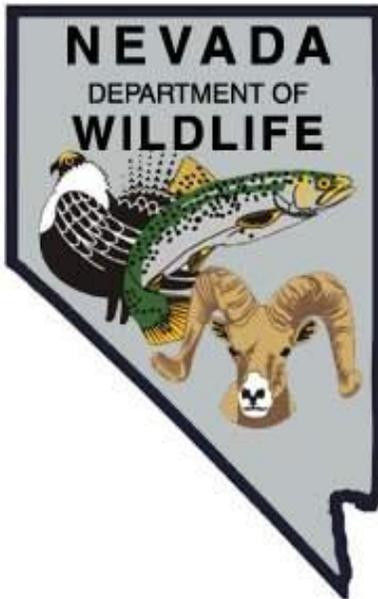


NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-50
2014

SQUAW CREEK RESERVOIR
WESTERN REGION



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

Table of Contents

| <u>Contents</u> | <u>Page</u> |
|-------------------------|-------------|
| SUMMARY | 1 |
| BACKGROUND | 1 |
| OBJECTIVES | 2 |
| PROCEDURES | 2 |
| FINDINGS | 3 |
| MANAGEMENT REVIEW | 8 |
| RECOMMENDATIONS | 8 |

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

List of Figures

| <u>Number</u> | <u>Title</u> | <u>Page</u> |
|---------------|--|-------------|
| 1 | Electrofishing Survey – Black Bass Length Frequency..... | 7 |
| 2 | Species Composition | 7 |

List of Tables

| <u>Number</u> | <u>Title</u> | <u>Page</u> |
|---------------|---------------------------------------|-------------|
| 1 | Stocking Summary - 2014..... | 4 |
| 2 | Stocking History – 2009 to 2013 | 5 |
| 3 | Dissolved Oxygen Readings..... | 6 |

List of Attachments

| <u>Number</u> | <u>Title</u> | <u>Page</u> |
|---------------|-------------------------------|-------------|
| 1 | Fish Sampling Transects | 10 |
| 2 | Water Quality Sampling | 11 |

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

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Squaw Creek Reservoir*
Period Covered: *January 1, 2014 through December 31, 2014*

SUMMARY

The mail-in angler questionnaire data estimated use at 214 anglers and 583 angler days in 2013. Total catch was 2,352 fish and the success rate was 4.03 fish per angler day. These numbers are slightly lower than those reported in 2012.

Squaw Creek Reservoir received 10,168 hatchery-reared trout in 2014. This includes 8,160 catchable rainbow trout and 2,008 catchable brown trout.

Water conditions (quantity and quality) were documented throughout the summer and fall at Squaw Creek Reservoir. The reservoir remained at or near capacity throughout 2014.

Fish population sampling with an electrofishing boat at Squaw Creek Reservoir resulted in the capture of spotted bass, brown bullhead catfish, brown trout, channel catfish, largemouth bass, and rainbow trout. Squaw Creek Reservoir is managed primarily as a trout fishery; however, carry-over of stocked trout has been very limited since 2007 when the population unexpectedly died off in summer. An additional fish kill was confirmed in 2009 and since then, reports of die-offs have become an annual event. The specific cause of these events is unknown. In contrast to the failure of the trout fishery, the warmwater fish population appears to be flourishing and was documented in these surveys.

At this time, Squaw Creek Reservoir appears to be exceeding the coldwater and warmwater General Fishery Management Concepts.

BACKGROUND

Squaw Creek Reservoir is located in northern Washoe County, approximately 20 mi north of Gerlach. At maximum capacity, the reservoir is 47.5 SA, stores 1,200 acre-ft, and is 45 ft deep (spillway elevation). Of the two tributaries to the reservoir, the east tributary flows from a warmwater spring.

The reservoir was constructed in 1952 as a private reservoir for water storage. The Nevada Department of Wildlife negotiated with the Holland Land and Livestock Company and agreed to manage the fishery as long as the reservoir would remain open to public fishing. Mr. Jaksick is the present owner of the land and water rights for the reservoir. A history of public abuse at the reservoir has prompted the landowner to post signs that notify the public of a set of 'regulations' for the reservoir.

The fishery at Squaw Creek Reservoir consists of hatchery maintained populations of rainbow, bowcutt, and brown trout. Tiger trout have also been stocked in recent years although carryover of the species is somewhat questionable. The reservoir also supports wild, self-sustaining populations of largemouth bass, spotted bass, bullhead catfish, channel catfish and green sunfish. The reservoir is managed under the Coldwater and Warmwater General Fishery Management Concepts, with established objectives for angler success rates of 0.25 to 0.75 fish per hour and 1.0 to 2.0 fish per angler day.

OBJECTIVES

General Management Objectives:

- Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts and mail-in angler questionnaire data.
- Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) when onsite.
- Electrofish two established transects during one night in the fall.
- Augment the reservoir with 2,500 channel catfish.

PROCEDURES

Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts and mail-in angler questionnaire data. Scheduled and opportunistic visits were made to Squaw Creek Reservoir throughout the year for the purpose of collecting creel survey data to contact the greatest number of anglers as possible. No anglers were contacted during any of these trips.

Angler use and success at Squaw Creek Reservoir was also assessed through the Department's Mail-in Angler Questionnaire Survey. Angler questionnaire data is derived from a survey that is mailed to 30,000 license purchasers from the previous year.

Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) when onsite. General habitat conditions were documented during numerous site visits throughout the summer and during visits to other northern Washoe County reservoirs. One trip was made to the reservoir on September 13 after a report of a fish die-off. At 10:43 am, dissolved oxygen and temperature readings were taken at six different locations at varying depths throughout the reservoir. Habitat assessment was based on visual observations of lake level and clarity and the basic water quality readings were taken with a YSI meter. Attachment 2 contains a map of sampling locations.

Electroshock two established transects during one night in the fall. Electrofishing surveys were conducted utilizing an 18 foot, Smith Root electrofishing boat outfitted with a Smith-Root generator powered electroshocker. The boat serves as the ground and the anode consisted of two electrode arrays, one at each corner of the

bow. Each electrode array consists of six stainless steel electrode droppers. One netter manned the bow of the boat while one person maneuvered the boat. On November 18, two transects were completed in littoral habitat that contained rock and hardstem bulrush habitats. A third transect was added to the survey near the Squaw Creek inlet. The first transect (T1) was approximately 442 meters long and took 0.35 hours of active electrofishing to complete. The second transect (T2) covered a distance of 482 meters and took 0.37 hours of active electrofishing to complete. The third transect (T3) was approximately 442 meters and took 0.31 hours of active electrofishing to complete. A map of transect locations can be found in Attachment 1.

Due to numerous reports of a salmonid die-off during the late summer, it was decided that concurrent to the electrofishing effort one gillnet would be set in an attempt to capture as many species of fish as possible. At 10:21 am on November 18, one monofilament experimental-mesh gill net was set (littoral zone along the southern shoreline, 4-18 ft in depth). The net ran perpendicular to the shoreline with the finest mesh panels being closest to the shoreline. The net was pulled when the electrofishing survey was completed at 1:35pm resulting in 3.23 net hours. The net consisted of five panels (bar mesh: 0.75, 1.0, 1.25, 1.5, and 2.0 in), each 25 ft long by 6 ft deep and sewn together end-to-end from smallest to largest mesh. Attachment 1 contains location map with the net set location.

During the course of the surveys, captured fish were placed into a live-well supplied with fresh water and dissolved oxygen. At the conclusion of each electrofishing transect or net retrieval, each captured fish was identified to species, measured in millimeters to fork length and weighed on a battery powered scale if greater than 200 mm fork length. Many of the black basses expressed characteristics of largemouth and spotted bass. If the field crew could not accurately identify the species of bass, it was simply classified as a black bass. Due to the frequency of conflicting characteristics between the two species, it is possible they are hybridizing in Squaw Creek Reservoir.

Augment the reservoir with 2,500 channel catfish. This objective was not completed due to the unavailability of channel catfish during 2014.

FINDINGS

Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts and mail-in angler questionnaire data. Angler contacts were attempted on three days at Squaw Creek Reservoir in 2014. No anglers were encountered on each occasion.

The mail-in angler questionnaire data estimated use at 214 anglers and 583 angler days in 2013. Total catch was 2,352 fish and the success rate was 4.03 fish per angler day. These numbers are all slightly lower than those reported in 2012.

Squaw Creek Reservoir received 10,168 hatchery-reared trout in 2014 (Table 1). This includes 8,160 catchable Mt. Shasta and Triploid strains of rainbow trout and 2,008 catchable Sheep Creek-strain brown trout.

Table 1. Stocking Summary – 2014.

| Date | Species | Strain | Size (in.) | Number |
|----------------|---------|-------------|-------------|-------------------|
| 3/24/2014 | RB | Mt. Shasta | 9.5 | 5200 |
| 2/21/2014 | RB | Triploid | 9.5 | 2960 |
| Average | | | 9.50 | Total 8160 |
| 2/21/2014 | BN | Sheep Creek | 9.8 | 2008 |
| Average | | | 10.3 | Total 2008 |
| Total | | | | 10168 |

Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) when onsite. Water conditions at Squaw Creek Reservoir typically remain stable from one year to the next and are not subject to the usual annual drawdowns of other western reservoirs. The reservoir remained at or near capacity in 2014.

Carryover of stocked salmonids in the last few years has been somewhat questionable in Squaw Creek Reservoir and after several reports from anglers of a die-off occurring in late summer, a trip was made to assess water quality parameters using a YSI dissolved oxygen meter. On September 9 at 10:43 am, dissolved oxygen and temperature readings were taken at six different locations at varying depths throughout the reservoir. The information collected is presented in Table 3. All dissolved oxygen and temperature readings fell within the tolerable levels for all species inhabiting the reservoir and no deceased fish were observed. The cause of these reported die-offs is unknown, but it has been theorized that oxygen depletion due to short-lived isolated algae blooms was the source.

Electroshock two established transects during one night in the fall. Fish population sampling at Squaw Creek Reservoir resulted in the capture of spotted bass, brown bullhead, brown trout, channel catfish, largemouth bass, and rainbow trout. Squaw Creek Reservoir is managed primarily as a trout fishery; however, carryover of stocked trout has been very limited since 2007 when the trout population experienced a fish kill. An additional fish kill was confirmed in 2009 and since then reports of die-offs have been reported or suspected annually. The specific cause of these events is unknown. In contrast to the struggling trout fishery, the warmwater fish population appears to be flourishing.

Table 2. Stocking History 2009-2013.

| Year | Species | Strain | Size (in.) | Number |
|--------------|---------|-------------|-------------------|--------------|
| 2009 | BC | Bowcutt | 9.9 | 2088 |
| 2009 | BC | Marlette | 10 | 2004 |
| 2009 | BN | Sheep Creek | 7.7 | 1019 |
| 2009 | RB | Eagle Lake | 8.9 | 3006 |
| 2009 | RB | Eagle Lake | 9.3 | 3024 |
| 2009 | TT | Tiger | 7.1 | 1018 |
| Total | | | (All Fish) | 12159 |
| 2010 | BC | Bowcutt | 9.5 | 2001 |
| 2010 | BN | Brown | 10.3 | 4002 |
| 2010 | CC | Channel Cat | 7 | 4810 |
| 2010 | RB | Eagle Lake | 9.5 | 3003 |
| 2010 | RB | Eagle Lake | 9.7 | 554 |
| 2010 | TT | Tiger | 10.3 | 1000 |
| Total | | | (All Fish) | 15370 |
| 2011 | BC | Bowcutt | 9.7 | 2001 |
| 2011 | BN | Sheep Creek | 10.5 | 3997 |
| 2011 | RB | Belair | 10 | 3036 |
| 2011 | RB | Eagle Lake | 10.4 | 3996 |
| Total | | | (All Fish) | 13030 |
| 2012 | BN | Sheep Creek | 10.2 | 4001 |
| 2012 | RB | Eagle Lake | 10 | 1506 |
| 2012 | RB | Eagle Lake | 10.3 | 1500 |
| 2012 | RB | Eagle Lake | 9.2 | 2568 |
| 2012 | RB | Jumper | 9 | 2028 |
| Total | | | (All Fish) | 11603 |
| 2013 | BC | Bowcutt | 10.2 | 2015 |
| 2013 | BN | Sheep Creek | 9.5 | 4001 |
| 2013 | CC | Channel Cat | 5 | 7000 |
| 2013 | RB | Eagle Lake | 9.1 | 1499 |
| 2013 | RB | Eagle Lake | 10.5 | 1502 |
| 2013 | RB | Tahoe | 9.8 | 2038 |
| Total | | | (All Fish) | 18055 |
| | | | Trout | 58407 |
| | | | Catfish | 11810 |
| Total | | | (All Fish) | 70217 |

On November 18, all three electrofishing transects revealed good numbers of bass. Discerning between largemouth and spotted bass was extremely difficult and, therefore, all bass were simply classified as black bass. The black bass (n=33) averaged 335 mm (13.2 in) and ranged from 52 mm (2.1 in) to 549 mm (21.6 in). The average weight of the captured black bass over 200 mm was 1,281.6 g (2.8 lbs). Young bass were captured at transect 3 (T3) and numerous more were observed but avoided capture at the other transects. The number of bass sampled is down substantially from the last electrofishing survey in 2011 (n=329). This can be attributed to the different

seasons between surveys and differing times of day. The 2011 survey was performed in August and at night while the 2014 survey was carried out in the much cooler month of November during daylight conditions. The black bass population appears to be healthy and sustaining in Squaw Creek Reservoir.

Table 3. Squaw Creek Reservoir Dissolved Oxygen Readings

| Reading | Depth (ft) | Location | DO (ppm) | % Saturation | Temp (F) |
|---------|------------|---------------|----------|--------------|----------|
| 1 | 3 | E Boat Launch | 9.4 | 95.8% | 64 |
| 2 | 6 | E Boat Launch | 8.0 | 81.4% | 64 |
| 3 | 9 | E Boat Launch | 7.1 | 74.4% | 64 |
| 4 | 15 | N Mid | 8.2 | 81.3% | 63 |
| 5 | 6 | N Mid | 9.7 | 88.0% | 64 |
| 6 | 9 | E Mid | 8.8 | 93.1% | 65 |
| 7 | 3 | Dam Mid | 9.3 | 96.1% | 64 |
| 8 | 15 | Dam Mid | 7.3 | 74.0% | 64 |
| 9 | 6 | W Mid | 8.4 | 83.2% | 64 |
| 10 | 12 | W Mid | 8.2 | 82.0% | 64 |
| 11 | 3 | NW | 8.7 | 89.0% | 65 |

A length frequency analysis of black bass reveals five distinct size classes inhabiting the reservoir (Figure 1). A length breakpoint of 60 mm (2.4 in) was used to separate the youngest age class of fish sampled in the reservoir (n=5). This smaller size of bass represents positive recruitment in the reservoir. The most prevalent size class (n=23) inhabiting the reservoir used a length breakpoint of 420 mm (16.5 in). The largest length breakpoint of 540 mm (21.3 in) was represented by a single fish.

Additional fish species captured included brown bullhead catfish (n=4; avg. FL=258 mm / 10.2 in), brown trout (n=2, avg. FL= 287 mm / 11.3 in), channel catfish (n=5, avg. FL=361 mm / 14.2 in), and rainbow trout (n=1, FL=287 mm / 11.3 in) (Figure 2). This represents the first survey since 2007 where trout were successfully captured.

Concurrent to the electrofishing survey at Squaw Creek Reservoir, a gillnet survey was also conducted. The only species captured during this short survey was brown trout (n=3), with a catch rate of 0.93 fish per net hour. The average fork length was 285 mm (11.2 in). It was theorized that by placing a gill net perpendicular to the shoreline, running from shallow to deeper water, might reveal more trout in deeper water that would not be observed during the shocking survey. This was not the case, as all three brown trout were captured in the range of six to eight feet in depth, the same depth occupied by the majority of the captured warm water species during the electrofishing surveys.

A K-factor analysis was performed on the six trout captured between the electrofishing and the gillnetting surveys. The average K-factor exhibited by all six fish (5 brown trout and 1 rainbow trout) was 1.02, which was considered poor.

Figure 1.

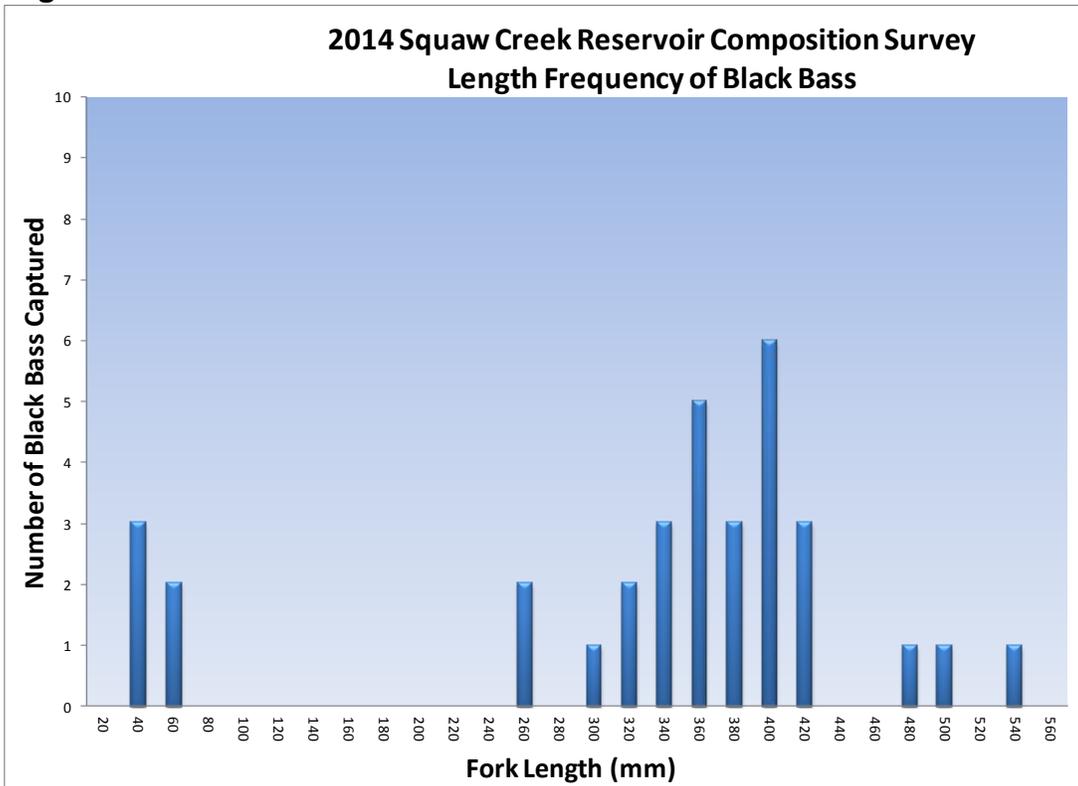
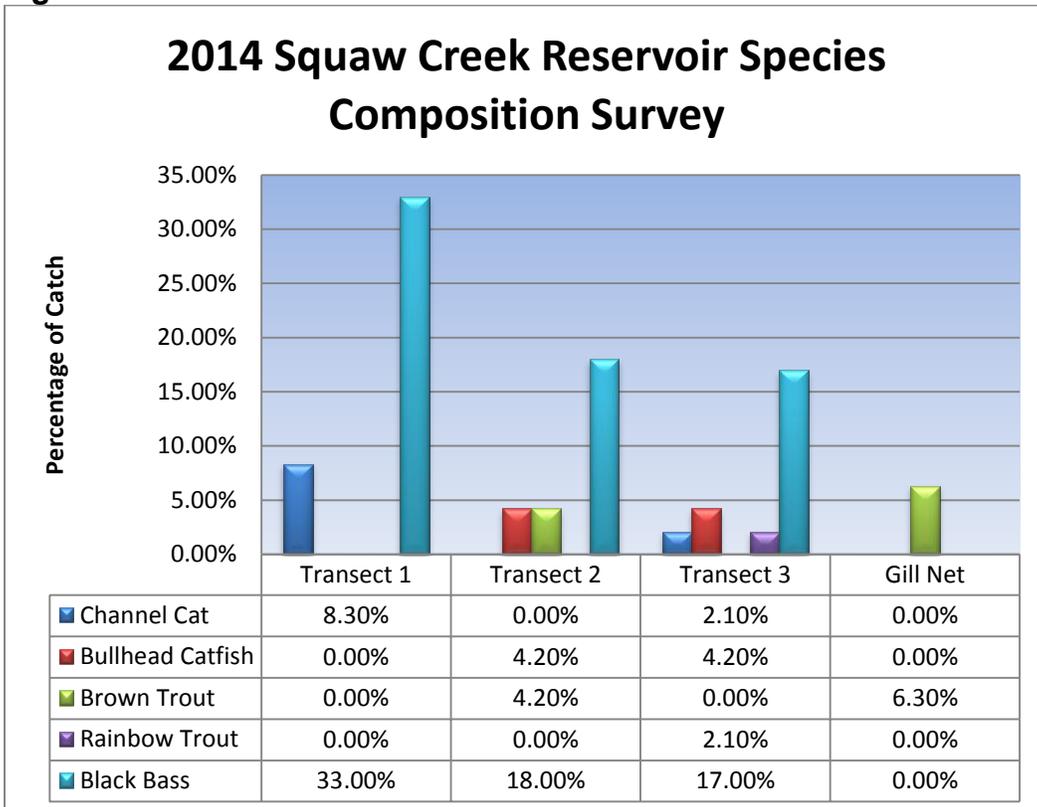


Figure 2.



In all, black bass made up the majority of the captured fish between the two survey types at 68%. The remaining species proportions were as follows: brown trout 10.5%, channel catfish 10.4%, brown bullhead catfish 8.4%, and rainbow trout 2.1%.

Augment the reservoir with 2,500 channel catfish. No channel catfish were available for stocking into Squaw Creek Reservoir during 2014. It is recommended that this objective be carried forward to 2015.

MANAGEMENT REVIEW

Angler use and success rates documented in the Mail-in Angler Questionnaire Survey meet the guidelines of a General Fishery Management Concept, which calls for 2.0 to 3.5 fish per angler day. This fishery is popular with anglers for producing high catch rates and an opportunity to fish in a semi-remote setting. In the past two years (2012 and 2013), angler reports and fish population surveys indicated moderate to severe summer fish kills with the reservoir's rainbow trout populations.

The constant water supply that feeds Squaw Creek Reservoir along with its almost constant water level is providing an excellent fishery for warm water species. It appears that these conditions are extremely conducive to the reproduction and growth of several species of warm water fish. However, when analyzing the data collected in 2014 and previous years, along with angler reports of seasonal die-offs, it becomes apparent that the coldwater fishery in Squaw Creek Reservoir is suffering from an unknown cause. Stocking rates and timing may need to be adjusted to improve carry over and provide year round fishing for cold water species.

RECOMMENDATIONS

General Management Objectives:

- Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts and mail-in angler questionnaire data.
- Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) when onsite.

Prepared By: Travis Hawks
Biologist III
Western Region

Date: January 28, 2015

Attachment 1



Attachment 2

