



The relationship of physical habitat to the distribution of northern pike and walleye in two Montana prairie streams
by John William Guzevich

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University
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Abstract:

Beaver Creek and Little Beaver Creek, located in eastern Montana, are tributaries to the Little Missouri River. These prairie streams were found to support small, reproducing, possibly non-migratory populations of northern pike (*Esox lucius*) and walleye (*Stizostedion vitreum vitreum*), two coolwater fish species more commonly associated with lacustrine and large riverine habitats.

Both streams were sampled from April 1990 through August 1991 to assess their physicochemical attributes and gamefish distribution. Correlation and logistic regression models were employed to assess the variation in biomass of northern pike and walleye in relation to prairie stream habitats. In Beaver Creek, northern pike were distributed in the middle portion of the drainage, with their presence related to submerged aquatic vegetation, water transparency, gravel substrate, conductivity and a streamside cover of forbs and grasses. Walleye distribution was likewise confined to the middle portion of the drainage, overlapping that of the pike although extending slightly farther upstream. Walleye presence was related to various measures of pool dimension, moderate turbidity, sand substrate and a lack of instream cover. In Little Beaver Creek, northern pike ranged through the middle portion of the drainage and their abundance was related to pH, pool volume, organic debris and a sand substrate. Walleye were not found in Little Beaver Creek.

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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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ABSTRACT

Beaver Creek and Little Beaver Creek, located in eastern Montana, are tributaries to the Little Missouri River. These prairie streams were found to support small, reproducing, possibly non-migratory populations of northern pike (*Esox lucius*) and walleye (*Stizostedion vitreum vitreum*), two coolwater fish species more commonly associated with lacustrine and large riverine habitats. Both streams were sampled from April 1990 through August 1991 to assess their physicochemical attributes and gamefish distribution. Correlation and logistic regression models were employed to assess the variation in biomass of northern pike and walleye in relation to prairie stream habitats. In Beaver Creek, northern pike were distributed in the middle portion of the drainage, with their presence related to submerged aquatic vegetation, water transparency, gravel substrate, conductivity and a streamside cover of forbs and grasses. Walleye distribution was likewise confined to the middle portion of the drainage, overlapping that of the pike although extending slightly farther upstream. Walleye presence was related to various measures of pool dimension, moderate turbidity, sand substrate and a lack of instream cover. In Little Beaver Creek, northern pike ranged through the middle portion of the drainage and their abundance was related to pH, pool volume, organic debris and a sand substrate. Walleye were not found in Little Beaver Creek.

INTRODUCTION

Physical habitat characteristics are believed to interact to determine the occurrence and biomass of fishes within streams (Lobb and Orth 1991). These physicochemical attributes contribute to the delineation of an organism's niche (Layher and Maughan 1985). Because so many factors can influence this relationship, there can be much variation among streams, regions and years. Previous studies describing the influence of physical habitat on fish occurrence in warmwater streams have assessed fish species commonly associated with these habitats (Schlosser 1982; Layher and Maughan 1985; Lobb and Orth 1991). In this study, I examined habitat characteristics associated with the distribution of two fish species not commonly found in small, warmwater prairie streams.

Beaver Creek and Little Beaver Creek, two eastern Montana streams (Figure 1), were found to support small, reproducing populations of northern pike (*Esox lucius*) and walleye (*Stizostedion vitreum vitreum*). These intermittent prairie streams are characterized by a wide range of habitat conditions, sporadic flow regimes and high summer water temperatures.

