Status of Konawa Lake Fishery

Prepared by

Michael Hollie

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Introduction

Konawa Lake is owned and operated by the Oklahoma Gas and Electric Company (OG&E) and used as the cooling source for their natural gas powered Seminole Power Plant. In 1971, OG&E opened Konawa Lake to the public for recreational activities (boating, fishing and swimming). The Oklahoma Department of Wildlife Conservation (ODWC) in cooperation with the Seminole Power plant manages the fishery as a "Trophy Bass Lake" through special state regulations.

Description

Konawa Lake impounds Jumper Creek two miles east of the town of Konawa in Seminole County, Oklahoma. It covers 1,350 surface acres. Construction began in 1968 and was completed in 1970. This lake serves as the cooling water source for a gas-fired power generation station; therefore water temperatures are higher year-round than in most other lakes in the state. Normal pool elevation is 924 feet MSL (above Mean Sea Level). Lake levels are maintained by pumping water from the nearby South Canadian River into settling ponds on the south side of the lake which are then allowed to gravity flow into the lake. Fish habitat consists primarily of aquatic vegetation. Twenty fish attractor sites consisting of artificial habitat structures made from polyethylene pipe called "spider blocks" have been installed by ODWC (Appendix 1). Due to good water fertility, the lake generally supports abundant populations of several game and forage fish species. It contains three boat ramps, one picnic area and requires no user fees. The Lake supports an excellent Largemouth bass fishery.

History of Konawa Lake Fishery

Konawa Lake was first opened to recreational uses in 1971. Fish stockings began shortly after with a focus on Florida largemouth bass, Hybrid striped bass and forage species. In 1994, a slot length limit for Largemouth bass of 16-22 inches with only one bass over 22 inches was put in place to increase the numbers of trophy size bass for anglers. Bass regulations changed once again in 2003 to six bass per day of which only one may be 22 inches or longer. The purpose of this regulation was to encourage more angler harvest of smaller bass. Florida largemouth bass stocking ceased in 2005 to further prevent overcrowding. These changes appeared to be working with a sizeable decrease in Largemouth bass abundance by 2006 (Figure 1), however abundance has increased and varied slightly since. In recent years Hybrid striped bass stockings have been reduced with the purpose of reducing competition for forage in order to maintain growth rates of Largemouth bass.

Management Problems and Concerns

One management problem at Konawa is the overabundance of Largemouth bass. For many years, the Largemouth bass fishery in the lake has been characterized by high abundance of all size-classes, which has resulted in slowed growth and stockpiling between 15-17 inches. While some anglers keep Largemouth bass, a large portion practice catch and release. Harvest of Largemouth bass is encouraged to help reduce abundance and competition for forage.

Another concern that has the potential to drastically affect Konawa Lake is reduced power generation. Threadfin shad are one of the main forage for sport fish species in Konawa Lake. They cannot tolerate water temperatures below the low 50's. With reduced power generation water temperatures are likely

to stay cooler for longer periods during the winter. This can cause a decrease in Threadfin shad abundance, reducing available forage and further adding to the problem of overabundance of Largemouth bass. Cost efficiency is the primary driver for power generation at Konawa Lake. Since the power station is operated by natural gas, it is run more when gas prices are cheaper than coal prices. When coal prices are cheaper power generation is then shifted to coal fueled facilities.

Largemouth Bass

Largemouth bass abundance at Konawa Lake remained high for the 2020 survey with a catch rate or catch per unit of effort (CPUE)(CPUE=142) but has decreased over the last several surveys from its highest ever in 2011 (CPUE=266) (Figure 1). Poor recruitment (number of fish surviving to reach one year of age) was observed from the 2016 and 2017 year classes. However, the 2020 age frequency histogram (Figure 2) indicates a strong 2018 year class, resulting in an increased number of stock size (8-12 in) (Figure 3) fish compared to the previous survey. Growth Rates were considered moderate up to age three (14.9 in.), then slowed down as fish stockpiled between 15 and 17 inches. Overall growth has increased with the decrease in abundance compared to the 2010 and 2017 age data (Table 1). Though Florida largemouth bass stockings ceased in 2005, and considering the most recent electrophoresis results (2018), it appears that the population has become totally integrated. No pure northern strain bass have been collected in recent samples. A decrease in overall abundance is considered beneficial for Konawa Lake. The largest fish sampled during the 2020 survey measured 23.8 (in) in total length and 8.0 (lbs) in weight.

Hybrid Stripped Bass

Striped bass x white bass hybrids were first stocked in the lake in 1979 and were stocked annually from 1988 through 2007 (Appendix 2). Over the years, catch per net set has varied with the highest catch rate in 2000 (CPUE= 13.2) to the lowest in the recent surveys in 2015 (CPUE=1.6) (Figure 4). Growth is good the first two years of life, and then slows down when they reach the size where they are competing with the stockpiled Largemouth bass population. Growth improves again when they exceed the 17 to 20 inch size range. Hybrid striped bass, a cross between female Striped bass and male White bass, will not naturally reproduce and must be stocked periodically to maintain the fishery. Stockings have been reduced to limit forage competition with Largemouth bass. The most recent stockings occurred in 2014 and 2017 (Appendix 2). The largest fish sampled during the 2015 survey measured 15.9 (in) in total length and weighed 2.0 (lbs) in weight.

White Bass

White bass catch rates in gill nets at Konawa Lake have varied over the years. Catch per net set has ranged from a low (CPUE=4.3) in 2002 to a high (CPUE=17.8) in 2006 from the more recent years surveyed (Figure 5). The most recent survey in 2015 had a moderate catch rate of (CPUE=4.9). The majority of those fish were of preferred size (12 in) or larger with a catch rate of (CPUE= 4.3). The largest fish sampled during the 2015 survey measured 14.4 (in) in total length and weighed 1.3 (lbs) in weight.

Crappie

Konawa Lake Crappie abundance is considered low with very few individuals sampled in past surveys. Only three were sampled in the 2008 survey and none were found in the 2015 survey.

Channel Catfish

Channel catfish abundance has remained high and relatively stable over the years (Figure 6.) Body condition were considered poor for stock (11 in) and quality (16 in) size classes with relative weights (Wr=79) and (Wr = 83) respectively, but was considered acceptable (Wr ≥90) for preferred (24 in) and memorable (28 in) size classes. The largest fish sampled in the 2015 survey measured 29.8 (in) total length and weighed 10.47 (lbs). Channel catfish harvest is encouraged.

Flathead Catfish

Flathead catfish are present in the lake at very low population levels. Very few have been collected in recent surveys.

Shad

The abundance of gizzard shad less than eight inches in length has been variable and has generally been less than satisfactory. The abundance of threadfin shad has decreased since the 1980's due to lower winter water temperatures from reduced wintertime power generation. This has impacted all the predatory fish species in the lake. During the 1970's and 1980's the threadfin were so abundant that the ODWC used Konawa Lake as a source for Threadfin shad brooders to stock in other waters of the state. Due to the reduction in Threadfin shad abundance and the fact that Largemouth Bass Virus (LMBV) was found in the lake, now Konawa Lake is rarely used as a source for Threadfin. Trends in the Shad population are monitored by floating gill nets and suspended gill nets. The results between the two cannot be compared to each other, however trends within each sample type can be observed. A drastic increase in the 2006 suspended gill net sample was observed, however, shad numbers quickly declined to once again unfavorable levels (Figure 7). The 2019 floating gill net survey results continue to indicate a low abundance of both Gizzard and Threadfin shad, although it indicated a slight increase compared to the 2017 survey (Figure 8).

Future Management Plans

Future management plans include:

1. Conduct a fall suspended gill net survey in 2021 to monitor trends in White bass, Channel catfish, and Hybrid striped bass populations.
2. Conduct a fall floating gill net survey in 2021 to monitor trends in Gizzard and Threadfin shad populations.
3. Conduct a spring electrofishing survey in 2022 to monitor trends in the Largemouth bass population.
4. Install water temperature data loggers to monitor potential Threadfin shad impacts as a result of reduced winter time power generation.
5. Conduct an Angler Use and Opinion Creel Survey to better understand angler preferences and direct future management strategies. Anticipated to begin in the spring of 2022.

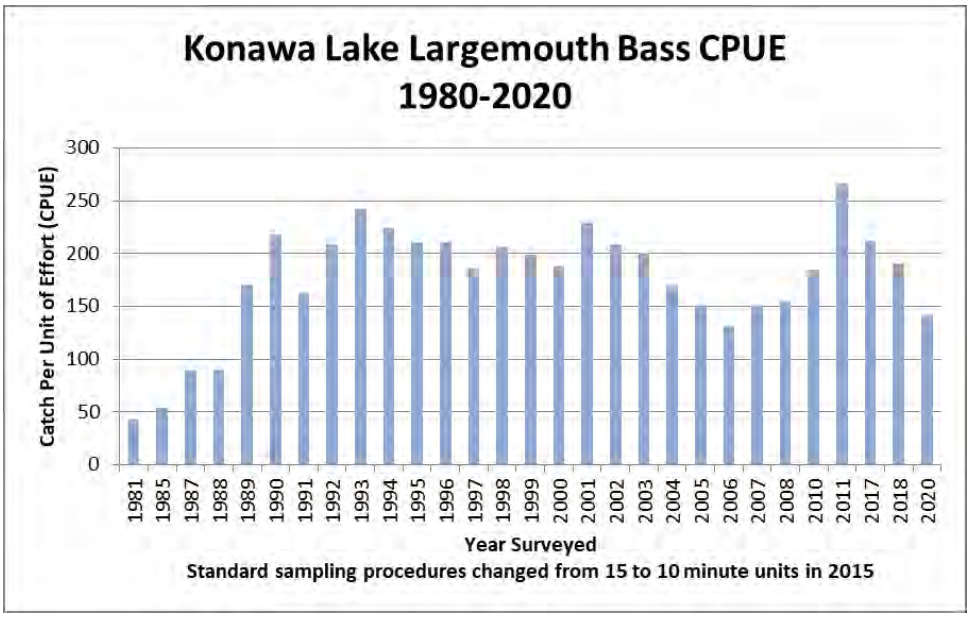


Figure 1. Largemouth Bass Catch Per Unit of Effort (CPUE) from Electrofishing Surveys 1980-2020.

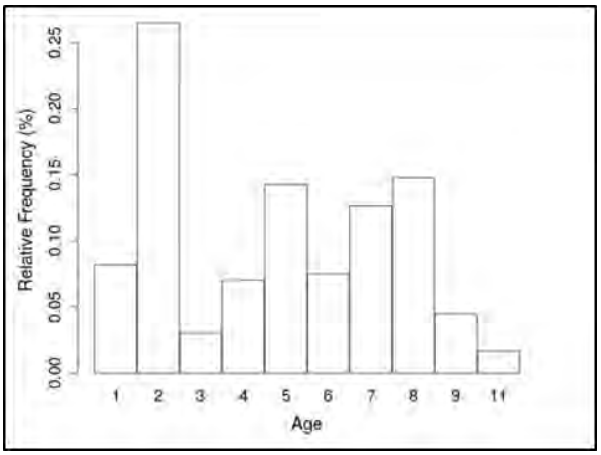


Figure 2. 2020 Age Frequency for Largemouth bass.

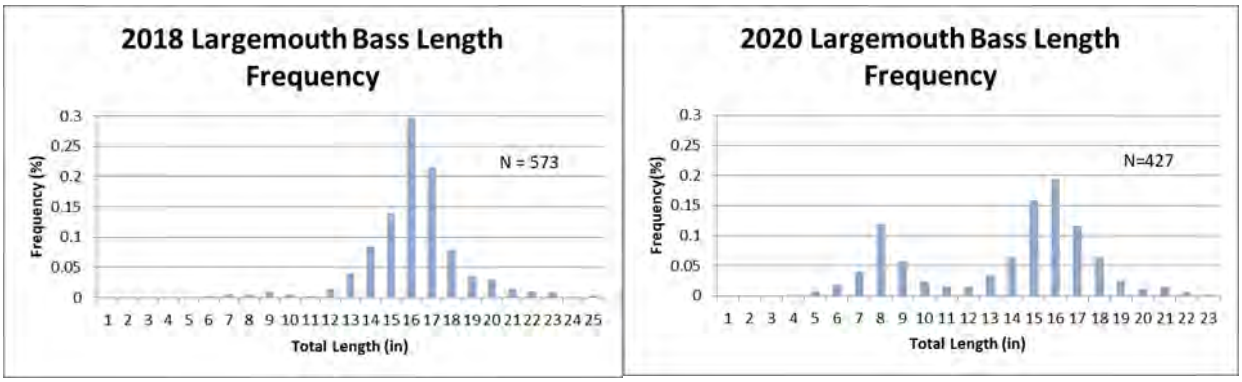


Figure 3. Largemouth Bass Length Frequency Histograms for Konawa Lake

Table 1. Mean Total Length at age (inches) and L infinity (estimated mean maximum length) for Largemouth bass from Konawa Lake.

Year	Age 1	Age 2	Age 3	Age4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	L inf.
2010	7.7	12.7	14.4	15.5	15.8	17.4	17.5	18.7	.	.	17.0
2017	7.4	12.6	14.1	15.1	16	16.3	17.5	17.1	20.1	17	17.7
2020	8.0	10.1	14.9	15.2	16.2	17.3	17.5	17.2	18.5	.	18.5

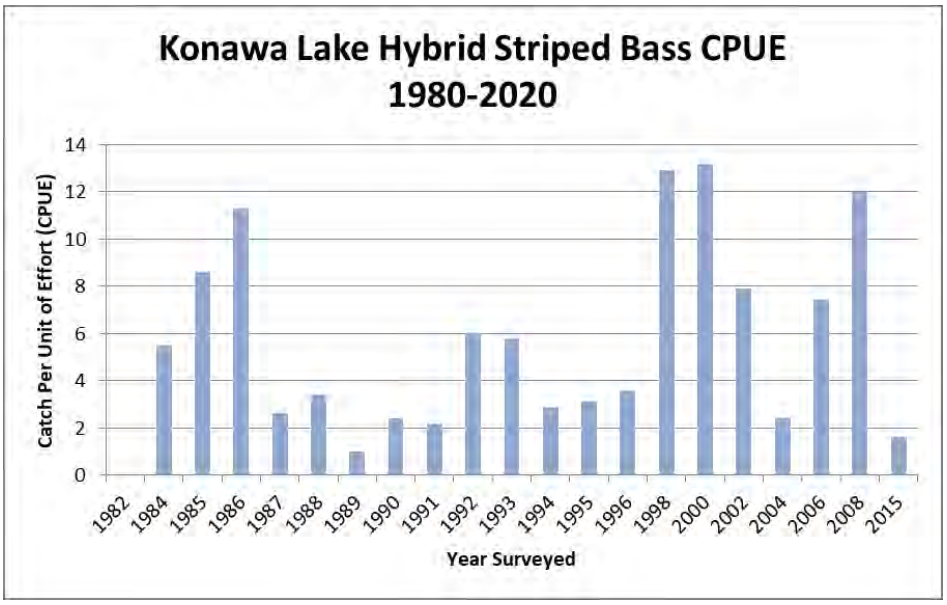


Figure 4. Hybrid Striped Bass Catch Per Unit of Effort (CPUE) from Gill Net Surveys 1980-2020.

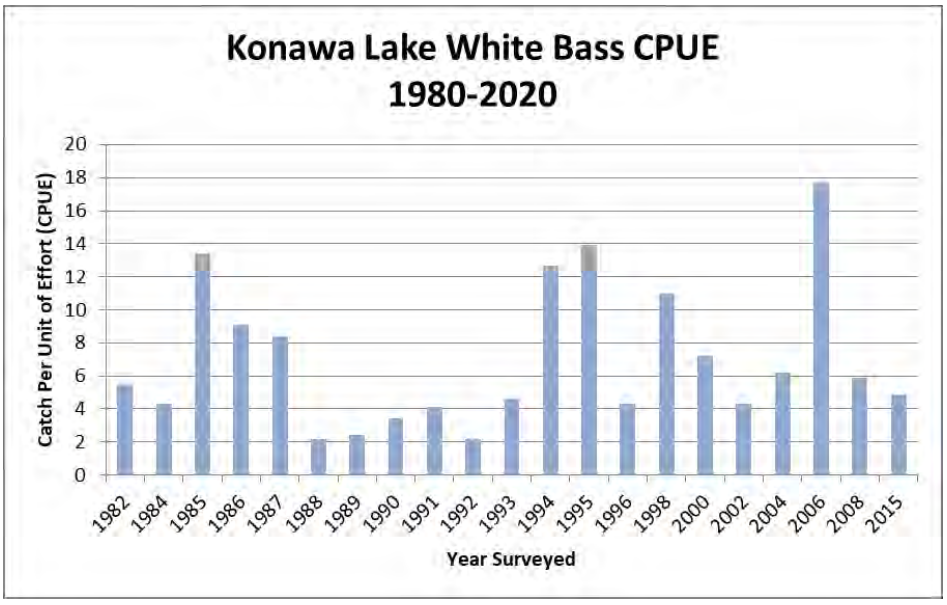


Figure 5. White Bass Catch Per Unit of Effort (CPUE) from Gill Net Surveys 1980-2020**.**

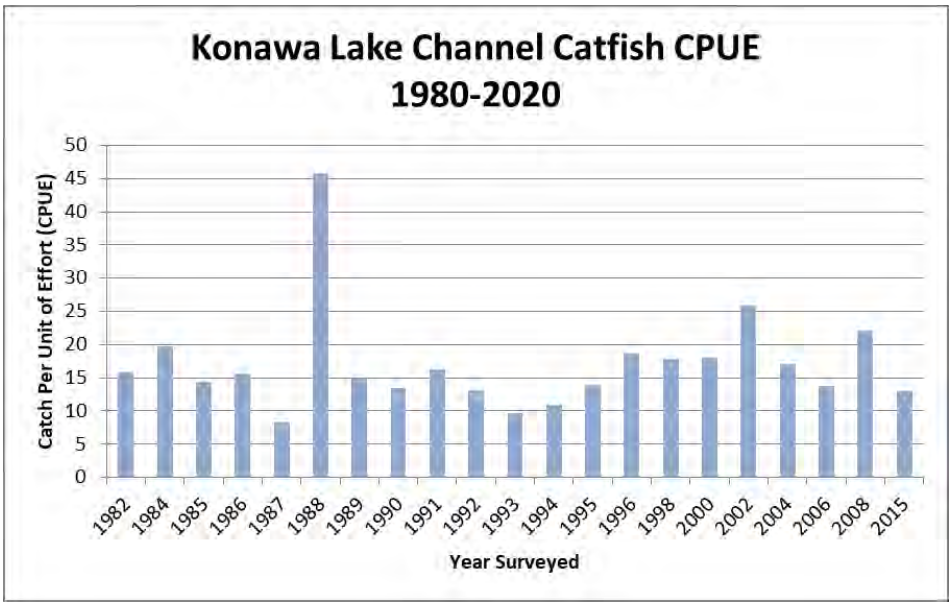


Figure 6. Channel Catfish Catch Per Unit of Effort (CPUE) from Gill Net Surveys 1980-2020.

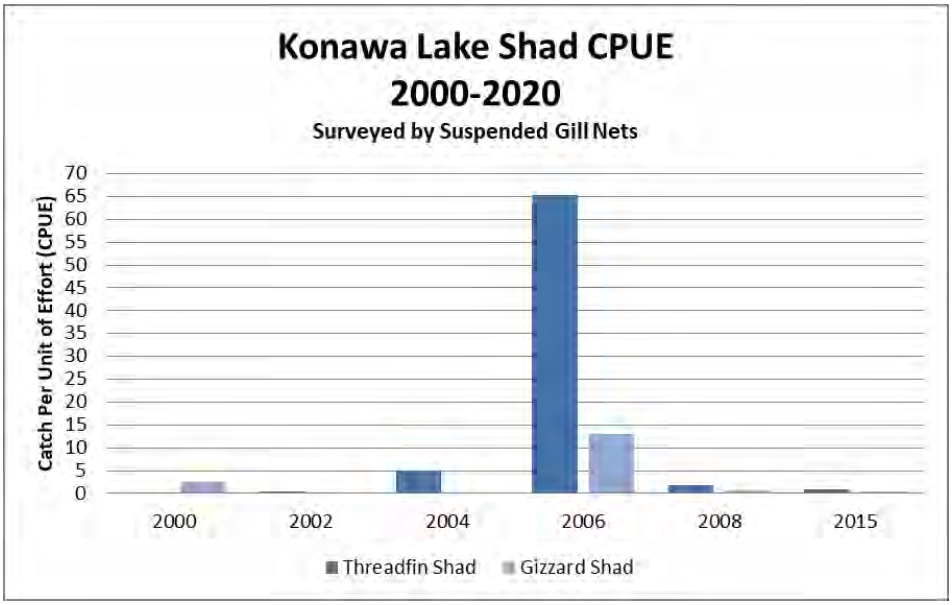


Figure 7. Threadfin and Gizzard Shad Catch Per Unit of Effort (CPUE) from Suspended Gill Nets 2000-2015.

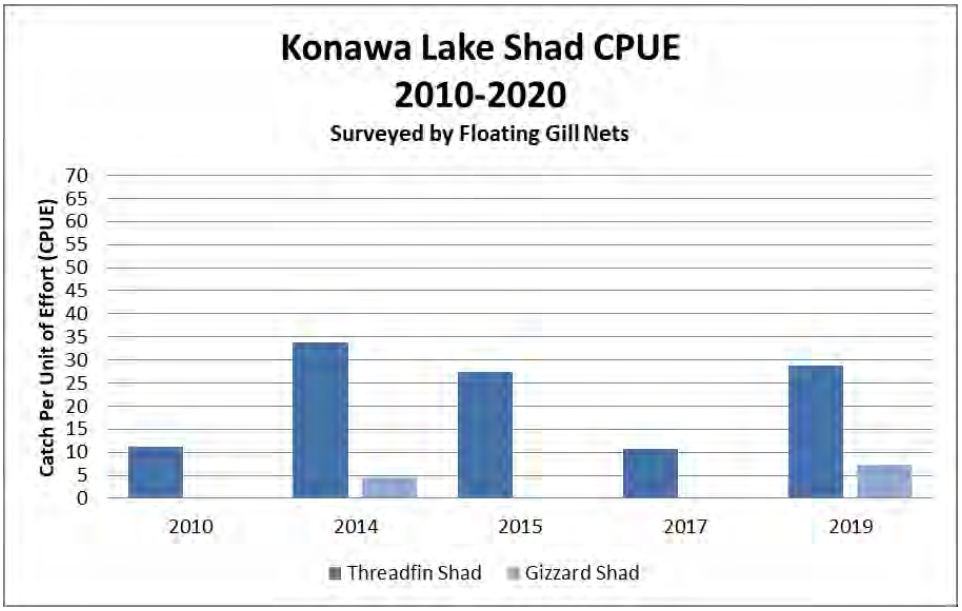
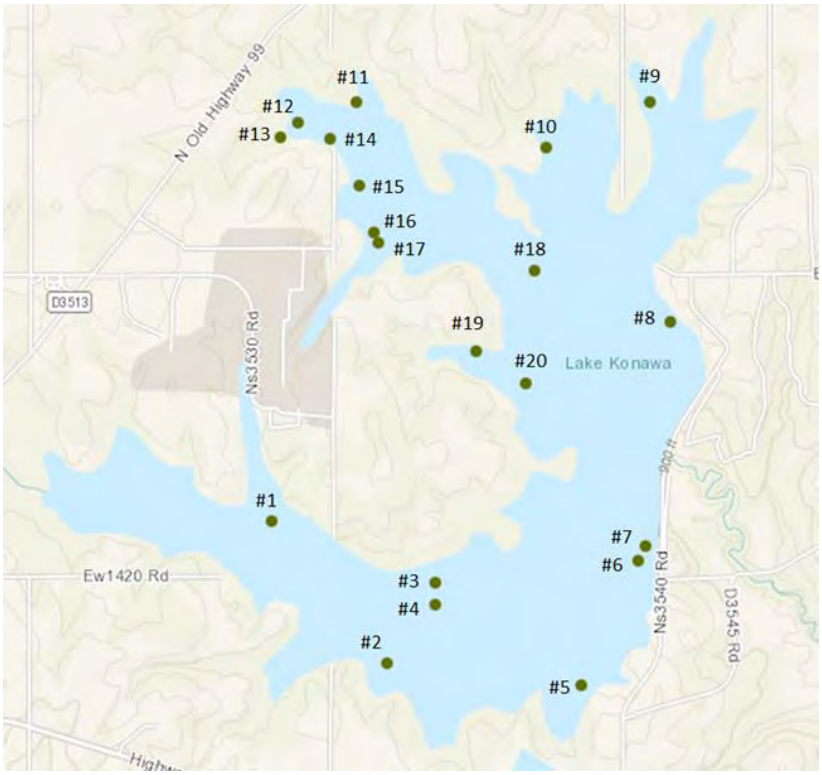


Figure 8. Threadfin and Gizzard Shad Catch Per Unit of Effort (CPUE) from Floating Gill Nets 2000-2015.



Appendix 1. Konawa Lake Fish Attractor Locations

Fish Attractor Site Information for Konawa Lake

Area Name	Site #	Latitude	Longitude	Habitat Type	Marked	Bank Access	Date
Intake	1	34.9587	-96.7258	Spider Blocks	Yes	No	6/16/2010
S. Bank Across from S. Island	2	34.9519	-96.719	Spider Blocks	Yes	No	2/20/2012
W. of S. Island	3	34.9557	-96.7162	Spider Blocks	Yes	No	4/9/2008
S. point of S. Island	4	34.9547	-96.7161	Spider Blocks	Yes	No	6/15/2010
S. Bank W. of SE. Ramp	5	34.9508	-96.7075	Spider Blocks	Yes	No	6/15/2010
Between S. End of Dam & SE. Ramp	6	34.9568	-96.7043	Spider Blocks	Yes	Yes	6/15/2010
S. End of Dam	7	34.9575	-96.7038	Spider Blocks	Yes	Yes	4/30/2009
SE. of Swim Beach	8	34.9683	-96.7023	Spider Blocks	Yes	Yes	6/15/2010
Cove N. of NE. Ramp	9	34.9788	-96.7035	Spider Blocks	Yes	No	4/30/2009
Hump in Middle of N. Cove	10	34.9766	-96.7097	Spider Blocks	Yes	No	4/9/2008
Rock Corner on N. Back from Discharge	11	34.9788	-96.7208	Spider Blocks	Yes	No	4/30/2009
NW. of Discharge	12	34.9778	-96.7243	Spider Blocks	Yes	No	6/15/2010
NW. of Discharge in Cove	13	34.9771	-96.7252	Spider Blocks	Yes	Yes	6/15/2010
Old Road Bed NW. of Discharge	14	34.977	-96.7224	Spider Blocks	Yes	Yes	4/9/2008
Old Foundation N. of Discharge	15	34.9748	-96.7206	Spider Blocks	Yes	Yes	4/9/2008
Mouth of Discharge	16	34.9725	-96.7198	Spider Blocks	Yes	No	2/20/2012
Mouth of Discharge	17	34.9721	-96.7195	Spider Blocks	Yes	No	4/30/2009
Old Road Bed	18	34.9707	-96.7103	Spider Blocks	Yes	No	2/20/2012
E.-W. Cove E. of Plant	19	34.9668	-96.7138	Spider Blocks	Yes	No	6/15/2010
Mid Lake W. Bank	20	34.9652	-96.7108	Spider Blocks	Yes	No	2/20/2012

Appendix 2. Species, number and size of fish stocked in Konawa Lake since 2000.

DATE	SPECIES	NUMBER	SIZE (inches)
2000	Florida LMB	27,400	2.75
	Striped bass hybrid	15,000	2
2001	Florida LMB	27,405	3
	Striped bass hybrid	13,805	1.25
2002	Striped bass hybrid	15,000	1.5
2003	Florida LMB	27,040	3
	Striped bass hybrid	15,625	1.3
2004	Striped bass hybrid	14,400	1.5
2005	Florida LMB	26,560	3
	Blue catfish	6,336	5
	Striped bass hybrid	14,620	1.5
2007	Striped bass hybrid	13,950	1.5
2014	Striped bass hybrid	9,100	1.5
	Striped bass hybrid	4,900	1.75
2017	Striped bass hybrid	15,050	1.5