



Effects of Captive Reconditioning and Post-Spawning Life History on Reproductive Performance in Female Steelhead (*Oncorhynchus mykiss*) Kelts

Laura Jenkins¹, Andrew Pierce^{1,2}, Scott Everett³, Neil Graham², Lea Medeiros¹, Ryan Branstetter², Douglas Hatch² and James Nagler¹

(1) University of Idaho and Center for Reproductive Biology (2) Columbia River Inter-Tribal Fish Commission, (3) Nez Perce Tribe

Introduction

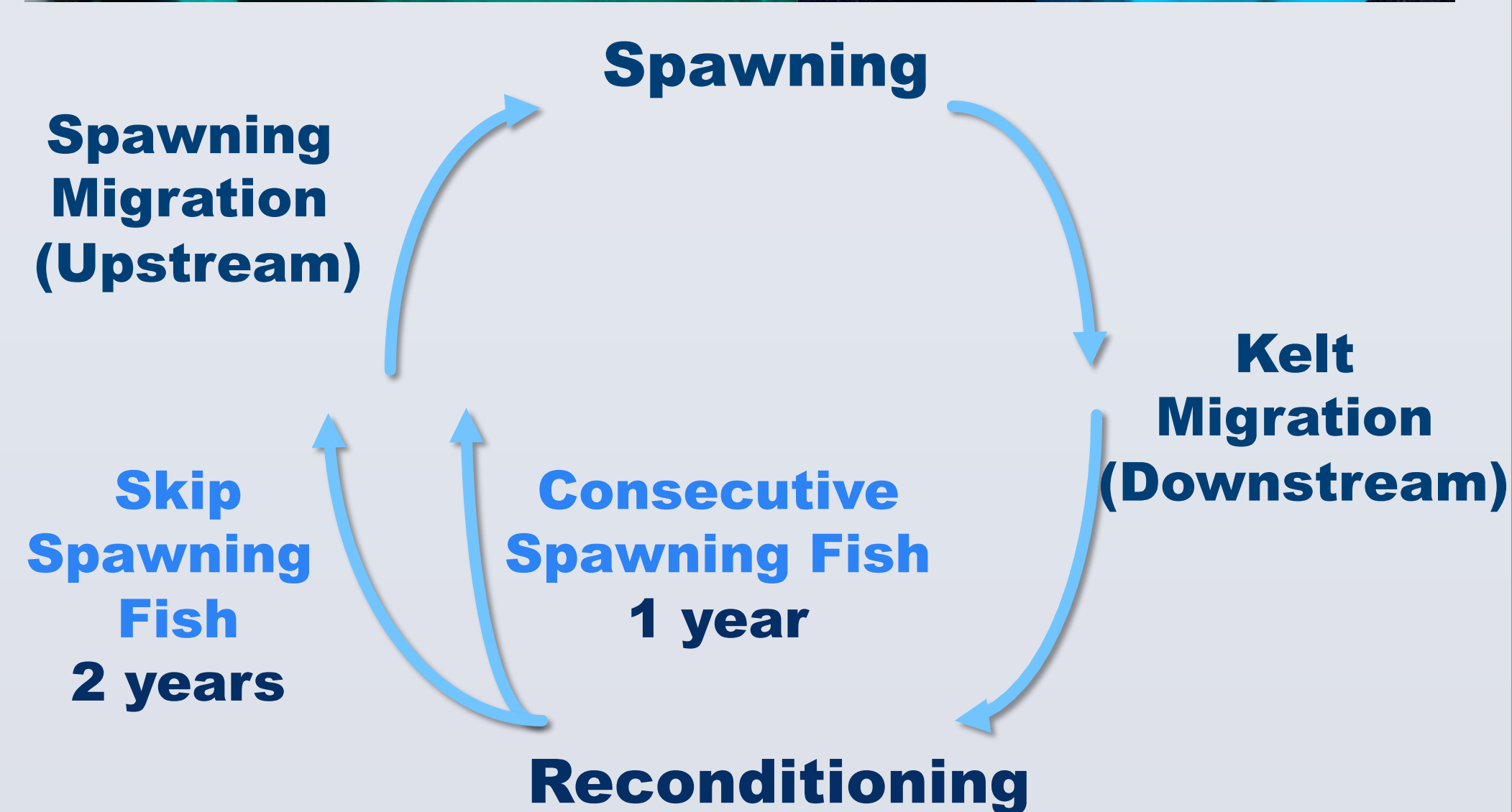
- Kelt reconditioning is a recovery tool addressing ESA-threatened Snake River steelhead populations.
- Reconditioning capitalizes on iteroparity, the ability to repeat spawn, and the natural selection that occurs prior to initial spawning.
- After initial spawning, post-spawn female steelhead (kelts) may re-mature to spawn in:
 - 1 year, as a “consecutive spawner”
 - or in 2 years, as a “skip spawner”
- Rematuring females can be identified by elevated plasma estradiol levels 6-9 months prior to spawning.
- Wild kelts are captured, fed, and released to migrate upstream, and spawn naturally without a return to the ocean.
- Hatchery kelts are reconditioned as a research tool.

Objectives

Long-term: Quantify the potential benefit of kelt reconditioning by directly comparing 2 spawning events within individual fish

- Determine whether reproductive performance differs between reconditioned kelts and first-time spawning maiden steelhead
- Determine whether reproductive performance differs between consecutive and skip spawning kelts

At present: Analyze results to date by comparing spawning categories



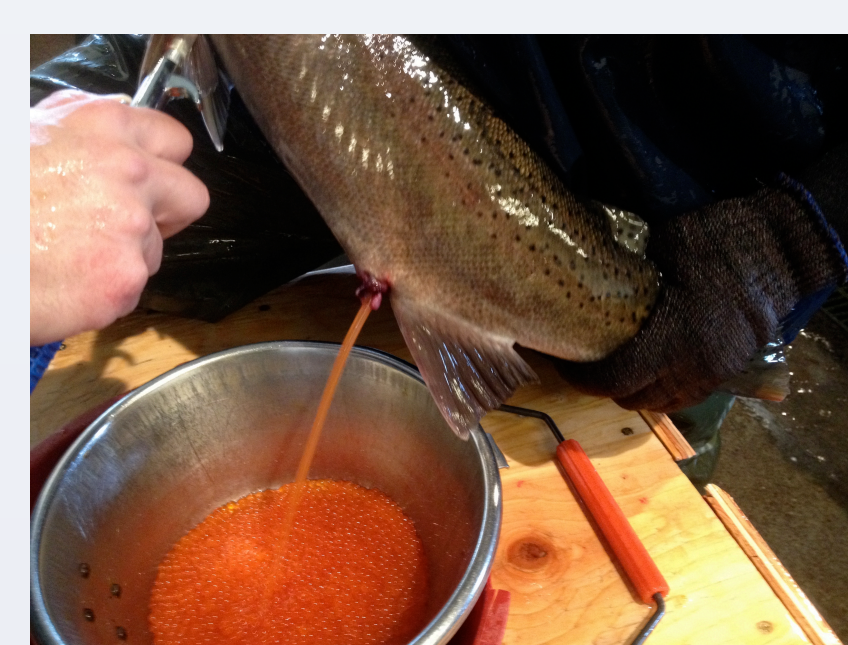
Acknowledgements

Special thanks to the Dworshak National Fish Hatchery staff, Nez Perce Tribe, & United States Fish and Wildlife Service, for including us in spawning, helping care for the kelts & providing kelt facilities.



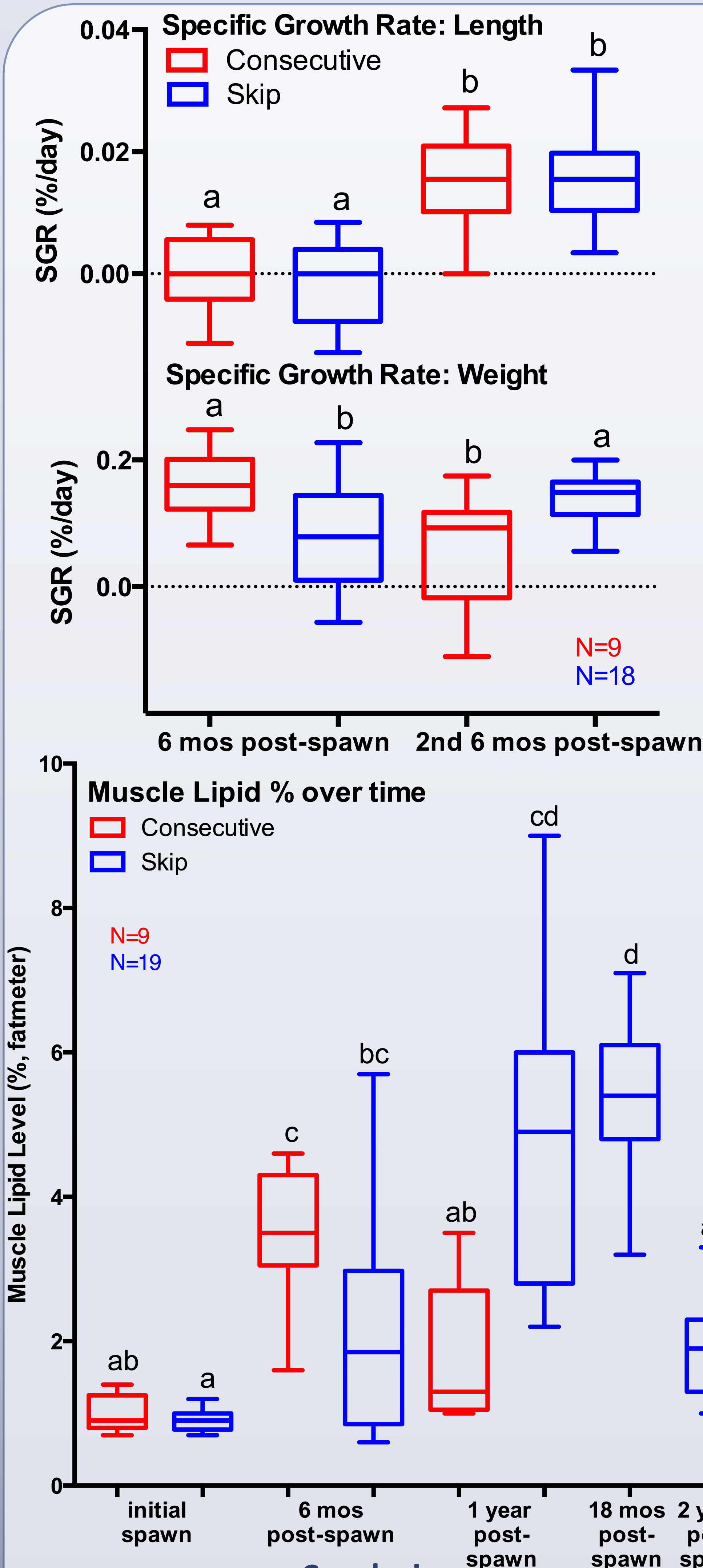
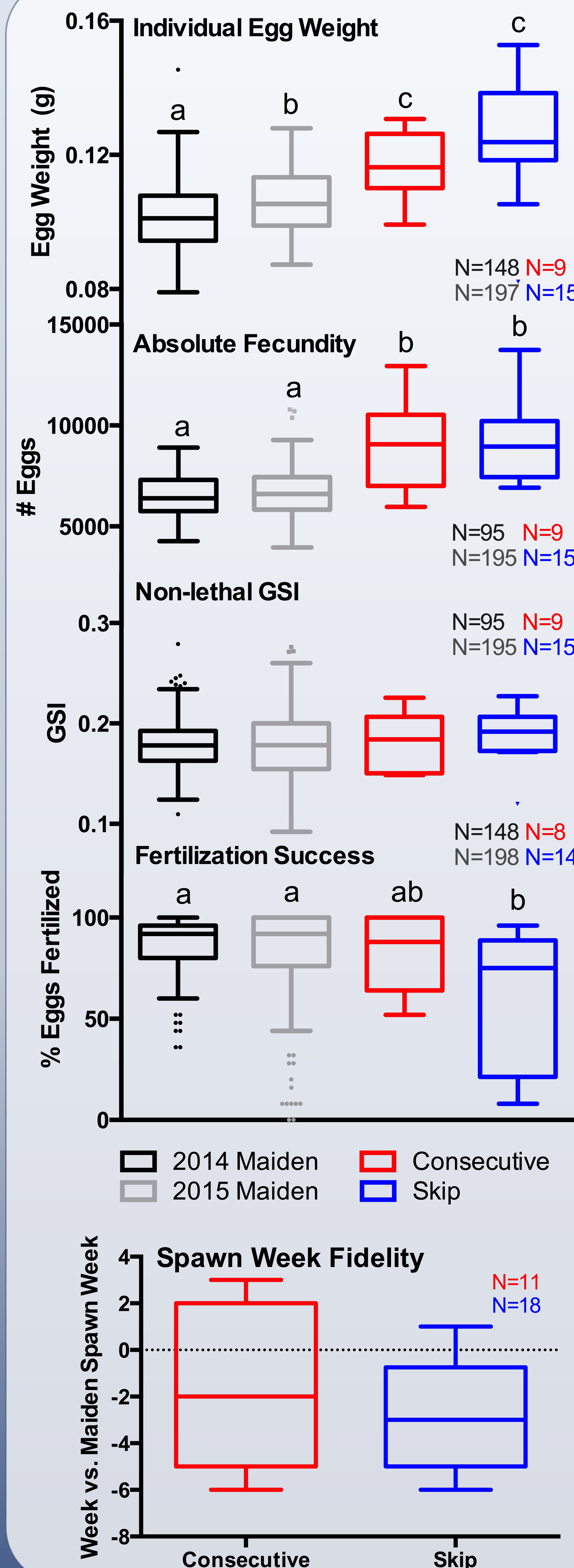
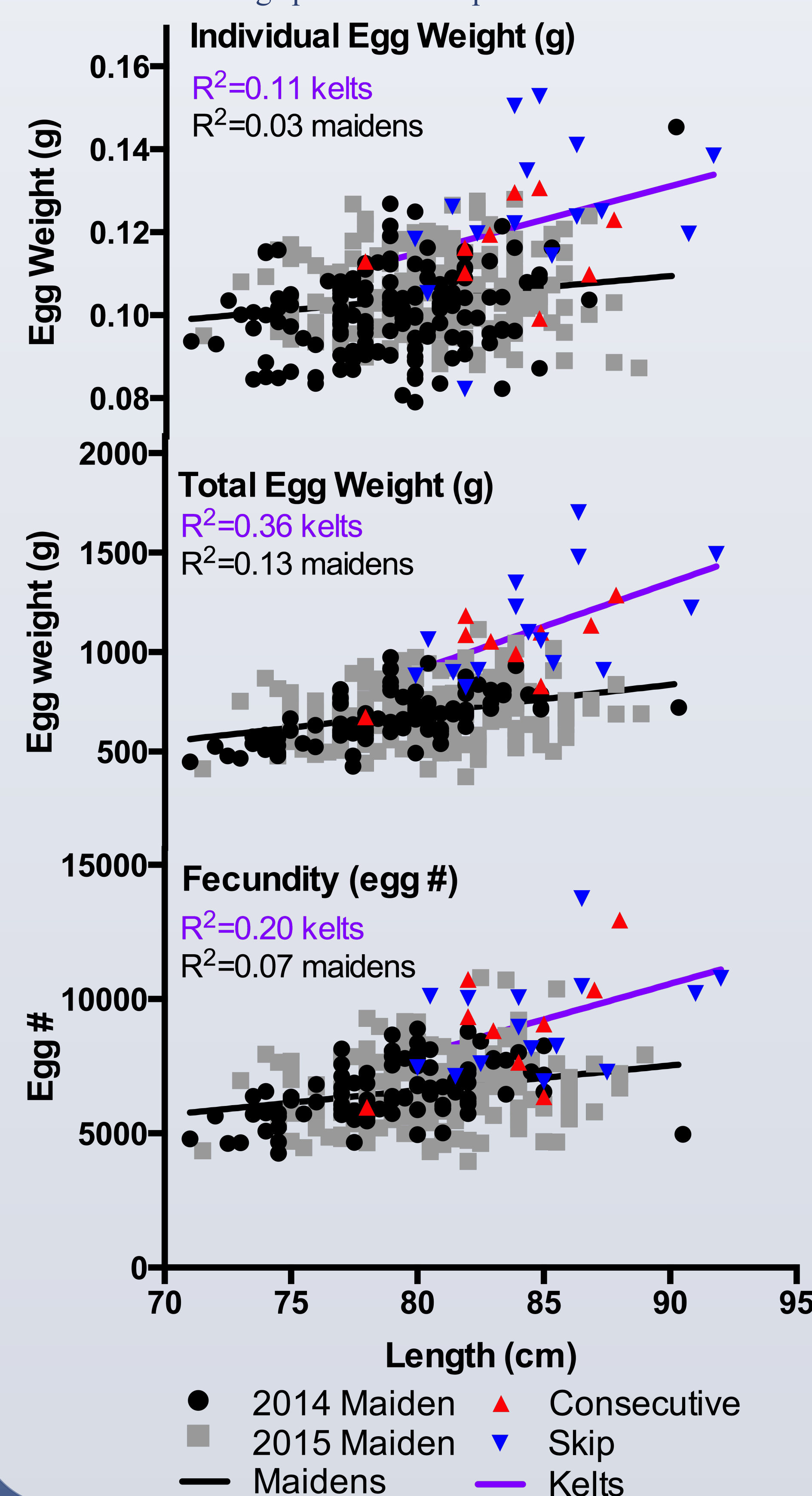
Methods

- Dworshak National Fish Hatchery female steelhead were used as a model for native Clearwater River B-run steelhead.
- Females were air-spawned upon return to hatchery.
- Reproductive performance was assessed.
- Hatchery kelts were reconditioned.
- Reproductive development and growth were tracked.
- Reproductive performance was assessed at second spawning.
- Fecundity was assessed by dividing total egg weight by individual egg weight.
- Eggs were fertilized in vitro.



Results

- 23% of surviving kelts spawned after one year reconditioning; 100% remaining spawned as skips



Conclusions

- Total egg weight & fecundity increased to a greater extent with increasing length in kelts than in maidens. A similar trend was observed with individual egg weight.
- Fecundity and egg size were greater in kelts than in maidens.
- Fertilization success was reduced in skip but not in consecutive spawners. The cause for reduced fertilization success in skip spawners is being further investigated.
- Consecutive spawners increased in weight more rapidly and tended to accumulate more muscle lipids than skip spawners during the first 6 months of reconditioning.
- Growth rate (weight) and muscle lipid levels decreased during the 6 months prior to spawning.

Contact: ljenkins@uidaho.edu