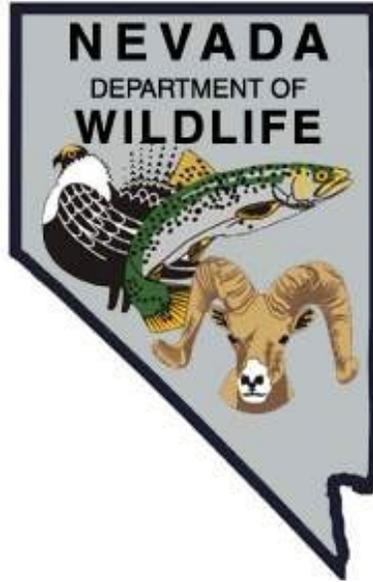


# NEVADA DEPARTMENT OF WILDLIFE STATEWIDE FISHERIES MANAGEMENT



## FEDERAL AID JOB PROGRESS REPORT

F-20-54  
2018

WALKER LAKE  
WESTERN REGION



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

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

**State:** Nevada  
**Project Title:** Statewide Fisheries Program  
**Job Title:** Walker Lake  
**Period Covered:** January 1, 2018 through December 31, 2018

**SUMMARY**

Walker Lake remains devoid of fish and the surface elevation declined in 2017 to the new documented low at the beginning of the year of 3,906 ft above MSL. However, during spring runoff, the elevation rose and the reservoir ended the year at 3,918 MSL. From January through June 2018, the lake level rose to 3,920 MSL, again due to spring runoff from the Walker River. Nonetheless, from June to December 2018, the elevation fell to 3,917 ft MSL from evaporation losses for an annual net loss of 1.0 ft. Total dissolved solids (TDS) increased to the highest concentration observed (29,100 mg/L) during 2017 and remained well beyond fish tolerance during 2018. Based on snow pack data from the Natural Resource Conservation Service (SNOTEL measurements), the Walker Basin captured 83 percent of median snow pack as reported on April 1, 2018.

The establishment of Walker Lake tui chub (*Siphateles bicolor pectinifer* and *S. b. obesa*) into Rose Creek Reservoir during 2010 was successful, as several hundred fish of at least three age classes have been observed continuously for the past four years. During 2017, tui chub were confirmed in Cat Creek Reservoir, which water is fed through a pipe from Rose Creek Reservoir. Three age classes of tui chub were observed in Cat Creek Reservoir this year suggesting a population has become well established.

**BACKGROUND**

Lake Lahontan, a large inland, freshwater sea, at its peak volume during the late Pleistocene epoch (approximately 15,000 years ago), covered much of northern Nevada. Climate change around the end of the Pleistocene epoch led to a gradual desiccation of ancient Lake Lahontan. Modern remnants of Lake Lahontan existing as true lakes are Pyramid Lake and Walker Lake. Over its long history, dry periods resulting from severe climatic changes caused Walker Lake to desiccate several times, the last of which happened approximately 2,100 years ago.

Lahontan cutthroat trout (LCT) have a long historical connection to the Lahontan basin as the dominant, predatory fish and, in Walker Lake, LCT have grown to over 13.6 kg (30 lbs). When explorers discovered the lake in the 1840's, its elevation was 1,244 m (4,080 ft) above mean sea level (MSL) and LCT was able to access the Walker River and propagate naturally. Shortly after, much of the river was diverted for agricultural and ranching use. The lack of a permanent flowing river, resulting from irrigation diversions and the construction of barriers has prevented upstream spawning migrations since the

early 1900's. The consequence of a declining lake is an increase in the TDS concentration, which shortens the life span of LCT.

Since the early 1950's, the LCT fishery in Walker Lake has been maintained only through stocking. Historically, several strains have been planted with good results, but regardless of strain, as TDS levels increased, LCT survival decreased. High TDS levels (mostly composed of bicarbonate, sodium, sulfate, and chloride) affect gill and kidney functions and negatively impact survivorship and size of fishes. Throughout the late 1990's and up until 2009, NDOW used several acclimation methods to increase survival of stocked LCT. NDOW and USFWS experimented, with stocking LCT into the river to allow self-acclimation in the plume of mixed water at the inflow to the lake. Success from this was unknown. By 2009, the last year LCT was documented in Walker Lake, TDS levels increased to over 18,000 mg/L. Stocking efforts were discontinued after this and fish no longer have been stocked into Walker Lake.

Decreasing lake levels leading to increasingly toxic lake conditions resulted in inhospitable conditions for all fishes. Other native species once existed in Walker Lake, but tui chub were the last known to survive, and none has been documented for several years. In 2012 when the last intensive monitoring of the Walker Lake fishery was conducted, rising TDS was found negatively influenced the viability of tui chub eggs and greatly reduced adult tui chub survival. In 2008, recognizing the eventual extirpation of tui chub in Walker Lake, there was a search for an adequate location to establish a refuge population of tui chub. Agreements with the Hawthorne Army Depot led to the use of Rose Creek Reservoir, on the east face of the Wassuk Range, for a refuge. Tui chub were successfully transplanted from Walker Lake into Rose Creek Reservoir in 2009, 2011, and 2012. Tui chub originating from Walker Lake are only known to exist in Rose Creek Reservoir and, more recently, they were discovered in Cat Creek Reservoir, which receives water via a pipeline from Rose Creek Reservoir.

Boat launching has been difficult around much of Walker Lake since 2007 due to shallow and rocky beaches becoming exposed as the water level recedes. In 2015, there was discussion between BLM and Nevada State Parks about the possible construction of a new or modified launch ramp at Sportsman's Beach, however, no progress has been made to improve access.

## **OBJECTIVES**

- Work with the Walker Basin Recovery Implementation Team to determine and implement measures that work towards restoration of LCT in Walker Lake.
- Monitor tui chub refuge populations at Rose Creek and Cat Creek reservoirs utilizing 20 minnow traps set over one night in summer and visually survey the entire perimeters of each pond to observe relative fish abundance.

## PROCEDURES

**Work with the Walker Basin Recovery Implementation Team (WRIT) to determine and implement measures that work towards restoration of LCT in Walker Lake.** The WRIT met several times during 2018 and several actions were agreed upon and implemented. Most notably was to continue monitoring Walker strain LCT in Cottonwood Creek, a tributary to Walker Lake that is entirely on land managed by the Hawthorne Army Depot (HWAD).

Walker Lake water level was monitored from USGS gauge number 10288500. Lake water quality data (TDS) was received from Angela Paul, USGS Team Lead for Walker Lake.

**Monitor tui chub refuge populations at Rose Creek and Cat Creek reservoirs utilizing 20 minnow traps set over one night in summer and visually survey the entire perimeters of each pond to observe relative fish abundance.** Tui chub populations in Rose Creek Reservoir were monitored on May 2, 2018. Twenty standard 0.25 in mesh baited minnow traps were set equidistant around the shore in approximately one to four foot depth and allowed to sit for one hour. Fish captured were measured to nearest millimeter, marked with an oblique clip of the upper caudal fin, and released back into the reservoir. Traps were reset after one hour and allowed to fish for an additional hour; fish were then tallied and inspected for marks. A random sample of 50 fish was measured. An “Adjusted Peterson Estimate” of Chapman’s version of the Peterson mark-recapture equation was used to estimate the size of the population  $[(M+1)(C+1)/(R+1)]$ .

Visual survey consisted of walking the shoreline and tallying all fish observed and recording approximate size classes in two-inch categories. Two laps around the reservoir were completed and number of fish observed was recorded.

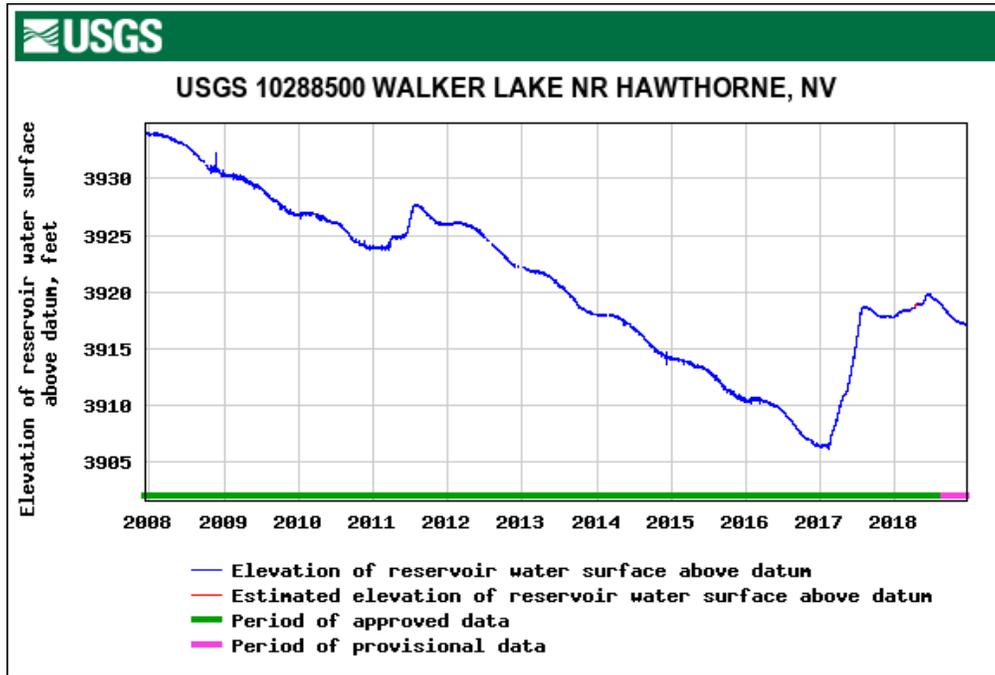
## FINDINGS

**Work with the Walker Basin Recovery Implementation Team to determine and implement measures that work towards restoration of LCT in Walker Lake.** No fish sampling was conducted in Walker Lake during 2018. During 2012 as TDS levels approached 20,000 mg/L, an evaluation of tui chub documented that very few fish, if any, under the age five years were able to survive at the high TDS levels, and adult tui chub were exhibiting signs of physiological stress and mortality. Gill net surveys conducted in 2015 found no tui chub in Walker Lake and no tui chub or LCT likely occur currently in Walker Lake. Therefore, fisheries management activities have been focused on establishing LCT in Cottonwood Creek, which is a tributary to Walker Lake. Based on annual surveys in Cottonwood Creek, the LCT population appears to be healthy and reproducing. A separate field trip report details the results of this work.

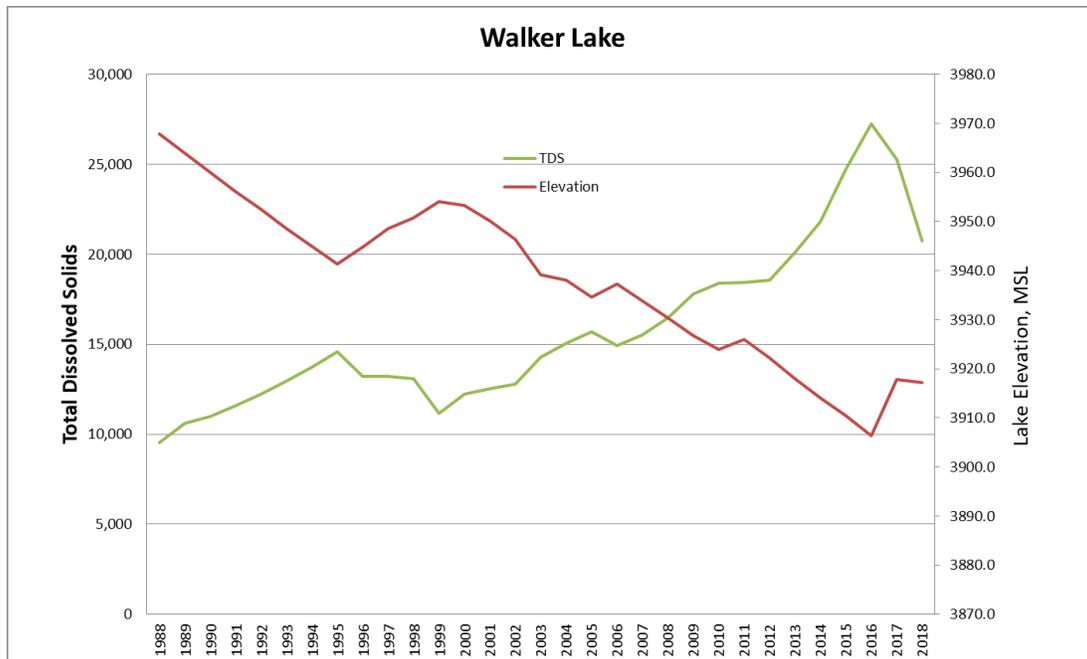
Several Walker RIT meetings were attended during 2018 and information was distributed regarding short term and long-term plans for Walker Lake as well as water quality requirements for tui chub and LCT.

TDS was recorded as high as 26,000 mg/l in 2016, and an all-time high recording of 29,100 mg/l was measured during the first quarter of 2017. However, in response to a 13 ft lake level rise in 2018, the annual average TDS decreased to 25,283 mg/l (Figure 2). Water quality monitoring data was only available for three quarters of the year and not available as of January 2019, but preliminary results indicate there was a drop in annual average TDS to 20,725 mg/l in 2018.

**Figure 1.** Walker Lake Historical Elevation.



**Figure 2.** Walker Lake TDS.



**Monitor tui chub refuge populations at Rose Creek and Cat Creek reservoirs utilizing 20 minnow traps set over one night in summer and visually survey the entire perimeters of each pond to observe relative fish abundance.** The tui chub population in Rose Creek Reservoir was estimated at 17,664 in 2015 (Table 1). During 2016, a reliable population estimate could not be determined due to lack of fish caught. For 2017, the population was estimated to be 5,284 and during 2018, it was 3,206. Tiger trout were stocked for angling and predation possibly could be shaping the juvenile tui chub population. Stomach contents collected from several tiger trout (up to 17 in), though, revealed only aquatic invertebrates were consumed.

**Table 1.** Rose Creek Reservoir Population Survey.

<b>2018</b>	Trapping	Captured	Mark	Recapture	Pop est.
	5/2/2018	58	58		
		162		2	3206
	Visual	Chub Pass #1	Chub Pass #2	Trout Pass #1	Trout Pass #2
	5/2/2018	100	265	20	35
Stocking Recommendation					100
<b>2017</b>	Trapping	Captured	Mark	Recapture	Pop est.
	5/24/2017	120	120		
	5/25/2017	130		2	5284
	Visual	Chub Pass #1	Chub Pass #2	Trout Pass #1	Trout Pass #2
	5/24/2017	901	820	11	15
		5/25/2017	845	850	10
Stocking Recommendation					500
<b>2016</b>	Trapping	Captured	Mark	Recapture	Pop est.
	4/12/2016	10	10		
	4/13/2016	15		0	176
	Visual	Chub Pass #1	Chub Pass #2	Trout Pass #1	Trout Pass #2
	4/12/2016	120	250	88	78
		4/13/2016	110	170	85
Stocking Recommendation					<100
<b>2015</b>	Trapping	Captured	Mark	Recapture	Pop est.
	3/10/2015	137	137		
	3/11/2015	127		0	17664
	Visual	Chub Pass #1	Chub Pass #2	Trout Pass #1	Trout Pass #2
	3/10/2015	850	931	N/A	N/A
		3/11/2015	466	2,610	N/A
Stocking Recommendation					500

Several age classes of tui chub were evident during the visual survey around the shore of Rose Creek Reservoir (Table 2) and Cat Creek Reservoir and all fish appeared to be healthy. Artificial habitat structures were placed in shallow water (less than 8.0 ft), as well as deeper locations (>10.0 ft) and provide escape cover for juvenile tui chub from tiger trout (see habitat work under the Western Region Urban Ponds Job Progress Report).

**Table 2.** Rose Creek Reservoir Visual Survey.

<b>2018 Size Class, Visual Survey</b>		
	Tui Chub	Trout
<2"	150	
2-4"	80	
4-6"	20	2
6-8"	15	24
8-10"		8
>10"		1
<b>2017 Size Class, Visual Survey</b>		
	Tui Chub	Trout
<2"	505	
2-4"	326	
4-6"	40	
6-8"	27	2
8-10"	2	8
>10"	1	5

### **MANAGEMENT REVIEW**

During 2018, the Walker Lake fell another one foot in elevation and preliminary monitoring suggests TDS may have dropped even further than the TDS observed in 2017. It is not clear why this may have occurred, but it is thought there possibly was a delay in lake mixing from the large influx of freshwater in 2017. No LCT has been caught in Walker Lake since May of 2009 and it is likely that environmental conditions have exceeded the limitations for fish survival. Based on snow pack and inflow into Walker Lake over the past several years, target TDS levels for LCT reintroduction (16,000 mg/L for stocking with acclimation, 12,000 mg/L for a sustainable high concentration, and 8,000 mg/l for stocking without acclimation) may be possible.

The water acquisition program administered by the National Fish and Wildlife Foundation (NFWF) has been successful at acquiring water rights from many willing sellers in Smith and Mason valleys. Litigation regarding the transfer of purchased water rights is ongoing; however, NFWF is optimistic that within the next couple of years water delivery to the lake will begin. A settlement regarding the first water right acquisition was

reached in 2018 and the first water delivery through this program is expected as soon as 2019.

A refuge population of tui chub was established in Rose Creek Reservoir in 2009. Rose Creek Reservoir also serves as a recreational fishery that receives an annual stocking allocation of tiger trout to support angling. Based on annual population monitoring, the tui chub population appears to be healthy. It should be closely monitored to ensure it is not negatively impacted by trout stocking and to document trends in the population. Artificial habitat structures were added to help provide protective cover. In addition to Rose Creek Reservoir having tui chub, Cat Creek Reservoir, which receives water through a pipeline from Rose Creek Reservoir, also has tui chub. Monitoring during 2018 confirmed several age classes of tui chub.

The LCT population in Cottonwood Creek appears to be thriving and the first documented reproduction of Walker Basin strain fish occurred there in June 2018. This population will be monitored annually and, once all available habitat is occupied, population abundance will be estimated. The Cat Creek drainage may provide additional fluvial and lacustrine LCT habitat and coordination with the WRIT is ongoing.

### **RECOMMENDATIONS**

- Work with the Walker Basin Recovery Implementation Team to determine and implement measures that work towards restoration of LCT in Walker Lake.
- Monitor tui chub refuge populations at Rose Creek Reservoir and Cat Creek Reservoir utilizing 20 minnow traps set over one night in the summer, and visual surveys around the entire perimeters of each pond conducted on one occasion in the summer.

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