

NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-53
2017

TOPAZ LAKE
WESTERN REGION



**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROGRESS REPORT**

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**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROGRESS REPORT**

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Topaz Lake*
Period Covered: *January 1, 2017 through December 31, 2017*

SUMMARY

Average monthly storage for Topaz Lake during 2017 was 163% of average (39,922 acre-ft, the 20-year average was 24,482 acre-ft). This was the first year since 2012 that an above normal storage level was observed.

Mail-in, angler questionnaire data for 2016 estimated 1,412 anglers fished 7,236 days to catch 11,794 fish (all numbers are increases from data reported during 2015). Since Topaz Lake straddles the Nevada and California state line, anglers may possess either state's fishing license, but the data reported here represents only anglers buying a Nevada fishing license. The average catch rate was 1.63 fish per angler day (2015 catch rates were also 1.63 fish per angler day). Coldwater and Warmwater General Fisheries Management Concept objectives were successfully met in 2016 and 2017 based on the mail-in survey as well as angler contact and drop-box data.

Monitoring for aquatic nuisance species (quagga mussels) continued in 2017 and no veligers or adult mussels were found.

Fish surveys conducted during 2014 verified an increasing population of adult smallmouth bass; however, since 2015 adult numbers have been low. Juvenile smallmouth numbers found during snorkel surveys increased in 2016 and 2017 (none were found in 2014, 28 in 2015, 30 in 2016, and 43 were found in 2017). A study aimed at assessing the effectiveness of artificial habitat structures on recruitment and survival of black bass was continued during 2017 with the installation of additional structures along the western shore (approximately 40 have been placed since 2015).

A study aimed at assessing the rainbow trout fishery was initiated during 2010. Growth and catch rates of four trout strains (bowcutt trout and Eagle Lake, Bel Air, and Tahoe strains of rainbow trout) indicated that bowcutt trout performed better than other strains. Creel survey results continue to indicate that bowcutt trout are by far the most likely to carry over from one year to the next.

BACKGROUND

The Nevada/California border almost equally divides Topaz Lake, but it is owned and operated by the Walker River Irrigation District (WRID). Nevada Department of Wildlife (NDOW) and California Department of Fish and Wildlife (CDFW), nonetheless, share fishery management responsibilities. Both agencies collectively have established a significant coldwater fishery in the reservoir. The earliest record of stocking by Nevada occurred in 1930 with black bass (*Micropterus* sp.) and since then, the lake has

been stocked abundantly with rainbow trout (*Oncorhynchus mykiss*). Other stocked fishes include brown trout (*Salmo trutta*), kokanee salmon (*O. nerka*), Lahontan cutthroat trout (*O. clarkii henshawi*), bowcutt trout (a hybrid between cutthroat and rainbow trout), tiger trout (a hybrid between brown and eastern brook trout, *Salvelinus fontinalis*), and black bullheads (*Ictalurus melas*). Common carp (*Cyprinus carpio*) also exist. Today, however, rainbow and bowcutt trout make up the principal sport fishery, other fishes such as tiger trout, largemouth bass, and occasionally brown trout encompass a minor fishery. Even though smallmouth bass were known to occur in the West Walker River and anecdotal reports from anglers suggested they were in the lake earlier, they were first confirmed by NDOW during 2008. Smallmouth bass are now established and they comprise a significant component of the sport fishery, particularly during the summer when trout fishing becomes slow. The native fish community is comprised of mountain whitefish (*Prosopium williamsoni*), Tahoe sucker (*Catostomus tahoensis*), Lahontan tui chub (*Siphateles bicolor obesus*), Lahontan reddsides (*Richardsonius egregious*), and speckled dace (*Rhinichthys osculus*).

Topaz Lake fishing season is open from January 1 to September 30. The fishing regulation states “Fishing is legal from 1 hr before sunrise to 2 hrs after sunset, except for the area within the jetties of Topaz Marina, which is closed to fishing. Limit is 5 trout, 10 mountain whitefish, and 15 warmwater game fish of which not more than 5 may be black bass.”

There are two major boat-launching facilities, Topaz Landing and Douglas County Park. Topaz Landing is privately owned with a fee for launching, while Douglas County Parks is public and charges a fee to launch boats. The Douglas County boat ramp is large enough for multiple launchings and can be used at all but extremely low water levels. In addition to a fish cleaning station, there are camping sites and restrooms. An angler drop-box near the Douglas County boat launch was installed in 2010 to collect basic information including hours spent fishing, number of fish caught, general size of fish and species. Douglas County Parks is open from January 1 to September 30.

Water storage typically declines during late summer, as water demands remain high. As the irrigation season ends in October, the water level increases throughout winter. Crop irrigation begins in mid-April and river runoff typically peaks shortly after, and the reservoir then reaches maximum capacity for the year. Maximum pool is 125,000 acre-ft, but usable storage, governed by the depth of the outlet, is about 59,500 acre-ft. At minimum stage, the reservoir reaches a depth of 59 ft. At full storage, maximum depth approaches 92 ft and the mean depth is 52 ft. It has 2,410 SA and sits at 5,005 ft above mean sea level when full.

OBJECTIVES

General Management Objectives

- Conduct a general fisheries assessment through opportunistic angler contacts, angler drop-box surveys, and mail-in angler questionnaire data.
- Monitor lake level and clarity when on site.

- Monitor for the presence of adult quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year.
- Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year.

Black Bass Study Specific Objectives

- Increase habitat complexity and provide additional juvenile habitat cover with additional artificial habitat structures.
- Monitor habitat structures and spawning activity through snorkeling surveys during summer.

PROCEDURES

General Management Objectives

Conduct a general fisheries assessment through opportunistic angler contacts, angler drop-box surveys, and mail-in, angler questionnaire data. Information obtained from angler contacts included total time fished and number, size, and species of fish caught. Location of angler, place of residence, and type of bait or lure used were also recorded. Angler drop-box survey forms were collected from a single drop-box located next to the Douglas County boat ramp. Angler questionnaires were sent to 30,000 anglers purchasing a Nevada fishing license. Information returned to the Department of Wildlife was entered into a database and summarized for use in assessment of individual fisheries. Since Topaz Lake straddles the Nevada and California state line, anglers can possess either state's fishing license, but the data reported here represents only those anglers buying a Nevada fishing license. Opportunistic angler contacts were made on nine occasions during 2017, January (2 days), May (1 day), June (3 days), August (2 days), and September (1 day).

Monitor lake level and clarity when on site. Lake volume was measured by a USGS gage in acre-ft near the dam and measurements were recorded at the beginning of each month. Water clarity was measured using a Secchi disk and measurements were taken on three occasions (June 7, June 26, and September 12, 2017) near mid-lake.

Monitor for the presence of adult quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year. Monitoring of buoys, submerged rocks, exposed rocks, moored boats, and boat docks was conducted on nine occasions during 2017, January (2 days), May (1 day), June (3 days), August (2 days), and September (1 day). Tactile surveys included snorkeling around boat docks and buoys as well as visually inspecting surfaces that became exposed as the reservoir level dropped throughout the summer.

Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year. Three stations have been established to sample for quagga mussel veligers. The first station was near Douglas County boat ramp, the second near mid-lake, and the third near Topaz Landing boat launch. Vertical tows were made from the hypolimnion to the surface and a minimum of 1,000 L of lake water was filtered through a 63- μ m mesh plankton net. Samples were

only collected twice during 2017 (June 26 and September 11), preserved in 75% ethanol, and analyzed by Pisces Molecular in Colorado and Eco Analysts in Idaho.

Black Bass Study Specific Objectives

Increase habitat complexity and provide additional juvenile habitat cover with additional artificial habitat structures. Habitat structures, purchased from Mossback Fish Habitat, are made of nontoxic “scuffed” PVC trunks with composite limbs to simulate sunken trees or root structures that would be found in a natural environment. Three different types of structures were utilized consisting of Safe Havens (Figure 1), Root Wad 3 Posts, and Trophy Tree Kits. Product dimensions and specifications are presented in Table 1.

Figure 1. Safe Haven Fish Habitat Structure.



Table 1. Mossback Habitat Specifications

	Dimensions	Limbs	Number of Anchors
Safe Haven	50" x 50"	24	1
Root Wad 3 Post	25" x 50"	12	1
Trophy Tree Kit	50" x 50"-100"	36	2

Habitat structures were constructed in Fallon and transported to the lake on a small flatbed trailer. They were then transported to lake locations to be installed using an 18 ft aluminum Delta Angler boat. Suitable locations were determined based on bathometric maps and depth was then proofed using a fish finder. All structures were placed in at least 6 ft of water and not more than 15 ft in order to target areas where all species were suspected to be most vulnerable to predation. These locations and depths also function as suitable spawning habitat for warm water species, which produce offspring that can utilize the structures as well. Structures were submerged and anchored using six-feet of nylon coated aircraft cable and either one or two cinder blocks per structure. GPS locations were recorded for each structure for future monitoring.

Monitor habitat structures and spawning activity through snorkeling surveys during summer. Snorkel surveys were conducted on three occasions (April 6, May 26, and June 7, 2017). A single snorkeler dove from a boat near habitat

structures and swam near each structure. Fish species, approximate size, and their location to the structure were recorded.

FINDINGS

General Management Objectives

Conduct a general fisheries assessment through opportunistic angler contacts, angler drop-drop box surveys, and mail-in, angler questionnaire data. A total of 30 shore anglers and 13 boat anglers were contacted at Topaz Lake during 2017, this compared to 74 total during 2016 and 105 during 2015. In 2017, shore anglers showed a catch rate of 0.76 fish per hour (0.49 fish per hour in 2016 and 0.27 fish per hour in 2015) and 1.40 fish per angler day (1.20 trout per angler in 2016 and 0.51 in 2015). Eight rainbow trout caught averaged 14.9 in and four bowcutt trout averaged 18.5 in during 2017. Two anglers targeting bass were contacted in 2017, whereas no anglers were contacted during 2016 and 15 were contacted in 2015. During 2017, bass angler use was limited and only three smallmouth bass were measured that averaged 18.5 in. The catch rate was 0.60 fish per hour. This represented a decline in the catch rate in 2017, compared to 2.08 fish per hour during 2014 and 3.33 during 2013. On the other hand, smallmouth bass were smaller, 20 in during 2015, 14.9 in during 2014, and 15.3 in during 2013. No angler caught largemouth bass have been reported since 2014.

Historical mail-in, angler questionnaire data is shown in Table 2. In 2016 (the latest mail-in data), results show slightly below average angler use and total number of fish caught. Catch rate (fish per angler day), on the other hand, was above average for the second consecutive year. Mail-in data does not distinguish between species caught, however, trout have historically dominated angler creel (based on contact and drop-box survey data).

Fifteen drop-box surveys were collected in 2017, while 23 were collected in 2016 and 18 in 2015. The Douglas County boat ramp was open for most of the 2016 and 2017 fishing season; however, it was closed throughout most of the year during 2015 and 2014 and data was limited since the drop-box was located at the end of the boat ramp. This survey does not distinguish between black bass species; however, angler creel contacts reported 100% of the black bass caught during the past several years have been smallmouth bass. Therefore, it is likely that most, if not all, black bass reported on drop-box surveys are smallmouth. Largemouth bass do occur in the lake, but their numbers are low. Angler drop-box data for 2010 through 2017 is shown in Table 3. In 2017, anglers showed average catch rates of 1.08 fish per hour and 8.6 fish per angler day, which were the highest seen for years. Catch of black bass has declined since 2013 (47% of fish caught), making up 21% of the total catch in caught in 2015, 5% in 2016, and 4% in 2017.

Table 2. Mail-in Angler Questionnaire History

Year	No. of Anglers	Days Fished	Fish Caught	Fish/Angler Day
2007	2,935	24,586	44,152	1.80
2008	2,482	10,474	12,443	1.19
2009	3,148	20,157	28,755	1.43
2010	2,793	14,895	22,395	1.50
2011	2,767	13,265	22,652	1.71
2012	2,574	8,414	12,497	1.49
2013	1,502	6,453	6,457	1.00
2014	1,094	7,670	7,147	0.93
2015	1,084	4,224	6,880	1.63
2016	1,412	7,236	11,794	1.63
Average	2,179	11,737	17,517	1.43

Table 3. Angler Drop-Box Survey - 2010 – 2017

	2010	2011	2012	2013	2014	2015	2016	2017	AVE
No. Anglers	4	32	29	25	0	18	23	15	18
Hrs Fished	24	167	122	144.5		95	141.5	120	116
Bass	0	22	4	45		8	6	5	13
Tiger	1	1	7	1		0	0	0	1
Rainbow	6	108	132	50		31	112	124	80
Fish/Hour	0.29	0.78	1.17	0.66		0.41	0.83	1.08	0.75
Fish/Day	1.75	4.09	4.93	3.84		2.17	5.13	8.6	4.36

Topaz Lake is managed as a “two tiered fishery” that is under guidelines of Coldwater and Warmwater General Fishery Management Concepts. The coldwater concept states “angler success rates should range between 0.25 and 0.75 fish per angler hour and 1.0 and 2.0 fish per angler day.” The warmwater concept states “angler catch rates should range between 0.25 and 0.75 fish per hour and 1.0 and 2.0 fish per angler day. Largemouth bass should average 10 inches.” The size of fish reported from the angler drop-box survey (Table 4) showed most black bass were larger than 14 inches (all bass caught during 2016 were larger than 14 inches) and 47% of trout caught were larger than 11 inches (96% of trout caught during 2016 were larger than 11 inches). Available data for angler catch rates and size of fish caught suggest that Topaz Lake is meeting the management objective.

Table 4. 2017 Drop-Box Size of Fish

	<3.9"	4-7.9"	8"-10.9"	11"-13.9"	14"-15.9"	16"-17.9"	>18"
Bass				1	3		
Rainbow			58	48	2		2

Most trout stocking typically occurs during October and December when Topaz Lake is closed to fishing. However, due to hatchery trout availability and angling demand, trout were stocked throughout the year when they met the size requirement (>9.0 in) (Table 5). Less than half the usual allocation of rainbow trout ($n=20,274$) were stocked in 2017, Table 6 shows a six-year stocking history for NDOW and CDFW. NDOW stocks approximately 50,000 catchable rainbow that range from 8.8 to 10.7 in,

whereas CDFW typically stocks 10,000 to 25,000 smaller rainbow trout that range from 6.0 to 8.9 in.

Table 5. Stocking Summary - 2017

Date	Species	Strain	Number	Size
5/23/2017	Rainbow	McConaughy	5,274	9.5
5/31/2017	Brown	Sheep Creek	1,524	9.7
6/27/2017	Rainbow	Kamloop	2,331	9.1
10/5/2017	Rainbow	Kamloop	5,706	9.2
10/19/2017	Cuttbow	Marlette	3,917	8.8
10/19/2017	Rainbow	Tahoe	1,815	10.1
10/20/2017	Rainbow	Tahoe	5,148	9.8
		Total Rainbow	20,274	9.5
		Total Cuttbow	3,917	8.8

Table 6. Stocking History – NDOW and CDFW

Nevada Department of Wildlife			
		Number	Size (in)
2016	Rainbow	48,552	9.5
	Tiger	2,783	10.0
	Bowcutt	5,950	9.0
2015			
		Number	Size (in)
2015	Rainbow	61,210	9.3
	Tiger	4,995	9.3
	Bowcutt	6,277	10.1
2014			
		Number	Size (in)
2014	Rainbow	50,815	9.5
	Tiger	4,502	8.9
	Bowcutt	-	
2013			
		Number	Size (in)
2013	Rainbow	52,830	10.4
	Tiger	12,644	3.8
	Bowcutt	4,752	9.5
2012			
		Number	Size (in)
2012	Tiger Trout	5,010	10.0
	Rainbow	53,339	10.7
2011			
		Number	Size (in)
2011	Rainbow	6,780	5.0
	Rainbow	50,110	9.6
	Bowcutt	5,794	10.1

California Department of Fish and Wildlife			
		Number	Size (in)
2016	Rainbow, triploid	15,200	6.8
2014	Rainbow, triploid	15,410	6.0
2013	Rainbow, triploid	25,200	6.5
2012	Rainbow, triploid	23,780	8.9
2011	Rainbow, triploid	15,600	6.2
	Rainbow, triploid	10,000	7.1
2010	Rainbow	12,812	6.3

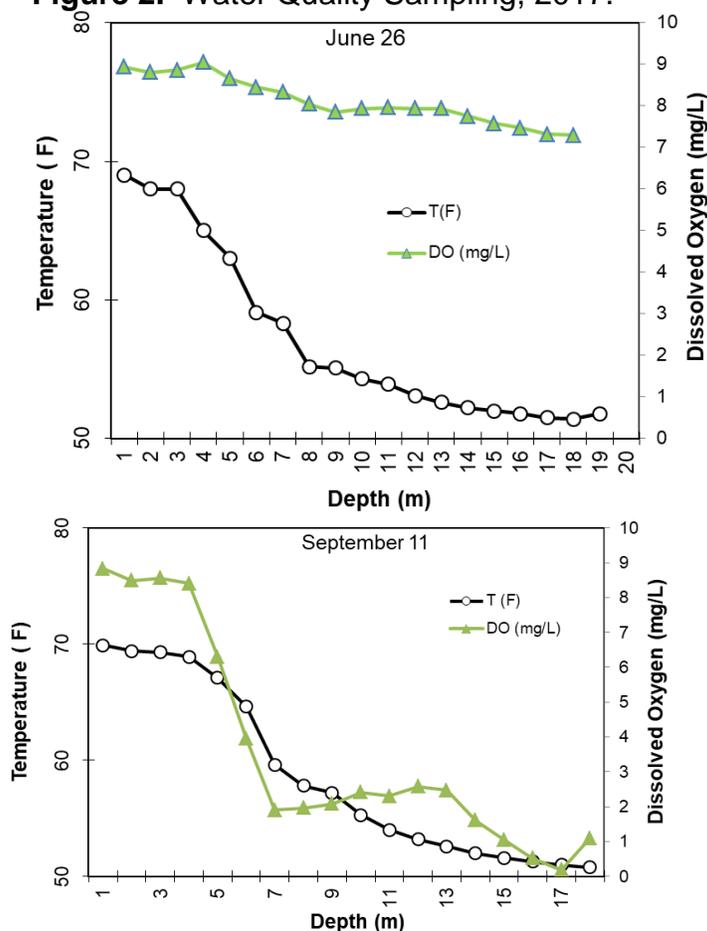
Monitor lake level and clarity when on site. Water quality profiles were taken on June 26 and September 11, 2017 (Figure 2). The annual surface temperature ranged from a high of 70°F during September to a low of 40°F during January (Table 7) and appeared not to create issues for trout survival. A strong thermocline commonly develops in summer and suitable trout habitat is typically reduced to a few vertical meters in the metalimnion as shown during September of 2017 (Figure 2). Suitable water quality was limited to approximately six feet of the water column from 13 to 20 ft

where temperatures were below 68°F (20°C) and dissolved oxygen levels were above 6.0 mg/L.

No large algae blooms or large-scale mortality events were observed or reported during 2017 and water quality appeared suitable for all fish species throughout the year. Spring runoff continued well into July and creating low surface temperatures and high dissolved oxygen levels. The lake level remained higher for longer than during the past several years due to above average precipitation and a longer runoff, and the possible reason surface temperatures remained within the tolerance of fish.

Water clarity fluctuates throughout the year at Topaz Lake. During winter, phytoplankton and macrophytes are reduced, improving water clarity. During late summer and fall, water clarity diminishes and during moderate to heavy winds, visibility reduces to just a few feet. Indirect effects on sport fish survival and recruitment could be attributed to water level (e.g., lack of inundated vegetation for protection of juvenile black bass). Additionally, rising water temperatures combined with falling oxygen levels in summer due to a low water volume and increased surface area could affect trout survival.

Figure 2. Water Quality Sampling, 2017.



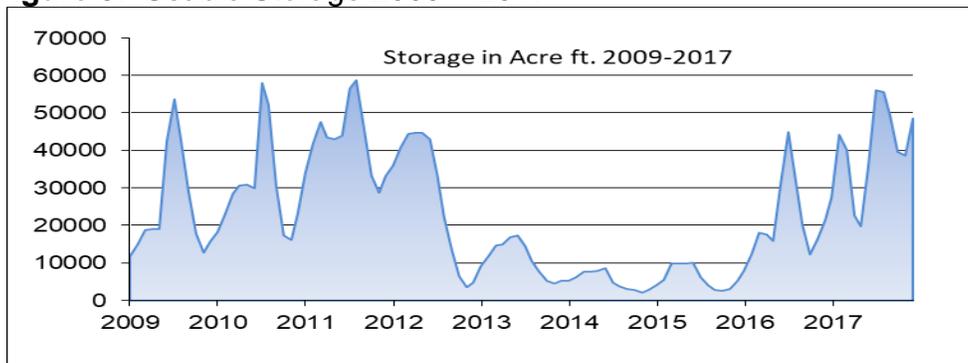
Secchi depth was measured at the same time water quality profiles were collected. Water clarity diminished throughout the summer, ranging from 15 ft in early June to 3.3 ft by mid-September (Table 7). This is consistent with past data.

Table 7. Surface Water Quality Sampling - 2017

Date	Air Temp F	Water Temp F	Secchi Depth Ft
1/1/2017	30	40	-
5/26/2017	65	50	-
6/7/2017	81	58	15
6/26/2017	88	69	10
9/11/2017	85	70	3.3

Water storage reported in Figure 3 was taken from USGS gage number 10297000. Only usable storage was measured at this gauge, which did not include the 65,000 acre-ft at minimum pool. While historical lows were observed during 2014 and 2015, reservoir levels rebounded to average levels during 2016 (88% of the historical average storage level) and 2107 (163% of the historical average storage level). In 2017, the lowest storage level occurred on April 17 at 15,270 acre-ft of usable water. As a comparison, October 26, 2014 showed the lowest storage of 2,220 acre-ft and September 19, 2015 had the lowest storage level of 2,560 acre-feet. Typically, the lowest storage is observed in January since the irrigation season is closed; however, during 2017, concerns of flooding caused water managers to fluctuate releases that were dependent on current runoff conditions. The reservoir peaked on June 26, 2017 at 56,710 acre-feet.

Figure 3. Usable Storage 2009 – 2017



Monitor for the presence of adult quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year. Several methods were used for monitoring the presence of quagga mussels and included tactile and visual surveys of boat docks, buoys, and submerged and exposed rocks. No physical detection of adult quagga mussels occurred in 2017.

Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year. Samples collected in 2017 have been negative for detecting the presence of quagga mussel veligers.

Study Specific Objectives, Black Bass

Increase habitat complexity and provide additional juvenile habitat cover with additional artificial habitat structures. Installation of artificial habitat structures was completed throughout the course of several months. Each new structure was placed as near as possible to the 2016 locations (Table 8, Figure 4). During 2016, several structures placed during the spring had to be relocated to deeper water during

late summer due to a rapidly declining reservoir level. In 2017, reservoir water levels were high and no replacement of structures was necessary. Generally, as structures attract a forage base of younger non-game and game species, they also attract larger black bass. While conducting work on Topaz Lake, boat anglers were observed fishing near the structures and suggesting they are providing a higher concentration of fish and anglers are targeting fishing around them.

Table 8. Mossback GPS locations 2016-2017

Label	Water Body	Easting	Northing	Zone
S-25	Topaz lake	279841.0	4282887	11
S-26	Topaz lake	279847.4	4282847	11
S-27	Topaz lake	279828.6	4283824	11
S-28	Topaz lake	279968.6	4283989	11
S-29	Topaz lake	280173.1	4284158	11
S-30	Topaz lake	280387.3	4284268	11
S-31	Topaz lake	280428.7	4284380	11
S-32	Topaz lake	280422.5	4284361	11
S-33	Topaz lake	280406.6	4284293	11
S-34	Topaz lake	280339.2	4284220	11

Monitor habitat structures and spawning activity through snorkeling surveys during summer. During 2016, surveys were conducted during late June, July and August when water temperatures are warmer and more conducive to snorkeling, however, by late summer fish observation efficiency was reduced due to clinging aquatic vegetation on the artificial habitat units and macrophyte growth and suspended algae growth in the epilimnion. In an effort to improve observation efficiency, the 2017 snorkeling surveys were conducted during April, May, and June. Visibility during the spring snorkeling effort was much higher (Secchi disk measurements up to 10 ft) which allowed for a greater number of fish to be positively identified than in previous surveys, however, the total amount of time expended on the survey was lower than in 2017 due to the colder temperatures which reduced the amount of time snorkelers could stay in the water. The 2017 survey documented 43 juvenile smallmouth bass that ranged between three and five inches. Approximately 45 fish were observed near structures, but were not positively identified, and 130 fish were identified as nongame fish (Table 9). Results from the 2015-2017 surveys show an increasing trend of positively identified bass using the structures. While 4 adult bass were observed using the structures in 2014, no adults have been observed during 2015-2017.

Figure 4. Artificial Habitat Structures Placement, 2016



Table 9. Snorkel Survey Results, 2017

	2015	2016	2017
No. Bass	28	30	43
No. Trout	0	0	0
No. nongame	50	95	130
No. Unidentified	75	80	45
Hours Snorkeled	2.9	7.5	5.5
Bass/Hour	9.66	4	7.82

MANAGEMENT REVIEW

The 2016 Mail-in Angler Questionnaire Survey suggests that although angler use was slightly below average, catch rates have recovered from the all-time lows observed since 2013. Results from the 2017 drop-box and opportunistic angler contact creel surveys suggest that management objectives for angler use and success were met in spite of drought conditions that persisted through 2015. The high summertime temperatures and low dissolved oxygen levels experienced during 2013 and 2014 likely lead to limited trout carryover, however, results from drop-box surveys and angler contacts during 2017 suggest that some trout were able to survive the summer of 2016. Most trout carryover observed during the past three years (and all carryover fish observed during 2016) have been bowcutt trout.

Monitoring of adult quagga mussels through tactile and visual inspection of boat docks, buoys, and substrates should continue annually. Monitoring of veligers should also continue. Results from 2017 were negative.

A rainbow trout study was conducted from 2010 through 2014 to examine the effectiveness (growth and catch rates) of stocking Bel Air, Tahoe, and Eagle Lake strains of rainbow trout and bowcutt trout. Results suggested that bowcutt trout outperformed the other strains. Various species of trout including rainbow trout, tiger trout, brown trout, and cuttbow trout should be stocked based on habitat, fish availability, and the results of the trout study. Results from angler contacts during 2016 and 2017 suggest that carryover bowcutt trout were averaging two to three inches larger than other strains of trout.

A black bass study was initiated in 2014. The addition of protective cover for juvenile bass was continued and further evaluation of population structure and habitat use will determine if artificial habitat results in increasing the angler catch rate and maximum size or relative abundance of bass. Even though bass angling was less successful during 2014 and 2015, it is likely a result of persistent drought and subsequent low reservoir levels and not due to the addition of the artificial habitat structures. Artificial habitat was placed in Topaz Lake where cover was limited and was monitored during the summer. Only four adults were observed utilizing these structures during the fall of 2014 (none were observed during 2015 through 2017), however, juveniles were utilizing structures during the summer of 2015, 2016, and 2017. In addition to providing cover for juvenile bass, artificial habitat should also provide protection for forage species. Additional monitoring techniques should be used to maximize detection efficiency and final evaluation of the 5-year study should be completed.

Recently, however, creel contacts and angler drop-box surveys suggest smallmouth bass numbers are stabilizing or even decreasing due to drought conditions experienced over the past several years. The low water levels observed from 2013 to 2015 either resulted in higher mortality in the adult smallmouth bass population or reduced recruitment into the adult population.

RECOMMENDATIONS

General Management Objectives:

- Conduct a general fisheries assessment through opportunistic angler contacts, return of angler drop-box surveys, and mail-in, angler questionnaire data.
- Monitor lake level and clarity when onsite.
- Monitor for the presence of quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year.
- Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year.

Black Bass Study Specific Objectives:

- Monitor habitat structures and spawning activity utilizing acoustic techniques during summer.

- Evaluate data collected and make recommendations.

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Date: February 2018