



**Bartlett Lake
Fisheries Management Plan
2019-2029**

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Approved by Chris Cantrell

Aquatic Wildlife Branch Chief

Date

6/25/19

Location

Bartlett Lake is located in game management units 21 and 22 downstream of Horseshoe Reservoir on the Verde River. It is approximately 80 kilometers northeast of Phoenix, Arizona in the Tonto National Forest. The reservoir is 51 kilometers east of Carefree. From Carefree, take the Cave Creek Road/Forest Road (FR) 24 to the Bartlett Road/FR 19 junction. Turn right on this paved highway; it is 21 kilometers to the reservoir. (Figure 1)

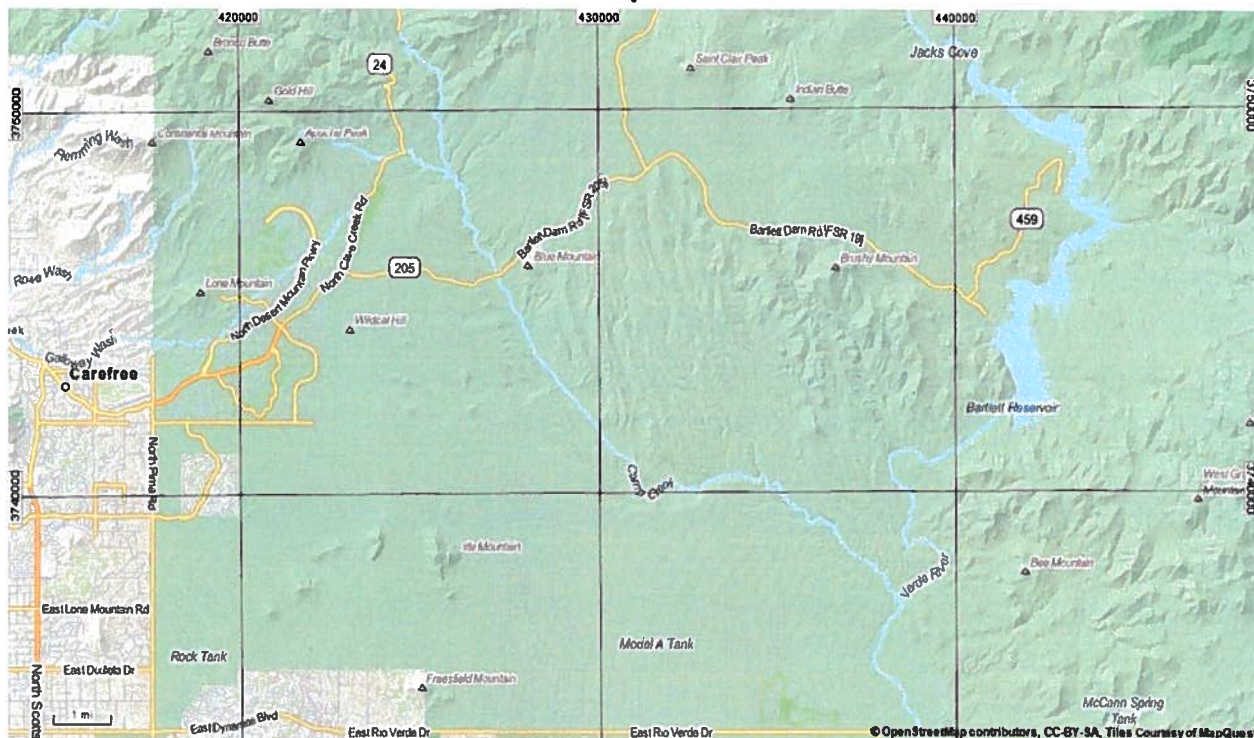


Figure 1. General vicinity map of Bartlett Lake.

Management Prescription

The Arizona Game and Fish Department (Department) has developed concepts under a Warmwater Strategic Vision Document (AGFD 2019) to help guide warmwater fisheries management in Arizona. Using these concepts, fisheries management at Bartlett Lake will focus primarily on a high quality Largemouth Bass *Micropterus salmoides* fishery, secondarily to manage for a Fat Cat water for Flathead Catfish *Pylodictis olivaris* and thirdly on a general opportunity fishery for Black Crappie *Pomoxis nigromaculatus*.

Objective 1: Maintain the Largemouth Bass population to meet or exceed High Quality Concept standards.

Objective 2: Maintain the Flathead Catfish population to meet or exceed Fat Cat Concept standards.

Objective 3: Maintain the Black Crappie population to meet or exceed General Opportunity Concept standards.

Objective 4: Maintain angler satisfaction at 80%.

Monitoring activities, including community-wide or species-specific electrofishing surveys and angler creel surveys will be used to determine if aforementioned management objectives are being met. Objective guidelines to meet objectives are listed in Table 1 below.

Table 1. Bartlett Lake Objectives and Adaptive Management Strategies:

<i>Objective 1: Maintain the Largemouth Bass population to meet or exceed High Quality standards as listed in the Warmwater Sportfisheries Strategic Vision Document.</i>			
Parameters	Objective Guideline	Trigger point to address unmet objectives	Strategies if Objectives are not met
Electrofishing Catch Rates	Spring electrofishing CPUE ¹ \geq 100 fish/hour of electrofishing.	Mean CPUE drops below 100 fish/hour for three consecutive sampling events. Mean CPUE drops below 10 fish/hour for a single sampling event.	<ul style="list-style-type: none"> ● Reevaluate survey method and/or equipment ● Stocking ● Regulation Changes

Mean Relative Weight	Mean relative weight between 90 and 105.	Mean relative weight drops below 90 for three consecutive sampling events.	<ul style="list-style-type: none"> ● Prey Stocking ● Regulation Changes ● Increase aquatic habitat ● Increase mean size of prey
Size Distribution	PSD ² between 40-70, PSD-P between 10-40.	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Increase aquatic habitat ● Increase mean size of prey species
Angler Catch Rates	Angler CPUE of no less than 0.5 fish per hour for anglers targeting Largemouth Bass.	Angler CPUE drops below 0.5 Largemouth Bass per hour for two consecutive creel surveys.	<ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education

Objective 2: Maintain the Flathead Catfish population to meet or exceed Fat Cat Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.

Parameters	Objective Guideline	Trigger point to address unmet objectives	Strategies if Objectives are not met
Electrofishing Catch Rates	Mean summer or fall electrofishing CPUE greater than 10 fish/hour.	Mean CPUE drops below 10 Flathead Catfish per hour for three consecutive surveys.	<ul style="list-style-type: none"> ● Reevaluate survey method and/or equipment ● Stocking ● Regulation Changes

Size Structure	Greater than 15% of the total catch of Flathead Catfish is greater than 34 inches.	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> ● Reevaluate survey method and equipment ● Stocking ● Regulation Changes
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Objective 3: Maintain the Black Crappie population to meet or exceed General Opportunity Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.

Parameters	Objective Guideline	Trigger point to address unmet objectives	Strategies if Objectives are not met
Angler Catch Rates	Black Crappie catch rates no less than 1 fish per hour for anglers targeting Black Crappie.	Overall CPUE drops below 1 Black Crappie per hour for two consecutive creel surveys.	<ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education
Size Structure	Multiple age classes captured during sampling events	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> ● Reevaluate survey method and equipment ● Stocking ● Regulation Changes

Objective 4: Maintain angler satisfaction at 80%.

Parameters	Objective Guideline	Trigger point to address unmet objectives	Strategies if Objectives are not met
Angler Satisfaction	Angler Satisfaction >80%; management trigger	Angler satisfaction drops below 80% for two consecutive creel surveys.	<ul style="list-style-type: none"> ● Stocking ● Regulation Changes ● Outreach/Education ● Habitat

¹ CPUE=Catch Per Unit Effort (fish per hour) ² PSD=Proportional Size Distribution

Background

Bartlett Lake covers 1,137 hectares when full and holds nearly 222,026,733 cubic meters of water. Bartlett Lake is about 14.5 kilometers in length although it fluctuates dramatically with seasonal runoff and water demand. It has a 1,207 square kilometer watershed fed by melted snow and runoff. Shoreline length is 53 kilometers and average depth is 19 meters, with a maximum depth of 53 meters. The land surrounding the lake is managed by the Tonto National Forest and the Department manages the aquatic species within the lake. Salt River Project (SRP) manages Bartlett Dam. Bartlett Dam was constructed between the years of 1936-1939. The dam is 94 meters high and 243 meters long. It was the first dam built on the Verde River and was constructed by the federal government with SRP paying 80% of the cost and the Bureau of Indian Affairs paying 20%. Currently it has no hydroelectric generating capability.

Sportfish such as Largemouth Bass *Micropterus salmoides*, Smallmouth Bass *Micropterus dolomieu*, Black Crappie *Pomoxis nigromaculatus*, Channel Catfish *Ictalurus punctatus*, Flathead Catfish *Pylodictis olivaris*, Common Carp *Cyprinus carpio*, and a variety of sunfish, mainly Bluegill *Lepomis macrochirus* and Green Sunfish *Lepomis cyanellus*, inhabit Bartlett Lake. The lake is fed by the Verde River which is home to a variety of native fishes such as Desert Sucker *Catostomus clarki*, Sonora Sucker *Catostomus insignis*, and Roundtail Chub *Gila robusta*. The endangered Razorback Sucker *Xyrauchen texanus* and Colorado Pikeminnow *Ptychocheilus lucius* are raised by the Department and stocked upstream in the Verde River near Childs and Beasley Flat. These tend to be lotic species but rarely are caught in the lake.

Productivity/Water Quality

Little primary productivity and or benthic sampling has occurred by the Department since 1998. Other partner agencies such as U.S. Geological Survey or Arizona Department of Environmental Quality have collected data more frequently. Initial efforts will focus on acquiring available productivity and benthic data so that it may facilitate data driven decisions regarding fish management. The Regional Aquatic Wildlife Program will work with the Water Quality Program at Phoenix Headquarters to develop a plan to gather productivity data where feasible and appropriate.

Bartlett Lake has never demonstrated problems with its water quality until recently. Normal temperature fluctuations occur seasonally with high temperatures in the high 20's °C and lower temperatures in the low 10's °C. However, high temperature resulted in the mortality of some fish in 2018. An extremely dry winter and a dam maintenance project resulted in a prolonged period of lower than normal lake elevations which likely contributed to the die off. Annual monitoring of pH shows the lake remains fairly consistent at or near 7.5 to 8.5. Historically it has reached as high as 9.1 but is fairly rare with the constant water exchange from the Verde River. The specific conductivity typically ranges from 500 to 700 µmhos and is dependent on precipitation amounts and the amount of fresh water flowing into the lake.

Currently there is very little data for the zooplankton population in Bartlett Lake. It is recommended that a study of the zooplankton population at Bartlett Lake be completed to update knowledge and understanding of conditions at the lake.

Forage/Prey

The prey base in Bartlett Lake is predominately made up of sunfish and Threadfin Shad *Dorosoma petenense*. Monitoring of the sunfish populations as a constituent of the prey base occurs as part of the bi-annual electrofishing survey conducted at Bartlett Lake. These populations are evaluated on their body condition through all size classes and overall length frequencies. For body condition, established management guidelines require that relative weights for a balanced population should be within the range of 95 to 105. During electrofishing surveys the number of fish per hour has increased dramatically from 2007 to our most recent survey in 2015. The CPUE in 2007, 2010, 2011 and 2015 are 24.02, 61.7, 262.67 and 395.82 respectively. The current population of sunfish is doing great within Bartlett Lake, although larger size class Bluegill are not showing up in our surveys. The last four surveys show very little growth to over 140 mm. Future habitat restoration projects should take place to give sunfish the opportunity to survive predation and provide anglers with larger size sunfish fishing success. Catching Threadfin Shad by electrofishing can be highly variable. The CPUE in 2007, 2010, 2011 and 2015 are 41.6, 850.4, 1,221.1 and 109.3 fish per hour. Standardization needs to take place when surveying for Threadfin Shad.

Habitat

A habitat project was started in the early 1990's with a partnership between the Tonto National Forest, Anglers United, Arizona Wildlife Federation, the Department and Bureau of Reclamation. The habitat project was implemented to improve fish habitat, improve and manage angling opportunities, and enhance recreational opportunities. The habitat structures installed were designed to provide target game and prey species with cover for spawning, hiding, and attacking. Structures were placed to maximize their effectiveness through lake level fluctuations. Overtime, many of these structures have become broken or have degraded due to extended dry periods where lake levels have not reached them. Recent low reservoir levels allowed for an inventory of the lake habitat and most of the habitat structures that were determined to be failing were removed. Additionally, this provided an opportunity to visually assess the lake for installation of new habitat and a habitat implementation plan was developed for Bartlett Lake (Dickens and Weedman 2019). We recommend beginning to implement this plan starting July 2019.

Species

The species composition at Bartlett Lake consists of Largemouth Bass, Smallmouth Bass, Black Crappie, Channel Catfish, Flathead Catfish, Common Carp, and a variety of sunfish, mainly Bluegill and Green Sunfish *Lepomis*. The lake is fed by the Verde River which is home to a variety of native fishes such as Desert Sucker, Sonora Sucker, and Roundtail Chub. Razorback Sucker and Colorado Pikeminnow are raised by the Department and stocked upstream in the Verde River near Childs and Beasley Flat. These tend to be lotic species but are occasionally caught in the lake. Although the lake is utilized by many anglers without a preference towards a particular species, Largemouth Bass, Flathead Catfish and Black Crappie are the most sought after species.

Largemouth Bass:

Bartlett Lake continues to have the highest density Largemouth Bass population in the Region. Gabelhouse (1984a) reported that Largemouth Bass populations that are in balance with their prey

base will express PSD values in the range of 40 -70, PSD-Preferred (PSD-P) values in the range of 10 - 40 and PSD-Memorable (PSD-M) values in the range of 0 - 10. In looking at these values for Bartlett Lake from the 2015 spring survey, the lake falls in line to having a balanced population of PSD 54 and PSD-Preferred 17 and PSD-Memorable of 0. It might be possible to increase and maintain the population within these guidelines by reducing or eliminating harvest on Largemouth Bass over 18 or 20 inches in an effort to protect the larger individuals. However, this is not likely to be popular with the many tournament anglers that participate in the numerous tournaments at the lake as it will restrict their ability to weigh multiple fish bags.

Anderson (1980) recommended that Largemouth Bass in a balanced population should have a relative weight that falls within a range of 95 to 105. Largemouth Bass require a prey source that is roughly 15 percent of the bass's total length to express a relative weight around 100. Largemouth Bass with a relative weight less than 95 are feeding on prey that are less than 15 percent of the bass's total length while bass with a relative weight greater than 105 are feeding on a prey source that is greater than 15 percent of that fishes total length (Davies 1987). Relative weights of the bass population have remained fairly stable and slightly below 95 to 105 range (Figure 3) suggesting that there is adequate prey of the appropriate size in the lake to support the Largemouth Bass population. This could be an indication of having large numbers of similar size classes competing for a limited prey base.

In looking at the length frequency data for this period the data shows a good distribution of fish throughout the entire population (Figures 4 - 7). Length frequency data does not suggest problems in the population and in fact suggest that the population is very healthy, both reproduction and recruitment are occurring at levels that are adequate for maintaining the bass population in spite of what is thought to be a large amount of angling pressure.

Bluegill:

The Bluegill population appears stable however the PSD values show that the population is dominated by smaller fish, evidenced by the lack of individuals in the PSD-P category. For Bluegill populations to be in balance Anderson (1985) reported that PSD values should be in the range of 20% to 60% and PSD-Preferred values should fall in the range of 5% to 20%. Proportional stock density in every size category falls well below preferred ranges for a balanced population of Largemouth Bass and Bluegill fishery. The 2015 survey had a PSD of 4.67 and a PSD-P of 0.67. The 2011 survey was consistent with 2015 and had a PSD of 4 and PSD-P of 0. This could be because lack of habitat or large number of predatory species not allowing them to get to larger size classes. Relative weights for Bluegill are also fairly static from year to year. However those values are consistently at or below the management guidelines of 95 to 105.

Length frequency data mirrors the PSD data and it appears that the population is well distributed in the various smaller size classes (Figure 8). Bluegill as a species typically average between 120-mm and 200-mm in length. The majority of the bluegill fall under 140 mm for the last 4 surveys, although the most recent 2015 survey does show some recruitment to larger size classes. We will continue to monitor the bluegill population during each spring electrofishing survey and during our Crappie trap net surveys.

Flathead Catfish:

Bartlett Lake is home to the current state record Flathead Catfish of over 76 pounds. Like other fish populations within Bartlett Lake, the Flathead Catfish population appears to be fairly stable. PSD values for the 2014 and 2015 electrofishing surveys were 86 and 73 respectively. PSD-preferred were 30 and 15.26 for 2014 and 2015 respectively. PSD-Memorable were 3.85 and 4.7 for 2014 and 2015 respectively. Relative weight values are very near to management guidelines for all size classes suggesting adequate prey for the population. Between 95 and 105 is a recommended relative weight for a balanced population. Relative weight-PSD were 96 and 93 for 2014 and 2015 respectively. Relative weight - Quality was 94 and 91 in 2014 and 2015. Relative weight - Preferred fell at 91 and 87 for 2014 and 2015 surveys respectively. Expansion of future electrofishing surveys are planned to gather a larger data set to help with management decisions. A tagging program is currently underway with both Arizona Catfish Conservation Association (ACCA) and the Department. Both the Department and ACCA are hoping to gather growth data from recaptured individuals allowing future management goals be met with potential size regulations.

Black Crappie:

Bartlett Lake is known for having excellent Black Crappie fishing. A recent bag limit of 15 crappie per day was implemented to help the population. Crappie specific trap net surveys are planned yearly in the fall to gather much needed data to help support the Department's management objectives. The Department would like to maintain Bartlett Lake as a high catch rate Black Crappie lake with the opportunity to catch trophy size crappie. PSD goals for a balanced Black Crappie population are between 30-60 and a PSD-P > 10 based on recommendation by Gablehouse (1984b).

Undesirable or Invasive Species:

Bartlett Lake has tested positive for Largemouth Bass Virus. Currently there is no recorded Gizzard Shad *Dorosoma cepedianum* population in Bartlett Lake. There is also no sign of Golden Algae or Quagga Mussels in Bartlett Lake. Continuing to monitor Bartlett Lake by the AIS program will need to take place along with public outreach and education to maintain an aquatic invasive species free lake.

Access

Currently Jojoba, Marina, and Yellow Cliffs are the three boat ramps at Bartlett Lake. When water levels are down ramp access can be limited. Rattlesnake Cove is closed to all motorized watercraft and has fishing access with fishing piers. Although, as of June 22, 2015 the Rattlesnake fishing pier has a broken weld and is closed to all access. Shoreline access is very good throughout most of the west side of the lake. Parking lots at both Jojoba and Yellow Cliffs will provide fishing access to shoreline. Efforts will continue in conjunction with partners and stakeholders to properly sign and develop fishing access points where feasible.

Catch

Catch rate goals for Bartlett Lake should be at minimum 0.5 fish per hour for Largemouth Bass and 1.0 fish per hour for Black Crappie when anglers are specifically targeting those species. Catch rates for Flathead Catfish should be 0.25 fish per hour when anglers are specifically targeting them. According to the 2011 Bartlett Lake Creel survey angler catch rates fell below these management goals. Catch rates for Largemouth Bass were 0.417 mean fish per hour for combined boat and shoreline anglers. Black Crappie had a combined mean catch rate of 0.023 fish per hour. Flathead Catfish had a combined mean catch rate of 0.019 fish per hour. This data does take into account anglers that are fishing for multiple species at the same time. Catch rates are suspected to be higher for anglers specifically targeting individual species instead of multiple species at the same time.

Bartlett was estimated to support 276,009 angler use days (AUD) in a statewide angler survey completed by the Aquatic Wildlife Branch in 2013/2014. This number of AUD's shows that Bartlett Lake is 5th most popular water in the state.

Satisfaction

Angler satisfaction of 80% is the established goal for this fishery. The 2011 creel study showed an average rating of 63%. This was over a year period with each season taken into account and averaged for the entire year. Winter angler satisfaction was significantly lower than other seasons due to poor fishing success. Satisfaction is directly correlated to number of fish caught. Two areas that can influence higher catch rates includes placement of fish habitat and development of new access points. If we can increase fishing success we can improve angler satisfaction. A future creel survey will need to take place within the next 2-3 years to get up to date angler information.

Literature Cited

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Gabelhouse, D. W., 1984b. An assessment of crappie stocks in small midwestern private impoundments. *North American Journal of Fisheries Management* 4:371-384.

Tables and Figures

Table 2. Mean catch-per-unit-effort (fish/hour) of fish captured during electrofishing surveys in Bartlett Lake.

Species	Spring 2007	Spring 2010	Spring 2011	Spring 2015
Largemouth Bass	124.52	109.04	177.47	42.11
Bluegill	80.40	220.36	201.24	395.82

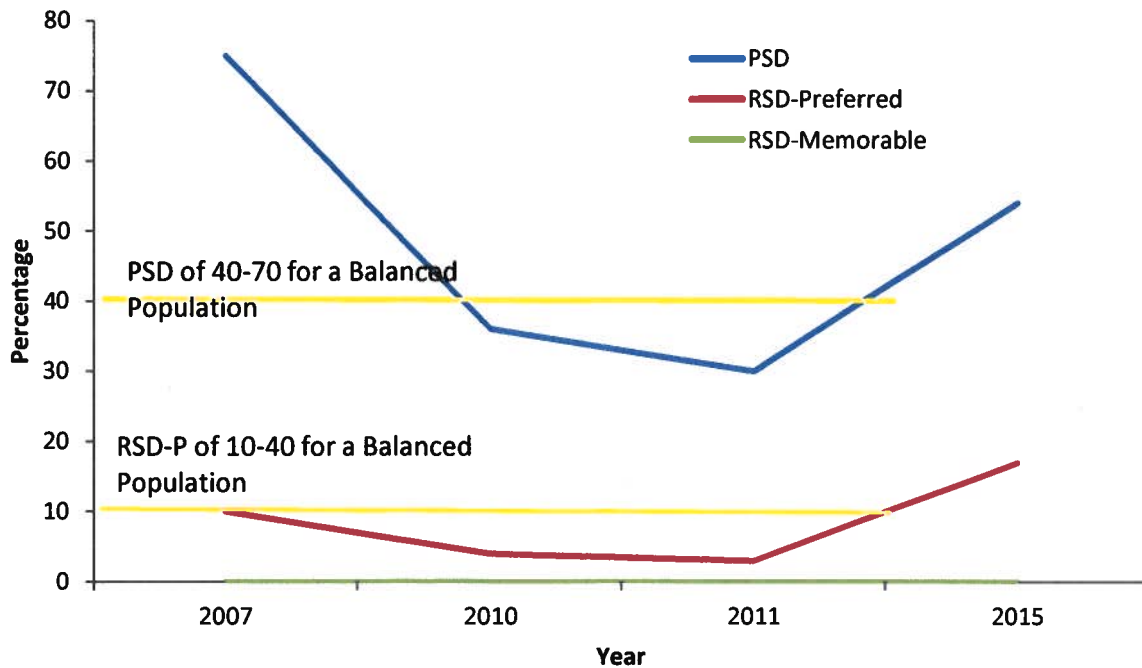


Figure 2. Proportional Stock Density Values of Largemouth Bass at Bartlett Lake, Spring 2007-2015 in relation to Anderson’s recommended percentages for a Largemouth Bass Population managed for a balanced population.

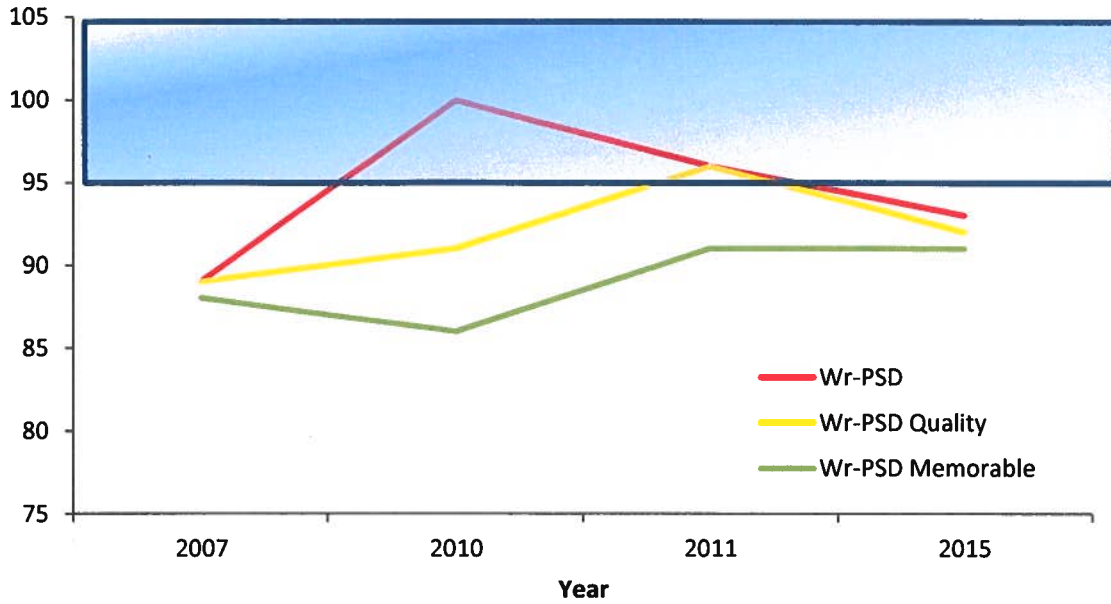


Figure 3. Relative Weights of Largemouth Bass at Bartlett Lake Spring 2007-2015

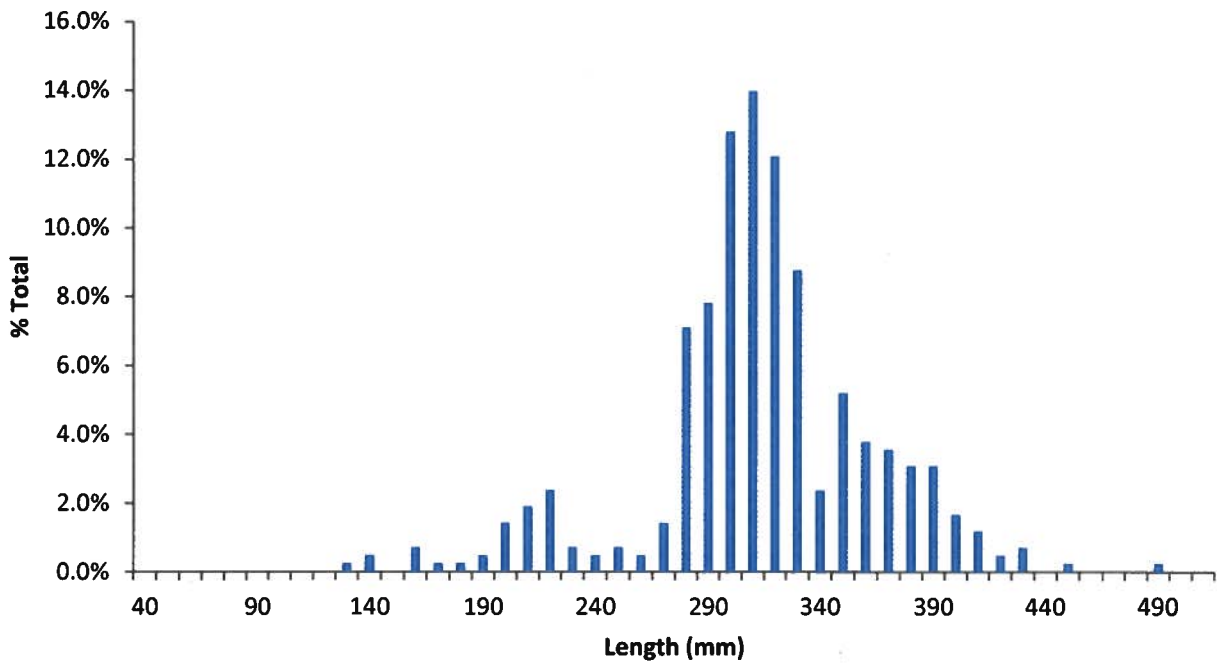


Figure 4. Length Frequency of Largemouth Bass at Bartlett Lake sampled spring 2007.

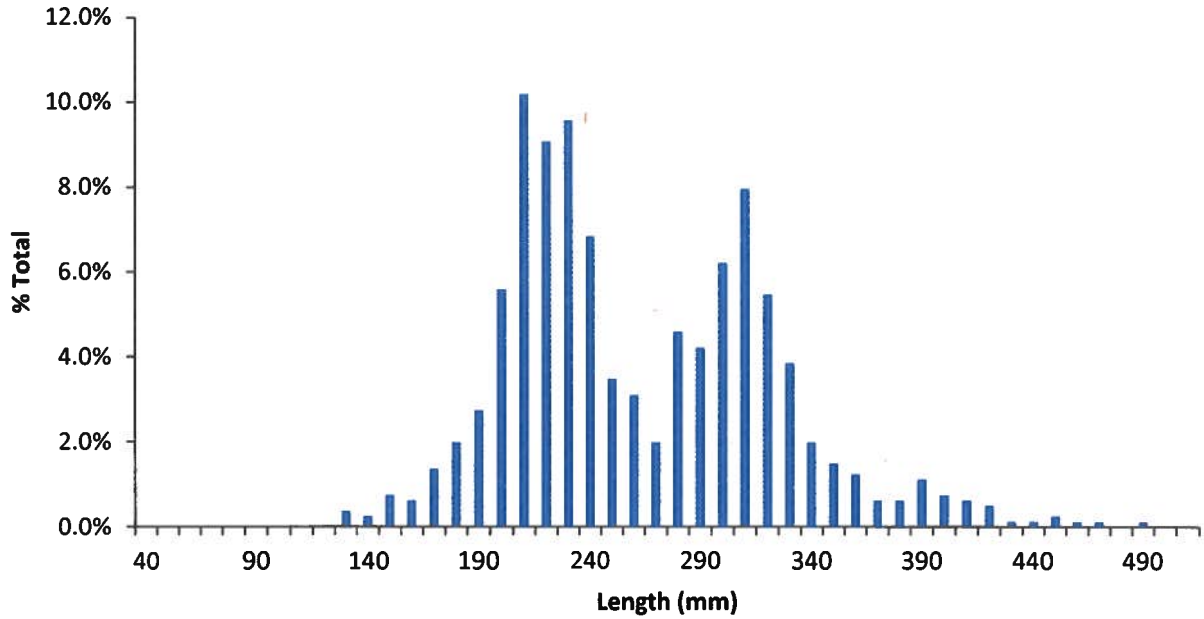


Figure 5. Length Frequency of Largemouth Bass at Bartlett Lake sampled spring 2010.

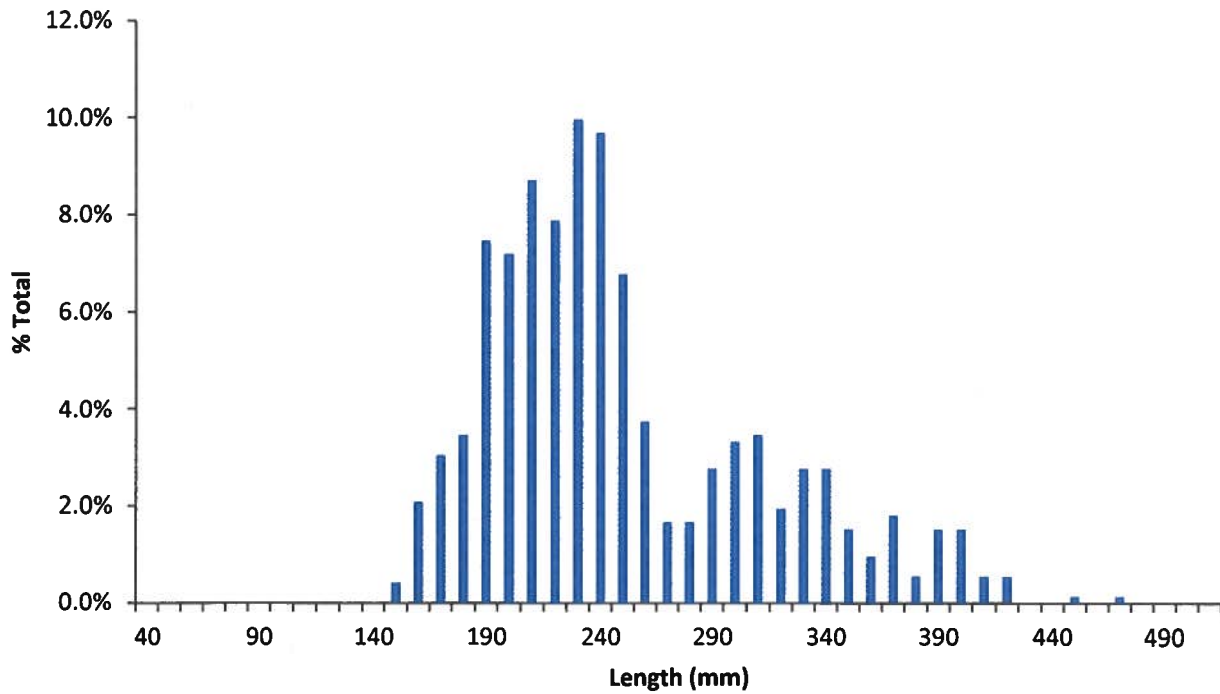


Figure 6. Length Frequency of Largemouth Bass at Bartlett Lake sampled spring 2011.

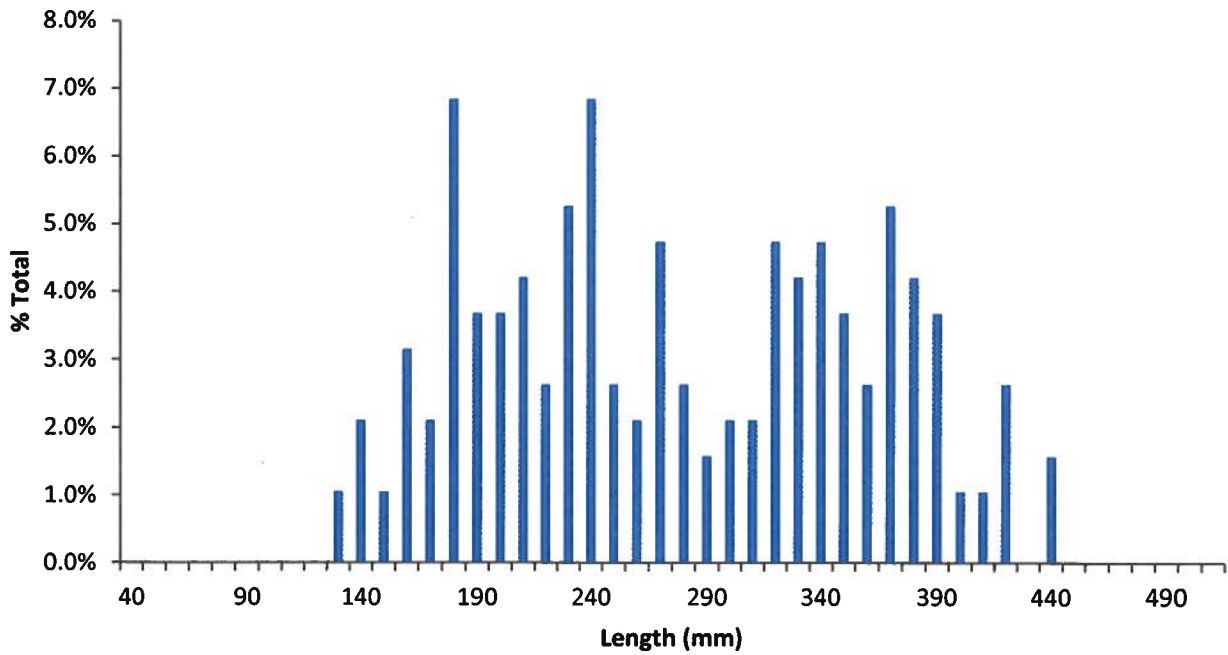


Figure 7. Length Frequency of Largemouth Bass at Bartlett Lake sampled spring 2015.

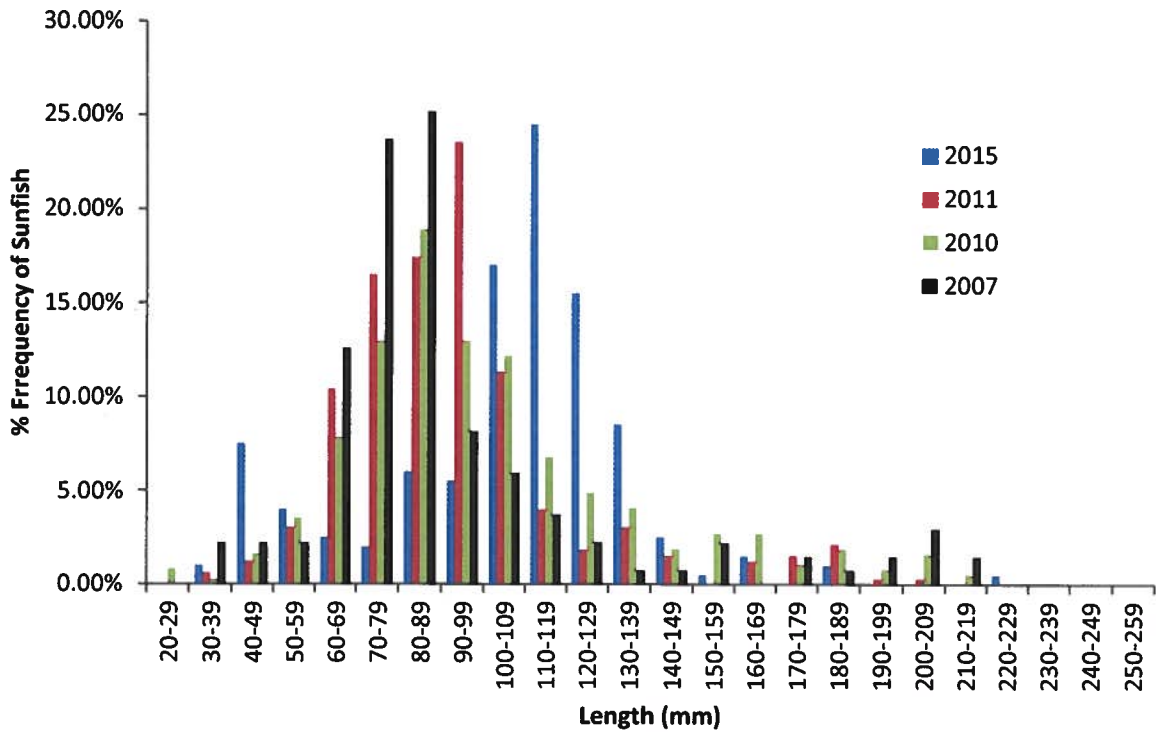


Figure 8. Length frequency of Bluegill caught at Bartlett Lake from 2007 to 2015. A total of four surveys were included in the data.