

Addressing Poor Salmon Returns to Canterbury Rivers

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At present, fishery managers only have a limited number of options to try and ensure adequate salmon numbers reach their spawning grounds each year. The key tool which Fish & Game (F&G) have direct control over is the reduction in angler harvest through regulations to ensure sufficient numbers return to the spawning streams to sustain the salmon fishery.

There is an acceptance by F&G councils that we need to significantly reduce the harvest of wild salmon, in order to increase the numbers of fish returning to the spawning streams and rebuild the fishery. While we do not know the minimum number of spawning salmon required to sustain the population in each spawning stream or catchment, we do know that in the last decade salmon returns have steadily declined to record low levels.

A number of regulations to incrementally reduce harvest have been put in place since the 2019/20 season, however introduction of a seasonal catch limit has been recommended by scientists as the least harmful regulation to further reduce harvest and rebuild spawning numbers. It has been noted that it is possible that life history, genetic diversity and population resilience may be adversely affected by shortening the season and areas anglers can fish over long time periods.

Moving towards an adaptive salmon management strategy, identifying minimum escapement targets at river or sub-catchment levels and implementing a model for setting harvest regulations aims to rebuild the fishery, requiring a long-term commitment to quality monitoring. In addition to designing, funding and conducting robust total run size surveys, there is also a need to continue high quality salmon harvest monitoring across F&G regions.

Salmon Spawning & Rearing Habitat

Preserving the pristine state of our spring fed streams and wetlands is critical to ensure ecological values of these areas are protected. In recent years, staff have placed more emphasis on the overall ecological health of the high-country salmon spawning streams, including the wetlands and riparian zones surrounding them. A gradual decline in instream and riparian habitat on some of the streams is likely to have reduced the spawning and rearing habitat quality.

Considerable F&G staff time is also spent each year ensuring sustainable environmental standards are included in local and regional plans, to best protect the variables on land that F&G can have influence over, however many of the factors and variables that are likely to influence salmon survival in fresh water are beyond our control. These include variables such as increased water abstraction, ineffective fish screens and the long-term degradation of habitat and water quality.

Environment Canterbury (ECan) and F&G completed a three-year study in 2017, looking at the differences in instream habitat between various salmon spawning streams in the Waimakariri, Rakaia & Rangitata rivers, investigating whether there were any adverse effects from farm intensification on significant salmon spawning streams. The project included recording in-stream habitat in key spawning streams along a gradient of intensification, recording substrate composition, invertebrate sampling, macrophyte and algae monitoring, along with collection of water samples for chemical analysis. Most streams show near pristine habitats, however this data provides an essential baseline for reference in future years.

Joint monitoring of key streams has been ongoing since then, which should determine what, if any modifications to plans are needed to achieve desired environmental standards. Monitoring also provides a valuable opportunity to involve the landowners when gathering data, enabling long term data sets to be collected for greater understanding of the issues. This helps ensure that local changes to land use can be suggested when required. The relationships that have been carefully developed with these landowners are critical to achieving changes in land management practice that we are increasingly realising will be required to improve and aid salmon recovery.

ECan published a report on this monitoring in August 2018, “High country spring-fed streams: effects of adjacent land use” (<https://ecan.govt.nz/data/document-library/> type in the keywords “high country”). The report indicates that farming has an impact on stream health even when riparian buffer zones exist, by showing that detrimental effects on some of the stream invertebrate and periphyton communities can occur with only small elevations of nitrates and sediment.

Early indications show that while most streams are in their natural and pristine states, some are showing early signs of habitat and water degradation. A decline in riparian habitat on some of the streams has reduced the rearing habitat. This is likely to have resulted in reduced spawning success (lower % of fry hatch / emergence survival). Reduced ecosystem health and food (invertebrate) abundance may also stimulate premature migration of many juvenile fry from the relative safety of these streams. During most years, major spring floods are common, and therefore most of the salmon that are forced to migrate out of the spring creeks earlier than desirable. Here they are not strong enough to swim against the currents and they are forced downstream and out to sea before they smoltify at around seven grams, the size at which they need to be to make the salt-water transition, subsequently dying.

This habitat protection continues to be a key focus for F&G and a number of stream protection projects have already been completed, including;

1. Winding Creek

Winding Creek is an important salmon spawning stream for the Waimakariri River salmon fishery. The Winding Creek Restoration Project was a collaborative effort between F&G, ECan and lessees to protect a large wetland and stream margin. It was project managed by F&G.

Stage 1: Winding Creek Wetland Fencing

Funding:

Selwyn Waihora Zone Committee grant: \$33,000 plus GST (\$37,950).

Selwyn District Council granted \$3,000 (incl GST).

Fish & Game contribution \$15,250 incl GST.

Fish & Game contribution to cost overrun = \$750.

Stage 2: Winding Creek springs and stream riparian fencing

Funding:

Fish & Game received \$35,000 (\$29,555 incl GST) for stage two from the Selwyn Waihora Zone Committee.

NZ Salmon Anglers Association: \$5000 for spraying

Granted \$5000 for spraying from SNF in 2014

Granted \$3500 for spraying from SNF in 2016 (had \$1500 left from last SNF grant)

Further funding:

In 2021 Fish & Game committed \$2,000 to go towards weed control in the wetland area.



Winding Creek Fencing 2018

2. Lake Pearson/ Craigieburn Stream Restoration Project

The Lake Pearson/ Craigieburn Stream project was a collaborative project between DOC, Fish & Game and Flock Hill Station to protect the lakefront of Lake Pearson and Craigieburn Stream. It was project managed by Fish & Game

Funding:

The Selwyn Waihora Zone committee granted \$25,000 towards fencing.

The Department of Conservation (Waimakariri Area) paid \$12,650 (incl GST) to Fish & Game for this project.

3. Glenariffe Stream Restoration Project

The Glenariffe Restoration Project is an ongoing project to protect a spring-fed system that contains important salmon spawning grounds. Many projects have already been completed and many are in the pipeline. Fish & Game have worked with landowners and ECan on these project as well as landowners.

On Glenariffe Station

Stage 1: Fencing of the true left of the Glenariffe mainstem

Fish & Game put in \$4,500 Rakaia River Promotions put in \$4,500.

Stage 2: Fencing of true left of the Glenariffe main stem

The Ashburton Zone Committee granted \$18,000 (\$20,700 incl GST) towards project costs of materials and labour.



On Glenaan Station

The Glenaan Project involved establishing stock exclusion fencing around two wetlands and spring-fed streams in in the Glenariffe spring-fed system. A protective covenant was placed on the protected areas by QE11.

fence = 830m. Area included = 2ha wetland and 0.35ha riparian strip downstream of wetland given 7m average buffer width.

fence= 1600m. Area includes 5.8ha for retirement and 1ha riparian strip given 7m average buffer.

fence = 1450m. Area includes 2.5ha wetland and 0.3ha riparian strip downstream of wetland given 3m average buffer width either side of Muddy Stream.

fence = 850m. Area includes Area includes 0.15ha riparian strip given 3m average buffer width either side of Muddy Stream

Summary of funding by project tasks (gst exclusive)			
Project Tasks (in order of priority)	Environment Canterbury Funds*	Funds from other sources* (incl. in-kind)	Totals*
fence (830 m at \$16.5/ha)	10,695	\$2,500 (Fish & Game) \$500 (In kind Labour 20 hours @25/hr) \$4000 (in kind land retirement of 2ha based on 20 year contract and income of \$100/ha)	13,695
fence (1600m)	18,425	\$5,000 (Fish & Game) \$500 (In kind Labour 20 hours @25/hr) \$11,600 (in kind land retirement of 5.8 ha based on 20 year contract and income of \$100/ha)	23,925 (Actually \$26,400)
fence (1450m)	Yet to be confirmed	Yet to be confirmed	23,925
fence (850)	Yet to be confirmed	Yet to be confirmed	\$14,025
Totals			\$64,363

Fish & Game have put in: \$5,560 (excludes GST)

ECan have put in: \$14,000 (excludes GST)

QE11 have put in: \$6,500

Landowner \$2,000

4. One Tree Swamp

In 2016 Fish & Game obtained funding from the Selwyn Waihora Zone Committee to fence off One Tree Swamp. Fish & Game as well as the landowners put some funding into to the project which was expanded to fence off a section of the true left of the Waimakariri River.

Funding (excl GST)

SWZC: \$12,000

Fish & Game: \$13,000

Mount White Station: \$13,000



One Tree Swamp in 2019

5. Otukaikino Restoration Project

This was a collaborative project led by Fish & Game that involved funding from DOC, QE11 Trust and ECan. It involved fencing out stock, planting natives, weed control and the establishment of a QE11 Covenant.

Stage 1: Fencing true left of the Otukaikino below the Scout Den.

The Biodiversity Condition Fund granted \$29,934 (incl GST) over two years towards fencing and planting.

Stage 2:

Fish & Game received \$20,000 from the Christchurch West Melton Zone Committee and \$7000 from QE11.

Recent Funding:

In 2019 Fish & Game obtained \$10,000 for landowners to help with weeds along the Otukaikino.



Otukaikino plantings in 2018

6. Wairarapa Stream Sand Wand

Fish & Game, in a joint project with the University of Canterbury, obtained funding from Pub Charity and ECan to buy a machine that clears silt from the stream and carried out an initial project on the Wairarapa Stream.

Pub Charity Granted \$8,225.09.

UC put in around \$4,000

ECan: \$20,000



In addition to the above projects managed and partially funded by F&G, a number of landowner funded projects have also been completed through negotiations with landowners including:

Fencing/retiring and protecting a 250ha wetland, The Hydra Waters, in the Rakaia headwaters.

Fencing/retiring and protecting a 70ha wetland in the Glenariffe Stream in the Rakaia headwaters.

Destocking of Manuka Point Stream in the Rakaia Headwaters.

Fencing and destocking a 5ha wetland in the headwaters of Cora Lynn Stream in the Waimakariri River catchment.

Commercial Fishing

F&G often gets complaints from anglers blaming commercial trawlers for catching salmon. In the 1980s this was a significant factor, with large numbers of salmon caught at sea as by-catch on large commercial trawlers targeting red cod and barracouta. This resulted in conflict with amateur anglers and in 1988 the government responded by closing the Salmon Conservation Area (SCA, the main area off Banks Peninsula where salmon congregate before returning to East Coast rivers to spawn) to large commercial trawlers from early December to mid-February.

In 1991 the "Salmon at Sea Agreement", an agreement between the Ministry of Primary Industries (MPI), F&G and the commercial sector was reached, which has taken the profit out of specifically targeting salmon, with 80% of the money from the sale of salmon caught at sea taken as a levy by MPI and paid to F&G. The result of this is that commercial operators now regard salmon as an unwanted by-catch. The number of salmon caught by trawlers has now become insignificant and is only a minor concern for F&G Councils.

Trawlers are now also required to GPS plot each trawl they make, with records supplied to MPI and many of the boats are now required to have monitoring cameras on board. In years when salmon are more abundant, trawlers do catch greater numbers, however, in both good and bad years, this catch is now reported to us and is considered to be a very small proportion of the total salmon run on the East Coast.

Contrary to popular belief, boats seen trawling past river mouths rarely catch salmon, as they are trawling too slowly, and are targeting other species such as elephant fish and flatfish. It is only the larger boats trawling at greater speeds that have a real chance of catching salmon and even then, usually only in specific areas at certain times of the year, with key areas now under restriction.

People often also assume that foreign trawlers are coming in at night and catching the salmon. There were reports of this occurring many years ago, but modern technology now allows accurate monitoring of who is fishing in the New Zealand economic fishing zone.

F&G often receives anecdotal reports that large quantities of wild salmon have been caught off the Canterbury coast and landed by commercial trawlers. In the 2018/19 season, there were a few tonnes of salmon landed by the commercial sector, however, investigations showed a large number of salmon had escaped from a commercial salmon farm in Akaroa Harbour that season and from their uniform size and fin wear from nets, it was easy to determine that these were the salmon being landed.

There are only a limited number of boats allowed to fish for salmon in the SCA, where there is a maximum of 5,000kg salmon by-catch permitted each year amongst the parties who originally signed the Salmon at Sea Agreement.

Since the 90's there has been a continued decrease in the number of vessels operating in the SCA. 32 vessels historically reported salmon catch, however, in the last few years only six vessels have.

Reports from the commercial fishing operators show that the last few seasons have been very poor seasons for red cod, barracuda and blue warehou, the three main quota species which tend to have similar abundance patterns as salmon, with commercial operators pointing to ocean temperatures as a strong indicator, which has been 2 – 3 degrees warmer than usual in recent years.

Salmon loss from rivers through ineffective fish screens

There is a high demand for in-stream flows in Canterbury to be diverted for irrigation and continuing development of new irrigation schemes requiring increasing quantities of water.

For some time, F&G has expressed concerns to ECan and local bodies about the state and effectiveness of existing fish screen designs and their operation in Canterbury, as well as their maintenance and compliance with consent requirements. Appropriately designed fish screens are necessary to prevent the loss of sports fish such as chinook salmon, brown trout and rainbow trout to water diversion schemes.

A review of fish screens in North Canterbury by F&G in 2004 identified a number of issues with the majority of operating fish screens. The review confirmed F&G's view that the design and maintenance of almost all of the operating screens did not conform to current best international practice.

Most of the fish screens in Canterbury were designed and installed prior to the completion of overseas scientific work on fish screen design and the subsequent development of guidelines and standards, with a full set of guidelines produced by NIWA & F&G for ECan in 2006.

Even on screened intakes (e.g. Amuri scheme), fish rescue operations yield in excess of 1,000 sports fish each year. The design of any fish screen should be such as to enable migrating and resident fish, safe passage past the structure. A successful fish screen requires various criteria to be taken into account at the design stage, with all individual parameters required to ensure the effectiveness of the screen.

F&G has continued to work with ECan to ensure their compliance and monitoring staff are familiar with the various parameters required for fish screens to work effectively. This has however not resolved the issue of the majority of existing screens, with most consented water takes continuing to operate inefficiently, with ECan struggling to comprehend how to legally address the consents with varying conditions imposed.

More recently during the 2019/20 irrigation season, ECan staff monitoring 30 of the significant screens in Canterbury against the NIWA guidelines, alongside consent conditions. The monitoring shows nearly all screens failed to meet the NIWA guidelines and were ineffective at screening salmon and returning them to their source river.