

NECHAKO FISHERIES CONSERVATION PROGRAM

A Joint Program of the Government of Canada, Alcan and the Province of British Columbia

NECHAKO FISHERIES CONSERVATION PROGRAM TECHNICAL COMMITTEE

DATE: September 1, 2004

Decision Record (2004/2005-2)

1. The Technical Committee has been asked by Fisheries and Oceans Canada (FOC) to review the rationale and need for the Stuart River Enumeration Project in the light of the weaknesses in the data set identified during the NFCP Technical Data Review (in draft). The Technical Committee has conducted that review and the findings are attached to this decision record. In summary, the review concluded that:


- The Stuart River enumeration project was developed based on a need, identified in 1988 and based on the Nechako River Working Group report appended to the 1987 Settlement Agreement, to identify escapement trends in a nearby unregulated system for comparison with Chinook escapements to the regulated Nechako. The Stuart escapement data would then be used to help identify when extrinsic factors (i.e. outside of the Nechako watershed) might explain unexpected changes in abundance in Nechako Chinook. The project has been implemented since 1988 to meet this goal. However, the techniques used to enumerate Stuart River returns varied until 1992 as adjustments were made to refine the methodology (see 1992 NFCP Terms of Reference, March 1992);
- These Stuart-Nechako comparisons were used, in part, to explain an unexpected decline in Nechako adult abundance that occurred in 1993-95 that may have otherwise resulted in the implementation of remedial measures under the terms of the 1987 Settlement Agreement. Over the period 1993-95 it was believed that extrinsic factors were responsible for the observed decline in adult abundance, and this was confirmed by a similar trend that occurred in the Stuart River abundance index.
- During the Technical Data review still underway by the NFCP Technical Committee, FOC Science Branch and Stock Management personnel advised the Technical Committee that they believed the technique currently used to enumerate the Stuart River escapement, both in theory and in practice, will result in sufficient variance in the data collected such that its value in identifying future trends in the escapement would be very limited unless the trend resulted in a major change such as occurred in 1993 to 1995. As a result, they expressed their

belief that consideration should be given, by the Technical Committee, to discontinue the annual project.

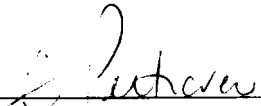
- A strong correlation exists between the Nechako River adult returns and the indices of emergent and out-migrant juveniles (Figures 2 and 3 in the attached review). The fry and out-migration indices for 1999, 2000 and 2001 (brood years for the 2004 escapement) are consistent with the indices for the rest of the program period. Additionally, physical conditions in the river (flow, temperature, turbidity) were not abnormal during 1999 to 2001. Thus, the Technical Committee does not expect returns to the Nechako in 2004 to be depressed unless affected by influences outside of the Nechako River (such as the above average water temperatures in the Fraser River during the 2004 upstream migration).

The Technical Committee therefore has reached the decision not to proceed with the Stuart River Adult Enumeration project in 2004. The Technical Committee has also decided not to cancel the carcass recovery portion of the project for 2004.


In reaching this decision, the Technical Committee realizes that many decisions altering the existing Nechako Fisheries Conservation Program suite of projects will be made as part of an assessment of future needs that has been initiated. As interim steps in that process, the Technical Committee has recommended an annual review of the Fry Emergence and Juvenile Out-Migration Projects, and now makes the same recommendation for the Stuart Enumeration Project. Based on the assessment carried out to date, the Technical Committee is confident that cessation of the Stuart project for 2004 will not materially affect their ability to assess any unexpected trends in Nechako chinook abundance in 2004. The need to cancel this project will have to be reviewed annually, especially in recognition of other changes taking place simultaneously to the data collection program of the NFCP.

for



J. Hwang



E. Petticrew



D. Bouillon



D. Cadden

ATTACHMENT 1

NECHAKO FISHERIES CONSERVATION PROGRAM

Review of the Need to Conduct the 2004 Stuart River Chinook Enumeration and Carcass Recovery Projects

Background

In 1998 the NFCP initiated a technical process to complete the analysis of data collected since the inception of the program, and to review the success of projects to meet the objectives of the overall program. This process is ongoing. After the completion of this review process, the NFCP has proposed to review the future need of the suite of NFCP projects in the context of a) the achievement of program objectives, and b) new needs and considerations that have developed in the Nechako Watershed since the signing of the 1987 Settlement Agreement. It is anticipated that the review of NFCP projects in the context of the future role of the NFCP will result in significant changes to the current program, and may affect the decision making process now in place to annually review the need of the Fry Emergence and Juvenile Out-Migration studies, and any other changes implemented on an interim basis. Similarly, this review of the Stuart River Chinook Enumeration and Carcass Recovery projects fits within the context of an interim step.

Nechako and Stuart Enumeration Projects

In order to assess potential river-specific changes in survival of Nechako River Chinook salmon the Nechako Fisheries Conservation Program (NFCP) has conducted an annual enumeration of adult Nechako River Chinook and an annual enumeration of adult Stuart River Chinook (as a reference stream). It is assumed that Nechako and Stuart Chinook share common freshwater and marine conditions downstream of the confluence of the two rivers. Both stocks appear to demonstrate large scale downstream migration of fry within 60-90 days post emergence. DNA analyses on rearing Fraser River Chinook show high use by both Stuart and Nechako juveniles (Bradford, in NFCP technical workshop, 1998). As well, spawner timing in the two systems are similar and the two stocks appear to show common migration timing through the Fraser. Considering these factors, the populations should experience similar extrinsic year-to-year growth, survival and harvest factors. Consequently, differences in population trends over time between the Nechako and Stuart would be expected to result from in-river survival differences above the confluence of the Stuart River.

While the identification of long-term trends was identified by the NFCP Technical Committee as a major objective of the use of a reference stream, the results of the Technical Data Review (in draft) indicate that variability in the data from the Stuart project weaken the ability to detect changes in production over time.

A second important objective for use of the Stuart River as a reference stream is the ability to detect large single year events that may indicate important differences in fish production rates. Similar large-scale changes in production for both the Stuart and the Nechako suggest extrinsic effects, while major divergence in spawner /recruit values would suggest river specific conditions. While the simultaneous large scale changes in recruit relationships have been detected in both rivers, the Technical Committee has been advised that the variance in the Stuart River enumeration data may make smaller changes or trends more difficult to identify.

These projects have been run annually since the 1988, although the methodology for the enumeration of Chinook in the Stuart River has changed since the project's inception. The number of adult Chinook returning to spawn in the Nechako River has generally met the minimum target of 1700, identified in the 1987 Settlement Agreement (see Figure 1). The exceptions to this general statement (1993, 1994 and 1995 escapements) are thought to be the result of extrinsic factors not related to the Nechako River, a conclusion supported by similar trends in the Stuart River escapements.

Nechako and Stuart Carcass Recovery Projects

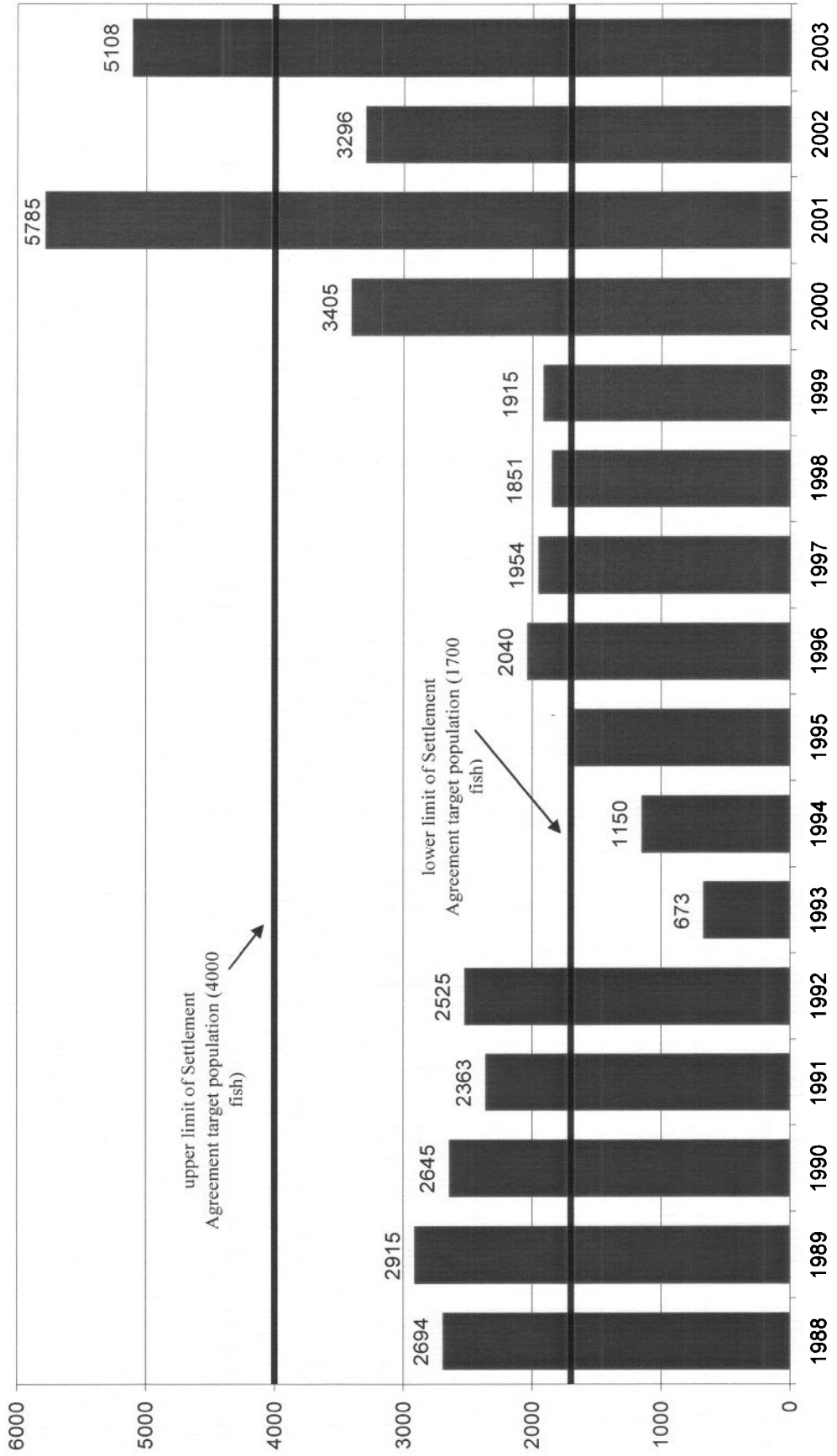
Biological information is collected from both the Nechako and Stuart Chinook populations through carcass recovery projects. In particular, age data obtained from scales reflects the relative production of different Chinook year classes. This information is required for interpretation of enumeration results, as it indicates the extent to which each brood year has contributed to the spawning population.

These projects have been run annually since 1988. The results of the age analyses have shown that the majority of Chinook salmon returning to spawn in both the Nechako and Stuart rivers are predominately 5 year olds with lesser contribution of 4 and 6 year old cohorts.

Nechako Fry Emergence and Juvenile Outmigration Projects

Fry Emergence and Juvenile Outmigration projects were developed in the early stages of the NFCP to detect short-term changes in juvenile production as an early warning of changes in Nechako River Chinook production. The development and implementation of these projects, as well as the spawner enumeration projects, was directed at providing a basis for identifying changes in production of Nechako chinook that were either a result of in-river conditions or events that took place after Nechako chinook left their natal stream. The analyses completed as part of the Technical Data Review (in draft) have demonstrated that the relationship between Nechako Chinook spawners and emergent fry or juvenile outmigrants is both strong and robust and can be used to identify changes in productivity in absence of comparative adult enumeration data.

Figure 1: Nechako Chinook Escapement - 1988 to 2003



The Fry Emergence Project was run annually from 1990 to 2002, providing information on the juvenile progeny of the 1989 to 2001 brood years (see Figure 2). Analyses of the historical results of this project show:

- emergent fry indices increase proportionately with the number of spawners upstream of the trapping site (there is no density dependence) indicating that the habitat does not appear limiting;
- based on hatching time, size at emergence and condition, chinook life-history parameters appear normal; and
- based on the relationship between spawner numbers and emergent fry, and the gravel quality results, the quality of the incubation environment in the upper Nechako River has not shown any degradation over the study years and appears to be stable.

The Technical Committee evaluated the need for the Fry Emergence project and decided that it was not necessary in either 2003 or 2004. The Juvenile Outmigration Project has run annually since 1991, providing information on the juvenile progeny of the 1990 to 2002 brood years. Data is currently being collected on the juvenile progeny of the 2003 brood year (see Figure 3). However, the continuing need for this project is being reviewed annually.

Analyses of the historical results of this project show:

- the timing of juvenile chinook out-migration has been consistent over the duration of the program;
- the number of fry leaving the system is directly and positively related to the number of spawners the previous year (with exception of 2001 which indicated that the record spawner escapement in that year may have over seeded rearing habitats in 2002);
- the numbers of fry rearing in the river as reflected by catch-per-unit effort values are directly and positively related to the number of spawners the previous year; and,
- the numbers of fry produced in the Nechako River have generally resulted in numbers of returning spawners within the values identified in the Conservation Goal.

In spite of uncertainties associated with the considerable variability in rearing conditions that exists external to the Nechako River, the habitat capacity of the upper river, as measured through various indices, has been shown to support reproduction and the early life stages of Chinook salmon at numbers that result in the return of Chinook salmon at the levels of abundance identified in the 1987 Settlement Agreement.

Figure 2: Index of emergence to spawners to 2002

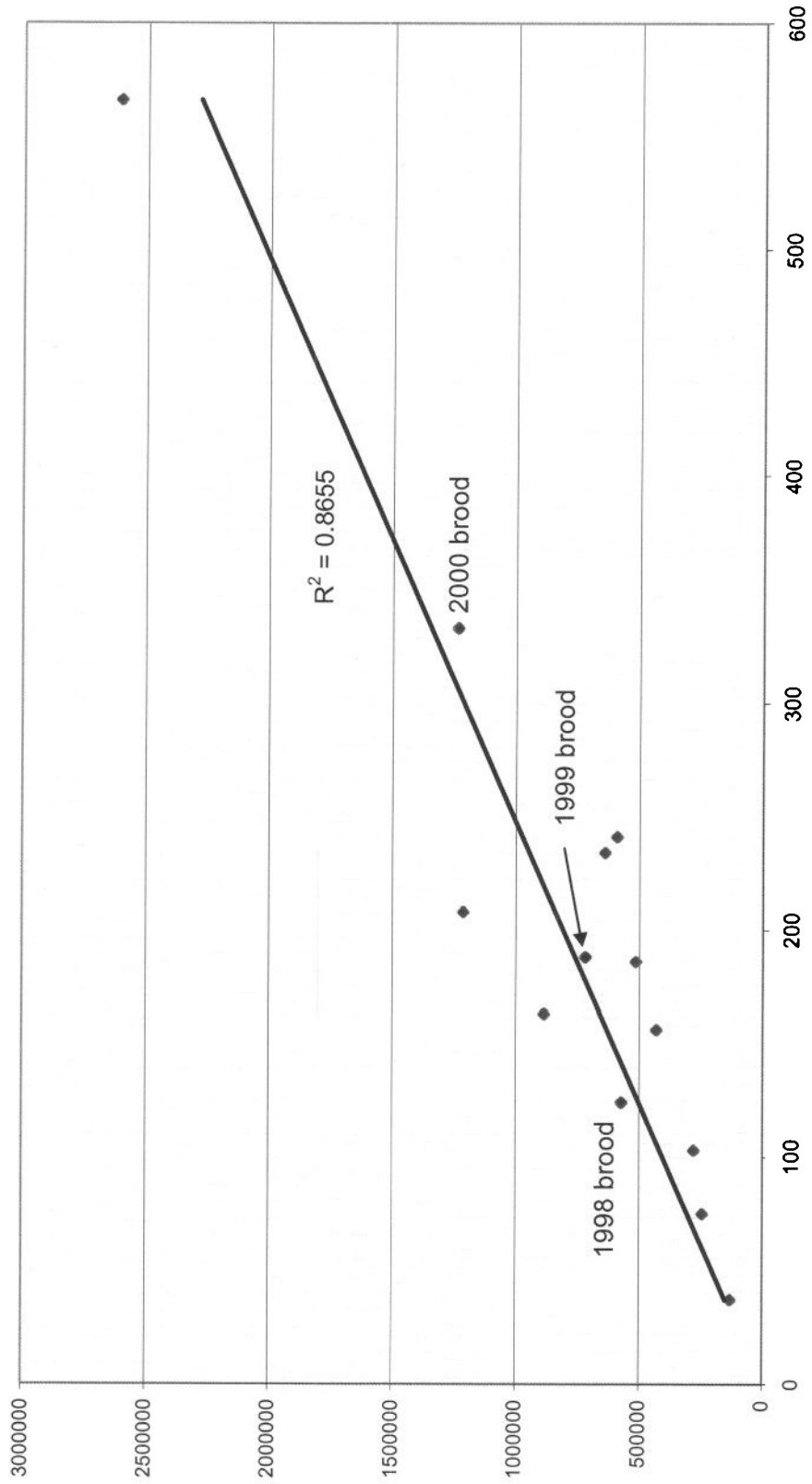
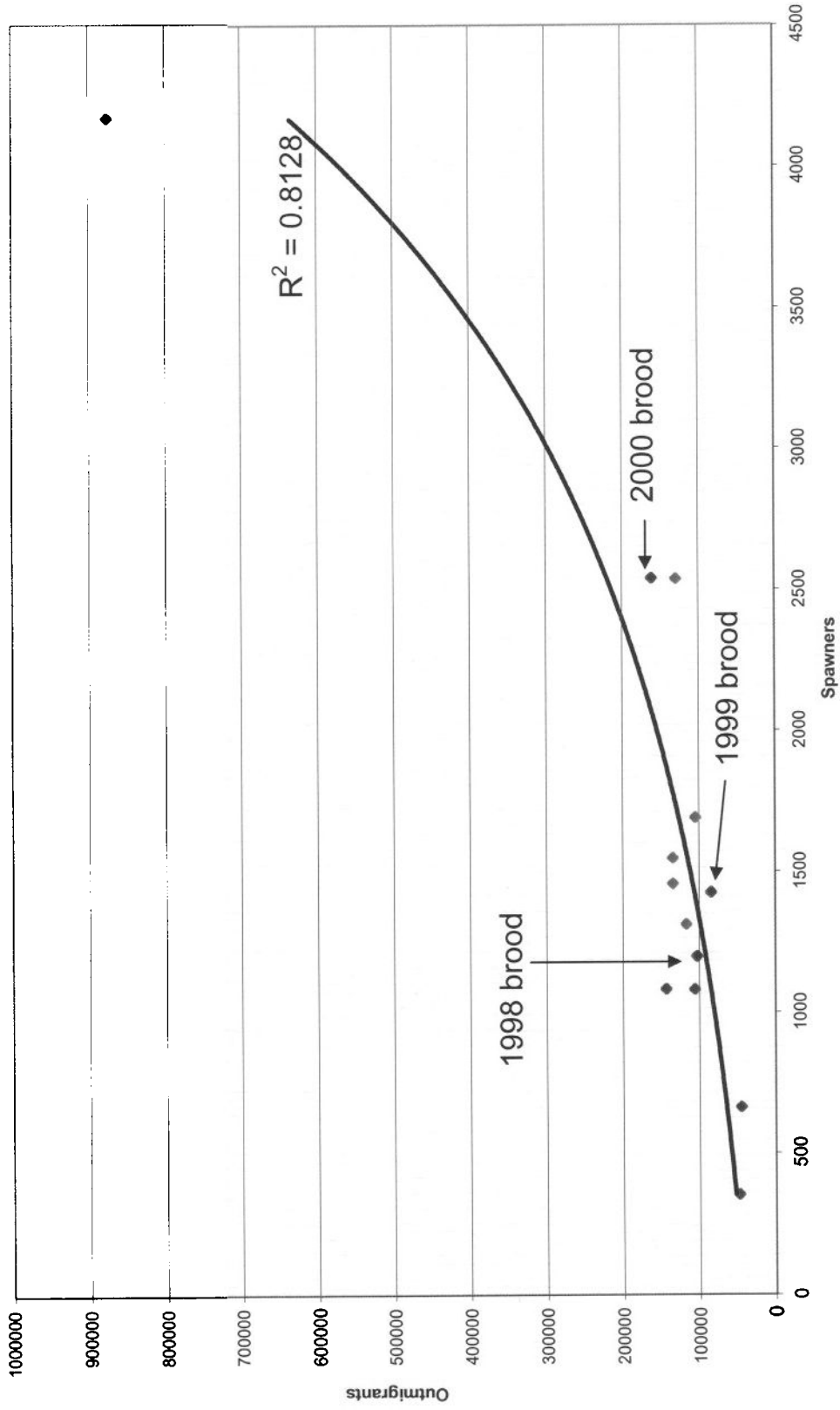


Figure 3: Outmigrants vs Spawners to 2003



Assessment of Need for 2004 Stuart Enumeration Project

The fry and out-migration indices for 1999, 2000 and 2001 (brood years for the 2004 escapement) are consistent with the indices for the rest of the program period (Figures 2 and 3). Additionally, physical conditions in the river (flow, temperature, turbidity) were not abnormal during 1999 to 2001. Thus, the Technical Committee does not expect returns to the Nechako in 2004 to be depressed unless affected by influences outside of the Nechako River (such as the above average water temperatures in the Fraser River during the 2004 upstream migration).

The normal range of production as estimated by fry/spawner and out-migrant per spawner indices, coupled with the fact that flows during these years followed typical regulated values, indicates that spawning and rearing conditions in the upper Nechako were normal in the brood years and that expected returns in 2004 should be normal. Based on this information, if the 2004 enumeration of adult Chinook in the Nechako River results in an escapement less than the minimum target of 1700 identified in the 1987 Settlement Agreement it is unlikely to be a result of in-river habitat conditions.

Based on this logic, it is unlikely that the results of the 2004 Stuart River Chinook Enumeration will be needed and therefore it is recommended that this project not be undertaken.

It is, however, recommended that the carcass recovery portion of the project be undertaken in 2004 for two reasons:

- The age class data that would be collected is directly comparable to data from the brood years – a significant deviation from the normal age structure of the returning adults in either the Nechako or Stuart Rivers would be an indicator of abnormal in-river conditions. A significant deviation from the normal in both the Nechako and Stuart Rivers would indicate that conditions outside of the Nechako had affected the returns.
- In the summer of 2004, water temperatures in the Fraser River during the Chinook migration were several degrees Celsius higher than normal, potentially affecting the health of the returning adults. The data on fish condition, meristics and egg retention by spawning females is needed to evaluate the effects of this event on the returning adults.

Recommendation

It is recommended that the Stuart River Chinook enumeration project be suspended for 2004, and that the need for this project be re-assessed in 2005. It is further recommended that the carcass recovery project on the Stuart River be continued in 2004.

NECHAKO FISHERIES CONSERVATION PROGRAM

A Joint Program of the Government of Canada, Alcan and the Province of British Columbia

NECHAKO FISHERIES CONSERVATION PROGRAM TECHNICAL COMMITTEE

DATE: September 22, 2004

Decision Record (2004/05-3)

3. The Technical Committee has been made aware of the following:
- Releases from the Skins Lake Spillway (SLS) made as part of the Summer Temperature Management Project (STMP) were decreased to 14.2 m³/s late on August 18, 2004 to decrease flow in the Nechako River below Cheslatta Falls from the STMP base flow to the fall chinook spawning flows. The predicted recession of the flow in the Nechako River at Cheslatta Falls required the SLS release to be increased to 30.0 m³/s on September 7 to ensure that the flow in the Nechako River below Cheslatta Falls did not drop below 30.0 m³/s as noted in Decision Record 2004/05-1.
 - The SLS release was maintained at 30.0 m³/s from September 7 to 20, 2004.
 - As noted on the attached calculation sheet, the average flow of 30.0 m³/s is to be released from the Skins Lake Spillway from September 21 to March 31 to ensure the Annual Water Allocation is achieved.

Given the above, the Technical Committee has decided that Alcan be directed to maintain the Skins Lake Spillway release as follows:

- the average Skins Lake Spillway release over this period September 22, 2004 to March 31, 2005 is to be at or above 30.0 m³/s;
- the minimum release from the reservoir is not less than 29.0 m³/s;
- releases from the Spillway to be managed in a manner to achieve release from the Nechako Reservoir of the annual water allocation without having to spike releases in the latter part of the water year; and,

- the running average of the release is to be calculated and reported monthly to the Technical Committee.

for Bryan Nutter
J. Hwang

D. Bouillon
D. Bouillon

E. Petticrew
E. Petticrew

D. Cadden
D. Cadden

Date: September 1, 2004 (2004 is a leap year)
Project: 3515; NFCP Annual Water Allocation - Estimated Winter Base Release *

* NOTE: based on an assumed increase to the spring base flow on April 23, 2004

Annual Average Flow Rate = 36.8 m³/s (as per the 1987 Settlement Agreement)

TIME PERIOD (JD)	TIME (Days)	FLOW (m ³ /s)	Volume (m ³ /s*Days)
Apr01 (92) to Apr23 (114)	23	32.70	752.1
Apr24 (115) to Aug18 (231)	117	53.1	6,211.5
Aug19 (232) to Aug28 (241)	10	14.16	141.6
Aug29 (242) to Sep02 (246)	5	19.20	96.0
Sep03 (247) to Sep06 (250)	4	14.16	56.6
Sep07 (251) to Sep20 (264)	14	30.00	420.0
Sep21 (265) to Mar31 (90)	192	X	192X
	365		7,677.9 + 192X

Annual Volume = 36.8*(365) = 13,432 m³/s*Days = 7,677.9 + 192X
X = 29.97 m³/s (1,058 cfs)

**The Skins Lake Spillway release required to ensure release of the
Annual Water Allocation by March 31, 2005 is 29.97 m³/s (1,058 cfs)**