Dispersal of Black Bass following Tournament Release in an Oklahoma Reservoir[1]

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Abstract: Largemouth bass *(Micropterus salmoides)* were tagged and released following a series of weekly tournaments at Lake Thunderbird, Oklahoma, in 1993. Forty-nine percent of the 176 fish recaptured in 1993 were caught within 0.8 km of the release sight and 64% were caught within a 1.6-km radius. Dispersal during the second year was slightly greater with 35% of the 56 recaptured bass coming from within 0.8 km and 46% from 1.6 km of the release site. The maximum distance from the release site that a tagged fish was recaptured was 12 km with a median distance of 1.6 km after 18 months. Natural dispersal and the use of live-release boats to redistribute tournament-caught bass during the second year of the study reduced the number of tagged fish that were recaptured; however, the harvest rate of tagged bass caught by non-tournament anglers was similar between 1993 (68%) and 1994 (67%).

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Fishery managers across North America have expressed concerns about the biological effects of live-release black bass (*Micropterus* spp.) tournaments (Schramm et al. 1991*a*). A 1989 survey indicated that management agencies were worried about dislocation of fish from home ranges, changes in availability to anglers, and the potential impacts that released fish had on forage fish and populations of competing species (Schramm et al. 1991*b*).

Much of this concern centered around concentrating bass at certain high-use boat ramp or marina areas with repeated tournament releases. Studies on the dispersal of released bass have shown that while some fish move out of the release area quickly (Warnecke 1986), many fish remain close to weigh-in sites for long periods of time (Lantz and Carver 1975, Blake 1981, Wilde and Paulson 1989). These areas are often frequented by both tournament and non-tournament anglers to catch previously released bass (P. Greenwood, Tournament Anglers Guild, pers. commun.). If the recapture of tournament-released bass increases mortality, either through additional

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handling and weigh-in associated stress or through overharvest by non-tournament anglers, then negative impacts could occur to bass populations, to fishing quality, and ultimately, to angler satisfaction.

In Oklahoma, there was a 55% increase in the number of bass tournaments permitted by controlling authorities between 1994 and 1998 (Gilliland 1998). Much of that increase came from weekly evening "jackpot" tournaments that use the same weigh-in and release sites for up to 25 weeks in a row. Tournament organizers and contestants expressed concern about the impacts these events might be having and asked the Oklahoma Department of Wildlife Conservation (ODWC) for guidance. In 1993, the Department's Fishery Research Laboratory (OFRL) began a study with the objectives of evaluating 1) dispersal, 2) recapture rate by both tournament and non-tournament anglers, and 3) harvest of tournament-released bass following weekly tournaments at a central Oklahoma reservoir.

I wish to thank the organizers and participants of the Lake Thunderbird Wednesday Night Bass Tournament and the Fishers of Men Bass Club for their cooperation and donations that made this study possible.

Methods

Lake Thunderbird is a 2,448-ha Bureau of Reclamation impoundment on the Little River, 20 km east of Norman, Oklahoma. The Lake Thunderbird Wednesday Night Bass Tournament conducts weekly 3-hour evening contests (1800 to 2100 hours) from April through September. Contestants must abide by a 5 bass per team creel limit and a 356-mm minimum length limit during the tournament.

In April 1993, OFRL personnel began tagging all bass that were brought to the weekly weigh-ins. Initial catch locations were not determined. Each fish was anesthetized in a salt solution (3% NaCI for 15–20 sec), measured (TL in mm), weighed (g), and implanted with a serially numbered Hallprint IEX internal anchor tag imprinted with the ODWC name and telephone number. Fish were placed in an aerated recovery tank for several minutes of observation before being released at the boat ramp/weigh-in site.

No estimates of tag retention or tagging mortality were made; however, previous studies using these tags showed excellent retention (95% +) with negligible mortality (T. Hollman, Miss. Dep. Game, Fish and Parks, pers. commun.). Delayed mortality of bass from tournament-related stresses was assumed to be minimal because of the short duration of these tournaments and cool water temperatures (<23 C) during the tagging phase of the study (Wilde 1999).

Newspaper releases, radio and television spots, posters, and presentations were used to advertise the program and encourage anglers to call when they caught a tagged fish. No rewards were offered. OFRL personnel attended Wednesday night tournament weigh-ins for the remainder of the 1993 season and all of the 1994 season to record recaptures and interview anglers. When anglers reported catching a tagged fish they were asked for the tag number, capture location, if they kept or released it, and what the length, weight and condition of the fish was if they noted this

information. A map of the reservoir with a 0.8 km grid superimposed on it was used to help identify tagged fish capture locations. Capture location, distance from the release site, and time at liberty were compiled for each tagged fish reported by anglers for the next 18 months.

Results

Five hundred largemouth bass >356 mm in length were tagged and released at the Indian Point boat ramp between 7 April and 4 August 1993. An average of 33 bass were tagged and released each week until the target of 500 fish had been attained.

Two hundred thirty-two recaptures were made during the 2-year study. These included 21 tagged bass that were caught twice, 2 that were caught 3 times and 1 that was caught 4 times. The first recapture was made 6 days after tagging began and 1 fish was recaptured <30 minutes after being weighed in the tournament, and tagged and released.

Of the 176 recaptures made in 1993, 91 (52%) were provided by tournament anglers while non-tournament anglers provided 85 fish (48%). During the second year of the study, tournament organizers began transporting fish away from the weigh-in site using contestant boats as live-release shuttles. This redistribution of the recaptured fish may have contributed to the overall reduction in recaptures compared to the previous year. Fifty-six recaptures were recorded in 1994. The proportions caught by each group were the same as in 1993 with tournament anglers providing 29 tagged fish (52%) and non-tournament anglers provided 27 (48%).

All but 3 tournament-caught fish were released alive after their second weigh-in (3% "harvest"). Non-tournament anglers harvested 76 of the 112 tagged fish they caught during the 2 years. This represented a harvest of 33% of all recaptures and 15% of the total number of bass tagged. Despite the decline in number of tagged fish caught in 1994, the harvest rate of recaptures remained constant between years with 58 of 85 in 1993 (68%) and 18 of 27 (67%) in 1994.

In 1993, 148 tagged bass (84%) were recaptured at sites connected to the release area by a continuous shoreline, whereas only 28 tagged fish (16%) were recaptured in areas where they had to cross deep, open water. Several fish were recaptured 3 to 5 km from the release site and 2 were recaptured 12 km away within 2 weeks of their being tagged. Forty-nine percent and 64% of 1993 recaptures were made within 0.8 km and 1.6 km of the release site, respectively (Fig. 1). The median distance traveled in 1993 was 0.5 km. In 1994, 35% of the tagged bass were caught within 0.08 km of the release site and 46% were recaptured within a 1.6 km radius (Fig. 1). The maximum distance from the release site a tagged fish was recaptured in 1994 was 10 km with a median distance of 3.2 km. For both years combined, the median distance from the release site that tagged fish were recaptured was 1.6 km.

Accurate length and weight data were obtained on 19 of the bass recaptured in 1994. The average increase in length was 34 mm and the average weight gain was 349 g. Smaller bass generally showed the greatest increases, with 1 fish growing 120 mm and gaining almost 1,330 g in 18 months at liberty. Several fish were observed

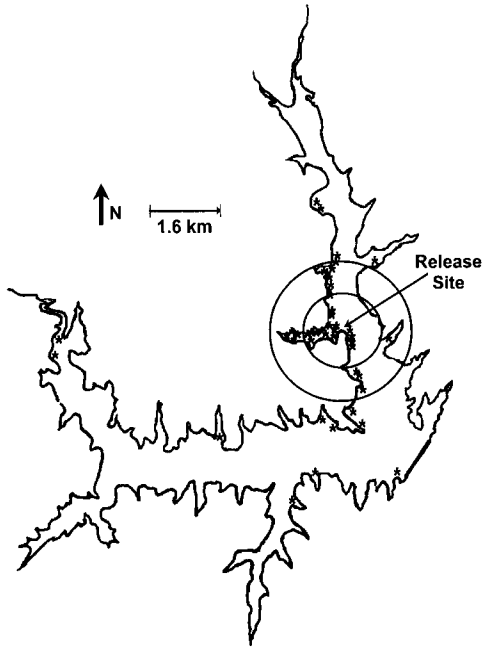

Figure 1. Lake Thunderbird, Oklahoma, showing the release site with asterisks indicating approximate locations where tagged largemouth bass were recaptured in 1993 and 1994. Many symbols represent several fish recaptured in close proximity to each other. In 1993, 49% and 64% of the recaptures were made within the 0.8 km and 1.6 km radius circles, respectively. In 1994, 35% and 46% of the recaptures were made within the 0.8 km and 1.6 km.

with fleshy growths surrounding the base of their tags. These were found to be benign tissue that had no apparent ill effects on the fish. Several affected bass showed above-average growth and weight gain and autopsies indicated normal healing on the inside of the body wall.

Discussion

Although some studies indicate that displaced fish move more than fish that are tagged and returned to their home ranges (Winter 1977, Tranquilli et al. 1981, Savitz and Thomas 1985, Mesing and Wicker 1986), our results support the findings of Lantz and Carver (1975), Blake (1981), and Wilde and Paulson (1989) which indicated many displaced largemouth bass do not travel extensively for some time after release. Fifty-five percent of the tagged fish recaptured during this study were caught within 1.6 km of the release site. These results are similar to those of Blake (1981) and Healy (1990) who reported that 48% and 41% of the tagged largemouth bass recaptured following tournaments in New York and California were recaptured within 1.6 km of their respective release sites.

Our study indicated there was minimal movement among some fish even though many were at liberty for over 18 months before recapture. The cove adjacent to the release site accounted for 37% of all recaptures (Fig. 1). Klindt and Schiavone (1991) reported that colder fall and winter water temperatures reduced dispersal of released fish; however, much of this study was conducted during the spring and summer when movement would have been expected to be greater.

Other factors were probably responsible for holding fish in the release area for such a long period. Abundant food, suitable habitat, and lack of competition with other bass may have precluded the need to move far from the release area. From the perspective of a year later, it is likely that natural events created the greater redistribution seen in 1994. An unusually dry summer resulted in a substantial decline in aquatic vegetation. Changes in prey fish abundance, foraging conditions, and habitat may have forced bass to move. The use of release boats by the weekly tournament probably also helped to spread some of the tagged fish to other areas of the lake.

This study showed that most Lake Thunderbird bass released following tournament weigh-in remained in the vicinity for a considerable length of time. The release area is also a favorite angling location for non-tournament boat and bank anglers (ODWC, unpubl. data). Lantz and Carver (1975) suggested that released bass may be especially vulnerable to angling because of hunger, genetic traits (aggressive nature), or depletion of the forage in release areas. Every Wednesday night from April through September, 1993 and 1994, the tournament anglers released up to 57 bass into a high-use area. These repeated releases of harvestable-size bass created a situation not unlike a put-and-take fishery where up to 68% of the tournament-released fish that were recaptured by non-tournament anglers were harvested. Creel surveys on Lake Thunderbird indicated that there was slightly higher than average catch and harvest rate in the area of the release site (ODWC, unpubl. data). While this was not a significant difference, it is likely that repeated releases of fish into such a high-use area probably inflated the harvest over what it would have been if those same fish were distributed throughout the reservoir. When tournament organizers eliminated the practice of restocking the weigh-in area each week, the net harvest of bass by non-tournament anglers was reduced.

Recommendations to tournament organizers at Lake Thunderbird and at other reservoirs across Oklahoma with similar situations are to utilize a live-release boat, fish-hauling truck or trailer to redistribute fish away from high-use areas. However, as Healy (1990) cautioned, it may be appropriate for tournament organizers to release bass away from popular weigh-in sites, but it must be done in a manner that insures it will not reduce survival of released fish. Another option tournament organizations may have is to rotate weigh-in sites throughout the year to more evenly distribute released fish.

A number of tournament organizations in Oklahoma have adopted these measures, building pontoon-style release boats or fish-hauling trailers with aerated tanks mounted on them to redistribute fish around the reservoir, or they apply for tournament permits at a number of different boats ramps during the season.

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