The Response of Wild Steelhead to Catch-and-Release Angling on the Bulkley River, BC.

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Acknowledgements

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Office of the Wet'suwet'en

Native Fish Society

The Steelhead Society of BC – Wild Fish, Wild Rivers

Wild Steelhead Coalition

oscar's Source for Adventure

Umpqua

Headwaters Fish Reproductions

MoldyChum – served fresh daily.

Costa

YETI Coolers

patagonia

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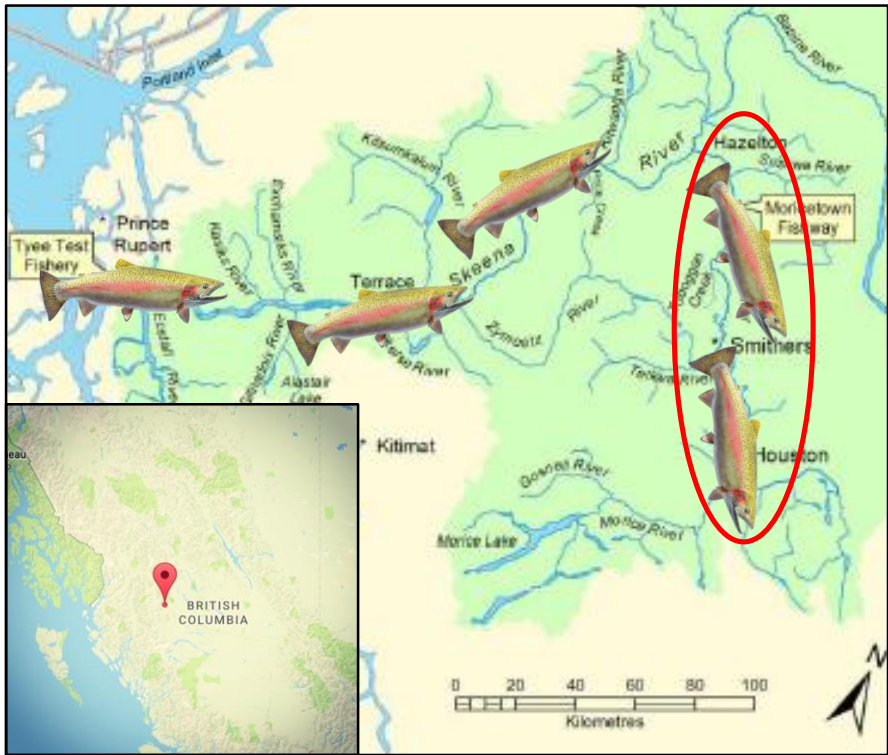
NSERC CRSNG

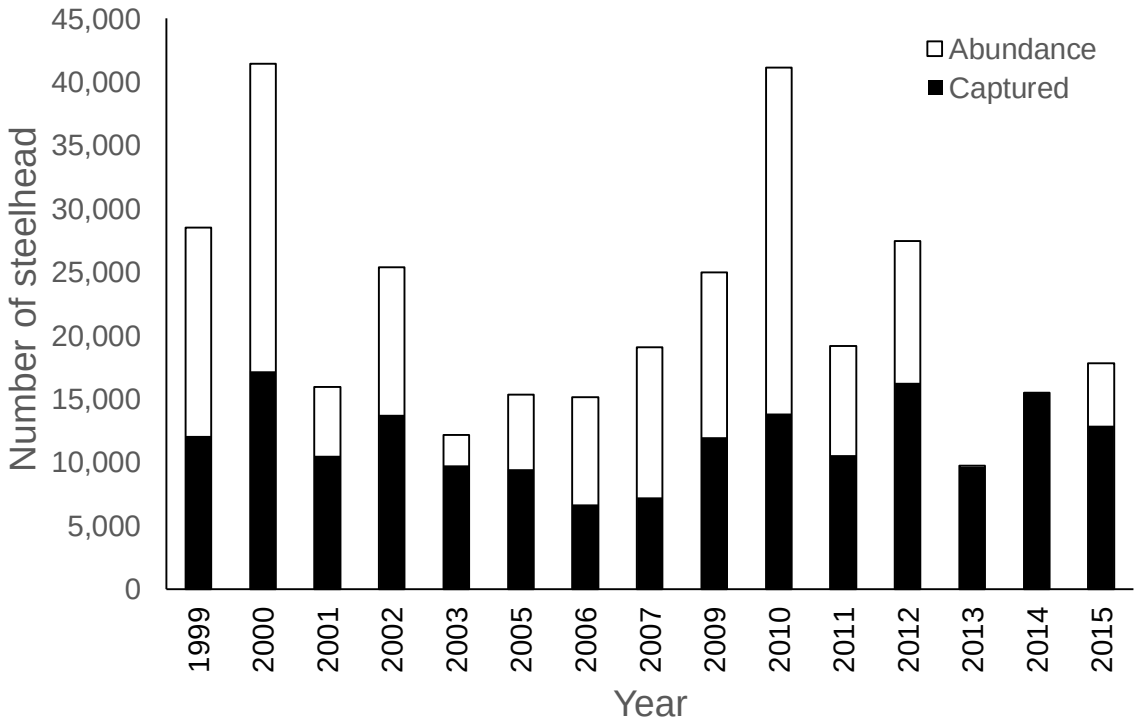
Bulkley River

- Largest tributary of the Skeena River
- Test fishery, Indigenous salmon fisheries, and recreational fishery
- Catch-and-release of steelhead is mandatory
- High access; effort of 12,000 angler days/season



Capture rates

- Mark-recapture and angler surveys suggest ~59% capture efficiency of the Bulkley steelhead run (BC MFLNR)
- Highest capture efficiency during years of low abundance



Purpose

- To evaluate the physiology, behaviour, and survival of wild steelhead following catch-and-release

  - Air exposure treatment (0, 10, 30 secs)
  - Varying angling durations, landing methods (net vs. tail-grab), and water temperatures

1: Capture

- Single barbless hooks, no bait, 80% fly fishing

2: Landing method

3: Air exposure (Baseline, 0, 10, or 30 secs)

4: Reflex test, then held (20mins) and blood sampled

5: Blood testing

- Indices of metabolic stress

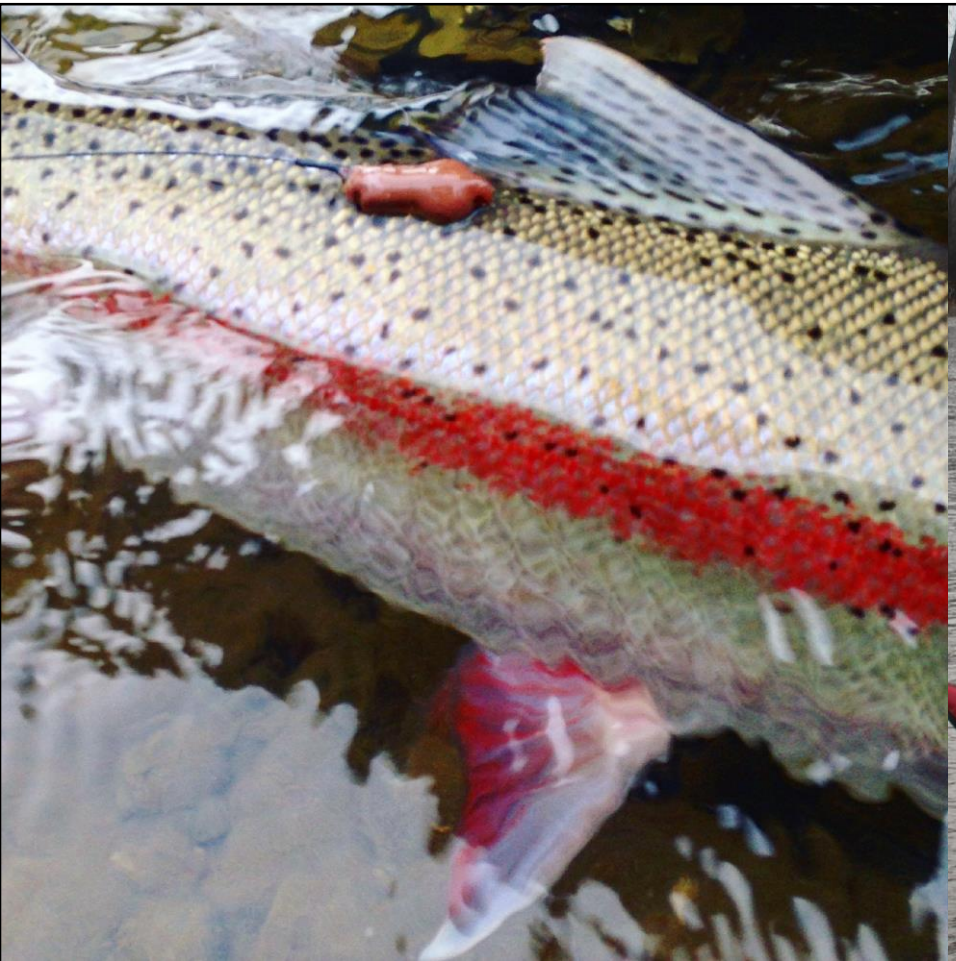
Glucose Meter

pH Meter

Lactate Meter

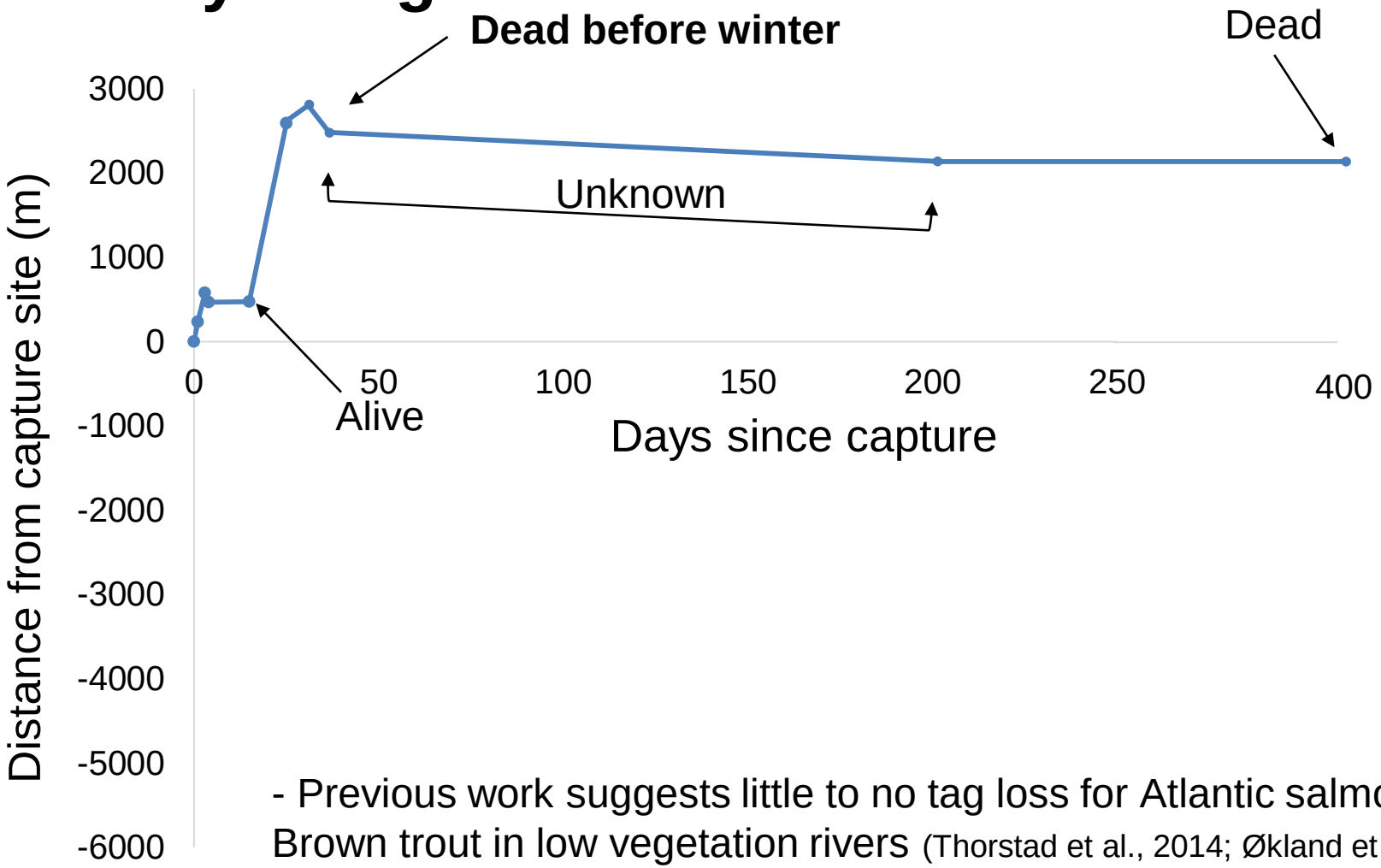
Baseline fish

6: Radio-tagged (post-release behaviour and fate)



6: Long-term tracking April and August 2017

Mortality designation



- Previous work suggests little to no tag loss for Atlantic salmon or Brown trout in low vegetation rivers (Thorstad et al., 2014; Økland et al., 1996; Aarestrup and Jepsen, 1998)

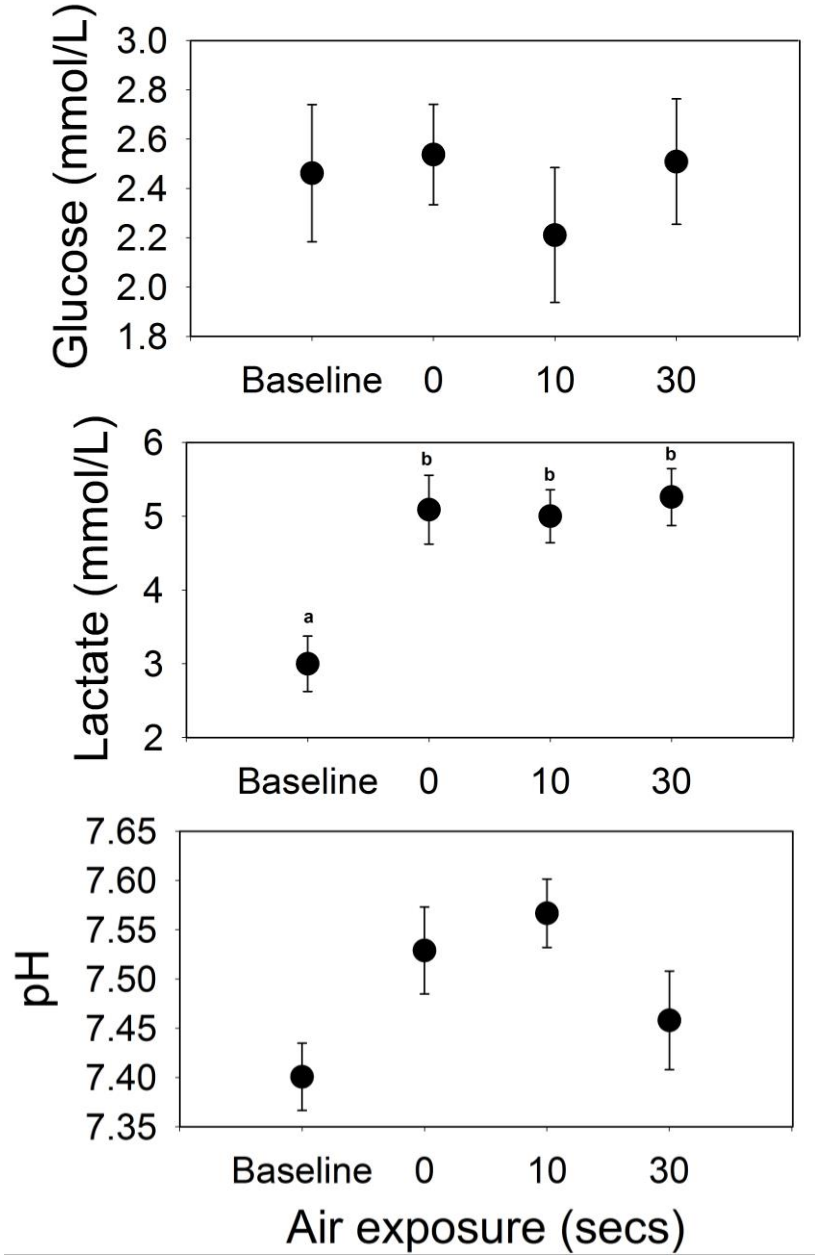
Methods

Treatment	Physiology	Behaviour
0 sec	n=18	n=22
10 sec	n=12	n=25
30 sec	n=15	n=20
Baseline (Physiology only)	n=14	NA
Total	n=59	n=67

- No significant differences in landing method, angling duration, water temperature, fork length, or sex across air exposure treatments
- Multiple regression models included the variables above

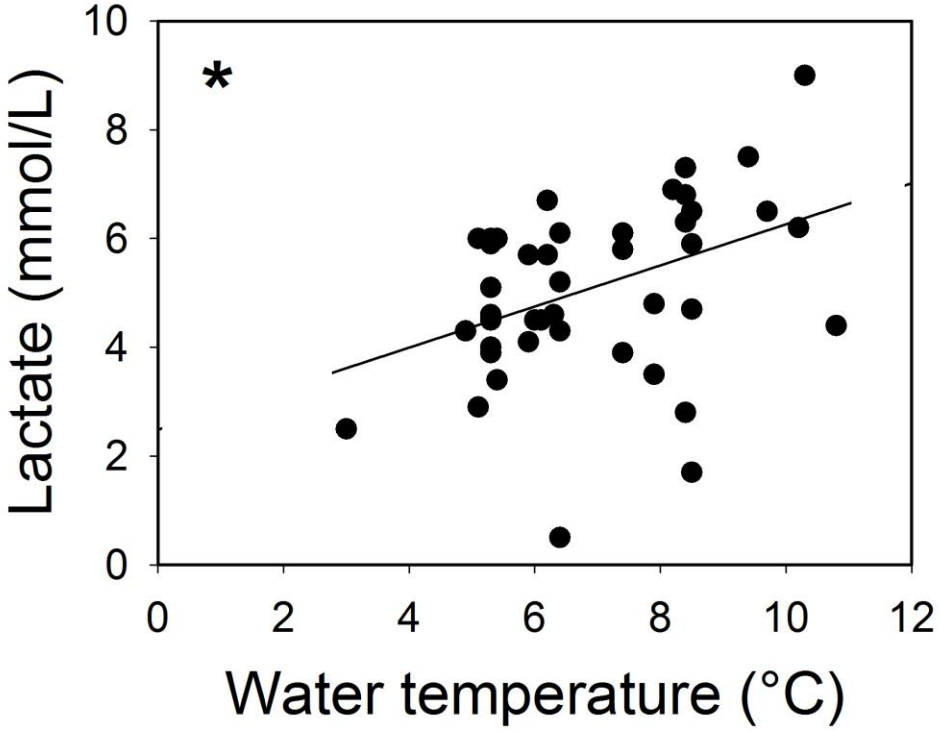
Physiology

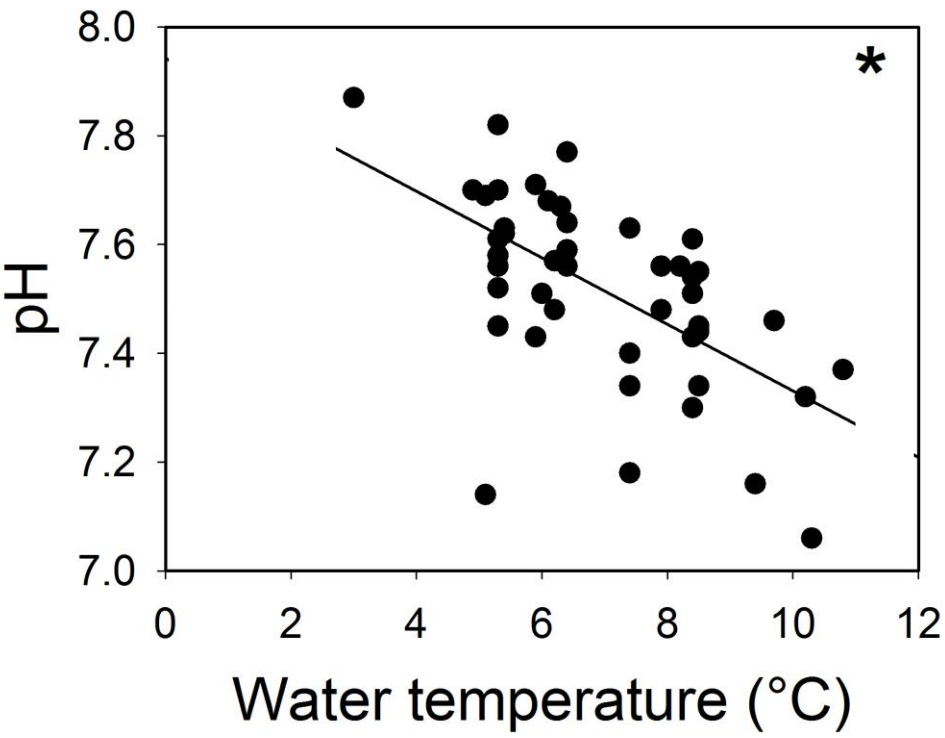
- Blood lactate greater in angled fish compared to baseline levels



Physiology

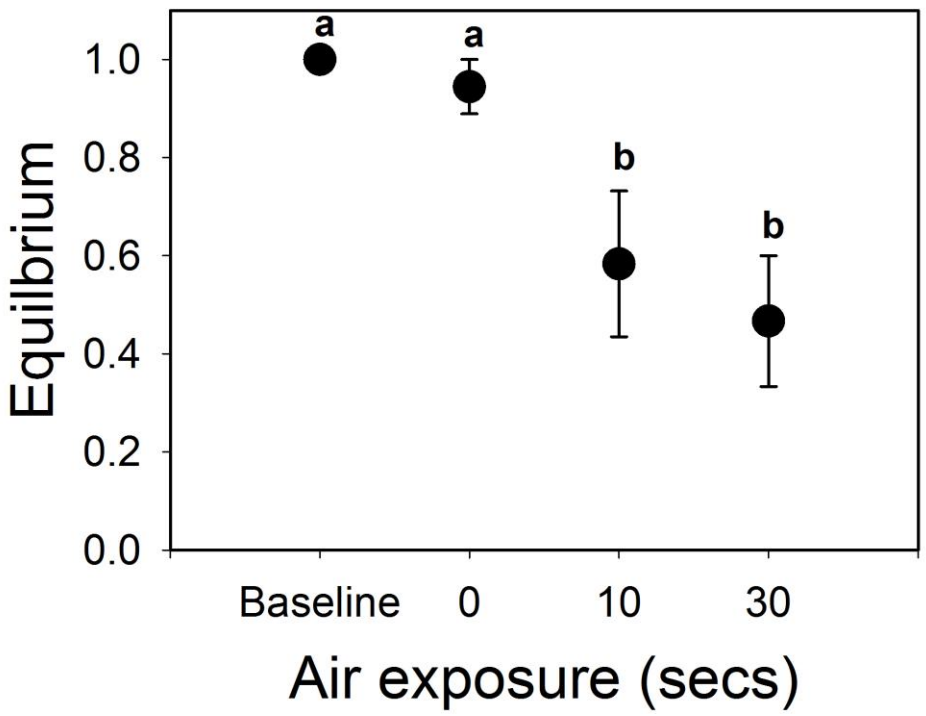
- Water temperature correlates with blood lactate and pH

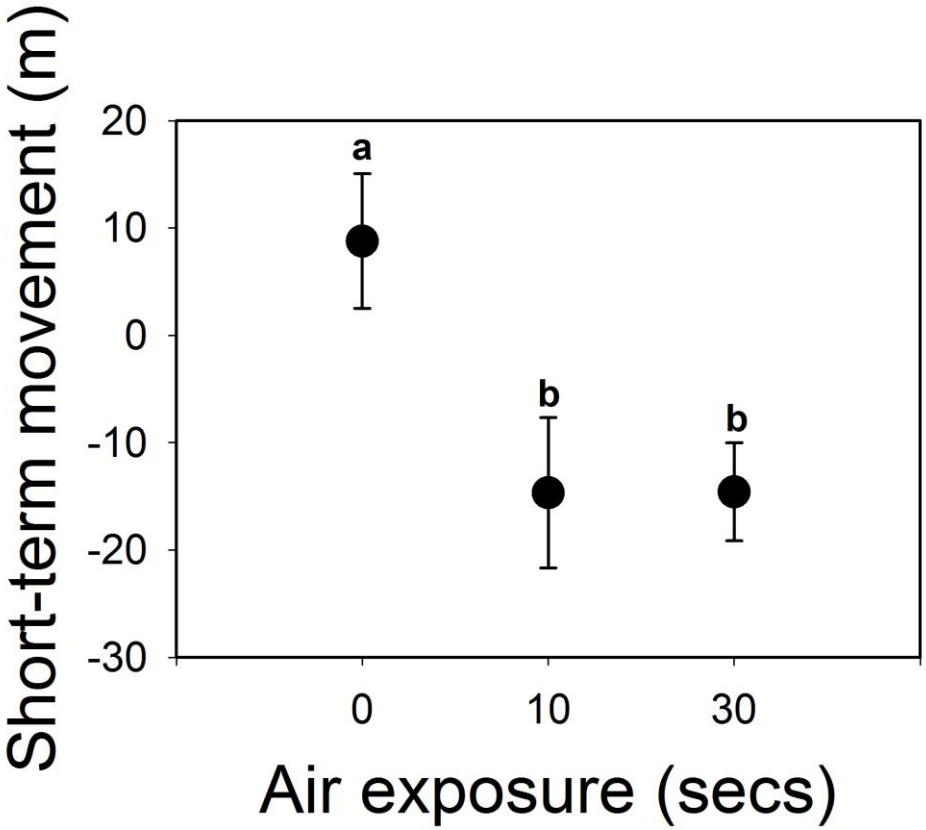




Reflex and Movement

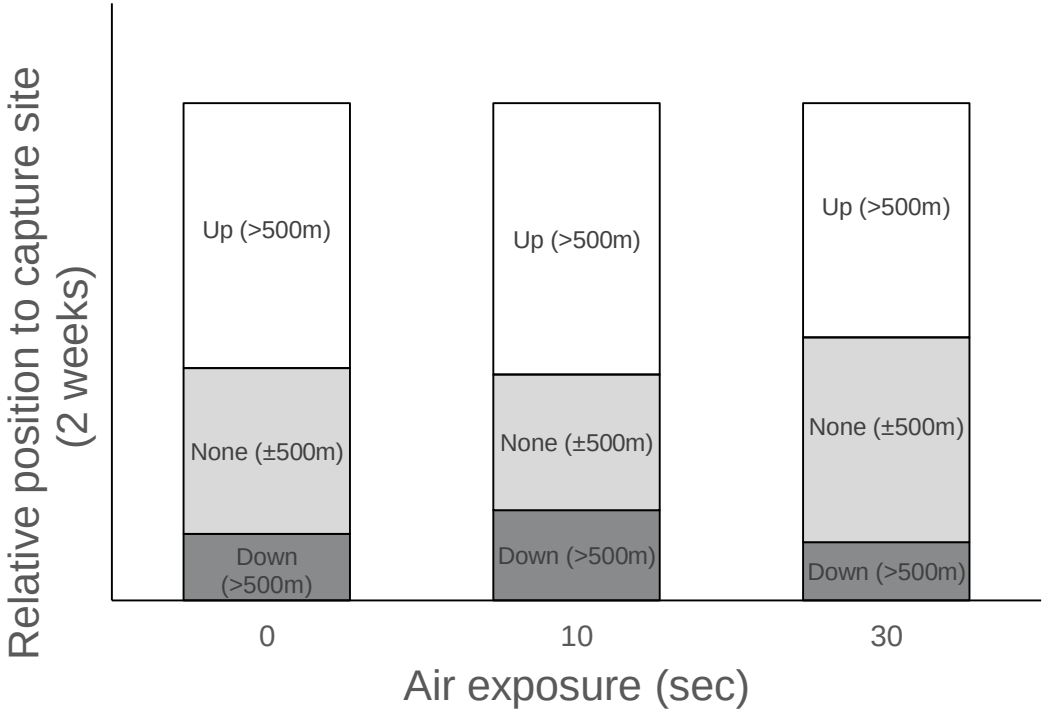
- 10 secs or more of air exposure increases reflex impairment and downstream movement





Longer-term movement

- Average movement was 11.5km and ranged from -11km to +61km over the 7-month period (anglers intercept holding fish vs. active migrants)
- Air exposure had little influence on 2 week movement



Mortality and Injury

- 2.3% Deep hooked fish (tongue)
- 3-day mortality ~4.5%
- Pre-winter mortality ~6.0%
- Pre-spawn mortality ~15% (13.5-25.0%)

- Average hooking mortality for Salmonids = 15.9%

(Huhn and Arlinghaus, 2011)

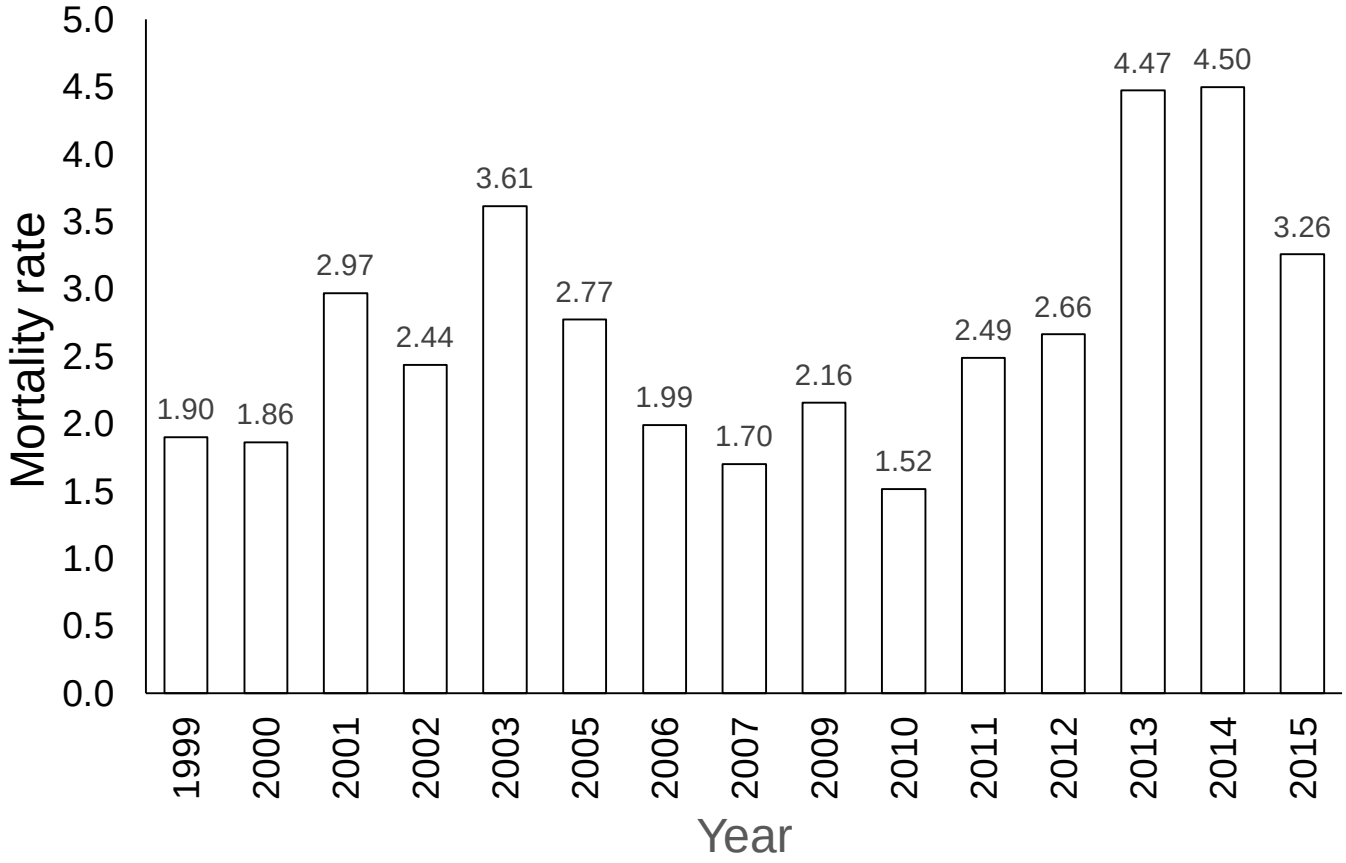
- Mortality estimates for *O.mykiss* range from 0-88.5%
- Chilliwack River wild winter-run steelhead = 4.8%

(Nelson et al., 2005)

- Mortality for bait-angled Steelhead ~4.1% (Hooton, 2001)

Mortality across years

- Catch-and-release angling mortality averages 2.7% (1.5 - 4.5%) for the entire run.



Discussion

- Angling in general increases blood lactate compared to baseline
- Air exposure of 10 and 30 secs increases short-term behavioural impairment but not long-term
- Temperature correlated with blood physiology
- Angling duration, sex, size had little influence on physiological and behavioural responses

Communicating best practices

Best practices

- Reduce air exposure to less than 10 secs; voluntary tool

- Take extra precaution when angling in warmer water temperatures

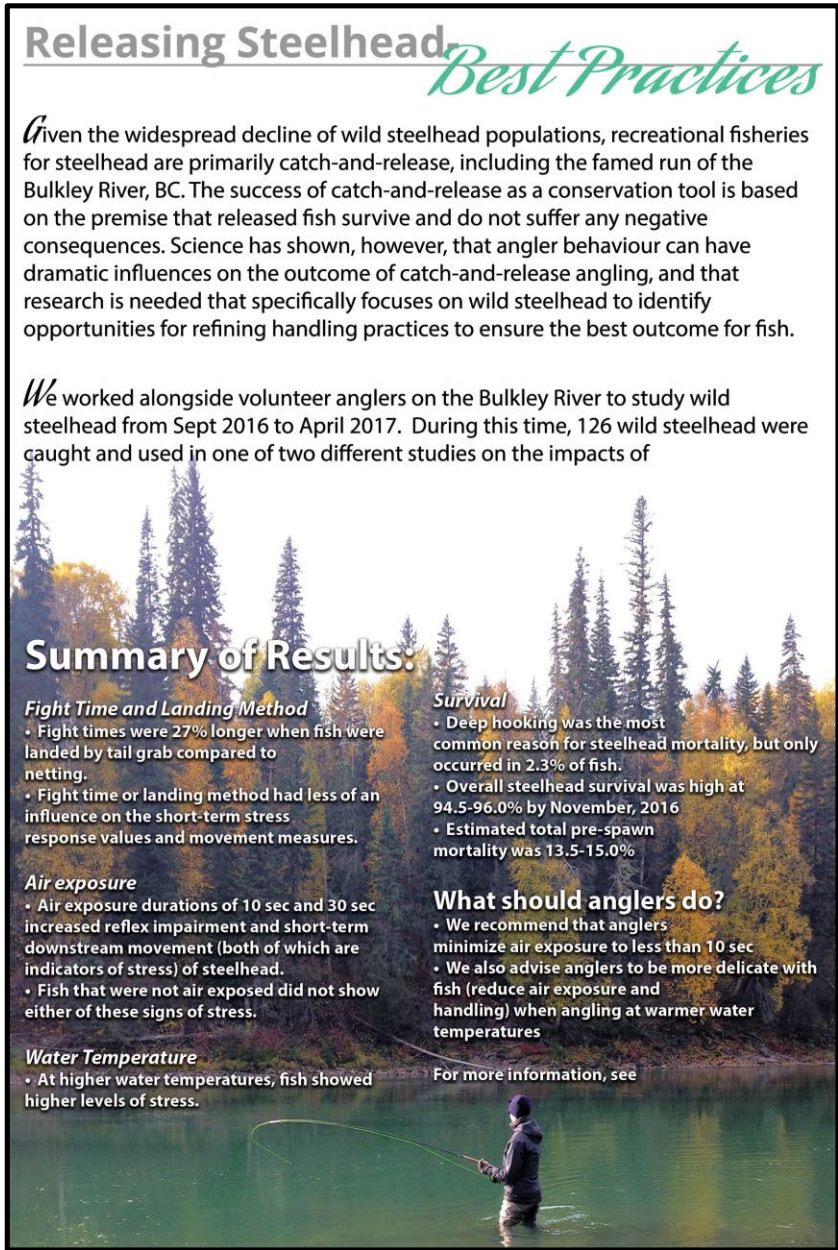
Adopting best practices (Guckian et al., In press)

- Paired this catch-and-release work with a social science survey
- Survey identified anglers' beliefs and attitudes towards evidence-based best practices
- 197 respondents
- 44% reported knowing a 'great deal' about 'best practices' for steelhead and feel 50% of other anglers know and use them

Communicating best practices

- Best practices are self-taught, learned from other anglers, and online
- Partnering with Keepemwet Fishing to communicate best practices to Bulkley River anglers (Danylchuk et al., In press)

KEEPEMWET FISHING



Conclusions and Future Work

- Provides scientific rigor to anecdotal claims on ‘best practices’ for steelhead
- Best practices guidelines and mortality estimates provide relevant information to other steelhead recreational fisheries
- Future work could evaluate the influence of air exposure on steelhead reproductive success (parentage analysis)


Thank you!