An Historical Comparison of Lake Superior Sea Lamprey Fecundity and Egg Size

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Background

- Lake Trout (Salvelinus namaycush) populations in Lake Superior collapsed in the early 1960’s due to overfishing and predation by invasive Sea Lamprey (Petromyzon marinus).
- Continual lampricide treatments have helped maintain lower densities of Sea Lamprey in Lake Superior.
- Fecundity and egg size of Sea Lamprey may be greater at these lower densities of Sea Lamprey.
- However, fecundity and egg size of Lake Superior Sea Lamprey have not been studied since 1960 (Manion 1972; Trans. Am. Fish. Soc. 101:718-720).

Objective

- Determine if fecundity or egg size of Lake Superior Sea Lamprey have changed since 1960.

Field and Lab Methods

- 35 Sea Lamprey were collected in 2016 from the Bad, Brule, and Middle Rivers (Wisconsin; Fig. 1) using portable traps and a fish ladder.
- Total length (mm) and weight (g) were recorded for each Sea Lamprey.
- Whole ovaries were preserved in 10% formalin.
- Total fecundity was estimated by expanding the counts of eggs in three 0.5 g subsamples from the ovary.
- Average egg diameter measured from digital images of 30 eggs was computed for each fish.
- Data were also obtained from Manion (1972) for 29 Sea Lamprey from the Chocolay River (MI) in 1960 (Fig. 1).

Analysis

- Indicator variable regressions were used to determine if the relationships between fecundity or egg diameter and total length differed by sampling location (i.e., river).
- Fecundity increased slightly with increasing total length (p=0.022), but the relationship between fecundity and total length did not differ among the four rivers (p=0.216; Fig. 2).
- No relationship between egg diameter and total length was detected (p=0.504), which was consistent among the four rivers (p=0.100).
- Mean egg diameter (i.e., intercepts) for the Chocolay River differed from the Brule (p<0.001) and Middle (p=0.013) Rivers, but not the Bad River (p=0.963). In 2016, the mean egg diameter for the Middle River did not differ from the Brule (p=0.641) or Bad (p=0.199) Rivers, but the Bad and Brule Rivers did differ (p=0.017; Fig. 3).

Summary

- Fecundity of Sea Lamprey in Lake Superior does not appear to have changed since 1960.
- The relationship between fecundity and total length is similar among rivers in 2016 and was not different from the Chocolay River in 1960.
- Egg diameter may have increased since 1960, but this increase was not consistent among rivers.
- These results are tentative because different rivers from different regions were sampled in 2016 than 1960 (Fig. 1).

Recommendation

- Sample Sea Lamprey from more locations, including the Chocolay River, to further assess spatial differences in fecundity and egg size.

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