Fool Hollow Lake
Fisheries Management Plan
2019-2029

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Approved [X] by Chris Cantrell for Date 9/26/19
Aquatic Wildlife Branch Chief

Location

Fool Hollow Lake is located in game management unit 3C on Show Low Creek in Navajo County at UTM Zone 12-NAD 83 585334E, 3792669N. It is less than 2 miles to the north of downtown Show Low, off of Old Linden Road. Access Old Linden Road either from Highway 60 / W. Deuce Of Clubs in town or at its western end from Highway 260. (Figure 1)

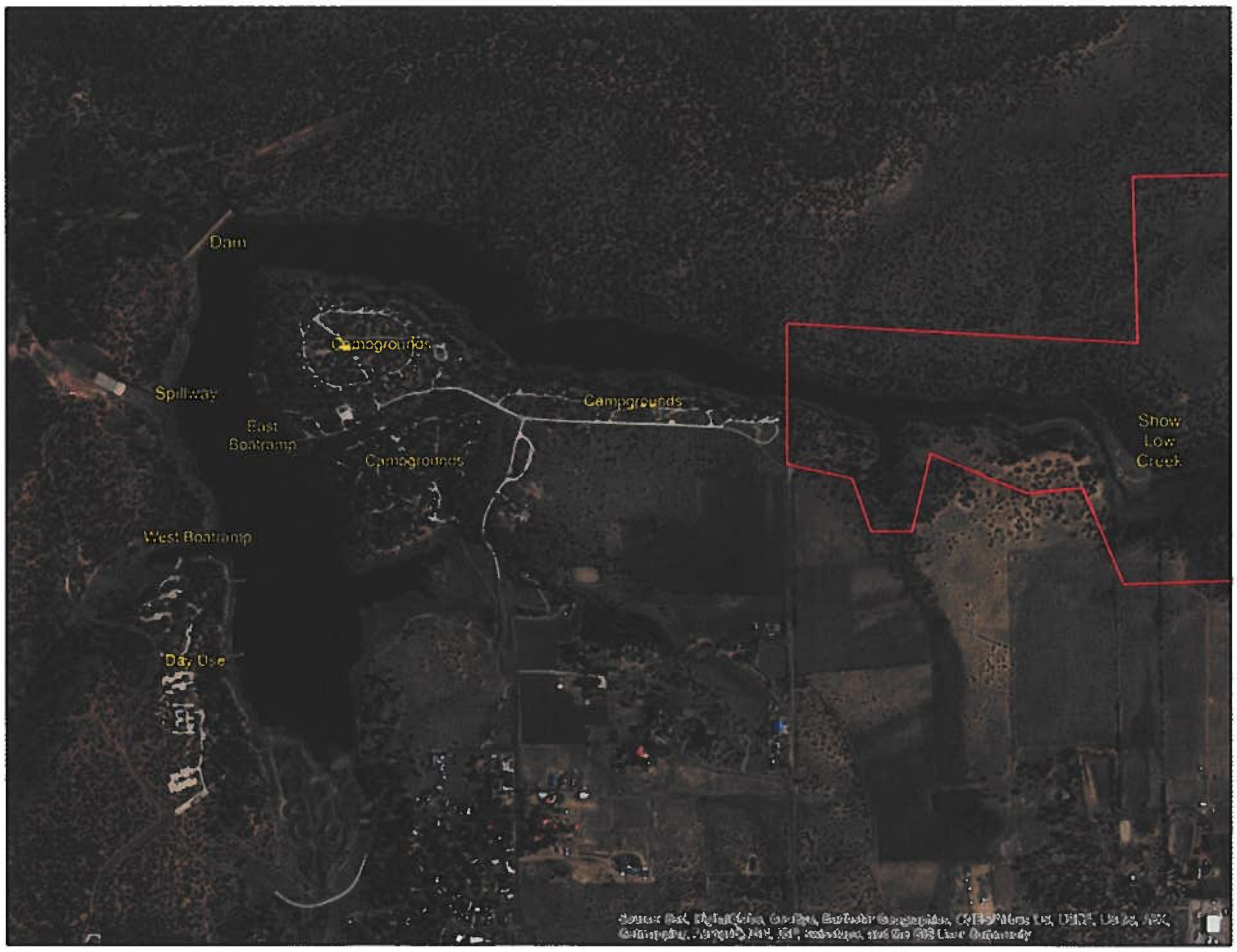

Figure 1. Map of Fool Hollow Lake, Navajo County, Arizona. Arizona Game and Fish Department owned property is outlined in red.

Management Prescription

The Arizona Game and Fish Department (Department) has developed concepts for coldwater and warmwater species management in Arizona under a Warmwater Strategic Vision Document (AGFD 2019b) and Coldwater Strategic Vision Document (AGFD 2019a). The primary management emphasis for Fool Hollow Lake is for multiple warmwater sport fisheries and the secondary management emphasis is for a coldwater sport fishery. The primary management approaches under the warmwater plan are as a High Quality Largemouth Bass *Micropterus salmoides* fishery, High Quality Smallmouth Bass *Micropterus dolomieu* fishery, High Quality Catfish fishery for Channel Catfish *Ictalurus punctatus*, Featured Species fishery for Walleye *Sander vitreus*, and a General Use Bluegill *Lepomis macrochirus* fishery (Young et al 2001; AGFD

2019b). The secondary management approach is as an Intensive Use Rainbow Trout *Oncorhynchus mykiss* fishery (Young et al 2001; AGFD 2019a).

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

Objective 2: Maintain the Smallmouth Bass population to meet or exceed High Quality Concept standards.

Objective 3: Maintain the Channel Catfish population to meet or exceed High Quality Concept standards.

Objective 4: Maintain the Walleye population to meet Featured Species Concept standards.

Objective 5: Maintain the Bluegill population to meet or exceed General Opportunity Concept standards.

Objective 6: Maintain the Rainbow Trout population to meet or exceed Intensive Use Concept standards.

Objective 7: Maintain angler satisfaction at 80%.

Fisheries monitoring activities, including gillnetting surveys and/or electrofishing surveys, and angler creel surveys will be used to determine if management objectives are being met. Objective guidelines to meet management objectives are listed in Table 1 below.

Table 1. Fool Hollow Lake Objectives and Adaptive Management Strategies.

Objective 1: Maintain the Largemouth Bass population to meet or exceed High Quality Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.			
Parameters	**Objective Guideline**	**Trigger point to address unmet Objectives**	**Strategies if Objectives are Unmet**
Size Distribution	PSD[2] between 40-70, PSD-P[3] between 10-40	Three consecutive sampling events where size distribution guidelines are not met	• Habitat improvement • Stocking • Regulation changes
Relative Weight	Mean relative weight between 90-105	Mean relative weight not between 90-105 for three consecutive sampling events	• Regulation changes • Habitat improvement
Angler Catch Rates	No less than 0.5 fish per hour	Angler catch rates for bass drop below 0.5 fish per hour for two consecutive creel surveys	• Stocking • Regulation changes • Outreach/education

Objective 2: Maintain the Smallmouth Bass population to meet or exceed High Quality Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.			
Parameters	**Objective Guideline**	**Trigger point to address unmet Objectives**	**Strategies if Objectives are Unmet**
Size Distribution	PSD[2] between 40-70, PSD-P[3] between 10-40	Three consecutive sampling events where size distribution guidelines are not met	• Habitat improvement • Stocking • Regulation changes
Relative Weight	Mean relative weight between 90-105	Mean relative weight not between 90-105 for three consecutive sampling events	• Prey stocking • Regulation changes • Habitat improvement
Angler Catch Rates	No less than 0.5 fish per hour	Angler catch rates for bass drop below 0.5 fish per hour for two consecutive creel surveys	• Stocking • Regulation changes • Outreach/education
Objective 3: Maintain the Channel Catfish population to meet or exceed High Quality Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.			
Size Distribution	PSD[2] between 40-70, PSD-P[3] between 10-40	Three consecutive sampling events where size distribution guidelines are not met	• Habitat improvement • Stocking • Regulation changes
Relative Weight	Mean relative weight between 90-105	Mean relative weight not between 90-105 for three consecutive sampling events	• Prey stocking • Regulation changes • Habitat improvement
Angler Catch Rates	No less than 0.5 fish per hour	Angler catch rates for catfish drop below 0.5 fish per hour for two consecutive creel surveys	• Stocking • Regulation changes • Outreach/education
Objective 4: Maintain the Walleye population to meet Featured Species Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.			
Size structure	Multiple age classes	Missing age classes, especially young fish, for three consecutive sampling events	• Habitat improvement • Regulation changes • Prey stocking

Parameters	Objective Guideline	Trigger point to address unmet Objectives	Strategies if Objectives are Unmet
Relative Weight	Mean relative weight between 90-105	Mean relative weight not between 90-105 for three consecutive sampling events	• Prey stocking • Regulation changes • Habitat improvement
Size Distribution	PSD[2] between 30-60	Three consecutive sampling events where size distribution guidelines are not met	• Habitat improvement • Stocking • Regulation changes
Objective 5: Maintain the Bluegill population to meet or exceed General Opportunity Concept standards as listed in the Warmwater Sportfisheries Strategic Vision Document.			
Size structure	Multiple age classes	Missing age classes, especially young fish, for three consecutive sampling events	• Habitat improvement • Regulation changes • Prey stocking
Angler Catch Rates	No less than 1.0 fish per hour	When catch rates for bluegill fall below 1.0 fish per hour during angler creel surveys	• Stocking • Habitat improvement
Objective 6: Maintain the Rainbow Trout population to meet or exceed Intensive Use Concept standards as listed in the Coldwater Sportfisheries Strategic Vision Document.			
Angler Catch Rates	Maintain catch rate of 0.5 fish per hour during stocking season.	When catch rates for trout fall below 0.5 fish per hour for two consecutive angler creel surveys	• Stocking • Outreach/education
Objective 7: Maintain angler satisfaction at 80%.			
Angler Satisfaction	Angler satisfaction in creel surveys >80%	Angler satisfaction drops below 80% for two consecutive creel surveys	• Stocking • Outreach/education • Habitat improvement

[1] CPUE=Catch Per Unit Effort (fish per hour) [2] PSD=Proportional Size Distribution [3]RSD-P = Relative Size Distribution – Preferred

Background

Fool Hollow Lake is a man-made reservoir built by the Department in 1957 for water-related outdoor recreation. Fool Hollow Lake was constructed by damming Show Low Creek in the Silver Creek drainage, within the Little Colorado River watershed. It is located within the City of Show Low, Arizona, at an elevation of 6,256 feet. The lake is 150 surface acres in size, with an average

depth of 23 feet and a maximum depth of 61 feet (Figure 1). Land ownership consists primarily of Apache-Sitgreaves National Forests (Forest), but approximately 125 acres of Arizona Game and Fish Commission property spans the very upper end of the lake where Show Low Creek enters.

Fool Hollow Lake has a watershed of approximately 108.8 square miles of juniper and Ponderosa pine forest. Show Low Creek is perennial where it enters the lake and the lake level is maintained mostly through these flows and winter snowmelt. Summer monsoonal rains have little influence on lake levels. Occasionally, water is released from Show Low Lake upstream to increase the lake level in Fool Hollow Lake. The Department has maintenance authority for the dam and spillway through a special use permit with the Forest. The Department also owns the water rights for 3,230 acre-feet of storage within Fool Hollow Lake for recreation, fish, and wildlife with a priority date of 4/13/1948. The water right does not allow for managed releases downstream.

The lake and surrounding land is managed cooperatively as the Fool Hollow Lake Recreation Area through an agreement between Arizona State Parks (who operate the facilities and collect fees), the Forest (land owners), the Department (who manage the fisheries, own the water rights, and maintain the dam), and the City of Show Low.

Fool Hollow Lake is located downstream of four reservoirs located in Pinetop-Lakeside and Show Low: Scott Reservoir on Porter Creek, Woodland Lake and Rainbow Lake on Walnut Creek (Porter Creek and Walnut Creek join to form Show Low Creek upstream of Show Low Lake), and Show Low Lake on Show Low Creek.

Current angling regulations at Fool Hollow Lake fall under the statewide regulations for gear and bag limits, which allow bait, lures, flies, including treble hooks. Daily bag limits include 6 trout, 6 bass, 6 Walleye, 10 catfish, and unlimited sunfish. The use of live baitfish is not permitted at Fool Hollow Lake, nor in all of Coconino, Navajo, Apache, Pima, and Cochise counties.

Productivity/Water Quality

Water quality is suitable for trout and other warmwater species at Fool Hollow Lake. Water temperatures, pH levels, and dissolved oxygen (DO) meet trout stocking standards year-round, allowing trout stocking from spring (early-April) through Labor Day weekend. Water quality is also suitable outside of these stocking dates, but few anglers are on the water at that time. Approval to stock in March is recommended because of the frequent occurrence of short/poor winters, resulting in fishable conditions earlier than in the past.

Winter ice cover rarely develops on Fool Hollow Lake, but when it does, it is extremely unsafe. It is never thick enough to allow for winter ice fishing. A thermocline develops in the summer as surface water temperatures increase, developing at about 7 meters below the surface in May, at 6 meters in June, at 4 meters July, 5 meters in August, 7 meters in September, 11 meters in October, then breaks up by November, when measured during an intensive limnological survey by Department Regional biologists in 1993-1994 (Table 2). Colder water temperatures exist below the thermocline in the summer, but the water is anoxic due to a lack of mixing below the thermocline and lack of oxygen production at those depths. Thus, trout and most warmwater species are only able to go as deep as the thermocline level when seeking colder water during the summer months, because of the lack of oxygen below the thermocline, and congregate in a narrow

layer on top of the thermocline. Warmwater species with lower oxygen demands may utilize more area below the thermocline, however dissolved oxygen levels are low enough that even more tolerant fish species such as bass and catfish would become stressed.

pH levels are usually suitable for trout stocking at Fool Hollow Lake, rarely exceeding 8.8 during the summer months. Conductivity is moderate, ranging from about 60-140 umhos through most of the water column through the year. The only water quality concerns was moderately low DO (5.4-5.8 mg/l) throughout the water column in October in 1993 following the fall turnover, and occasionally warm surface temperatures in mid-summer that exceeds trout stocking thresholds. These levels were near marginal, but still suitable for trout since the DO levels never dropped below 5 mg/l in the upper water layers, and the warm water is only in the very top layer. Fool Hollow Lake does not experience fish kills due to water quality.

Fool Hollow Lake can be classified as a slightly-hard water eutrophic lake (Bright et al 1994). Hardness and total phosphorus averaged 64.5 mg/l as equivalent CaCO3 and 0.04 mg/l, respectively, when measured in 1993-1994 by Department biologists. The total nitrogen average concentration was 0.68 mg/l and the N:P ratio is 15.7:1. Phosphorus concentration in the hypolimnetic water (below thermocline) was 0.23 mg/l, while epilimnetic (above thermocline) phosphorus on the same day was 0.03 mg/l. This demonstrates a concentration gradient which is due to the utilization by the algal population in the epilimnion during stratification.

Replication of 1993-1994 water sampling data is recommended to update water quality knowledge and improve stocking recommendations and fishing information.

Forage/Prey

Forage in Fool Hollow Lake consists of zooplankton, benthic invertebrates (including crayfish), aquatic and terrestrial insects, and small fish species.

Zooplankton were surveyed in Fool Hollow Lake by Department Regional biologists in 1993. This survey found moderate densities of zooplankton available to trout and other small fish such as juvenile bass and catfish. Zooplankton counts ranged from a low average of 80 organisms per vertical net haul in March to a high of 630 organisms per haul in October (Figure 2). Copepod densities, mostly comprised of Cyclopoids, fluctuated through the year, with the highest densities through the winter (up to 398 Cyclopoids per haul in January) and lowest in the summer (30.4 total Copepods in August). Densities of Cladocera remained fairly constant through the year, with a spike in the fall, mostly due to a rise in Ceriodaphnia at that time. Rotifers were more numerous in the summer than in the winter when there were almost none found. Overall, Fool Hollow Lake has moderate densities and diversity of zooplankton that should provide a good food base for trout and small fish.

Benthos invertebrates in Fool Hollow Lake were also surveyed by Department Regional biologists in 1993. Chironomid midge larvae and Oligochaetes (a group of segmented worms) were the most abundant benthos invertebrates, averaging 27.5 and 19.8 per dredge sample, respectively (Figure 3). All other organisms found made up a very small percentage of the overall benthos community.

Fool Hollow Lake has an abundant population of Northern Crayfish *Orconectes virils*, which are not native to Arizona, but have not been surveyed formally. Bullfrogs *Lithobates catesbelanus*, both adult and juvenile stages, are also present in the lake.

Fool Hollow Lake has a moderate abundance of forage fishes, including Bluegill, Black Crappie *Pomoxis nigromaculatus*, Green Sunfish *Lepomis cyanellus*, Fathead Minnow *Pimephales promelas*, juvenile carp *Cyprinus carpio* and even trout when stocked in smaller sizes. Bluegill are found in higher densities than the other sunfishes in Fool Hollow Lake. Small carp are rarely found in Fool Hollow Lake, suggesting they are preyed upon heavily.

The addition of new species of forage fishes into Fool Hollow Lake is not recommended since Rainbow Trout would likely not utilize them anyway and several forage species already exist. Improving habitat (artificial structures) in the lake is recommended to boost sunfish populations, which would benefit bass, Walleye, and likely catfish. Replication of 1993-1994 benthos sampling data is recommended to update forage information, however this is unlikely given available staff and resources. Partnering with an outside group to conduct and/or analyze survey data may be possible to collect current information.

Habitat

There is a moderate amount of structure and habitat in Fool Hollow Lake. Large basalt rock outcrops are common on the Show Low Creek arm of the lake, with some woody stumps present in the upper end where the creek enters. There are also a moderate amount of aquatic plants growing in the lake, especially in the relatively shallow Fool Hollow arm of the lake, as well as the shallow upper portions of the Show Low Creek arm.

Some structures have been added in the past, including juniper tree bundles, catfish condos, and artificial plants that hang underneath the fishing piers, however, the number installed of any of these was very low.

Trout are not known to require structural habitat to do well, therefore, habitat is not considered to be a limiting factor for trout in Fool Hollow Lake. However, other species, including sunfish, bass, catfish, and even Walleye often key on structure or features in a lake and would benefit from the addition of artificial habitat. Bathymetric surveys were conducted in 2016 and 2017 to assess lake depth and aquatic habitat type (Figure 4; Figure 5). Additional habitat and structure needs should be determined and projects developed to install this habitat/structure. Boosting populations of Bluegill and crappie should benefit and improve bass and Walleye populations. The introduction of additional or improving catfish condos would help improve catfish recruitment.

Species

Current fish composition in the lake consists of Largemouth Bass, Smallmouth Bass, Green Sunfish, Bluegill, Walleye, Channel Catfish, Black Crappie, Black Bullhead *Ameiurus melas*, Common Carp, Northern Pike *Esox lucius*, Fathead Minnow, and stocked Rainbow Trout. Cutthroat Trout *Oncorhynchus clarkii*, Brook Trout *Salvelinus fontinalis* and Apache Trout *Oncorhynchus apache* are occasionally stocked when surpluses of these species exists. Brown Trout *Salmo trutta* and Redear Sunfish *Lepomis microlophus* were also historically stocked into Fool Hollow Lake, but no longer persist. Fool Hollow Lake is prioritized as a Tier II fishery,

requiring a minimum of one fish population survey every 5 years. Electrofishing is the standard survey gear for bass and sunfish, while gillnetting is the standard for trout, catfishes, and percids like Walleye and Northern Pike (AGFD 2004). Two separate but paired surveys must be conducted at Fool Hollow Lake to accurately assess comprehensive fish populations.

Largemouth Bass:

With high species diversity and variety of forage fish available, Largemouth Bass are self-sustaining and grow well in Fool Hollow Lake. They were most recently surveyed in 2012 by boat electrofishing. Largemouth Bass were the most common species found in this survey at 21.2% of the catch (Figure 6). A balanced population of fish is one in which the relationship between small size class fish and large size class fish falls within an established range of values; these values indicate rates of recruitment as well as growth and mortality are satisfactory for recreational angling (Anderson and Neumann 1996). For Largemouth Bass, a balanced populations has a Proportional Size Distribution (PSD) between 40-70, a Proportional Size Distribution-Preferred (PSD-P) between 10-40 and a PSD-Memorable (PSD-M) between 0-10 (Gablehouse 1984)(Guy et al. 2007). Largemouth in Fool Hollow Lake fell slightly outside these recommendations (Figure 7). These values indicate an inadequate number of smaller size class fish surveyed, suggesting recruitment in Fool Hollow Lake was lacking at the time of this survey. Poor recruitment may be tied to a lack of aquatic habitat for juvenile fish to utilize, or excessive consumption of small fish by other predatory fish. Improving fish habitat, increasing the number of forage fish available, or decreasing the number of large predatory fish like largemouth, smallmouth, Walleye or Northern Pike all may improve Largemouth Bass population dynamics.

Largemouth Bass had a relative weight (Wr) of 101, with values around 100 representing an average, healthy fish (Figure 8). Largemouth Bass surveyed had the highest relative weights of any of the larger sportfish, particularly at the larger sizes, indicating they have the potential to grow larger in this lake. This suggests adequate prey availability and normal levels of food competition for piscivorous fish.

Smallmouth Bass:

Like Largemouth Bass, Smallmouth Bass are maintaining large-growing, self-sustaining populations in Fool Hollow Lake. Smallmouth were the second most numerous species found in 2012 boat electrofishing surveys at 20.9% of the total catch (Figure 6). PSD ranges are the same for smallmouth as they are for largemouth, as are management goals. Smallmouth Bass PSD values fell comfortably within the ideal ranges, indicating excellent population balance (Figure 9). This difference is likely due to several factors, including the two species utilizing different habitat, both for spawning and rearing, as well as different adult feeding behavior. Additionally, angler knowledge and angling tactics may affect harvest rates on largemouth vs. smallmouth.

Relative weight of Smallmouth Bass overall was poor compared to Largemouth Bass in the 2012 survey, suggesting preferred prey items of smallmouth may be less abundant than those of largemouth. Additionally, Wr decreased in the larger size classes of smallmouth, further suggesting a lack of appropriate prey (Figure 8). Other predatory fish may be outcompeting Smallmouth Bass in Fool Hollow Lake. Show Low Lake has an extremely healthy Smallmouth

Bass population based on 2018 survey results; comparative diet analysis or habitat studies may help indicate the differences and suggests management actions to improve Fool Hollow Lake Smallmouth Bass populations.

Channel Catfish:

Fool Hollow Lake routinely provides good Channel Catfish fishing opportunity for anglers. However, unlike other warmwater species, the population is not adequate to support summer harvest numbers. This may be due to lack of recruitment. When funding is available, the Department stocks fingerling catfish to increase population numbers and provide opportunity. Channel Catfish will be stocked once per year at a fingerling or subcatchable size at a rate of 100 per acre. Catfish readily grow large sizes, thus stocking smaller sizes will maximize the numbers we are able to stock. Channel Catfish were most recently sampled in 2016 and 2017 gillnetting surveys. CPUE was similar in both surveys, 0.05 fish per hour in 2016 and 0.08 fish per hour in 2017. Relatively few Channel Catfish were surveyed while gillnetting. Channel Catfish were incidentally surveyed in 2012 electrofishing surveys where CPUE was greater than 10 fish per hour.

In all three surveys, Channel Catfish fell outside ideal size distribution ranges, suggesting their population is not in balance (Figure 8). Additionally, length frequencies between the three surveys were varied and show little trending data (Figure 11). Finally, Wr was acceptable in all three recent surveys, though 2016 and 2017 gillnetting efforts found better overall condition than in 2012 (Figure 8). However, given the relatively few numbers of fish surveyed in 2016 and 2017, 2012 data is the most robust and therefore most reliable. Increasing Wr is a good sign of improved fish condition and size. Continued stocking, stocking at larger size classes or lowering bag limits may be required to benefit population structure and improve angling opportunity.

Walleye:

Fool Hollow Lake holds the current state catch-and-release record for Walleye at 33". As one of a small number of lakes where the opportunity for Walleye angling exists and in an even smaller group where the water quality and mercury levels allow for the safe consumption of Walleye, Fool Hollow Lake is often sought as a fishing destination for this uncommon species. Spring gillnetting surveys have been the most effective method of sampling Walleye when spawning attracts these normally deep water fish to shallower areas. A recent gillnetting survey in March 2016 found high numbers of Walleye, comprising 59% of the fish sampled. The March 2017 gillnetting survey found few Walleye, though no management changes occurred to explain this shift. Multiple years of survey results show a range of sizes sampled and suggest a good variety of size classes for anglers (Figure 12).

In the 2012 boat electrofishing survey and 2016 gillnetting survey, Walleye generally fell within ideal size distribution ranges, suggesting that while their population may fluctuate, is it largely balanced (Figure 13). Relative weight of Walleye sampled in 2012 was below ideal range at all size classes, suggesting a broad lack of appropriate forage fish in Fool Hollow Lake for Walleye (Figure 8). Diet studies may be used to determine Walleye ideal prey and/or acceptable secondary prey sources for Walleye.

Bluegill:

Bluegill are the most common and preferred sunfish species in Fool Hollow Lake. They provide enjoyable angling opportunity for young or new anglers and an important forage resource for large piscivorous fish, especially in the absence of small stocked trout. In a 2012 boat electrofishing survey, Bluegill (16.1% of the catch) were the most numerous forage fish sampled, compared to Black Crappie (3.7%) and Green Sunfish (3.4%) (Figure 6). Bluegill ranged among the Stock and Quality sizes, but no fish were surveyed in Preferred length or larger, suggesting high harvest of large fish, high predation of large fish, poor growth to large size or some combination of those issues (Figure 14). Creel data and further survey data could help indicate methods for increasing Bluegill size.

Relative weight of Bluegill was good at the smaller size classes but marginal between Quality and Preferred sizes, suggesting inadequate prey to grow large Bluegill (Figure 8). Replication of 1993 invertebrate and zooplankton surveys may be required to better assess forage base in Fool Hollow Lake.

Rainbow Trout:

Rainbow Trout are stocked monthly from April through August during Fool Hollow Lake's highest angler use time. Trout do not reproduce in the lake, which is consistent with other trout lakes in Arizona, requiring regular stockings to maintain the Intensive Use coldwater sport fishery. Rainbow Trout are stocked at the supercatchable size, averaging 1.0 fish per pound or around 12 inches in length. Stocking larger size class trout reduces predation from the many piscivorous fish species in Fool Hollow Lake and improves return to creel numbers. Supercatchable size Rainbow Trout will continue to be stocked every 2-3 weeks from early-April through Labor Day weekend at a rate of approximately 5-10 pounds per acre per stocking. Trout persisting in the lake through the winter is rare, but is occasionally observed. Spring gillnetting in 2016 found no trout, but 2017 surveys before stocking sampled 8 trout, 6% of the total effort. Overall there is very little carryover of stocked trout from one stocking year to the next, likely due to the heavy predator load in Fool Hollow Lake.

Some fish species have been known to overpopulate in Fool Hollow Lake and compete directly with stocked trout, and the Department has taken actions in the past to eliminate them. The lake was chemically treated with rotenone six times, in 1957, 1959, 1962, 1970, 1972, and 1984 to eradicate species including Goldfish, Common Carp, Black Bullhead, and sunfish.

Invasive/undesirable species:

There are no records of aquatic invasive species at Fool Hollow Lake.

The lake contains Northern Crayfish and Bullfrogs, and a number of illegally introduced fish species have been documented, including Golden Shiner, Goldfish, Common Carp, Black Bullhead, Northern Pike, and Green Sunfish. Golden Shiner and Goldfish are no longer found in the lake. Illegally stocked Northern Pike persist in Fool Hollow Lake, but in low numbers and are likely not creating a significant predation problem. It would not be worth the amount of effort it would take to reduce their numbers further.

Access

Access to Fool Hollow Lake is convenient as it is located less than 2 miles from downtown Show Low on paved roads from Old Linden Road. The lake is operated like a State Park by Arizona State Parks, but is technically a Recreation Area since State Parks does not own the land. Fees are charged for daily and overnight access, with the exception of anglers fishing for the day that can get the fee waived but must park on the west side. There are 2 boat ramps, one on the east side of the main body of lake and operated by State Parks, and one on the west side and operated by the Department. There is a fish cleaning station located at the restroom near each boat ramp. There is a boat dock located at the west launch ramp, and 2 ADA accessible fishing piers and 1 ADA accessible fishing platform also on the west side. There are 2 ADA accessible fishing piers and 1 ADA accessible fishing platform on the east side. Boats are restricted to 10 horsepower motors or less.

Campgrounds are located on the east side of the lake, some that can accommodate large RVs and others for tent camping only. A day use area is located on the west side. A concession rents kayaks, canoes, and paddleboards on the west side.

Access to fishing along the shoreline is good, particularly with the fishing piers. Water levels fluctuate between seasons and years, occasionally leaving the fishing piers and boat ramps in shallow water. The City of Show Low has occasionally released water from Show Low Lake to increase the water level at Fool Hollow during the low times, usually enough to allow boats to launch. The lake is accessible year-round, but may develop unsafe skim ice occasionally in December through February.

Current regulatory and informational signs at the lake are few and far between. Signs at both the east and west boat ramps describe boating regulations, but no signs exist describing fishing regulations, harvest limits or live baitfish restrictions. It is recommended that signs with species presence, bag limits and tackle or technique suggestions be posted at boat ramps and fishing piers, and at popular shore access points around the lake.

Challenges in access include the increasing use of non-motorized kayaks, paddleboards, and canoes, many who aren't fishing and often occupy the boat launch areas, fishing piers in shallow water during low water years, and occasional confusion about when the day-fishing fee-waiver is allowed. The Department may consider installing a ramp or beach for launching non-motorized craft that is separate, but possibly adjacent to the boat ramps, extending the fishing piers permanently or during low water years, and coordinating better with State Parks employees and volunteers regarding the day-fishing clause of the agreement to address some of these challenges.

Catch

The overall target angler catch rate at Fool Hollow Lake is 0.5 fish per hour (fish/hour) during the stocking season from April through August when anglers are targeting Rainbow Trout, Largemouth Bass, Smallmouth Bass, and Channel Catfish. Target catch rates for Bluegill are 1.0 fish/hour during the same season. Additionally, an overall angler satisfaction rate of at least 80% is desired. Catch rates focused during the stocking season are due to angler use occurring during the summer months in the White Mountains area and the lack of opportunity during the winter

when cold conditions diminish warmwater species activity, trout are no longer being stocked, and when access to the water may be difficult or impossible due to ice and snow.

The summer months of July, June, and May are the highest angler use months, in that order, as seen in results from angler creel surveys conducted from April through November in 2012 (Figure 15). Over 50% of angler hours spent at Fool Hollow Lake are by bank anglers, except during April and November when boat anglers are the predominate users. The better fishing also occurs during the summer timeframe, with the highest catch rates in June (0.25 fish/hour), May (0.24 fish/hour), and July (0.20 fish/hour) (Figure 16). August is not much lower, at 0.17 fish/hour. No single month met our overall angler catch rate of 0.5 fish/hour and the average for the year fell well below our target, at 0.18 fish/hour. These catch rates are hopefully now higher after changing the trout stocking regime from regular catchables (9-10" trout) to supercatchables (>12") to increase the fish's catchability and reduce predation. This change occurred in 2014.

According to angler creel data, the majority of trout harvested from Fool Hollow Lake in 2012 were in May and June, then in July. Numbers of trout caught and harvested in all other months were extremely low. Catch rates by species show that anglers are utilizing stocked trout, bass, sunfish, and catfish (Figure 17). Walleye are not well-utilized in Fool Hollow Lake. Catch rates for warmwater species as well as Walleye could be increased by boosting sunfish populations, installing artificial fish habitat/structure, stocking Channel Catfish on a consistent program, and increasing outreach on how to fish for all species at Fool Hollow Lake.

A variety of sizes of Rainbow Trout were stocked in 2012 so that Department personnel could track return rates to anglers by the size of trout stocked. This was to determine if stocking larger trout would reduce the predation by large sportfish and allow more trout to be caught by anglers. Over 75% of the trout stocked were 8-12" in size, yet only 3% of trout harvested by anglers were of that size, and most of those were in the 11-12" size range. The return to creel increased for trout over 12", but remained at 30% return to creel or lower until the trout were stocked at over 15", then the return to creel went up to over 50% (Figure 18).

In 2010, trout stocked at 9" in length in Fool Hollow Lake returned at a rate of only 2.1%, while 12" stocked trout returned at a rate of 94.0%. Supported by 2012 creel census data, a change to stocking primarily supercatchable size trout, at least 12" in length, was made in 2014. However, in making this size change, fewer fish are able to be stocked. Trout are raised in hatcheries by weight, and every hatchery is raising fish at total capacity. Each trout stocked into Fool Hollow Lake, starting in 2014, is heavier (average 1 pound each) than regular catchable size. Our hatcheries are able to raise fewer of these supercatchable trout to keep the same overall weight of fish grown. Recent creel surveys conducted from April to November of 2014 to determine if this stocking change will result in greater catch rates of trout, greater overall harvest rates, and greater angler satisfaction have not yet been analyzed.

Angler use at Fool Hollow Lake supported approximately 28,433 anglers days in 2001, with a little over 50% targeting trout and a little under 50% targeting warmwater fish, according to a Statewide angler use survey (Pringle 2004). In 2013, another Statewide angler use survey found that use increased dramatically at Fool Hollow to approximately 85,655 angler use days, representing the

4th highest use lake in the Region (behind only Big Lake, Woods Canyon Lake, and Willow Springs Lake).

Satisfaction

Under the current management plans, satisfaction rates for Fool Hollow Lake are to be greater than 80%. During the last creel census, goals were lower. Satisfaction rates at Fool Hollow Lake were very low and did not meet the (then) target rate of 50% of fair/good/excellent ratings overall in any single month in 2012. Over rating of fair/good/excellent was 23% overall (Figure 19). May had the highest satisfaction rating of 45% fair to excellent, but no other month was close to that. The lowest satisfaction rates occurred in April (6%), November (0%), and August (14%). The satisfaction rates somewhat tracked evenly with catch rates, but not for some months. September had the 4th lowest catch rates, but had the second highest satisfaction rating. Some of the satisfaction ratings are influenced by expectations. Many of the people fishing at Fool Hollow Lake are camping at the recreation area and fishing is secondary to other activities. Fool Hollow Lake has the best facilities of all lakes in Region I, which suggests facilities might not have much influence on angler satisfaction.

The change to stocking supercatchable size (>12") trout in 2014 should improve satisfaction rates if it results in overall higher catch rates, which is expected. Anglers like catching larger fish, as long as they catch them often enough to keep them satisfied. Satisfaction may also be improved by improving warmwater species population sizes and increasing outreach/education tactics.

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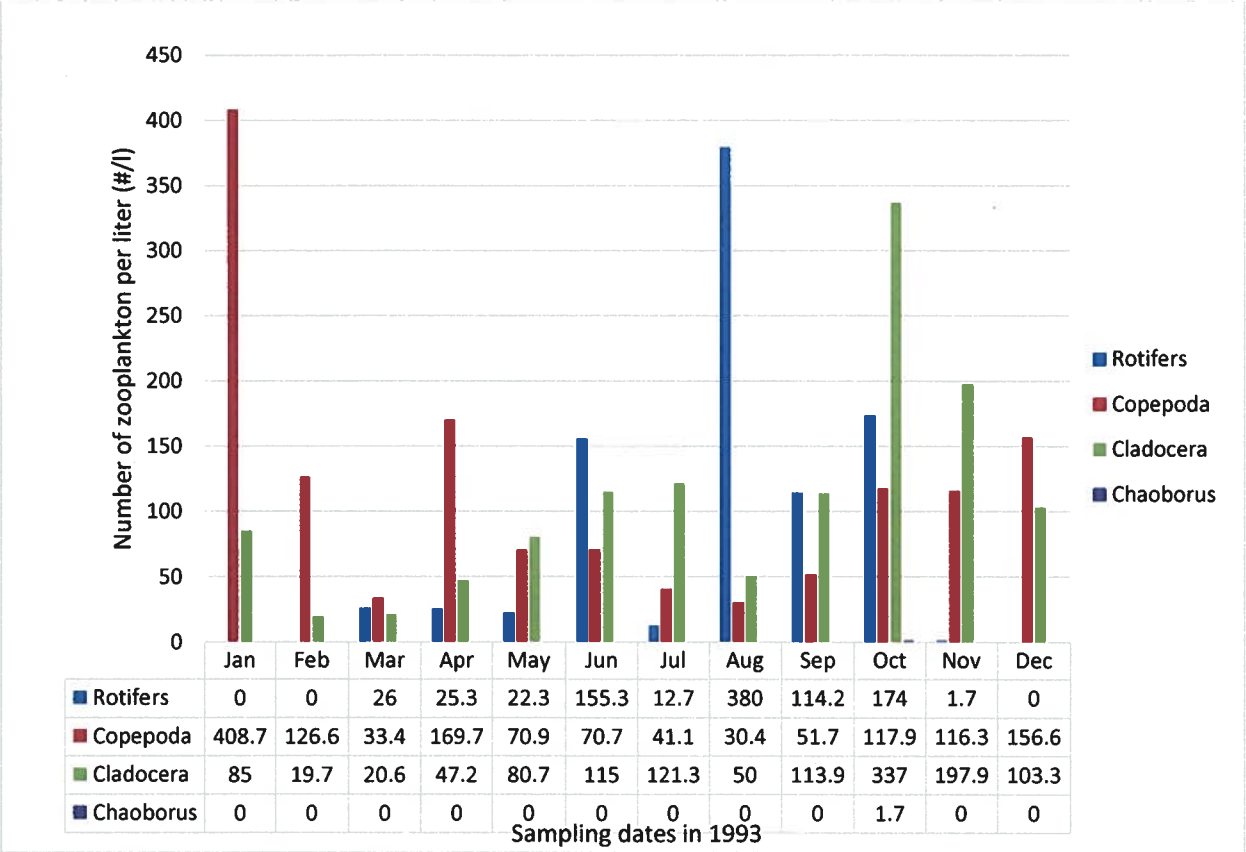
Tables and Figures



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rotifers	0	0	26	25.3	22.3	155.3	12.7	380	114.2	174	1.7	0
Copepoda	408.7	126.6	33.4	169.7	70.9	70.7	41.1	30.4	51.7	117.9	116.3	156.6
Cladocera	85	19.7	20.6	47.2	80.7	115	121.3	50	113.9	337	197.9	103.3
Chaoborus	0	0	0	0	0	0	0	0	0	1.7	0	0

Figure 2. Number of zooplankton per liter of water during monthly vertical hauls in Fool Hollow Lake in 1993.

Table 2. Water quality profiles for temperature (°C), pH, and dissolved oxygen (DO in mg/l) by month in Fool Hollow Lake, Arizona, when measured in a limnological survey in 1993-1994. The red shaded areas highlights very low DO levels in the bottom layers in the summer that are lethal, or near lethal, to trout.

Depth	January			February			March			April			May			June		
Meters	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO
S	4.1	7.8	9.7	5.3	7.3	10.6	12.9	8.1	9.6	15.1	8.1	8.9	22.2	8.4	8.6	20.9	8.6	7.7
1	4.1	7.8	9.7	5.0	7.3	9.6	12.7	8.2	9.5	15.0	8.1	8.7	20.9	8.4	8.7	20.8	8.7	7.8
2	4.1	7.8	9.7	4.7	7.3	9.6	10.4	8.2	9.2	14.7	8.1	8.6	20.6	8.4	8.7	20.5	8.7	7.8
3	4.0	7.8	9.7	4.5	7.3	9.6	10.0	8.2	9.2	14.3	8.0	8.3	17.4	8.0	7.2	18.7	8.3	6.5
4	4.0	7.8	9.7	4.4	7.3	9.5	8.7	8.1	8.4	13.4	7.8	7.9	15.1	7.6	5.0	17.9	8.0	5.2
5	4.0	7.8	9.6	4.4	7.3	9.5	8.5	8.0	8.1	12.0	7.6	7.1	13.5	7.5	4.7	17.0	7.9	4.0
6	4.0	7.8	9.6	4.4	7.3	9.5	8.3	7.9	8.1	11.7	7.5	6.7	12.9	7.4	4.4	16.1	7.7	2.8
7	4.0	7.8	9.6	4.3	7.3	9.4	8.3	7.8	8.1	11.4	7.4	6.1	12.6	7.3	3.5	15.0	7.6	1.3
8	4.0	7.8	9.6	4.3	7.5	9.4	8.2	7.8	8.1	11.2	7.4	6.1	12.3	7.2	2.2	13.8	7.5	0.2
9	4.0	7.8	9.9	4.3	7.5	9.4	8.1	7.8	8.1	10.9	7.3	5.6	12.2	7.5	1.7	13.1	7.4	0.1
10	4.0	7.8	9.8	4.3	7.5	9.4	8.1	7.7	8.1	10.7	7.3	4.8	11.9	7.3	1.2	12.6	7.4	0.0
11	4.0	7.7	9.8	4.3	7.5	9.4	8.0	7.7	8.1	10.7	7.3	4.6	11.9	7.2	0.7	12.3	7.3	0.0
12	4.0	7.7	9.7	4.3	7.5	9.3	7.9	7.6	8.1	10.4	7.2	4.3	11.8	7.2	0.6	12.2	7.3	0.0
13	4.0	7.7	9.7	4.3	7.5	9.2	7.9	7.6	8.0	10.3	7.2	4.1	11.8	7.2	0.5	12.1	7.3	0.0
14	4.0	7.7	9.6	4.2	7.5	9.2	7.8	7.6	7.9	10.2	7.2	4.0	11.8	7.1	0.6	12.1	7.3	0.0
15	4.0	7.7	9.6	4.2	7.4	9.1	7.7	7.5	7.5							12.1	7.3	0.0

Depth	July			August			September			October			November			December		
Meters	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO	Temp	pH	DO
S	22.9	8.4	6.8	20.4	7.8	6.7	17.5	7.9	8.8	15.2	7.5	5.4	8.0	8.1	9.4	5.8	7.2	9.4
1	22.7	8.5	6.8	20.3	7.8	6.7	17.4	8.0	8.8	14.7	7.6	5.4	8.0	8.1	9.4	5.8	7.2	9.3
2	22.4	8.5	6.7	20.2	7.8	6.5	17.4	8.0	8.7	14.6	7.6	4.8	8.0	8.1	9.4	5.8	7.2	9.5
3	21.1	8.3	5.5	20.1	7.9	6.3	17.3	8.1	8.6	14.5	7.6	5.0	7.9	8.1	9.3	5.8	7.3	9.7
4	19.8	7.9	1.5	20.1	7.8	5.9	17.3	8.1	7.6	14.4	7.6	5.7	7.8	8.1	9.2	5.8	7.3	9.5
5	17.3	7.8	0.2	18.7	7.6	1.2	17.2	7.9	6.6	14.4	7.7	5.8	7.8	8.1	9.1	5.8	7.3	9.5
6	15.9	7.7	0.1	17.7	7.4	1.3	17.1	7.8	6.2	14.3	7.7	5.8	7.8	8.1	9.1	5.8	7.3	9.3
7	14.9	7.6	0.1	17.0	7.4	2.2	16.9	7.6	3.0	14.3	7.7	5.8	7.8	8.1	9.0	5.8	7.3	9.3
8	13.8	7.5	0.1	15.9	7.2	0.5	16.6	7.4	0.3	14.2	7.7	5.4	7.8	8.1	9.0	5.8	7.4	9.4
9	13.1	7.5	0.1	14.0	7.2	0.4	15.7	7.4	0.3	14.1	7.7	4.1	7.7	8.1	8.9	5.8	7.4	9.3
10	12.7	7.4	0.1	13.3	7.1	0.4	14.2	7.2	0.3	14.1	7.6	4.0	7.7	8.0	8.8	5.8	7.4	9.3
11	12.4	7.4	0.1	13.1	7.1	0.1	13.4	7.1	0.2	14.0	7.6	1.1	7.7	8.0	8.8	5.8	7.4	9.3
12	12.3	7.3	0.1	12.9	7.1	0.1	13.1	7.1	0.2	13.6	7.4	0.4	7.6	8.0	8.6	5.8	7.4	9.3
13	12.3	7.3	0.1	12.8	7.1	0.1	13.0	7.1	0.2	13.2	7.3	0.2	6.6	8.0	9.0	5.8	7.4	9.2
14	12.3	7.3	0.1	12.8	7.1	0.1	12.9	7.1	0.2	13.1	7.3	0.2	6.4	8.0	9.2	5.7	7.4	9.1
15	12.3	7.3	0.1	12.8	7.1	0.1	12.9	7.0	0.2				6.3	8.0	8.2	5.7	7.4	9.0

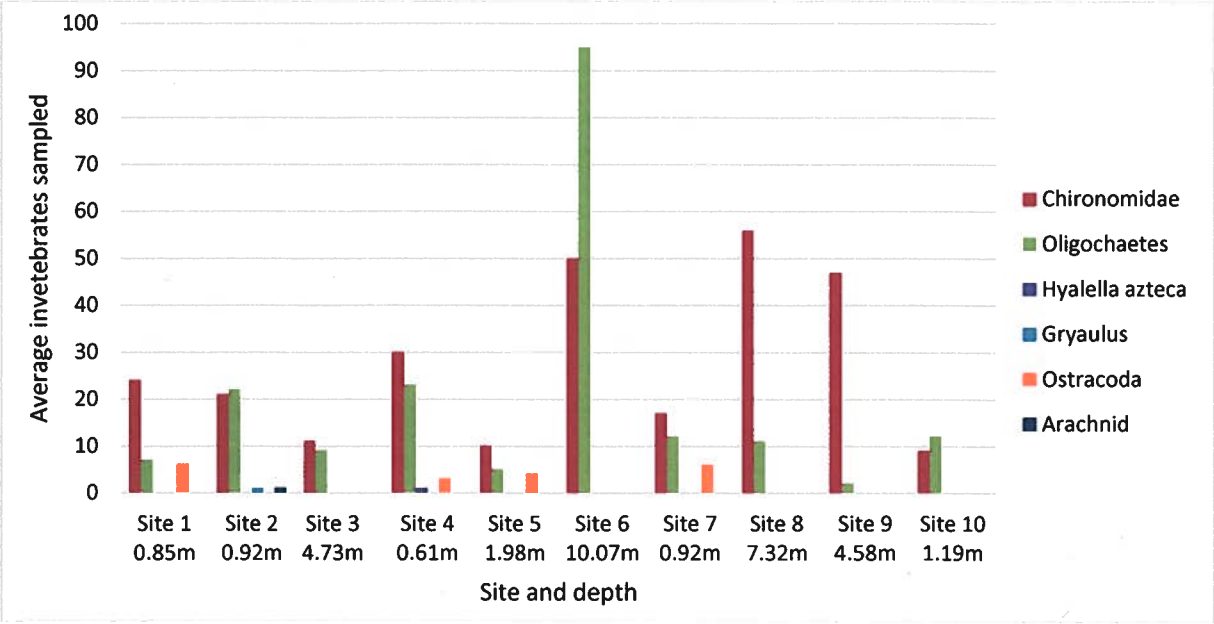


Figure 3. Number of benthos invertebrates in Fool Hollow Lake in 1993. Number is given as the mean number of invertebrates in three samples collected by Ponar dredge at each of 10 sites in the lake.

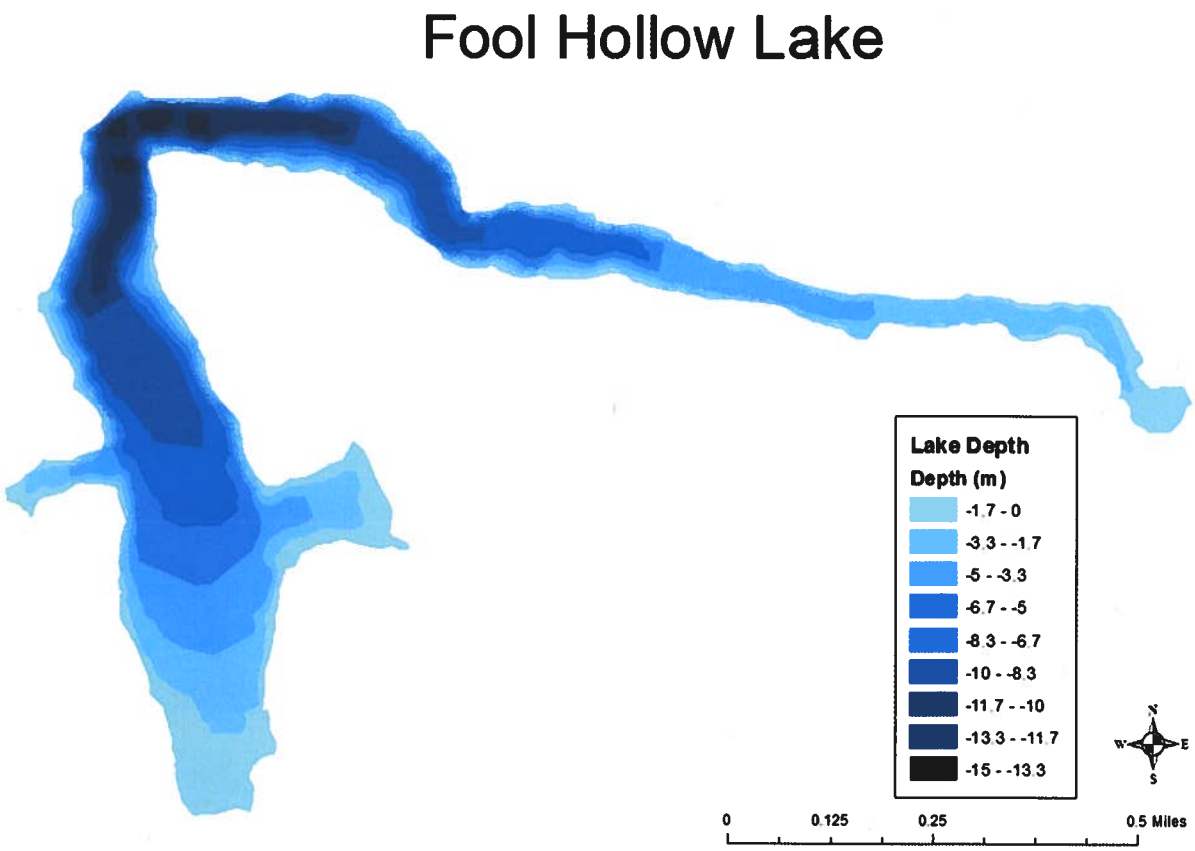


Figure 4. Bathymetric map of Fool Hollow Lake from 2017 survey.

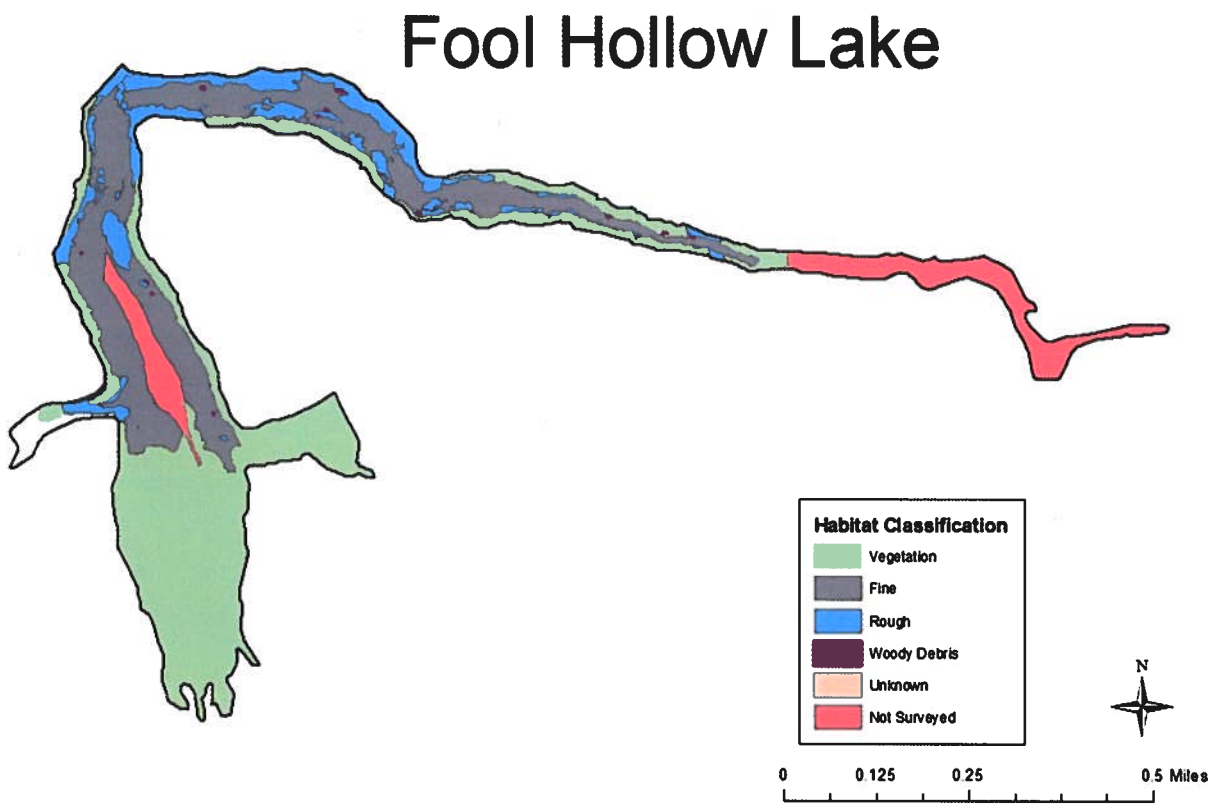


Figure 5. Map of Fool Hollow Lake by habitat type, determined using side scan sonar in 2016.

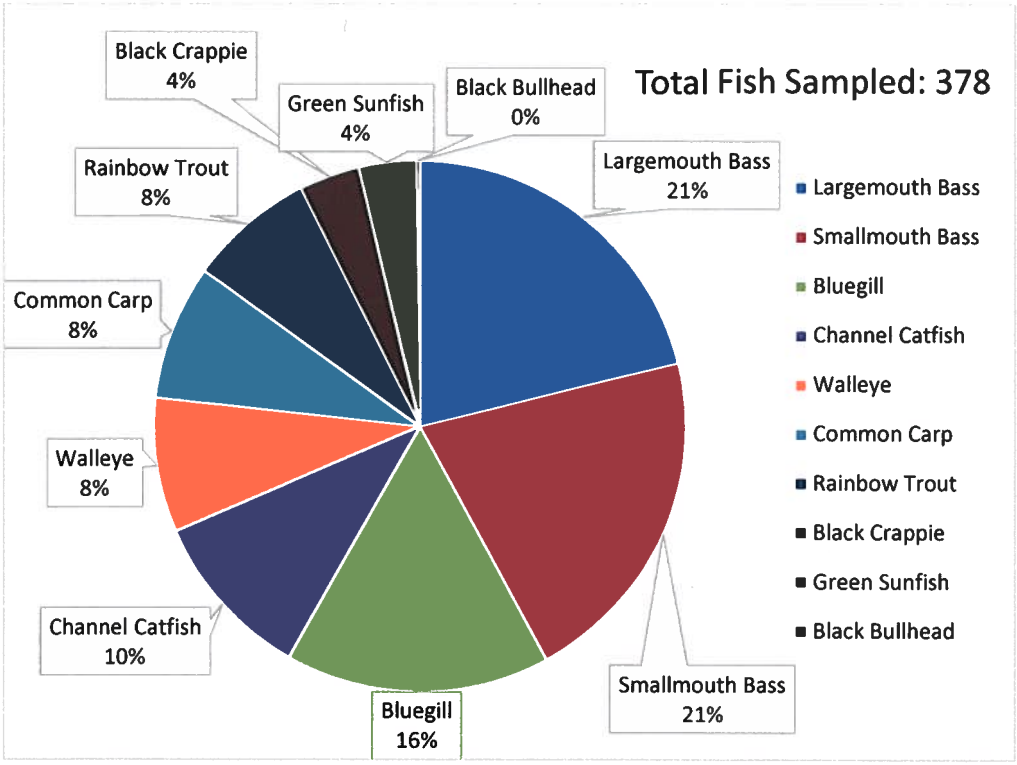


Figure 6. Fish surveyed by percentage during boat electrofishing surveys at Fool Hollow Lake, Arizona, on May 2-3, 2012.

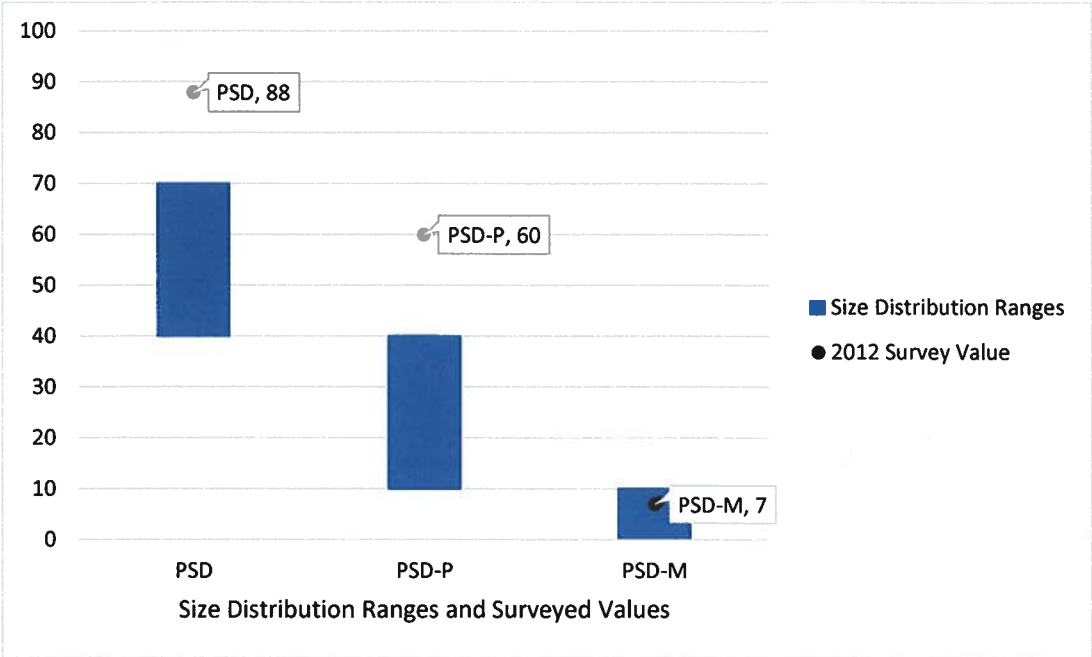
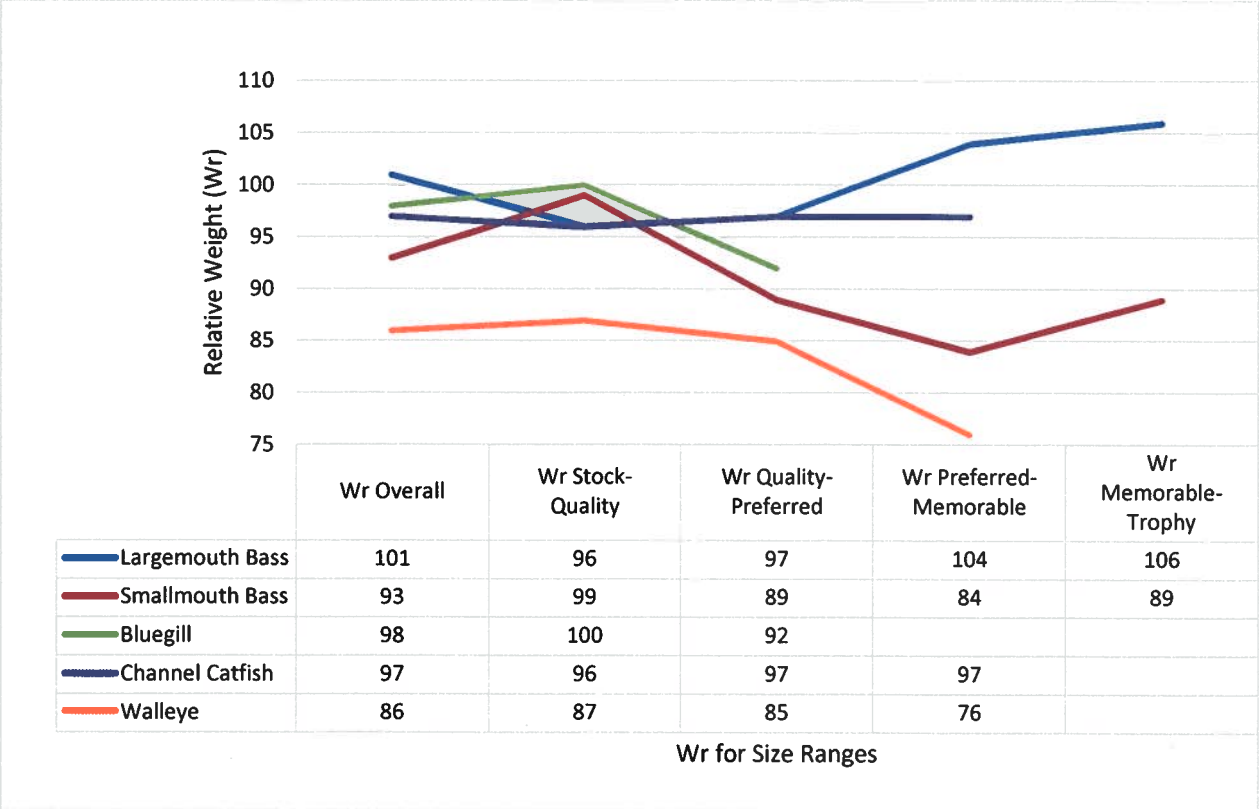


Figure 7. Range of ideal size distribution for Largemouth Bass and computed size distribution values from boat electrofishing survey at Fool Hollow Lake, Arizona, on May 2-3, 2012.



	Wr Overall	Wr Stock-Quality	Wr Quality-Preferred	Wr Preferred-Memorable	Wr Memorable-Trophy
Largemouth Bass	101	96	97	104	106
Smallmouth Bass	93	99	89	84	89
Bluegill	98	100	92		
Channel Catfish	97	96	97	97	
Walleye	86	87	85	76	

Figure 8. Relative weights of fish sampled during boat electrofishing survey at Fool Hollow Lake, Arizona, on May 2-3, 2012.

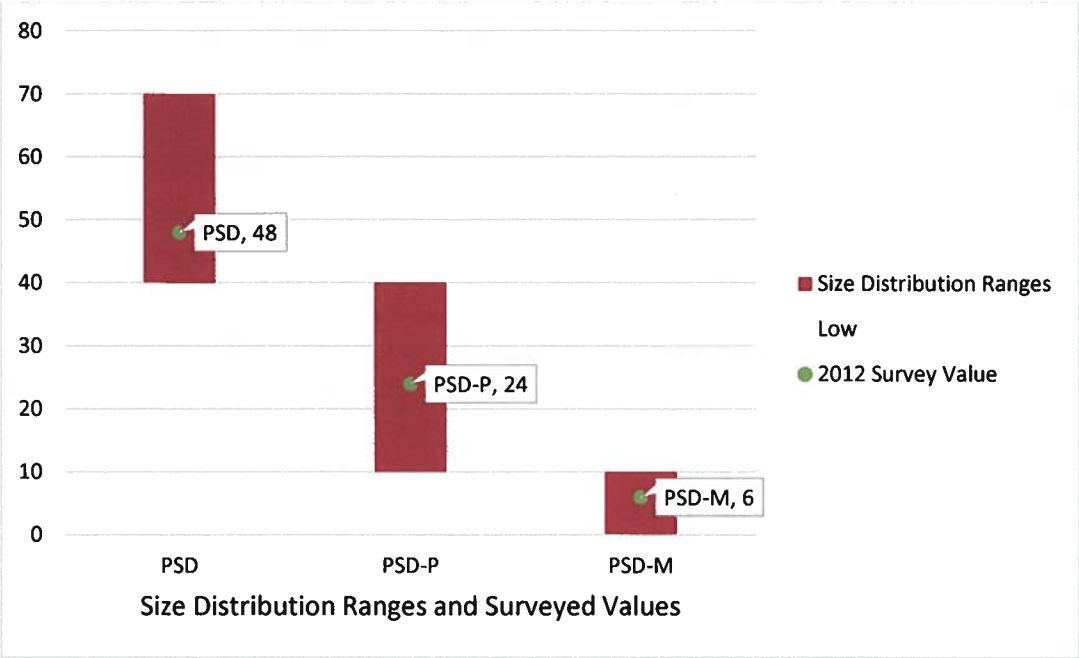


Figure 9. Range of ideal size distributions for Smallmouth Bass and computed size distribution values from boat electrofishing survey at Fool Hollow Lake, Arizona, on May 2-3, 2012.

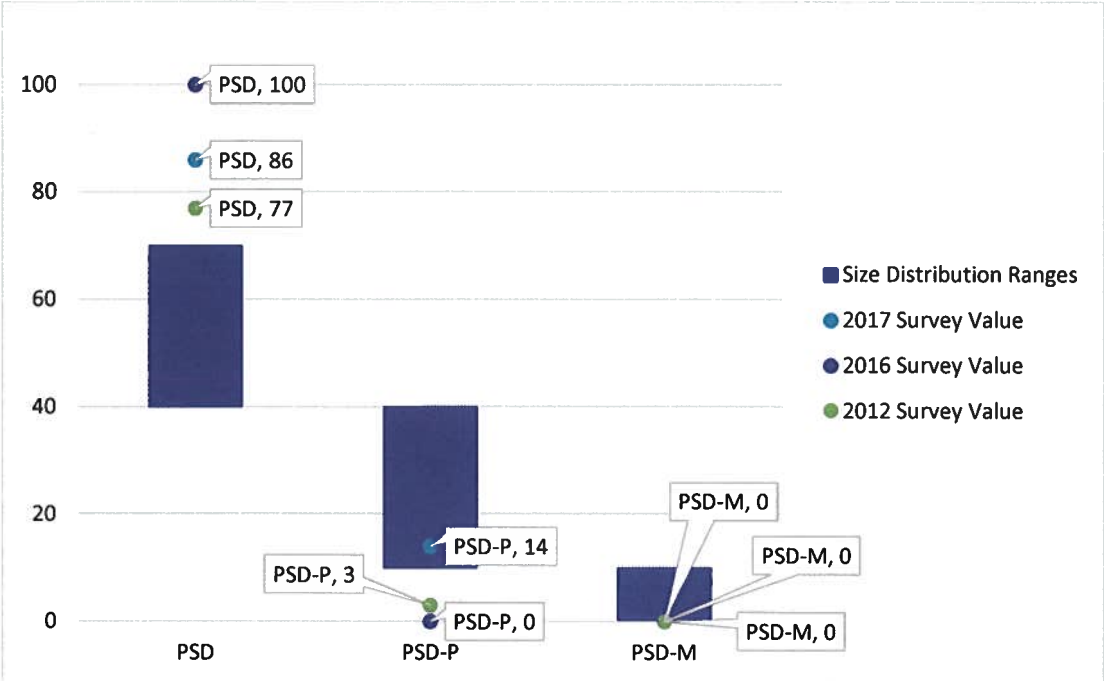


Figure 10. Range of ideal size distributions for Channel Catfish and computed size distribution values from 2012 boat electrofishing survey, 2016 gillnetting survey and 2017 gillnetting survey at Fool Hollow Lake, Arizona.

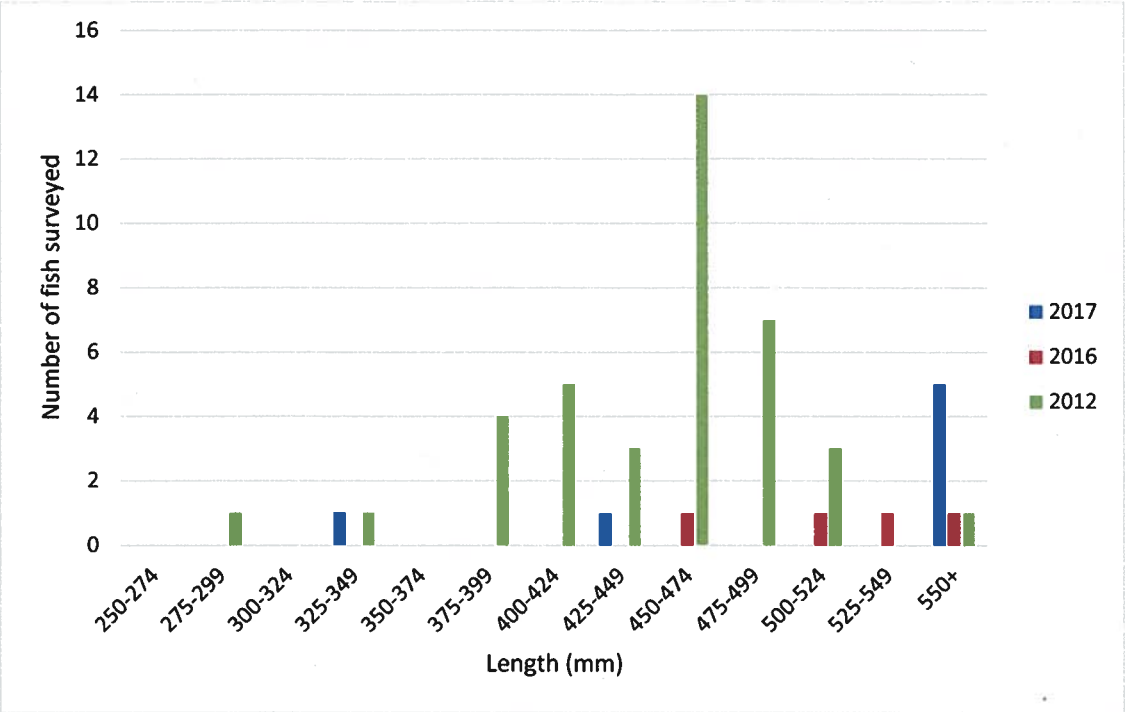


Figure 11. Length frequencies for Channel Catfish from 2012 boat electrofishing survey, 2016 gillnetting survey and 2017 gillnetting survey at Fool Hollow Lake, Arizona.

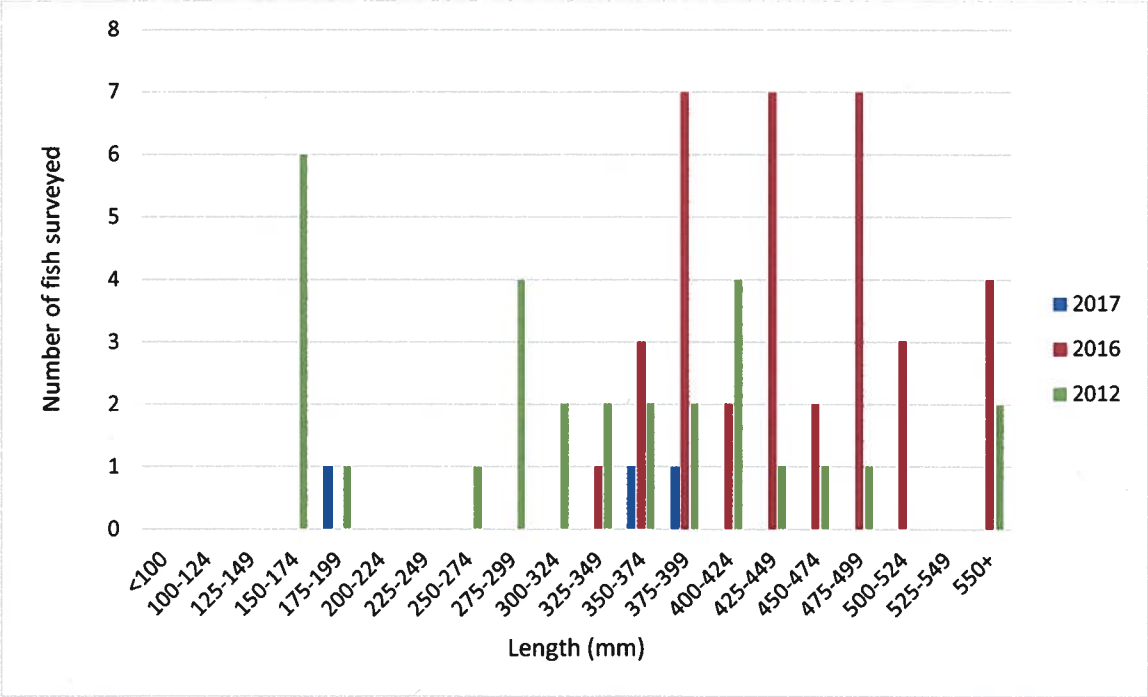


Figure 12. Length frequencies for Walleye from 2012 boat electrofishing survey, 2016 gillnetting survey and 2017 gillnetting survey at Fool Hollow Lake, Arizona.

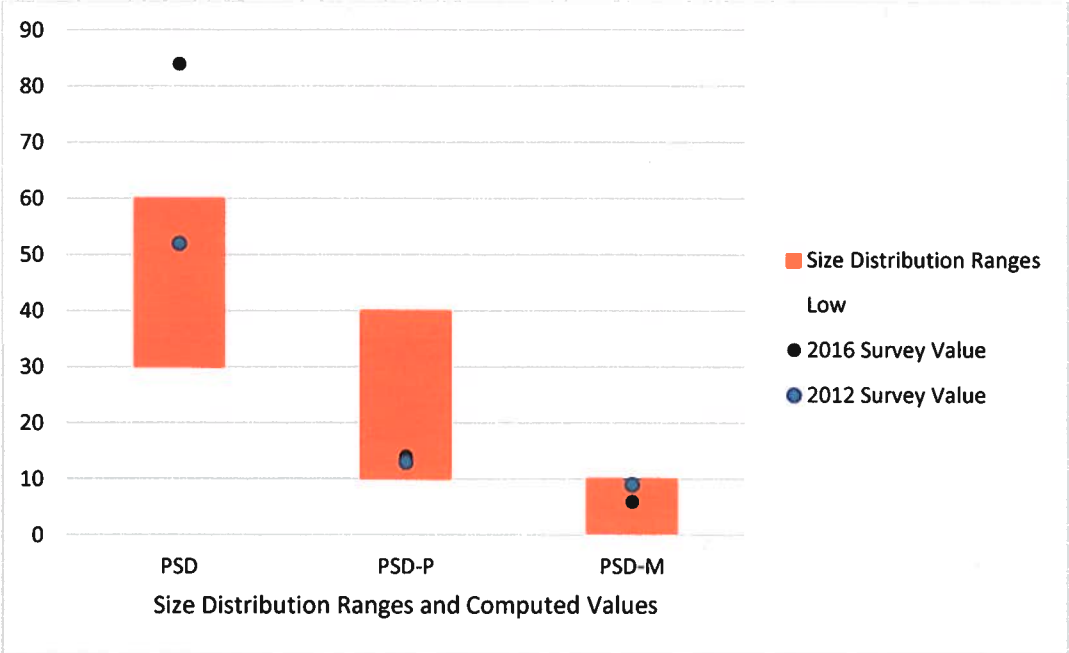


Figure 13. Range of ideal size distributions for Walleye and computed size distribution values from 2012 boat electrofishing survey and 2016 gillnetting survey at Fool Hollow Lake, Arizona.

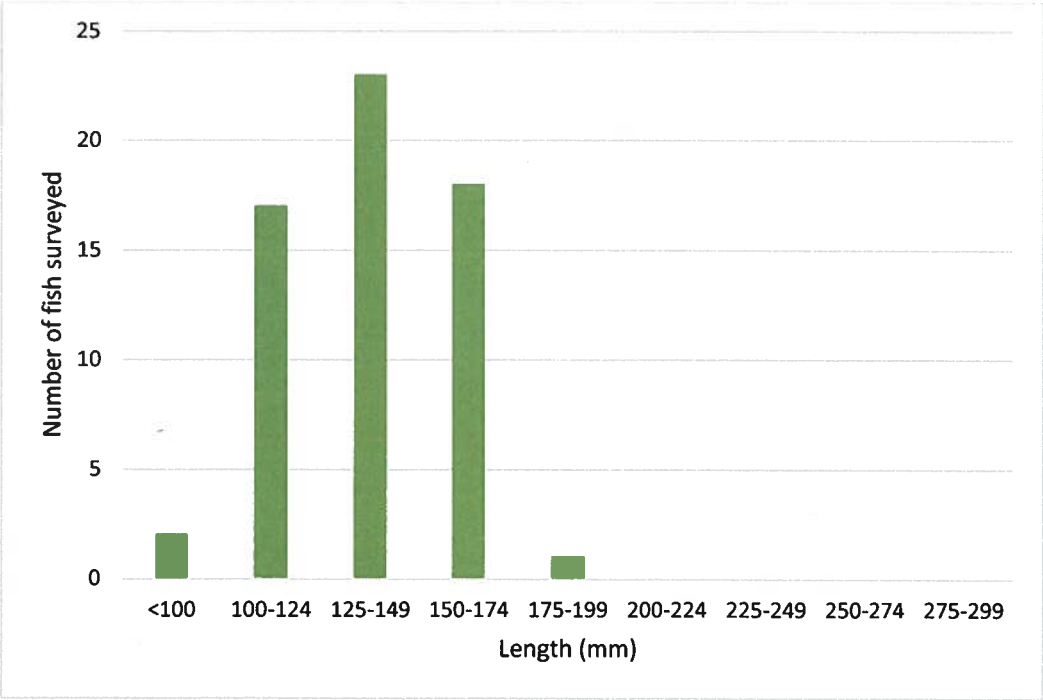


Figure 14. Length frequencies for Bluegill from boat electrofishing survey at Fool Hollow Lake, Arizona on May 2-3, 2012

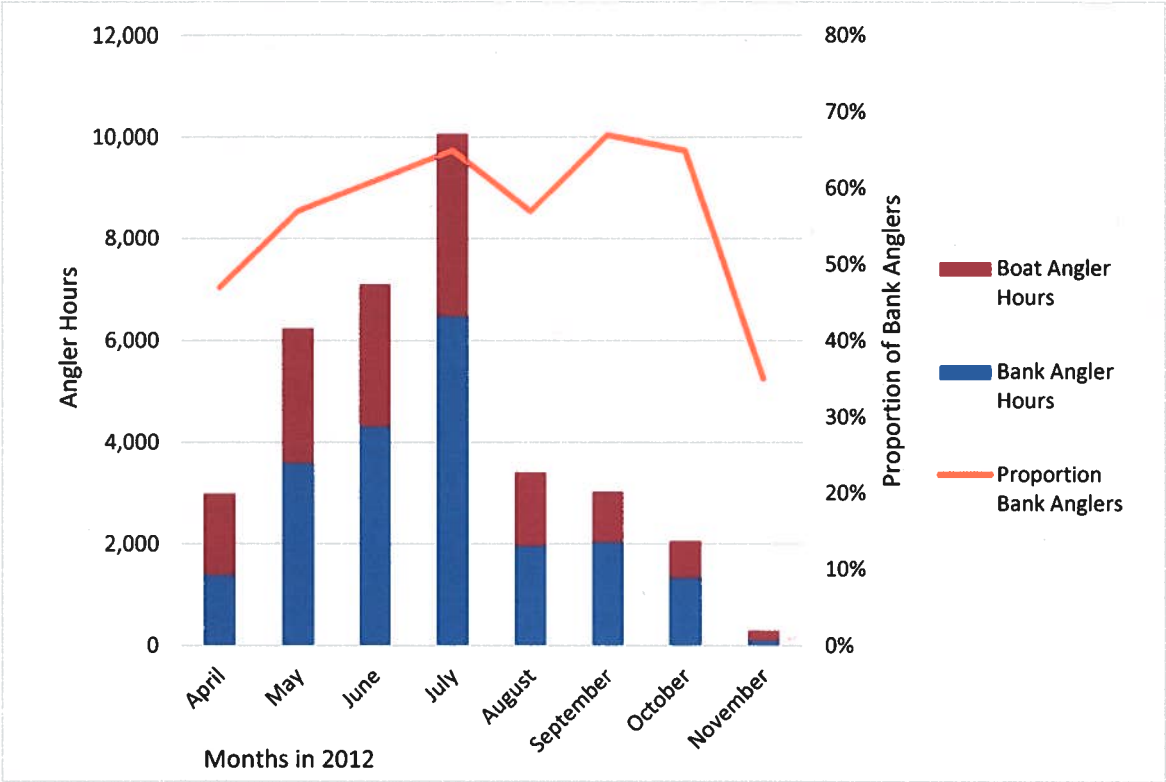


Figure 15. Angler use and proportion of bank anglers by month at Fool Hollow Lake in 2012.

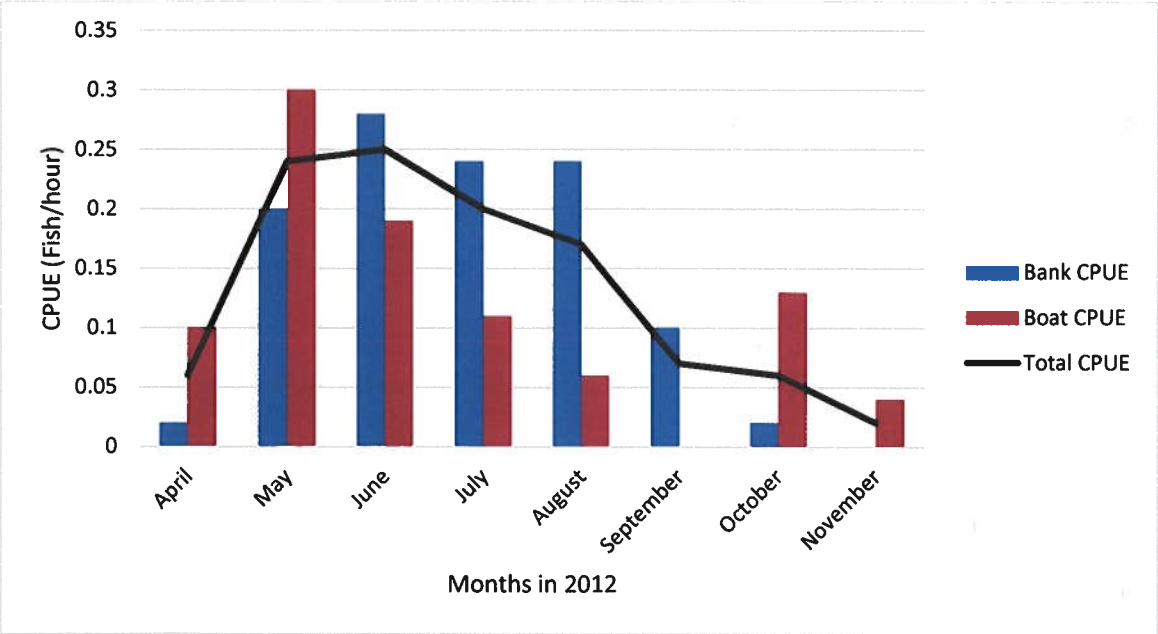


Figure 16. Angler catch rates (fish/hour) by month at Fool Hollow Lake in 2012.

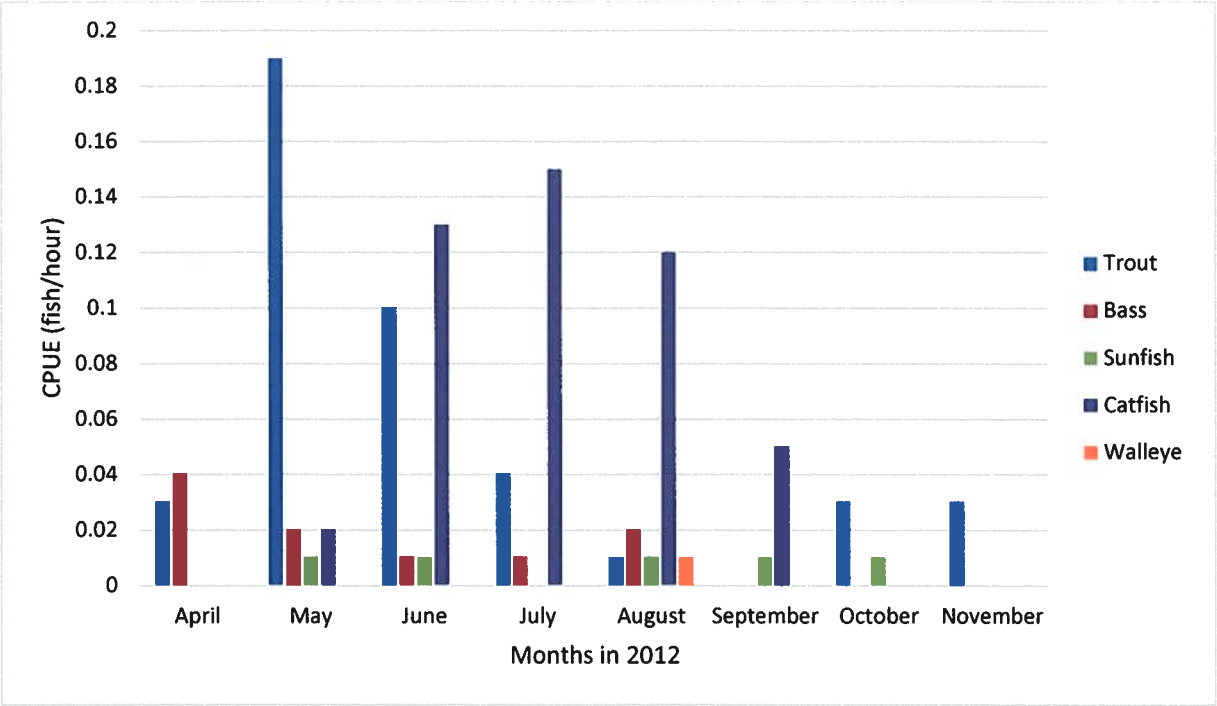


Figure 17. Angler catch rates (fish/hour) by species and month at Fool Hollow Lake in 2012.

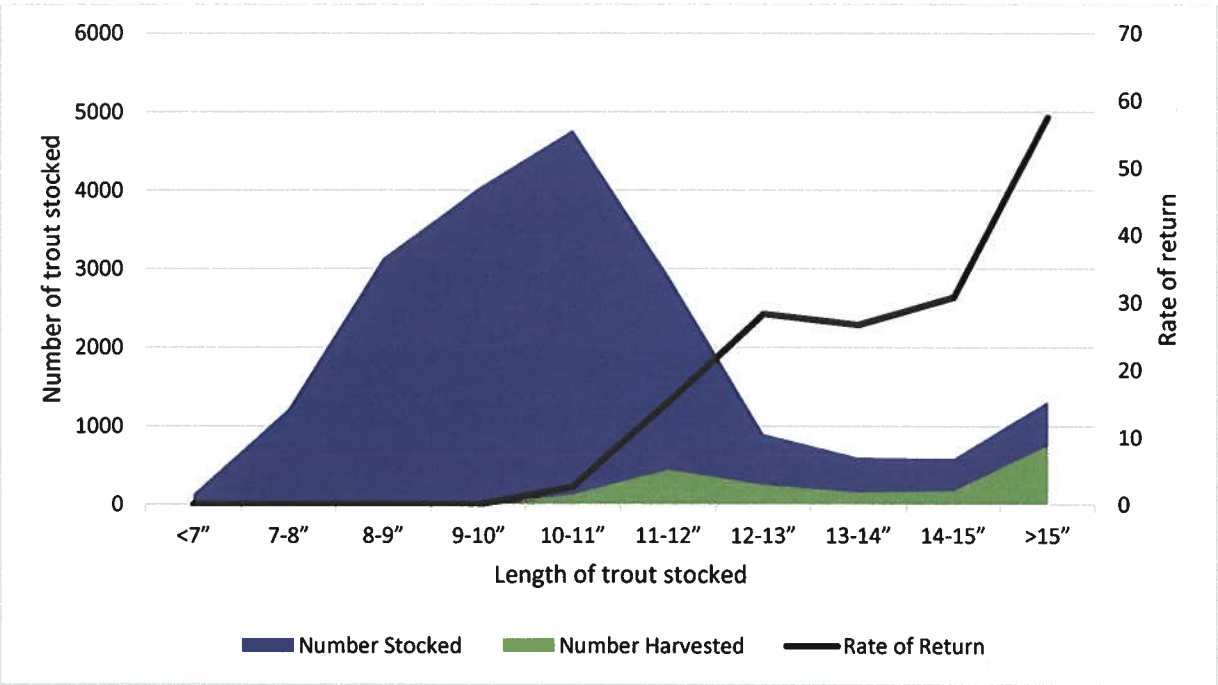


Figure 18. Estimated harvest and rate of return of Rainbow Trout by size stocked in Fool Hollow Lake in 2012.

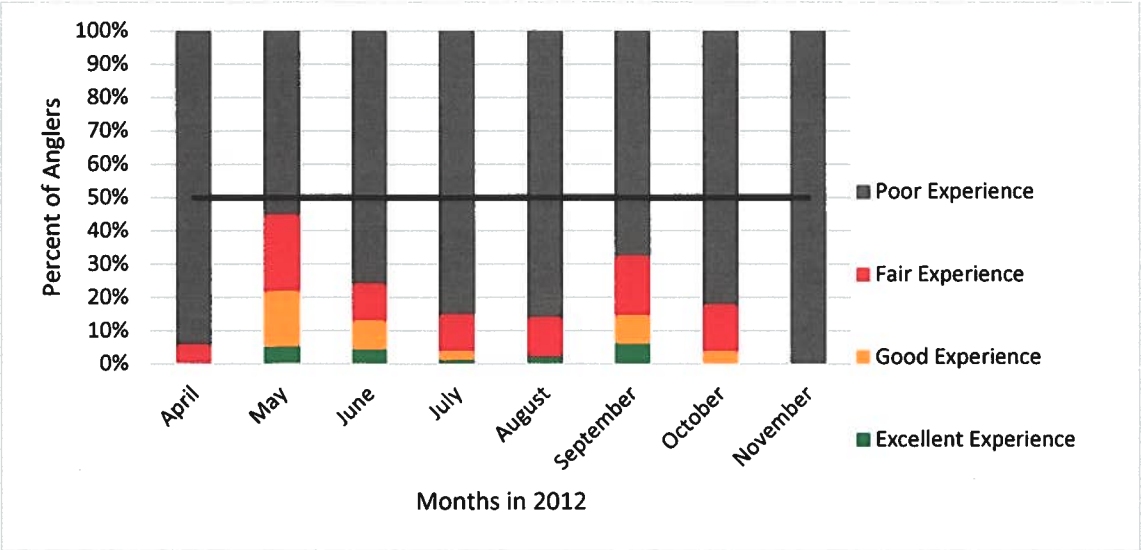


Figure 19. Satisfaction rates by month at Fool Hollow Lake in 2012. Numbers represent percent of anglers rating their angling experience as Poor, Fair, Good, or Excellent that month. The solid black line indicates the 50% goal for each month for the cumulative experience rating of Fair, Good and Excellent.