

Effects of sublethal Sea Lamprey (Petromyzon marinus) parasitism on long-term milt concentration and testosterone production in two Lake Trout (Salvelinus namaycush) morphotypes.

Introduction

- Previous studies on interactions between invasive sea lamprey and lake trout have focused on direct mortality of lake trout resulting from sea lamprey parasitism. However, an estimated 45-75% of lake trout survive a parasitism event.
- Little is known on how sea lamprey parasitism affects the reproductive physiology of survivors or what the consequences are for lake trout populations. Previous studies have indicated these parasitism events to affect lake trout reproduction in the short-term by suppressing various reproductive endpoints.
- This study focuses on the sublethal effects of sea lamprey parasitism on long-term reproduction in male siscowet and lean lake trout. These lake trout differ by their morphometry, life history, physiology, and habitat.





We investigated these effects on two reproductive endpoints: milt concentration and testosterone production, and between morphotypes and parasitism wound types (i.e., severity of wound).

Methods

Parasitic sea lamprey were collected and allowed to freely attach to lean and siscowet lake trout for 4 days. Un-parasitized lake trout of both morphotypes were also included as controls in the study.







Parasitism wounds were examined on each lake trout and classified based on their severity. Type A wounds result when the lamprey has pierced into the musculature of the fish, whereas Type B wounds are just abrasions to the skin.

Type A





Type B

- Plasma and milt samples were collected from both un-parasitized and parasitized lean and siscowet lake trout one year following a parasitism event.
- Plasma samples were analyzed for testosterone concentration through radioimmunoassays. Milt samples were diluted and cells were counted using a hemocytometer. Concentrations were calculated in cells/ml.

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Discussion

Milt Concentrations

- One year following sea lamprey parasitism, parasitized siscowet lake trout had significantly lower milt concentrations than their unparasitized counterparts. Further, individuals with type A wounds had lower milt concentrations than those with type B wounds. Lean lake trout displayed the same trend, however, the differences
- were more subtle.



Fig. E. Milt samples from unparasitized (left) and parasitized (right) siscowet lake trout.

Testosterone Concentrations

- There was a lot of variation and no apparent trend in testosterone concentrations between parasitized and un-parasitized lake trout, of both morphotypes.
- We speculate that 11-ketotestosterone, a hormone that plays a key role in the production of milt, may be a better metric for understanding differences in milt concentrations associated with sea lamprey parasitism.

Implications

- Our results suggest that the long-term effects of sublethal sea lamprey parasitism on male siscowet lake trout can have negative impacts on their reproductive success.
- Differences between morphotypes may have implications on how these two populations would respond to sea lamprey parasitism.
- Lean lake trout may be more resilient to sea lamprey parasitism effects on reproduction – growth impacts are still being assessed.

This study provides insight into the mechanisms driving reproductive disruption in parasitized lake trout and will be useful for predicting effects at the population level.

Acknowledgements

MICHIGAN STATE College of Agriculture and Natural Resources UNIVERSITY

NOAA NWFSC: Rick Goetz UWSP-NADF: Greg Fischer, Josh Siebert, and Jim Miazga USGS Hammond Bay BS: Nick Johnson













