

## ABSTRACT

### SURVIVAL AND MOVEMENT OF ATLANTIC SALMON (*SALMO SALAR*) IN FRESHWATER

2006

GREGG E. HORTON

Ph. D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Dr. Benjamin Letcher

Survival and movement are fundamentally important processes that structure vertebrate populations. For mobile populations, mortality and emigration represent the only two ways that individuals are lost from a population and because each acts in concert with the other, it is neither possible nor practical to estimate or consider one without estimating or considering the other. When it comes to Atlantic salmon, growth is a third factor that is inextricably linked to the fate of individuals. The individual-based approach used in this work facilitated disentangling these three processes for multiple Atlantic salmon cohorts in two streams in New England. Advancements of this work include: (1) development and testing of stationary passive integrated transponder (PIT) tag detection techniques for tracking movement of stream fish; (2) new methods to incorporate emigration information into capture-mark-recapture models to assist in decoupling emigration from true mortality; (3) elucidating the effect of local movement on estimates of true survival; and (4) examining the effects of size on growth, survival and movement over multiple seasons.

#### **Publications:**

Horton, G. E., B.H. Letcher, M. M. Bailey, M. T. Kinnison, **in Press**. Atlantic salmon smolt production: the relative importance of survival and body growth, *Can. J. Fish. Aquat. Sci.*

Horton, G.E., and B.H. Letcher. 2008. Movement patterns and study area boundaries: influences on survival estimation in capture–mark–recapture studies. *Oikos* 117(8): 1131-1142.

Letcher, B.H., G.E. Horton. 2008. Seasonal variation in size-dependent survival of juvenile Atlantic salmon (*Salmo salar*): performance of multistate capture-mark-recapture models, *Can. J. Fish. Aquat. Sci.* 65: 1649-1666.

Horton, G. E., T. L. Dubreuil, and B. H. Letcher. 2007. A model for estimating passive integrated transponder (PIT) tag antenna efficiencies for interval-specific

emigration rates. *Transactions of the American Fisheries Society* 136: 1165-1176.

Zydlewski, G.B., G. Horton, T. Dubreuil, B. Letcher, S. Casey, and J. Zydlewski. 2006. Remote monitoring of fish in small streams: a unified approach using PIT tags. *Fisheries* 31(10): 492-502.

Letcher, B. H., G. E. Horton, T. L. Dubreuil, and M. J. O'Donnell. 2005. A field test of the extent of bias in selection estimates after accounting for emigration. *Evolutionary Ecology Research* 7(4): 643-650.

Sigourney, D. B., G. E. Horton, T. L. Dubreuil, A. M. Varaday, and B. H. Letcher. 2005. Electroshocking and PIT tagging of juvenile Atlantic salmon: Are there interactive effects on growth and survival? *North American Journal of Fisheries Management* 25(3): 1016-1021.