

# Catfish Angling and Harvest Statistics with an Emphasis on Trophy Blue Catfish Management in Oklahoma

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**Abstract:** Increasing interest in “trophy” catfish angling in Oklahoma has prompted Oklahoma Department of Wildlife Conservation (ODWC) staff to collect basic biological data aimed at managing these fisheries. In light of recent studies indicating slow growth rates of reservoir blue catfish (*Ictalurus furcatus*) populations, management of trophy fisheries becomes challenging. In an effort to better understand catfish angler and harvest statistics, ODWC Law Enforcement Division personnel interviewed catfish anglers statewide to determine angling method, average angler party size and species, numbers, and sizes of catfish harvested. Data were collected from 4007 catfish anglers (1889 parties contacted) on 66 bodies of water from May 2006 through December 2007. Most anglers pursued catfish using rod and reel (69.1%), followed by juglines (23.7%), trotlines (5.0%), and limblines or noodling (2.2%). Rod and reel angling accounted for most catfish harvested (4425), followed by juglines (2206). However, juglines were more efficient with a catch rate of 2.3 (SE = 0.033) fish per angler versus 1.6 (SE = 0.083) fish per rod and reel angler. Only 2.5% of rod and reel anglers and 1.2% of jugline anglers reached the daily creel limit [15 blue catfish and channel catfish (*Ictalurus punctatus*) in aggregate]. Only 6.0% of all anglers harvested preferred size (>762 mm) blue catfish; and of this group, over half (55.4%) harvested more than one preferred size blue catfish. The majority of preferred size blue catfish (54.5%) were harvested in cool water periods (1 November through 18 May). Even though harvest of preferred size blue catfish is low (6.0% of total blue catfish harvest), it exceeds the percentage of preferred size blue catfish in ODWC population samples (0.7%). Agency discussion of potential management strategies to maintain the “trophy” status of blue catfish fisheries has led to a proposed regulation limiting the harvest of preferred size blue catfish.

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Blue catfish (*Ictalurus furcatus*) are widely distributed throughout Oklahoma rivers and reservoirs. However, life history information on the blue catfish is scarce in the published literature (Graham 1999). Intensive management of catfish has historically been limited to stocking programs for put-grow-take and/or put-take fisheries in small impoundments (Michaletz and Dillard 1999). Constraints to implementing catfish management programs include low agency priority/angler interest, inadequate habitat, inadequate sampling methods, and inadequate data (Michaletz and Dillard 1999).

The primary reason agencies do not place an equal amount of emphasis on intensive management of catfish fisheries is the lack of biological information on catfish populations (Arterburn et al. 2002). The emphasis placed on managing catfish fisheries by state wildlife agencies is not commensurate with the desires of catfish anglers to pursue “trophy” catfish. Few agency experts (2%) surveyed by Arterburn et al. (2002) indicated that their agencies emphasized managing for trophy catfish fisheries while 75% of catfish anglers surveyed were in favor of developing trophy fisheries.

Two types of data are needed to properly manage slow-growing catfish populations: age and growth data and angler harvest data. These data are important for developing a science-based man-

agement program and setting appropriate harvest regulations. Oklahoma Department of Wildlife Conservation (ODWC) staff have increased efforts to collect blue catfish population data. Blue catfish abundance, growth, and mortality estimates have been reported for seven Oklahoma reservoirs (Mauck and Boxrucker 2005, Boxrucker and Kuklinski 2006). Growth rates are slow (blue catfish average 528.5 mm at age 10) and highly variable. On average, it takes 13–16 years for blue catfish in Oklahoma reservoirs to reach preferred size (762 mm; Gabelhouse 1984). Slow growth in conjunction with increasing angler pressure on “trophy” catfish has indicated a need for increased management efforts.

In addition to limited biological data for Oklahoma catfish populations, catfish creel data are largely unavailable for Oklahoma waters due to the expensive and laborious nature of creel surveys. The percentage of catfish anglers catching their daily creel limit or what proportion of the harvest is composed of preferred-size catfish is unknown. Because concerns have been raised over the potential overharvest of blue catfish in numerous reservoirs and rivers, the need exists for this information to be available on a statewide basis. Law enforcement personnel (game wardens) are assigned on a county basis, with as many as three wardens working some of the larger counties. Consequently, several wardens may work some of

the larger reservoirs and river systems. Given that wardens patrol these systems during the normal course of their assigned duties, the opportunity existed to use this labor force to collect creel information on blue catfish harvest and anglers. The objective of this study was to determine the average number of catfish harvested per surveyed angler and the proportional length of catfish being harvested in Oklahoma waters. The creel survey was not intended to be used to calculate angler effort or total harvest and pressure estimates.

**Methods**

Oklahoma Department of Wildlife Conservation Law Enforcement personnel were asked to conduct creel interviews during the normal course of their law enforcement activities. This allowed the wardens to approach catfish anglers for creel purposes when the opportunity presented itself. Wardens were not asked to devote entire workdays to creel surveys. A series of training workshops were set up to train 88 wardens in creel procedures. Wardens were supplied with measuring boards, clip boards, and printed instructions. Wardens recorded date, body of water, number of anglers in party, type of fishing (boat or bank), angling method, whether or not the trip was completed, number of fish caught identified to species, and measurement of all catfish in possession. Angling method was defined as one of five common catfish angling techniques: rod and reel, jugline (a vertical line suspended from a floating device), trotline (a line attached to standing timber), limblime (a line attached to a limb or branch), or noodling (the taking of fish by use of hands only). A trip was defined as completed if the angler(s) was interviewed while leaving a water body.

Completed creel forms were collected monthly, reviewed by the project leader, and included in the database. Creel data were stratified by year, by season (warm-water months: 16 May through 31 October; and cool-water months: 1 November through 15 May), by gear and by season and lake, by season and gear, and by season, lake, and gear. Mean length of catfish by season was compared using a one-way analysis of variance ( $P < 0.05$ ) for each species.

**Results**

Creel data were collected on 66 different bodies of water throughout the state from mid-May 2006 through December 2007 that included large reservoirs, reservoir tail waters (the area immediately below a reservoir dam), small municipal impoundments, and rivers. Number of anglers interviewed on each water body ranged from one at several small municipal impoundments to 1,078 at Lake Texoma. Eight water bodies had more than 100 anglers interviewed, Ellsworth (123), Eufaula (325), Fort Gibson (479), Grand (180), Kaw (283), Robert S. Kerr (157), Texoma (1,078), and Waurika (209).

Table 1. Number and percent of anglers, average number of anglers in party (standard error), number and percent of catfish harvested and average number of catfish per angler (standard error) by angling method from 66 bodies of water in Oklahoma from 18 May 2006 through 31 December 2007.

Angling method	<i>n</i> Anglers	% Anglers	Average <i>n</i> in party	<i>n</i> Catfish harvested	% Catfish harvested	Average Number Fish/ Angler
Rod and reel	2768	69.1	2.4 (0.025)	4425	57.8	1.6 (0.083)
Jugline	950	23.7	2.8 (0.033)	2206	28.8	2.3 (0.033)
Trotline	202	5.0	3.2 (0.034)	952	12.4	4.7 (0.022)
Noodling	80	2.0	2.9 (0.150)	51	0.7	0.6 (0.200)
Limblime	7	0.2	2.3 (0.194)	16	0.3	2.3 (0.479)
<b>Total</b>	<b>4007</b>			<b>7650</b>		
Warm water season (16 May – 31 October)						
Rod and reel	2050	66.2	2.5 (0.031)	3244	60.4	1.6 (0.078)
Jugline	785	25.4	2.9 (0.041)	1650	30.7	2.1 (0.035)
Trotline	174	5.6	2.5 (0.044)	416	7.7	2.4 (0.048)
Noodling	79	2.6	3.0 (0.144)	47	0.9	0.6 (0.216)
Limblime	7	0.2	2.3 (0.194)	16	0.3	2.3 (0.479)
<b>Total</b>	<b>3095</b>			<b>5373</b>		
Cool water season (1 November – 15 May)						
Rod and reel	718	78.7	2.2 (0.038)	1181	51.9	1.6 (0.105)
Jugline	165	18.1	2.5 (0.044)	556	24.4	3.7 (0.032)
Trotline	28	3.1	3.7 (0.034)	536	23.5	19.1 (0.274)
Noodling	1	0.1	1.0 (0.000)	4	0.2	4.0 (0.000)
Limblime	0	0	0 (0.000)	0	0	0 (0.000)
<b>Total</b>	<b>912</b>			<b>2277</b>		

On an annual basis, most catfish anglers interviewed fished with rod and reel (69.1%), followed by jugline (23.7%), trotline (5.0%), noodling (2.0%) and limblime (0.2%) (Table 1). A similar pattern was observed when the data were analyzed by season (warm-water versus cool-water months), noting an increase in the percentage of rod and reel anglers in the cool water season (Table 1). Rod and reel anglers harvested 4427 catfish, 57.8% of the total harvest; however, trotlines were by far the most effective method of harvest averaging 4.7 (SE = 0.022) catfish/angler (Table 1). Juglines were also more efficient (2.3 catfish/angler, SE = 0.033) than rod and reel (1.6 catfish/angler, SE = 0.083) at harvesting catfish (Table 1). The seasonal harvest trends for warm water and cool water were similar to the annual trends with the exception of jugline and trotline harvest efficiency in cool water. The efficiency of juglines increased in cool water months with 18.1% of the anglers harvesting 24.4% of the catfish, and the number of catfish harvested per angler increased from 2.1 (SE = 0.035) to 3.7 (SE = 0.032, Table 1). Likewise, trotline harvest efficiency increased from 2.4 (SE = 0.048) fish per angler in warm water months to 19.1 (SE = 0.274) fish per angler in cool water months (Table 1).

Blue catfish comprised 71.1% of the catfish harvested, followed

Table 2. Number and mean length (mm) of catfish caught by species and season from 66 bodies of water in Oklahoma, from 18 May 2006 through 31 December 2007. Seasons were classified as: warm water = 16 May – 31 October, cool water = 1 November – 15 May.

Species	Warm water		Cool water		Total	
	n Fish	Mean L	n Fish	Mean L	n Fish	Mean L
Blue catfish	3568	492.8	1870	589.3	5438	523.2
Channel catfish	1601	411.5	371	429.3	1972	414.0
Flathead catfish	204	680.7	36	624.8	240	673.1

Table 3. Number and percent of catfish anglers interviewed by completed and uncompleted trips by season from 66 bodies of water in Oklahoma, from 18 May 2006 through 31 December 2007. Seasons were classified as: warm water = 16 May–31 October, cool water = 1 November–15 May.

Trip status	Warm Water		Cool Water		Total	
	n	%	n	%	n	%
Completed	672	21.7%	199	21.9%	871	21.7%
Not completed	2423	78.2%	713	78.2%	3135	78.3%
Total trips	3095	100%	912	100%	4007	100%

by channel catfish (*Ictalurus punctatus*, 25.8%), and flathead catfish (*Pylodictis olivaris*, 3.1%). Mean lengths of blue catfish (492.8 mm) and channel catfish (411.5 mm) harvested in warm water months were significantly less than the mean lengths of blue catfish (589.3 mm) and channel catfish (429.3 mm) harvested in cool water months ( $P < 0.001$  (Table 2). The mean length of flathead catfish harvested significantly decreased from 680.7 mm in warm water months to 624.8 mm in cool water months ( $P = 0.0353$ ) (Table 2).

Approximately 22% of the anglers interviewed were from completed trips (Table 3). Seven hundred eight-eight anglers (19.6% of total) were from completed trips that had at least one catfish in the creel (Table 4). Of those anglers, only 13 (1.6%) harvested their daily creel limit of blue catfish and channel catfish (15 in aggregate, Table 4).

Only 6.0% of the 2514 anglers who harvested blue catfish had preferred size blue catfish in their possession, and only 3.3% of anglers harvested more than one preferred size blue catfish per trip (Table 5). The percentages increased in cool water months to 14.2% of anglers harvesting preferred size blue catfish, and 8.4% of anglers harvesting more than one preferred size blue catfish (Table 5).

The percentage of preferred size blue catfish harvested in cool water months (16.5%) was double the harvest in warm water months (8.3%) (Table 6). Anglers using rod and reel (7.6%) and juglines (7.9%) harvested a similar percentage of preferred size but the percent harvest of preferred size fish was slightly higher (11.9%) for anglers using trotlines (Table 6). Although harvest of preferred size blue catfish is a small proportion of total blue catfish

Table 4. Number of anglers interviewed after completing trips and percent of those anglers catching daily creel limit (15) of blue catfish and channel catfish in aggregate from 66 bodies of water in Oklahoma, from 18 May 2006 through 31 December 2007. These data included only those anglers harvesting at least one catfish.

Angling method	n Anglers	% Anglers
Rod and reel	314	2.5
Jugline	345	1.2
Trotline	118	0.8
Noodling	6	0
Limblime	5	0
All methods	788	1.6

Table 5. Number of anglers harvesting blue catfish by season and angling method, number and percent of fishing trips where one or more blue catfish  $\geq 762$  mm total length was harvested and number of anglers harvesting more than one blue catfish  $\geq 762$  mm total length by season and angling method from 66 bodies of water in Oklahoma, from 18 May 2006 through 31 December 2007.

Angling method	n Anglers harvesting blue catfish	n Anglers harvesting blue catfish $\geq 762$ mm	% Anglers harvesting blue catfish $\geq 762$ mm	n (%) Anglers harvesting >1 blue catfish $\geq 762$ mm
Rod and reel	1563	90.1	5.8	51 (3.3)
Jugline	800	52.1	6.5	27 (3.4)
Trotline	135	7.5	5.5	5 (3.7)
Noodling	9	0	0	0 (0)
Limblime	7	1.8	26.4	1 (14.3)
Total	2514	151.5	6.0	84 (3.3)
Warm water (16 May–31 October)				
Rod and reel	1151	37.6	3.4	18 (1.6)
Jugline	656	26.9	4.1	14 (2.1)
Trotline	111	5.2	4.7	2 (1.8)
Noodling	8	0	0	0 (0)
Limblime	7	1.8	26.4	1 (14.3)
Total	1933	71.5	3.7	35 (1.8)
Cool water (1 November–15 May)				
Rod and reel	412	52.6	12.8	33 (8.0)
Jugline	144	26.5	18.3	13 (9.0)
Trotline	24	3.5	14.4	3 (12.5)
Noodling	1	0	0	0 (0)
Limblime	0	0	0	0 (0)
Total	581	82.6	14.2	49 (8.4)

Table 6. Number of blue catfish harvested by season and angling method along with number and percent of blue catfish >762 mm total length harvested by season and angling method from 66 bodies of water in Oklahoma, from 18 May 2006 through 31 December 2007.

Angling method	n Blue catfish harvested	n Blue catfish ≥762 mm harvested	% Total blue catfish harvest ≥762 mm
Rod and reel	2814	214	7.6
Jugline	1853	147	7.9
Trotline	751	89	11.9
Noodling	12	0	0
Limblines	8	3	37.5
Total	5438	453	8.3
Warm water (16 May–31 October)			
Rod and reel	1986	69	3.5
Jugline	1359	66	4.9
Trotline	207	7	3.4
Noodling	12	0	0
Limblines	4	3	75.0
Total	3568	145	4.1
Cool water (1 November–15 May)			
Rod and reel	828	145	17.5
Jugline	494	81	16.4
Trotline	544	82	15.1
Noodling	0	0	0
Limblines	4	0	0
Total	1870	308	16.5

harvest (6.0%), more than half (55.4%, 84 of 151.5 anglers) (Table 6) of the anglers harvesting preferred size blue catfish had multiple blue catfish this size or larger.

## Discussion

Regardless of angling method, most catfish anglers did not harvest the daily limit of catfish. The current angler harvest regulation on blue catfish in Oklahoma is a 15-fish daily creel limit, in aggregate with channel catfish, with no length restriction. Previous studies indicate that catfish anglers are harvest oriented and that obtaining fish for consumption is an important motivation for angling (Wilde and Ditton 1999, Reitz and Travnichek 2005). The small proportion of catfish anglers reaching the daily creel limit is more likely a result of simply not catching 15 harvestable-size fish rather than different motivational factors.

The relatively small percentage of preferred size blue catfish creeled (8.3%) still represents a higher proportion of preferred size fish than collected in population samples. Only 46 of 6717 (0.7%) of blue catfish in electrofishing samples were >762 mm in length (Boxrucker and Kuklinski 2006). In addition, the high percentage (55.4%) of anglers harvesting multiple preferred size blue catfish,

which did not differ among angling methods and was more evident in cool water months, suggests that either a small proportion of catfish anglers are effective at targeting preferred size blue catfish, or preferred size blue catfish are more vulnerable to angling in cool water months.

This study was not designed to estimate total numbers of catfish harvested on a statewide basis and it is not known what proportion of total fishing pressure occurs during the cool water months. However, if data collected in the future continue to bear out the increased percentage of large blue catfish harvested in late fall, winter, and spring, there may be cause for concern over the potential overharvest of large blue catfish.

A liberal daily creel limit is warranted given the high catch rates of blue catfish reported in Boxrucker and Kuklinski's (2006) study, consistent recruitment, and relatively slow growth. Evidence of a density-dependent growth response also suggests the need for a more liberal creel limit (Boxrucker and Kuklinski 2006). Restricting harvest of preferred size blue catfish has the potential of increasing abundance of large individuals in the population, especially when creel survey results show that more than 50% of anglers harvesting one preferred size blue catfish had multiple preferred size fish in the creel. Implementing a conservative daily harvest regulation for preferred size fish would prevent multiple blue catfish >762 mm from being harvested by a single angler. Although such a regulation change has the potential of increasing the harvest of blue catfish < 762 mm thus improving growth rates of the remaining population, it is unlikely to occur based on creel survey results which indicate that few anglers (1.6%) harvest a daily limit of catfish.

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