Bulkley River Wild Steelhead Catch-and-Release Project
Preliminary Results 08 May 2017

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Rationale

Steelhead trout are one of the most iconic salmonid species. Their spawning migrations often span several hundred's of kilometres resulting in considerable energy expenditure during their spawning cycle (Penney and Moffitt, 2014). This severe energy depletion as well as a change in feeding behaviour during their reproductive cycle may make steelhead particularly susceptible to human-induced stressors that result in fish incurring additional energetic costs. Previous research has highlighted the influence of warm water temperatures (Wade et al., 2013), habitat degradation (NRC, 1996), water pollution (Suttle et al., 2004) and fisheries interactions (Andrews and McSheffries, 1976; Stewart and Lewysnky, 1988) on steelhead populations. Although commercial fisheries for salmon have been associated with significant by-catch mortality of steelhead (J.O. Thomas & Associates LTD., 2010), little is known about the impacts of recreational angling practices on steelhead physiology, behaviour, and survival (but see Nelson et al., 2001 for example with hatchery steelhead).

Given the widespread decline of wild steelhead populations, recreational fisheries for steelhead are primarily catch-and-release, including in the famed run of the Bulkley River, BC. The success of catch-and-release as a conservation tool is based on the premise that released fish survive and do not suffer fitness consequences following the capture event (Cooke and Schramm, 2007). Differences in morphology, life-history strategies, and metabolism can result in inter-specific responses to catch-and-release, emphasizing the need for species-specific evaluations of catch-and-release (Cooke and Suski, 2005). Given that angler behaviour can have dramatic influences on the outcome of catch-and-release angling opportunities, research specifically focused on wild steelhead has the potential to identify opportunities for refining handling practices to ensure the best outcome for the fish.

Our Approach:

We worked along-side volunteer anglers on the Bulkley River to tag and blood sample wild steelhead. The duration of the angling event was accurately timed, and we measured where the fish was hooked, how difficult the hook was to remove, as well as other relevant site variables (see below for full list). After hook removal, fish were held out of water for 10 sec, 30 sec or kept submerged (0 sec), creating three different air exposure groups. These fish were then either blood sampled (~0.4mL of blood) to measure physiology or tagged with a radio telemetry transmitter to monitor movement after release. Blood was sampled for glucose, lactate, and pH as indicators of stress related to the angling event. We also blood sampled steelhead from Moricetown Falls immediately after they were caught via dipnet (<3mins). Since blood samples were obtained quickly, the stress of the dipnet

Taking a small blood sample from the underside of the tail (top left), a radio telemetry tracking receiver being used to detect fish movement (top right), and a radio telemetry transmitter (tag) attached to a steelhead prior to release (lower)

capture was not reflected in the blood glucose, lactate, or pH levels, and ultimately those values are considered "baseline" or the natural levels of free-swimming fish. All fish that had blood samples taken also had a reflex assessment done immediately after capture (equilibrium/righting reflex). To assess the presence of this reflex, fish were turned upside down in the river and were scored as positive for the reflex if it regained normal orientation in <3 seconds. Radio tagged fish were monitored for their location 20 min following release, and then relocated regularly by manual tracking between Sep 17th-Nov 8th. We also surveyed the Bulkley and Morice Rivers in early April, 2017 to relocated tagged steelhead, at or near putative overwintering/spawning grounds.

Summary of Preliminary Results:

- 68 steelhead were tagged and tracked, while an additional 59 steelhead were blood sampled
- There was a direct correlation between the size of fish and fight time, and fight times were longer in faster flowing water.
- Males were slightly larger (27.6 inches) than females (26.9 inches), and took longer to land (5min 19secs vs. 4min 41secs).
- Catch rates for males and females were similar, and sizes were not different among treatments
- Air exposure of 10 and 30 sec increased reflex impairment (equilibrium loss) and short-term downstream movement of steelhead compared to fish air exposed for 0 sec
- Angled fish had greater lactate values than those captured by dipnet and sampled immediately to obtain baseline levels
- Glucose and pH were not significantly different across any of the air exposure groups or the baseline fish
- Fight time or landing method had less of an influence on the short-term stress response values and movement measures
- 2.3% of fish were deeply hooked
- Steelhead survival was greater than 91% within the first three days after release
- 61 (87%) of the tagged steelhead were detected in early April, with changes in position compared to their previous relocation in November 2016 ranging from 11 km downstream to 30 km upstream
- Laboratory analyses of samples taken in the fall are being used to identify which fish pathogens are most prevalent in Bulkley River steelhead: a vector that could contribute to fish mortality.

Relevance for Steelhead Conservation:

This research evaluates the role of various angling practices on the physiology, behaviour, and survival of wild steelhead following catch-and-release. Findings from this research will be relevant to fisheries managers attempting to balance the recreational value and conservation needs of the species. Preliminary recommendations to anglers, prior to the final tracking event this winter, are to minimize air exposure to less than 10 sec as fish air exposed for 10 to 30 sec had immediate reflex impairment and immediate downstream movement following release. With additional analyses, the tracking data from early April will allow us to evaluate the influence of various angling practices and pathogen burden on the long-term survival and movement of steelhead prior to spawning.

Media:

For a brief video introduction to the project, check out the following link and support its submission in the NSERC, Science-Action Research Video Contest by watching and sharing to others.
"Angling Steelhead – William Twardek – Carleton University"

https://www.youtube.com/watch?v=6g59nfpLPtw&index=39&list=PL6ox0GB7vXYn-jN-ICu540E1xKalUxyr6

Partners and Supporters:

A special thank you to all organizations and individuals who have provided support for this project. Through funding and in-kind support we were able to have a very successful research program last season. We look forward to learning more about the species' long term-movement and spawning locations in the Bulkley River and how this relates to angling practices. The final tracking of our tagged steelhead in the spring will allow us to finalize the results of this study, and provide recommendations to anglers on how we can best support these fish as they make their way back to natal streams each year. We thank you for your continued collaboration and for sharing our goal of conserving this remarkable fish species for generations to come.

Literature

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