



## Parker Canyon Lake Fisheries Management Plan 2020-2030

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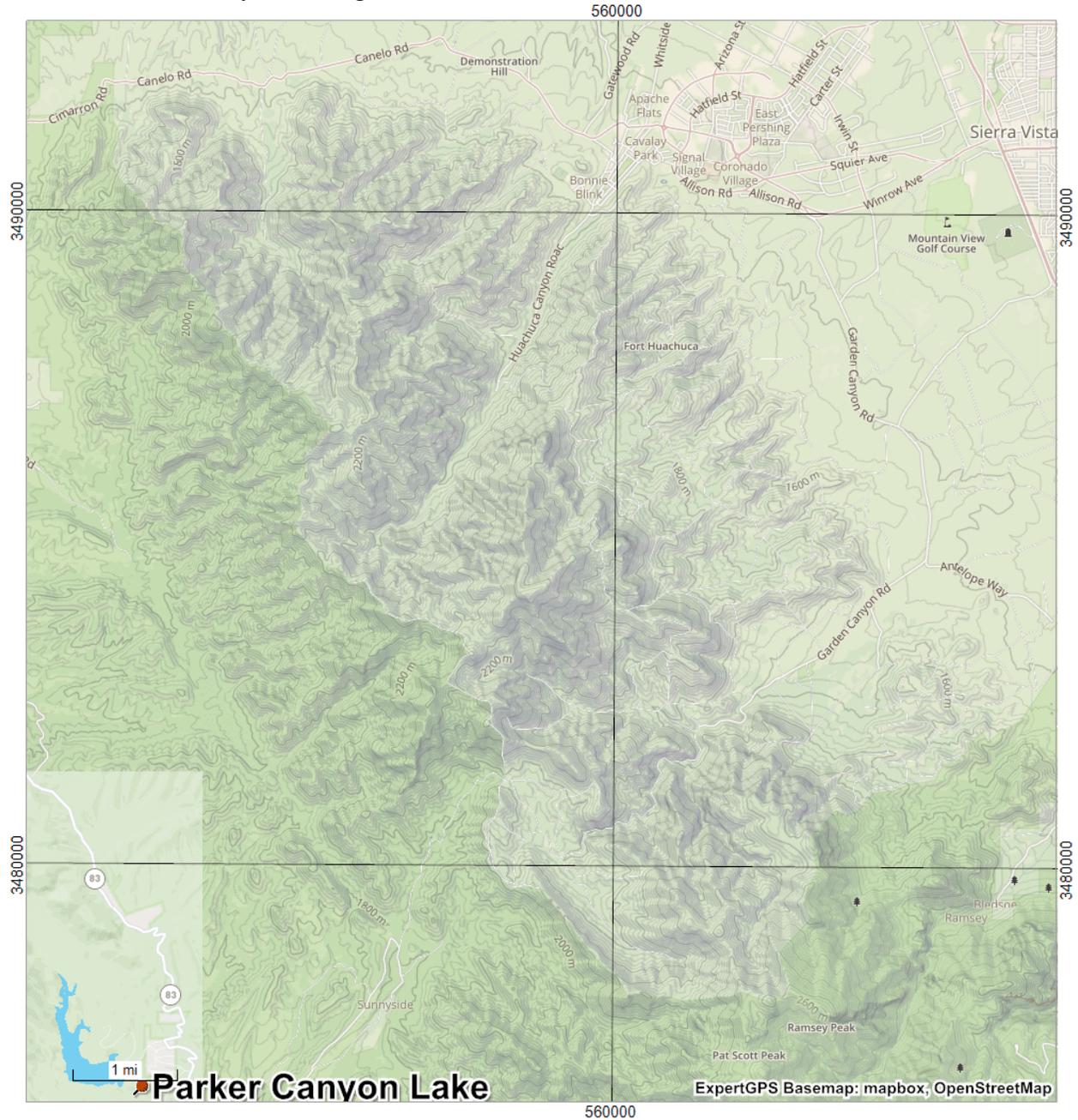
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Approved [  ] by Chris Cantrell *D. Andrew Clark* acting for Date: 7/31/2020  
Aquatic Wildlife Branch Chief

## Location

Parker Canyon Lake is located in south central Arizona in game management unit 35A, approximately 30 miles southwest of Sierra Vista and 18 miles southeast of Sonoita (Figure 1). The lake is reached by following State Route 83.



**Figure 1.** Location map for Parker Canyon Lake.

## Management Prescription

The Arizona Game and Fish Department (Department) has developed approaches for coldwater and warmwater species management in Arizona under a Coldwater Strategic Vision Document (AGFD 2019a) and Warmwater Strategic Vision Document (AGFD 2019b). Using these documents, fisheries management at Parker Canyon Lake will focus primarily on a High Quality approach for Largemouth Bass *Micropterus salmoides* and a General Opportunity approach for Bluegill Sunfish *Lepomis macrochirus*, Redear Sunfish *Lepomis microlophus* and Channel Catfish *Ictalurus punctatus*. High Quality waters are defined as having conditions for producing Largemouth Bass that reach lengths generally considered of quality size by anglers. During the months of October – March, the lake will be stocked with catchable size Rainbow Trout *Oncorhynchus mykiss* under the Intensive Use strategic approach defined in Coldwater Sportfisheries Strategic Vision Document.

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

Objective 1: Manage the Largemouth Bass population to support High Quality standards.

Objective 2: Manage the Channel Catfish population to support General Opportunity standards.

Objective 3: Manage the sunfish populations to support General Opportunity standards.

Objective 4: Maintain a Rainbow Trout stocking program to meet or exceed Intensive Use standards.

Objective 5: At least 80% of the anglers interviewed during creel census rate the fishing as fair, good or excellent.

**Table 1.** Parker Canyon Lake Objectives and Adaptive Management Strategies.

<b>Parameters</b>	<b>Objective Guideline</b>	<b>Trigger point to address unmet objectives</b>	<b>Strategies if Objectives are not met</b>
<b><i>Objective 1: Manage the Largemouth Bass population to support High Quality approach standards.</i></b>			
Electrofishing Catch Rates	Total spring electrofishing catch per unit effort (CPUE): $\geq 100$ Largemouth Bass/Hour.	Three consecutive sampling events with a catch per unit effort $\leq 100$ Largemouth Bass/hour.	<ul style="list-style-type: none"> <li>● Change daily bag limit and size restriction</li> <li>● Stocking</li> <li>● Regulation Change</li> </ul>
Mean Relative Weight (Wr)	Mean fall Wr between 90 – 105.	Mean relative weight $\leq 90$ for three consecutive sampling events.	<ul style="list-style-type: none"> <li>● Reduce Largemouth Bass in appropriate size classes</li> <li>● Stock prey</li> </ul>
<b>Parameters</b>	<b>Objective Guideline</b>	<b>Trigger point to address unmet objectives</b>	<b>Strategies if Objectives are not met</b>
Proportional Size Distribution (PSD)	PSD = 40 – 70 PSD - P = 10 – 40.	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> <li>● Reduce Largemouth Bass in appropriate size classes</li> <li>● Stock prey</li> <li>● Regulation Change</li> </ul>
Angler Catch Rates	CPUE $\geq 0.50$ for anglers targeting Largemouth Bass.	Largemouth Bass CPUE $\leq 0.50$ for two consecutive creel surveys.	<ul style="list-style-type: none"> <li>● Change daily bag limit and size restriction</li> <li>● Angler education</li> <li>● Habitat alterations</li> </ul>
<b><i>Objective 2: Manage the Channel Catfish population to support General Opportunity approach standards.</i></b>			
Channel Catfish Hoop Net CPUE	Mean summer hoop net CPUE $\geq 1$ catfish/net night.	Mean summer hoop net CPUE $\leq 1$ catfish/net night for three consecutive surveys.	<ul style="list-style-type: none"> <li>● Stocking</li> <li>● Regulation Changes</li> </ul>
Angler Catch Rates	CPUE $\geq 0.50$ for anglers targeting catfish.	CPUE $\leq 0.50$ for anglers targeting catfish.	<ul style="list-style-type: none"> <li>● Stocking</li> <li>● Regulation Changes</li> </ul>

<b>Objective 3: Manage the sunfish populations to support General Opportunity approach standards.</b>			
<b>Parameters</b>	<b>Objective Guideline</b>	<b>Trigger point to address unmet objectives</b>	<b>● Strategies if Objectives are not met</b>
Size Structure	Multiple age classes present.	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> <li>● Stocking</li> <li>● Regulation Changes</li> </ul>
Electrofishing Catch Rates	Total spring electrofishing catch per unit effort (CPUE): $\geq 50$ sunfish/hour.	Three consecutive sampling events showing population below management guideline.	<ul style="list-style-type: none"> <li>● Stocking</li> <li>● Regulation Changes</li> </ul>
Angler Catch Rates	CPUE $\geq 0.50$ for anglers targeting sunfish.	CPUE $\geq 0.50$ for anglers targeting sunfish.	<ul style="list-style-type: none"> <li>● Stocking</li> <li>● Regulation Changes</li> </ul>
<b>Objective 4: Maintain a winter Rainbow Trout stocking program to support Intensive Use approach standards.</b>			
Angler Catch Rates	No less than 0.5 fish per hour.	Angler catch rates drop below 0.5 fish per hour for two consecutive creel surveys.	<ul style="list-style-type: none"> <li>● Stock larger trout</li> <li>● Regulation changes</li> <li>● Outreach/education</li> </ul>
<b>Objective 5: At least 80% of the anglers interviewed during creel census rate the fishing as fair, good or excellent.</b>			
Angler Satisfaction	A minimum of 80% of angler's rate fishing as fair, good or excellent during creel census.	Creel Census shows less than 80% of the angler's rate fishing as fair, good or excellent.	<ul style="list-style-type: none"> <li>● Develop an angler outreach program to attempt to increase the angler's ability to catch fish on Patagonia Lake.</li> <li>● Stock larger trout.</li> </ul>

## Background

Parker Canyon Lake is a 124 surface-acre lake constructed in 1964 with a maximum storage capacity of 4,400 acre-feet. The reservoir is formed by a dam approximately 88.5 feet high in the south end of the Canelo Hills. Parker Canyon is a tributary of the upper Santa Cruz River with the confluence located in Mexico. The lake is located within the Coronado National Forest, which

maintains the campgrounds. The area provides a variety of recreational opportunities including fishing, boating, and hiking opportunities. At the lake there is a convenience store, fishing pier, and boat ramp. The lake is a popular spot for anglers from all over southern Arizona. Parker Canyon Lake has historically been managed as a two-story fishery: primary cold water put-and-take winter Rainbow Trout fishery, secondarily a naturally reproducing warm water fishery of Largemouth Bass, Bluegill and Redear Sunfish and Channel Catfish.

## **Productivity/Water Quality**

Water quality issues have rarely been documented at Parker Canyon Lake. Temperatures experience typical season fluctuations with high temperatures in the mid 80's °F and lower temperatures in the mid 40's °F. Annual monitoring of pH suggests the lake can fluctuate from 7.97 to 9.42, with the higher pH values during summer months due to little or no inflow. Specific conductivities typically range from 145 to 276 µS depending on precipitation and flow into the lake.

## **Forage/Prey**

In an effort to improve the forage base of the lake, multiple bait fish species have been stocked. These species include Fathead Minnow *Pimephales promelas*, Red Shiner *Cyprinella lutrensis*, Threadfin Shad *Dorosoma petenense*, and freshwater shrimp. None of these species have persisted for unknown reasons. Today, Bluegill, Redear and Green Sunfish *Lepomis cyanellus*, Yellow Bullhead *Ameiurus natalis*, crayfish and bullfrogs comprise the prey base at the lake. When available, studies to address questions about forage composition and utilization by sportfish species are needed.

## **Habitat**

Parker Canyon Lake has an abundance of aquatic habitat. The habitat includes a mixture of natural and manmade structures to benefit Largemouth Bass, Bluegill and Redear Sunfish. In 2012, Pisces Pyramid Channel Catfish structures, also called catfish houses, were built and scattered around the lake to improve recruitment. Larger Channel Catfish structures were installed in 2016. Aquatic vegetation includes Eurasian milfoil and cattails both of which provide adequate cover for young of year fish species as well as habitat to support Largemouth Bass feeding. Although submerged aquatic vegetation is important to the health of the fish populations, it has become quite the nuisance to anglers and can cover near 100% of the shallow water areas in the lake during the summer. In an effort to reduce the large amount of submerged aquatic vegetation and thereby increase angler access, 850 (8 to 10 inch) White Amur *Ctenopharyngodon idella* were stocked from 2015 – 2019. Pípalová (2006) provided a thorough review of utilizing Grass Carp to control abundant aquatic vegetation and numerous factors determine the success of this management approach. The goal is an intermediate density of aquatic vegetation to support the fish populations while also maintaining angler access. The effectiveness of this approach will continue to be monitored and if needed, mechanical or chemical removal options will be explored.

## Species

The current fish population consists of Largemouth Bass, Bluegill Sunfish, Redear Sunfish, Green Sunfish, Rainbow Trout, Channel Catfish, White Amur and Yellow Bullhead. Warm water fish species (excluding Channel Catfish and White Amur) have remained self-sustaining since their introduction to the lake. An illegally introduced Northern Pike *Esox lucius* population was documented in 1999. Winter gillnet survey/removals for Northern Pike were done until 2004. Winter surveys targeting Northern Pike were halted in 2005 and Northern Pike have not been reported by anglers nor have they been documented in annual lake surveys that occur in the spring and fall.

### *Largemouth Bass:*

Parker Canyon Lake has become a High Quality Largemouth Bass fishery capable of providing abundant recreational opportunity for anglers. In spring electrofishing surveys the past three consecutive years (2017-2019), the catch per unit of effort (CPUE) for Largemouth Bass was above the established guideline of  $\geq 100$  fish/hour except in 2019 (Figure 2).

Anderson (1980) reported that Largemouth Bass populations that are in balance with their prey base will express proportional size distribution (PSD) values (fish  $\geq 12$  inches) in the range of 40 -70% and proportional size distribution - preferred (PSD-Preferred) values (fish  $\geq 15$  inches) in the range of 10% - 40%. For example, Largemouth Bass  $\geq 15$  inches should make up 10 – 40% of a sample in a high quality fishery. The Department has adopted these parameters to identify its high quality fishery approach (AGFD 2019b). To assess the Largemouth Bass population over a three year period from 2017 through 2019 the PSD values from spring surveys were plotted on a graph fitted with these parameters (Figure 3). These values are within the proposed management guidelines for a high quality fishery except PSD size fish in 2017.

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). The Department has established a broader management parameter between 90 and 105 for relative weight of a high quality fishery. The Department has adopted standard methods for sampling fish populations (Bonar et al 2009) and it's recommended to sample in the spring season for the greatest CPUE. Spring is also when the Largemouth Bass population is in some form of the reproduction cycle (i.e. pre – spawn, post – spawn, nest guarding, nest building, etc.). These activities can add substantial variability to individual fish weight (Blackwell et al 2000) and as such relative weight data will be gathered in the fall during other management activities or as spot – check surveys. Figure 4 shows the relative weight near or within established management guidelines for all three years suggesting that there is adequate prey of the appropriate size in the lake to support a high quality Largemouth Bass fishery. When available, studies to address questions about age and growth of Largemouth Bass are needed.

### *Bluegill Sunfish:*

The Bluegill Sunfish population at Parker Canyon Lake is managed under a General Opportunity approach. The catch per unit of effort parameter for Bluegill Sunfish during spring surveys should be  $\geq 50$  fish per hour during spring electrofishing surveys (Table 1). Figure 2 shows that the CPUE for Bluegill Sunfish does not meet the objective except in 2017. Length frequency data shows that the population is well distributed through many of the length classes, however there are very few individuals above the 200 mm (8 inches) length class (Figure 5).

### *Redear Sunfish:*

The Redear Sunfish population at Parker Canyon Lake is managed under a general opportunity approach. The catch per unit of effort parameter for Redear Sunfish during spring surveys should be  $\geq 50$  fish per hour during spring electrofishing surveys (Table 1). Figure 2 shows that the CPUE for Redear Sunfish is well below management guidelines. Length frequency data shows the population is well distributed through many of the length classes however unlike the Bluegill Sunfish population there are much larger individuals in the population with fish reaching up to 280 mm (11 inches) (Figure 6).

### *Channel Catfish:*

Channel Catfish are not known to reproduce in Parker Canyon Lake. The fishery was historically maintained by stocking with an Intensive Use approach. However, due to budgetary constraints, annual Channel Catfish stocking ceased in 1995. In 2012, Parker Canyon Lake residents and the store owner approached the Department about renewing Channel Catfish stocking and offered to raise donations to assist in purchasing Channel Catfish. Prior to the initial stocking, the Department conducted Channel Catfish electrofishing surveys and habitat analysis and determined that spawning habitat was not adequate to support a self-sustaining population. Artificial habitat was constructed and strategically placed around the lake to promote spawning. Following habitat improvements, three stockings of catchable Channel Catfish occurred in 2012, 2013 and 2017 with the goal of establishing a self-sustaining population.

The Channel Catfish population at Parker Canyon Lake is currently managed under a General Opportunity approach (Table 1). The CPUE parameter established for Channel Catfish is  $\geq 1$  fish/net night (Table 1). Following a stocking in 2017, CPUE values have been above that parameter. Length frequency data shows that the population consists of larger individuals with no evidence of reproduction or recruitment occurring in the population (Figure 7). The lack of reproduction is an identified issue and the Department has begun to address this issue by installing spawning habitat in 2016. Future sampling events should focus on documenting reproduction in the population.

### *Rainbow Trout*

Rainbow Trout have been continually stocked during the winter months (October thru March) to provide an Intensive Use Rainbow Trout fishery. Growth of Rainbow Trout in Parker Canyon Lake is minimal but there are indications trout will survive through the summer; however, the level of Rainbow Trout persistence is unknown. Historically, stocking rates were based on the size of

the waterbody (Parker Canyon Lake received approximately 225 Rainbow Trout/acre/year). Figure 8 shows the total number and pounds of Rainbow Trout stocked from 2000 – 2020. Annually the mean total number of fish stocked is 27,000 or 10,500 pounds per season. A new stocking strategy is being implemented using Angler Use Days (AUD) (Coldwater Strategic Vision Document AGFD 2019a) as the guide for stocking rates as well as stocking fewer but larger trout. An AUD is defined as one angler fishing any part of a day. Under the Intensive Use approach the lake should be stocked at a rate of 1 fish/AUD. Creel data gathered in 2017 estimated 3,817 AUD's at Parker Canyon Lake. We know however, that 3,800 fish will not be enough to reach a catch rate of .5 per hour, therefore the planned stocking rate will be near 2.4 fish/AUD (approximately 8,000 – 10,000 total fish). This number provides as many trout as possible due to Arizona state hatcheries producing at maximum capacity. Currently the mean fish length is 8 - 12" or roughly 2.5 trout per pound. Page Springs State Hatchery (primary fish source) is implementing actions to grow larger fish that will approach 10 - 13" inch fish or 2 trout per pound. Studies have shown that trout stocked at larger sizes return to the creel at a higher rate (Cassinelli 2018). If the angler CPUE is below 0.5 fish per hour for two consecutive creel surveys, more fish may be purchased and stocked as funding allows. Beginning in the 2017 - 18 stocking season the lake received additional fish detoured from Pena Blanca Lake due to its poor water quality.

#### *White Amur:*

White Amur were stocked into Parker Canyon Lake in 2015 and 2017 for the purpose of consuming aquatic vegetation. Though rarely seen, this species can be caught and harvested by anglers (one fish  $\geq$  30 inches may be kept). The species will be monitored during routine sampling events and restocking of smaller individuals may be necessary to achieve desired results.

### **Access**

Boat ramp access is in need of repairs and the Development and Engineering Branch is working on plans for a new boat ramp facility. Fully accessible fishing opportunities and facilities are available for physically challenged anglers. A fishing pier and shoreline access is available including a five mile trail which leads around the entire shoreline of the lake never getting more than a few steps from the water with occasional benches and interpretive signs.

### **Catch**

Angler catch rate goals established for Parker Canyon Lake for each species are listed within each Objective in Table 1 above. Catch rates throughout the year can be variable and do fluctuate with the season. Catch rates for Largemouth Bass during April through July meet or exceed established management guidelines but decline as water temperatures begin to cool (Figure 9). Harvest of Largemouth Bass is extremely low. An estimated 3,728 Largemouth Bass were caught during the 2017 creel survey and only 70 were harvested (1.88%). In order to achieve high quality standards (PSD parameter, Table 1) greater harvest is desired. With such low angler harvest, a simulated harvest by the Department of appropriate size classes may be necessary to achieve the PSD objective (Schramm and Willis 2012). Catch rates for Rainbow Trout are mostly above management guidelines during the stocking season (Figure 9). Catch rates for Bluegill and Redear Sunfish and Channel Catfish do not meet established management guidelines (Figure 9).

Strategies to increase numbers of stocked sunfish and catfish as well as increase the mean size of stocked Rainbow Trout will be implemented based on available funding.

## Satisfaction

An angler satisfaction of 80% is the established goal for this fishery. Angler satisfaction at Parker Canyon Lake is currently at 51% (Figure 10). The reason for the low satisfaction rate is likely tied to the poor catch rates at the lake. Support for this is shown when angler satisfaction is looked at in regards to angler success. Figure 11 shows angler satisfaction scores as it relates to angler success. This suggests that angler's satisfaction is directly tied to catching fish and the more fish they catch the more satisfied they are (Figure 11). Angler satisfaction will be monitored as changes to the winter trout stocking regime is implemented.

## Literature Cited

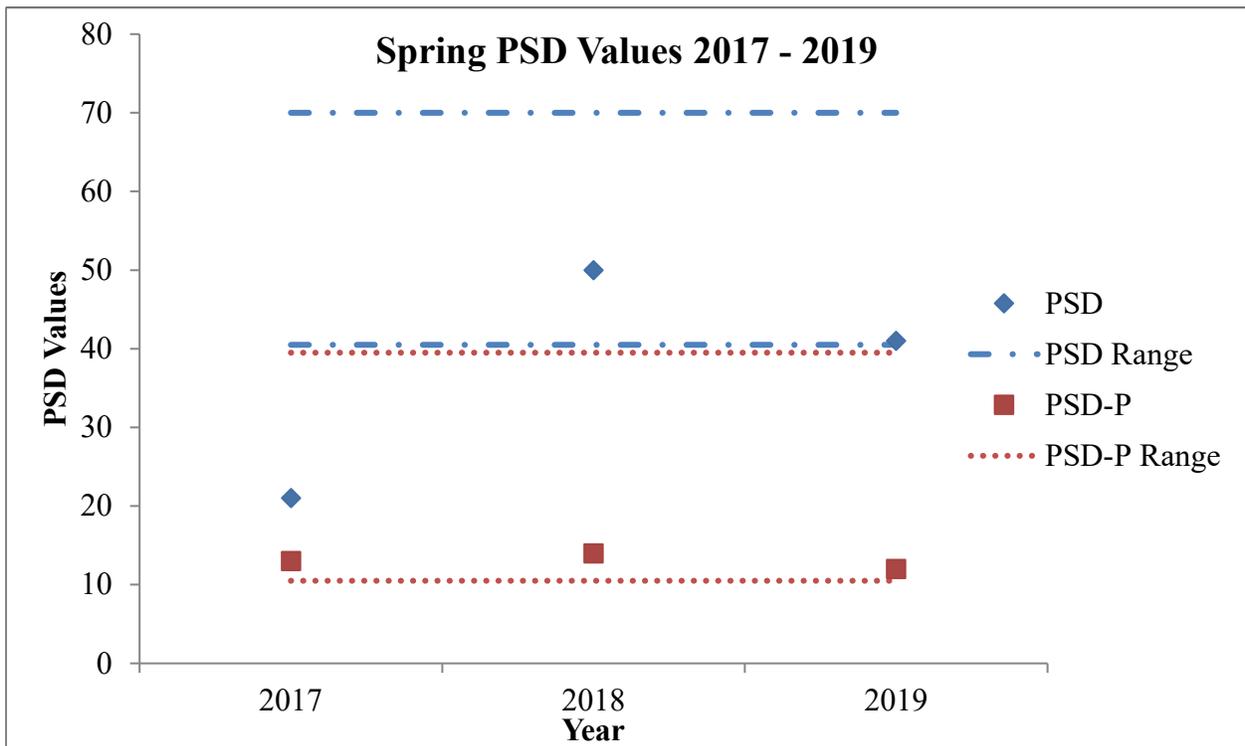
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## Tables and Figures

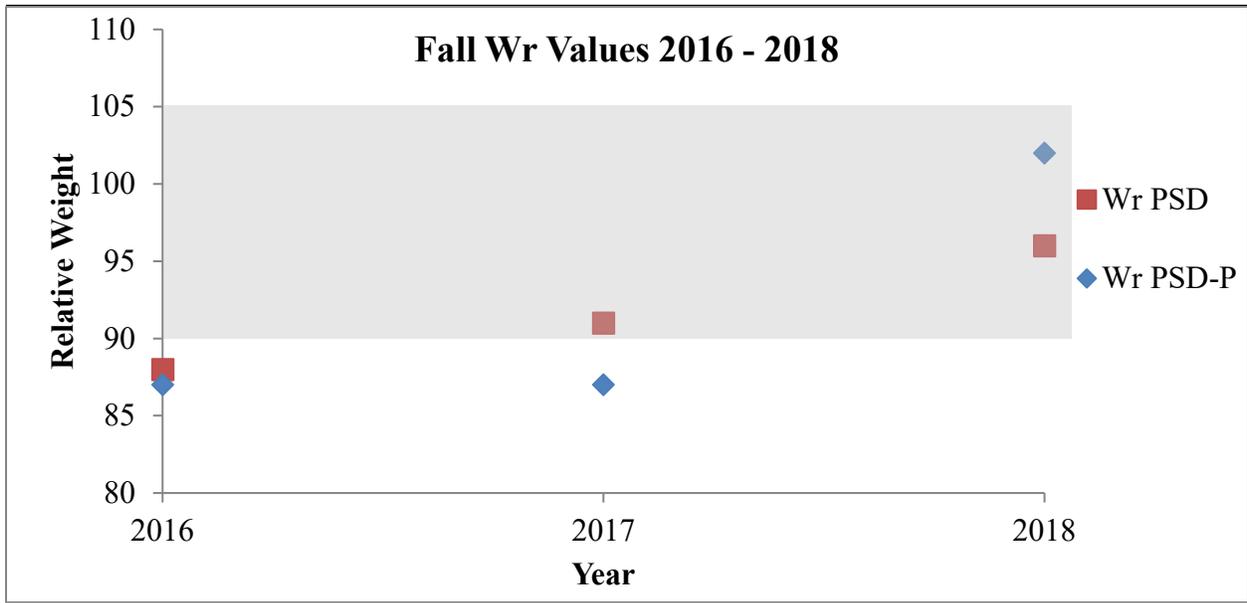
Year	Catch per unit of effort (Fish per hour)			
	Largemouth Bass	Bluegill Sunfish	Redear Sunfish	Channel Catfish <sup>1</sup>
2016	-	-	-	76
2017	130	50	13	230
2018	118	44	10	189
2019	89	22	31	-

<sup>1</sup> Channel Catfish were sampled with baited hoop nets in August of each year (excluding 2019) and reported as total fish caught. The large number of fish in 2017 is due to sampling following a stocking event.

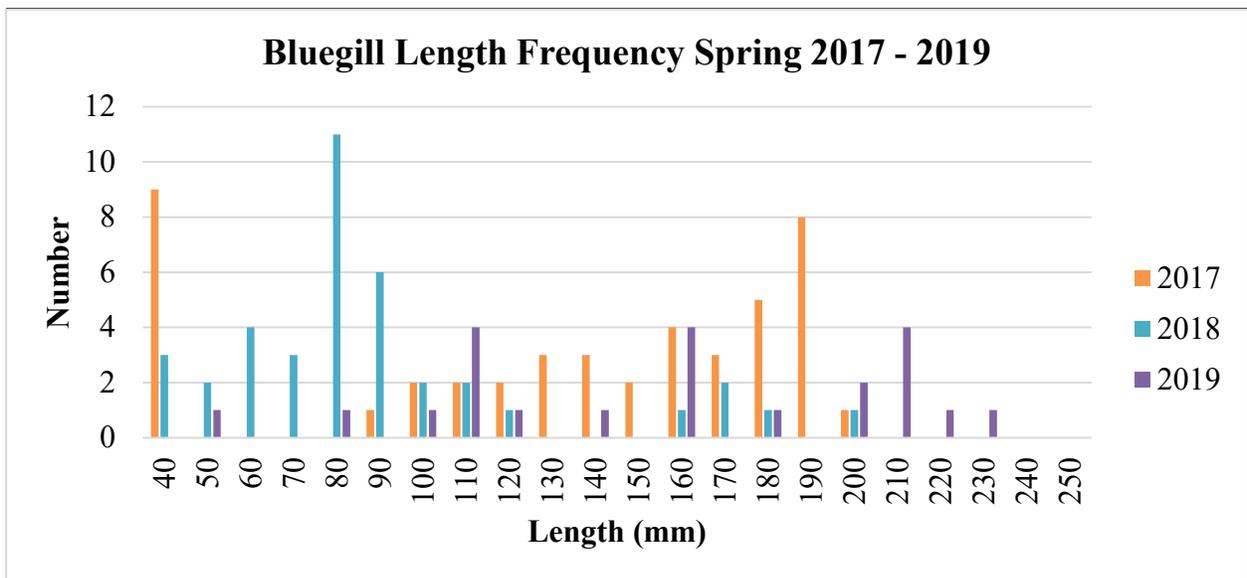
**Figure 2.** Catch per unit effort of species sampled at Parker Canyon Lake spring 2017 – 2019.



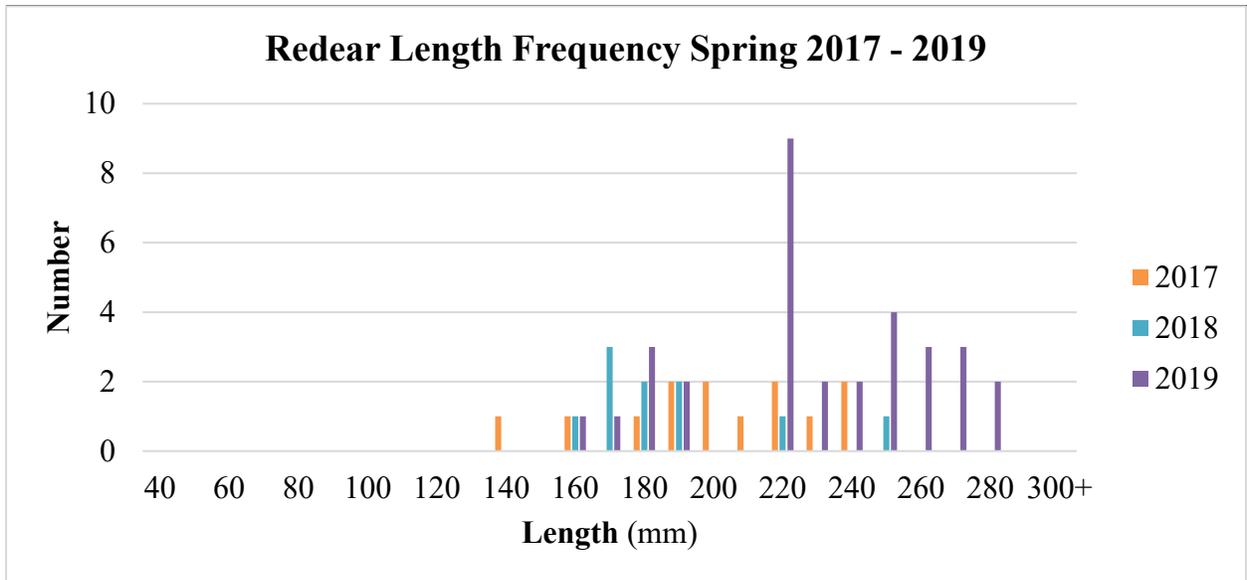
**Figure 3.** Proportional size distribution values of Largemouth Bass at Parker Canyon Lake, spring 2017 – 2019 in relation to management objectives for a high quality fishery approach.



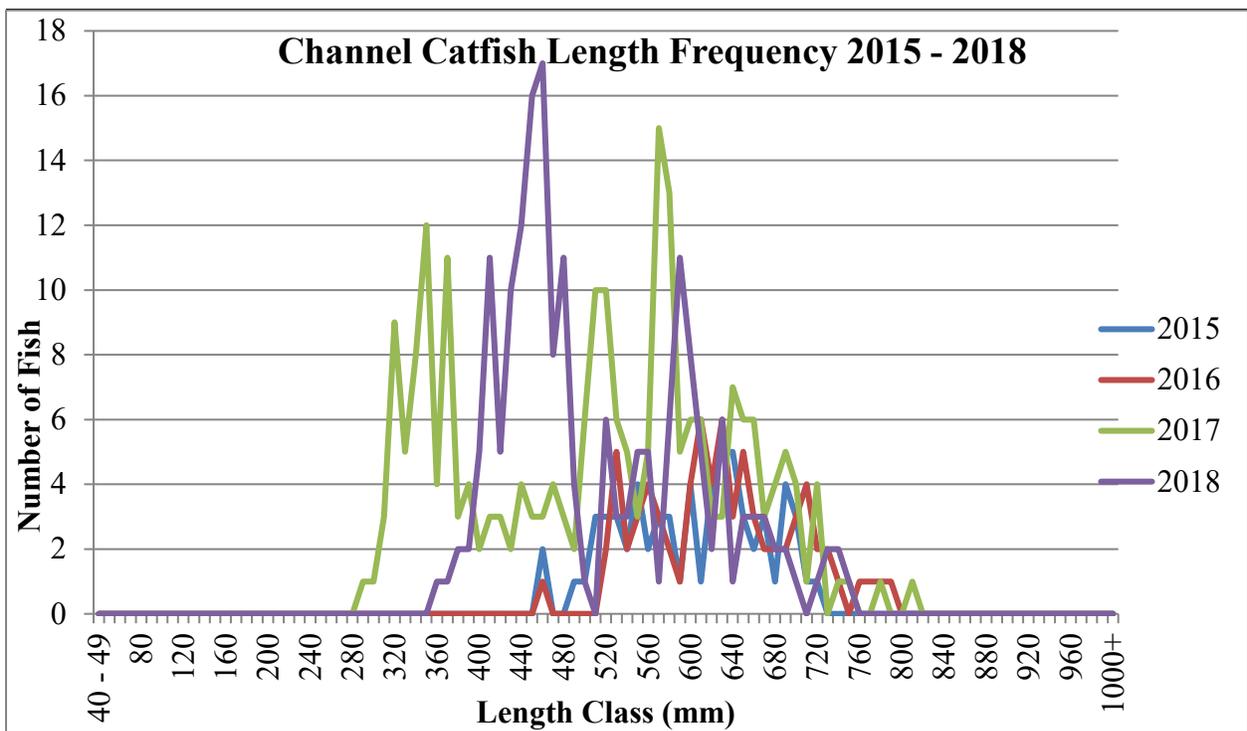
**Figure 4.** Relative weight of Largemouth Bass at Parker Canyon Lake fall 2015 – 2017. The shaded area represents the management guideline of 90 – 105.



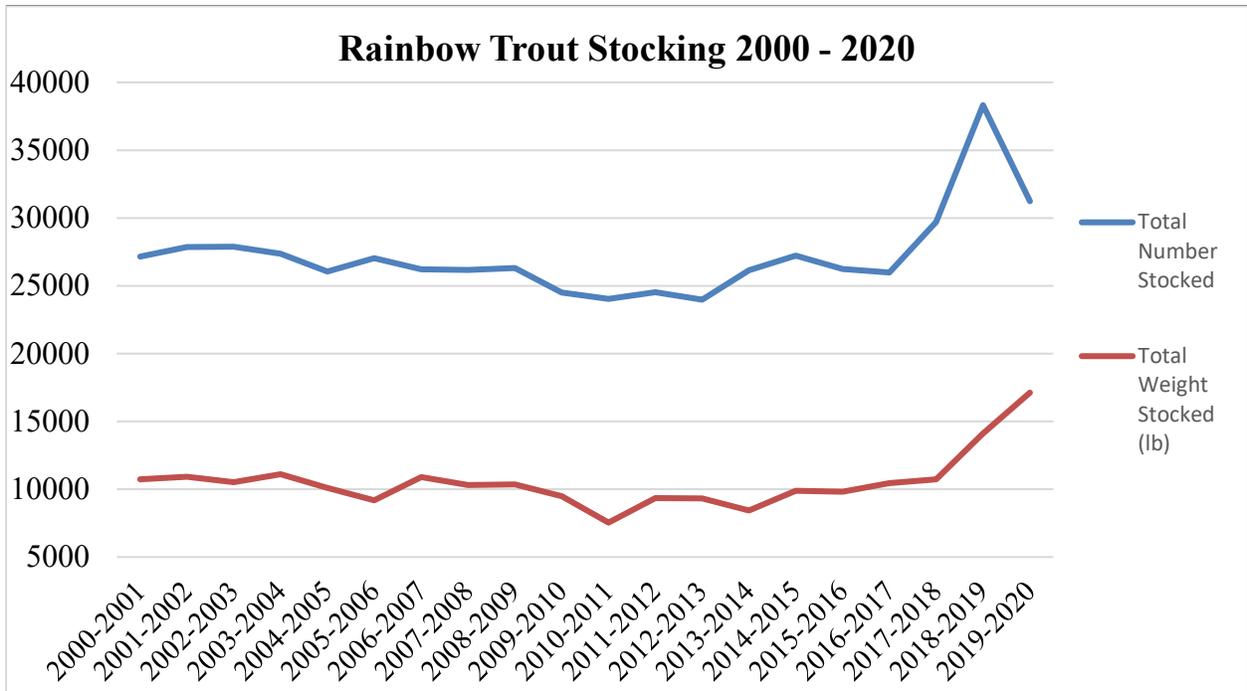
**Figure 5.** Length frequency values for Bluegill Sunfish at Parker Canyon Lake, spring 2017 – 2019.



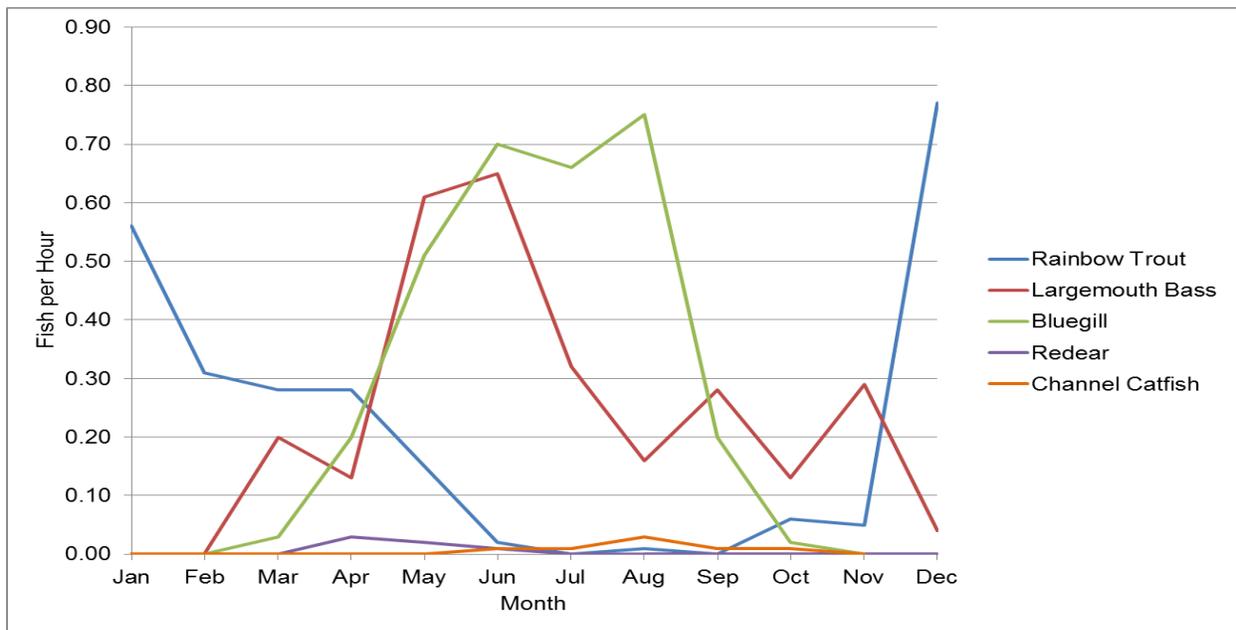
**Figure 6.** Length frequency values of Redear Sunfish at Parker Canyon Lake, Spring 2017 – 2019.



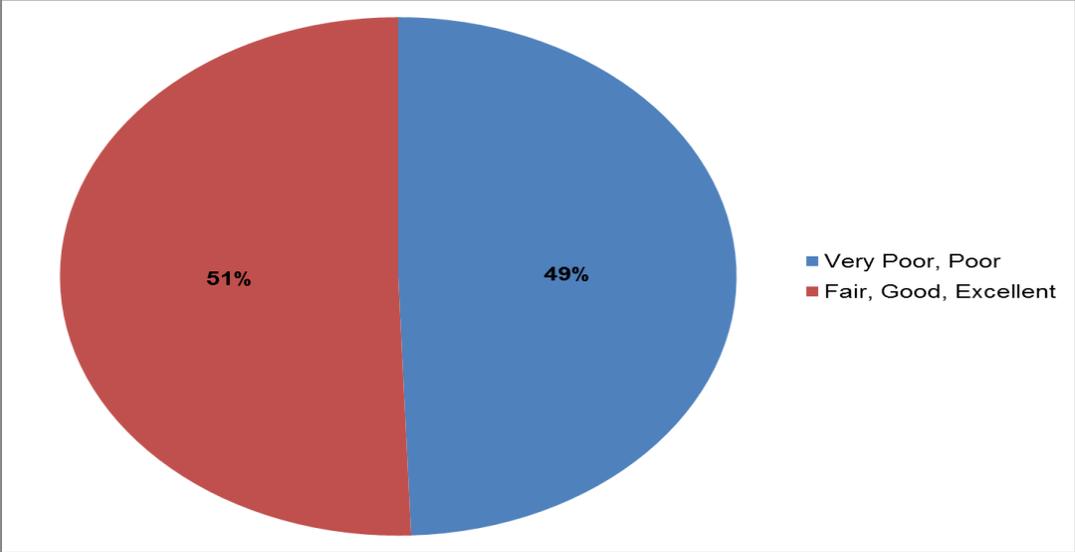
**Figure 7.** Length frequency of Channel Catfish sampled at Parker Canyon lake August, 2015 – 2018.



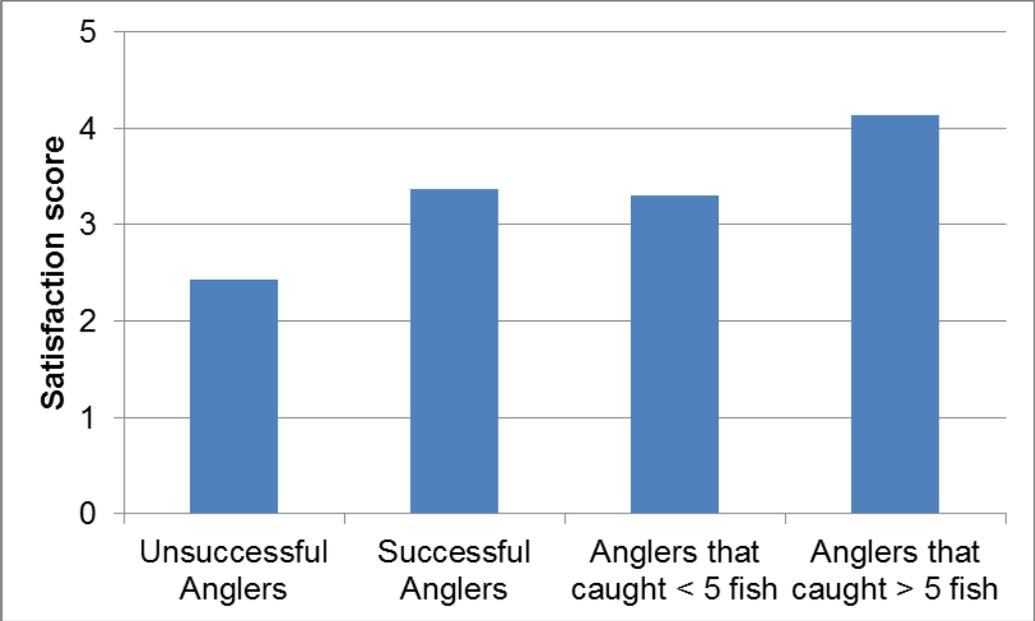
**Figure 8.** Total number and pounds of Rainbow Trout stocked at Parker Canyon Lake from 2000 - 2020.



**Figure 9.** Catch per unit of effort for anglers at Parker Canyon Lake 2017.



**Figure 10.** Angler rated satisfaction at Parker Canyon Lake 2017.



**Figure 11.** Angler satisfaction as it relates to angler success at Parker Canyon Lake 2017.