



**Santa Fe Reservoir
Fisheries Management Plan
2019-2029**

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Approved by Chris Cantrell *D. Andrew Dauter* Date 10/1/19
Aquatic Wildlife Branch Chief

Location

Santa Fe Reservoir is located southern edge of Williams Arizona (UTM 392120, 3900445).

Figure 1. Santa Fe Reservoir Aerial Photo.



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). Using the concepts in these plans, Santa Fe Reservoir will be managed primarily as an Intensive Use fishery focused on angler catch rates. In addition, management will also promote Yellow Perch *Perca flavescens* under a Featured Species concept.

Objective 1. Maintain the fishery to meet or exceed Intensive Use Concept standards for all species as listed in the Warmwater Sportfisheries Strategic Vision Document.

Objective 2. Maintain angler satisfaction at 80%.

Objective 3. Maintain Yellow Perch as a Featured Species.

Monitoring activities, including community-wide 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. Santa Fe Reservoir Objectives and Adaptive Management Strategies.

<i>Objective 1: Maintain the fishery to meet or exceed Intensive Use Concept standards for all species 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
Catch Rate	Catch rate for all species combined exceeds .5 fish per hour.	Catch rate during creel census is less than .5 fish per hour	<ul style="list-style-type: none"> • Develop an angler outreach program to attempt to increase the angler's ability to catch fish on Santa Fe Reservoir. • Increase the number for Rainbow Trout and Channel Catfish stocked.
<i>Objective 2: At least 80% of the anglers interviewed during creel census rate the fishing as fair, good or excellent.</i>			

Angler Satisfaction	A minimum of 80% of anglers rate fishing as fair, good or excellent.	Creel Census shows less than 80% of the anglers rate fishing as fair, good or excellent.	<ul style="list-style-type: none"> • Increase stocking rates • Increase size of trout stocked • Creel Census conducted a minimum of once every 10 years.
<i>Objective 3: Maintain the Yellow Perch population to meet Featured Species Concept 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
Age structure	Multiple age classes	Missing age classes, especially young fish, for three consecutive sampling events	<ul style="list-style-type: none"> • Habitat improvement • Prey enhancement.
Size and number of Perch	Angler Perch catches are comprised of 40% 7 inches or greater Yellow Perch.	Creel Census indicates a catch of less than 40% of Yellow Perch 7 inches or longer and electroshocking suggests that stunting is occurring.	<ul style="list-style-type: none"> • If Perch are stunting consider adding a predator to control population. • Explore the stocking of forage fish. • Enhance habitat by sinking juniper trees.

Background

Santa Fe Reservoir is located on the southern edge of the City of Williams along the Perkinsville Road (4th Street). The reservoir was constructed on Cataract Canyon by the Santa Fe Railroad in 1887 to provide water for their steam engines and was raised twice, in 1892 and in 1901, to increase the reservoir's capacity. The reservoir was transferred to the City of Williams in 1918 for use as a municipal water supply. Runoff from snowmelt provides most of the water for Santa Fe Reservoir.

Productivity/Water Quality

Water Quality is generally adequate for most of the years during the spring and fall. Frequently, algal blooms will cause the pH to rise above 9.5 on the water's edge during summer months. Fish kills caused by poor water quality are rare because of the depth of the reservoir. Turbidity during high water years can significantly reduce productivity within the Reservoir. Region II Aquatic Wildlife staff will coordinate with Water Quality staff in order to monitor water quality seasonally as required.

Forage/Prey

Zooplankton, especially large Daphnia, are an important food source for many of the fish in the lake including the stocked catchable Rainbow Trout. Turbidity can be high during years of high runoff and can limit productivity within the lake. The lake has an abundant population of aquatic insects during years of lower turbidity when aquatic macrophytes are present. Crayfish along with small Yellow Perch and Black Crappie *Pomoxis nigromaculatus* provide forage for the Channel Catfish *Ictalurus punctatus* and Brown Trout *Salmo trutta* found in the lake. It may be beneficial to stock forage fish in Santa Fe Reservoir. The most appropriate species or group of species will be further investigated.

Habitat

Fish habitat in the reservoir is limited. Placement of fish habitat in the deeper areas of the lake could improve the fishery. We propose sinking juniper trees in the upper end of the lake where deeper areas are available. Habitat enhancement will become more critical if more predatory fish are added to reduce the densities of Perch and Crappie.

Species

Species found in the lake include Black Crappie, Channel Catfish, Brown Trout, Rainbow Trout and Yellow Perch. In most years, catchable Rainbow Trout are stocked during the spring and early summer. Catchable sized Channel Catfish are stocked in the spring and subcatchable Brown Trout are stocked in the fall. Up to 20,000 catchable sized Rainbow Trout may be stocked in Santa Fe along with 5,000 subcatchable Brown Trout when they are available. Catchable Channel Catfish will be stocked in Santa Fe when funding is available.

Yellow Perch:

In recent years, the demand for a perch fishery in the Williams/Flagstaff area has increased. Santa Fe Reservoir is one of the most stable Yellow Perch fisheries in the area. It is unlikely that Santa Fe will grow large perch because of its unpredictable turbidity, productivity and forage. However, recent electrofishing efforts suggest that Yellow Perch and Black Crappie have increased since 2011 and appear to be stunted due to overcrowding (Figures 2 and 3, Tables 2 and 3, Benedict 2019 and 2012). The augmentation of current piscivorous fish populations, increased harvest and the introduction of additional prey species may be appropriate in this reservoir. Multiple strategies will be considered through

the environmental checklist process. In the event of catastrophic loss of the Yellow Perch in Santa Fe, Region II staff will find a source for perch and investigate the feasibility of stocking or translocation.

Access

There are multiple ways to access the lake with a primitive road near the shore along the west side of the lake. Shore access for anglers is via social trails along the edge of the lake. There is a primitive area where small boats may be launched on the east side of the lake near the dam. Parking is limited at Santa Fe Reservoir. Region II staff will work with the City of Williams to explore the expansion of parking opportunities. Region II staff will also work with the City of Williams in order to maintain access for stocking.

Catch

Creel census has not been conducted on the lake since 2003. In 2003, Santa Fe Reservoir had 5,238 angler hours of fishing, angler satisfaction was not recorded, the catch rate was .3 fish per hour and 1,593 fish were harvested (Benedict, 2004). Yellow Perch and Black Crappie were not targeted or recorded in the creel in 2003 (Table 4).

Satisfaction

No satisfaction questions were asked during the 2003 creel census. However satisfaction will be addressed in the next creel survey and by ongoing anecdotal conversations with anglers and staff from the City of Williams.

Literature Cited

- Arizona Game and Fish Department. 2019a. Coldwater Sportfisheries Strategic Vision. Arizona Game and Fish Department, Statewide Sportfish Program, Phoenix, Arizona.
- Arizona Game and Fish Department. 2019b. Warmwater Sportfisheries Strategic Vision. Arizona Game and Fish Department, Statewide Sportfish Program, Phoenix Arizona.
- Benedict C.T et al. 2004. City Reservoir and Santa Fe Reservoir 2003 Creel Census Report, Arizona Game and Fish Department.
- Benedict C.T. 2012. City Reservoir and Santa Fe Reservoir 2011 Fish Sampling Report, Arizona Game and Fish Department
- Benedict C.T. Rogers S. 2019. Santa Fe Reservoir 2018 Electrofishing Survey Report, Arizona Game and Fish Department.

Tables and Figures

Table 2. 2011 Santa Fe Reservoir Electrofishing Data

Species	Number	Average Length (mm)	Average weight (g)	Catch per 900 seconds
Channel Catfish	2	450		1.14
Rainbow Trout	5	225		2.49
Brown Trout	7	187		3.45
Yellow Perch	17	115		8.4
Black Crappie	26	187		18.15

Table 3. 2018 Santa Fe Reservoir Electrofishing Data

Species	Number	Average Length (mm)	Average weight (g)	Catch per 900 seconds
Channel Catfish	1	457	861	.26
Rainbow Trout	1	272	161	.26
Yellow Perch	140	141	36	37.7
Black Crappie	199	128	45	52.3

Table 4. 2003 Creel Survey Results from Santa Fe Reservoir

Species	Number Caught	% of Catch	Number Harvested	% Released
Channel Catfish	97	6	97	0
Rainbow Trout	1301	80	1268	3
Brown Trout	228	14	228	0

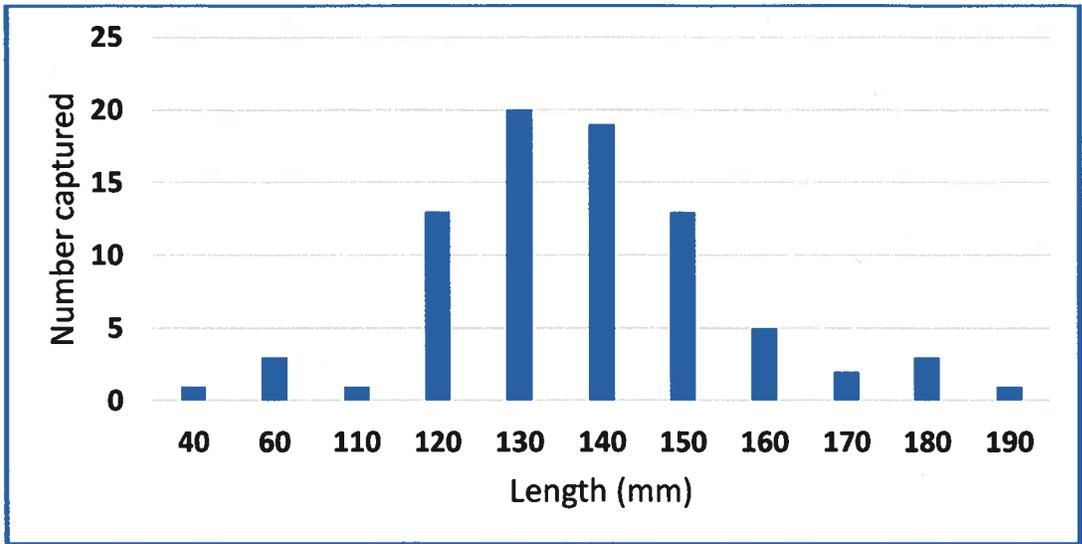


Figure 2. Ten Millimeter Length Frequency for Yellow Perch Measured During the Electrofishing Survey on Santa Fe Reservoir (August 16, 2018)

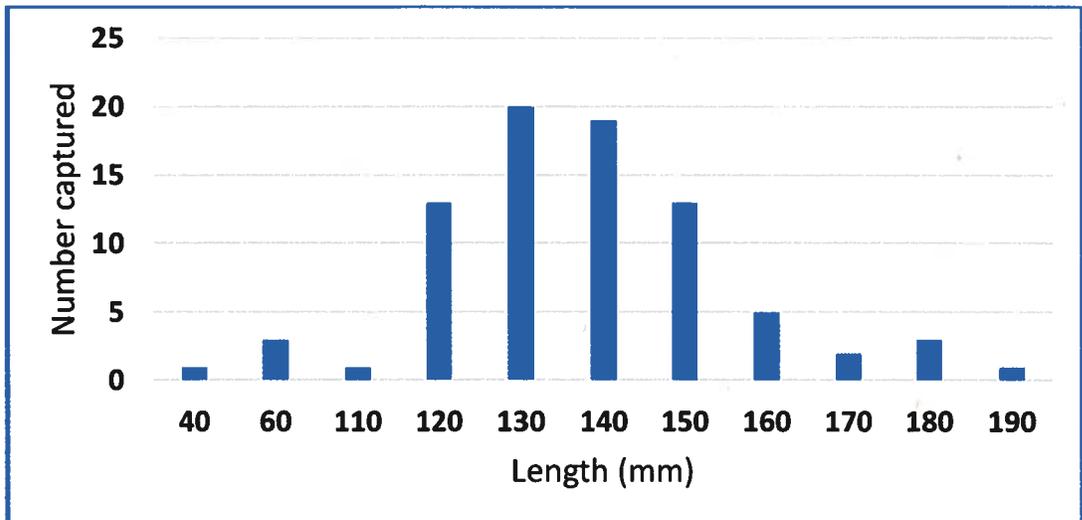


Figure 3. Ten Millimeter Length Frequency for Black Crappie Measured During the Electrofishing Survey on Santa Fe Reservoir (August 16, 2018)