

OFFICIAL ABSTRACT and CERTIFICATION

Shifting Environmental Factors Influence the Abundance and Fitness of Juvenile American Eels

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The American eel (*Anguilla rostrata*) is a catadromous migratory species, whose drastic decline has placed this fish on the IUCN endangered list. This study examined environmental factors linked to climate change that may influence the abundance and fitness of juvenile eels during their spring migration into a Hudson River tributary. A fyke net was deployed annually (2008-2019) in Furnace Brook to track seasonal glass eel migration. Eels were counted daily, weighed, as a proxy for fitness, and released upstream. A HOBO Logger, installed above the head of tide, measured water depth (a proxy for flow), with water temperature recorded separately. Our eleven-year analysis reveals an annual peak arrival of glass eels, occurring mid-season, likely in response to optimal water temperatures ~55F between Julian dates 95-116. It was found that the fittest eels arrive at lower water temperatures and higher water flows, earlier in the season. Glass eels arriving later were lighter and therefore weaker, likely the result of longer, more strenuous migrations. These findings suggest that the fittest eels have the highest chance at survival; however, shifting environmental conditions, particularly water temperature and flow may pose challenges for migrating eels in terms of overall energy reserves and food availability, furthering the grim outlook for this species. Collectively, our findings provide novel insight on patterns of American eel abundance and fitness in a tributary of the Hudson River, a critical habitat for this culturally, economically, and ecologically important species.

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