Allison Barlows, Fisheries & Wildlife

University: University of Missouri-Columbia
Year in School: Senior
Hometown: St. Louis, Missouri
Faculty Mentor: Dr. Raymond Semlitsch, Biological Sciences
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Effects of shade and predation on survival and growth of larval gray treefrogs (Hyla veriscolor)

Allison Barlows, Daniel Hocking, and Raymond Semlitsch

Worldwide biodiversity has been most seriously endangered by the degradation of natural habitats (Groom et al., 2006). As part of the larger Land-use Effects on Amphibian Populations (LEAP) project, we examined some implications of timber harvest for larval treefrog development and survival. Shade and predator levels are two factors expected to significantly impact treefrog larvae in clearcut ponds compared with forested ponds. Our experiment consisted of 24 cattle tanks to which 100 newly hatched tadpoles were added in mid-May 2006. Each tank was randomly assigned a treatment combination, consisting of high and low shade simulated by tank covers and 4 levels predator density (dragonfly larvae; family Libellulidae). Though there was no difference in days to metamorphosis between treatments, the survival and size of the metamorphosed frogs differed greatly as shade or predation level was changed. The percent survival in low shade treatments was greater than in high shade treatments (71.0% and 65.7%, respectively), as was the average mass at metamorphosis (0.3347 g and 0.2960 g, respectively), which indicates a higher average growth rate in sunnier ponds. This was probably due to a higher level of solar radiation causing increased periphyton growth, which the tadpoles utilize as food. In the predator treatments, ponds that had no dragonfly larvae had a greater percent survival than the high predator density ponds (81.2% and 61.8%), however, the average mass of the zero and high treatments were similar and smaller than masses in the low and medium treatments. We attribute small size at metamorphosis in the high predator treatments to reduced tadpole activity in order to avoid predators. The higher survival rate in the low predator treatments resulted in greater tadpole density and less food available per individual. This density effect resulted in smaller average mass at metamorphosis.