NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE SPORT FISHERIES MANAGEMENT

FEDERAL AID JOB PROGRESS REPORT

F-20-50
2014

LAKE MEAD
SOUTHERN REGION

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
JOB PROGRESS REPORT

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NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROGRESS REPORT

State: *Nevada*
Project title: *Statewide Fisheries Program*
Job title: *Lake Mead*
Period Covered: *January 1, 2014 to December 31, 2014*

SUMMARY

General Sport Fishing Evaluation

In 2014, 80 days were expended conducting creel surveys on Lake Mead. A total of 877 anglers were contacted whose catch totaled 3,906 fish of multiple species for a catch rate of four fish per angler day and averaged 0.9 fish/angler hour. The observed 1,898 fish harvested provided a harvest rate of 2.2 fish/angler day and an average 0.47 fish/angler hour.

During the fall, Nevada Department of Wildlife (NDOW), Arizona Game and Fish Department (AZGFD), and U.S. Bureau of Reclamation (USBOR) cooperatively completed electroshocking and gill netting surveys. Electroshocking surveys were dominated by green sunfish *Lepomis cyanellus*, bluegill *L. macrochirus*, and threadfin shad *Dorosoma petenense*, while gill-net surveys caught primarily gizzard shad *D. cepedianum*, striped bass *Morone saxatilis*, and common carp *Cyprinus carpio*.

Striped Bass Assessment

Striped bass catch per unit effort (CPUE) in the gill-net survey decreased from that of 2013, and angler interest in striped bass as a percentage of total angler preference also decreased from that observed in 2013. Harvested striped bass sampled during creel surveys (March through December) were smaller than last year, though in better condition. They averaged 15.3 inches (in, 389 millimeters [mm]) total length (TL), with an average weight of 1.6 pounds (lbs, 726 grams [g]), and an average condition factor ($K_{FL(fork\ length)}$) of 1.14. Striped bass were also smaller in the gill net sample than last year, though in better condition. Striped bass averaged 13.5 in (343 mm) TL, weighed an average of one pound (472 g), and had a condition factor of 1.21 K_{FL}. This is a 1.1 in (30 mm) decrease in total length over last year and a 0.08 K_{FL} increase in condition factor.

Black Bass Fisheries Assessment

Gill-net surveys revealed increases in abundance for smallmouth bass *Micropterus dolomieu* and decreases for largemouth bass *M. salmoides*. Black bass harvest, as a percentage of the total harvest, decreased in 2014 to 1.26%. The fishery remained mostly catch and release with only 5.9% of the catch harvested. The percentage of angler preference for black bass continued to climb, reaching 21% of the

total angling effort in 2014. This was after a lull in angler preference found between 2007 and 2011. Samples recorded from tournaments revealed slightly larger largemouth bass that declined in condition compared to last year. The largemouth bass average total length was 16.5 in (419 mm), weight was 2.1 lbs (953 g), and W_r was 85.2. Very little change occurred in smallmouth bass length and weight, though body condition dropped slightly. Smallmouth bass had an average total length of 15.6 in (396 mm), average weight of 1.8 lbs (820 g), and an average W_r of 83.6. Smallmouth bass spawning success was good in 2014. Smallmouth bass young-of-the-year (YOY) observations were nearly triple from 2013, while largemouth bass YOY observations were mostly unchanged from 2013.

Prey Base Studies

Threadfin shad production was monitored during the spring and summer seasons in two basins of Lake Mead. A total of 47 transects were sampled in the Overton Arm and the Boulder Basin. The shad population exhibits a cyclical pattern with two to three years of poor production followed by a peak year in production. This year, Boulder Basin was a peak year for threadfin shad production while Overton Arm production was near average. Average peak density for Boulder Basin was 129 shad/3,531 cubic feet (ft^3, 100 cubic meters [m^3]) and Overton Arm was 58 shad/3,531 ft^3 (100 m^3). The overall average shad density was 93 shad/3,531 ft^3 (100 m^3).

Salmonid Fisheries Assessment

No rainbow trout *Oncorhynchus mykiss* were stocked in 2014. One rainbow trout was captured during the electroshocking survey in Gregg Basin.

BACKGROUND

Lake Mead was created by the completion of the Hoover Dam in 1935. The newly formed impoundment was stocked with largemouth bass and sunfish *L.* spp., and soon became known for its excellent bass fishery. In the 1940s the bass fishery began to decline with reports of fish in poor condition. In 1954, threadfin shad were introduced to Lake Mead to provide additional forage. Initially there was some improvement in largemouth bass condition, but this was short-lived. In 1963, the construction of upstream impoundments reduced flow conditions with the filling of Lake Powell. This also changed historic water storage patterns to one of lower springtime flows and higher wintertime flows, which caused drawdowns during the black bass spawning season. Changes in temperature fluctuations and nutrient loading to Lake Mead were also observed after the construction of Lake Powell.

Because of the declining largemouth bass fishery, introductions of coldwater fish occurred in 1969 to enhance the fishery and to fill a vacant niche. Fish included rainbow trout, cutthroat trout *O. clarkii*, hybrid bowcutt trout *O. mykiss* x *O. clarkii*, and silver salmon *O. kisutch*. Striped bass were also stocked at this time and up until 1972, at which time they were found to be naturally reproducing and stocking was

discontinued. At the time of these introductions, the threadfin shad population had grown to become an over-abundant pelagic biomass mostly unavailable to littoral species. After ten years, however, striped bass had become well established in Lake Mead and depleted the threadfin shad population. Moreover, increasing evidence indicated that striped bass were negatively impacting the concurrently established salmonid fishery and contributing to the severe decline of the long established black crappie fishery. Trout stocking was discontinued in 1983 for a variety of reasons, including poor long-term returns and other demands on production capability. Poor condition factors persisted in both striped and black bass.

Since 2007, the management strategy for striped bass was manipulated to encourage anglers to harvest the smaller sizes that were very abundant by increasing angler possession limits. Increased harvest of the 12 to 15 in (305-381 mm) size cohort, primarily one and two year old fish, was expected to decrease the impact on YOY shad thus improving the availability of annual shad production for larger striped bass during late summer and early fall. Body condition factor should increase in larger fish. Similar regulations now occur throughout lakes Powell, Mead, and Mohave, with an unlimited take of striped bass under 20 in (508 mm) and a 20 fish limit on striped bass over 20 in. Despite these regulation changes, angler use has declined and there continues to be abundant young cohorts of striped bass in Lake Mead.

Second to the popular striped bass fishery is the black bass fishery. The largemouth bass population remained stable over the past 10 years, though in 2014 it declined as the lake dropped below the 1,082 ft (330 m) elevation. Smallmouth bass, first detected in the creel survey in 1999, are now a large part of fishing tournament catches and are found lake-wide. While they are not usually as abundant as largemouth bass, smallmouth bass outnumbered them in 2014. The trout stocking program, reestablished in 1991, was suspended as of March 2011 due to Lake Mead Fish Hatchery closure.

The newest challenges to the Lake Mead fishery are invasive species. In 2007, two aquatic nuisance species (quagga mussel and gizzard shad) made their way to Lake Mead. The impact these species will have on the Lake Mead fishery is unknown at this time. So far, gizzard shad have been found to provide additional forage for striped bass; however, they grow rapidly to a size most fish cannot utilize as prey and could become competitors for food resources. Another recent invader, the New Zealand mud snail *Potamopyrgus antipodarum*, now inhabits the benthos with unknown effects to the fishery. Despite these invasions, Lake Mead continues to provide anglers with a variety of fishing opportunities.

OBJECTIVES and APPROACHES

Objective: To monitor angler use, catch, and fish population dynamics of the Lake Mead fishery.

Approach:

- Evaluate angler success through at least 100 days of contact creel surveys at four angler access points on Boulder Basin and Overton Arm.
- Collect angler catch data from black bass tournaments.
- Conduct lake-wide gill net and trammel-net surveys in the fall in cooperation with Arizona Game and Fish Department (AZGFD).
- Conduct fall electroshocking surveys in cooperation with AZGFD to evaluate changes in littoral zone fish species.
- Conduct summer black bass dive transects to assess impacts of reduced and variable lake elevations on black bass spawning and recruitment.
- Complete weekly meter net trawls during peak threadfin shad production.
- Conduct quarterly stomach content analysis from a minimum of 200 tournament caught striped bass to detect changes in their diet.
- Utilize creel, tournament, and monitoring data to assess sport fishery performance and changes, and develop estimates of sport fish availability and condition to inform anglers.

Objective: Identify and/or develop artificial habitat structures suitable for installation into Lake Mead.

Approach:

- Identify sites in Lake Mead for habitat structure deployment.
- Develop a project plan for coordination, permitting, and regulatory compliance.

PROCEDURES

Creel Survey

Opportunistic creel surveys were conducted on 80 separate creel days from March through December. The creel clerk position was vacant during January and February; therefore, only two surveys were conducted. The clerk monitored anglers at four landings. Boulder Harbor was surveyed on nearly a weekly basis, Callville Bay and Echo Bay were surveyed less frequently, from zero to three times a month, and Hemenway was surveyed once monthly.

Angler contacts were made at boat landings on Lake Mead from March through December. Surveys were performed for a continuous period of time and information collected included total catch, effort, bait type used, species caught, angler origin, species preference, and presence of tags or marks on fish. Subsamples of harvested fish were weighed and measured to obtain length and weight data. Due to the creel clerk vacancy, sampling was limited to March through December.

Black Bass Tournament Monitoring

Major largemouth bass fishing tournaments were monitored to evaluate weigh-in procedures, obtain tag returns, and insure a proper release procedure is adhered to consistent with National Park Service (NPS) permitting. Additionally, from a subsample of the catch, species, length, and weight were measured at seven selected tournaments after weigh-in. After tournament, fish were transferred to the live-release boat and released at a site away from the marina weigh-in site.

Gill-net Surveys

The gill-net survey was carried out in the fall. Sampling was performed according to NDOW's Sport Fish Sampling Guidelines for Lakes, Ponds, and Reservoirs for gillnetting warmwater species. An exception was gill net dimensions, which were made of multifilament at 150 ft (46 m) in length and five 30-ft (9 m) panels ranging in mesh size from 0.75 to 3 in (19 to 76 mm). Nets were set overnight at no deeper than 40 ft (12 m). Fish were identified to species, weighed, measured, and released back to the lake.

Electroshocking Surveys

Sampling was done in the fall, during the evening hours using a boat equipped with a Coffelt shocking apparatus and VVP-15B electrical box. Boat electroshocking methods described in NDOW's Sport Fish Sampling Guidelines for Lakes, Ponds, and Reservoirs were used. Fish were identified to species, measured, weighed, and released back to the lake.

Summer Dive Surveys

Fish counts were conducted diving with mask and snorkel. Counts occurred from stratified random sampling of coves. Selection of coves was also dependent on visibility and clarity of water using methods described in NDOW's Sport Fish Sampling Guidelines for Lakes, Ponds, and Reservoirs for snorkeling. Dive transects were timed and all fish species were counted or number estimated (e.g., threadfin shad schools). Black bass were further categorized into fry, fingerling, juvenile, or adult size-classes.

Shad Trawls

Weekly meter net trawls for shad were conducted from May 1 to July 23, 2014. Las Vegas Bay was sampled the first two weeks of May, and then sampling of both Las Vegas Bay and Overton Arm began June 3, 2014. Samples were taken in Boulder Basin and Overton Arm using established transects and procedures in accordance with a 1988 nutrient study protocols, but with reduced number of sample sites. The procedure for shad trawling consisted of towing a cone-shaped net with an open end of 3.3 ft (1 m) in diameter and 0.06 in (1.6 mm) mesh screening. The net is 19.7 ft (6 m) in length, with a 10 in (25.4 cm) collection cup on the end. The net is towed approximately

65.6 ft (20 m) behind the boat. Trawls generally last for 10 min at a boat speed of 2 knots (approximately 1,000 rpm engine speed) and are replicated three times to provide an average number. A flow meter is attached at the mouth opening to record water movement through the net to determine the volume of water sampled. Fish are counted and abundance is converted to number of fish/3,531.5 ft^3 (100 m^3) of water. This sampling technique is efficient for small fish up to 0.8 in (20 mm) as larger fish tend to avoid the net and, therefore, is an estimate of reproductive success and does not represent a true recruitment value. In 1997, after eight years of trend data, sampling was streamlined to concentrate on peak shad production. Peak abundance estimates are calculated as an average of the highest four or five weeks of shad production.

FINDINGS

Creel Survey

A total of 80 days were expended creel surveying anglers on Lake Mead, contacting 877 anglers at four sites. Boulder Harbor received the most surveying effort of the four sites at 48.8% followed by Callville Bay, Hemenway, and Echo Bay (Table 1). Anglers caught 3,925 fish of multiple species for a catch rate of 0.9 fish/angler-hour (Table 2) and four fish per angler-day. The highest catch rates were observed during the warmer months (May through October), with catch rates from 0.91 to 1.53 fish/angler-hour (Table 2). Of the 3,925 fish reported, 1,898 were harvested. This resulted in harvest rates of 0.47 fish/angler-hour and 2.2 fish/angler-day. The 2014 catch rates were comparable to the 2013 catch rates of 0.84 fish/angler hour (Table 2) and 3.92 fish/angler-day, and harvest rates of 0.45 fish/angler-hour and 2.2 fish/angler-day (Table 2).

Species composition of harvested fish was led by striped bass at 95.6%, followed by channel catfish *Ictalurus punctatus* at 2.2%, and black bass at 1.7% (Table 3). Angling effort (angler preference) for striped bass as a percentage of the total angling effort in 2014 dropped to 66%, with largemouth bass the second most sought after sport fish at 21%, and indiscriminate anglers climbing to 9.6% (Table 4). From samples of harvested fish, striped bass averaged 15.3 in (389 mm) TL and 1.6 lbs (717 g). The average condition factor was 1.14 K_{FL}, with 13.7% in poor condition. Fewer striped bass were in poor condition from August through December (Table 5), after shad had spawned.

TABLE 1. Fishing docks (marinas) and number of days surveyed during the 2014 Lake Mead creel survey.

Dock (Marina)	Days	Percent
Echo Bay	11	13.8
Callville Bay	17	21.3
Hemenway Harbor	13	16.3
Boulder Harbor	39	48.8
Total	80	100

TABLE 2. Lake Mead angler catch rates (fish/angler hour) by month from contact creel surveys, 2004-2014.

Month	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
January	0.48	1.05	0.59	1.01	1.02	0.70	0.40	0.47	0.47	1.68	---
February	0.22	0.53	0.49	0.81	1.07	0.89	0.57	0.52	0.52	0.44	---
March	0.56	0.79	0.74	0.97	0.58	0.80	0.52	0.29	0.70	0.25	0.26
April	0.55	0.91	1.24	1.01	1.47	1.23	0.82	0.60	0.56	0.47	0.57
May	1.17	1.14	1.77	1.5	1.67	1.56	1.33	0.77	1.08	2.07	1.37
June	0.94	1.02	1.53	0.64	1.53	2.14	1.10	0.67	1.60	0.98	0.91
July	0.99	1.39	1.27	1.48	1.38	1.03	0.90	0.72	1.42	0.83	1.53
August	1.13	1.44	1.30	1.72	1.31	0.96	0.89	1.20	1.98	0.66	0.98
September	1.20	1.47	1.02	1.23	1.42	0.90	0.98	1.20	1.38	0.85	1.24
October	1.20	1.29	1.01	1.21	1.33	1.46	1.04	0.97	0.90	---	1.18
November	1.28	1.42	0.93	1.36	1.22	0.52	0.73	1.05	1.01	0.60	0.77
December	1.45	0.78	1.14	1.3	0.83	0.76	0.47	1.58	2.14	0.42	0.2
Average	0.93	1.10	1.08	1.19	1.24	1.08	0.81	0.84	1.15	0.84	0.90

TABLE 3. Composition of harvest by species (percentage of total harvest) from contact creel surveys on Lake Mead, 2004-2014.

Species	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Black bass	1.0	0.6	0.5	0.2	0.3	0.7	0.4	1.0	0.6	3.5	1.7
Bluegill	0.03	0.2	0.1	0.1	0.1	0	0	0.8	0.5	0.3	0
Black crappie	0	0	0	0	0	0	0	0	0	0.2	0
Channel catfish	5.9	5.2	4.1	2.4	3.5	3.0	5.9	7.7	3.5	4.6	2.2
Rainbow trout	1.3	0.4	1.6	4.3	2.2	7.3	12.0	3.1	0	0	0
Striped bass	91.8	93.6	93.7	92.9	94.0	88.9	81.6	87.4	95.2	91.4	95.6

TABLE 4. Lake Mead angler effort by species or preference (percent of total angler use) from contact creel surveys, 2004-2014.

Species	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Largemouth bass	23.4	16.6	16.9	6.1	5.4	8.0	5.1	8.7	11.2	14.8	21.0
Bluegill	0.1	0.1	0	0	0	0	0	0	0	0	0
Black crappie	0	0.2	0	0	0	0	0	0	0	0	0
Channel catfish	1.0	0.7	0.8	0.6	0.7	1.1	1.0	1.8	0.75	1.8	1.7
Rainbow trout	1.2	1.0	2.1	5.4	5.9	7.0	11.1	3.9	0	0	0
Striped bass	63.6	69.2	65.4	84.2	85.1	75.2	75.8	78.7	84.8	80.2	66.0
Multiple or any	10.7	12.4	14.8	3.6	2.8	8.7	7.0	6.6	3.0	2.9	9.6

The percent of observed harvest for black bass decreased this year to 1.7% compared to 3.5% of the total harvest last year (Table 3). Observed harvest represents only a portion of angler use on Lake Mead for black bass because of the catch-and-release nature of this fishery, with 94.1% of black bass captured released back to the

lake. Preference anglers for largemouth bass continued to grow to 21% of all anglers in 2014 (Table 4). Smallmouth bass harvest and angler preference are combined with largemouth bass data. Channel catfish was the second most harvested fish in 2014, at a rate of 2.2% of the total harvest (Table 3). Interest for catfishing was nearly unchanged from last year at 1.7% of the surveyed angling effort (Table 4). No bluegill or black crappie were reported in this year's creel survey.

In 2014, the percentage of out-of-state anglers increased to just over 27% of the anglers surveyed. Anglers from Nevada made up 72.7%, California 2.2%, Arizona 3.9%, and anglers from other states or countries made up 21.2% of the use at Lake Mead. This is the largest percentage of out-of-state anglers since 1985 when they made up 31.6% of anglers surveyed (Table 6).

TABLE 5. Striped bass average lengths, weights, and condition factor (K_{FL}) from 2014 monthly creel survey samples Lake Mead.

Month	*n*	Average total length		Average weight		K_{FL}	K_{FL} %<1.0
		in	mm	lb	g		
March	40	16.4	416.7	1.99	903.3	1.3	20.0
April	30	14.0	355.3	1.2	537.9	1.1	13.3
May	72	15.8	401.7	1.8	807.1	1.1	16.7
June	27	16.9	428.1	1.9	849.6	1.1	25.9
July	93	15.4	391.7	1.5	668.2	1.1	22.6
August	36	14.4	365.4	1.2	555.3	1.1	11.1
September	47	15.2	386.6	1.6	735.3	1.2	2.1
October	47	14.3	362.6	1.4	618.1	1.2	8.5
November	50	15.1	383.52	1.6	708.4	1.2	2.0
December	4	15.7	398.25	1.7	782.5	1.2	0.0
Average		15.3	389.0	1.6	716.6	1.1	12.2
Total	446						

TABLE 6. Angler origin by state of residence (percentage of total angler use) from contact creel surveys on Lake Mead, 2004-2014.

State	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Nevada	85.3	75.9	74.2	78.5	75.5	86.0	88.6	84.8	87.0	77.6	72.7
California	2.3	3.7	6.6	3.0	3.4	2.1	1.1	2.3	1.4	1.4	2.2
Arizona	0.3	1.7	2.1	0.6	1.4	0.6	0.1	0.2	0.6	1.8	3.9
Other	12.2	18.7	17.0	17.9	19.5	11.3	10.2	12.7	11.0	19.2	21.2

The Mail-in Angler Questionnaire Survey is another source of data that is used to track trends in angler use and fishing success. Angler use at Lake Mead was highest in the late 1990s with nearly 43,000 anglers/year. According to the questionnaire data, angler use at Lake Mead has been declining since 2000. Data for 2013 shows that use dropped to less than 12,000 anglers/year with anglers catching 262,000 fish (Figure 1),

yet fishing success is comparable to historic years with anglers catching close to the average of 3.1 fish/day (Figure 2). This was less than 3.9 fish/angler observed in 2013.

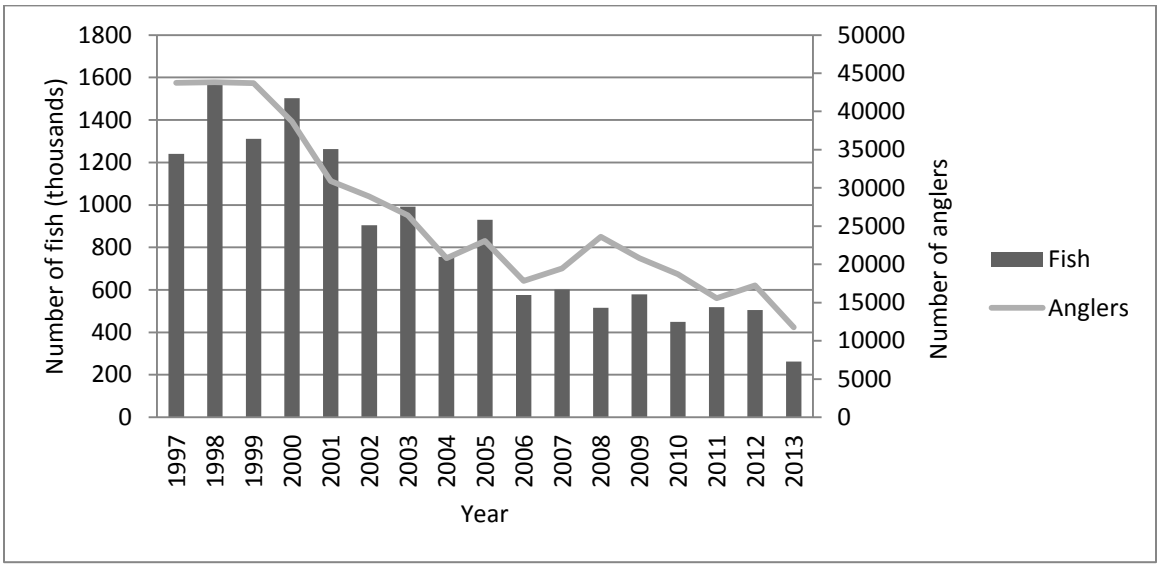

FIGURE 1. Expanded number of anglers and fish caught from the mail-in angler questionnaire data for Lake Mead, 1997-2013.

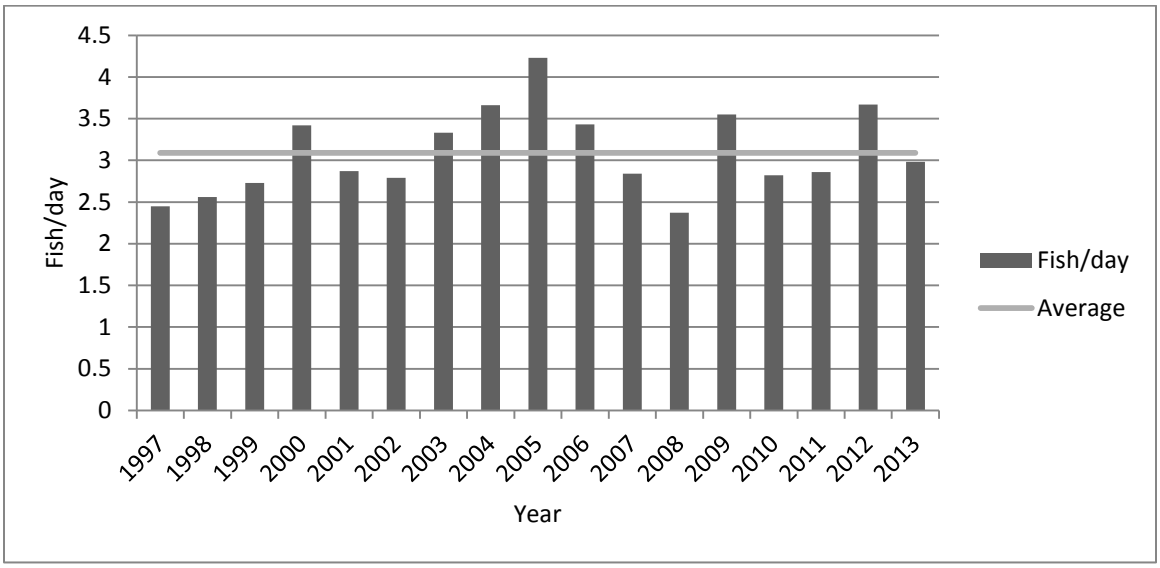

FIGURE 2. Expanded number of fish/day data from the mail-in angler questionnaire data for Lake Mead, 1997-2013.

Black Bass Tournament Monitoring

Seven black bass tournaments were attended to collect information on species composition (largemouth or smallmouth bass), length, and weight for investigating trends in the black bass fishery. Sampling occurred from a portion of the total catch, 65 largemouth bass and 113 smallmouth bass were measured. Largemouth bass

averaged 16.5 in (419 mm) TL and weighed an average of 2.1 lbs (953 g) with a W_r of 85.2. Largemouth bass condition dropped sharply over 2012 and 2013 (Figure 3), despite an excellent shad production year. Lake level declines and the reduction of aquatic vegetation were likely reasons for this decrease. Smallmouth bass averaged 15.6 in (396 mm) TL and weighed an average of 1.8 lbs (820 g) with a W_r of 83.6. Smallmouth bass condition also declined from that observed in previous years, though the drop was not as severe as that observed in largemouth bass (Figure 3). The presence of smallmouth bass in the tournament catch remained similar to last year at 32.8%.

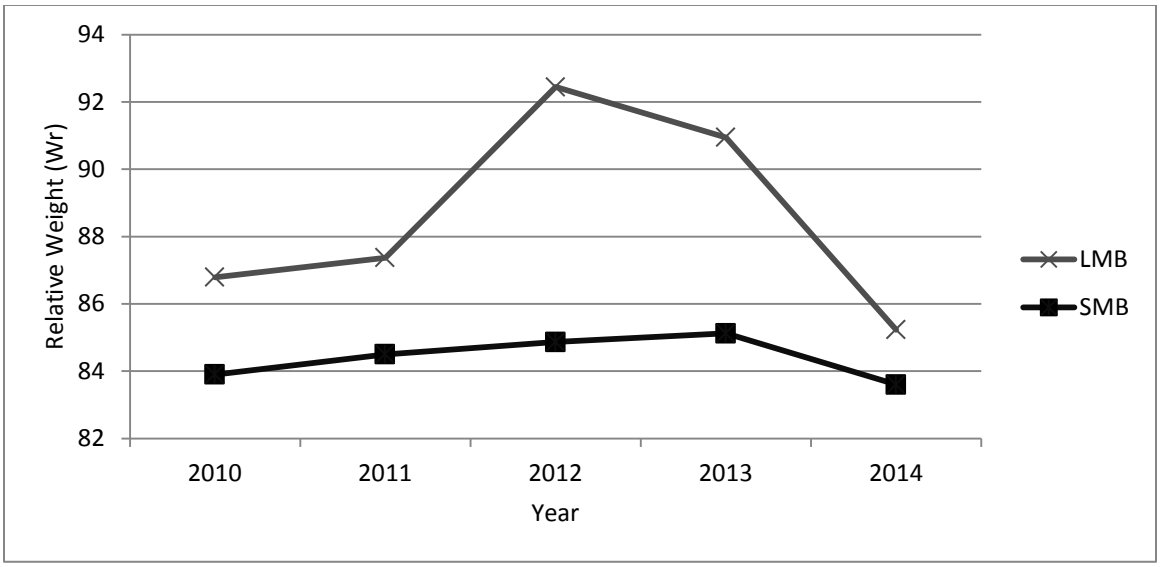

FIGURE 3. Black bass condition (relative weight) for largemouth bass (LMB) and smallmouth bass (SMB) from tournament catch data on Lake Mead, 2010-2014.

Summer Dive Surveys

Dive surveys were completed from June 20 to August 13, 2014. Each transect duration averaged 24 minutes (min)/diver. From the 20 transects surveyed, 1,134 black bass of different ages were observed, of which 501 were largemouth bass and 633 were smallmouth bass. Historically, dive surveys started in July, but counts in 2014 initialized in June (Figure 4) eliminating any direct comparisons with past years. Figure 4 includes data collected in June, but Figure 5 does not. The two figures show that the attrition rate for black bass is high, especially in 2014 brought on by the lack of aquatic or inundated shoreline vegetative cover to protect juveniles. Largemouth bass had higher attrition rates with 53% fewer fingerling observations compared to 31% fewer smallmouth bass fingerling observations from July – August (Figure 5).

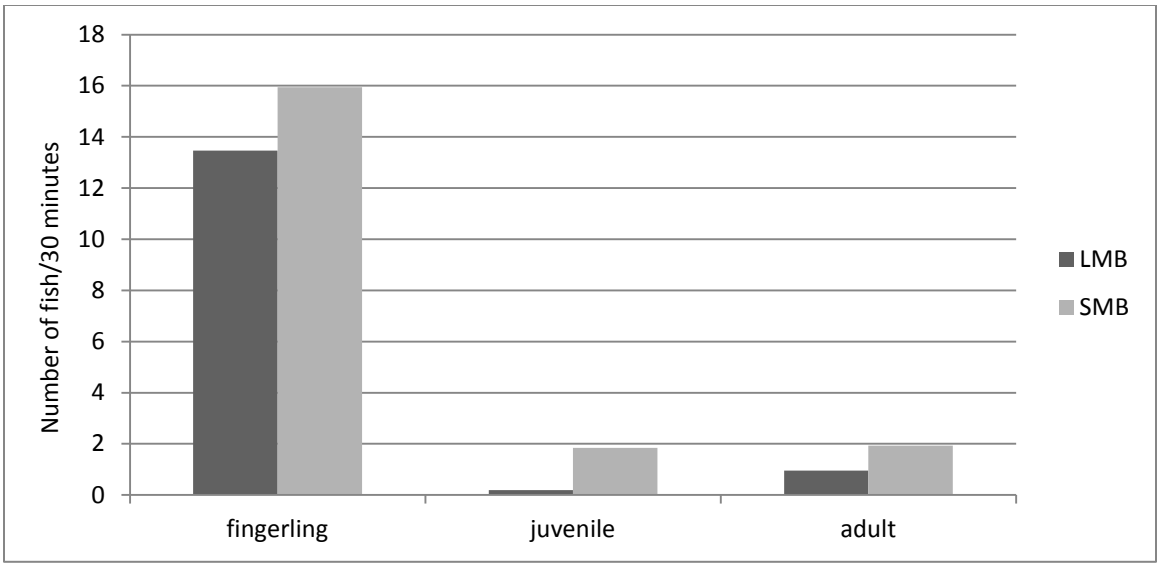

FIGURE 4. Count data from black bass snorkel surveys on Lake Mead, June – August, 2014. Note: LMB = largemouth bass, SMB = smallmouth bass.

Using July – August data (Figure 5), fingerling smallmouth bass were observed (11 fish/30 min) almost twice as much as largemouth bass (6 fish/30 min) (Figure 5). Similarly, juvenile and adult smallmouth bass observations were more than double the largemouth bass observations. Juvenile smallmouth bass were observed at a rate of 1.6 fish/30 min, while largemouth bass were only observed at 0.14 fish/30 min. Adult smallmouth bass were observed at a rate of 1.72 fish/30 min, while adult largemouth bass were observed at 0.59 fish/30 min.

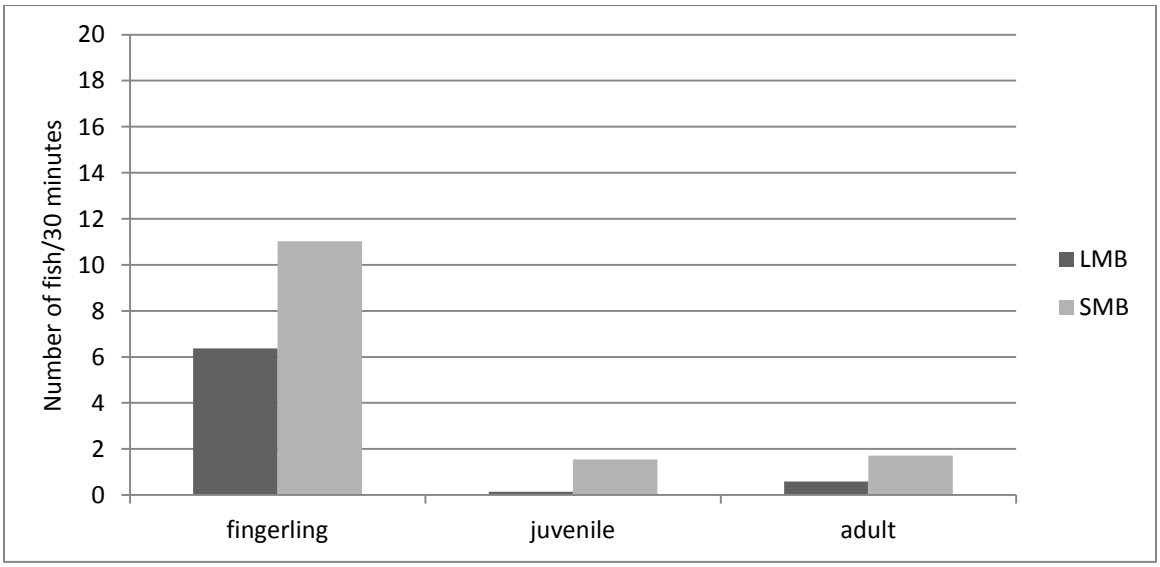

FIGURE 5. Count data from black bass snorkel surveys on Lake Mead, July – August, 2014. Note: LMB = largemouth bass, SMB = smallmouth bass.

Compared to last year, largemouth bass fingerling observations were only slightly elevated, but were still considered to be quite low given what occurred during peak years in 2009 and 2011 where the observed rate was over 30 fish/30 min. Smallmouth bass thrived in 2014 with numbers nearly tripling those in 2013. This was the first year where smallmouth bass YOY counts have been greater than largemouth bass counts (Figure 6).

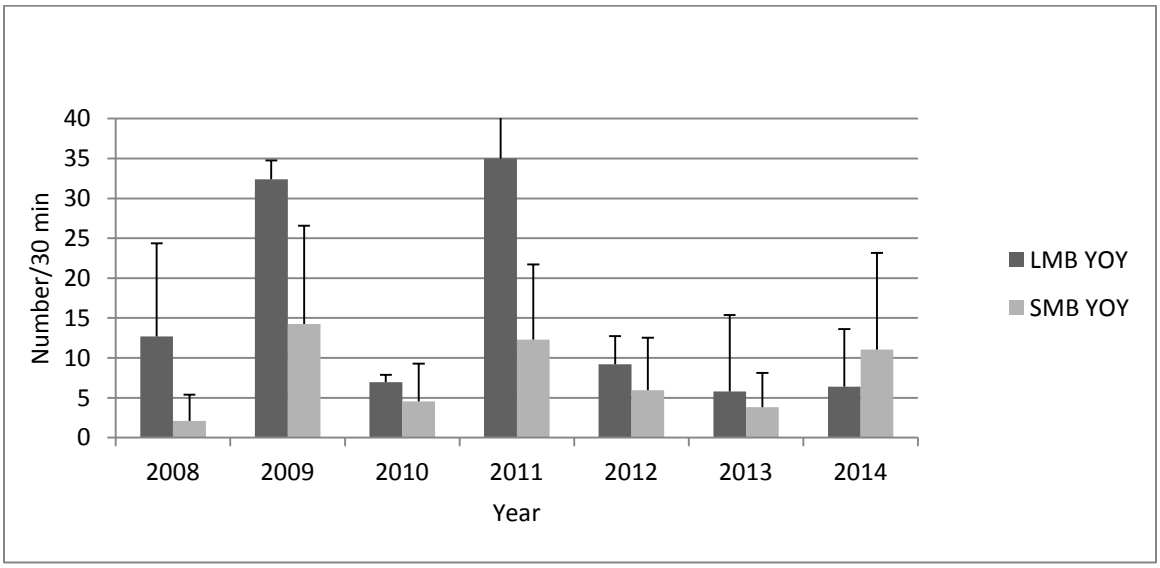

FIGURE 6. Black bass YOY count rates from snorkel surveys on Lake Mead, 2008-2014.

Electroshocking Surveys

The electroshocking survey was conducted from October 2-29 in conjunction with the gill net survey. A total of 37 electroshocking sites were sampled (17 were sampled by NDOW) for 555 min of effort and a yield of 2,510 fish from 14 species for a catch rate of 67.8 fish/15 min. Green sunfish and bluegill were the most numerous species followed by threadfin shad and striped bass (Table 7).

Striped bass YOY CPUE increased this year to 3.24 fish/15 min. This increase comes after two years of a CPUE less than one fish per 15 min effort (Figure 7). While this is an increase over previous years, striped bass YOY abundance has been depressed since 2009 for reasons unknown (Figure 7). Smallmouth bass and channel catfish CPUE increased in 2014, while largemouth bass declined from what was caught in 2013 (Figure 7, Table 8).

TABLE 7. Summary catch data by species from the 2014 fall electroshocking survey on Lake Mead.

Species	# of fish	CPUE (#fish/15 min)	Composition (% of catch)	Average total length		Average weight	
				in	mm	lbs	g
Black crappie	3	0.08	0.1	3.9	99	0.03	13
Blue tilapia[a]	24	0.65	1.0	5.1	129	0.12	54
Bluegill	512	13.84	20.4	2.9	73	0.002	9
Bullhead catfish[b]	1	0.03	0.0	2.8	70	0.004	2
Common carp	53	1.43	2.1	23.2	589	6.47	2,933
Channel catfish	41	1.11	1.6	5.2	131	0.25	114
Gizzard shad	101	2.73	4.0	8.3	210	0.55	251
Green sunfish	1,210	32.70	48.2	2.6	66	0.01	5
Largemouth bass	104	2.81	4.1	5.4	137	0.21	93
Rainbow trout	1	0.03	0.0	11.2	285	0.27	124
Red shiner[c]	14	0.38	0.6	2.1	53	0.004	2
Smallmouth bass	99	2.68	3.9	4.2	106	0.04	16
Striped bass	120	3.24	4.8	3.9	100	0.02 (	11
Threadfin shad	227	6.14	9.0	3.0	75	0.01	5
Totals	2,510	67.8	100				

[a]*Oreochromis aureus*
[b]*Ameiurus* sp.
[c]*Cyprinella lutrensis*

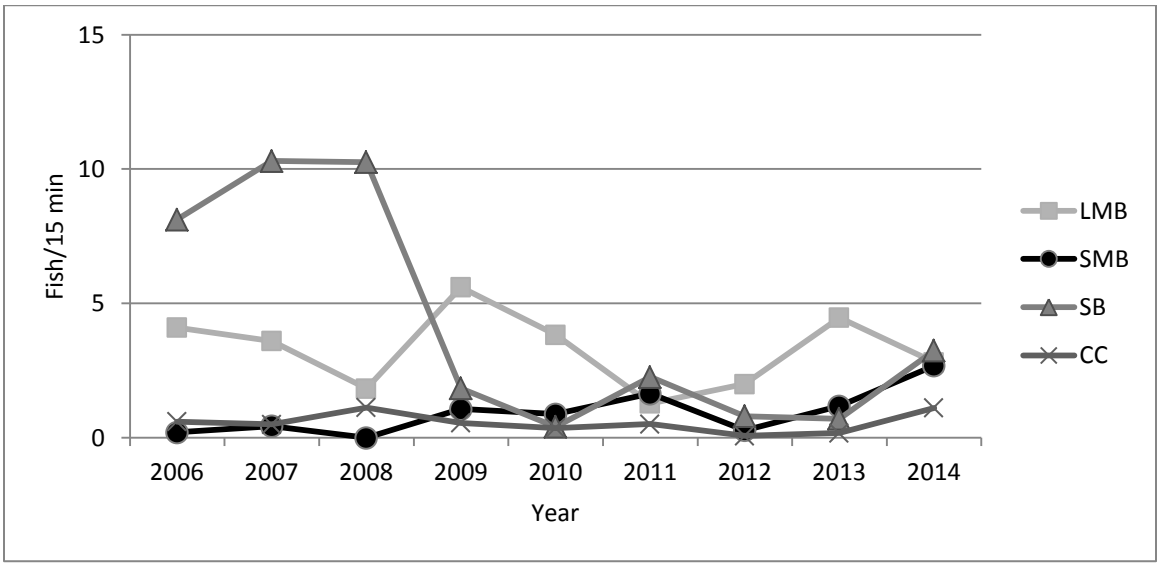

FIGURE 7. Largemouth bass (LMB), smallmouth bass (SMB), striped bass (SB), and channel catfish CPUE from fall electroshocking surveys on Lake Mead, 2006-2014.

TABLE 8. Catch rates of all species captured during electroshocking surveys on Lake Mead, 2009-2014.

Species	Year					
	2009	2010	2011	2012	2013	2014
Black crappie	0	0	0.3	0	0.06	0.08
Blue tilapia	0.99	0.57	0.1	0.07	0.32	0.65
Bluegill sunfish	7.00	11.58	2.77	20.2	23.44	13.84
Bullhead catfish	0	0.05	0	0.03	0.09	0.03
Common carp	1.18	1.03	0.36	1.3	1.91	1.43
Channel catfish	0.55	0.36	0.51	0.07	0.18	1.11
Gizzard shad	1.92	1.96	0.62	0.24	2.64	2.73
Green sunfish	15.47	13.81	7.6	7.1	13.78	32.70
Largemouth bass	5.60	3.83	1.28	2.0	4.47	2.81
Red shiner	0.66	1.55	0	0.17	0.15	0.38
Smallmouth bass	1.07	0.98	1.64	0.28	1.18	2.68
Striped bass	1.84	0.41	2.26	0.8	0.71	3.24
Threadfin shad	0.07	3.62	1.18	2.49	3.53	6.14
Mosquitofish[a]	---	---	---	---	0.06	---
Totals	36.35	39.66	18.43	34.8	52.5	67.8

[a]*Gambusia affinis*

Gill Net Survey

The annual fall gill net survey was conducted October 1-21. Random sites were selected by AZGFD. A total of 98 nets were set for an average of 18.8 hrs each, totaling 152.6 net-nights of effort (NDOW set 48 nets). A total of 2,251 fish were captured for a catch rate of 14.75 fish/net-night (Table 9). The most numerous fish captured was gizzard shad at 62.7% of the catch, followed by striped bass (8.5%), common carp (7.6%), channel catfish (6.6%) and smallmouth bass (6%) (Table 9).

Striped bass captured in 2014 averaged 13.5 in (342 mm) TL and weighed one pound (472 g). Compared to 2013, total length decreased by 1.1 in (30 mm) (Figure 8) and weight decreased by 0.06 lbs. Striped bass were in good condition with K_{FL} factors averaging 1.2 (Table 10), with only 4% in poor condition at less than 1.0 K_{FL}. Striped bass condition observed from the 2014 October gill-net survey was consistent with the condition factor from the creel survey of the same time (Table 3). By basin, striped bass in Boulder Basin showed the best condition, followed by Virgin Basin and Overton Arm. Striped bass in Gregg Basin had the lowest condition factor, with the highest percentage of fish in poor condition (Table 10).

TABLE 9. Summary of catch data from the 2014 fall Lake Mead gill net survey.

Species	*n*	Fish/net-night	Composition (% of catch)	Average total length		Average weight		Percent biomass
				in	mm	lbs	g	
Black crappie	6	0.04	0.3	9.3	237	0.7	304	0.10
Blue tilapia	33	0.22	1.5	7.7	196	0.4	157	0.34
Bluegill	6	0.04	0.3	3.4	87	0.1	23	0.01
Bullhead catfish	6	0.04	0.3	11.5	291	0.7	330	0.14
Carp	172	1.13	7.6	18.6	473	3.9	1,761	20.57
Channel catfish	149	0.98	6.6	17.3	440	1.8	798	8.12
Gizzard shad	1,411	9.25	62.7	13.5	342	1.3	598	57.22
Green sunfish	7	0.05	0.3	6.6	167	0.2	101	0.05
Largemouth bass	87	0.57	3.9	11.3	287	0.8	355	2.06
Northern walleye[a]	2	0.01	0.09	15.8	401	1.9	863	0.12
Plecostomus[b]	1	0.01	0.04	19.4	494	2.4	1,100	0.08
Razorback sucker[c]	9	0.06	0.4	22.1	561	4.5	2,033	1.25
Smallmouth bass	136	0.89	6.0	12.0	305	0.9	411	3.79
Striped bass	191	1.25	8.5	13.5	342	1.0	472	6.09
Threadfin shad	35	0.23	1.6	5.6	141	0.06	29	0.06
Totals	2,251	14.75	100.0					100.0

[a]*Sander vitreus*
[b]*Hypostomus plecostomus*
[c]*Xyrauchen texanus*

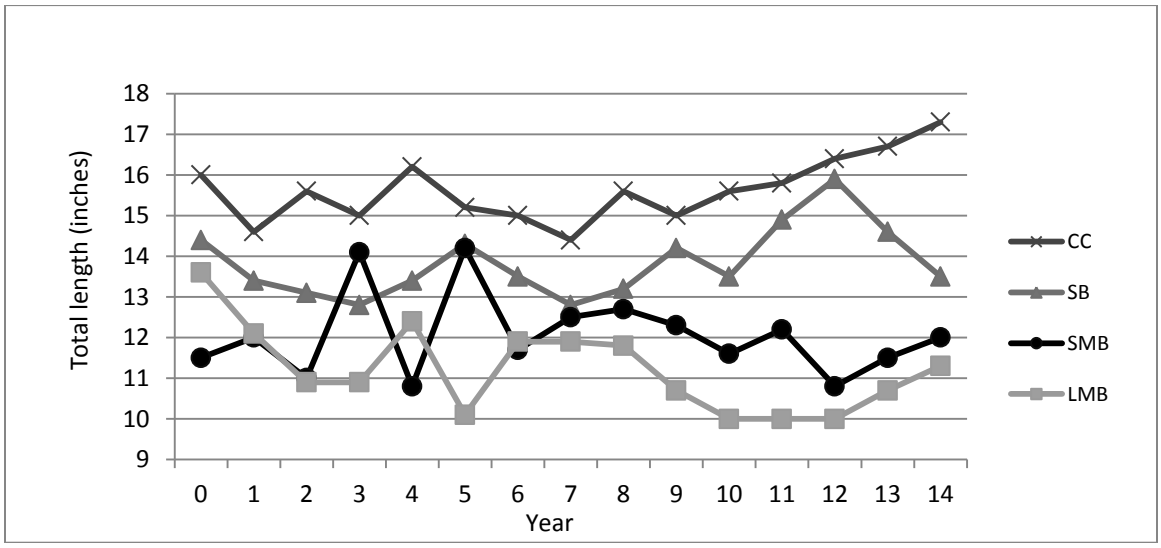

FIGURE 8. Mean total length for channel catfish (CC), striped bass (SB), smallmouth bass (SMB), and largemouth bass (LMB) captured during fall gill net surveys on Lake Mead, 2000-2014.

TABLE 10. Average condition (relative weight [*Wr*] and Fulton's K_{FL}) of sport fish captured during 2014 gill-net surveys on Lake Mead.

	Wr				K_{FL}	
Basin	Largemouth bass	Smallmouth bass	Channel catfish	Striped bass	Striped bass	Striped bass % in poor condition
Boulder Basin	79.8	84.1	87.2	82.4	1.27	0
Overton Arm	83.5	88.8	80.9	79.8	1.21	10.9
Virgin Basin	90.3	86.9	86.9	79.4	1.22	6.7
Greggs Basin	84.6	82.3	88.3	72.3	1.11	19.1
Overall	86.5	86.2	84.8	78.9	1.21	8.6

Striped bass abundance varied by basin. Striped bass was most abundant in Boulder Basin (which includes Las Vegas Bay) followed by Overton Arm, Gregg Basin, and Virgin Basin (Table 11). Black bass also varied in abundance by basin. The CPUE was highest for largemouth bass in Gregg Basin followed by Overton Arm, Virgin Basin, and Boulder Basin, while smallmouth bass were most abundant in Boulder Basin followed by Overton Arm, Virgin Basin, and Gregg Basin. Channel catfish was more abundant in Overton Arm followed by Boulder, Gregg, and Virgin basins. Of the four basins, Boulder Basin had the highest abundance for total sport fish followed by Overton Arm, Gregg Basin, and Virgin Basin (Table 11).

TABLE 11. Sport fish CPUE (fish/net-night) by basin from the fall 2014 gill net survey on Lake Mead.

Species	Basin			
	Boulder	Overton Arm	Virgin	Gregg
Largemouth bass	0.22	0.47	0.43	1.2
Smallmouth bass	1.8	0.75	0.66	0.38
Striped bass	2	1.4	0.36	1.4
Channel catfish	0.79	1.5	0.47	0.75
Total CPUE (fish/net-night)	4.81	4.12	1.92	3.73

Largemouth bass CPUE dropped to 0.57 fish/net-night compared to 0.97 fish/net night observed in 2013 (Table 12, Figure 9). Mean TL increased to 11.3 in (287 mm) (Figure 8). Largemouth bass body condition was considered to be average, though it decreased from 2013 with a W_r of 86.5 (Table 10). This year, largemouth bass showed the best condition in Virgin Basin (Table 10). Smallmouth bass CPUE increased to 0.89 fish/net-night (Table 9) and total length increased just slightly to an average of 12.0 in (305 mm) (Table 9, Figure 8). The average smallmouth bass W_r was 86.2, with the best-conditioned smallmouth bass located in the Overton Arm with a W_r of 88.8 (Table 10).

Channel catfish CPUE at 0.98 fish/net-night showed a slight increase compared to last year (Table 9). The total length averaged 17.3 in (439 mm), continuing the yearly

trend of increasing length since 2009 (Figure 8). Channel catfish body conditions ranged from average to good, but the average W_r was 84.8, a small decrease from 2013. Gregg and Boulder basins showed the most robust catfish with a W_r of 88.3 and 87.2, respectively (Table 10).

TABLE 12. Average CPUE (fish/net-night) for each species captured during fall gill-net surveys on Lake Mead, 2004-2014.

Species	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Black crappie	0	0	0.01	0.01	0.02	0.13	0.01	0.08	0	0.1	0.04
Blue tilapia	0.06	0.70	0.19	0.31	0.25	0.83	0.20	0.32	0.55	0.34	0.22
Bluegill Sunfish	0.02	0.11	0	0	0.06	0.09	0.02	0.04	0.10	0.06	0.04
Bullhead catfish	0	0.01	0.01	0	0	0.01	0.4	0.21	0.06	0.06	0.04
Carp	1.47	1.13	1.93	1.2	1.76	1.30	1.42	0.98	1.64	0.95	1.13
Channel catfish	0.76	0.88	0.79	0.72	0.82	1.11	1.37	1.20	0.75	0.70	1.98
Flannelmouth sucker	0	0	0.01	0	0	0	0.01	0	0.04	0.06	0
Gizzard shad	0	0	0	0.08	0.73	5.17	11.25	8.29	7.03	9.57	9.24
Green Sunfish	0.07	0.05	0.04	0.02	0.05	0.06	0.17	0.05	0.13	0.07	0.05
Largemouth bass	0.58	0.82	0.56	0.47	0.43	0.60	0.76	1.05	1.07	0.97	0.57
Northern walleye[a]	0	0	0	0	0	0	0	0	0	0	0.01
Rainbow trout	0	0	0	0	0	0	0	0	0	0	0
Razorback sucker	0.02	0	0	0	0.02	0.03	0.04	0.01	0.03	0.02	0.06
Smallmouth bass	0.02	0.06	0.14	0.14	0.28	0.29	0.80	0.60	0.59	0.67	0.89
Striped bass	3.97	2.11	2.55	2.08	1.69	1.65	1.90	1.48	1.38	1.58	1.25
Threadfin shad	0.82	0.25	1.05	1.47	0.78	0.98	1.51	0.43	0.33	0.39	0.23

Gizzard shad became well established in Lake Mead reaching a maximum CPUE of 11.25 fish/net-night in 2010. It has since maintained a relatively high abundance and is the most numerous fish caught from the gill net survey. In 2014, the CPUE was similar to 2013 at 9.24 fish/net-night (Figure 10). The population size structure tends to be bimodal with YOY fish under 10 in (254 mm) TL and adult fish over 12 in (305 mm) TL (Figure 11). In 2010, the population distribution was evenly split between YOY and adult fish. Since that time the population has shifted to more adult fish. The trend continues in 2014 with more adult gizzard shad in the sample (Figure 11).

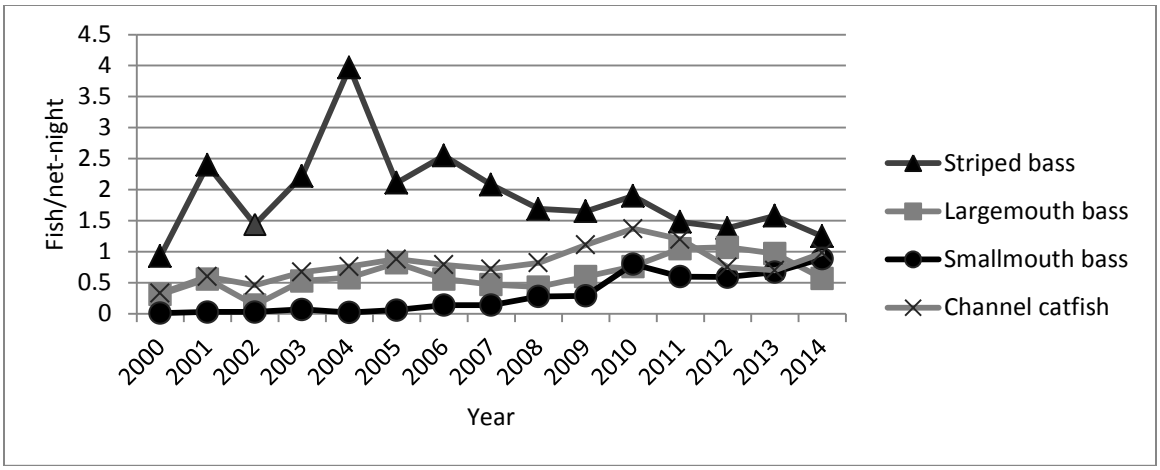

FIGURE 9. CPUE (fish/net-night) for striped bass, largemouth bass, smallmouth bass, and channel catfish from fall gill-net surveys on Lake Mead, 2000-2014.

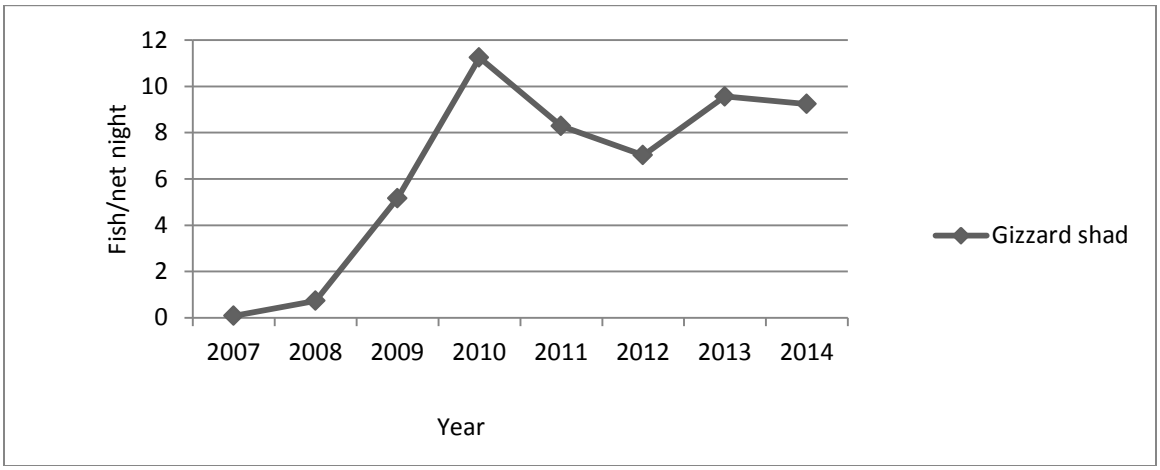

FIGURE 10. Gizzard shad CPUE (fish/net-night) from fall gill-net surveys on Lake Mead, 2007-2014.

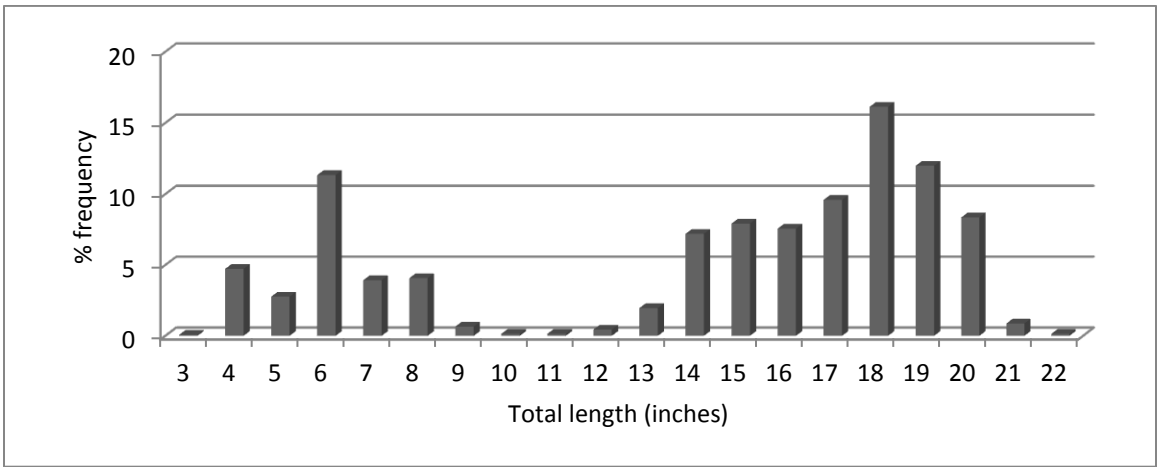

FIGURE 11. Gizzard shad length frequency distribution data from the 2014 fall gill-net survey on Lake Mead.

Two walleye were captured during the gill net survey for a CPUE of 0.01 fish/net-night (Table 9). One walleye was caught at Detrital Reef in the Virgin Basin measuring 20.3 in (516 mm) TL and weighing 3.3 lbs (1500 g) and the other walleye was caught at Smith Bay in Gregg Basin. It measured 11.2 in (285 mm) TL and weighed 0.5 lb (226 g). Walleye have not been captured in the fall gill net survey since 2001 when a walleye measuring 11.9 in (302 mm) TL, weighing 0.5 lb (230 g) was caught at North Bay located in Gregg Basin.

Native razorback sucker is another rare species found in Lake Mead. This year, nine razorback suckers were caught for a CPUE of 0.06 fish/net-night. They averaged 22.1 in (561 mm) TL and weighed an average of 4.5 lbs (2,033 g) (Table 9). This was the highest CPUE recorded from fall gill netting (Figure 12). Of the nine fish that were captured, six were not scanned for a passive integrated transponder (PIT) tag because one boat did not have a scanner. Of the three that were scanned, two were new fish and one was a recapture.

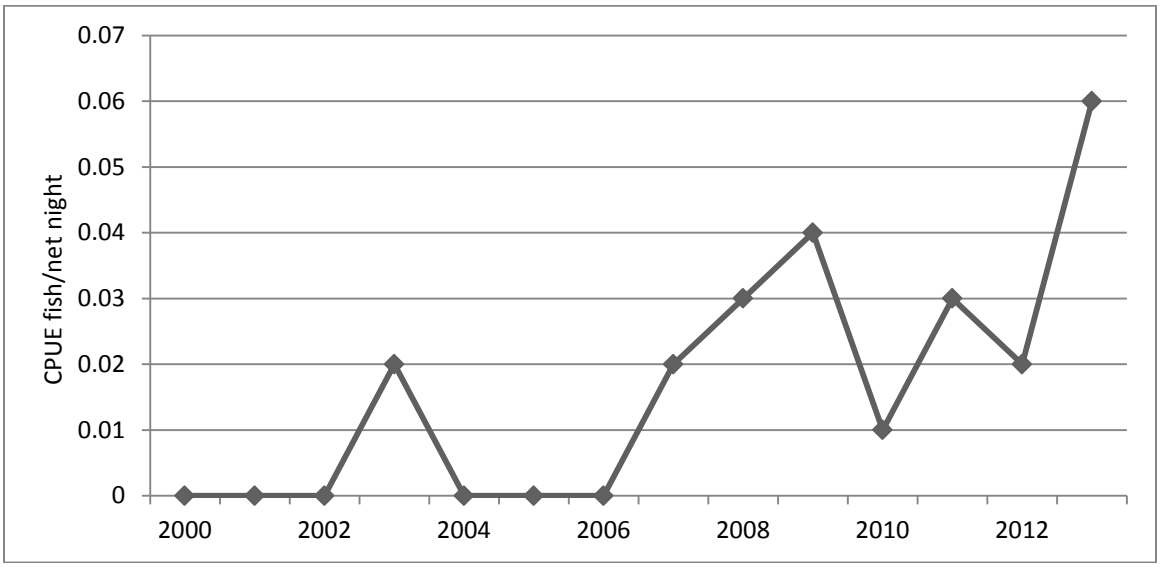

FIGURE 12. Razorback sucker CPUE (fish/net-night) from fall gill-net surveys on Lake Mead, 2000-2014.

Prey Base Studies

Threadfin shad reproductive success was monitored from May 1 through July 23. A total of 47 standard transects were trawled in the Overton Arm and the Boulder Basin (including Las Vegas Bay). The 2014 lake-wide larval shad production estimate (peak value) on Lake Mead was above average at 93 fish/3,531 ft^3 (100 m^3) (10-year average is 74 fish/3,531 ft^3 [100 m^3]) (Figure 13, Table 13). This year, Boulder Basin showed a peak production year at 129 shad/3,531 ft^3 (100 m^3), while Overton Arm was average at 58 shad/3,531 ft^3 (100 m^3) (Table 13).

Larvae collected from Las Vegas Bay consisted of both large and small sizes of both threadfin and gizzard shad species. The average length collected from Las Vegas

Bay was 21 mm with some large ones measuring 26-65 mm in length. Usually larval shad collected are too small to be identified to species without the use of a microscope to count myomeres. This year, fin rays were counted on some of the larger shad to determine that both species of shad were present. The Overton Arm samples, though, consisted of only typical small-sized larval shad with an average length of 16 mm. These were too small to identify to species.

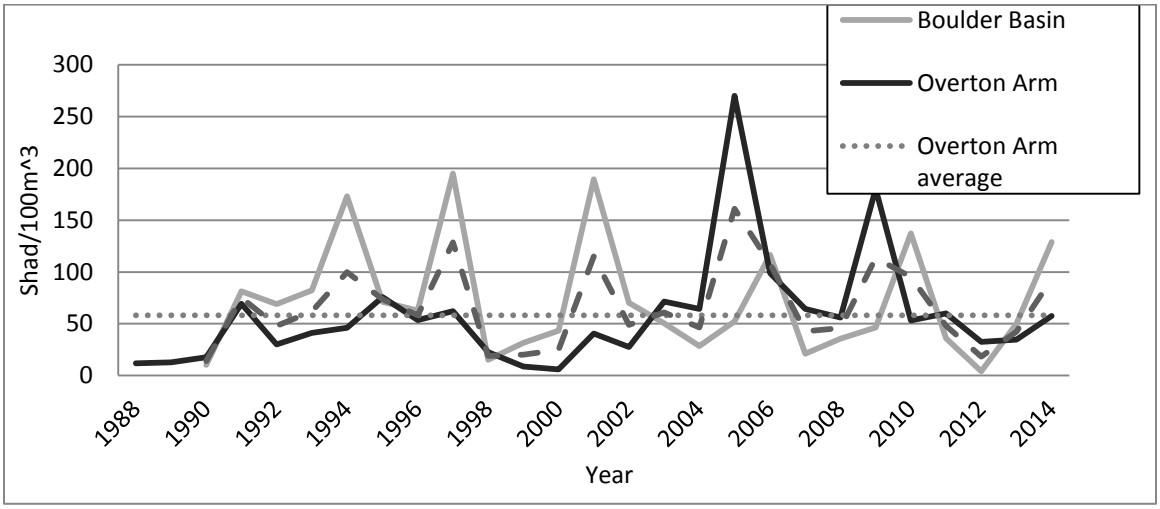

FIGURE 13. Shad densities from trawl surveys during peak production periods, 1988-2014.

TABLE 13. Lake Mead average peak shad production from trawl surveys, 2005-2014.

Year	Overton Arm stations						Boulder Basin stations				Lake mean
	M-1	F-1	F-2	F-3	F-4	Overton Arm Mean	ILVB	MLVB	BB	Boulder Basin Mean	
2005	218	333	265	290	244	270	75	56	26	52.3	161.2
2006	17.4	59.5	132.8	145.1	140.7	99.1	238.3	89.4	22.4	116.7	107.9
2007	24.3	83.2	131.8	66.6	15.7	64.3	25.9	31.7	5.9	21.1	42.7
2008	Dry	6.3	38.8	83.9	95.2	56.1	44.2	56.4	5.9	35.5	45.8
2009	Dry	199.3	294.5	119.8	107.7	180.3	83.7	38.0	17.8	46.5	113.4
2010	Dry	0.9	131.2	48.0	32.4	58.1	118.5	281.4	12.0	137.3	95.2
2011	Dry	36.7	64.9	76.9	61.5	60.0	11.7	83.1	13.2	36.0	48.0
2012	Dry	2.9	56.6	44.6	25.8	32.5	2.0	8.5	1.6	4.1	18.3
2013	Dry	2.0	33.5	42.0	62.0	34.9	73.4	68.6	5.4	49.1	42.4
2014	Dry	34.1	118.4	38.9	38.8	57.6	187.2	174.9	24.5	128.9	93.2

Artificial Habitat Development and Site Selection

Two types of artificial fish habitat structures were considered in 2014. One type was PVC (polyvinyl chloride) cube structure that has been used in Lake Mohave (Figures 14 and 15). The other was a reclaimed PVC siding product called Fishiding (Figure 16). The three-cube structures were built with three 5 ft X 5 ft (1.5 m X 1.5 m) cubes making a structure having dimensions of 14.1 ft (4.3 m) long by 10.6 ft (3.2 m) high by 5 ft (1.5 m) in width. A four-cube structure was made with the same sized cubes, but increasing the structure dimensions to 15 ft (4.6 m) long, 10 ft (3 m) high, by

5 ft (1.5 m) in width. These structures were wrapped with snow fence, and PVC lattice attached to the sides to provide additional cover and structure for fish.

The reclaimed siding structures were constructed in various heights and widths, with the tallest being 4 ft (1.2 m) high and the widest of approximately 6–7 ft (1.8-2.1 m) when fully opened. The initial Fishiding materials were purchased (Fishiding.com) and 14 structures were assembled. These were made by cutting 8 in (20.3) diameter Corex drain pipe into approximately 8 in (20.3 cm) sections to form a "pot." Prepared cement was then added along with the siding material and allowed to cure before shaping (Figure 16). Additional PVC cube and Fishiding structures will be constructed and deployed in 2015 and tested for their ability to attract fish and their ability to be moved.

Using a boat-mounted depth finder, three potential artificial habitat sites were surveyed for adequate depth contours. Because of current drought conditions and fluctuating lake elevations at Lake Mead, installed habitat may need to be periodically moved, therefore, suitable coves need to accommodate movement of structures. The ideal sites will have gradual depth contours from 25-50 ft (7.5-15 m) or more. Three potential sites were located in Boulder Basin and include: Boulder Beach (area between the Handicap fishing dock and the Hemenway Launch Ramp), Lover's Cove, and Finger/Fire Bowl Cove area (Figure 17). Razorback suckers are not known to inhabit these sites.

Boulder Beach

Boulder Beach was chosen because of its close proximity to angler access and its popularity for shore fishing. This site has a large area with 20-30 ft (6-9 m) depth contours gradually sloping to depths of 50 ft (15 m) and more.

Finger/Fire Bowl Cove

This cove is located southeast of Callville Bay and is sometimes where tournament caught black bass are liberated from live-release boats. When surveyed, there was a satisfactory amount of 30 ft (9 m) contour around the perimeter of the cove and with some areas having 40-50 ft (12-15 m) depths. The mid-channel running through the cove was 75 ft (23 m) at its deepest. There was adequate room to move habitat structures if needed.

Lovers Cove

Lovers Cove is located southwest of Callville Bay and is another location where tournament caught black bass are sometimes released. This cove had 30 ft (9 m) depth contours in two areas with other areas having depths greater than 50 ft (15 m). The center of Lovers Cove dropped off and exceeded 100 ft (30 m). Of the three surveyed coves, this cove was the least desirable. Next year, other potential sites in the Boulder Basin will be investigated, including but not limited to: Swallow Bay, Roadrunner Cove, and Crawdad Cove.

FIGURE 14. Three-cube PVC habitat structure.

FIGURE 15. Four-cube PVC habitat structure.

FIGURE 16. Reclaimed PVC (Fishiding) artificial habitat structure.

FIGURE 17. Satellite image of potential habitat sites for Lake Mead.

Striped Bass Fisheries Assessment

Harvested striped bass were slightly larger this year, averaging 15.3 in (389 mm) TL and 1.6 lbs (717 g) and an average condition factor of 1.14 K_{FL}. The condition factor drop from that observed in 2013 (1.04 K_{FL}). Of the 446 striped bass sampled (March through December) in creel surveys, only 12.2% had a condition factor less than 1.0 K_{FL} (a value considered to represent poor condition). Angling preference for striped bass

decreased to 66% of the total observed preference (down from 80.2% last year), while angling pressure for black bass and indiscriminate anglers increased. Harvest rates increased to 0.61 fish/hour and 3.9 fish/day (compared to 0.55 fish/hour and 3.4 fish/day in 2013) for successful striped bass preference anglers. Striped bass percent of total observed harvest has remained high at 95.6%.

In the fall gill net survey, 191 striped bass were caught. They averaged 13.5 in (342 mm) TL and weighed an average of one pound (472 g). Striped bass total length decreased by 1.1 in (28 mm) compared to 2013. The average condition factor of 1.21 K_{FL}, an increase from the 1.13 K_{FL} observed in 2013. CPUE decreased slightly from 1.58 in 2013 to 1.25 fish/net-night in 2014 (Table 12). Striped bass proportional stock density (PSD) showed the population was comprised mostly of small fish with less than 10% of the catchable-sized (≥13 in [330 mm]) striped bass being over 20 inches (Figure 18). The length frequency distribution also shows few striped bass over 20 in (508 mm), with an improved year class strength of 7-10 in (178-254 mm) fish over that observed in 2013 (Figure 19).

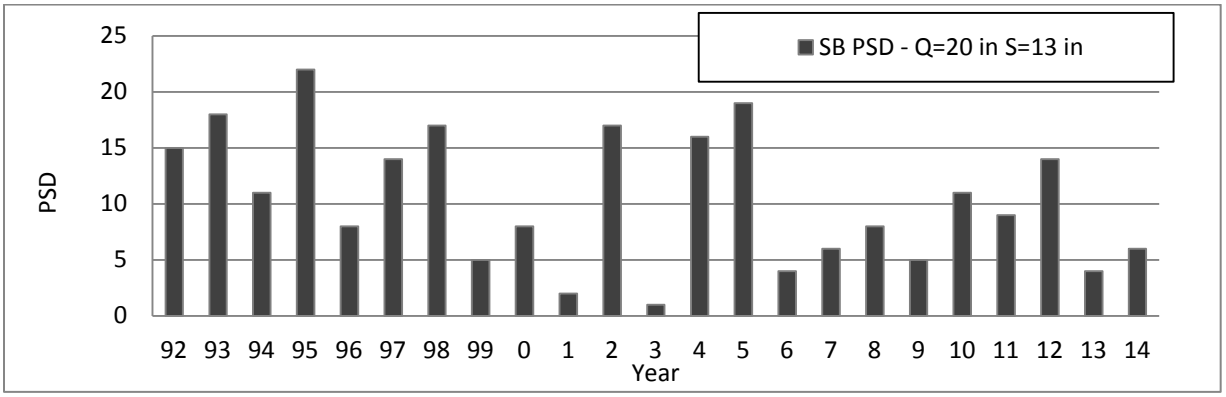

FIGURE 18. Striped bass proportional stock density (PSD) from Lake Mead gill-net surveys, 1992-2014.

In addition to NDOW surveys, striped bass data was volunteered from three striped bass tournaments held by the Nevada Striper Club on June 15, September 14, and December 14. Sampling for March was cancelled by the tournament director. A total of 158 striped bass were sampled, averaging 19.6 in (497 mm) TL and 2.5 lbs (1,133 g) (Table 14). There was little change in fish size compared to those sampled in 2013. The average condition factor K_{FL} increased to 1.11 from the K_{FL} of 1.04 observed in 2013, and was consistent with that found from harvested fish during the creel survey (K_{FL} =1.1).

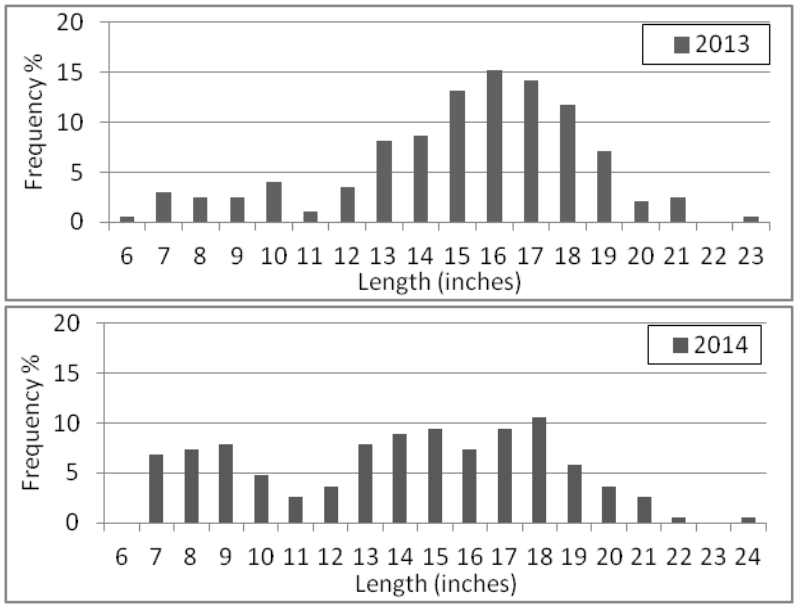

FIGURE 19. Striped bass length frequency distributions from fall gill-net surveys on Lake Mead. Note: 2013 on top and 2014 on bottom.

TABLE 14. Striped bass length, weight, and condition data from three fishing tournaments held on Lake Mead, 2014.

Date	*n*	Mean total length		Mean weight		K_{FL}	% in poor condition K_{FL}=<1.0
		in	mm	lbs	g		
6/15/2014		19.4	493	2.48	1,127	1.07	16
9/14/2014		19.9	505	2.49	1,127	1.08	12
12/14/2014		19.3	491	2.53	1,147	1.17	0
Overall Average		19.6	497	2.50	1,133	1.11	9.5

The analysis of stomach contents has been reduced to a cursory inspection noting only the major food items by season of occurrence. This provides a baseline for striped bass food habits by observing shifts in content composition or use of sub-standard prey items. Because the inspection occurs with tournament caught fish, there are inherent biases from much of the content reflecting what anglers used as bait. In June, anchovy (*Engraulidae*) was the highest ranking food item (after empty stomach), which reflected the type of bait used (Table 15). In September and December, shad was the highest ranking food item and was either due to type of bait used or actual diet intake. Shad is the preferred food for striped bass and with the 2014 shad production very high in Boulder Basin, striped bass prey selection (Table 15) and body condition reflected this (Table 14).

TABLE 15. Striped bass ranked stomach content by month from stomach content analysis of tournament caught striped bass in Lake Mead, 2014 .

	June		September		December		All months combined	
Item	number	rank	number	rank	number	rank	number	rank
Anchovy	20	2	0		0		20	4
Empty	21	1	21	1	35	1	77	1
Corn	5	4	0		0		5	6
Shad	3	6	17	2	7	2	27	2
Fish mass	8	3	12	3	6	3	26	3
Crayfish	4	5	1	4	2	4	7	5
Chicken parts	4	5	0		0		4	7
Clam	3	6	0		0		3	8
Fish scale	0		1	4	0		1	9
n	56		52		50		158	
Male/female	17/39		30/21		23/27		70/87	

Black Bass Fisheries Assessment:

The black bass fishery was monitored through a variety of survey methods including general creel information, spring or summer dive surveys, gill netting, electroshocking, and professional bass fishing tournaments. Data from creel surveys showed that harvest of largemouth bass dropped to 1.7% in 2014 from the total reported harvest. Observed harvest in 2013 was 3.5%. Most black bass anglers practice catch-and-release with 94% of captured fish returned to the lake. While black bass make up only a small portion of observed harvest, angling interest continued to grow in 2014 with 21% of anglers surveyed being preference black bass anglers. This was the third consecutive year where interest in black bass fishing was more than 10% of total angler preference.

Summer dive surveys showed a similar abundance of largemouth bass YOY and almost triple the number of smallmouth bass YOY compared to last year. Smallmouth bass appear to be doing well with lake elevation declines. The gill net survey showed that abundance of largemouth bass decreased, with CPUE dropping to 0.57 fish/net-night in 2014 compared to 0.97 fish/net-night in 2013. Smallmouth bass CPUE increased to 0.89 fish/net-night in 2014 from 0.67 observed in 2013. Similar trends were seen with the electroshocking survey where smallmouth bass were twice as abundant as last year, with a CPUE of 2.7 fish/15 min. Largemouth bass CPUE decreased to 2.81 from 4.47 fish/15 min observed last year.

Over the past 12 years, smallmouth bass have become well established in Lake Mead. Since 2009 they have made up at least at 30% of black bass fishing tournament catches. Samples taken from tournaments revealed largemouth bass averaged 16.5 in (419 mm) TL, with an average weight of 2.1 lbs (953 g) and a W_r of 85.2. Smallmouth bass averaged 15.6 in (396 mm) TL, with an average weight of 1.8 lbs (820 g) and a W_r

of 83.6. Both largemouth and smallmouth bass decreased in relative weight compared to last year, though largemouth bass decreased more than smallmouth bass. The tournament highlight of the year was a 9.77 lb (4,432 g) trophy largemouth bass measuring 23.25 in (591 mm) TL caught in April. The current Lake Mead record largemouth bass is 12 lbs (5,443 g), 26 in (660 mm) caught in 1999. Typically, most Lake Mead black bass are less than five pounds (2,268 g).

Salmonid Fisheries Assessment:

No trout were stocked in 2014. One rainbow trout was captured in the electroshocking survey at Wagon Trail Bay in Gregg Basin. It measured 11 in (285 mm) and weighed 0.3 lb (124 g) and is suspected to have come upstream from the Grand Canyon where rainbow trout occur.

GENERAL MANAGEMENT REVIEW

The approaches for the general management objective were completed. Objectives were met through creel surveying, collecting fishing tournament data, gill netting, electroshocking, dive surveying, shad trawling, analyzing striped bass stomach content, constructing artificial habitat, and surveying of potential habitat sites.

RECOMMENDATIONS

- The creel program should be redesigned to an access point survey type of a randomized stratified design of at least 100 days to track trends in angler use and success.
- Seasonal gill-net surveys and summer dive investigations should be continued.
- Continue collecting black bass biological data at tournaments to track trends in the black bass fishery.
- Continue with assigned electroshocking transects during the fall survey.
- Continue the quarterly checking of stomach samples of tournament striped bass to detect changes in diet.
- Continue weekly shad trawl transects during the peak spawning season.
- Continue to investigate the feasibility and effectiveness of moveable underwater habitat structures for future deployment to Lake Mead.
- Study the growth rates and diet of smallmouth bass to obtain baseline data on the species and to better understand their food habits in Lake Mead.

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