

# Predatory Effects of Northern Pike and Largemouth Bass: Bioenergetic Modeling and Ten Years of Fish Community Sampling

Craig P. Paukert<sup>a,b</sup>, Wayne Stancill<sup>c</sup>,  
Timothy J. DeBates<sup>a</sup>, and David W. Willis<sup>a</sup>

## ABSTRACT

Bluegill (*Lepomis macrochirus*), yellow perch (*Perca flavescens*), northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), and common carp (*Cyprinus carpio*) were sampled in fall 1992 to 2001 in Pelican Lake, Nebraska using electrofishing, gill netting, and trap netting to evaluate the effects of northern pike and largemouth bass on the introductions of bluegill and perch and the potential effects of northern pike on common carp recruitment throughout a 10-year period. The number of yellow perch per gill net remained low even after over 59,000 adult perch were stocked in 1994. However, the number of bluegill collected per hour of night electrofishing increased from <20 prior to 1997 (when 102,800 25-50 mm bluegills were stocked) and has typically been >40 since then. The mean number of common carp collected per gill net remained low in all years and protection of northern pike  $\geq 710$  mm with a maximum length limit may have aided in controlling carp recruitment. Bioenergetic modeling revealed that the 2001 northern pike population consumed between 49,000 and 77,000 yellow perch, suggesting that these predators can substantially reduce perch abundance.

## INTRODUCTION

The introduction of warmwater and coolwater fish species into lakes and impoundments is a common practice. Smith and Reeves (1986) reported that 29 states primarily in the Midwest and Southeast stock bluegill (*Lepomis macrochirus*), whereas the yellow perch (*Perca flavescens*) is commonly stocked in the Midwest to provide angling opportunities and prey for larger predators (Conover 1986). However, success of these introductions may depend in part on predator abundance. To provide quality angling opportunities for these panfish, a sufficient predator population is needed to control the reproductive potential and avoid overabundant, slow growing panfish. However, an overabundance of predators may reduce panfish abundance to levels not acceptable to anglers.

Northern pike (*Esox lucius*) and largemouth bass (*Micropterus salmoides*) can exert substantial influences on fish community structure. Northern pike may reduce abundance and size structure of yellow perch through predation (Margenau 1995, Paukert and Willis In press) but are less likely to affect bluegill (Beyerle and Williams 1968, Paukert and Willis In press). Anderson and Shupp (1986) suggested that stocking northern pike into Horseshoe Lake,

<sup>a</sup> Department of Wildlife and Fisheries Sciences, PO Box 2140B, South Dakota State University, Brookings, South Dakota 57007.

<sup>b</sup> Corresponding author present address: Grand Canyon Monitoring and Research Center, 2255 North Gemini Drive, Flagstaff, Arizona; E-mail: cpaukert@usgs.gov.

<sup>c</sup> U.S. Fish and Wildlife Service, Office of Fishery Assistance, 420 South Garfield Avenue, Room 400, Pierre, South Dakota 57501