

Crappie Regulation Recommendations

Background:

Crappies are popular among Minnesota anglers. Statewide, nearly 13% of Minnesota anglers prefer fishing for crappies, ranking them only lower than walleye (20%) and “any thing that bites (18%) (Jacobson et al. 1999). Crappies are among the three most sought after species in lake classes 22, 24, 29, 31, and 38 (Cook and Younk 1998). More than 20% of all crappies harvested by Minnesota anglers were from Class 24 lakes (Cook and Younk 2001). Nearly 86% of black crappies released by summer anglers are less than 8 inches long, but over 90% of those released by winter anglers are less than 7 inches long. Most black crappies harvested by anglers are 8 to 9 inches in length (56% and 66% for summer and winter anglers, respectively)(Cook and Younk 1998).

Declines in the quality of black crappie fisheries have been linked to angling. Numbers of black crappie 1.75 pounds and larger entered into an annual fishing contest in northern Minnesota dropped from 151 in 1941 to 15 in 1987 (Olson and Cunningham 1989). This decline in the number of large black crappies also coincided with increases in fishing license sales in Minnesota.

Despite these declines quality black crappie fisheries still exist in the state. The proposed regulations are designed to create, restore, or preserve some quality black crappie fisheries. These proposed regulations are designed to increase by one to two inches (or 1/3 lb to 1/2 lb) the average size of harvested crappies, but these regulations will not reverse trends in trophy-sized black crappies observed by Olson and Cunningham (1989). With careful consideration and implementation, the proposed toolbox should allow managers to reach these goals.

Suggested Regulations:

Mortality and growth rates are the driving force in the success or failure of regulations designed to improve size structure or increase yield of crappie fisheries (Allen and Miranda 1995; Isermann et al. 2002). With that in mind we recommend the following regulations for crappie fisheries in Minnesota lakes. Each regulation proposed should meet the criteria recommended by the work group.

1. **5 Fish Creel Limit.** Should reduce harvest by 16-18 % (Cook and Younk 1998), or temporally redistribute harvest in lakes with inconsistent, but periodically high fishing pressure. Crappie population should meet the following criteria:
 - a. Crappies are a primary species managed in the body of water (due to evidence that walleye may negatively affect black crappie populations, managers should give higher priority to lakes that are not stocked with walleye fingerlings when choosing candidates for special regulations).
 - b. Heavy fishing pressure directed at crappies for short periods of time within a year (i.e. late winter ice season) or “pulse” fisheries with heavy fishing pressure in certain years due to inconsistent recruitment.
 - c. Evidence that the lake has a history of producing large (>12 inch) or older (> 5 years old) crappies.

- d. Crappies should reach at least 7 inches in length by age 3.
 - e. This regulation could also be considered in newly renovated lakes or those previously closed to public fishing.
2. **10 inch Minimum Size Limit.** Should improve size structure and/or yield in lakes with consistently high fishing pressure and populations that meet these criteria:
- a. Crappies are a primary species managed in the body of water (due to evidence that walleye may negatively affect black crappie populations, managers should give higher priority to lakes that are not stocked with walleye fingerlings when choosing candidates for special regulations).
 - b. Evidence of decreased size structure caused by continuously high fishing pressure.
 - c. Age structure consisting mainly of age-3 or younger individuals (i.e. few older individuals).
 - d. Evidence that the lake has a history of producing large (>12 inch) or older (> 5 years old) crappies.
 - e. General growth and mortality guidelines: crappies should reach 10 inches in length by age 3 and have natural mortality less than 40%; they should reach 9 inches by age 3 and have natural mortality less than 30%; or they should reach 8 inches by age 3 and have natural mortality less than 20%.
 - f. Stockpiling can occur if growth rates slow as a result of reduced harvest. If stockpiling occurs then we recommend either lifting the regulation or applying a protected slot of 8 to 10 to 12 inches so that harvest of small crappies can occur.
3. **5 Fish Creel Limit with a 10 Inch Minimum Size Limit.** Should temporally redistribute harvest in lakes with consistently high fishing pressure, and crappies populations meet the following criteria:
- a. Crappies are a primary species managed in the body of water (due to evidence that walleye may negatively affect black crappie populations, managers should give higher priority to lakes that are not stocked with walleye fingerlings when choosing candidates for special regulations).
 - b. Consistently heavy fishing pressure directed at crappies.
 - c. Evidence that the lake has a history of producing large (>12 inch) or older (> 5 years old) crappies.
 - d. General growth and mortality guidelines: crappies should reach 10 inches in length by age 3 and have natural mortality less than 40%; they should reach 9 inches by age 3 and have natural mortality less than 30%; or they should reach 8 inches by age 3 and have natural mortality less than 20%.
 - e. Stockpiling can occur if growth rates slow as a result of reduced harvest. If stockpiling occurs then we recommend either lifting the regulation or applying a protected slot of 8 to 10,11, or 12 inches so that harvest of crappies < 8 inches can occur.
 - f. This regulation could also be considered in newly renovated lakes or those previously closed to public fishing.

When choosing between the creel reduction and the size limit, we suggest that if pressure targeted at crappie exceeds 12-15 hr/acre and the lake meets the aforementioned criteria, (minimum growth) the 10 inch size limit or protected slot limit be implemented. When pressure is less than this or seasonal in nature, growth is slower, and the lake has produced larger crappies, then the 5-fish bag limit would probably be the better option.

We recommend that 30 to 40 lakes, statewide, be considered for inclusion in these regulations. We also recommend that these regulations be considered primarily for populations of black crappie, however they are likely applicable to populations of white crappie as well as mixed populations.

Biological Considerations:

Growth and Mortality

Crappie populations must exhibit adequate growth and relatively low natural mortality before applying these regulations. However, we do not know the minimum growth and or maximum natural mortality criteria needed to improve yield or average size of crappies by implementing the reduced creel limit. This regulation should not be applied to populations considered stunted (5 or more years required to reach 8 inches in length) or to populations where natural and fishing mortality appear compensatory rather than additive. Populations with compensatory mortality have relatively constant maximum ages and lengths over time even though fishing pressure was inconsistent. These populations also tend to be fast growing (reaching 8 inches in 3 years or less) and short-lived (maximum ages 4 to 6 years), and individuals exceeding 12 inches in length are rarely sampled.

Ten-inch minimum length limits will not increase yield or average size of harvested crappies unless crappies reach 10 inches in 3 years or less (end of their third growing season) and natural mortality is less than 40% (Allen and Miranda 1995; Isermann et al. 2002). If more than three years are needed for crappies to reach 10 inches then natural mortality has to be lower before these 10-inch length limits can increase yield or average size of harvested crappies. For example, natural mortality should be less than 30% if crappies are only 9 inches long after three growing seasons, and natural mortality should be less than 20% if crappies are only 8 inches long after three growing seasons.

Although growth rates are easily determined, we are unaware of any method that provides reliable estimates of natural mortality or total mortality from one time samples such as those collected during lakes surveys and population assessments (McInerney and Cross, in preparation (a) and (b), MNDNR, unpublished data). Therefore, managers must rely on age distribution data in their trap net catches, historical records, and their best judgment in determining natural mortality.

Historical Characteristics/Potential

Historical records and anecdotal information about potential sizes of crappies will be useful information to consider. Creel surveys from the 1950's were fairly common and

length frequencies from these surveys can be a valuable source of information (Parsons 1996). Length frequency information from historical trap net data sets is also useful in identifying potential candidate lakes. Historical gill net data should not be used.

Current Fishery and Fish Community

Information from recent creel surveys would be useful in judging the usefulness and likely success of proposed regulations. Lakes in which crappies are considered a secondary species may also be included in the suite of lakes. However, those lakes with crappies listed as the primary species should be given higher priority. Lakes that are not currently managed for walleye through stocking should be given the strongest consideration for special crappie regulations.

Lake Characteristics

Crappies are highly mobile species, therefore lakes with significant connections to other water bodies should not be considered for special regulations unless all water bodies can be included in the regulation (Parsons and Reed, In Review).

Social Considerations

Social concerns will play a large role in the success, failure or even implementation of a special regulation. As with other management activities, lake associations, resort owners, and other stakeholders should be included in the process of selecting lakes for special regulations. To avoid the “not in my backyard” situation, special regulations should be distributed throughout the state.

Conservation Officers are also an integral part of the success or failure of a special regulation. They should be included during the selection phase of the special regulation process. It is also vital that they are incorporated into the process before public involvement. Conservation officers should be aware of the selection process and the rationale behind the regulation so that they can communicate the scope and purpose of the regulation to public.

Evaluation

Population Assessments

We recommend that these regulations be evaluated for a period of at least 10 years. This timeframe will help us sort out effects of strong and weak year-classes. Crappie populations should be sampled with trap nets, and trap nets should be set during the same time of year within lakes, similar to standard lake surveys and population assessments (MNDNR 1993). Trap netting during summer is ineffective for sampling crappies in some lakes, especially larger lakes that thermally stratify (i.e. lake classes 22 and 27). Therefore, special spring or fall trap netting should be done in these cases. Spring trap netting should be done after water temperatures reach 50 °F but before submergent macrophytes become established. Fall trap netting should be done in September (60 to 72 °F) but not in October. Catchability of black crappies in trap nets is usually higher in spring than in fall. We recommend sampling be on a three-year cycle, however, more frequent sampling will improve the likelihood of detecting a change in size distribution in the population. Scale or otolith samples should be removed from at least 10 individuals

from each 10-mm or 0.5-inch length group < 300 mm (12 inches), and at least 10 individuals from each 25-mm or 1.0 inch length group > 300 mm (12 inches).

Because some lakes lack adequate pre-regulation population data, we also recommend selecting one control lake. Control lakes should have similar fish communities and receive similar amounts of angling pressure as lakes with these regulations. Some of these control lakes could be used as controls for other species which toolbox regulations are being evaluated. Furthermore, some lakes identified as candidates for these regulations could also be used as controls. Control lakes should also be sampled with similar frequency as those lakes with regulations.

Funding will not be available for additional creel surveys; therefore, we will not be able to reliably address why regulations succeeded or failed. However, we highly recommend that Areas periodically visit boat accesses and fish houses (when angler pressure is high in that particular lake) so that they can contact anglers and examine their catches. These visits serve several purposes. We can gather data on lengths of crappies harvested, determine some degree of noncompliance, educate anglers about the regulation, and get angler comments about the regulation. Local conservation officers should also be contacted for similar information, especially if they are able to check angler catches.

Literature Cited

- Allen, M.S., and L.E. Miranda. 1995. An evaluation of the value of harvest restrictions in managing crappie fisheries. *North American Journal of Fisheries Management* 15: 766-772.
- Cook, M.F., and J.A. Younk. 1998. A historical examination of creel surveys from Minnesota's lakes and streams. Minnesota Department of Natural Resources, Division of Fish and Wildlife Investigational Report 464, St. Paul.
- Cook, M.F., and J.A. Younk. 2001. A recalculation of the annual statewide recreational fishing effort and harvest in Minnesota lakes. Minnesota Department of Natural Resources, Division of Fish and Wildlife Investigational Report 493, St. Paul.
- Isermann, D.A., S.M. Sammons, P.W. Bettoli, and T.N. Churchill. 2002. Predictive evaluation of size restrictions as management strategies for Tennessee reservoir crappie fisheries. *North American Journal of Fisheries Management* 22:1349-1357.
- Jacobson, P.C., T.L. Close, C.S. Anderson, and T.J. Kelly. 1999. Attitudes of Minnesota residents about fisheries issues. Minnesota Department of Natural Resources, Section of Fisheries Investigational Report 478, St. Paul.
- McInerny, M.C., and T.K. Cross. In preparation (a). Comparison of methods for estimating instantaneous total mortality of black crappies in Minnesota lakes. Minnesota Department of Natural Resources Division of Fisheries Research Report.
- McInerny, M.C., and T.K. Cross. In preparation (a). Estimating exploitation of black crappies in Minnesota lakes. Minnesota Department of Natural Resources Division of Fisheries Research Report.
- Minnesota Department of Natural Resources (MNDNR). 1993. Manual of instructions for lake survey. Minnesota Department of Natural Resources, Section of Fisheries, Special Publication Number 147, St. Paul.
- Olson, D.E., and P.K. Cunningham. 1989. Sport-fisheries trends shown by an annual Minnesota fishing contest over a 58-year period. *North American Journal of Fisheries Management* 9:287-297.
- Parsons, B.G. 1996. Length frequencies of angler-caught fish in the 1950's and 1990's: were they the good old days? Minnesota Department of Natural Resources Unpublished Manuscript.

Parsons, B.G. and J.R. Reed. In Review. Movement of black crappie and bluegill among interconnected lakes in Minnesota.