Survival and Harvest of Channel Catfish in Two Community Fishing Lakes

by
Charles Munger

Management Data Series
No. 270
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TEXAS PARKS & WILDLIFE

INLAND FISHERIES DIVISION
4200 Smith School Road
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ABSTRACT

One of Texas Parks and Wildlife Department's management practices for community fishing lakes is regular stocking of 229-mm channel catfish *Ictalurus punctatus* for put-grow-take fisheries. Stocking of these fish is thought to be a cost-effective way to provide fishing opportunity in urban communities. Anecdotal evidence suggests that these fish do not remain in the lakes throughout the year, but it is unknown whether the fish are harvested or die without being caught. Two community fishing lakes in the Texas panhandle were surveyed using hoop nets and creel surveys for 14 months in an attempt to determine the fate of stocked channel catfish. Hoop-net data indicated variable survival of stocked channel catfish, with fish disappearing from both lakes within five months in the first year, and then surviving well in the second year after one of the lakes was restocked. Creel-survey data indicated that anglers were not harvesting the channel catfish. However, there was limited catch-and-release fishing for channel catfish in one of the lakes.

INTRODUCTION

Urban fisheries are created to provide increased angling opportunity. One challenge of providing fishing opportunity is deciding how to allocate resources over space and time to yield the greatest benefit to anglers. One strategy managers often use is to distribute the limited resource (in this case stocked fish) over many water bodies in hopes of providing benefit to many anglers. A basic element of angling opportunity is the expectation of catching a fish. Without anticipation of a catch, the quality of the fishing experience will decline (Alcorn 1981; Miko et al. 1995; Wickham et al. 2004). Fishery managers assume that stocking channel catfish *Ictalurus punctatus* in urban lakes makes them available to anglers, and if they are caught by anglers, then they are providing opportunity and benefit to anglers.

Stocking advanced fingerling channel catfish (203-254 mm) is a cost-effective method of providing fish to the angling public and is a management practice in many states (Eder and McDannold 1987; Michaletz and Dillard 1999). Texas Parks and Wildlife Department (TPWD) invests substantial amounts of time and money to produce 229-mm channel catfish for stocking into community fishing lakes (CFLs), as do other states (Michaletz et al. 2008). The department stocked 148,748 229-mm channel catfish into 255 CFLs in 2007 and 157,589 into 250 CFLs in 2008. The estimated cost, including delivery cost, was $4.62 per fish (total cost $687,216) in 2007 and $3.94 per fish (total cost $620,901) in 2008 (N. T. Engeling, Texas Parks and Wildlife Department, personal communication).

Community fishing lakes in the Amarillo, Texas area are regularly stocked with channel catfish. Conversations with urban anglers and observation of fishing events at these lakes indicated low return to the creel, which led us to question whether stocking channel catfish was providing the intended fishing opportunity. We had little information about the channel catfish populations in these urban lakes and their use by anglers. It was important to find out if, or for how long, the stocked fish were surviving and whether mortality was mostly due to angling or natural causes. The objectives of this study were to determine survival of stocked channel catfish and angler harvest rates for channel catfish in two CFLs. This study may enable TPWD determine if stocking 229-mm channel catfish into CFLs is a cost-effective management option for anglers and the department.

MATERIALS AND METHODS

Selected study sites were 5.3-ha Thompson Park Lake (TPL) in Amarillo, Potter County, Texas and 1.2-ha Canyon Southeast Park Lake (CSE) in Canyon, Randall County, Texas. These lakes have minimal water level fluctuation and maximum depths of less than 3 m. These lakes have been regularly stocked with 229-mm channel catfish since 1998.

Hoop nets are commonly used to collect channel catfish in lentic systems (Holland and Peters 1992; Sullivan and Gale 1999; Michaletz and Sullivan 2002; Flammang and Schultz 2007). These nets are species selective for channel catfish and the mesh size used affects the size and numbers of fish collected (Holland and Peters 1992; Walker et al. 1994). Holland and Peters (1992) reported that as mesh size increased from 25.4-mm-bar to 38.1-mm-bar mesh, the mean length of channel catfish collected by the net significantly increased while total catch rate decreased. We selected a net with 25.4-mm-bar mesh for this study to maximize catch rate and to target the size of fish stocked.

Hoop nets used in this study had five 0.61-m inside diameter fiberglass hoops with throats tied to the first and third hoops and were approximately 3 m long. A hoop-net series consisted of 3 hoop nets tied throat to tail, with 1.5 m of rope separating adjacent nets. Each net in the series was baited with a piece of commercially available cheese log placed in a mesh bag tied to the second hoop. Each hoop-net series was set and allowed to fish undisturbed for two consecutive nights. A hoop-net series fished for two consecutive nights was considered one unit of sampling effort. Hoop-net sampling locations were selected within each lake and remained the same throughout the study. Prescribed sampling effort was two sets per month in CSE and three sets per month in TPL. All fish collected in a hoop-net series were considered a single sample and counted by species. Fish lengths and weights were measured to the nearest millimeter and gram, respectively. Fish were released back into the lakes after data collection.

Hoop-net surveys were conducted on both lakes from July 2009 through November 2010 and continued through April 2011 on CSE only. Hoop-net surveys in July, August, and September 2009 were used to evaluate the channel catfish populations present prior to stocking for this study. Fish collected in July had the left pelvic fin removed and fish collected in August had the right pelvic fin removed. Fish captured in both months had both pelvic fins removed. September surveys were used to estimate the pre-stocking population size.

Thompson Park Lake and CSE were stocked on 1 October 2009 with 893 and 565 channel catfish (229-mm each), respectively. These fish had the adipose fin removed prior to stocking. All fish were checked to ensure the fin clips were complete and counted to ensure accurate numbers were stocked. A second stocking of 555 unmarked channel catfish occurred at CSE in October 2010 to further study seasonal variation in hoop-net catch rates.

Population estimates were calculated based on hoop-net recaptures of marked fish. Population estimates were calculated following each hoop-net survey using Bailey's Modified Lincoln-Peterson Index:

Modified Lincoln-Peterson

$$N = \frac{(S1+1)(S2+1)}{(M+1)} - 1$$

where N is the estimated population size, $S1$ is the initial marked population size, $S2$ is the number captured in the second sample, and M is the number of recaptures in the second sample.

Roving-creel surveys were conducted on both lakes for 14 months; the sampling period began on 1 August 2009 and ended on 30 September 2010. An additional creel survey was conducted on CSE from 1 April 2010 through 30 June 2010. The creel surveys followed standard TPWD procedures (Inland Fisheries Division manual revised 2008, unpublished). Five random creel days and times were selected per month for each lake in 2009, these included three weekend days and two week days. Creel effort was increased to 10 surveys each month on CSE in 2010. Each roving creel lasted 1 h. All harvested fish were inspected for fin clips and counted.

RESULTS AND DISCUSSION

Seven fish were marked with pelvic-fin clips in July and August 2009 in TPL and five fish were marked in CSE in the same period. Pre-stocking population estimates were seven channel catfish in TPL and 13 in CSE. Population estimates from returns of adipose fin-clipped fish (stocked fish) indicated a population of 900 channel catfish in TPL and 574 channel catfish in CSE in October 2009. The November 2009 population estimates were 924 channel catfish in TPL and 589 in CSE. These estimates indicate that stocked channel catfish made up over 95% of the channel catfish population in each lake, validating the low population estimates from pre-stocking sampling. Siegwarth and Johnson (1998) similarly noted a high contribution of stocked channel catfish (93%) to the overall population in the Buffalo River, Arkansas, but this was a very infertile river system whereas both TPL and CSE could be classified as eutrophic.

Survival of stocked channel catfish, as indicated by hoop-net catch rates, was low in both lakes in 2009 and 2010 (Table 1). Hoop-net catch rates for channel catfish were highest in the month following stocking, 25.3/net series for TPL and 19.0/net series for CSE, but catch rates quickly declined to less than 1.0/net series within three months for TPL and five months for CSE. Catch rates remained at or near zero for the remainder of the spring and summer of 2010. The rapid decline in catch rates was unexpected and could have resulted from either channel catfish mortality or seasonal variation in catch rate. No channel catfish were collected during extra sampling at TPL indicating the low catch rate was not a seasonal phenomenon. Catch rates again increased at CSE following stocking, and remained above 8.0/net series for all sampling through April 2011 indicating much higher survival from this stocking. It appears that stocking survival in these CFLs was highly variable and that no apparent seasonal variation in catch rate existed.

Catch rates for anglers targeting a particular fish species are presumed to be higher than for those fishing for "anything" (McConnell et al. 1995; Knapp and Goeman 2005). There were 170 angler contacts on CSE and 142 on TPL during 2009-2010; an additional 112 contacts were made on CSE in 2011. Most anglers at TPL and CSE were not fishing for a specific species, with 54% of anglers at TPL and 62-66% at CSE seeking "anything" (Table 2). This level of unspecified preference is much higher than the 18% seen in Missouri (Eder and McDannold 1987). When anglers did name a species, channel catfish was the most sought after (44% of anglers at TPL and 24-27% at CSE). This level of directed effort was similar to the 33% reported by Eder and McDannold (1987) for daytime anglers on Pony Express Lake, Missouri. The fact that 24-44% of anglers at TPL and CSE were targeting channel catfish leads to the expectation that some channel catfish would be caught and observed during creel surveys.

No channel catfish were documented as caught by anglers in any season at TPL, but the seasonal pattern of angler catch at CSE was similar to that seen on Pony Express Lake, Missouri with the highest catch rates occurring during the warmest months (Eder and McDannold 1987). A notable difference between Pony Express Lake, Missouri and CSE was that Missouri anglers released very few of their catfish, while all catfish caught at CSE were reported released. There were an estimated 4,593 channel catfish caught and released from CSE from August 2009 to September 2010 and 537 during the three-month creel in 2011 (Tables 3 and 4). Creel clerks only observed one marked channel catfish being caught during surveys at CSE. No channel catfish were documented as harvested from either lake during any of the creel-survey periods, and there was no catch and release of channel catfish reported at TPL. Evidence of catch-and-release fishing, at least on CSE, may indicate area anglers are more interested in the recreational aspect of fishing than in harvesting fish.

Anglers go fishing to harvest fish, for recreation including social interaction, or a combination of these reasons. Harvest ranks very low relative to the outdoor experience in studies of why anglers fish (Driver and Knopf 1976; Holland and Ditton 1992), but those studies included all types of anglers. Surveys conducted 30 years ago showed urban anglers were more likely to be interested in harvest than recreation (Alcorn 1981; Ditton and Fedler 1984; Manfredo et al. 1984). More recent studies of urban anglers indicate a higher percentage focused on the recreational and social aspect of fishing rather than harvest (Schramm and Dennis 1993; Hutt and Jackson 2008; Mahasuweerachai et al. 2010). This may indicate an overall change in attitudes of urban anglers toward harvest and may relate to results seen in this study.

CONCLUSIONS

Based on this study, survival of stocked channel catfish can vary greatly between years. The initial stocking of marked channel catfish showed very poor survival, yet a follow-up stocking at CSE indicated good survival. Whether survival was good or poor, creel data indicated that angler harvest was not a factor impacting channel catfish populations in these CFLs and that stocking channel catfish may provide some benefit in sustaining catch-and-release fisheries on some CFLs. If urban anglers are becoming less harvest-oriented, then fishing opportunity and angler use could be maintained in CFLs by stocking fewer fish, which would lower the cost to the department. More research needs to be conducted on stocking survival of channel catfish in CFLs to determine why survival was so variable between years in this study.

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TABLE 1.—Channel catfish catch-per-unit-effort (CPUE) from hoop-net surveys in Thompson Park Lake and Canyon Southeast Park Lake, Texas from July 2009 through April 2011. Thompson Park Lake was sampled with three hoop-net series per month and Canyon Southeast Park Lake was sampled with two hoop-net series per month. The population estimation used Bailey's Modified Lincoln-Peterson Index. The population estimates for September 2009 were derived from counts of pelvic fin clips in the existing population of channel catfish (prior to stocking adipose fin-clipped fish).

	Thompson Park Lake			Canyon Southeast Park Lake		
	Total CPUE	CPUE marked fish	Population estimate	Total CPUE	CPUE marked fish	Population estimate
2009						
July	0.8			1.3		
August	1.3			0.0		
September	0.3	0.3	7	2.0	0.5	13
October	6.0	6.0	900	0.5	0.5	574
November	25.3	24.7	924	19.0	18.5	589
December*						
2010						
January	0.3	0.3	900	15.5	14.5	612
February*	0.7	0.3	1350			
March	0.0	0.0		7.5	7.5	574
April	0.0	0.0		1.0	0.5	861
May	0.0	0.0		0.0	0.0	
June	0.0	0.0		0.0	0.0	
July	0.0	0.0		0.0	0.0	
August	0.7	0.7	900	1.0	0.0	
September	0.0	0.0		0.0	0.0	
October	0.0	0.0		9.5	0.0	
November	0.0	0.0		8.5	0.0	
December*						
2011						
January				9.0	0.0	
February				54.5	0.0	
March				14.5	0.0	
April				10.0	0.0	

*Unable to sample due to environmental conditions.

TABLE 2.—Percent of anglers seeking each species as determined by angler surveys on Thompson Park Lake, Amarillo, Texas and Canyon Southeast Park Lake, Canyon, Texas from August 2009 through September 2010. An additional angler survey was conducted on Canyon Southeast Park Lake from April through June 2011.

Species	Thompson Park Lake	Canyon Southeast Park Lake	
		8/2009-9/2010	4/2011-6/2011
Anything	53.5	65.9	61.8
Channel catfish	44.4	27.1	23.6
Black bullhead	1.4		
Bluegill	0.7		1.8
Common carp		2.9	3.6
Largemouth bass		3.5	3.6
Rainbow trout		0.6	3.6
White crappie			1.8

TABLE 3.—Channel catfish pressure estimates (in hours) and release rate per hour at Thompson Park Lake, Amarillo, Texas and Canyon Southeast Park Lake, Canyon, Texas by month for the creel period August 2009 through September 2010. Relative standard errors are in parentheses.

	Thompson Park Lake		Canyon Southeast Park Lake	
	Effort	Release/h	Effort	Release/h
2009				
August	1,476.1 (211.0)	0.00	1,588.1 (131.0)	0.43
September	468.0 (98.3)	0.00	558.0 (198.5)	0.00
October	297.6 (223.6)	0.00	297.6 (223.6)	0.00
November	0.0 (.)	0.00	72.0 (223.6)	0.60
December	0.0 (.)	0.00	0.0 (.)	0.00
2010				
January	0.0 (.)	0.00	18.6 (223.6)	0.00
February	0.0 (.)	0.00	5.4 (223.6)	0.00
March	148.8 (223.6)	0.00	755.9 (147.9)	0.00
April	252.0 (223.6)	0.00	1,116.0 (126.1)	0.07
May	1,373.4 (126.8)	0.00	2,406.1 (85.5)	0.27
June	1,372.5 (96.9)	0.00	2,268.9 (140.3)	0.93
July	2,566.8 (139.6)	0.00	2,661.3 (108.9)	0.26
August	2,268.5 (194.7)	0.00	587.8 (129.9)	0.00
September	2,566.8 (214.6)	0.00	714.2 (158.6)	1.24
Total	12,790.4 (1,752.7)	0.00	13,049.8 (2,121.1)	
Average/month	913.6 (175.3)	0.00	932.1 (163.2)	0.28

TABLE 4.—Angler survey statistics for Canyon Southeast Park Lake, Canyon, Texas by month for the creel period April through June 2011.

	Anglers	Effort (h)	RSE effort	Channel catfish released/h
April	43	1,346.0	96.1	0.0
May	67	3,104.7	128.5	0.2
June	2	72.0	316.2	0.0

RSE is relative standard error.

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