Hurunui Water project

Document 1 in a series of 5.

Salmon (*Oncorhynchus tshawytscha*): Records, trends and knowledge in the Hurunui River.

Report prepared by Boffa Miskell Ltd

for

The Hurunui Water Project

February 2011

Introduction

A representative of the Hurunui Water Project (Amanda Loeffen) and the project Ecologist (Dr Keesing) met with Fish and Game (Ross Heslop and Tony Hawker) to discuss and confirm aspects of salmon and salmon spawning in the Hurunui River, specifically the South and North Branches of the River relative to their "values" as salmon spawning habitat.

The following records what is an agreed set of facts and statements in regard to the existing knowledge of salmon spawning on the river and ends with the two different opinions as to what the proposed project (particularly a dam on the south branch) may mean for the salmon population on the Hurunui River. Fish and Game have expressed that they wish this memo to come from HWP and not as a joint statement. This is because Fish and Game have already submitted their advice to the committee and while they concur with the factual matter of this memo, it is that material which remains their formal position.

The Salmon Spawning Run.

We are in agreement that the methods of estimating salmon spawning on the Hurunui River are difficult and that the "area under the curve" method (a method using repeated aerial survey data) is not a practical one in the Hurunui (primarily because of cost and logistics). It is also agreed that the current methods employed, a onetime aerial count, is the best method currently useable on the river and it is this method that has largely been employed. The method utilises knowledge of other rivers' counts and the differences between observational counts and "under the curve" calculations as well as on the ground research (redd counts[1] angler catch[2]) to pro-rata the one off aerial counts of the Hurunui. How valid that may be is unknown, but it is accepted that the one off count method cannot account for all of the salmon spawning and an estimated "correction" factor of 2.5 is one which Fish and Game

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[1] Redd counts continue to be undertaken in the Ashburton River system, tributaries of the Rangitata, and the Orari, Opihi, Tengawai, Waihi-Temuka, Waitaki and Hakataramea rivers where they are a very valuable long-term record used as an index of spawning population size.

[2] Typically harvest estimates for larger fisheries have 95% confidence limits that are +/- 30% of the estimate while smaller fisheries may be +/- 100% because of the greater difficulty in contacting sufficient anglers who have fished the smaller rivers.

have applied in light of data from other larger Rivers and which the Author is in no better position to advise upon. .

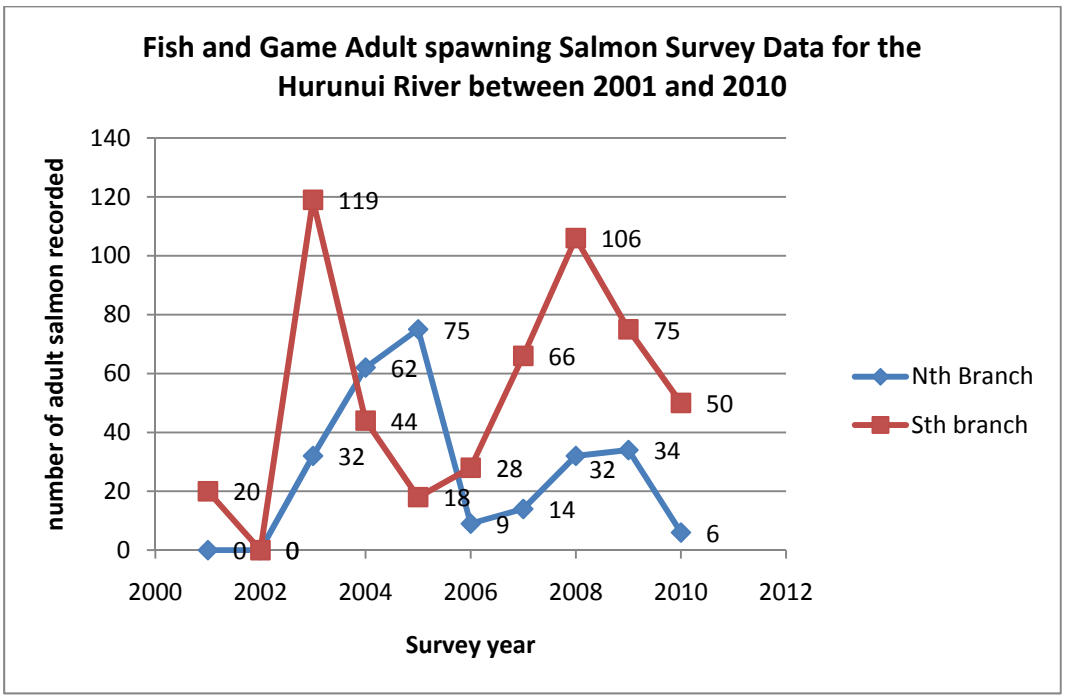
Consequently, although there may be large errors in the estimated spawning salmon numbers in the Hurunui there is no other better available method and neither party has particular dispute with the numbers produced from the estimates.

We agree with the historic statement that “Home Stead Creek” on the South Branch is not a likely salmon spawning site. Fish and Game now, however, observe and consider that the main stem (in the section above the South Branch Gorge – the braided section) is the dominant salmon spawning site on the Hurunui, with around 60% of the total spawning salmon occurring here and the other 40% above lake Sumner (likely in the Landslip creek tributary). The Author has no evidence to refute that statement and has measured and observed potentially suitable gravels for spawning in that reach.

Spawning in a main river stem does have its issues in regard to year to year success. In the 2008-2009 Fish and Game report on Salmon management in North Canterbury (Terry 2009) the author states that in the “Hurunui and Waiau Rivers the majority of the spawning occurs in the main stems and is therefore subject to a higher risk of spawning failure due to flooding which creates greater annual variation”.

The data below (Figure 1&2) and kindly supplied by Fish & Game, records spawning salmon numbers from the onetime aerial count method during the peak of the spawning period throughout the years 2001-2009.

Figure 1. Plot of salmon spawning run numbers from data in Terry 2009 supplemented with 2010 data (also from Fish and Game).



The trend of which branch holds more spawning salmon is not stable, but favours on average a 60-40 split in favour of the South Branch. Furthermore, the numbers of salmon year to year are variable.

A previous statement regarding the salmon run on the Hurunui by Fish and Game stated that the run was between 100 and 5000 (Heslop pers com). This upper range is challenged in that the typical run currently is around 500. Fish and Game concur with this typical run figure and do not suggest that the current run typically numbers in the thousands. It is acknowledged that the historic run (1995-1999) has been much higher and may have been in the low thousands the current run (over the last 10 years has been much less than 1000).

Other river salmon spawning counts have also reported in Terry (2009) and the figures show (for comparative purposes) that:

- the upper Waiau count in 2009 was 310 salmon,
- for Hurunui the count was 109,
- for Rangitata, 7034 salmon,
- for the Waimakariri, 3733,

- for Rakaia, 3945, and
- for the Waitaki 800 returns to the hatchery at McKinnon's Creek.

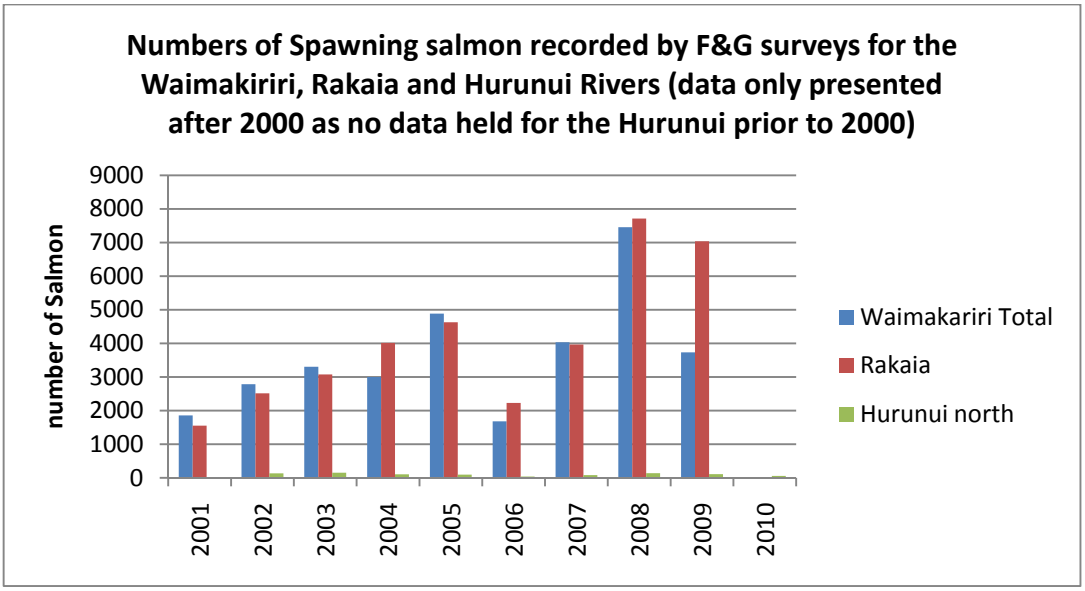
The current estimates are based on the observational count multiplied by a factor of 2.5 plus the angler reports. This gives a typical total salmon run between 2001 and the current time of between 44 and 684 (Table 1).

Table 1 – estimated total salmon spawning run

Year	observation	multiplier	angler harvest	Total Run
2001	20	50	15	65
2002	132	330	113	443
2003	151	377.5	307	684.5
2004	106	265	439	704
2005	93	232.5	268	500.5
2006	37	92.5	128	220.5
2007	80	200	109	309
2008	138	345	441	786
2009	109	272.5	219	491.5

The South Branch spawning run (using the data available) makes up less than half a percentage of the Regions salmon returns. Figure 2 illustrates the differences between two of the top rivers and the Hurunui.

Figure 2



Each year the Salmon reintroduce themselves into the Hurunui River in relatively small numbers. Some (an unknown quantity) of these run fish come from the other east coast rivers. Quinn & Unwin (1993)[3] suggest that perhaps around 4% of fish (from hatchery) stray (the case they refer to is a hatchery release from the Glenariffe on the Waimakiriri). This may mean at least several 100's (if we assume only one young for every spawner returns to sea from the 4 main rivers) stray from their spawning river (i.e. return to a different river) each year. While some Hurunui fish may stray there is a much larger pool of potential immigrant fish to the Hurunui.

Fish and Game rank the top (dominant rivers) as the Rakaia, Wataki, Waimakariri and the Rangatata. The Hurunui, Opihi and Waiau are middle "belt" salmon fisheries. The following rivers are listed on the Fish and Game site as Salmon fishing rivers: Grey, Taramakau, Hokitikia, Waitaha, Poerua, Waiau, Hurunui, Waimakairiri, Rakaia, Ashburton, Rangitata, Orari, Opihi, Waitaki, Moeraki, Clutha.

Salmon Population trend on the Hurunui

We are agreed that the data suggests Salmon fishing success and spawning returns are declining on the Hurunui, but again the pattern is not stable (Figure 3) and that the Salmon run in total is trending downward since the mid 1990s. Currently there is no one satisfactory or solid reason for this trend.

Fish and Game are of the opinion that although the Hurunui run is small compared to the Rakaia, it does attract considerable angler pressure.

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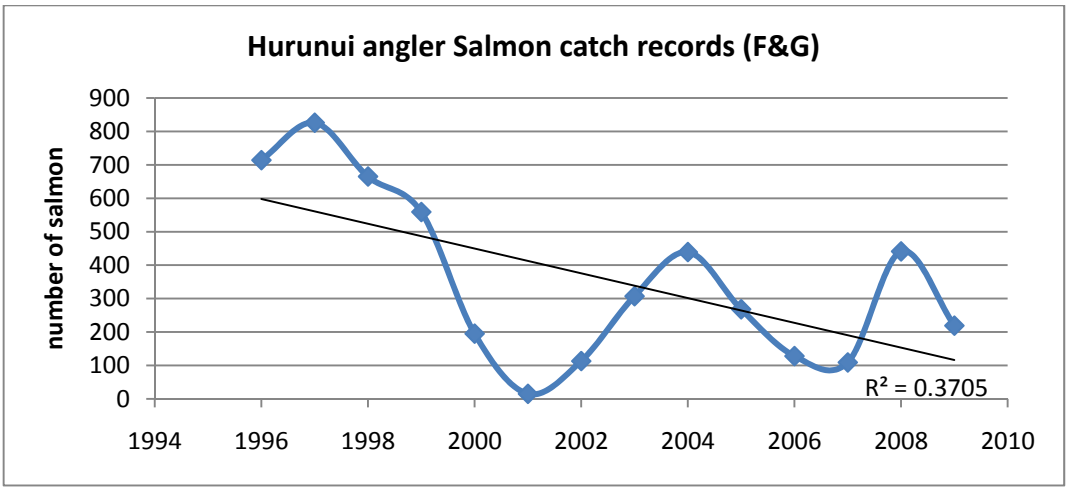
Quinn, T. P., and M. J. Unwin. 1993. Life history patterns of New Zealand chinook salmon *(Oncorhynchus tshawytscha)* populations. Can. J. Fish. Aquat. Sci. 50:1414-1421.,

Figure 3



The effect of a fish passage barrier on the South Branch

Should the South Branch above the gorge be blocked by a dam or other fish pass unfriendly structure there will continue to be the North Branch salmon run. The blocked South Branch run may do one of several things: they may detour up the Esk Head River; they may return to the North Branch and proceed up that branch to spawning sites. But the most likely outcome is that the salmon will congregate at the dam face and die. The overall effect of a salmon obstruction on the South Branch is unclear in regard to the numbers of catchable salmon that will be present on the wider Hurunui River year to year.

It is at this point, the consequence of the loss of perhaps 60% of the spawning run, that Fish and Game and the Author diverge somewhat. We agree that if the loss of 60% of the salmon run occurs every season post dam construction then the salmon run in the Hurunui will trend down much more rapidly that it does currently and in a more direct manner.

The debate is whether that will mean the end of the salmon run in the Hurunui in total.

Following the dam's installation and after the failure of the first run, the unknown is what will the next run do and how large will that be. Will the run entering the river be 60% smaller than the previous years run, or supplemented by other river's fish?

We agree that supplementing the Hurunui run in the absence of access to the South Branch via creation of spawning channels, and / or fry releases has not been proven in New Zealand to be a successful. However, some research in the USA has reported successful introduction of Chinook salmon spawning where it did not occur previously through habitat recreation methods (Merz & Setka 2004).[4] It remains a possibility that areas on the north branch may be so enhanced.

We agree that fencing from stock is one method of enhancing spawning sites, but only where those spawning sites exist. It does not create new spawning sites.

There is a question as to will the spawning fish of the next season (post dam and first season failure) be directed (or choose) the North Branch due to the changed flow regime in the South Branch and if so will they find sufficient spawning grounds in the North Branch (especially in the absence of spawning habitat creation)? Fish and Game consider that they will not or else they would be utilising that habitat now.

The Author considers that there is a chance that the Hurunui population may adapt to the North Branch conditions and that there may be habitat there that is acceptable, if not ideal; that specific enhancements might be successful in supplementing that habitat; and that the loss of the South Branch in any case will only accelerate the trend downwards but not substantively change the ultimate result of diminished (or lost) salmon in the Hurunui. Fish and Game do not share this opinion and consider that with the South Branch intact that the Hurunui salmon fishery can be preserved.

Boffa Miskell LTD

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09.02.2011

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[4] Merz, J.E. & Setka, J.D. 2004. *North American Journal of Fisheries Management* 2004; 24: 397-407