

# Exploitation of Crappie by Contest Anglers on Lake Texoma, Texas-Oklahoma

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*Abstract:* Contest angler exploitation rates for crappie (*Pomoxis* spp.)  $\geq 254$  mm total length (TL) were estimated for Lake Texoma, Texas-Oklahoma, from tags returned by anglers fishing in Crappiethon USA contests in 1994 and 1995. Unadjusted contest angler exploitation was 27% in 1994 and 23% in 1995. Exploitation rates were adjusted for handling and tagging mortality and tag retention. Non-reporting was assumed to be 0%. Handling and tagging mortality rate estimates were 22% in 1994 and 10% in 1995. Tag loss for both years was calculated at 14%. Adjusted contest angler exploitation rate of crappie  $\geq 254$  mm TL during Crappiethon was 41% in 1994 and 30% in 1995.

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Crappie rank second in angling preference and second in angler harvest at Lake Texoma, Texas-Oklahoma (Hysmith and Moczygemba 1996) and are therefore an important segment of the sport fishery. White crappie (*Pomoxis annularis*) and black crappie (*P. nigromaculatus*) occur in Lake Texoma. Texas Parks and Wildlife Department (TPWD) database contains trend information on relative abundance, size and age structure, angling effort, harvest, and catch rates of crappie but lacks information on angler exploitation rate and exploitation by contest anglers in particular. Knowledge of exploitation rate is essential to effective crappie management.

The literature contains many references to annual angler exploitation of crappie (Angyal and Maughan 1983, Boxrucker 1989, Saul and Jones 1990, Colvin 1991, Larson et al. 1991, Brock 1994), but no references to angler exploitation for <1-year periods were found. There is no reference to exploitation of crappie by fishing-contest anglers. Considering the lack of fishing-contest exploitation information and because most recreational angling for crappie occurs in the spring (Glass and Maughan 1982, Brock 1994), the objective of this study was to determine exploitation of crappie  $\geq 254$  mm TL at Lake Texoma by anglers participating in a 60-day Crappiethon USA fishing contest.

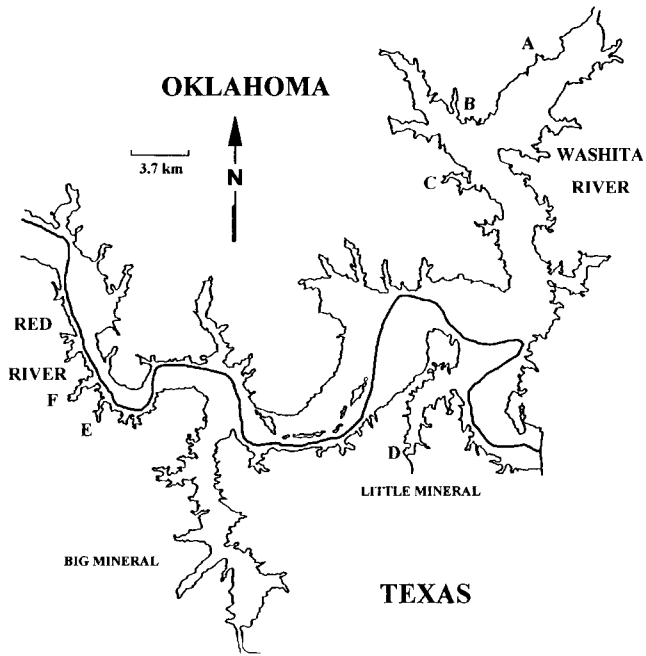
We acknowledge Crappiethon USA for providing fish tags and local businesses who participated in the Lake Texoma Crappiethon by paying cash rewards for tagged fish. Recognition is given to TPWD technicians J. R. Ballard and L. L. Sloan who aided in collecting, tagging, and releasing crappie and maintained and monitored the handling, tagging, and tag retention experiments and conducted ongoing creel surveys. Oklahoma Department of Wildlife Conservation, Fish Division, technicians R. E. Currie and R. S. Wichers also conducted ongoing creel surveys on Lake Texoma. Editorial comments by R. W. Luebke and R. L. McCabe were greatly appreciated. Funding for the study was provided in part by the Federal Aid in Sport Fish Restoration Act, Grant F-30-R of TPWD.

## Methods

Lake Texoma, a 36,018-ha impoundment of the Red River between Texas and Oklahoma, is located 120 km north of the Dallas-Fort Worth metroplex and 195 km south of Oklahoma City. The reservoir was constructed by the U.S. Army Corps of Engineers in 1944 for flood control, hydroelectric power, and as a municipal and industrial water source. Approximately 70% of the reservoir lies within Oklahoma and 30% is in Texas. The reservoir is moderately turbid with Secchi disk visibility of 1.5–1.8 m in the main pool (Matthews 1984). Fluctuating water levels deter growth of aquatic macrophytes. Maximum depth is 31 m and average depth is 10 m at conservation elevation. Crappie harvest regulations during the study on Lake Texoma included a 254-mm minimum length limit and 25-fish daily bag limit in Texas and no minimum length limit and 37-fish daily bag limit in Oklahoma.

A total of 1,306 crappies  $\geq 254$  mm were tagged in the Big Mineral and Little Mineral arms and the Catfish Bay and Cumberland Cove areas of Lake Texoma between 15 February and 18 March 1994 (Fig. 1). In conjunction with Crappiethon USA, 1,200 crappies were collected by volunteer and tournament anglers. Crappies were transported in live wells to holding pens located in marinas near where the fish were collected. Another 106 crappies  $\geq 254$  mm were collected by TPWD personnel in trap nets (TPWD 1993) set overnight in the Little Mineral arm on 17 February. These fish were transported in a TPWD live haul system (Hysmith et al. 1992) to a 1.2-m wide  $\times$  1.8-m long  $\times$  1.2-m deep live car constructed of 13-mm bar mesh nylon netting located in the boathouse at the Lake Texoma Fisheries Station (LTFS). All crappies were tagged with consecutively numbered Floy T-bar 68B tags and released in Texoma from Rock Creek Camp on the Red River arm to Cumberland Cove Resort on the Washita River arm (Fig. 1). Tagged crappies were transported to release points in live wells of private boats or in a TPWD live haul system.

In 1995, 1,144 crappies  $\geq 254$  mm were tagged in the Big Mineral and Little Mineral arms and Paw Paw Creek Resort, Cumberland Cove, and Bridgeview Resort areas of Lake Texoma between 15 February and 10 March (Fig. 1). In conjunction with Crappiethon USA, 1,000 crappies were collected by volunteer and tournament anglers. Crappies were transported in live wells to holding pens located in marinas near where the fish were collected. Another 144 crappie  $\geq 254$  mm were collected by



**Figure 1.** Location of crappie collection, release, and/or holding sites on Lake Texoma, Texas-Oklahoma: Big Mineral and Little Mineral arms, Cumberland Cove (A), Bridgeview Resort (B), Catfish Bay (C), Lake Texoma Fisheries Station (D), Paw Paw Creek Resort (E), and Rock Creek Camp (F).

TPWD personnel in trap nets (TPWD 1993) set overnight in the Little Mineral arm on 7 March. These fish were transported in the TPWD live haul system used in 1994 and held in the same live car in the same boathouse. All crappies were tagged with consecutively numbered tags as in 1994, but a different color was used in 1995. Release sites for tagged crappies were the same as in 1994 and transport to the release site was provided by the same or similar equipment.

Tagging and handling mortality each year was estimated from 50 crappie collected in trap nets by TPWD personnel. Each year a 0.04-ha pond located at the LTFS was filled with water from Lake Texoma and prey fishes provided. Test crappie were tagged and released into the pond. After 15 days the pond was drained and the population inventoried. A tag retention rate was calculated from the regression analysis:  $[\text{Log}(e) Y = -0.047 - 0.0017X]$ ; where:  $Y$ =tag retention and  $X$ =number of days (Brock 1994).

Local businesses around Lake Texoma sponsored the "Lake Texoma Crappie-thon" held 19 March–17 May 1994 and 11 March–9 May 1995. Contestants were required to purchase badges (\$5/individual, \$8/family, and \$4/senior in 1994 and \$3/individual and \$10/family in 1995) before fishing and rewards of \$25 to \$50,000 were offered to contest anglers returning live, tagged crappie to any participating business.

Reward values were randomly assigned to each tag. Returns provided data on the recapture of tagged fish by contest anglers. Non-reporting was assumed to be zero because of the high reward values.

Directed crappie angling effort was obtained from results of an ongoing annual creel survey on Lake Texoma (TPWD 1993). Additionally, to differentiate between contestant and non-contestant crappie anglers, all anglers in the creel survey encountered during the contest were asked if they were Crappiethon USA contestants.

Contest angler (Crappiethon USA participants) exploitation of crappie  $\geq 254$  mm TL was calculated using the following formula (Ricker 1958):

$$E=r/m;$$

where E=exploitation rate of crappie by contest anglers;

r = number of tag returns by contest anglers; and

m=total numbers of fish tagged, adjusted for tag retention and mortality.

## Results

There were 4,416 contest anglers in 1994 and 3,496 contest anglers in 1995. Contestants returned 356 tagged crappie in 1994 and 262 tagged crappie in 1995. Unadjusted contest angler exploitation was 27% in 1994 and 23% in 1995. Adjusting for tagging and handling mortality which was 22% in 1994 and 10% in 1995 and tag retention, 85% both years, contest angler exploitation of crappie  $\geq 254$  mm during the 60-day contest at Lake Texoma was 41% in 1994 and 30% in 1995.

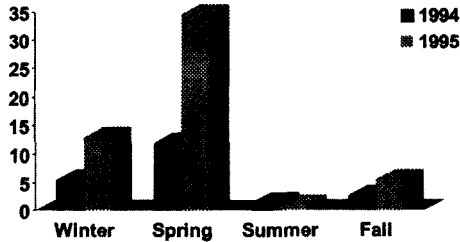
## Discussion

Brock (1994) conducted 9 tagging and handling mortality studies. He collected crappie in Lakes Columbus and Beulah, Mississippi, with trap nets and electrofishing. Mortality among 147 test fish was 5% to 40%. Larson et al. (1991) reported tagging and handling mortality of 35% to 40%. Their studies were conducted on 3 Georgia reservoirs and they collected crappie with trap nets, hoop nets, and electrofishing.

Since angler exploitation of crappie in Lake Texoma is skewed toward spring (Fig. 2), which coincides with the Crappiethon USA contests, we are comfortable with comparing our 60-day study to annual angler exploitation estimates. Furthermore, we did not find studies reporting data for <1 year. Contest angler exploitation of crappie in Lake Texoma falls within the range of annual angler exploitation (12%–68%) in reservoirs from Nebraska to Georgia (Schainost 1986, Boxrucker 1989, Colvin 1991, Larson et al. 1991, Reed and Davies 1991, and Brock 1994).

As with any exploitation estimate based on mark-and-recapture methods, accurate enumeration is difficult because of the numerous factors which can bias results. Factors which could have affected exploitation estimates during this study were recruitment of fish to harvestable sizes, vulnerability differences between tagged and

## Directed Effort



**Figure 2.** Directed crappie angling effort by season on Lake Texoma, Texas-Oklahoma. Data taken from an ongoing annual creel survey.

untagged fish, homing instinct of tagged crappie, and Crappiethon rules. Although recruitment in Lake Texoma is normally strong each year (Hysmith and Moczygamba 1996), this probably had little influence on exploitation estimates for this short study period. The vulnerability to angling of tagged fish used in this study may have differed from the vulnerability to angling of the overall population because most tagged fish were caught at least once by angling before recapture. Anecdotally, tagged crappie in this study may have become “educated” after being angled, which may have influenced their vulnerability. However, no studies were found concerning vulnerability of crappie to angling. The schooling nature of crappie may have allowed greater susceptibility to recapture. Once the school was located and if it contained significant numbers of tagged crappie, exploitation would have been limited only to the fish’s willingness to bite. There were a number of Crappiethon anglers who were also participants in the tagging tournaments. Crappie establish day home ranges (Markham et al. 1991) and may demonstrate a homing instinct similar to largemouth bass (*Micropterus salmoides*) (Mesing and Wicker 1986). This would make them more vulnerable to recapture by tagging-tournament anglers who would have knowledge of their home range. Crappiethon rules required participants to turn in only tagged live crappie at various businesses around Lake Texoma. Dead crappie were not eligible. This may have deflated exploitation estimates because dead fish were not considered in the calculation.

## Conclusions

Cooperation with Crappiethon USA required minimal agency expenditure. Crappiethon USA personnel handled marketing, organizing, coordinating, and record keeping. Crappiethon USA sponsors provided funds for tag rewards. This partner-shiping was mutually advantageous.

Considering the range of annual angler exploitation of crappies (12% to 68%), contest angler exploitation identified in this study (41% and 30%) may not appear

excessive. However, we assumed non-reporting to be 0% which may have deflated exploitation because contest rules forbade rewards for dead tagged crappie. Dead tagged crappie were simply filleted and forgotten. Not all anglers fishing for crappie during this 60-day period in 1994 and 1995 were Crappiethon contestants. In 1994 only 32% of the crappie anglers interviewed were contestants. In 1995 36% were Crappiethon USA contestants. Tagged crappies caught by non-contestants were not accounted for equation.

All things considered, contest angler exploitation of crappie may be high and fisheries managers on reservoirs hosting crappie fishing contests should be aware to the potential impact to the fishery. Despite what could have been a very high exploitation of crappie in 1994 and 1995, annual fish stock assessments have indicated the Lake Texoma crappie fishery is not over-exploited.

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