Angler Exploitation of Walleye in Norris Reservoir, Tennessee

Christopher J. O'Bara, *Tennessee Technological University, P. O. Box 5033, Cookeville, TN 38505*

Douglas P. Peterson, *Tennessee Wildlife Resources Agency, 6032 West Andrew Johnson Highway, Talbott, TN 37877*

Abstract: Walleye *(Stizostedion vitreum)* (TL>381 mm) were collected from February through April 1994 from 4 distinct regions and in March 1997 from 2 distinct regions of Norris Reservoir, Tennessee, and inserted with Hallprint T-bar anchor tags to determine angler exploitation, location of re-capture, and the effectiveness of a reduction in the daily creel limit. Fish were collected with both horizontal gill nets and electrofishing techniques, but only walleye captured by electrofishing gear were used in angler exploitation analysis. A $5 reward was offered to promote tag return. Annual angler adjusted exploitation was 30% (±9) in 1994 and 14% (± 11) in 1997 for the entire reservoir population. Annual angler adjusted exploitation was 42% (±11) in 1994 and 14% (±11) in 1997 for walleye tagged in 2 riverine spawning areas. Annual angler adjusted exploitation was 11% (±19) in 1994 for walleye tagged in 2 lake spawning areas. No walleye were tagged in lake spawning areas in 1997. Deviation between tagging location and angler capture location was minimal with >80% of walleye captured within the region of tagging. Only 1 riverine tagged walleye was captured in the lower lake region and only 1 lower lake tagged walleye was captured in a riverine region. Total angling mortality for 1994 was estimated to be 30% because none were reported released. Anglers reported that 6% of the tagged walleye caught were released in 1997. Delayed mortality was estimated from 66% (27C) to 1% (7C). Total angling mortality was approximately 14% at all water temperatures because of the extremely low release rate.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 54:135–145

Walleye is a valuable native sportfish throughout the southeastern United States being found in all southeastern states except Florida (Hackney and Holbrook 1978). Originally, 3 distinct races were believed to inhabit aquatic systems of the southeastern United States with the endemic Mississippi River drainage race restricted to streams and rivers in Kentucky and Tennessee, and sections of Virginia, North Carolina, South Carolina, Georgia, Alabama, and Mississippi. This race is believed to be the ancestral stock of the river-spawning cohorts of many Tennessee

River and Cumberland River tributary reservoirs (Hackney and Holbrook 1978). Reservoir construction has provided new habitat opportunities for walleye populations, and many state fisheries agencies have responded by introducing lake-spawning walleye from northern aquatic systems. In Tennessee, walleye from New York and Pennsylvania (Lake Erie broodstock) have been extensively introduced into many tributary reservoirs, and both riverine- and lake-spawning cohorts of walleye are found in many southeastern tributary reservoirs.

Concern about the perceived decline in angling opportunities for several fish species, including walleye, in Norris Reservoir led to the formation of the Norris Reservoir Task Force (Tomljanovich et al. 1996). Anglers felt walleye were being overharvested, especially in riverine spawning reaches, and new, more restrictive regulations were warranted. To address this concern, the Tennessee Wildlife Resources Agency (TWRA) reduced the daily creel limit from 10 to 5, but maintained a minimum size limit of 381 mm. The regulation change was effective 1 March 1994.

Walleye are an important component of the Norris Reservoir fishery, representing approximately 15% of total angler effort (O'Bara 1997). Previous studies reported tag returns of Norris Reservoir walleye ranging from 6% to 22% for the reservoir population (Fitz and Holbrook 1978) and from 15% to 26% for riverine walleye (Peterson and Lane 1990, Peterson 1991).

Both riverine- and lake-spawning sub-populations are believed to inhabit Norris Reservoir (Fitz and Holbrook 1978). The major riverine-spawning areas are the Clinch and Powell rivers. Lake-spawning walleye are believed to utilize rocky points, especially in many of the larger embayments (Big Creek and Cove Creek). Supplemental stocking of both riverine- and lake-spawning walleye has occurred via introductions from the TWRA Eagle Bend Fish Hatchery and a nursery pond in the Powell River arm. Riverine walleye broodstock have been acquired from both the Clinch and Powell rivers, and fry from Greers Ferry Lake, Arkansas. Lake walleye broodstock have been acquired from Lake Erie , as well as several Tennessee River and Cumberland River reservoirs.

This study was conducted as a part of a larger project on several Norris Reservoir fisheries. Specific objectives were: to determine annual angler exploitation and angling related mortality on walleye, and to ascertain both temporal and spatial capture patterns.

The Tennessee Wildlife Resources Agency and the Center for the Utilization, Management, and Protection of Water Resources at Tennessee Technological University (TTU) provided funding. J. Negus and M. Thurman (TWRA), and R. J. Cornell, D. K. Weaver, C. Centraccio, C. McCracken, B. Estes, and J. Crunk (all of TTU) contributed to this study.

Methods

Norris Reservoir is a Tennessee Valley Authority (TVA) operated tributary impoundment. The dam, completed in 1936, is located at Clinch River kilometer 128 creating a 13,840-ha reservoir at full pool. Two major tributaries of the reservoir are the Clinch River and Powell River, both of which originate in southwest Virginia. During spring, these 2 rivers provide spawning habitat for walleye and sauger *(S. canadense)* at the headwaters of Norris Reservoir (Fitz and Holbrook 1978). Several large embayments including Cove Creek and Big Creek, as well as a large area referred to as the Loyston Sea, are known to provide lake spawning areas.

Walleye were collected from 5 areas of Norris Reservoir (Fig. 1). The free-flowing reaches of the Clinch River and Powell River were considered distinct riverine spawning regions, and walleye tagged in these reaches were considered riverine walleye. The Big Creek and Cove Creek embayments were in the lower reservoir region (LRR). The Loyston Sea Region (LYS) was in the middle section of the reservoir. Fish tagged in these 2 regions were considered lake walleye. Collections were made both with horizontal gill nets 138- or 51-mm bar mesh, 30.5 m long, 2.4 m wide; 30-minute sets) and with boat-mounted electrofishing gear (220-V 2–4 AC/DC), but only walleye captured by electrofishing gear were included in the angler exploitation analysis. Lake walleye were collected and tagged from February 1994 through April 1994, and riverine walleye were collected and tagged in March 1994 and March 1997. After collection, all fish were kept in aerated live wells for 10 minutes prior to measuring and tagging. Fish were individually measured and sexed, and only individuals greater than the legal-size limit were tagged.

Walleye were inserted with anchor tags (T-bar, Model T-104, Hallprint, Australia) that were color-coded and uniquely numbered. Individual fish were retained for a minimum of 10 minutes after tagging to insure recovery and fish that appeared stressed were not released. To encourage tag returns, a $5 reward was offered for each returned tag, posters were placed at all commercial boat docks on Norris Reservoir and at area sporting-goods stores, articles were published in local newspapers, and public service radio announcements were broadcast. In all media, anglers were encouraged to return tags with information about capture location, date of capture, and whether the fish was released or harvested.

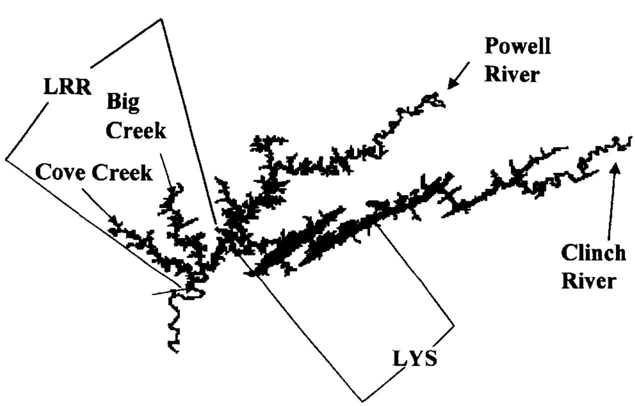

Figure 1. Tagging and recover embayments and regions of Norris Reservoir.

To estimate tag loss and total tagging-related mortality (tagging and handling) 70 walleye were collected in March 1997 with electrofishing gear and returned to the TWRA Eagle Bend Hatchery. At the hatchery, fish were either tagged or clipped (upper caudal fin), and held in 0.1-ha ponds for 21 days. Handling-related mortality was estimated with the clipped subset, and total tagging-related mortality was determined using only the tagged subset. Tagging-only induced mortality was determined as the difference of total tagging-related and handling mortality. To estimate angler nonreporting, the creel clerk distributed 450 postcards to anglers from November 1997 through May 1998. Anglers received a $5 reward for completing the postcard and returning it to TWRA. The percent not returned was considered the nonreporting rate.

All tags and information were initially returned to the TWRA Region IV Office, and once logged, information was sent to TTU-Water Center. If anglers did not provide the necessary information, they were contacted by mail in an attempt to complete the survey.

Annual angler exploitation was defined as a percent of tags returned by anglers during a 12-month period after tagging, adjusted for percent of released walleye, tag loss, tagging-related mortality, and nonreporting (Jagielo 1991). Annual angler catch also was determined and defined as the percent of tags returned corrected for tag loss, tagging-related mortality, and nonreporting by anglers. Confidence limits (95%) were determined using a binomial distribution for annual angler exploitation and catch, and unless otherwise indicated, were the measurement of variance.

Delayed mortality was determined based on the temperature-integrated model of Hoffman et al. (1996), and is presented in relation to water temperature. Tagged and returned sex ratio and length frequency distributions (25-mm size class) were compared using a chi-square test (alpha =0.05).

The length of time between tagging and angler capture was determined to the nearest month providing an understanding of angler behavior. All analysis was conducted on a 12-month basis and walleye were divided into river- and lake-tagged cohorts for temporal analysis.

Deviation from tagging location to angler capture location was ascertained for each fish tagged and returned, and was defined from the tagging location (region) to the region of capture. Deviation from tagging location was divided into 2 periods: within the first year of tagging and for a $\geq$ 13-month period following tagging.

Results

Tag retention by walleye was 100%. Walleye total tagging-related mortality was 22% with 12% attributed to tagging and 10% attributed to handling.

Anglers fishing for walleye (70% $\pm$ 8 SE) returned postcards at similar rates to the general fishing public; thus angler nonreporting was estimated at 30% for walleye.

Annual angler exploitation results for 1994 were based on 355 walleye tagged within the 2 riverine regions, and 218 walleye tagged within the 2 lake regions (Table 1). Anglers returned 82 (23%) tags from riverine-tagged walleye and 13 (6%) from lake-tagged walleye within the first 12 months (Table 1).

Table 1. Actual and adjusted number of tagged individuals and returned tags, and actual percent of tags returned for walleye in Norris Reservoir, Tennessee, 1994 and 1997.

Year	N Tagged		N Returned tags			
	Actual	Adjusted	Actual	Adjusted harvest	Adjusted catch	Actual % returned
Riverine Walleye						
1994	355	277	82	117	117	23
1997	517	403	41	54	58	8
Lake Walleye						
1994	218	170	13	18	18	6

Annual angler adjusted exploitation rate (adjusted exploitation) was 30% (±9) for the entire walleye population. Riverine walleye displayed a significantly greater annual exploitation than lake walleye. Riverine walleye adjusted exploitation was 42% (±11) with adjusted exploitation of 35% (±18) for the Powell River and 48% (±14) for the Clinch River (Table 2). Lake walleye adjusted exploitation was 11% (±19) (Table 2). The annual angler adjusted catch rate was identical to the adjusted exploitation because anglers reported harvesting all walleye caught.

Walleye were only tagged in the riverine regions during 1997 because of the relative paucity of walleye in the lake regions. Five hundred and seventeen walleye were tagged in March 1997 and of these, anglers returned 41 within 12 months of tagging (Table 1). Adjusted number of tagged walleye was 403 and adjusted number of tags returned was 58, of which 54 were from harvested individuals (Table 1). The angler adjusted exploitation rate (adjusted exploitation) for the 2 rivers was 14% (±11). Adjusted exploitation was 11% (±18) for the Powell River and 16% (±14) for the Clinch River (Table 2). The annual angler catch (adjusted catch) was 15% (±11) for the riverine fishery, 11% (±19) for the Powell River, and 17% (±14) for the Clinch River (Table 2).

Anglers reported that all tagged walleye caught in 1994 were harvested, thus total angling mortality was equal to adjusted exploitation (riverine-tagged: 42%; lake-tagged: 11%). Total angling mortality for all Norris Reservoir walleye tagged in 1994 was estimated to be 30%. Anglers reported that 6% of the tagged walleye caught were released in 1997. Delayed mortality was estimated from 66% (27C) to

Table 2. Annual angler exploitation and catch with 95% confidence limits for walleye in Norris Reservoir, Tennessee, 1994 and 1997.

Cohort/Year	Annual exploitation			Annual catch		
	Mean	Upper	Lower	Mean	Upper	Lower
River–1994	42	53	31	42	53	31
Lake–1994	11	30	0	11	30	0
River–1997	14	24	3	15	26	3

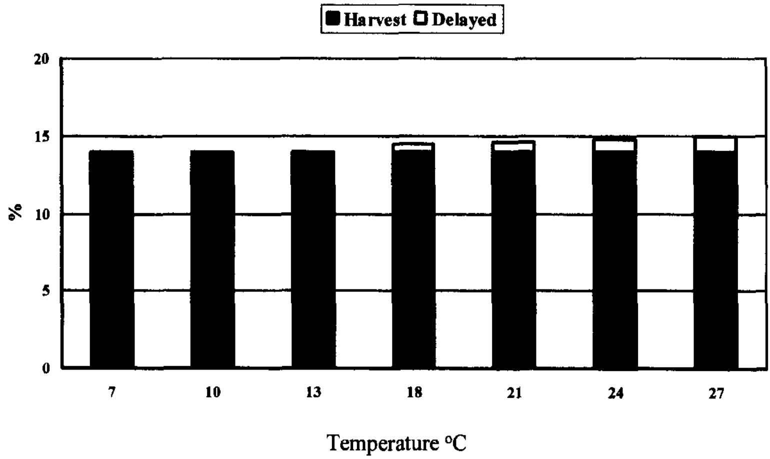

Figure 2. Total angling mortality for the Norris reservoir walleye fishery, 1997.

1% (7C). Total angling mortality was approximately 14% at all water temperature because few walleye were released (Fig. 2). If walleye anglers practice catch and release, delayed mortality may become important.

Length frequencies and sex ratios of fish tagged and caught were compared to determine if anglers were selecting by either size and/or sex. No significant differences were detected for either length frequencies or sex ($P > 0.05$).

River-tagged walleye were caught primarily during March through May with minimal catch in the summer months (Fig. 3). No river-tagged walleye were reported to be caught in either year during the late summer, fall, or early winter. Percent catch of lake-tagged walleye displayed different trends than river-tagged walleye. Lake-tagged walleye were caught primarily during April through July with minimal catch being reported in late summer or early fall (Fig. 3). Few lake-tagged walleye were reported caught only in the late fall and winter.

Riverine-tagged walleye were captured by anglers primarily within the region of tagging for both 1994- and 1997-tagged fish. Eighty percent of all returned tags from 1994-tagged riverine walleye and 98% of 1997-tagged walleye were caught within the region of tagging. Powell River walleye displayed a greater affinity for their tagged locations, with 97% of 1994-tagged fish and 94% of 1997-tagged fish caught within the Powell River region (PRR). The only Powell River-tagged walleye not caught in the PRR were caught in the forks of the river area. Interestingly, 2 walleye tagged in 1994 and released in the Powell River were caught in spring 1998.

Similar results were found for Clinch River tagged fish.Walleye tagged in 1994 were caught primarily in the Clinch River region (CRR) (68%) with an additional 30% caught in the LYS. Walleye tagged in 1997 were caught by anglers entirely in the CRR. Walleye tagged in 1994 and released in the Clinch River have been caught in the CRR from 1995 through 1998. No Clinch River-tagged alleye were caught in the PRR, nor were Powell River-tagged walleye caught in the CRR.

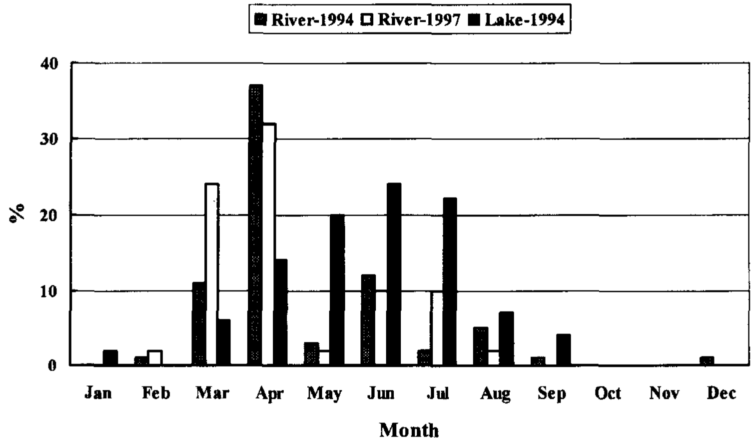

Figure 3. Percent of tagged walleye caught within a given month for the Clinch and Powell Rivers fishery and the lake fishery, Norris Reservoir, 1994 and 1997.

Lake-tagged walleye displayed a slightly greater affinity to move throughout the reservoir. Seventy-five percent of the lake-tagged walleye were captured in the region of tagging. The LYS-tagged walleye displayed the greatest affinity to move, with only 57% being caught by anglers in the LYS. The remaining were captured in the LRR, CRR, and PRR. LRR-tagged walleye were caught primarily in the region of tagging.

Discussion

Nonreporting of tags by angling can be a significant factor in angler exploitation, but can be reduced by offering a reward. (MacRitchie and Armstrong 1984, Zale and Bain 1994). Weaver and England (1986) found no evidence that rewards greater than $5 resulted in increased tag returns. Nonreporting for other reward studies has been estimated as low as 7% for black crappie (Elder 1990) to 73% for sauger (Maceina et al. 1998). Values used in this study were similar to those modeled by Nichols et al. (1981) for a $5 reward; i.e., the nonreporting rate estimated from postcard returns was consistent with other studies.

Tag loss is an important confounding in any exploitation study. Tag retention ranging from 96%–100% has been reported for sauger that were double tagged (Pegg et al. 1996, Maceina et al. 1998). Results from our study conducted in hatchery ponds for walleye were in close agreement with those of Maceina et al. (1998) for sauger. Walleye experienced total tagging mortality of 22% with 10% attributed to handling and 12% to tagging. Walleye were collected, tagged, and held during the spawning period, and were this subjected to more stressful conditions. Czajkowski et al. (1996) reported that survival of walleye collected by electrofishing was not initially affected, but that collection by electrofishing did influence tag returns.

Exploitation by recreational and commercial anglers may play an important role in the quality of angling experiences and population stability of sportfish. Excessive exploitation may reduce population size and abundance of desirable-size fish (Smith 1988), or promote growth and well-being of overabundant population (Schramm et al. 1985). In either scenario, it is important to have an understanding of angler exploitation in the management of any fishery.

Annual angler exploitation of walleye was significantly different between riverine- and lake-tagged cohorts in 1994. Riverine-tagged walleye were subjected to an annual exploitation of 42% (±11), as compared to 11% (±19) for lake-tagged individuals. Both groups were regulated by the same size (381 mm) and bag (5) limits.

Peterson and Lane (1990) and Peterson (1991) reported an annual angler unadjusted exploitation rate of 26% for walleye tagged in the CRR during the 1989 spawning period and 15% for walleye tagged in the PRR during the 1990 spawning period. Fitz and Holbrook (1978) reported unadjusted exploitation of 6% for lake walleye tagged in 1975. If the current estimates for tag retention, mortality, and non-reporting were applied to these unadjusted exploitation rates, the adjusted exploitation would be 48% for the CRR, 28% for the PRR, and 11% for the lake walleye. These adjusted exploitation rates were similar to results found in our study. Consequently, a reduction in the daily bag limit apparently did not alter angler exploitation during the first year following the regulation change. In contrast, annual exploitation was 14% (±11) in 1997 indicating at least a partial reduction in harvest because of angling regulations.

Several other factors may have contributed to the differential exploitation in 1994. The riverine fishery is restricted both temporally and spatially. Walleye move into the riverine portion of the reservoir in early February and continue to move upstream until mid-April (Fitz and Holbrook 1978). Spatially, the fishery consists of an approximately 13-km reach on the PRR and a 19-km reach on the CRR. Anglers aggressively seek walleye in these reaches during these 3 months in the 2 rivers (O'Bara 1999). Although no angling effort data were available in 1994, roving creel surveys in 1995–1997 found that annual effort exceeded 40,000 hours during these 3 months, of which approximately 60% were confined to the Clinch River. After riverine walleye curtailed spawning and returned to the upstream sections of Norris Reservoir, angler exploitation was reduced.

In contrast to the riverine walleye fishery, the lake-spawning walleye fishery is not temporally and spatially restricted. Anglers seek these walleye throughout the year with slightly more effort in the spring and fall. Walleye-directed angling effort in the lake section of Norris Reservoir ranged from 80,000–140,000 hours annually (O'Bara 1997). Lake walleye are widely distributed in the system and do not aggregate during spawning. Thus, lake-spawning walleye may not be as susceptible to angling.

Differential behavior patterns may have resulted in the dissimilar exploitation rates. Vulnerability of riverine walleye to angling was increased during the spawning period as evident by the high monthly angler exploitation rates. Similar trends have been found for walleye in Greers Ferry Lake, Arkansas (M. L. Armstrong, pers.commun., Ark. Game and Fish Comm.) and the Tombigbee River system, Mississippi (Kingery and Muncy 1988).

The reduction in annual angler exploitation from 1994–1997 may be partially due to walleye dynamics in the reservoir. Walleye populations in Norris Reservoir have experienced a substantial loss in recruitment. In conjunction with the recruitment failure, angling effort has declined over the last few years (O'Bara 1999). Thus, regulations may only partially contribute to the decline in annual angler exploitation.

Exploitation of the Norris Reservoir walleye fishery is similar to that found in other systems. Kallemeyn (1989) reported annual angler exploitation of 23.6% (±2.3) in Kabetogama Lake, Minnesota. Exploitation rates of 6%–47% have been reported for northern New York lakes and 30% for Oneida Lake, New York (Festa et al. 1987).

Annual angling-related mortality for the Norris Reservoir walleye fishery was similar to annual angler exploitation for legal-size fish. Anglers reported that they harvested over 96% of all legal-size fish caught. No sub-legal size walleye were tagged in this study, thus angling-related mortality was not determined for this group. Delayed mortality has been estimated based on water temperature to range from 1% (7C) to 66% (27C) for released walleye (Hoffman et al. 1996). Consequently, if catch-and-release was practiced more by walleye anglers or regulations were changed encouraging release of walleye, delayed mortality would be important, especially at elevated temperatures.

Two distinct walleye sub-populations appear to inhabit Norris Reservoir. The riverine walleye were believed to be descendants of the Mississippi River race (Hackney and Holbrook 1978), and lake walleye were most likely descendants of introduced Lake Erie walleye. Results from this study suggest that these exist, and they appear to be segregated both during the spawning period as well as throughout the non-spawning period.

Distributional ranges of these sub-populations appear to minimally overlap. Eighty percent of the walleye captured by anglers in this study were within the tagging region. No CRR-tagged walleye were captured in the PRR, and no PRR-tagged walleye were captured in the CRR. Only 1 (<1%) CRR- or PRR-tagged walleye was captured in the LRR, and 18 (21%) CRR- and PRR-tagged walleye were captured in the LSR, which was most likely the result of the close proximity of the LSR to the CRR. Conversely, only 1 LRR-tagged walleye was captured in the PRR, and none were captured in the CRR. LSR-tagged walleye displayed only slightly more movement with 2 walleye captured in the CRR, 1 in the PRR, and 3 in the LRR. Movement and range trends displayed by Norris Reservoir walleye were similar to that of many populations inhabiting southeastern tributary reservoirs (Ager 1976, Kingery and Muncy 1988, Schultz 1992).

Homing behavior also was evident for riverine walleye. Clinch River-tagged walleye returned to the site of tagging (spawning area) for 3 subsequent spawning periods, and PRR-tagged walleye returned for 2 subsequent periods. Return to spawning areas is a well-documented but not a well-understood behavior (Olson et al. 1978, Horrall 1981, Jennings et al. 1996).

The presence of distinct sub-populations of walleye provides some challenging fishery management opportunities. If angler exploitation is heightened on one sub-population, different regulations may be warranted. In the case of many walleye fisheries, these sub-populations may experience spatial restriction throughout the year, but the fisheries may be only temporally segregated. Thus, differential regulations within a given time period may be biologically sound and publically acceptable, thus effective. If supplemental stocking is required, it may warrant that progeny from all sub-populations be introduced to maintain the behavioral patterns of the sub-populations, as well as the productivity of the fishery. Thus, it is recommended that these sub-populations of walleye be considered in any management program for Norris Reservoir.

Literature Cited

Ager, L. M. 1976. A biotelemetry study of the movement of walleye in Center Hill Reservoir, Tennessee. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 30:311–323.

Czajkowski, S. P., D. W. Coble, F. A. Copes, R. Burch, K. Kamkes, and P. J. Peters. 1996. Lower returns of tagged walleye initially caught by trawling than by trap nets, fyke nets, or electrofishing. North. Am. J. Fish. Manage. 16:453–456.

Elder, S. 1990. Angler use of black crappie and the effects of reward-tag program at Jamesport Community Lake, Missouri. Am. Fish. Soc. Symp. 7:647–654.

Festa, P. J., J. L. Forney, and R. T. Colestante. 1987. Walleye management in New York State: A plan for restoration and enhancement. N. Y. Dep. Environ. Conserv., Albany.

Fitz, R. B. and J. A. Holbrook II. 1978. Sauger and walleye in Norris Reservoir, Tennessee. Pages 82–88 in R. L. Kendall, ed. Selected coolwater fishes of North America. Am. Fish. Soc. Spec. Publ. 11. Bethesda, Md.

Hackney, P. A. and J. A. Holbrook II. 1978. Sauger, walleye, and yellow perch in the southeastern United States. Pages 74–81 in R. L. Kendall, ed. Selected coolwater fishes of North America. Am. Fish. Soc. Spec. Publ. 11. Bethesda, Md.

Hoffman, G. C., D. W. Coble, R. V. Frie, F. A. Cope, R. M. Burch, and K. K. Kamkes. 1996. Walleye and sauger mortality associated with live-release tournaments on the Lake Winnebago system, Wisconsin. North Am. J. Fish. Manage. 16:364–370.

Horrall, R. M. 1981. Behavioral stock-isolating mechanisms in Great Lake fishes with special reference to homing behavior and site imprinting. Can. J. Fish. and Aquat. Sci. 38:1481–1496.

Jagielo, T. 1991. Synthesis of mark-recapture and fishery data to estimate open-population parameters. Am. Fish. Soc. Symp. 12:492–506.

Jennings, M. J., J. E. Claussen, and D. P. Philipp. 1996. Evidence of heritable preference for spawning habitat between two walleye populations. Trans. Am. Fish. Soc. 125:978–982.

Kallenmeyn, L. W. 1989. Loss of Carlin tags from walleye. North Am. J. Fish. Manage. 9:112–115.

Kingery, R. W. and R. J. Muncy. 1988. Walleye spawning, movements, and habitat use in Tombigbee River drainages. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 42:249–257.

Maceina, M. J., P. W. Bettoli, S. D. Finley, and V. J. DiCenzio. 1998. Analyses of the sauger fishery with simulated effects of a minimum size limit in the Tennessee River of Alabama. North Am. J. Fish. Manage. 18:66–75.

MacRitchie, I. C. and E. R. Armstrong. 1984. An incentive program to increase angler tag returns. North Am. J. Fish. Manage. 4:129–132.

Nichols, J. D., R. J. Blohm, R. E. Reynolds, R. E. Trost, J. E. Hines, and J. P. Bladen. 1981. Band reporting rates for mallards with reward bands of different dollar values. J. Wildl. Manage. 55:119–126.

O'Bara, C. J. 1997. TWRA Reservoir Creel Study. Tenn. Wildl. Resour. Agency, Nashville. 282pp.

———. 1999. Norris Reservoir Fishery Investigation: 1992–1998. Tenn. Wildl. Resour. Agency, Nashville. 230pp.

Olson, D. E., D. H. Schupp, and V. Macins. 1978. An hypothesis of homing behavior of walleye as related to observed patterns of passive and active activities. Pages 52–57 in R. L. Kendall, ed. Selected coolwater fishes of North America. Am. Fish. Sic. Spec. Publ. 11. Bethesda, Md.

Pegg, M. A., J. B. Layzer, and P. W. Bettoli. 1996. Angler exploitation of anchor-tagged saugers in the lower Tennessee River. North Am. J. Fish. Manage. 16:218–222.

Peterson, D. C. 1991. Norris Reservoir Annual Report: 1990. Tenn. Wildl. Resour. Agency, Nashville. 76pp.

——— and D. L. Lane. 1990. Norris Reservoir Annual Report: 1989. Tenn. Wildl. Resour. Agency, Nashville. 87pp.

Schultz, R. D. . 1992. Walleye and clupeid interactions in Dale Hollow Reservoir, Tennessee. M. S. Thesis, Tenn. Tech Univ., Cookeville. 80pp.

Schramm, H. L., Jr., J. V. Shireman, D. E. Hammond, and D. M. Powell. 1985. Effect of commercial harvest of sport fish on the black crappie population in Lake Okeechobee, Florida. North Am. J. Fish. Manage. 5:217–226.

Smith, T. F. 1988. Stock assessment methods: the first fifty years. Pages 1–33 in J. A. Gulland, ed. Fish population dynamics, J. A. Wiley and Sons, New York.

Tomljanovich, D., D. P. Peterson, L. R. Wilson, and C. J. O'Bara. 1996. Partnership in reservoir fisheries. Am. Fish. Soc. Symp. 16:132–133.

Zale, A. V. and M. B. Bain. 1994. Estimating tag-reporting rates with postcards as tag surrogates. North Am. J. Fish. Manage. 14:208–211.