Potential Risks Associated with the Reinstatement of the Cowichan River Steelhead Hatchery Program

I am an avid steelhead fisherman, and therefore have a vested interest in the viability of the Cowichan River steelhead population. I have been fly-fishing the Cowichan for the past 14 years, but over the past 10 years it has been the winter steelhead fishery that provides me with the most anticipated and enjoyable angling experience. I may catch a dozen fish over the course of a season, but every one of them is hard-earned and memorable. I am also a fish and wildlife biologist, which means I generally rely on science and proven fact to interpret what is occurring in our natural world.

When the provincial government decided to suspend the steelhead hatchery program in 2007 (the last smolts were released in 2008), I was somewhat relieved and thankful that the government was moving away from hatchery augmentation, which has been a significant component of the traditional management of fisheries over the years. There can be absolutely no argument as to the main reasoning for discontinuing the hatchery program on the Cowichan River: survival from hatchery smolt to adult was consistently below expectations. As a result, the occurrence of hatchery-raised fish in the recreational fishery was extremely low over the course of the hatchery program, with wild fish always dominating the catch. My own personal experience supports this fact, as I have never encountered a hatchery fish over the years of fishing for steelhead on the Cowichan. It is also not difficult to understand the lack of return on the hatchery investment; why continue a relatively expensive enterprise that is operating at a low success rate. Retention of hatchery steelhead was also shown to be low on the Cowichan River, with only a handful of hatchery fish being retained out of those captured.

Based on the lack of success of the steelhead hatchery program and the fact that it was not helping to sustain or enhance the angling opportunities in the river, the government allocated hatchery rearing capacity to the production of catchable-sized rainbow trout for release into stocked lakes. This would appear to be a better use of resources, based on the fact that the Cowichan River hatchery steelhead program was not reaching the objective of providing any measurable increase in steelhead numbers or angling success. Increasing the numbers of fish available in lakes that are already managed on a "put and take" basis makes biological sense, while also increasing recreational fishing opportunities.

I am concerned about the recent petition that is circulating throughout the angling community that supports the reinstatement of the Cowichan River steelhead hatchery program. I am unsure as to the justification for this proposal, as I have seen no scientific evidence or data that supports the release of hatchery steelhead into the Cowichan River. As discussed, the fact that the hatchery steelhead simply returned in much lower than expected numbers throughout the operation of the hatchery cannot be argued. The fact that these fish did not, therefore, contribute significantly to the recreational catch of steelhead on the river also cannot be argued. I read the note on the petition that stated that the steelhead numbers on the Cowichan have "plummeted", with the inference being that reinstating the hatchery would boost the numbers of fish returning. I will provide more detail on this topic, but I believe that it has been proven in the scientific literature that the release of hatchery fish does not necessarily result in the return of more fish to a river.

I am also unsure as to the accuracy of stating that the steelhead numbers have "plummeted" – is this statement based on actual numbers of fish, personal angling success, or an apparent low number of returning steelhead this season (2013-2014)? I am in no doubt that there are less steelhead than usual in the Cowichan River this year, but I don't believe we can use one year on which to base our opinions. A significant factor that has the obvious potential to reduce the numbers of steelhead returning is the

placement of nets that specifically target steelhead in the lower river. With the relatively low river conditions over the majority of the winter, the nets would have been much more effective at capturing steelhead this year. Without having an idea of numbers of fish taken as a result of this "fishery", it is difficult to ascertain the overall effect on the population. It is not beyond the realm of possibility, however, that an increased effectiveness of the netting operation this year had a significant impact on the number of returning fish.

The last meaningful return of hatchery-origin steelhead to the Cowichan River would have been in 2010, with less in 2011 and even less in 2012. From my journal entries and through correspondence with other anglers, I remember both 2011 and 2012 being "good" years, which seems to show that fishing was good despite there being no appreciable return of hatchery-origin fish during those years. Reviewing steelhead fry abundance counts in the river provided by the provincial government, it can be seen that numbers of fry seem to have been increasing since 2008, with relatively high counts in 2011, 2012 and 2013, during years when the relative proportion of hatchery-origin fish would be decreasing in the system.

I believe that the vast majority of anglers these days are not interested in retaining steelhead, with the new ideology being more of a catch and release philosophy. I know there are anglers out there who relish the opportunity to have the ability to retain a steelhead, but I am in no doubt that these anglers are few and far between. To have a naturally resilient, viable wild steelhead population that provides angling opportunities into the future has to be the main management objective, as opposed to catering to a few anglers who want to retain a steelhead.

With the proposal to reinstate the steelhead hatchery program on the Cowichan River, it is worth discussing the potential risks that have been studied regarding the interaction of hatchery fish with a viable wild population. If we are indeed experiencing a decline in the numbers of steelhead returning to the Cowichan River, then the release of hatchery fish into the system may actually be counter-productive to the natural ability of the genetically-unique population to rebound or cope with natural (or human-related) pressures. It has been well documented in the scientific literature that there are inherent risks to wild populations associated with the release of hatchery fish. For example, there is a proven tendency of some hatchery-released smolts to fail to migrate to the ocean, which has been shown to occur in numerous systems, including the Somass, Stamp and Sproat rivers, and the Seymour and Chilliwack rivers (Ward 2006; Ward and Slaney 1990; Slaney and Harrower 1981). These relatively high numbers of residual fish in a system can compete with wild rearing juveniles for food and habitat, with direct predation on juvenile fish also being a negative impact. Residual fish that survive over the summer months can breed with wild adults the following spring (Ward 2006). Internal and external morphological and behavioural differences have been noted between residual hatchery-origin smolts and wild smolts, with associated potential life history and genetic impacts (Walters 2005).

Recruitment of wild fish has been shown to be negatively impacted as a result of the presence of hatchery fish (e.g. Ward 2006; Walters 2005). In an extreme case, *i.e.* when natural recruitment to the population is very low, hatchery fish could potentially replace the wild population, where the resulting population would be at a much lower abundance, based on the fact that the reproductive success of hatchery fish from which the population originated is inferior (Ward 2006). At this point in the discussion, I need to refer to the Stamp River system, which has been associated with a significant hatchery steelhead program over the years. It appears that the numbers of returning fish have been very low over the past couple of seasons on the Stamp. It is not unreasonable to assume that the natural genetic integrity and survivability of that stock has been affected as a result of years of intensive hatchery operations, and that the low returns may be attributed to the lower survival of hatchery fish, which are less able to cope with external forcing factors (be it as a result of lower fecundity, lack of fitness, or lack

of natural adaptation to the habitat variables). As a result, it may be difficult for that population to now rebound naturally, as the resilience of the population has been effectively "diluted" by the historical presence of hatchery fish in the system. This example appears to fit with the findings presented by Ward (2006) discussed previously. Without the history of the hatchery on the Stamp system, it is likely that the wild population of fish would have been much more resilient to any negative impacts to the population. Coupled with low numbers of returning fish, there have also been hatchery-related problems associated with disease in the Stamp river hatchery operation, which is an inherent risk when keeping fish in closed containment systems typical of hatcheries. There is always the risk of disease being transported from hatcheries into the adjacent natural system.

The life history of steelhead is such that populations can be stable during years when relatively few adult fish return. This is related to the fact that there is less competition for food and habitat, and more juveniles survive as a result. It does not take many spawners, therefore, to "seed" the system to its natural maximum carrying capacity. In years where more steelhead return to spawn, the same carrying capacity would be reached, as survival of juvenile fish would be limited accordingly by the capacity of the habitat.

Steelhead are naturally equipped to deal with events that decrease the numbers of returning fish, based on the fact that steelhead have the ability to spawn more than once (10% to 20% of returns can be from repeat spawners) and have a diverse life cycle, with 1 to 5 years spent in freshwater and 1 to 3 years spent in saltwater. Based on the overlapping generations of steelhead, a population can recover quickly from a very low return year through younger or older age classes (Ward 2006).

Wild steelhead populations are inherently adapted to their natal system. These adaptations help to ensure the long-term viability of any given population. Raising fish in a hatchery takes away the ability of fish to become naturally adapted to the specific life-requisites needed for survival in a particular stream. Artificially raising fish removes the process of natural selection, while also preventing the natural ability of steelhead to distribute naturally throughout a system, based on fidelity to successful spawning and rearing areas. Ward (2006) noted lower fecundity in female hatchery fish in comparison to wild fish, which obviously suggests lower spawning success. Wild steelhead have also been shown to display specific behavioural adaptations that ensure survival of the population; such traits can be lost in the artificial rearing environment of a hatchery.

To summarize, it is very unlikely that the reinstatement of the Cowichan River hatchery program will result in any measurable increase in the steelhead population in the river. In addition, it is unlikely that the release of hatchery steelhead will increase angler effort or the potential for recreational angling opportunities. As has been shown in the scientific literature, the very introduction of hatchery fish to a system may actually impede the natural ability of a population to recover and to be viable over the long term. We cannot risk losing the unique behavioural traits and genetic integrity of the Cowichan River steelhead, especially if the population is currently under stress from external forcing factors. It is at these times that we need to rely on the natural resilience of the population to allow the numbers to rebuild naturally, instead of introducing another factor that may impede that process. During lower return years, it may be tempting to put more fish into the system, but it has been shown that this activity does not necessarily result in the return of more fish, and we run the risk of negatively impacting upon the long term viability of the steelhead population.

Instead of fighting for the implementation of a hatchery program, the angling community needs to work together with conservation groups, First Nations and government agencies to ensure that as much as possible is done to increase the survival and natural recruitment of the steelhead population. Habitat enhancement activities, which encompass both the river and estuarine habitats will help ensure optimal conditions for steelhead productivity, while also benefitting all fish and wildlife throughout the Cowichan River corridor and estuary. We also need to work towards ensuring that appropriate enforcement

management is applied to the fishery, which is consistent throughout all user groups. For example, the direct capture of adult steelhead in gill nets placed across the lower river is an example of an activity that must be curtailed, as this has an obvious direct impact on the number of fish returning. In addition, anglers must practice proper catch and release techniques, to ensure the survival of fish that are returned to the river. I have seen too many photographs of steelhead hoisted up out of the river and being held high for the camera over a drift boat, or have witnessed fish being kept out of the water for too long.

I am hopeful that all stakeholders can work together to help preserve the unique angling opportunity that is represented by the Cowichan River steelhead. I am also hopeful that the appropriate government agencies will stand by their original decision to discontinue the steelhead hatchery program and that we are able to continue to fish for a truly wild fish that is absolutely adapted to its natural environment. The future is uncertain, but we need to ensure that the steelhead population is as diverse and resilient as possible to allow it to remain viable over the long term.

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