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Black Bass Fishing Seasons in Michigan: Background, Research Review, and Recommendations

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Introduction

The Michigan Department of Natural Resources (MDNR) is committed to the conservation, protection, management, use, and enjoyment of the state's natural resources for current and future generations. The mission of Fisheries Division is "to protect and enhance the public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimum use of these resources for the benefit of the people of Michigan." Therefore, Fisheries Division works to maximize recreational fishing opportunities where possible, while ensuring the sustainability and quality of sport fish populations, and the ecosystems in which they live.

Michigan has two species of black bass: largemouth bass *Micropterus salmoides* and smallmouth bass *M. dolomieu*. The harvest season for largemouth bass and smallmouth bass in Michigan is set by statute. Similarly, statutory provisions prohibit fishing for or targeting species outside of the open

harvest season. Over the years, bass angling groups have expressed a desire to extend the fishing season for black bass. In lieu of pursuing statutory changes, a study of six lakes was conducted by Fisheries Division in 1988–90 to estimate impacts on bass populations from preseason fishing. Although this study detected no "catastrophic" effects on bass fisheries or bass recruitment, inadequacies of the study design and lack of resources available for sampling prevented rigorous examination of the effects of early season catch-and-release fishing during the bass nesting season on bass fisheries and recruitment.

It became obvious that the study of six lakes mentioned above did not provide the answers needed to determine whether a change in the bass season throughout the state was warranted. Therefore, beginning in 2002, Fisheries Division sought to integrate a wider knowledge base (professional experience and literature review) to evaluate black bass seasonal regulations and the potential effects of an expanded fishing season. At statewide meetings in 2002 and 2003, field and research fisheries biologists discussed the issue at length, reviewed the literature, and entertained presentations by governmental and university researchers from Michigan, Ohio, Indiana, and Ontario, Canada. Several members of the Michigan biologists group (representing division managers and researchers, as well as university faculty) were chosen to serve on the newly formed Smallmouth and Largemouth Bass Regulations Committee (SALBRC). We (the committee) were directed to evaluate current seasonal bass regulations in Michigan and to determine if seasons could be altered to allow for more recreational bass fishing opportunity, without placing undue risk on the sustainability and quality of bass fisheries and their associated fish populations and aquatic ecosystems.

This document summarizes our comprehensive assessment of potential black bass seasonal regulations in Michigan and recommendations that we provided to the division. In particular, we sought to anticipate the potential benefits and risks associated with allowing bass fishing prior to Memorial Day weekend. Doing so would substantially increase the extent to which fishing occurs while black bass are nesting. This issue is a controversial one for both ethical and biological reasons. The decision is made more difficult by existing uncertainties regarding the biological effects of fishing during the nesting season on the sustainability of black bass populations and quality of fishing opportunities in Michigan. The uncertainty regarding the effects of any early season extension on black bass populations requires that the risk of negative effects be characterized as well as possible and weighed against expected benefits of such a regulation change. For example, we agreed that an increase in fishing opportunities (by increasing the duration of the bass fishing season) would not be acceptable if it was likely to substantially reduce the quality (i.e., size structure and density) of bass fisheries. In addition, we sought to identify regulations that could (a) be easily understood by the general public, (b) be applied to most, if not all, bass waters of the state, and (c) simplify enforcement.

In this document, we first provide an overview of the ecological, social, and economic components of the issue upon which our recommendation was based. We then consider Michigan regulations past and present in the context of trends in regulations throughout North America. After providing an overview of black bass biology, we summarize the literature most relevant to the biological effects of fishing during the nesting season on bass populations (specifically, bass recruitment and adult survival). We then integrate this information to characterize the expected benefits, risks, and uncertainties associated with several different management scenarios. Our recommendation was based on this exercise. We close by summarizing the remaining uncertainties that must be addressed (and recommended approach to research) before additional improvements or modifications to black bass regulations can be achieved.

It should be noted that our committee's efforts occurred during 2003 and 2004. In 2005, subsequent to writing this report, an angler opinion survey was conducted, SALBRC was disbanded, and a meeting between Fisheries Division personnel and the external Coolwater Regulations Steering Committee was conducted. The Fisheries Division Management Team used this report, the angler survey, and additional public feedback to produce their recommendation to the Natural Resources

Commission in fall 2005, which resulted in new regulations (scheduled to "sunset" after five years) taking effect in 2006. These new regulations will allow catch and release of largemouth and smallmouth bass from the last Saturday of April (Lower Peninsula) or May 15 (Upper Peninsula) until the harvest season begins on its 'traditional' day of the Saturday of Memorial Day weekend. These events, discussion, and final decision relating to this new regulation, which occurred subsequent to our 2003–04 efforts as a committee, will be summarized in a forthcoming Fisheries Division document.

Ecological Significance of Black Bass

Black bass in Michigan are ecologically important. Both species of black bass, largemouth bass and smallmouth bass, are native predators found in a wide variety of habitats throughout the state. Black bass are opportunistic foragers, allowing them to take advantage of a wide range of prey items. Large black bass are efficient piscivores (meaning they consume fish), playing a pivotal role in the food web dynamics of north temperate lakes. They co-evolved with the native panfish species in Michigan waters and, under most conditions, facilitate healthy panfish populations, with favorable size structure, through predation. By promoting balanced panfish populations, black bass indirectly help reduce panfish predation on large zooplankton, which helps maintain clear water, thus encouraging healthy aquatic plant communities (Carpenter and Kitchell 1993; Mittelbach et al. 1995; Power et al. 1996). For example, whole-lake experiments in northern Wisconsin have demonstrated that changes in largemouth bass populations can cause three-fold changes in phytoplankton biomass and primary production (Carpenter et al. 1987; Carpenter and Kitchell 1993). Because phytoplankton determine water clarity, in large part, largemouth bass have been recognized as "keystone" species in north temperate lakes, meaning that they have a disproportionately large effect on lake ecosystems.

Black bass predation likewise influences the species composition of fish communities (Lewis and Helms 1964; Tonn and Magnuson 1982). Black bass prefer soft-rayed fishes, such as minnows, over spiny-rayed fishes, such as bluegill and pumpkinseed. When bass are abundant, the abundance of minnows is usually very low, because of direct predation on these preferred prey and because of indirect effects on the prey (Carpenter et al. 1987).

Black bass cause changes in the behavior of their prey. When these important predators are abundant in a lake, potential prey alter their own behavior, reducing the chance of being eaten. Such changes in behavior have been observed in a variety of bass prey, including sunfish *Lepomis* spp. (Mittelbach 1986; Mittelbach and Chesson 1987; Mittelbach and Osenberg 1992), minnows (Carpenter et al. 1987), and crayfish (Stein 1977). One such change in behavior involves change in habitat use. When largemouth bass are present in lakes or ponds, juvenile sunfish of several species and minnows stay predominantly in the littoral zone, where their growth rates are lower but where they are less vulnerable to bass than in the open-water zone (Werner et al. 1983; Werner and Gilliam 1984; Mittelbach 1986; Carpenter et al. 1987). Such influence of bass predators on juvenile prey fish links the population dynamics of those species, even when the adults have distinct food resources (Mittelbach and Chesson 1987; Mittelbach and Osenberg 1992).

Although large black bass are important predators of panfish such as bluegill, small juvenile bass are competitors of juvenile panfish. Juveniles of several species of fish can be found in the littoral zone of lakes, and there can be significant competition among the species. High densities of juvenile panfish can depress the density of aquatic insects and other prey so much that juvenile bass grow slowly and delay their shift to piscivory (Olson et al. 1995). As a result, if panfish abundance increases due to poor predatory control by a reduced bass population, the ability of bass population abundance to recover, through increased recruitment, may be hampered by competition between juvenile bass and juvenile panfish.

Past and ongoing research initiatives demonstrate that effects of bass on lake food webs and water quality are complex and of fundamental importance to lake ecosystems. Thus, maintaining the abundance, size structure, and genetic integrity of bass populations are key components to management of aquatic ecosystems in Michigan.

Social and Economic Significance of Black Bass Fisheries

Fishing for black bass is a major recreational activity in Michigan and across a large region of North America. There are approximately one-half million anglers in Michigan who predominately fish for black bass, representing ~30% of all state licensed anglers (USFWS 1999, USFWS and USBOC 2001). In fact, Michigan ranks 11th nationally in number of bass anglers. Angler-days spent fishing for bass in Michigan account for nearly 23% of the annual total in Michigan (i.e., nearly 4.7 of 19.8 million; USFWS 1999; USFWS and USBOC 2001). Even on the Great Lakes and connecting waterways, where fishing opportunities are exceptionally diverse, black bass rank third in terms of number of anglers and first in effort (days of fishing). As individuals, these anglers spend an average of 13 days per year pursuing bass and invest $642 annually in this pursuit. An estimate of the total economic impact of bass fishing activity in Michigan, $321 million annually, should be considered a minimum given that bass fishing is probably the most heavily marketed fishery of all species and most sponsored fishing tournaments are directed at bass (Schramm et al. 1991). For the entire U.S., there are approximately 11 million bass anglers who spend over $12.8 billion annually, an average exceeding $1000 per angler (B. Shupp, Bass Angler Sportsmen's Society [B.A.S.S.], personal communication). With more than 1,000 tournaments per year, Michigan ranks fourth in the nation, and is the only northern state in the top five tournament states (Kerr and Kamke 2003). By itself, this is a powerful statistic, which attests to the quality of Michigan's aquatic resources in general and to its bass fisheries in particular. Currently we have no definitive numbers on the trend of bass fishing tournaments in Michigan, although they are likely increasing given general trends. Tournaments are increasing nationwide (B. Shupp, B.A.S.S., personal communication; Wilde 2003), and in another top-five tournament state (Oklahoma), fishing tournaments increased by 55% between 1994 and 1998 (Gilliland 1998).

Despite the increasing abundance of tournaments and visibility of tournament anglers, organized bass anglers represent a relatively small, unique subgroup of the half million bass anglers in Michigan. According to recent statistics (R. Spitler, Michigan Chapter-B.A.S.S., personal communication), there are currently 70 B.A.S.S. Federation clubs in Michigan, with a total membership of about 1,000 people. Although it is estimated that there are approximately 20,000 avid bass anglers in Michigan, of that subgroup, only about 2,000 regularly compete in bass tournaments. Viewed within the context of all anglers, these data indicate that avid bass anglers constitute 1.25% of Michigan's 1.7 million anglers, and regular tournament fishers make up only 0.1% of Michigan's fishing population. Tournament anglers tend to be younger, fish roughly twice as much, belong to a club, and perceive themselves as more skilled than non-tournament anglers (Wilde et al. 1998). In addition, compared with non-tournament anglers, competitive fishers in Texas place greater importance on catching larger, trophy-sized fish, developing their skills, winning a prize, and enjoying the challenge of the sport. Further, tournament anglers place less emphasis on keeping fish and are more likely to believe that bass released from tournaments survive. Though the Wilde et al. (1998) study only evaluated black bass anglers in Texas (another top-five fishing tournament state), the results suggested that the behaviors and attitudes of tournament anglers differ from those of non-tournament anglers, regardless of the target species. In contrast, generalized anglers tend to value the contemplative aspects over the competitive aspects of fishing. For example, in a Michigan study (Driver and Knopf 1976), warmwater lake anglers ranked the following motivations for fishing, in decreasing order of importance: experiencing nature, escaping, making a mental change, exploring, avoiding others' expectations, enjoying family, releasing tension, achieving, keeping fit, dominating

or controlling, and thrill seeking. Similarly, black bass anglers in Texas, as a whole, gave high marks to experiencing natural surroundings, getting away from other people, recreating with family, and experiencing the catch as motivational factors in their fishing activities (Fedler and Ditton 1994). Given the different motivations of these two broad groups, it is perhaps not surprising that non-tournament anglers perceive that bass tournaments negatively affect their fishing experiences, regardless of whether or not released fish survive (Wilde et al. 1998). As resource managers, we need to recognize that we need more specific information from both our tournament and non-tournament anglers in terms of basic fishery statistics (i.e., catch, effort, and harvest rates) and human dimensions data (i.e., perceptions, motivations, and expectations of the resource; see **Research Needs**).