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Invertebrate Phenology and Prey Selection of Three Sympatric Species of Salmonids; Implications for Individual Fish Growth

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Abstract
Growth plays an important roll in the survival of individual salmonid fish. Diet inevitably plays a significant role in the determination of salmonid growth, with these diets consisting primarily of aquatic macroinvertebrates, predominately insect taxa. Aquatic insects have a complex life history with most having a short, aerial adult period and an aquatic juvenile stage(s). The periodicity of this juvenile stage (voltinicity) can take a few months to a few years, with the vast majority lasting a single year. These numerous and overlapping phenologies therefore have a significant impact on the availability of prey that salmonid fish find profitable.

Variation in the availability and use of macroinvertebrate prey may be an important determinant of growth variation in stream salmonids. However, few studies possess the requisite information to make these links explicitly, particularly for more than one co-occurring species. Drift and benthic invertebrate availability and selection were measured for three

sympatric species of stream salmonids (Atlantic salmon, brook trout, and brown trout) in a long-term study site at West Brook, Whately MA through out 2003.

Benthic macroinvertebrates were found to have a strong seasonal cycle of size and abundance in West Brook. Consistent with the numerical domination of univoltine aquatic insects in this stream, relatively few large, individuals are present in the spring prior to the peak of adult emergence, with many small, individuals in the fall. This phenology combined with abiotic factors (discharge, temperature) has significant effect on the availability of profitable salmonid prey.

Examining the role of prey selection revealed that salmonid fish were able to capitalize on this seasonal abundance. Additionally, salmonid species were shown to change foraging tactics from drift feeding to the consumption of both benthic and terrestrial derived prey. These results suggest that spring is a period of high prey abundance producing a common pattern of high consumption and growth for all three species. Among-species differences in diet are most manifest during periods of resource scarcity. These results indicate that seasonal dynamics in physical conditions and invertebrate phenology may combine to produce a critical period for individual growth in stream salmonids.

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