

# Understanding tagging effects to facilitate stakeholder adoption of studies using electronic tags: a case study with adult Pacific salmon



The use of electronic tags is a popular technique to study wild fish. Sub lethal effects and tag-related mortality are concerns for any tagging study but are rarely estimated. This study will quantify the rates of tag retention and mortality for en route adult sockeye salmon implanted with gastric or small external radio tags in the Harrison River, BC. The application of the findings will help to ensure that the techniques used are the best possible and to ultimately improve practices for welfare purposes. Given recent issues with stakeholders failing to fully embrace telemetry findings we suggest that inclusion of such tagging validations and refinements need to be considered as integral components of tracking studies.

## Introduction

All tagging studies assume that (1) tags are retained for the duration of observation and (2) tagged individuals accurately represent the population under study (Ramstad & Woody 2003). It is generally difficult, if not impossible, to confirm either assumption in species that are mysterious enough to merit radio tagging. Rates of tag loss and fish mortality are necessary to adjust survival estimates. While several tagging studies have occurred on Harrison sockeye salmon and provide information relevant to determining relative survival, no research studies have been specifically designed to quantify the tag-related effects on migrating adult salmon.

## Proposed Methods

Adult sockeye salmon recently transitioned from the marine environment will be intercepted in the Harrison River. They will be captured using a beach seine and tagged with a radio transmitter. I will apply a total of 410 tags, most of which will be applied in August and September 2014. The following will also be collected from each tagged fish:

- DNA (to determine stock composition),
- scales (to determine age and stock composition),
- length,
- sex,
- and color (index of proximity to spawning).

The movement and survival of these fish will be monitored using both fixed-receiver stations and mobile tracking to confirm fish arrival at spawning grounds and to locate positions of fish that die within the system.

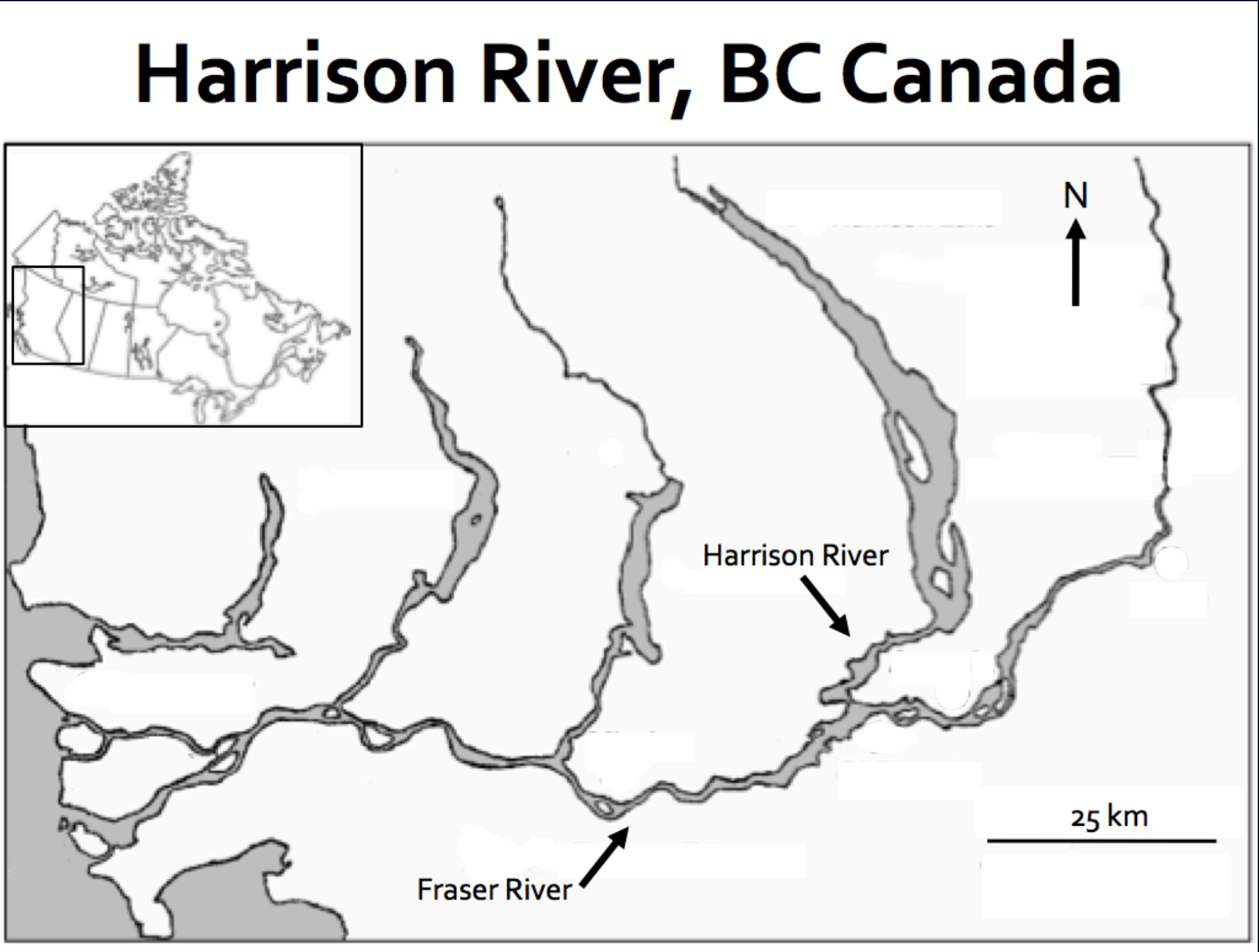


Figure 1: Location of the Harrison River, BC.

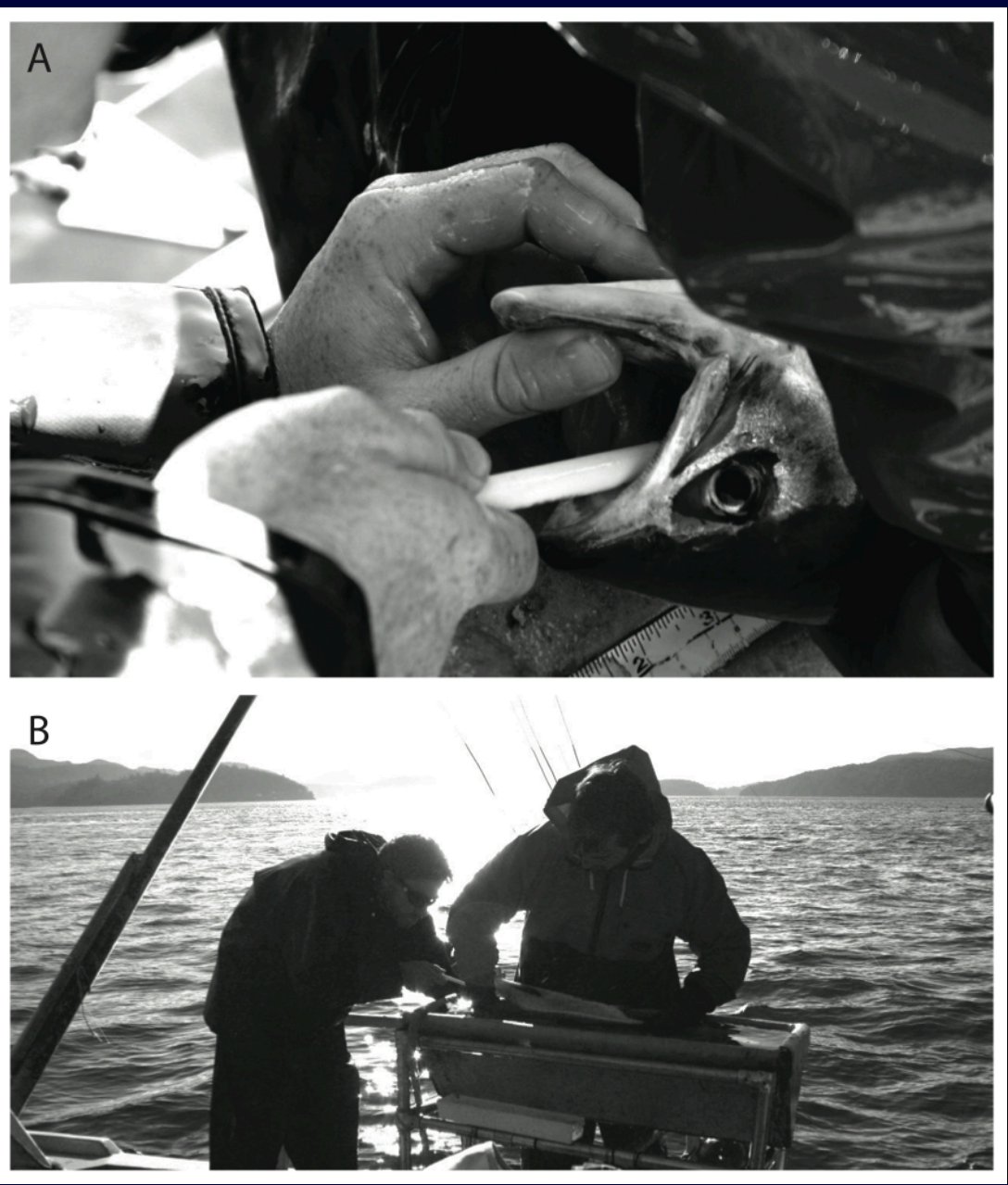


Figure 2: (A) Gastric radio tagging of an adult Pacific salmon using a smooth plunger. (B) The fish is held in a water-filled trough to minimize air exposure and to protect the fish from handling. (Source: Cooke et al. 2012)

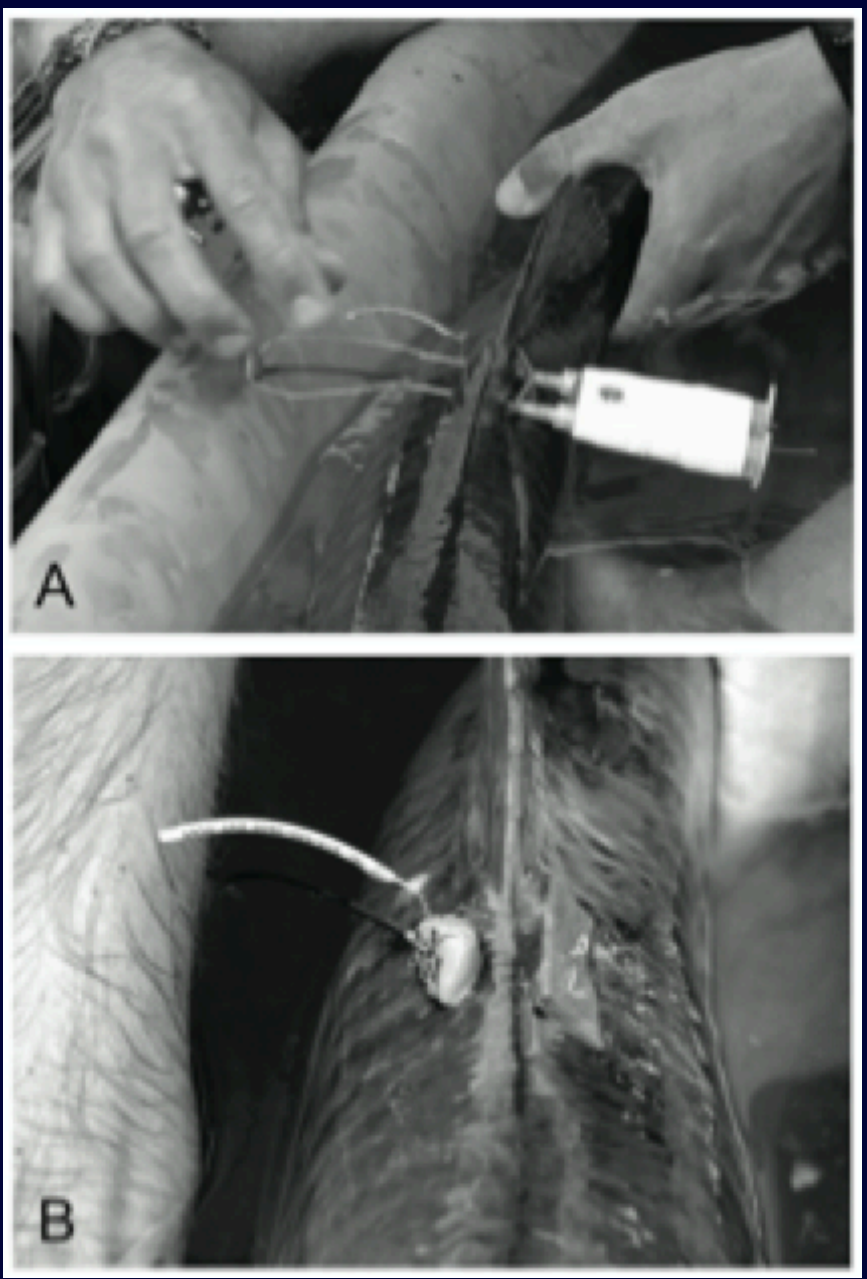


Figure 3: External radio tagging of an adult muskellunge. (Source: Cooke et al. 2012)

## Value in the Ocean Tracking Network

Theme 2	Biology and behaviour of migratory living marine resources
Crosscutting Activity 3	Advancing tracking technology and tagging techniques

## Implications for Natural Resource Management and Policy

The use of electronic transmitters in fish research continues to be important for managing all fisheries. Managers and stakeholders include:

- fishers,
- government agencies,
- and research groups.

Most emphasis on fish telemetry has been placed on improvements of technology and on fish movements themselves, however, few attempts have been made to determine whether the placement (internally or externally) and size of the transmitter affects behaviour, physiology, or swimming performance. It is key that stakeholders take a step back and include such tagging validations and refinements as integral components of tracking studies.

## References and Important Studies

Brown, R. S., Eppard, M. B., Murchie, K. J., Nielsen, J. L., & Cooke, S. J. (2011) An introduction to the practical and ethical perspectives on the need to advance and standardize the intracoelomic surgical implantation of electronic tags in fish. *Reviews in Fish Biology and Fisheries*, 21(1), 1-9.

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Ramstad, K. M., & Woody, C. A. (2003) Radio tag retention and tag-related mortality among adult sockeye salmon. *North American Journal of Fisheries Management*, 23(3), 978-982.

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