

ABSTRACT

FACTORS INFLUENCING THE DIET AND GROWTH OF JUVENILE ATLANTIC SALMON

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In New England there are ongoing efforts to restore Atlantic salmon (*Salmo salar*) to rivers where they historically occurred, but were extirpated from due to dam construction, loss of habitat, and degraded water quality. Since the late 1960's, when inter-governmental committees were formed to develop and implement basin-wide restoration plans, freshwater management has (at various times) focused on increasing adult returns by stocking fry, parr and smolts into mainstem and tributary habitat. For the early life stages (i.e., fry and parr), recruitment to the smolt stage is dependent on survival governed by factors such as predation and overwinter mortality. Growth plays a primary role in both factors; salmon that grow faster reduce their risk to predation and to overwinter mortality. Additionally, faster growing fish tend to smolt earlier, which limits the time they are exposed to freshwater sources of mortality. The research I conducted focused on how diet and exposure to stressors influence growth of Atlantic salmon. The first study examined diel and seasonal variability in gut fullness and prey composition of juvenile salmon in a New England brook, then compared those feeding patterns with growth patterns of a separate study population on the same brook. On seven occasions between June 1998 and April 1999 I collected stomach contents, invertebrate samples, water temperature and stream discharge information at four to six hour intervals over the course of 24-hours. Gut fullness varied seasonally, and in some months diel differences were noted. Prey composition varied greatly between months, with Baetid mayflies dominating in the summer months, Limnephilid caddisflies in the fall, and Ephemerellid mayflies in the late winter/early spring. Correlations between fullness and abiotic environmental variables were observed. This study provides new information on the diel and monthly food habits of juvenile salmon in a temperate, North American stream. Results suggest that spring and fall are critical periods of feeding for post-young-of-year salmon. The field study required repeatedly exposing fish to gastric lavage and electric current. While these sampling techniques are commonly used in fisheries research and management,

few studies have investigated the effect of repeated exposure on long-term fish growth. Therefore, my second study consisted of two laboratory experiments designed to evaluate the impact of the stressors on growth of Atlantic salmon by comparing final weight and growth trajectory of fish across treatments. Experiment 1 compared controls, fish lavaged-only, and fish both lavaged and shocked. Experiment 2 compared controls and fish shocked at 100-400 volts. Results indicate that lavaging does not negatively influence salmon growth, but that shocking at high voltage, or in conjunction with lavaging, does affect growth trajectory. Both of these studies provide information that should be useful to researchers and managers interested in the factors influencing growth of Atlantic salmon.

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