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## **Title**

Evaluation of Nature-like and Technical Fish Passes for the Passage of Alewife (*Alosa pseudoharengus*) at Two Coastal Streams in New England

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## Abstract

Nature-like fish passes have been designed with the intent to re-connect river corridors and provide passage for all species occurring in a system. Nature-like fish pass designs have been constructed in Europe and elsewhere with some success, but performance of these designs has not been evaluated for North American species. Re-establishing passage for adult anadromous clupeids to their spawning areas is critical considering their recent dramatic population declines. Two nature-like fish pass designs in New England were evaluated for passage of anadromous adult alewives (*Alosa pseudoharengus*) using passive integrated transponder (PIT) telemetry and showed differing results. At Town Brook in Plymouth, Massachusetts the 32 m long perturbation boulder rock ramp with a 1:24 slope passed 94% of attempting fish with most ascending in under 22 minutes. At East River in Guilford, Connecticut the 48 m long steppool bypass design with a 1:14 slope passed only 40% of attempting fish with a median transit time of 75 minutes. Two technical fishway designs at the field sites were also evaluated and showed contrasting performance. At Town Brook a 14 m long 1:7 slope pool and weir fishway exhibited attraction and passage deficiencies. At East River two 3.05 m long steppass fishways both passed the majority of attempting fish but one steppass fishway may have had poor attraction efficiency. At both sites tagged fish passed rapidly downstream through the fish passes after spawning. Nature like fish pass designs are suitable for the passage of alewife but further evaluations are required to more precisely identify the influence of vertical drop per pool and specific local hydraulics on behaviors and passage performance for this species.

## First Advisor

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