

20 July 2022

Rasmus Gabrielsson  
Chief Executive North Canterbury Fish & Game  
595 Johns Road,  
Harewood, Christchurch 7400

Dear Rasmus,

#### *Purpose of this letter*

This letter outlines the key risks that releases of hatchery reared (commercial strain) chinook salmon smolt pose to wild salmon populations in New Zealand, specifically within the context of the Waimakariri River salmon fishery. The letter has been circulated among salmonid experts within NZ and overseas who have signed it to indicate their agreement with its content.

#### *Background*

Prior to 2019, the Salmon Smolt NZ farm (Kaiapoi, North Canterbury) has undertaken annual releases of salmon smolt at its Silverstream hatchery outlet, on a tributary of the Waimakariri River. These commercial strain chinook smolt are surplus to requirements for supplying South Island salmon farms where the fish are grown for the commercial market. Anecdotally, around 50 to 200 thousand smolt have been released per year. Releases have likely occurred annually over multiple preceding decades. However, reliable release and return records are not available.

Since 2019, North Canterbury Fish & Game Council (NCF&G) has requested that the Salmon Smolt NZ farm stops releasing excess smolt to reduce the potential for interbreeding between commercial-strain and wild salmon. This request is in line with F&G's national policy on commercial origin salmon releases and NCF&G decommissioning their own salmon smolt hatcheries to protect the genetic integrity of wild chinook populations.

Some salmon anglers are concerned that stopping the Salmon Smolt NZ releases has been, or will be, detrimental to the salmon fishery in the Waimakariri River. In particular, anglers have noticed declining catch rates at the popular McIntosh's rocks salmon fishing area, near the confluence of the Kaiapoi and the Waimakariri Rivers.

#### *Potential risks of the Silverstream smolt releases*

I acknowledge that stopping the Salmon Smolt NZ releases will probably contribute to reduced salmon angling opportunities around the confluence of the Kaiapoi and Waimakariri rivers, at least in the short term. Over the long term, if the Waimakariri wild salmon population recovers, greater abundance of wild fish may at least partially compensate for the cessation of hatchery returns. Allowing the continued release of commercial strain salmon risks impairing the viability of the wild Waimakariri River salmon fishery. In my review of F&G's national hatchery practices, I discuss in detail the research on the risks that hatchery-reared salmon can pose for wild fisheries. That report can be found here: <https://fishandgame.org.nz/dmsdocument/1418>.

The South Island East Coast salmon fisheries are under unprecedented stress from a combination of water abstraction, nutrient and fine sediment pollution, intensification of high-country farmland, high harvest rates and increasing river and ocean temperatures. This is not a time to be exacerbating pressures on wild populations by introducing commercial strain salmon.

By way of analogy, commercial strain salmon are equivalent to battery farmed chickens. Commercial strain salmon have been selectively bred for traits that suit market demands and enable them to thrive in the benign environment of commercial fish farms; traits such as rapid growth, high aggression, and lack of fear of predators. These salmon are not well adapted to cope

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with the complex challenges provided by dynamic braided river systems and the Pacific Ocean. However, if enough fish are released (i.e., 100's of thousands) then some 10's to 100's of fish will return as adults to spawn—potentially interbreeding with wild fish and passing on traits that will reduce the survival chances of their young. While the Kaiapoi River is located in the lower catchment, an unknown portion of the returning commercial strain salmon may continue to headwater spawning areas. Typically, around 10% of returning wild salmon 'stray' to spawn in areas that are not their natal origin streams. Hatchery-origin fish can display a higher degree of straying than wild fish.

A large body of international research has demonstrated that allowing commercial strain salmon to interbreed with wild fish can greatly reduce the survival rates of individual young, and that these effects can accrue over time to reduce the productivity of entire salmon populations. Closer to home, a decade of research undertaken at the Glenariffe research station by Martin Unwin (NIWA) and scientists from the University of Washington showed that the various East Coast braided river salmon populations display specific adaptations in response to differing catchment conditions. Furthermore, there is a four-fold 'home court advantage' in terms of survival rates for fish that rear within the same river as their locally adapted parents (i.e., salmon smolts which had been spawned and released in their river of origin had four times higher survival (return rates) than when they were released in a different river). It is this process of local adaptation that stabilises and maintains the productivity of salmon populations. This adaptation process can be put at risk by the release of hatchery, and especially commercial strain, salmon.

In short, large-scale releases of commercial strain hatchery reared salmon smolt into *any* system already containing self-sustaining wild populations can:

1. Introduce domesticated fish genetics to the wild population, retarding the process of local adaptation and reducing overall population fitness,
2. Reduce resources for wild salmon through competition (for example, within the limited area of the Waimakariri freshwater ocean plume, which is a crucial habitat for smolt transitioning to salt water),
3. Attract aggregations of predators (e.g., kahawai) which may increase predation on wild smolt,
4. Increase disease and parasite risks to the wild population; rearing high densities of salmon within confined hatchery spaces inevitably results in increased biosecurity risks.

In addition to the issues outlined above, returning adult commercial-strain salmon may attract wild-run salmon to spawn in the Kaiapoi River system. Spawning by salmon within this tributary is unlikely to be successful. Nitrate-nitrogen concentrations within the Kaiapoi catchment surface water are now around 4-6 mg/L (5-year median values from the Ohoka, Cust and Kaiapoi water quality monitoring sites, LAWA<sup>1</sup>). These nitrate-nitrogen concentrations are around twice the threshold value of 3.2 mg/L, above which mortality rates increase for chinook fry. This tributary is likely a 'population sink' for salmon. Any spawning by wild salmon that occurs there will draw down the recruitment potential of the population. In general, measures that encourage salmon to by-pass the polluted lowland spring creeks in the Canterbury plains, and encourages spawning within the cleaner headwater areas, may help population recovery.

In summary, the cessation of the Salmon Smolt NZ releases will probably reduce catch rates around the McIntosh's rocks fishing area in the short term. However, these releases were likely putting the long term productivity and viability of the wider Waimakariri River wild salmon population at risk. NCF&G's previous approach to managing the braided river chinook salmon fisheries was focused intensely on decades of hatchery releases. This approach failed to prevent, and potentially contributed to, recent population declines leading to historically low salmon runs. Both NCF&G and the Central South Island F&G Council are now focusing on managing harvest rates to ensure enough wild salmon reach the headwater spawning grounds to maintain and grow the population. In addition, initiatives are underway to protect and expand spawning and rearing habitats in the high country. I encourage anglers and councilors to support this new coordinated management direction, which is scientifically sound. In my opinion this will be the best approach to preserve and enhance these unique and precious fisheries.

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<sup>1</sup> <https://www.lawa.org.nz/explore-data/canterbury-region/river-quality/waimakariri-river-catchment/>


Yours sincerely



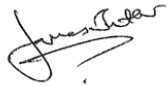
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