

Evaluation of Michigan Creel Survey Catch Rate Estimator

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Abstract.—Access-site creel surveys are conducted at numerous Great Lakes ports and on inland waters each year in Michigan to estimate angling effort and catch. Estimated catch is the product of estimated angler hours and catch rate. Catch rate has been determined by averaging angler party catch per hour by species, angling mode, and time period. This method for calculating catch rate is not weighted by number of anglers in the party or by length of fishing trip which could lead to biases in estimates. Effects of bias on accuracy and precision of catch per hour estimates were measured using Monte Carlo sampling techniques on 132 data sets from Michigan access-site creel surveys. Each data set was considered a discrete population and population catch rate parameters were compared with sample catch rate estimates. Estimated mean catch rate by angler party was significantly greater, $P_{\alpha} \leq 0.05$, than population catch rate parameters in 82 data sets and significantly less in 49 others. Due to trip length and angler party size bias, the sample confidence limits were incorrectly represented in 123 of 132 data sets. Biases associated with averaging angling party catch rates were found to be prevalent in Michigan access-site creel surveys. I concluded that averaging angler party catch rates is inappropriate for Michigan access-site creel surveys. Calculating catch rate by dividing total catch by total hours from angler interviews eliminates the bias.

Introduction

Michigan Department of Natural Resources (MDNR), Fisheries Division conducts creel surveys on inland and Great Lakes waters of Michigan to evaluate status and trends in fish populations, changes in sportfishing regulations, trends in angling effort, success of fish plantings, and success of other management practices (Ryckman and Lockwood 1985; Rakoczy and Lockwood 1988; Alexander et al 1979; Schneider and Lockwood 1979; Beyerle 1984; and Galbraith and Schneider 1984). In 1994, some 16,000 angling parties fishing Lake Michigan (G. Rakoczy, MDNR, personal communication) and

over 2,000 angling parties fishing six inland lakes and Southern Michigan's Rogue River (Lockwood 1995) were interviewed.

Michigan creel surveys are best described as access-site creel surveys (Malvestuto 1983) and follow a stratified design using structured random sampling within strata (Fabrizio et al 1991). These access-site creel surveys consist of two separate sampling components, angler counts and angler party interviews. Angler counts are made at each site or lake and averaged by angling mode and time period (Ryckman 1981; Ryckman and Lockwood 1985). Mean counts are then expanded by hours sampled in a given time period to estimate total angling effort. Angling parties are interviewed as