Performance Report

State: Oklahoma

Project Title: Fisheries Management Survey

Southwest Region Fisheries Management

Elk City Lake

Abstract

Elk City Lake was surveyed in 2022 via electrofishing for Largemouth Bass to determine population structure, Florida Largemouth Bass genetics, and dynamics to evaluate the fishery for needs and possible improvements to the lake to enhance the system as a whole. Southwest region considers Elk City lake to be a recovering bass fishery due to drought and fish kills so routine sampling occurs to monitor current trends in the population. Electrofishing surveys have been conducted here in 2022 and 2016, along with gill net samples in conjunction with hatchery stocking to continually rebuild fishery.

Introduction

Elk City Lake is a small impoundment (240 acres) that is owned and operated by the city of Elk City for water storage usage and recreational activities such as fishing, boat, and camping. This fishery is managed by ODWC who conducts surveys and compiles data for Bass, Channel Catfish, Saugeye and Crappie. Elk City Lake is a turbid lake with average depths of 9 feet with high abundance of yellow bullheads, gizzard shad, largemouth bass, and crappie.

The biggest management issues that seem to be present is continual drought related issues and blue-green algae blooms that have resulted in fish kills. Since Elk City is a recovering fishery we have sampled via several methods to monitor the population along with yearly stocking and transferring of fish from other bodies of water. Another key management practice that needs to be implemented is habitat; the lake is a fairly murky with limited woody structure and vegetation present. There needs to be cedar trees placed in both deep and shallow water areas for cover in conjunction with the riprap and transition areas where fish may utilize. While sampling we made note of abundance of yellow bullheads and common carp, the amount of biomass that these resources take up could cause future problems to the forage present.

Elk City Lake has continually had good catch rates and acceptable ranges of fish health. Elk City is located on the south side of Elk City along with being a quality fishery makes it a sought after fishing destination in southwest Oklahoma. Our management objectives has been geared towards maintaining a quality bass, saugeye, and crappie fishery by evaluating the fishery and stocking Florida Largemouth Bass, crappie, and shad to allow anglers an opportunity to catch sizeable fish. The recovery of this lake is

crucial to anglers and the management principles that we set out to achieve are stocking saugeye, catfish, and forage along with providing various habitat types.

The most recent stocking events at Elk City Lake was Channel Catfish, Saugeye, Northern Largemouth bass, Florida Largemouth Bass, Crappie, Gizzard Shad, and Orange Spotted Sunfish from2015 to 2022. There has been a high volume of stocking since the last fish kill and a yearly routine schedule for catfish and saugeye.

Results

Our electrofishing samples were conducted in May of 2022 when water temperatures were 77^0F which are slightly above our spring electrofishing standard sampling protocols (SSP) but were sufficient enough to conduct a survey. Being a smaller lake, we were able to sample all available shoreline which consisted of 8 sample sites with each timed site being a 10 minute units of effort that included bare bank/cobble, remnant woody stickups, and drops with poor shoreline vegetation. In the duration of the 80 minute sample we collected a total of 83 largemouth bass from Elk City Lake. We felt that 8 sample sites were sufficient in collecting of individuals and met the current SSP protocols and Florida Largemouth Bass DNA sample protocols due to increasing water temperatures and seeing less fish throughout the sampling day.

Largemouth bass samples are measured in catch per unit effort (CPUE) and were moderate based off of similar sized bodies of water with 62.5 fish/hr for largemouth CPUE (Figure 1). When measuring fish body condition (body mass/length) relative weight (Wr) is the metric that is used to describe how fit the population is, the relative weight was on average a 99 (Figure 1) which would be considered the acceptable level to population present, but overall growth and condition looked good. The length frequency of fish (Figure 2) was normally distributed with overall size structure looking similar to previous data (Figure 4) showing a equally distributed range of growth with older individuals being found in the population. Age and growth data showed individuals are growing consistent and the overall most abundant fish were of age 4 which is when hatcheries stock a largemouth into the lake. In 2022 we collected fin clips, sex, and basic data for Florida Largemouth Bass (FLMB) genetics for all 83 individuals collected and submitted samples for a statewide FLMB genetic project.

The growth trends that we have found since 2016 (Figure 4, table 1) show the abundance of largemouth bass in 2022 had increased significantly over that time span of six years. Since the stocking of larger individuals we can see that we are having natural recruitment occur within the population and seeing younger individuals. The overall growth rates have declines from previous samples but that is expected with increasing the amount of fish in a recovering lake but was high body conditions and relative weights (Table 1).

Since we have sampled consecutively from 2016-present and having comparative data it can be easier to determine the overall extent of the largemouth bass population at Elk City. Elk City Lake has been a rebounding fishery over the past 8 years based on growth rates and size structure with the fish that are present. The amount of usable habitat (cedar trees, riprap, shoreline vegetation, etc.) is very low and if the usable amount is increased it would help the fishery out tremendously by providing the

cover that is needed for all species. Elk City Lake has the potential to improve if a large amount of habitat is added to the lake and we continue to make improvements such as stocking regimes and continued monitoring. The best management plan should utilize the forage present, continue to provide habitats, and sample routinely for stocking recommendations to optimize sportfish growth.

Elk City	Electrofishing - Bass Summary Statistics			2022
	# Samples = 8			
Species	CPUE	Standard Deviation	Standard Error	Relative Weight W_r
Largemouth Bass	62.25	20.77	7.34	99

Elk City	Electrofishing - Bass Summary Statistics			2022
	# Samples = 8			
Species	CPUE	Standard Deviation	Standard Error	Relative Weight W_r
Largemouth Bass <8	3.75	8.45	2.99	86
Largemouth Bass >=8<13	6.75	8.14	2.88	97
Largemouth Bass >=8<14	11.25	10.36	3.66	96
Largemouth Bass >=12	53.25	19.09	6.75	100
Largemouth Bass >=14	47.25	16.49	5.83	100
Largemouth Bass >=13<16	23.25	16.49	5.83	93
Largemouth Bass >=16	28.50	15.30	5.41	105
Largemouth Bass >=21	2.25	4.46	1.58	123

Figure 1: Catch per unit effort and relative weights of Largemouth Bass at Elk City Lake 2022 samples

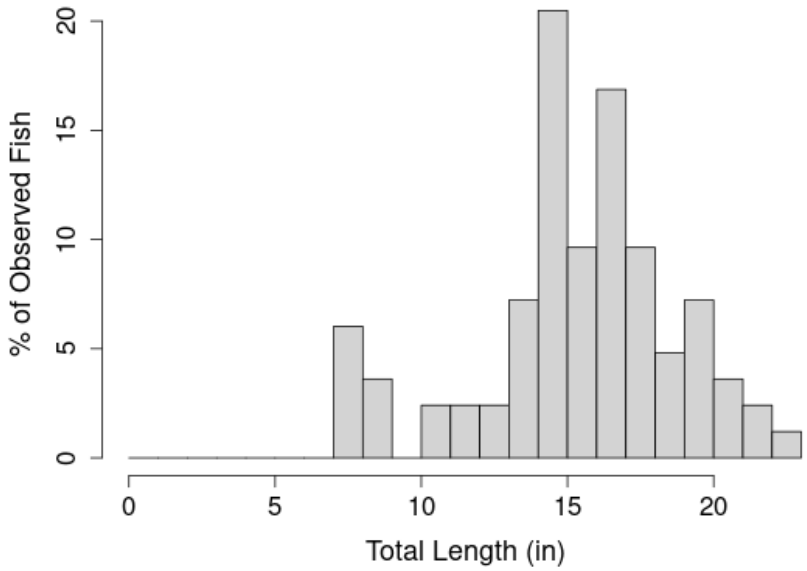

Figure 2. Length frequency and size structure of Largemouth Bass at Elk City Lake 2022 samples

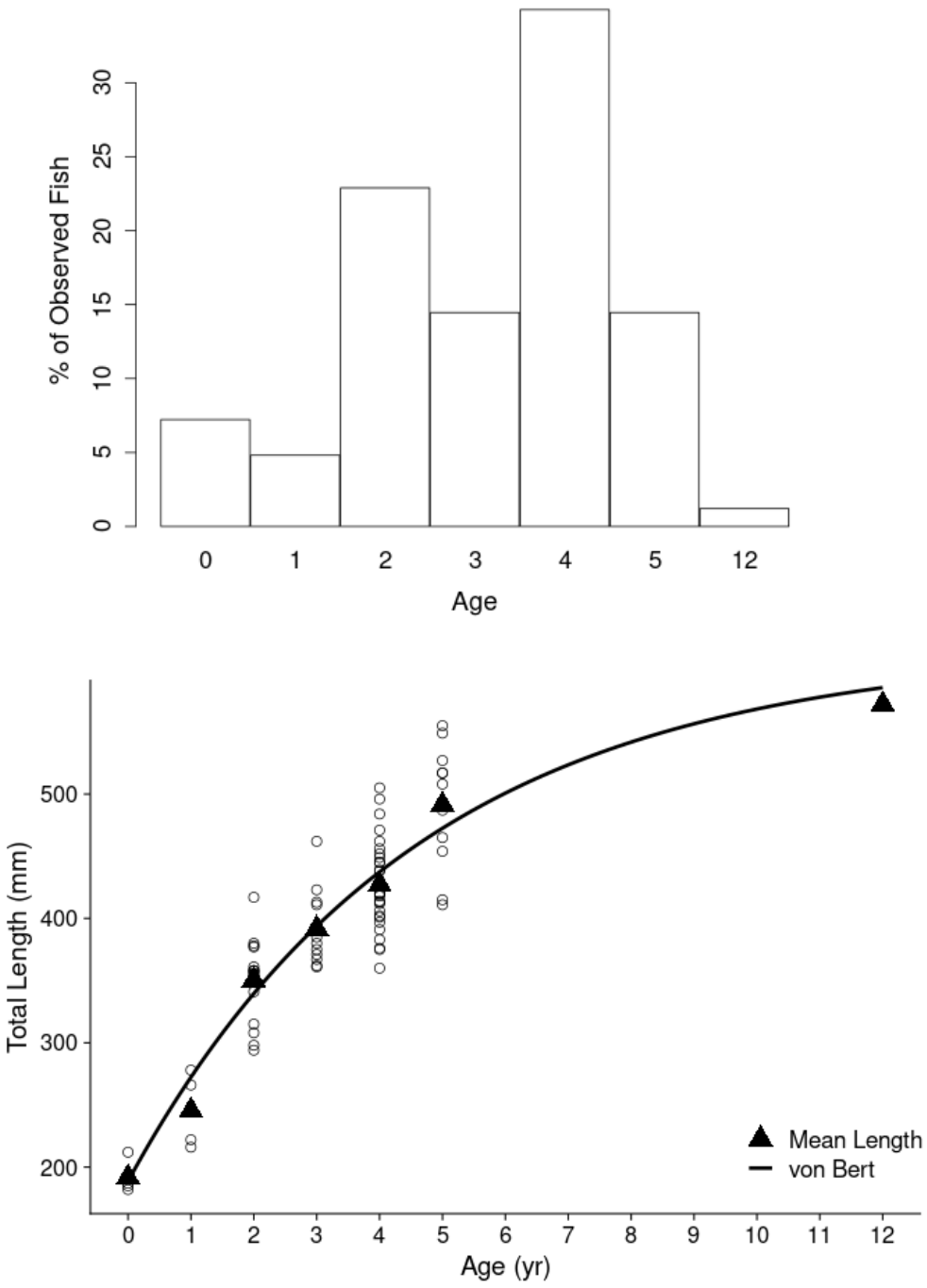

Figure 3. Age and Growth structure of Largemouth Bass at Elk City Lake 2022

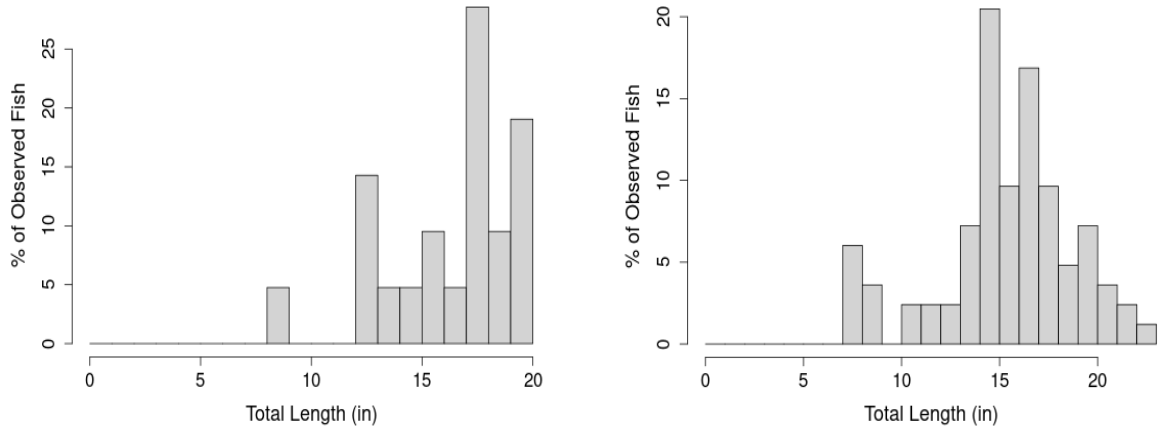

Figure 4. Length Frequency of Largemouth Bass in Elk City Lake 2016 (Left) and 2022 (Right)

Year	Total Catch	Relative Weight
2016	21	117
2022	83	99

Table 1. Total Catch and relative weights of Largemouth Bass at Elk City Lake 2016-2022