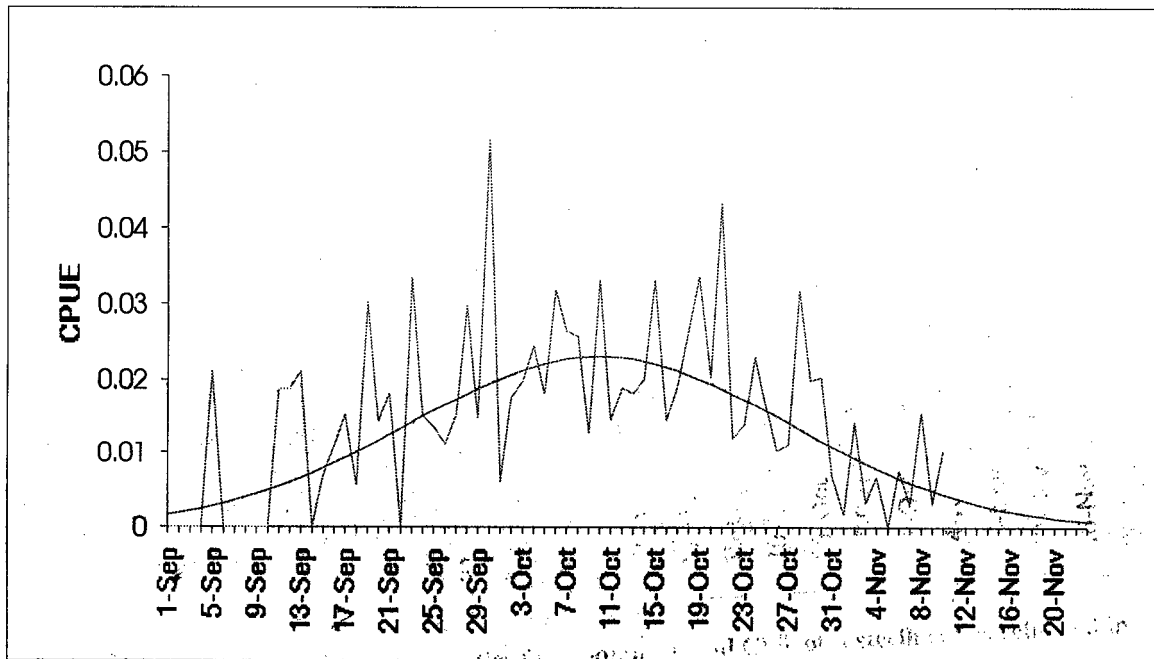


Figure 1. Run timing characteristics for Thompson and Chilcotin steelhead as reflected in the Albion test fishery.

Thompson and Chilcotin river steelhead are captured in a number of commercial, aboriginal and sport fisheries. In recent history, commercial fisheries that harvested significant numbers of these steelhead include those located along the west coast of Vancouver Island near Nitinat, in the Strait of Juan de Fuca,

in Johnstone Strait, in the U.S. waters near the San Juan Islands and Point Roberts, and the Fraser River (Oguss and Andrews 1977, Oguss and Evans 1978, Evans 1979, Lewynsky *et al.* 1987, Bison 1990, 1991, 1992, Caverly 1991b, McGregor 1992). The occurrence of Thompson and Chilcotin steelhead in Johnstone Strait and the Strait of Juan de Fuca indicates that these steelhead will use both migration routes around Vancouver Island, however year to year variability in diversion rates is not currently understood. Historical catches of Thompson and Chilcotin steelhead have also been documented for the aboriginal fisheries along the Fraser River (Schubert 1983, 1984, 1985, 1986, MacDonald 1987, 1988, 1989, 1990, 1991, 1992, Lewynsky *et al.* 1987, Stewart and Lewynsky 1988, Lewynsky 1989, 1990a, 1990b) and have also been reported in the U.S. Treaty Fisheries in the Strait of Juan de Fuca, and near the San Juan Islands (file data, Ministry of Environment). Historically, sport fisheries located in the lower Fraser, Thompson, and Chilcotin rivers also harvested significant numbers of Thompson and Chilcotin steelhead (Steelhead Harvest Analysis, B.C. Ministry of Environment, Lewynsky *et al.* 1987). However, the legal harvest of wild steelhead in these sport fisheries was heavily curtailed during the 1980's and eliminated in 1989 by the Ministry of Environment. The reason for this dramatic change in sport fishing management was the continued decline in the numbers of Thompson and Chilcotin steelhead spawners (file data, B.C. Ministry of Environment).

Since 1989, Thompson and Chilcotin steelhead populations have continued to fluctuate at very low levels. Many individual stocks are below levels that would ensure the genetic health and conservation of individual spawning stocks (Labelle 1995a). In efforts to further relieve harvest pressure on these stocks, the Ministry of Environment became increasingly involved with commercial and aboriginal fisheries which, unlike the freshwater sport fisheries, are under the jurisdiction of the DFO.

The following describes the management of the 1995 commercial and aboriginal fisheries and their impact on Thompson and Chilcotin steelhead management.

Provincial Involvement in the Management of Commercial and Aboriginal Net Fishing, 1995.

In 1995, representatives of the B.C. Ministry of Environment, Fisheries Branch, participated in numerous meetings with DFO management and scientific staff, commercial and aboriginal fishing advisory committees and Aboriginal Fisheries Strategy (AFS) advisory committees regarding the management of various net fisheries. On May 12, 1995, provincial Fisheries Branch biologists developed a Discussion Paper stating the Ministry's position with respect to steelhead harvest problems in southern B.C. (Labelle 1995a, 1995b). Key elements contained in this document included the identification of "minimum conservation requirements", current and allowable exploitation rates for steelhead, areas of responsibility between DFO and the Ministry of Environment, decision making mechanisms with respect to fishing plans, and the future evolution of commercial and native fisheries including the progressive elimination of detrimental fishing practices. The Ministry's position was presented to three key groups on the following dates:

- South Coast Advisory Committee - June 8
- Fraser River Advisory Committee - June 15
- Fraser Watershed Steering Committee - June 22

Further to these presentations, Ministry representatives participated in the South Coast Advisory Committee and Fraser River Advisory Committee meetings in September and the Sto:lo Fisheries Planning Committee and Fraser Watershed Steering Committee meetings in September, October and November. In addition, the Ministry maintained communications with DFO technical and managerial staff throughout the season.

Pre-Season Management Recommendations by the Ministry of Environment for the Conservation of Thompson and Chilcotin Steelhead

The Ministry clearly identified that detrimental fishing practices must be managed appropriately in order to reduce the harvest of steelhead by-catch in certain net fisheries (Labelle 1995b). In doing so, the Ministry considered fishing gear to be either selective or non-selective in nature. Gillnets designed for the gilling of Pacific salmon were deemed to be non-selective because bycatch species suffer a high incidence of mortality. Steelhead in particular usually die in gillnets prior to retrieval of the net. Large seines were also considered non-selective because of the damage to fish caused by retrieving a large catch of fish over the stern of a seine vessel, excessive scale loss, or the length of time required to select out steelhead once the catch is brought on board. Fish traps, fish wheels, reef nets or small carefully conducted seining operations were considered to be potentially selective alternatives. Innovation in developing selective fishing techniques was also advocated by the Ministry.

Since the mid 1980's, the Ministry of Environment has requested that fishing times and methods be designed to reduce harvest pressure on Thompson and Chilcotin river steelhead in certain commercial and aboriginal fisheries. In 1995, the Ministry of Environment repeated this request by identifying "timing windows" where no fishing should be allowed or only selective gear should be permitted. These timing windows were based on historical run timing data from DFO and PSC test fisheries and steelhead migration characteristics (Ruggerone *et al.* 1990, Spence 1989). This coordinated approach was presented to DFO managers at South Coast Division for application to the Nitinat and Johnstone Strait chum fisheries (gillnet and seine fisheries) and to the Fraser River Division for application to the Fraser River commercial and aboriginal (AFS) gillnet fisheries. At the request of DFO, the Ministry of Environment also presented this approach directly to the Sto:lo Fisheries Planning Committee.

With respect to Nitinat (Area 21), the Ministry of Environment requested that the gillnet fishery not commence until October 2 which is one week after the average peak of Thompson and Chilcotin steelhead run timing through that area (Figure 2). It was also requested this initial opening not operate for more than 48 hours in order to allow the passage of some steelhead between openings. The second opening was recommended to start no sooner than October 9 and again this opening was to be limited to 48 hours. It was also made clear that the majority of Thompson and Chilcotin steelhead were expected to clear the Nitinat chum fishing area by October 16.

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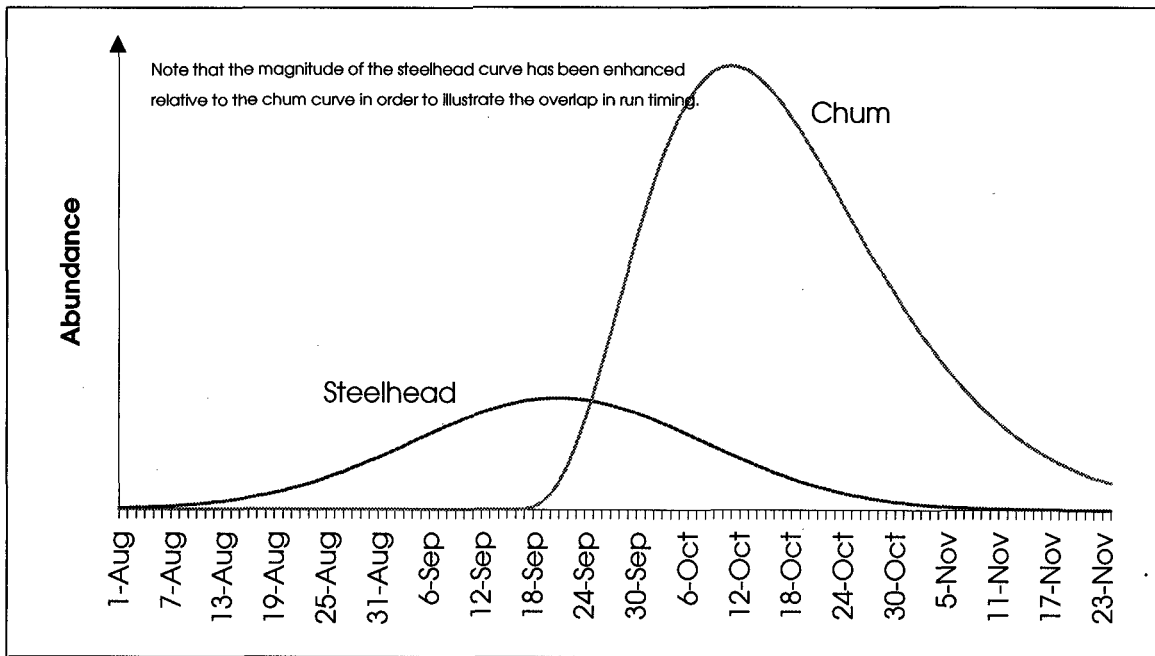


Figure 2. Run timing comparison between Thompson and Chilcotin steelhead and Nitinat chum salmon.

With respect to the Johnstone Strait chum fishery, the Ministry of Environment requested that the chum assessment fishery (gillnet and seine) be scheduled after October 16 (Figure 3). If this was not acceptable, the Ministry indicated that it would accept an alternative opening prior to October 16 if it were located in the northern portion of Area 12 only.

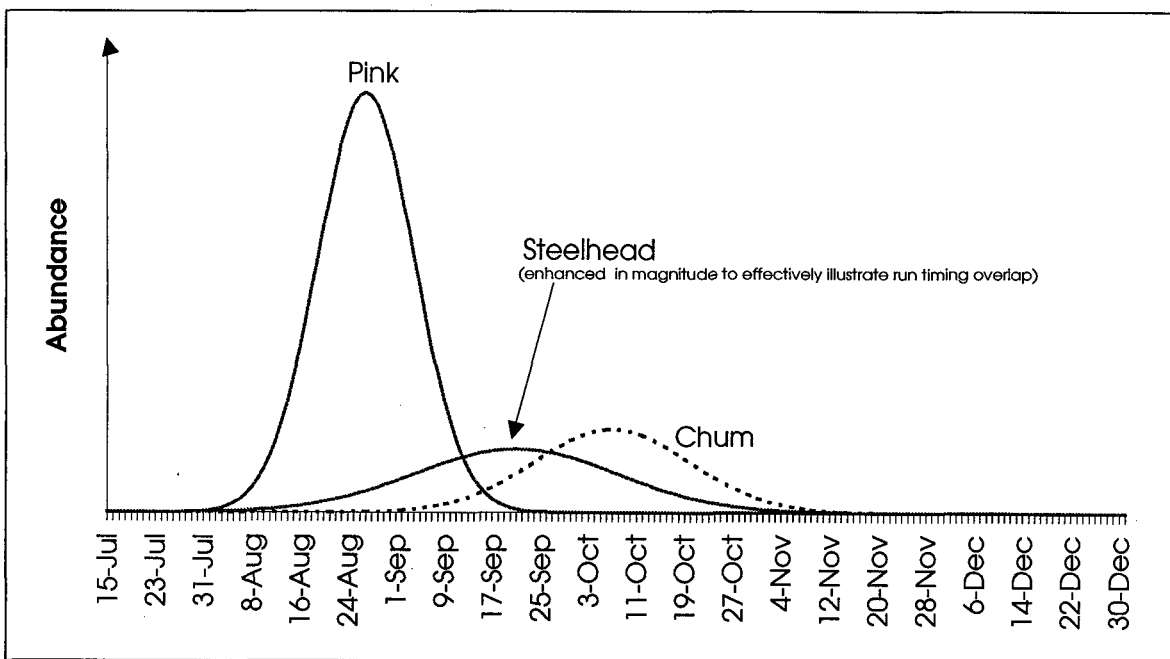


Figure 3. Run timing comparison between Thompson and Chilcotin steelhead, Fraser pink salmon and Fraser chum salmon. The run timing displayed is representative of Kelsey Bay which is approximately mid way from the outer boundary in Area 12 to the inner boundary in Area 13.

With respect to the commercial gillnetting for chum salmon in the Fraser River (Area 29), the Ministry of Environment advised DFO that commercial gillnetting for chum salmon should not occur prior to October 31 (Figure 4).

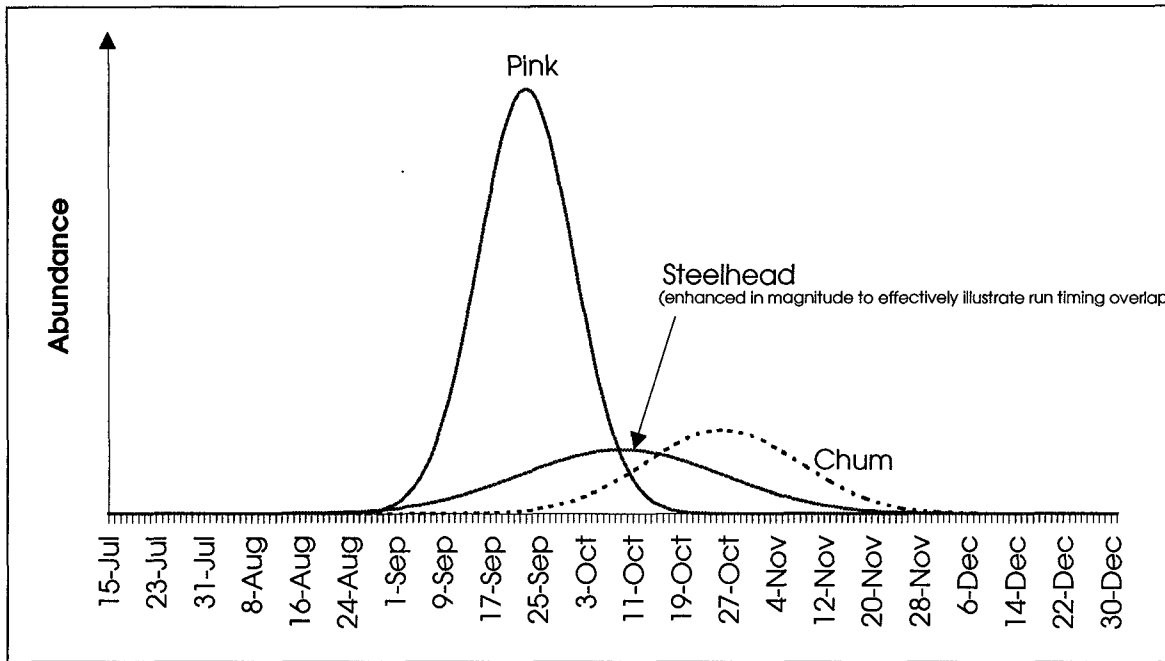


Figure 4. Run timing comparison between Thompson and Chilcotin steelhead, Fraser pink salmon, and Fraser chum salmon in Area 29. The run timing displayed is representative of timing at the Albion test fishery site in the Fraser River.

With respect to the aboriginal drift gillnet and set gillnet fisheries in the Fraser River, the Ministry of Environment advised that this type of gear not be used during specific time periods and in specific geographical areas. The following table represented a coordinated “window” approach designed to successfully pass Thompson and Chilcotin steelhead through the Fraser River, yet still offer a maximum amount of fishing opportunity for both selective and non-selective gear types.

Table 1. Selective fishing windows for the mainstem Fraser River for the conservation of Thompson and Chilcotin steelhead. The start date is based on a 95% protection window*. The end date is based on an anticipated non-native commercial chum opening on October 30 from Mission to Steveston.

Area	Steelhead travel time (days)	Proposed closure period for non-selective fishing in the mainstem Fraser River	
		Start Date	End Date
Port Mann to Steveston	3.8	Sep 03	Oct 29
Mission to Port Mann	4.0	Sep 07	Oct 29
Harrison River to Mission	2.9	Sep 10	Nov 01
Hope to Harrison River	4.0	Sep 14	Nov 05
Sawmill Creek to Hope	1.8	Sep 16	Nov 07
Lytton to Sawmill Creek	4.2	Sep 20	Nov 11

* The “95% protection window” refers to the period of time that encompasses 95% of the run timing curve.

In summary, the details outlined above constituted a comprehensive, coordinated approach designed to reduce the bycatch of steelhead as they migrate southward along the coast and up the Fraser River. Not all interception fisheries were dealt with in 1995, however those identified above were considered to be the most significant, non-selective, interception fisheries of the 1995 season. Also, these recommendations were not considered final, but rather an intermediate step towards reducing harvest to reasonably safe levels.

Post-Season Review of Non-Selective Net Openings

In 1995, there were numerous non-selective net fisheries that occurred in locations and times in which, according to historical information, Thompson and Chilcotin steelhead were at risk of being intercepted. Table 2 lists these openings which occurred in Johnstone Strait, west coast Vancouver Island near Nitinat, Strait of Juan de Fuca, San Juan Islands (including the area near Point Roberts), and the Fraser River. Note that interception of these steelhead in net fisheries along BC's central coast, north coast and southeast Alaska is not well understood and are not included here. Efforts are underway to obtain information on interceptions of B.C. origin steelhead through the Pacific Salmon Commission.

The fisheries that attracted large amounts of fishing gear included those fisheries in Johnstone Strait (Area 12/13), Strait of Juan de Fuca (Area 20), Nitinat (Area 21), Fraser River (Area 29 commercial gillnet), and the Fraser River AFS fisheries. In terms of the timing of openings, the fisheries that caused the highest potential catch of Thompson and Chilcotin steelhead included the Fraser River AFS fisheries, and the Nitinat, Johnstone Strait, and the Strait of Juan de Fuca fisheries. Figures 5 to 10 illustrate the components of the Thompson and Chilcotin steelhead run that were placed at risk to capture in these fisheries. Specifically, fisheries that operated on or very near the peak of Thompson and Chilcotin steelhead run timing included the first Fraser River AFS chum fishery (Oct 27), the last pink/late sockeye fishery in Johnstone Strait (Sept 11-13), and the Johnstone Strait chum assessment fishery (Sept 25-26). The commercial chum fishery at Nitinat was also originally scheduled to begin on the peak of Thompson and Chilcotin run timing, however this fishery was delayed one week because test fishing results indicated low chum salmon abundance and high steelhead by-catch (Ministry of Environment/DFO data). In summary, the collective effect of these larger fisheries alone placed every part of the Thompson and Chilcotin steelhead run at risk to capture. In addition, many components were "fished on" repeatedly.

The only fishery in which Ministry of Environment recommendations were accepted by the DFO was the Fraser River Area 29 commercial gillnet fishery for chum salmon. In the Nitinat chum fishery, the Johnstone Strait chum assessment fishery, and the Fraser River AFS fisheries for chum salmon, the DFO rejected Ministry recommendations for the conservation of Thompson and Chilcotin steelhead. In Nitinat, the openings beginning on October 2 and October 9 were both extended beyond the recommended maximum duration of 48 hours per opening. Based on average migration rates for steelhead in marine waters, it is estimated that steelhead passed freely through the Nitinat area for only 3 days between October 2 and October 16. In the Johnstone Strait chum fishery, recommendations made by the Ministry were ignored. In the Fraser River AFS chum fisheries, the selective fishing 'window' approach recommended by the Ministry of Environment was rejected by the Sto:lo Planning Committee and as a result, DFO elected to accept recommendations from the user representatives of the Planning Committee and ignore recommendations made by the Ministry.

Table 2. Summary of non-selective net fisheries conducted in 1995 that occurred during times and locations where Thompson and Chilcotin steelhead are known to migrate through.

Geographic location	Statistical area	Allocation sector/gear type	Date/time of opening	Date/time of closing	Duration (hours)
Strait of J. de Fuca	Area 20	Commercial/seine	Aug 22/0700 hrs	Aug 22/1900 hrs	12 hrs
Strait of J. de Fuca	Area 20	Commercial/seine	Aug 28/0700 hrs	Aug 29/1900 hrs	2-12 hr periods
Strait of J. de Fuca	Area 20	Commercial/seine	Sept 5/0700 hrs	Sept 6/1900 hrs	2-12 hr periods
Strait of J. de Fuca	U.S. Areas 4B, 5, 6C	Treaty Indian/gillnet	Aug 21/1200 hrs	Aug 26/1200 hrs	5 days
Strait of J. de Fuca	U.S. Areas 4B, 5, 6C	Treaty Indian/gillnet	Oct 15/1200 hrs	Nov 11	27 days
Johnstone Strait	Area 12/13	Commercial/seine	Aug 22/0700 hrs	Aug 22/1900 hrs	12 hrs
Johnstone Strait	Area 12/13	Commercial/seine	Aug 28/0700 hrs	Aug 29/1900 hrs	2-12 hr periods
Johnstone Strait	Area 12/13	Commercial/gillnet	Aug 27/1800 hrs	Aug 29/0800 hrs	38 hrs
Johnstone Strait	Area 12/13	Commercial/seine	Sept 4/0700 hrs	Sept 5/1900 hrs	2-12 hr periods
Johnstone Strait	Area 12/13	Commercial/gillnet	Sept 3/1800 hrs	Sept 5/0800 hrs	38 hrs
Johnstone Strait	Area 12/13	Commercial/seine	Sept 12/0700 hrs	Sept 12/1900 hrs	12 hrs
Johnstone Strait	Area 12/13	Commercial/gillnet	Sept 11/1800 hrs	Sept 13/0800 hrs	38 hrs
Johnstone Strait	Area 12/13	Commercial/seine	Sept 25/1600 hrs	Sept 26/1600 hrs	24 hrs
Johnstone Strait	Area 12/13	Commercial/gillnet	Sept 25/1600 hrs	Sept 26/1600 hrs	24 hrs
Nitinat	Area 21	Commercial/gillnet	Oct 2/0800 hrs	Oct 3/1900 hrs	35 hrs
Nitinat	Area 21	Commercial/gillnet	Oct 3/1900 hrs	Oct 5/1900 hrs	48 hrs
Nitinat	Area 21	Commercial/gillnet	Oct 9/0800 hrs	Oct 11/1900 hrs	59 hrs
Nitinat	Area 21	Commercial/gillnet	Oct 16/0800 hrs	Oct 19/1800 hrs	82 hrs
Nitinat	Area 21	Commercial/gillnet	Oct 23/0800 hrs	Oct 23/1800 hrs	10 hrs
San Juan Islands	U.S. Area 7	Commercial/gillnet	Aug 31/2100 hrs	Sept 1/0900 hrs	12 hrs
San Juan Islands	U.S. Area 7	Commercial/seine	Aug 31/0500 hrs	Aug 31/2100 hrs	16 hrs
San Juan Islands	U.S. Areas 6,7	Treaty Indian/gn & sn	Aug 28/0500 hrs	Aug 29/0900 hrs	16 hrs
San Juan Islands	U.S. Areas 7, 7A	Commercial/gillnet	Sept 5/2000 hrs	Sept 7/0700 hrs	12 hrs & 11 hrs
San Juan Islands	U.S. Areas 7, 7A	Commercial/seine	Sept 5/0500 hrs	Sept 6/2100 hrs	2-16 hr periods
San Juan Islands	U.S. Areas 6,7, 7A	Treaty Indian/gn & sn	Sept 2/1800 hrs	Sept 4/2100 hrs	51 hrs
San Juan Islands	U.S. Areas 7, 7A	Commercial/gillnet	Nov 2/0600 hrs	Nov 3/1800 hrs	2-12 hr periods
San Juan Islands	U.S. Areas 7, 7A	Commercial/gillnet	Nov 7/0600 hrs	Nov 10/1800 hrs	4-12 hr periods
Fraser River	Area 29	Commercial/gillnet	Oct 31/0800 hrs	Oct 31/1800 hrs	10 hrs
Fraser River	Sawmill to Steveston	AFS/gillnet	Sept 1	Sept 13	13 days
Fraser River	Sawmill to Steveston	AFS/ drift gillnet	Oct 27	Oct 28	34 hrs
Fraser River	Sawmill to Steveston	AFS/ set gillnet	Oct 27	Oct 27	24 hrs
Fraser River	Sawmill to Steveston	AFS/ drift gillnet	Nov 4	Nov 4	12 hrs
Fraser River	Sawmill to Steveston	AFS/ set gillnet	Nov 3	Nov 5	48 hrs
Fraser River	Sawmill to Steveston	AFS/ drift gillnet	Nov 9	Nov 9	10 hrs
Fraser River	Sawmill to Steveston	AFS/ set gillnet	Nov 10	Nov 13	48 hrs
Fraser River	Sawmill to Steveston	AFS/ drift gillnet	Nov 13	Nov 13	10 hrs

Further to the Area 29 commercial gillnet fishery, the start date of October 30 was agreed to by the Ministry and DFO as a compromise to traditional starting times. In concert with this start date was the understanding that observers would be placed on board gillnetters so that steelhead bycatch could be estimated. Similar sampling efforts had been performed in 1991 and 1992 with the limited cooperation of commercial gillnetters (Bison 1991, McGregor 1992). Unfortunately, commercial fishers were displeased about DFO's net size restrictions designed to reduce the bycatch of coho because similar net restrictions were not being imposed on aboriginal fishers as well. As a result, the commercial gillnetters refused to accept these net restrictions and also refused to accept bycatch observers. Despite industry's defiant reaction, the fishery was allowed to continue.

The Ministry's position did incite an offer from the Katzie Indian Band to remove some gillnetters from the Fraser River AFS chum fishery in exchange for the use of selective beach seines. Unfortunately, this progressive initiative was unsuccessful because the AFS agreement between the Sto:lo Nation and DFO specified fishing time management guidelines for gill nets only. Beach seines were not identified as an acceptable gear type in "the agreement" between the Sto:lo Nation and DFO. Furthermore, the Katzie Band proposed to catch a specified number of chum salmon. The planning committee was unable to accept this proposal because "the agreement" only specified an allocation of salmon to the Sto:lo Nation as a whole. Specific allocations to individual bands did not exist (M. Staley, pers. comm.). Nevertheless, the Ministry was supportive of the proposal and stated that selective fisheries should occur during regular openings rather than creating "add on" fisheries. Despite the difficulties encountered in their original proposal, members of the Katzie Band together with a group of non-native commercial fishers conducted an experimental beach seine operation in December under a DFO Scientific Fishing Permit. Salmon abundance was very sparse at the time and consequently no fish were captured. However, operation of the gear proved to be successful and fishers' opinions about the effectiveness of the gear was optimistic (R. Bailey, pers. comm.).

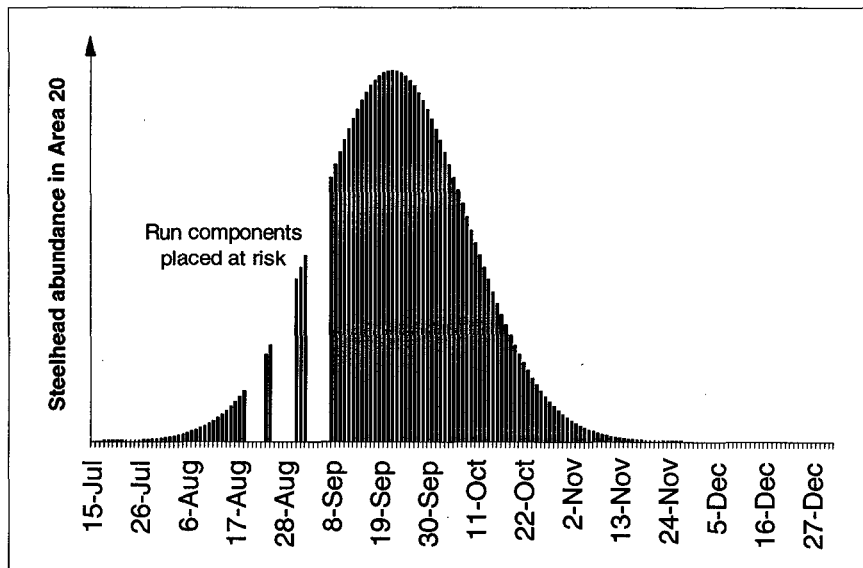


Figure 5. Thompson and Chilcotin steelhead run timing components that were placed at risk to capture in the Area 20 commercial seine fisheries for pink/sockeye in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components.

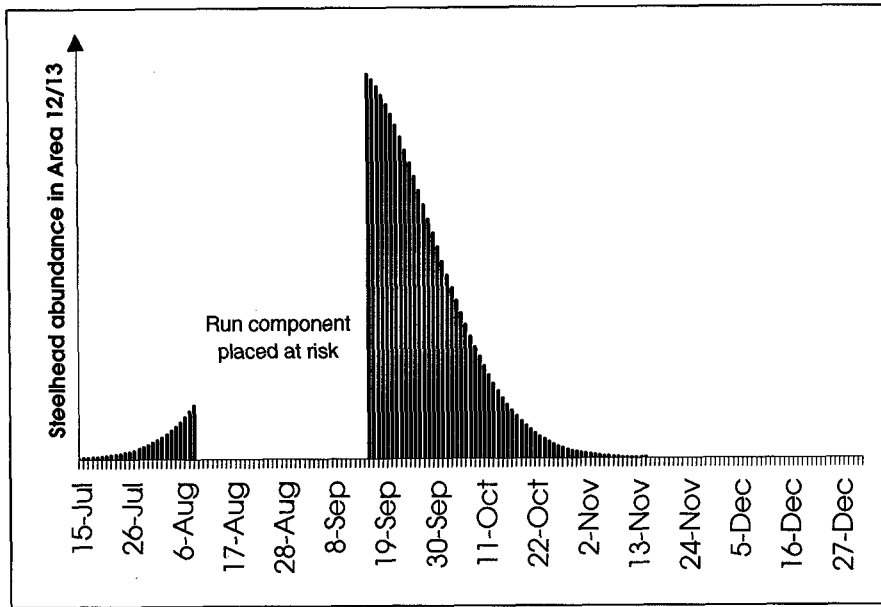


Figure 6. Thompson and Chilcotin steelhead run timing components that placed at risk in the Area 12/13 commercial sockeye/pink salmon fisheries in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components.

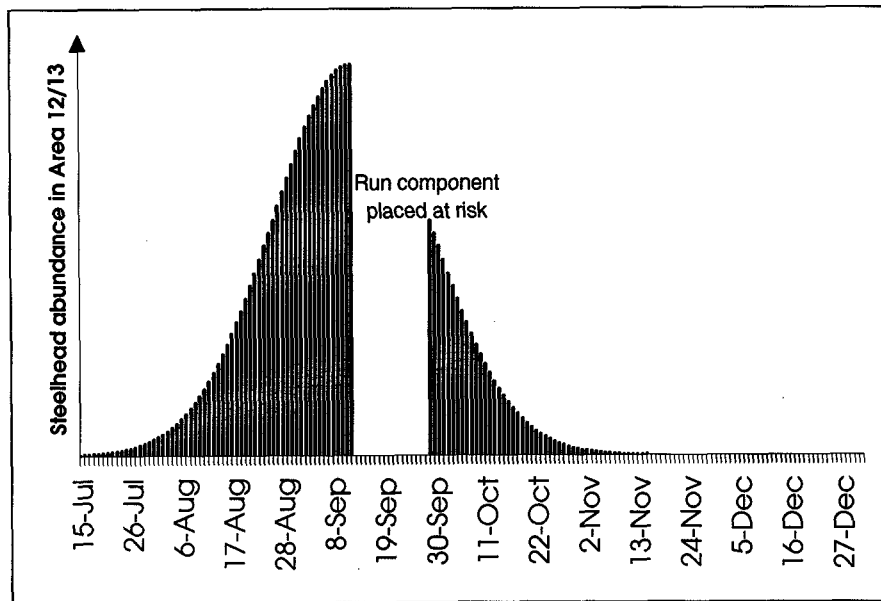


Figure 7. Thompson and Chilcotin steelhead run timing components that were placed at risk to capture in the Area 12/13 "chum assessment fishery" in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components.

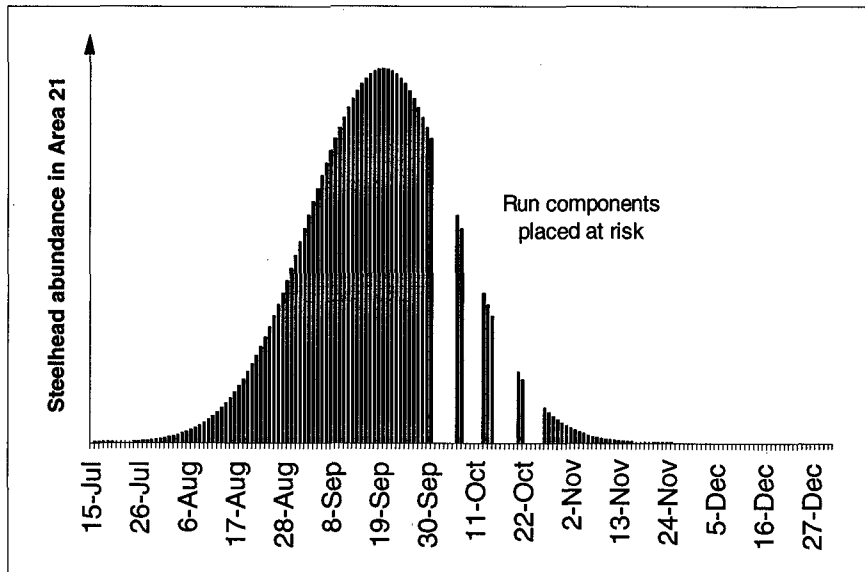


Figure 8. Thompson and Chilcotin steelhead run timing components that were placed at risk to capture in the Area 21 commercial gillnet fisheries for Nitinat chum salmon in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components (note that the by-catch assessment fishery was not included in this illustration).

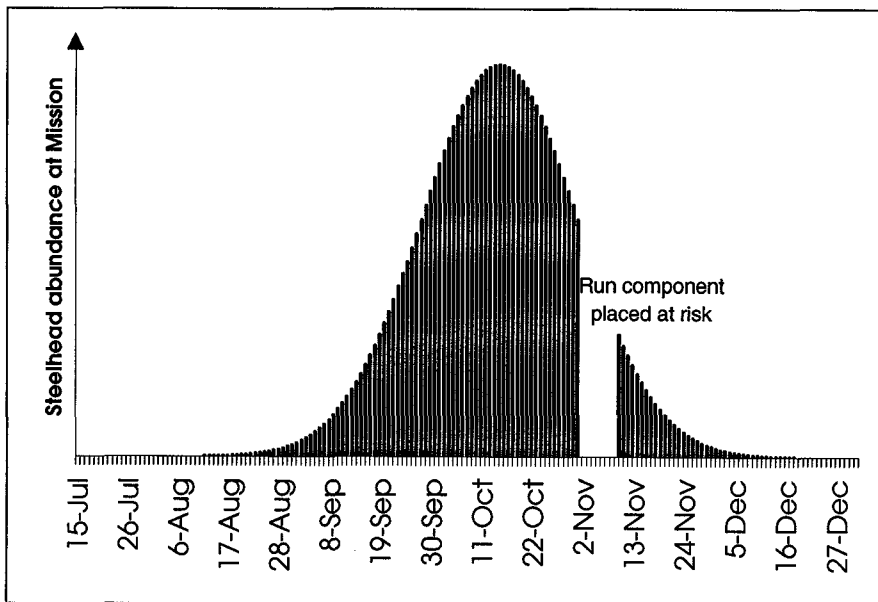


Figure 9. Thompson and Chilcotin steelhead run timing components that were placed at risk to capture in the Area 29 commercial gillnet fishery for chum salmon in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components.

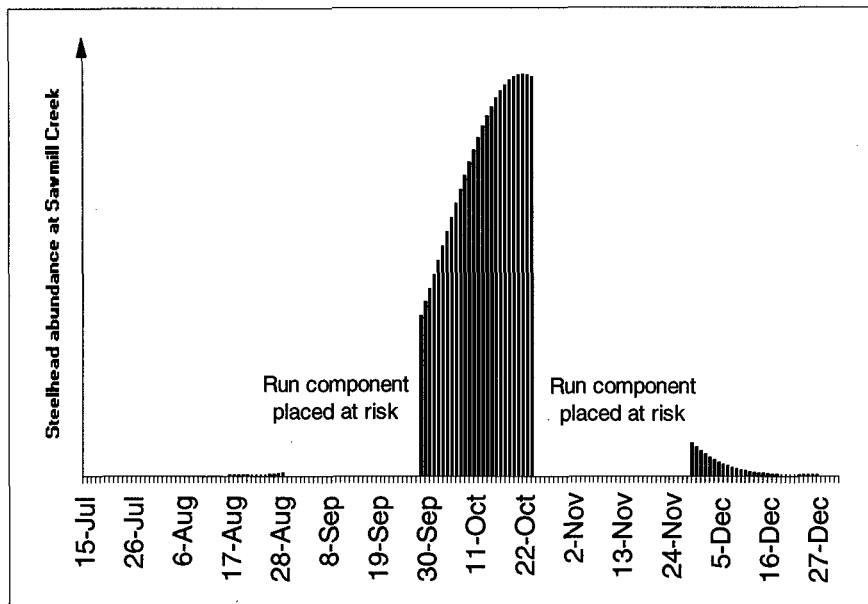


Figure 10. Thompson and Chilcotin steelhead run timing components that were placed at risk to capture in the Fraser River AFS fisheries in 1995. The 'blank' areas of the run timing curve illustrates the affected run timing components.

The Status of Thompson and Chilcotin Steelhead in 1995.

Based on the historical relationship between the Albion test fishery, the activities of aboriginal fisheries upstream of Albion, and spawner escapements, test fishery results from this year indicate that there will a high likelihood that some Thompson/Chilcotin steelhead stocks will not reach the minimum conservation requirements as defined by Labelle (1995a). Figure 11 illustrates the relationship between the test fishery index and the total composite Thompson and Chilcotin steelhead escapement. Note that steelhead were harvested upstream of Albion in sport fisheries and aboriginal fisheries up to 1989 and by aboriginal fisheries from 1989 to present. Also, steelhead mortality associated with the non-retention sport fisheries has continued since 1989. Presently, the Ministry of Environment has identified that the Thompson and Chilcotin composite is made up of a least 6 separate stocks. In the past, the distribution of the composite run to each of the stocks has been extremely uneven. For example, the Deadman steelhead stock, which is one of the most accurately and precisely estimated for spawner abundance, failed to reach a minimum conservation requirement of 300 spawners for 7 out of the 18 years. Even more critical is that one of these low abundance years for the Deadman stock was 1985 which was the highest recorded escapement for Thompson and Chilcotin steelhead as a whole. This suggests that very conservative buffering is required to compensate for uneven spawner distribution and ensure that minimum conservation requirements are met.

The status of Thompson and Chilcotin steelhead will be determined with increased accuracy and precision once spawner enumerations are conducted in the spring of 1996.

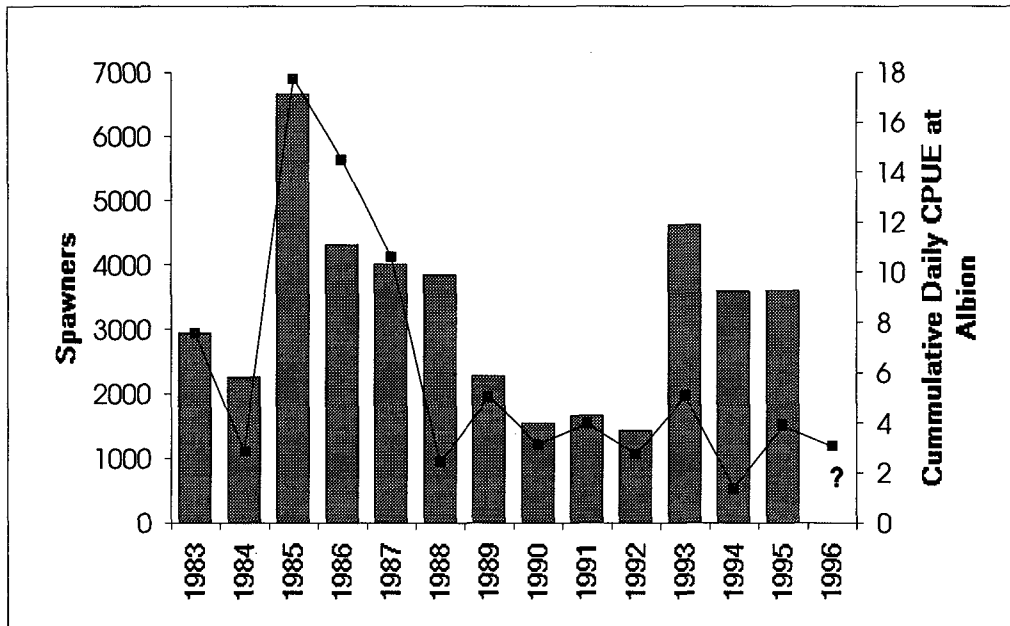


Figure 11. Estimated total escapement for all Thompson and Chilcotin steelhead stocks in comparison with the Albion test fishery (October 1 to November 10).

Future Recommendations.

1. It is recommended that the DFO managers adopt a risk averse, coordinated approach to further reduce the interception of Thompson and Chilcotin steelhead in the commercial and aboriginal fisheries along the coast and rivers of British Columbia.
2. It is recommended that this approach be adopted internationally through the Pacific Salmon Treaty and that specific management guidelines be formulated for each of the fisheries mentioned in Table 2 of this report.
3. The "moving window" approach should be negotiated by DFO as an integral conservation component at the 1996 AFS agreements between DFO and those First Nations party to the agreements.
4. Selective fishing techniques/technologies should be introduced, at least in the Fraser River fisheries as soon as possible beginning in 1996.
5. It is recommended that only selective fishing techniques be used during the 95% run timing window for Thompson and Chilcotin steelhead as the run passes through Area 12/13, 20 and 21 as well as fisheries in the U.S. including those in Areas 4B, 5, 6C, 7, and 7a.
6. It is recommended that DFO and the Ministry of Environment develop a mixed stock fisheries model to use as a decision making tool.
7. It is recommended that the understanding of steelhead stock composition be improved through genetic analysis. Successful completion of genetic sampling and analysis programs currently underway by the Ministry of Environment should be pursued.
8. It is recommended that all fisheries (aboriginal, commercial, and sport) not exceed 32% mortality rate on Thompson and Chilcotin steelhead until further research indicates otherwise as indicated by Labelle (1995a).
9. It is recommended that these steelhead populations be allowed to rebuild and that this rebuilding be monitored in order to better understand what composite escapements are necessary to ensure that stock specific conservation goals are met.

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