The Efficacy of the Brunswick-Topsham Hydroelectric Dam in Passing American Shad (*Alosa sapidissima*)

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Previous work by Bowdoin students has shown that American Shad (*Alosa Sapidissima*) are hindered by the design of fish passage at the Brunswick-Topsham hydroelectric dam. The dam inhibits shad from moving upstream to their historical spawning habitats, which range all the way to the Great Falls at Lewiston. Because few shad are able to cross the dam, they are forced to spawn in the lower Androscoggin tidal waters. This loss of spawning habitat has had a detrimental effect on the shad population and the Androscoggin and Gulf of Maine ecosystems. It has been well documented that shad populations have declined to the point of local extinction by construction of dams, along with other threats such as water pollution (Taylor, 1951). The upcoming relicensing of the Brunswick-Topsham hydroelectric dam in 2029 provides us with an opportunity to urge the dam owners to alter the dam's fish ladder to better allow shad to reach their spawning habitats. The purpose of my research was to collect data showing that the fish ladder at the Brunswick-Topsham dam does not pass nearly as many shad as are trying to swim upstream. This data will be useful in making a case for the dam's fish ladder's ineffectiveness in court, and will hopefully result in a re-structuring of the fish ladder to the shad's advantage.

Shad downstream of the dam were counted using an ARIS sonar instrument that provides video images of the sonar data, on which the fish could be manually counted (fig. 1). Like data collected by Meera Prasad showed in 2017, my findings also supported the hypothesis that the Brunswick-Topsham fish ladder passes significantly less shad than the amount of shad that are swimming upstream, towards the fish ladder (*Trap Count Statistics*, 2022). Of all shad I counted from data over the past 6 years, only 4.35% made it past the dam (fig. 2). Furthermore, we only collected data on 14 days, for a few hours each time, for a limited section of the river. Therefore, this is almost certainly an underestimate of the amount of shad downstream of the dam, and these data should be able to strongly support that the dam needs to be altered if we want shad populations to persist and recover.

Figures

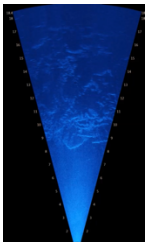

Fig. 1. Example of the sonar footprint produced by the ARIS Explorer 3000.

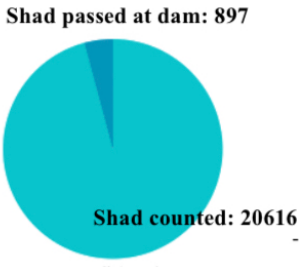

Fig. 2 Shad counted swimming upstream on a total of 14 days during the yearly shad run from 2017 to 2022, compared to how many shad passed the dam in total across those 6 years as of July 20 2022 (*Trap Count Statistics*, 2022).

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References

Taylor, C. C. (1951). *A survey of former shad streams in Maine* (No. 66). US Fish and Wildlife Service.

Trap Count Statistics. (2022). Maine.Gov. Retrieved July 24, 2022, from https://www.maine.gov/dmr/science-research/searun/programs/trapcounts.html