

Quantifying optimal sampling effort for estimating recruit abundance for juvenile anadromous alewife

Matthew T. Devine^{1,2}, Allison H. Roy^{1,2,3}, Andrew R. Whiteley⁴ and Adrian Jordaan¹

¹Department of Environmental Conservation, University of Massachusetts, Amherst, MA 01003

²Massachusetts Cooperative Fish and Wildlife Research Unit

³U.S. Geological Survey

⁴Department of Ecosystem and Conservation Sciences, University of Montana, Missoula, MT, 59812

Abstract:

Anadromous alewives (*Alosa pseudoharengus*) are considered an important historical forage for a variety of predatory fish species. Alewife populations, and thus their role in aquatic ecosystems, have declined throughout their range necessitating improved monitoring and assessment. Current monitoring employs adult run counts at river fishways and fisheries surveys at sea and in large rivers and estuaries, but does not quantify juvenile recruitment in freshwater nursery habitats. This approach has resulted in considerable uncertainty regarding stock status and mortality estimates. We use fishery-independent methods to link spawner and recruit life stages by exploring sampling effort required to estimate juvenile alewife densities in freshwater lakes. Fish were sampled in freshwater lakes using a small-sized pelagic purse seine at night throughout the summer growing season, and sampling effort varied from 3 seine hauls to more than 50 hauls. Data from 32 lakes along the northeastern US coast were used to describe the variation in catch within and across systems, and to evaluate uncertainty in growth and mortality coefficients. Results indicate that precision, and thus estimates of abundance, increased with incremental sampling effort. The number of hauls needed to accurately estimate abundance varied based on lake size and juvenile densities. Larger lakes with high densities may require up to 10 hauls and repeat visits, while small waterbodies with low densities may only require 5 hauls performed once during the summer. Ultimately, this information will provide guidance for sampling methodology to inform stock assessment models, harvest regulations, and monitoring strategies.

Keywords: anadromous alewives; sampling effort; stock assessment; uncertainty

Contact author: Matthew Devine

University of Massachusetts Amherst, Massachusetts Cooperative Fish and
Wildlife Research Unit

Email: mtdevine@umass.edu

Phone: 860-716-9926

Address: 160 Holdsworth Way,
Amherst, MA 01003

