

FISH MANAGEMENT REPORT 141

September 1989

Bureau of Fisheries Management • Department of Natural Resources • Madison, Wisconsin 53707

MECHANICAL REMOVAL OF BULLHEAD
AND BLACK CRAPPIE ALONG WITH
GAMEFISH STOCKING, STAPLES LAKE,
BARRON COUNTY, 1977-86

By
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ABSTRACT

A 1977 winterkill on 304-acre Staples Lake in Barron County left an unbalanced fishery dominated by black bullhead, Ictalurus melas, and black crappie, Pomoxis nigromaculatus. Subsequent stocking of walleye, Stizostedion vitreum vitreum, and largemouth bass, Micropterus salmoides, for 7 years failed to restore balance. Therefore, during spring 1984 and 1985, approximately 23,498 bullhead (77/acre), weighing 17,624 lbs (58 lbs/acre), and 154,888 black crappie (510/acre), weighing 30,481 lbs (100 lbs/acre) were removed. The fyke net operations reduced the estimated bullhead population by nearly 3/4, while black crappie catch per effort decreased by about 30%. During and after the removal operations, stocking continued, yielding improved walleye recruitment and increased largemouth bass catch per effort. I recommend, therefore, the mechanical removal of overabundant panfish along with gamefish stocking as complementary management practices to restore fishery balance.

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INTRODUCTION

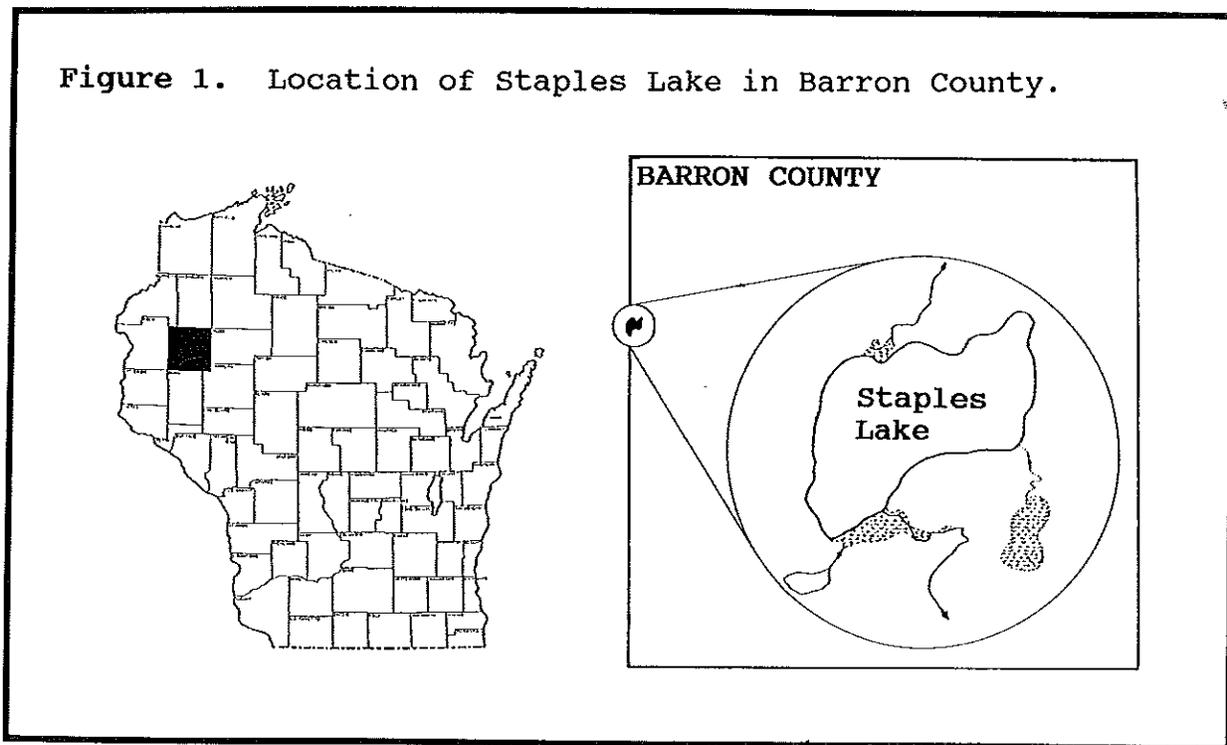
Fisheries dominated by slow-growing panfish are a management problem in Wisconsin (WDNR 1979). When winterkill causes such imbalance, the resulting overabundant species are often black bullhead, Ictalurus melas, and black crappie, Pomoxis nigromaculatus.

In February 1977, winterkill undermined the thriving, diverse Staples Lake fishery -- which included walleye, Stizostedion vitreum vitreum; largemouth bass, Micropterus salmoides; northern pike, Esox lucius; bluegill, Lepomis macrochirus; pumpkinseed, Lepomis gibbosus; yellow perch, Perca flavescens; and white sucker, Catostomus commersoni; along with black bullhead and black crappie. The last two species survived disproportionately.

STUDY AREA

Staples Lake is in Barron County in northwest Wisconsin. The 304-acre lake has a 10-ft mean depth, with a 17-ft maximum. It has three intermittent inlets and one outlet -- the headwaters of the Apple River.

Figure 1. Location of Staples Lake in Barron County.



Highly eutrophic, Staples Lake undergoes heavy algae blooms during summer and early fall -- aquatic macrophytes can cover 20-25% of the lake bottom. The 1977 winterkill is the only one on record, although there are undocumented reports of winterkill during the 1930s.

METHODS

Stocking began after the 1977 winterkill in an effort to suppress rapidly increasing bullhead and black crappie populations (Table 1).

Table 1. Stocking since the 1977 winterkill.

Year	Number (and Length in Inches) of Fish Stocked		
	Walleye	Largemouth Bass	Bluegill
1977	15,232 (3)	10,000 (2)	225 (5-6)
1978	15,357 (3) 260,000 (fry)	10,000 (1)	1,000 (5)
1979	15,294 (3)	10,000 (fry)	
1980	300,000 (fry)		
1981	21,950 (3-5)	10,000 (3)	
1982	43,691 (3-5) 305,000 (fry)	15,226 (1-5)	
1983	13,600 (3) 300,000 (fry)	16,300 (3-5)	
1984	30,100 (3)	3,000 (2)	
1985	15,297 (3)		
1986	15,042 (3)		

When stocking had failed to reestablish walleye populations by 1981, Fisheries Management proposed alternate strategies -- 1) gamefish stocking with concurrent mechanical panfish removal, 2) fish toxicant applications with subsequent restocking, or 3) no active management. Staples Lake area residents, polled by mail and at a public meeting, voted for the plans -- 55%, 41%, and 4%, respectively.

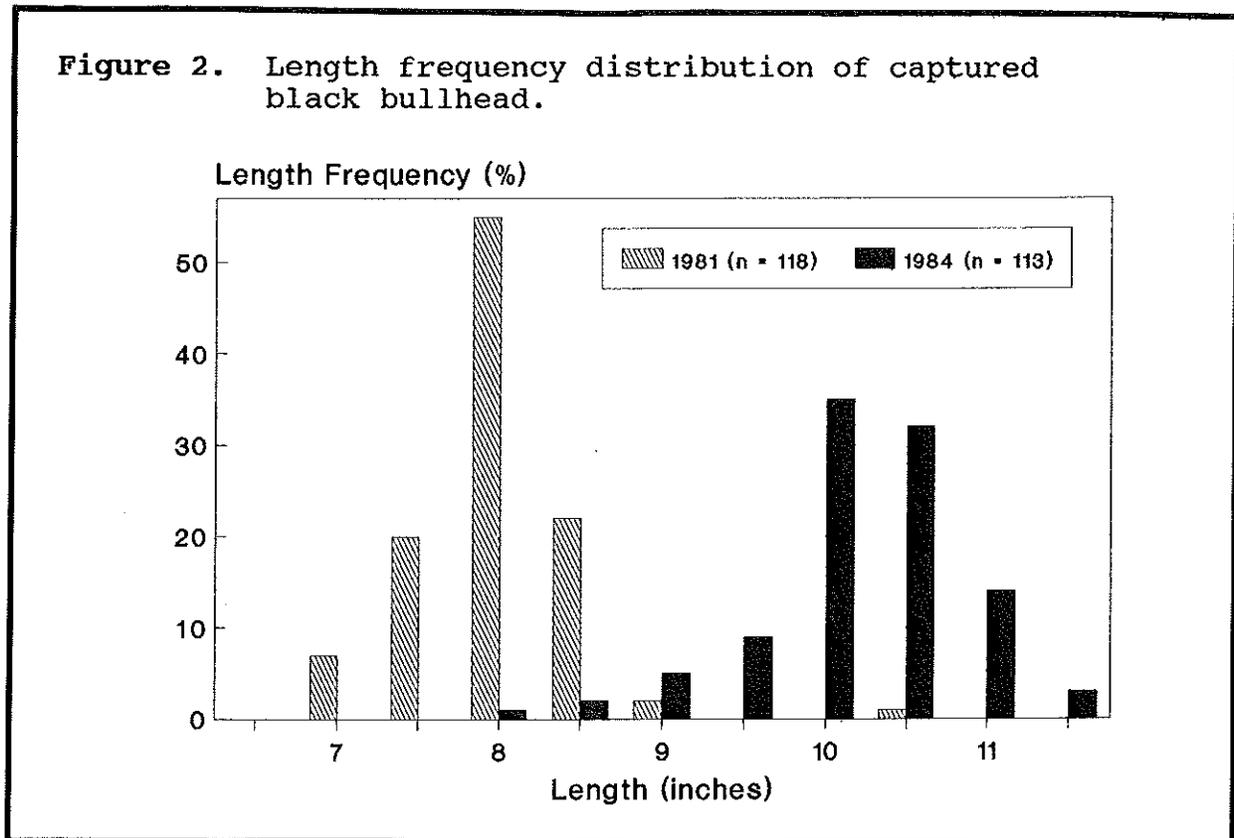
WDNR crews using 1- to 2-inch stretch mesh fyke nets removed bullhead and black crappie during 406 net lifts from 16 April through 17 May 1984. They removed additional black crappie during 128 net lifts from 16 April through 2 May 1985. The bullhead were sold; the crappie, stocked elsewhere; and all other netted fish were returned to Staples Lake.

Fish surveys in 1977, 1981, 1984, and 1986 combined spring fyke-netting with spring and fall electrofishing (250-volt A.C.) data. The survey crews measured gamefish and panfish to the nearest 0.5 inch and 0.1 inch, respectively, for length-frequency analyses and scale-aged a representative sampling of these fish for age-length analyses. They also recorded catch per effort to compare population densities before and after removal operations. The Delury method (Ricker 1975) was used to estimate bullhead populations. Black crappie condition factors were calculated using: $C = W10^5/L^3$, where C = condition factor, W = weight to the nearest 0.1 lb, and L = length to nearest 0.1 inch.

RESULTS

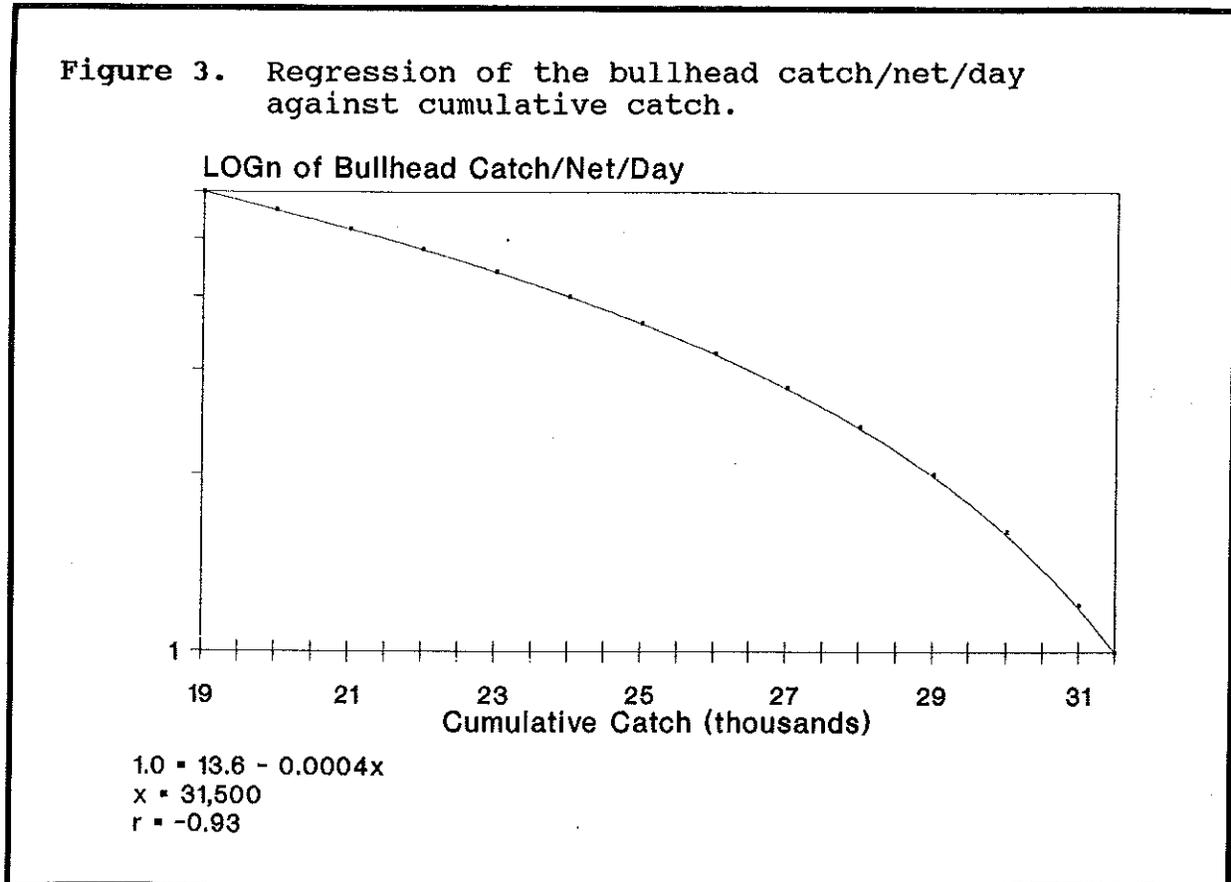
BULLHEAD AND BLACK CRAPPIE

From 1981 to 1984, the mean length of captured black bullhead increased from 8.0 inches to 10.4 inches (Fig. 2). Population density did not preclude moderate growth, and black bullhead size was acceptable to anglers.



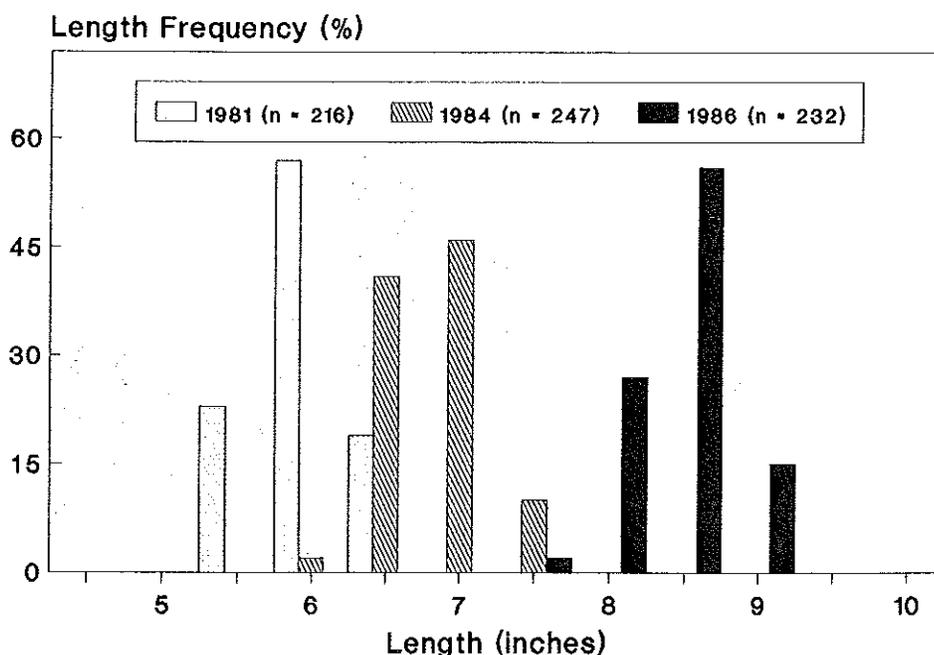
The estimated bullhead population before removal was 31,500 (Fig. 3). In 1984, almost 3/4 of the population were removed -- about 23,498 bullhead (77 bullhead/acre), weighing 17,6724 lbs (58 lbs/acre). Species composition was 82% black bullhead, 10% brown bullhead, and 8% yellow bullhead.

Figure 3. Regression of the bullhead catch/net/day against cumulative catch.



The black crappie population could not be estimated using the Delury Method. In 1984-85, about 154,888 black crappie (510 black crappie/acre), weighing 30,481 lbs (100 lbs/acre), were removed. Average catch per effort of fyke-netted black crappie decreased 30% from 425/lift in 1984 to 297/lift in 1985, while the mean condition factor increased from 52.5 to 57.0. Black crappie growth rates also increased from 0.3"/year for the 3 years before removal operations to 0.9"/year for the 2 years after, raising springtime mean lengths from 7.0 inches in 1984 to 8.7 inches in 1986 (Fig. 4). Length at age, however, remained below average for northwest Wisconsin.

Figure 4. Length frequency distribution of captured black crappies.



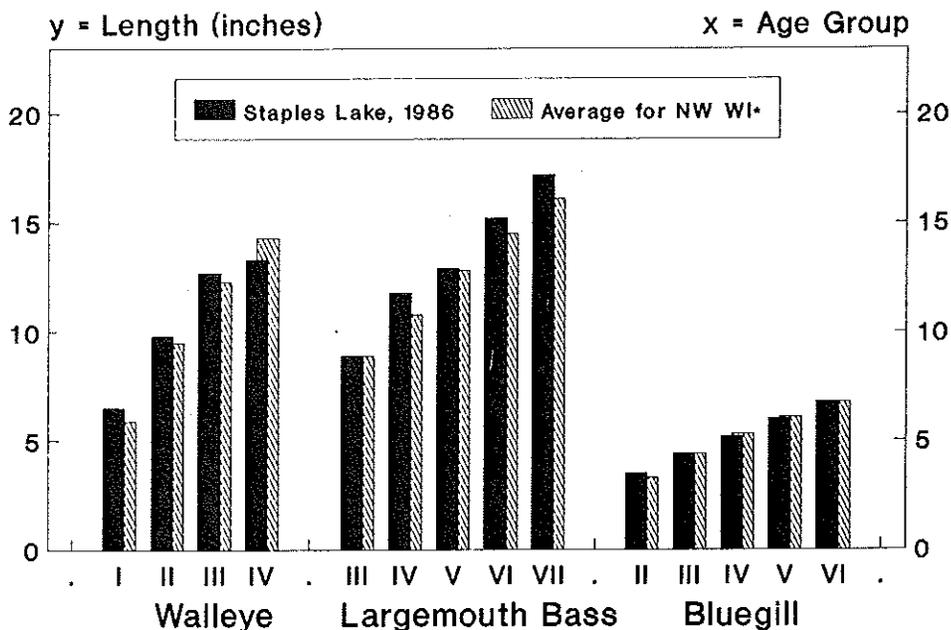
WALLEYE

An average 20,618 walleye fingerlings were stocked each summer during the study, except in 1980. During that year, as well as 1978, 1982, and 1983, walleye fry stocking averaged 291,250.

Walleye catch per effort during spring and fall electrofishing was low in 1977 (6 walleye/hour) and 1981 (8 walleye/hour), but increased in 1984 (63 walleye/hour) and 1986 (127 walleye/hour).

The mean length of electrofished walleye was 7.8 inches in 1984 and 9.4 inches in 1986. Walleye growth rates were average for northwest Wisconsin (Fig. 5).

Figure 5. Length at age comparisons.



• WI Department of Natural Resources,
Bureau of Fisheries Management, 1984

LARGEMOUTH BASS AND BLUEGILL

Largemouth bass recovered from the winterkill more quickly than walleye. An average 10,647 largemouth bass fingerlings were stocked 7 times during the study. Electrofishing catch per effort increased from 5/hour in 1977 to 29/hour in 1981 to 45/hour in 1986. The 1984 and 1986 surveys found consistent recruitment representing at least five year classes and growth rates slightly above average for northwest Wisconsin.

Bluegill catch per effort in 1977 was 0.78/hour. After 1,225 adult bluegill were stocked in 1977-78, bluegill catch per effort in 1981 increased to 31/hour. In 1986, it was 18/hour, showing a moderately low bluegill population with consistent recruitment and average growth for northwest Wisconsin.

DISCUSSION

Mechanically removing 77 bullhead/acre and 510 black crappie/acre from Staples Lake improved black crappie growth rates and size distribution. Similarly, removing 112 bullhead/acre and 1,143 black crappie/acre from English Lake, Manitowoc County, Wisconsin also improved black crappie growth rates and size distribution (Hanson, et al., 1983).

Bullhead and black crappie removal may have implemented recovery of the walleye fishery in Staples Lake. Inversely, black crappie introduced to 13 New York lakes in the 1960s resulted in loss or decline of walleye populations in 11 of the lakes a decade later (Schiavone, 1985). The most drastic effects were on shallow homothermous lakes like Staples Lake.

Staples Lake produced no successful walleye year classes 1977-81 after winterkill left overwhelming numbers of black crappie and bullhead. By 1984, two moderate year classes were produced, and electrofishing catch per effort was 63/hour. In 1984-85 during removal operations, two very strong year classes were produced, and electrofishing catch per effort jumped to 127/hour in 1986. Catch per effort of largemouth bass also increased after removal operations.

In Staples Lake, 7 years of walleye and largemouth bass stocking failed to significantly reduce bullhead and black crappie populations, in part because of poor survival rates for stocked walleye fry and fingerlings. Gamefish stocking alone to control panfish overabundance also failed in Clear Lake, Sawyer County, Wisconsin, when stocked walleye and muskellunge had no significant effect on a slow-growing bluegill population (Snow 1968).

MANAGEMENT RECOMMENDATIONS

I recommend the mechanical removal of overabundant panfish along with gamefish stocking to restore a balanced fishery.

Total eradication and restocking has been the most successful method of restoring a balanced fishery. Chemical treatments, however, have disadvantages, including nontarget species mortality, prolonged time requirements, and high cost. Eradication on Staples Lake, using rotenone at 2.0 ppm, would have cost approximately \$20,000. By contrast, mechanical removal cost about \$10,000.

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ACKNOWLEDGEMENTS

Thanks to Tom Beard, Jerry Perkins, Tod Brecka, and Larry Steams for assisting in the field work. Thanks also to Tom Beard and Mike Hansen for critically reviewing the manuscript and to Kendra Nelson for editing it.

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