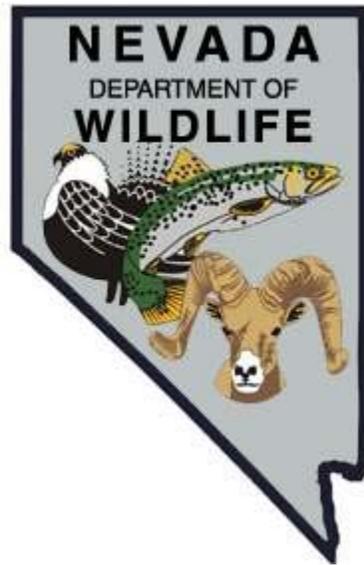


NEVADA DEPARTMENT OF WILDLIFE STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORT

F-20-52
2016

TRUCKEE RIVER 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: *Truckee River*
Period Covered: *January 1, 2016 through December 31, 2016*

SUMMARY

On April 1, 2016, the designated end of the snow-measuring season, the Truckee River Basin snow pack stood at 102% of average and the overall precipitation for the year stood at 108%. The slightly above average winter brought much needed relief to the drought stressed basin in 2016.

With the return of a more normal flow regime in 2016, the first complete electroshocking survey since 2013 was conducted on the Truckee River. Ten fish survey transects were completed across four river zones (2 through 5) on the Truckee River from October 25 through 27, 2016. A total 903 fish were captured during the survey consisting of 187 salmonids, 668 native non-game species, and 48 undesirable species.

A total of 66 volunteer angler surveys were received in 2016 from the three drop-boxes along the Truckee River. Anglers fished for 150.5 hrs and caught 61 fish consisting of 22 rainbow trout, 22 brown trout, 13 cutthroat trout, and 4 mountain whitefish. Resulting catch rates (all fish) were 1.0 fish per angler and 0.4 fish per hour. Of the fish reported, all but six brown trout were released. The reported angler use in 2016 was higher than the five-year average of 56.4 anglers. Improved flow conditions and cooler water temperatures in 2016 attributed to an increase in angler interest compared to the five year low reported in 2015.

The Mail-in Angler Questionnaire Survey estimated use at 2,888 anglers and 14,377 angler use days in 2015. There was an estimated 18,656 fish caught for an angler success rate of 1.3 fish per day. These estimates are the second lowest (1992) recorded in the 35-year history of collecting angler questionnaire data on the Truckee River.

From February through early April, the Truckee River received 30,185 triploid rainbow trout and 61,142 Pilot-Peak strain Lahontan cutthroat trout.

Five new transects on the Truckee River were surveyed for the presence of New Zealand mud snails (*Potamopyrgus antipodarum*). No additional mud snails were detected and, therefore, the distribution was believed not to have changed since the 2013 baseline surveys.

BACKGROUND

The Truckee River formerly supported tremendous spawning runs of cui-ui that lived in Pyramid Lake and lacustrine/ad-fluvial Lahontan cutthroat trout (LCT) that inhabited Lake Tahoe and Truckee River basins. It is generally accepted there were two spawning runs (winter and spring) of LCT from Pyramid Lake that would ascend the Truckee River to reach spawning habitat in the main stem and tributaries. The cui-ui is believed to have had an upstream distribution limit near East McCarran Boulevard while LCT is believed to have moved throughout the Lake Tahoe-Truckee River-Pyramid Lake watershed.

The influx of European settlers to the Truckee River basin brought with it a number of anthropogenic changes to the system including water diversions (fish passage barriers) for municipal and agricultural use (e.g., Derby Dam), over-harvest of fish, habitat alteration, reduced water quality and quantity, and introduction of non-native fishes. The Pyramid Lake LCT population began dwindling in the early 1900s and it eventually was extirpated around 1940. Fortunately, the cui-ui was able to persist in limited numbers due to the longevity of the species.

Historically, LCT was successfully reintroduced into Pyramid Lake by the Nevada Department of Wildlife (NDOW), with stocks coming from a number of genetic strains including Summit Lake and the Carson River Basin. Further advancements by the Pyramid Lake Paiute Tribe (PLPT) and USFWS have produced a quality fishery. Pyramid Lake is within the boundaries of the Pyramid Lake Paiute Reservation and the PLPT currently manages the lake's LCT fishery, which is maintained by hatchery stocking.

Subsequent to the collapse of the LCT fishery in the Truckee River, non-native salmonids such as rainbow and brown trout were introduced for sport fishing. These species soon established self-sustaining populations, which continue to persist. In an effort to meet angler demand, the fisheries are annually augmented with hatchery-reared trout.

Portions of the Truckee River managed by the Nevada Department of Wildlife have seen an array of catch regulations and tackle restrictions over the years. In an effort to minimize confusion, and with the support of angling groups in the area, the entire portion of the Truckee River within the state of Nevada and upstream of the Pyramid lake Paiute Tribe (PLPT) boundary was changed to a three game fish harvest limit in 2013. Subsequently, all tackle restrictions were lifted in 2014 and any legal method of fishing is allowed. These regulations were meant to benefit all angling methods and should have no adverse effects on the fishery.

NDOW and the PLPT signed a five-year Memorandum of Agreement (MOA) in 2002 to coordinate efforts that restore LCT in the Truckee River. Upon the expiration of this agreement, another meeting occurred in late 2014 to reenact the agreement and include the USFWS as an additional party. The main objectives were to 1) Work toward

the reestablishment of a natural LCT spawning run from Pyramid Lake to the Truckee River and 2) To utilize LCT for maintaining recreational fishing in the Truckee River. Due to improved habitat conditions for salmonid spawning and rearing, there was optimism that some degree of restoration could be possible. In addition, through the work of the Fish Passage Team, several fish passage barriers will be evaluated in the hope that future modification allows trout to move naturally throughout the system.

In April of 2013, the Department of Wildlife was informed by the Nevada Division of Environmental Protection (NDEP) that a substrate sample collected in August of 2012 from the Truckee River confirmed the finding of a single New Zealand mud snail (*Potamopyrgus antipodarum* - NZMS). It was collected near East McCarran Bridge in Sparks, representing the first confirmed occurrence in the Truckee River/Lake Tahoe Basin. Subsequent NZMS surveys defined its distribution from Mayberry Park downstream to the Mustang exit.

The entire Great Basin, specifically the Lake Tahoe Basin, experienced a drought that began in 2012. Four consecutive years with a snowpack of less than 60% had culminated in 2015 with entire stretches of the Truckee River being void of flow for periods of time. This resulted in numerous fish die offs that negatively impacted the fishery as a whole. The winter of 2015/2016 brought much needed relief to the region with an average snowpack of 100% that enabled flows in the Truckee River to return to a more normal state. The total effects of the drought are unknown at this point but the 2016 field season and surveys have given some insight as to what has happened to the fishery and what can be expected.

OBJECTIVES

- Monitor water quantity (discharge) through USGS Stream Flow data.
- Monitor fish populations by conducting tote-barge electroshocking surveys at nine traditional transects during three days in the fall.
- Collect fin samples from rainbow trout and LCT for genetic analysis during electroshocking surveys for genetic analysis by the University of Nevada Genetics Lab.
- Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts, return of angler drop-box surveys, and mail-in angler questionnaire data.
- Maintain the angler information center and angler drop-boxes.
- Conduct two days of presence/absence surveys for NZMS at suitable locations upstream and downstream of the area they are presently known to occupy.

PROCEDURES

Monitor water quantity (discharge) through USGS Stream Flow data. Natural Resource Conservation Service (NRCS) and US Geological Service (USGS) data were used to assess water quantity in the Truckee River throughout the year. Annual snowpack data was derived from NRCS SNOTEL sites in the Truckee River

Basin, while river discharge was obtained from USGS gages located at Reno and Derby Dam.

Monitor fish populations by conducting tote-barge electroshocking surveys at nine traditional transects during three days in the fall. A Smith Root 5.0 GPP tote barge was used in a single pass fish survey at ten traditional transects along the Truckee River from October 25 to 27, 2016. One traditional transect was excluded from the survey (Wingfield Park) due to low flows in that portion of the river. A subset of all fish captured were measured to fork length, weighed, and genetic samples (fin clips) were collected from certain species. All fish were released after processing.

Collect fin samples from rainbow trout and LCT for genetic analysis during electroshocking surveys for genetic analysis by the University of Nevada Genetics Lab. Genetic samples were collected from 30 rainbow trout during the electroshocking survey. All samples were delivered to the University of Nevada Genetics Lab for analysis.

Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts, return of angler drop-box surveys, and mail-in angler questionnaire data. During the course of other duties on the Truckee River throughout the year, anglers in the area were contacted. Fish caught, hours fished, tackle used, and environmental factors were recorded.

Three volunteer angler drop-boxes on the Truckee River were periodically monitored and restocked with survey forms. Angler satisfaction was rated on a scale from -2 to +2, with -2 being unsatisfied and +2 representing satisfaction. At the end of the calendar year, data was collected, reviewed, and summarized.

Angler use and success was also assessed through the Department's Mail-in Angler Questionnaire Survey. Angler questionnaire data was summarized from a survey that was mailed to about 30,000 license purchasers from the previous calendar year.

Maintain the angler information center and angler drop-boxes. The angler information center and drop-boxes were visually inspected and restocked with survey forms on a regular basis.

Conduct two days of presence/absence surveys for New Zealand mud snails at suitable locations upstream and downstream of the area they are known to occupy. A modified zigzag technique was used to survey seven transects on the Truckee River to identify the presence/absence of NZMS on July 12 and 13, 2016. These surveys were used to monitor any change in distribution from the 2015 survey.

Two to three surveyors were utilized per transect, similar to that of the 2014 and 2015 surveys. At each transect, a midpoint was delineated, and from here, a length of 100 ft was measured and marked both upstream and downstream. Beginning at the

midpoint, one surveyor completed a “zig” by first walking perpendicular to the bank to a point halfway across the river. At the completion of every other step, two to three rocks or substrate material were picked up from the river bottom and thoroughly examined for the presence of snails. A corresponding “zag” was accomplished by walking at a 45-degree angle back to the same bank, checking the substrate accordingly at every other step.

Zigs and zags were completed by one surveyor moving upstream and another surveyor downstream to each corresponding 100-ft marker. At most transects this equated to four zigzags upstream and four zigzags downstream. In some cases, the halfway point of the river could not be safely reached during the zig due to depth or high flow. In these instances, a returning zag was initiated from the furthest, safest location that could be reached. In addition, some transects did not allow for a complete 100-ft transect upstream or downstream from the initial midpoint. In such cases, the longest attainable distance was completed. In addition to the two surveyors conducting the zigs and zags, a third surveyor focused on areas that appeared to be of the best snail habitat, this person was deemed the “rover.” Areas were chosen based on previous knowledge of quality snail habitat gained during the 2013 survey. All gastropods found were collected in plastic vials until the transect was completed. Gastropods were then preserved in ethyl alcohol. Notes were taken at each transect depicting the actual location and cataloguing what was sampled.

FINDINGS

Visually monitor water quantity (discharge) through USGS Stream Flow data. On April 1, 2016, the designated end of the snow-measuring season, the Truckee River Basin snow pack stood at 102% of average and the overall precipitation for the year stood at 108%. The slightly above average winter brought much needed relief to the drought stressed region in 2016. The snowpack and precipitation allowed for some filling of the upstream storage reservoirs and was able to maintain flow in the mainstem Truckee River for all of 2016. The USGS gage on the Truckee River located in Reno recorded average to above average flow rates for large portions of 2016, with flow rates dipping below the long-term average on only a few short occasions (Figure 1). Lake Tahoe water level had rose above its natural rim for the first time since 2014 and was maintained until mid-summer when it once again fell below the natural rim. Although there are several gages, the Reno gage was a general representation of water conditions throughout the Truckee Meadows downstream to Derby Dam.

Discharge in the Truckee River near Wadsworth (Figure 2) mirrored upstream discharge for the majority of the year. Flow remained near the 43-year average for that location and saw several large spikes that were attributed to precipitation events.

Discharge near Mogul (Figure 3) realized significantly better flow rates than in 2015 but were still below the 21-year average for a large portion of 2016. The gage is situated downstream of the Washoe Highlands diversion dam that diverts water for municipal use. Due to this diversion, lower flows are realized in the reach of river that runs from the diversion downstream to the confluence of Hunter Creek. Continued

winters of average to above average snowpack will be needed for this portion of the river to maintain flows that are consistent with the long-term average.

Figure 1. USGS Gage - Truckee River at Reno – 2016 Discharge Summary.

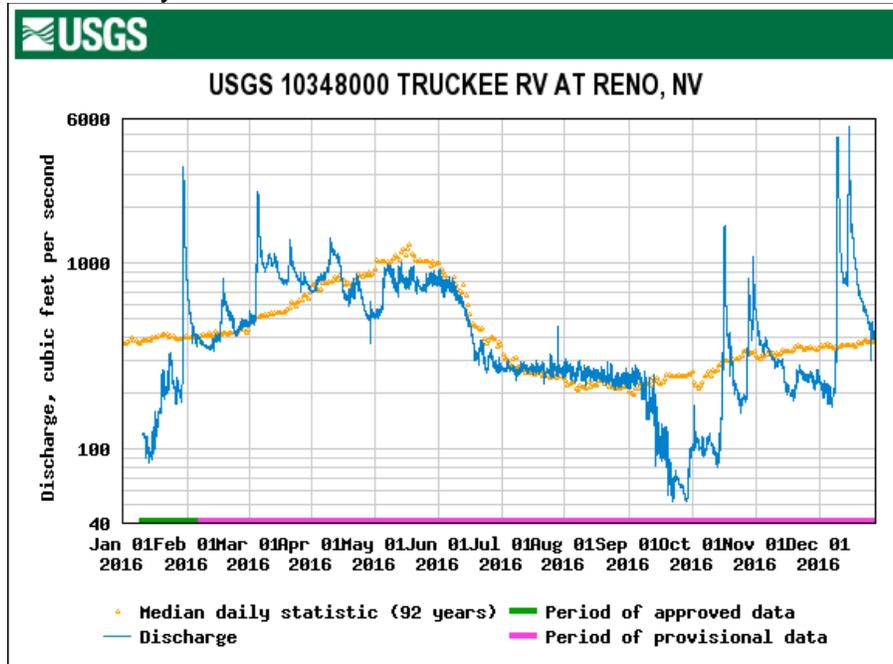


Figure 2. USGS Gage – Truckee River near Wadsworth – 2016 Discharge Summary.

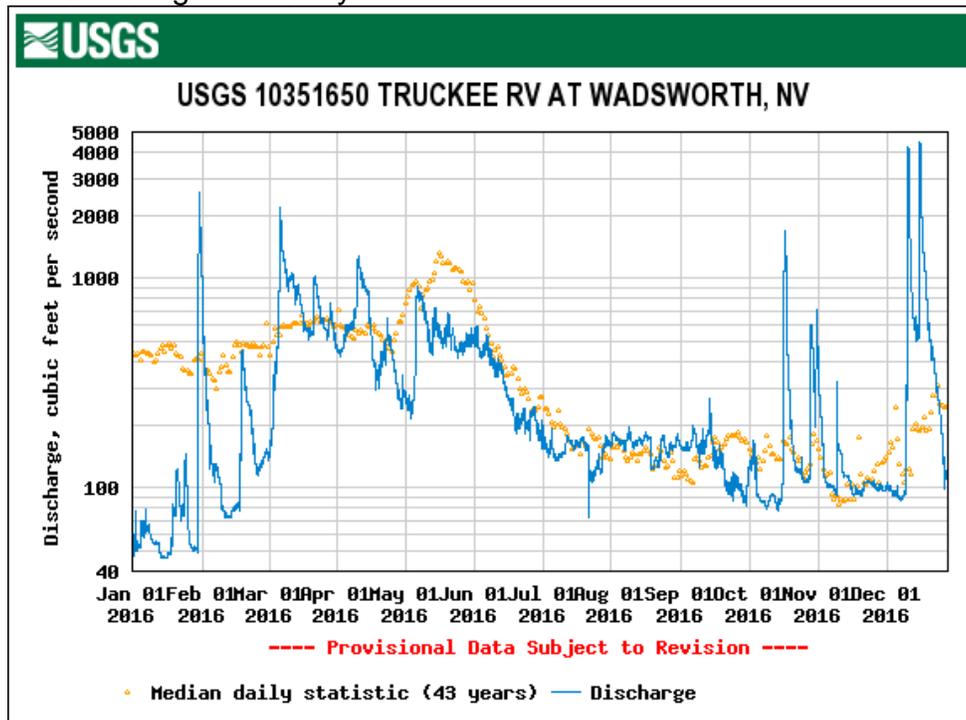
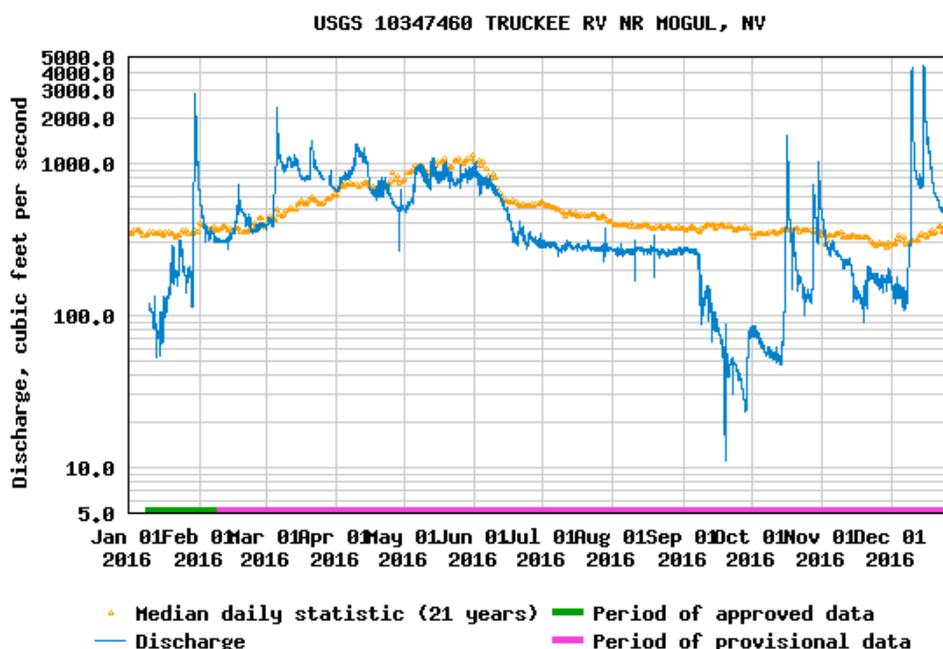


Figure 3. USGS Gage – Truckee River near Mogul – 2016 Discharge Summary.



Monitor fish populations by conducting tote-barge electroshocking surveys at 11 traditional transects during three days in the fall. With the return of a more normal flow regime in 2016, the first full electroshocking survey since 2013 was conducted on the Truckee River. Ten fish population survey transects were completed across four river zones (2 through 5) on the Truckee River from October 25 to 27, 2016. A total 903 fish were captured during the survey consisting of 187 salmonids, 668 native non-game species, and 48 undesirable species. Salmonids caught were comprised of rainbow, brown, and brook trout, all of which are non-native, as well as native mountain whitefish. Although more than 60,000 LCT were stocked into the Truckee River in 2016, none were observed or captured during the survey. Native non-game species consisted of Paiute sculpin, redbside shiner, speckled dace, mountain sucker, Tahoe sucker, and tui chub. Green sunfish, largemouth bass, fathead minnows, and common carp made up the component of undesirable species. Undesirable species are a result of unintentional and/or illegal introductions in the river over time.

Excluding undesirable species, a game fish to non-game fish ratio of 28:72 was found. This ratio is far different from the ratio of 56:44 experienced during the last full survey (2013). This change in fish composition may be a function of the four-year drought the area has experienced that culminated in 2015 with large portions of the Truckee River becoming dry and void of flow. Salmonid species are not as tolerant to lower levels of dissolved oxygen and warmer temperatures and large die offs were experienced in certain reaches of the river.

Zone 2 population sampling transects were completed at Painted Rock and Derby Dam. A total of 103 non-game fish, 24 salmonids, and 38 undesirable fish were captured. Non-game fish captured include redbside shiners, mountain suckers, Tahoe

suckers, mosquito fish, and speckled dace. Undesirable fish consisted of green sunfish and largemouth bass. Salmonids were comprised of 20 rainbow trout and 4 brown trout resulting in a relative density of 60.8 fish per mile. While only four brown trout were sampled, one of the four was a juvenile (less than 150 mm). This is a positive sign that despite low flow conditions, some successful recruitment occurred during 2015. Approximately 60% of wild rainbow trout captured in Zone 2 were Class I or younger fish (<150 mm) suggesting excellent recruitment in 2015. Of the 20 rainbow trout captured, 70% were identified as wild fish.

Table 1. Zone 2 Salmonid Data.

		Brown	Rainbow	LCT	Whitefish
No. Caught		4	20	0	0
Avg. Size	mm	203	204	0	0
	inches	8.0	8.0	0	0
Size Range	mm	106.0	118.0	0.0	0.0
	inches	4.2	4.6	0.0	0.0
	mm	289.0	370.0	0.0	0.0
	inches	11.4	14.6	0.0	0.0
# Wild		4	14	0	0
Percent Wild		100.0%	70.0%	0	0
Fish / Mile (By Species)		10.1	50.7	0.0	0.0
Total Trout (Incl. Pools)		24			
Total Salmonids (Incl. Pools)		24			
Trout Fish / Mile (River)		60.8			
Salmonid Fish / Mile (River)		60.8			

A single population sampling transect was completed in Zone 3 at McCarran Ranch. This transect was added in 2012 and provides a unique look at the fisheries response to a number of restoration projects that have taken place on this stretch of the Truckee River. A total of 270 non-game fish, 17 salmonids, and 20 undesirable fish were captured. Non-game fish were represented by Lahontan redbside, mountain sucker, speckled dace, and Tahoe sucker. The undesirable species sampled were fathead minnow and green sunfish.

Salmonids were comprised of five brown trout and 12 rainbow trout resulting at a combined density of 97.7 fish per mile (Table 2). Of the brown trout sampled, 60% were considered Class I or younger (<150 mm). Similarly, 63.6% of wild rainbow trout captured in Zone 3 were class I or younger fish and all rainbow trout were identified as wild fish. The high levels of recruitment occurring in a stretch of the Truckee River that saw extremely low flows and high water temperatures during 2015 are a positive indicator of successful restoration work in the area. Continued monitoring of this zone will provide further insight into the full effects of the restored portion of the Truckee River in response to the four years of drought it has experienced.

Table 2. Zone 3 Salmonid Data.

		Brown	Rainbow	LCT	Whitefish
No. Caught		5	12	0	0
Avg. Size	mm	228	145	0	0
	inches	9.0	5.7	0	0
Size Range	mm	130	100	0	0
	inches	5.1	3.9	0.0	0.0
	mm	569.0	190.0	0.0	0.0
	inches	22.4	7.5	0.0	0.0
# Wild		5	11	0	0
Percent Wild		100.0%	91.7%	0	0
Fish / Mile (By Species)		28.7	69.0	0.0	0.0
Total Trout		17			
Total Salmonids		17			
Trout Fish / Mile		97.7			
Salmonid Fish / Mile		97.7			

Zone 4 population sampling transects were completed at two transects at Rock Park in 2016. Traditionally, there was also a transect on the southern channel at Wingfield Park, but low flow made it difficult to survey and that transect was eliminated. A total of 35 non-game fish and 11 salmonids were captured. Non-game fish captured included Lahontan redbside, speckled dace, and Tahoe sucker.

Salmonids were comprised of four brown trout, six rainbow trout, and a single brook trout (Table 3) resulting in a density of 27.9 fish per mile. Approximately 75% of brown trout captured in 2016 were considered Class I or younger fish (<150 mm), which is a positive sign of recruitment in a severely drought impacted reach of the river. Approximately 40% of wild rainbow trout captured in Zone 4 were Class I or younger fish (<150 mm), again showing positive signs of recruitment in this stretch of the river. A single brook trout was found in Zone 4 and was highly unusual. It is thought that a rainstorm and subsequent spike in river flow may have resulted in the brook trout washing downstream and finding refuge in Zone 4. Wingfield park was not surveyed in 2016 and historically has one of the highest percentages of juvenile salmonids during the survey. For this reason, it appears that recruitment levels in Zone 4 are down from what they were during the last full survey (2013,) but those numbers are skewed due to the lack of data from Wingfield Park.

Table 3. Zone 4 Salmonid Data.

		Brown	Rainbow	LCT	Whitefish
No. Caught		4	6	0	0
Avg. Size	mm	137	246	0	0
	inches	5.4	9.7	0	0
Size Range	mm	120.0	102.0	0.0	0.0
	inches	4.7	4.0	0.0	0.0
	mm	155.0	490.0	0.0	0.0
	inches	6.1	19.3	0.0	0.0
# Wild		4	5	0	0
Percent Wild		100.0%	83.3%	#DIV/0!	#DIV/0!
Fish / Mile (By Species)		10.1	15.2	0.0	0.0
Total Trout		11			
Total Salmonids		11			
Trout Fish / Mile		27.9			
Salmonid Fish / Mile		27.9			

Zone 5 population sampling transects were completed at Patagonia, River Bend Dam, Crystal Peak Park, and Verdi Power Dam. A total of 128 non-game fish and 128 salmonids were captured. Non-game fish captured included Paiute sculpin, speckled dace, mountain sucker, Tahoe sucker, Lahontan redbside, and one tui chub.

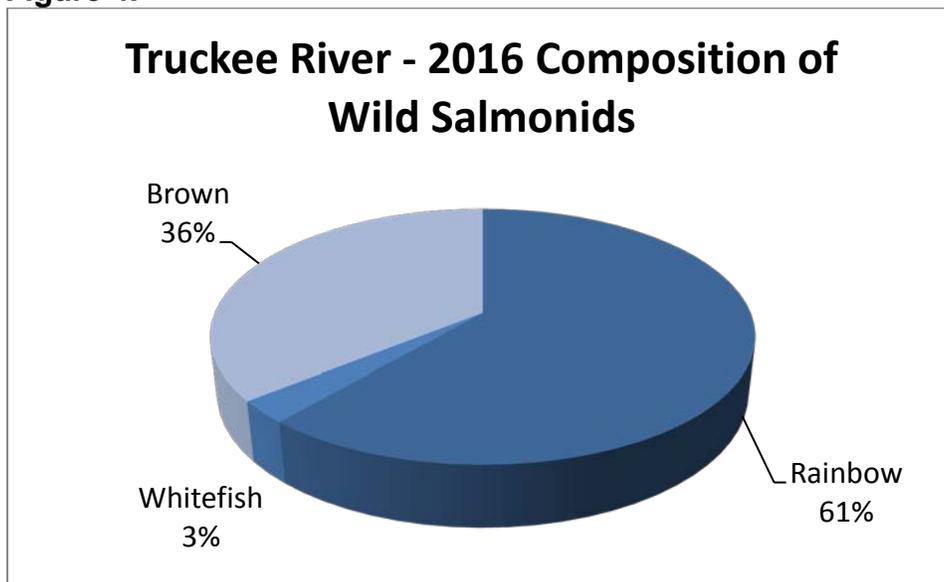
Salmonids were comprised of 25 brown trout, 100 rainbow trout, and 3 mountain whitefish resulting in a density of 204 fish per mile (Table 4). Fish collected and processed from large pools at the foot of River Bend Dam and Verdi Power Dam were included in length assessments, but not factored into density estimates. Class 1 (<150 mm) brown trout made up approximately 52% of the total captured in Zone 5 and represents positive recruitment. Approximately 60% of wild rainbow trout captured in Zone 5 were Class I or younger fish (<150 mm), also suggesting good recruitment in 2016. Of the 100 rainbow trout captured, 35% were identified as wild fish. During the month preceding the survey, the Truckee River was stocked with hatchery raised triploid rainbow trout, many of which were planted in Zone 5. Only three whitefish were sampled and all three were found in Zone 5. It appears that the four year drought in the region is having the most significant impact on this species.

Table 4. Zone 5 Salmonid Data.

		Brown	Rainbow	LCT	Whitefish
No. Caught		25	100	0	3
Avg. Size	mm	275	221	0	176
	inches	10.8	8.7	0	6.9
Size Range	mm	100	77	0	164
	inches	3.9	3.0	0.0	6.5
	mm	670	445	0	200
	inches	26.4	17.5	0.0	7.9
# Wild		25	35	0	3
Percent Wild		100.0%	35.0%	0	100.0%
Fish / Mile (By Species)		30.4	105.6	0.0	5.4
Total Trout (Incl. Pools)		125			
Total Trout (Excl. Pools)		111			
Total Salmonids (Incl. Pools)		128			
Total Salmonids (Excl. Pools)		114			
Trout Fish / Mile (River)		198.7			
Salmonid Fish / Mile (River)		204.0			

Relative density of salmonids in the Truckee River across all transects and zones averaged 97.6 fish per mile down from the 614.8 fish per mile observed during the last full survey in 2013. Salmonid estimates ranged from a low of 25.7 fish per mile at the first Rock Park transect to a high of 470.2 fish per mile at Crystal Peak transect. It should be noted historically that Wingfield Park has the highest density estimates of any transect. In 2016, this transect was not surveyed. Composition of wild salmonids from all transects showed 61% rainbow trout, 36% brown trout, and 3% mountain whitefish (Figure 4). This is similar to the results in 2013 showing 64% rainbow trout, 27% brown trout, and 9% mountain whitefish.

Figure 4.

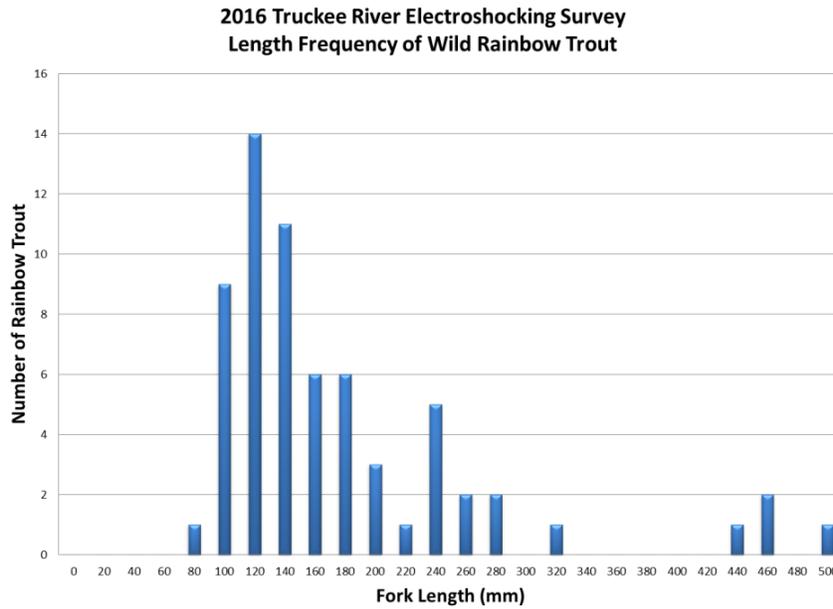


A length frequency analysis of wild rainbow trout reveals at least five age classes currently inhabiting the Truckee River (Figure 5). A breakpoint of 5.9 in (150 mm) was used to distinguish Class I and younger fish while breakpoints at 8.7 in (220 mm), 11.8 in (300 mm), and 16.5 in (420 mm) were used to separate older age classes. Due to rainbow trout of various sizes being stocked throughout the year, it is important to note the length frequency analysis was completed only with rainbow trout identified as wild. Of the 65 wild rainbow trout analyzed, 60% (39 fish) were deemed as Class I or younger and were positive indicators of successful spawning in 2015 and 2016. As noted above, Wingfield Park historically has the highest percentage of juvenile fish of any transect sampled and was not sampled in 2016. Of the 138 rainbow trout captured at all transects, 47.1% (65 fish) were deemed as wild.

Rainbow trout appear to have been negatively impacted by the four-year drought experienced in the region. Density estimates for rainbow trout across all transects (excluding Wingfield Park) in 2013 was 240 fish per mile while the average in 2016 across the same transects was 109 fish per mile. This is a decline of nearly 55% in the course of three years. This negative impact is also conveyed in the length frequency analysis. A clear gap in size structure can be observed by three and four year old fish. These fish would have presumably been the hardest impacted during the drought as they were forced to occupy either unsuitable habitat where low flows and high temperatures caused them to perish or they were occupying habitat with larger predatory fish that may have utilized them as forage. A large percentage of the wild rainbow trout were juveniles (60%), a positive sign of their ability to compensate for the loss in abundance experienced over the past few years. If the flow regime returns to a more normal state and there is relief from the drought, this species has previously shown the ability to repopulate rapidly and fill in vacant habitat. Moving forward, it is expected there may be a decline in trophy-sized fish as the missing age class (3-4) moves out and the older age fish currently in the system phase out.

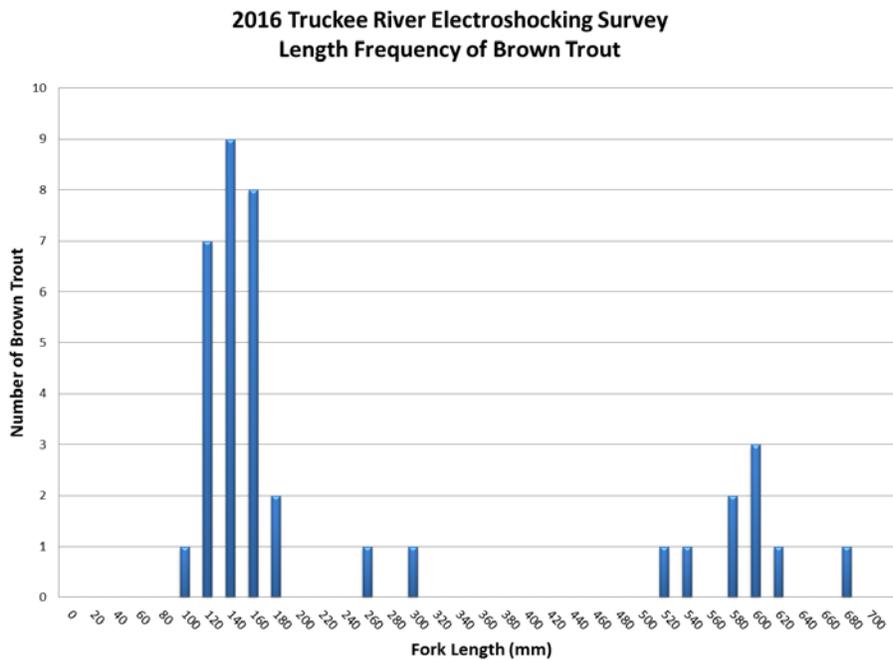
When analyzing the length frequency of brown trout captured during the 2016 survey, a total of five age classes can be observed (Figure 6). A length breakpoint of 7.9 in (200 mm) was used to distinguish Class I and younger fish. It is assumed that older fish (\geq Class II) have suffered from poor growth rates due to the drought experienced. Breakpoints of 12.6 in (320 mm), 22.0 in (560 mm), and 25.2 in (640 mm) were used to reveal older age classes found in the survey. Similar to rainbow trout, it appears that a gap in age structure resulted from the poor flow conditions experienced from 2012 to 2015. Fish that would be in the three to five year old range were not sampled and appear to be the most affected by the drought. All brown trout captured were considered wild as none have not been stocked since 2005. Of the 38 wild brown trout analyzed, 52.6% were deemed to be Class I or younger and serve as a positive indicator of successful spawning in the past two years.

Figure 5.



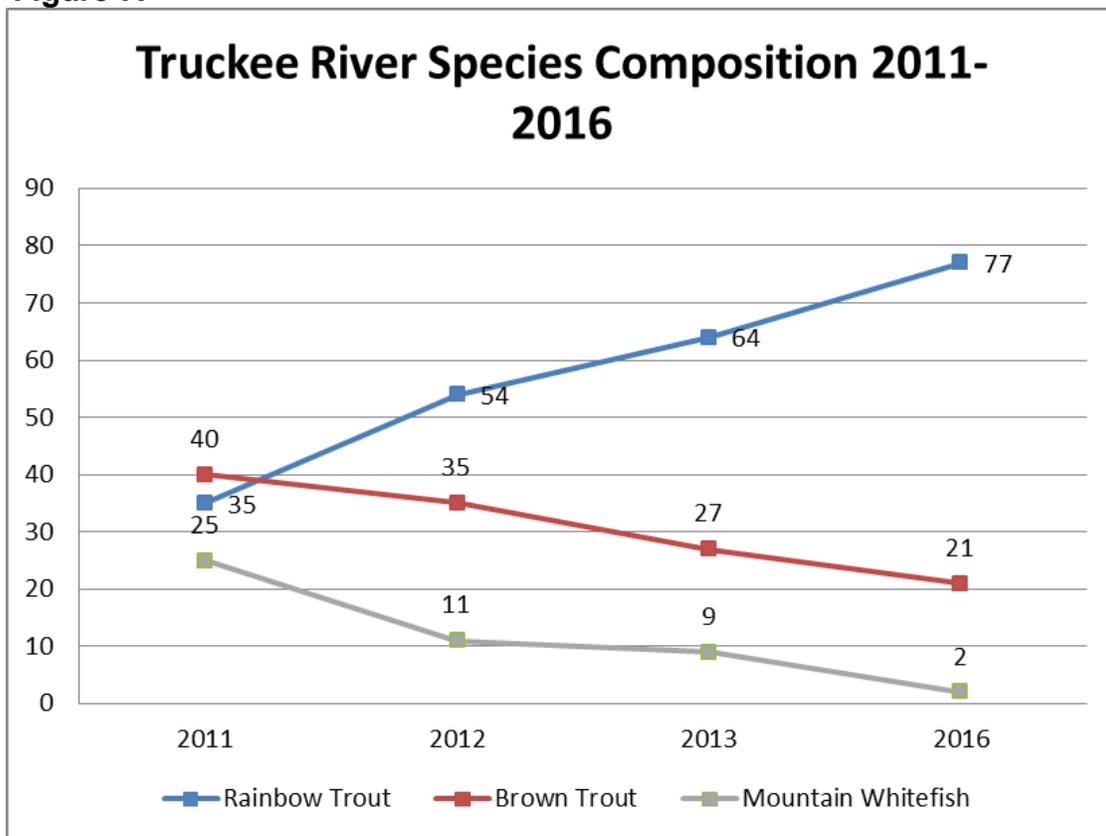
Brown trout populations in the Truckee River appear to have been negatively impacted by the drought conditions experienced from 2012 to 2015. A gap in age structure may have an impact to what anglers commonly refer to as trophy-sized trout in the years to come. As with the rainbow trout, when older age classes phase out and the observed gap in the age structure moves into that bracket, there will be a lack of larger fish. Juvenile brown trout data reveals that the population appears to be rebounding and, with continued precipitation and relief from the drought, the wild brown trout population should return to pre-drought conditions quickly.

Figure 6.



The mountain whitefish population within the Nevada portion of the Truckee River appears to be suffering as a result of the poor flow conditions in the region. A total of three mountain whitefish were found during the 2016 survey and all were found in Zone 5. The average size was (176.3 mm) and the largest was (200 mm). Mountain whitefish are known for their sensitivity to water conditions and temperature, and with the extremely low flows experienced throughout the Truckee River from 2013-2015, their population has been negatively impacted. With continued relief from the drought, it is expected that the native salmonid will rebound. Figure 7 shows declines in brown trout and mountain whitefish since 2011. Rainbow trout abundance has increased.

Figure 7.



During the course of the survey, a subset (fish over 275 mm) of salmonids sampled were measured to fork length and weighed in grams in order to calculate Fulton's K (condition factor). The results are presented in Table 5. Overall, the fish included were considered to be in good health, with several fish falling into the excellent rating. Average K-factors of 1.3 for both brown and rainbow trout are on the healthy side of the spectrum and represented most of the fish handled during the survey. Because the overall population level has declined due to the drought, it is hypothesized the remaining fish in the Truckee River have benefitted from increased forage and habitat availability (density dependent growth). This increase in available habitat and forage is being expressed in the body condition of individual fish.

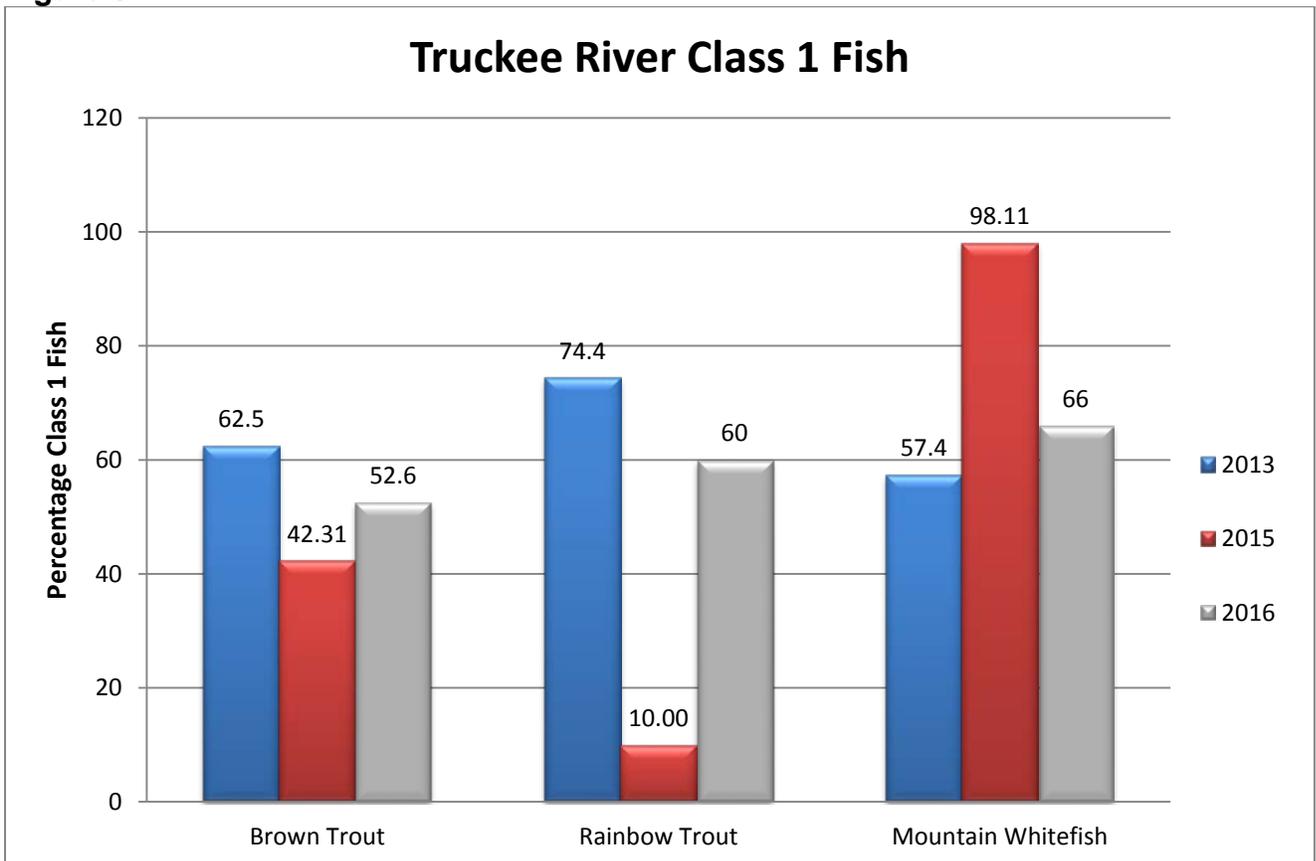
Table 5.

TRUCKEE RIVER POPULATION SAMPLING Salmonid Body Conditions Factors 2016						
	Avg. Length		Range		Avg. K-Factor	Range
	mm	inches	mm	inches		
Brown Trout (10)	552	21.7	289 - 670	11.4 - 26.4	1.28	1.0 - 1.7
Rainbow Trout (7)	403	15.9	310 - 490	12.2 - 19.3	1.25	0.9 - 1.8

* () indicates the number of fish measured

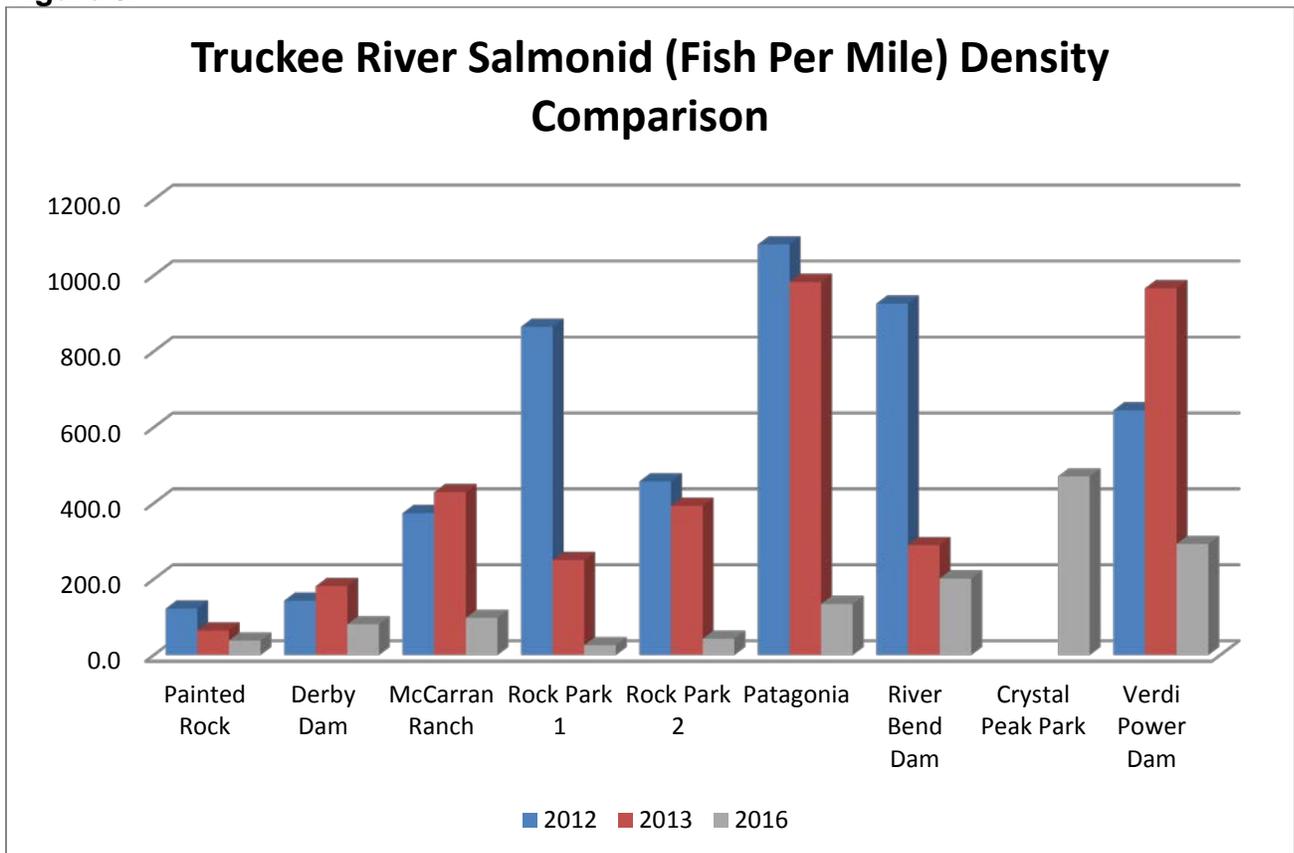
An important aspect of the Truckee River fishery is its ability to be maintained as a wild trout fishery. A significant decline in recruitment was seen during 2015 for both brown and rainbow trout while mountain whitefish increase. Flow rates experienced in 2015 were the worst the river had experienced in over two decades and there was a measurable effect on spawning and recruitment of trout species in the river. The winter of 2016 brought relief from the drought and flows that are more normal were realized throughout the year. With this, recruitment of juvenile trout returned to levels more consistent with the long-term averages and the rivers potential. It should be noted that only three mountain whitefish were sampled in 2016, a larger sample size would be necessary to make any assumptions about that species population structure.

Figure 8.



When comparing the survey results from 2016 to the last few years that full surveys were completed it becomes clear that the Truckee River fishery has been negatively impacted by the drought conditions experienced beginning in 2012 and culminating in 2015. Salmonid density (fish per mile) estimates were lower in 2016 at each transect sampled excluding the Crystal Peak transect where surveys were not conducted in 2012 and 2013. Similarly, density estimates by river zone were also lower in 2016 than in previous years. In all, the Truckee River salmonid fishery in 2016 was 25.6% of what it was in 2013 based on the electroshocking surveys. While a decline of nearly 75% is undesirable, it was not unexpected and the fisheries have shown the ability to rebound quickly after other similar periods of time (1992 to 1994).

Figure 9.



Collect fin samples from rainbow trout and LCT for genetic analysis during electroshocking surveys for genetic analysis by the University of Nevada Genetics Lab. A total of 30 rainbow trout fin clips were collected during the electroshocking survey in 2016 from five different transects (Verdi Dam, Crystal Peak, Rock Park, Patagonia, and McCarren Ranch). The samples were collected from locations spanning the portion of the river managed by the state of Nevada and should provide an accurate representation of the genetic makeup for the wild rainbow trout in the Truckee River. Samples were delivered to the University of Nevada Genetics lab and results are pending.

Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts, return of angler drop-box surveys, and mail-in angler questionnaire data. During the spring of 2016, the USFWS began stocking the Truckee River with Pilot-Peak strain Lahontan cutthroat trout. In an effort understand how this affected recreational fishing, NDOW and USFWS conducted a creel survey by making numerous trips to the river throughout 2016. A standardized form was used to record angler hours fished, species caught, tackle used, size of catch, and other pertinent information. Stocking locations were targeted for angler contacts, but other areas were also opportunistically visited.

In all, 11 creel survey trips were made by NDOW (Table 6). Rainbow trout were the most prevalent species caught at 1.4 fish per hour, while Lahontan cutthroat trout and brown trout catch rates were 0.5 and 0.1 fish per hour, respectively. Of the anglers contacted, 78.9 percent reported being satisfied with their fishing experience. Only two fish were reported being harvested (one rainbow and one LCT) out of 72 caught. Fly tackle was most commonly used, with lures being second and bait being the least common. The first LCT reported caught was on June 28 and the last reported was on July 29, while rainbow trout were first reported on July 7 and the last being on August 30. This could be a function of rainbow trout being stocked in both the spring and fall, whereas LCT was stocked in the spring due to availability.

Table 6.

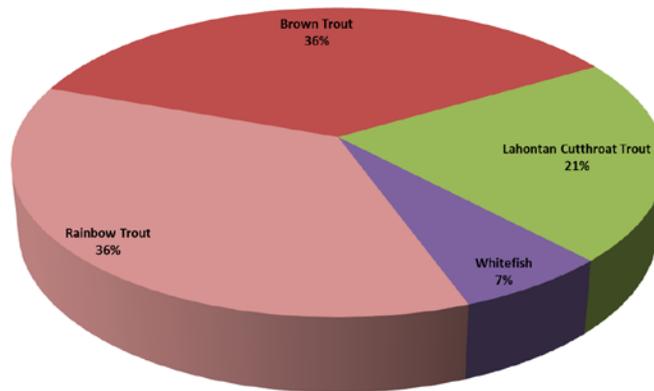
Truckee River Creel Survey - 2016 -NDOW					
Number of Anglers			38		
Hours Reported			36.6		
% Satisfied with experience			78.9		
Species	# Caught	Length (mm)	% Hatchery	# Harvested	Fish/Hour
RB	51	211.2	96.1	1	1.4
BN	3	237.1	0	0	0.1
LCT	18	209.2	100	1	0.5

Being this was the first year creel surveys have been used to assess angler satisfaction and success in regards to of Lahontan cutthroat trout, numerous things were learned and the approach will be adjusted in the future. An actual schedule of survey days and a refined list of survey sites will be developed for the 2017 field season.

A total of 66 volunteer angler surveys in 2016 were received from the three drop-boxes along the Truckee River. Anglers fished for 150.5 hrs and caught 61 fish consisting of 22 rainbow trout, 22 brown trout, 13 cutthroat trout, and 4 mountain whitefish (Figure 10). Catch rates (all fish) were 1.0 fish per angler and 0.4 fish per hour. Of the fish reported, all but six brown trout were released. The reported angler use in was higher than the five-year average of 56.4 anglers. The increased angler interest in 2016, from the five year low reported in 2015, was attributed to improved flow conditions and cooler water temperatures.

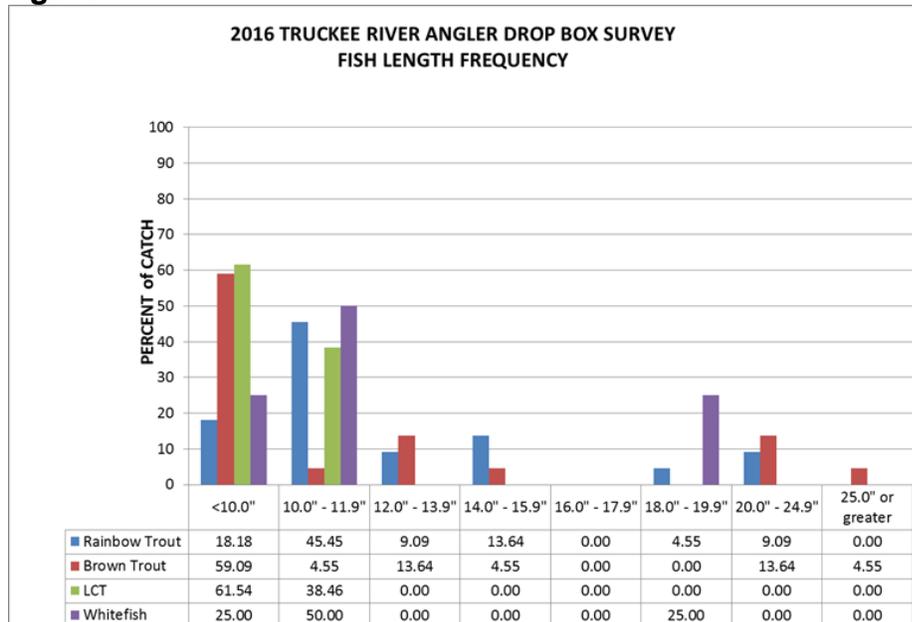
Figure 10.

2016 Truckee River - Angler Drop Box Species Composition



An examination of fish lengths from drop-box data showed rainbow trout occurred in most size categories below 24.9 in, with the heaviest representation being in the 10.0 to 11.9 in bracket (Figure 11). This was the size that most hatchery-raised rainbow trout were stocked. Brown trout were also represented in most size classes, with a limited amount greater than 25 in and most heavily represented in the less than 10.0 in bracket. Lahontan cutthroat trout were less than 11.9 in, which was expected as all LCT are presumed to have been hatchery raised and stocked at the 8.0 to 12.0 in.

Figure 11.



Average ratings varied from 0.21 for total fishing experience, -0.04 for size of fish, and -0.53 for number of fish. Ratings were slightly below the five year averages and were attributed to drought related population declines. In general, anglers report a more positive experience when they are able to catch more fish.

The Mail-in Angler Questionnaire Survey estimated use at 2,888 anglers and 14,377 angler use days in 2015. There was an estimated 18,656 fish caught for an angler success rate of 1.3 fish per day. These estimates were the second lowest (1992) in the 35-year history of the angler questionnaire data on the Truckee River. This was not surprising, as flows were extremely low and limited to standing water for entire reaches of the Truckee River in 2015. Anglers were encouraged to limit their activities on the river in 2015 by the Nevada Department of Wildlife and it appeared a large portion of the angling community obliged.

From February through early April, the Truckee River received 30,185 triploid rainbow trout and 61,142 Pilot-Peak strain Lahontan cutthroat trout (Table 7). With a more normal flow regime in 2016 and having an availability of LCT, stocking numbers were increased to numbers more consistent of the long-term average for the river. Efforts between NDOW, USFWS, and PLPT in recent years have implemented a stocking strategy that should improve LCT restoration efforts in the Truckee River (Appendix B) and still maintain a quality sport fishery. For this reason, Lahontan cutthroat trout were stocked into the Truckee River in 2016 for the first time since 2011. Stocking LCT provides for another species that anglers can catch, while at the same time raising awareness for the only native trout in the Truckee River basin.

Table 7. Truckee River Stocking Summary – 2016

Species	Number	Average Size	Date
Lahontan Cutthroat	3561	9.9	4/28/2016
	4525	9.2	5/4/2016
	4499	8.1	5/5/2016
	4763	8.9	5/10/2016
	4575	9.1	5/11/2016
	2652	7.9	5/17/2016
	2652	7.9	5/19/2016
	4500	8.8	5/25/2016
	4476	8.9	5/31/2016
	4458	9.2	6/1/2016
	3289	7.8	6/7/2016
	3289	7.8	6/8/2016
	5004	8.1	6/14/2016
	4844	8.5	6/15/2016
	200	9.4	6/20/2016
3855	9.4	6/21/2016	
Total Cutthroat	61142		
Rainbow	5948	9.4	3/30/2016
	6498	9.1	4/20/2016
	6650	8.9	8/23/2016
	5960	9.4	9/7/2016
	5129	9.8	9/15/2016
Total Rainbow	30185		
2016 Total	91327		

Maintain the angler information center and angler drop-boxes. Angler drop-boxes were maintained and restocked on a regular basis during the course of other duties along the river.

Conduct 2 days of presence/absence surveys for New Zealand mud snails at suitable locations upstream and downstream of the area they are known to occupy. A total of seven transects were completed during the 2016 surveys. Five of the seven transects were repeated from the 2015 survey, while two transects not been done since 2013 were completed.

In 2016, no NZMS were found at any of the five 2015 transects and it is reasoned that the distribution of NZMS in the Truckee River remains the same as it was in 2013. This is further supported by the fact that in 2016 NZMS continued to occupy the mid-river transects of Rock Park and Mayberry Park where they were documented in 2013. Further analysis reveals that, while NZMS declined in number at the Mayberry Park transect, they showed a slight increase in number at the Rock Park transect. The results of the 2016 NZMS Distribution Survey are presented in Table 8.

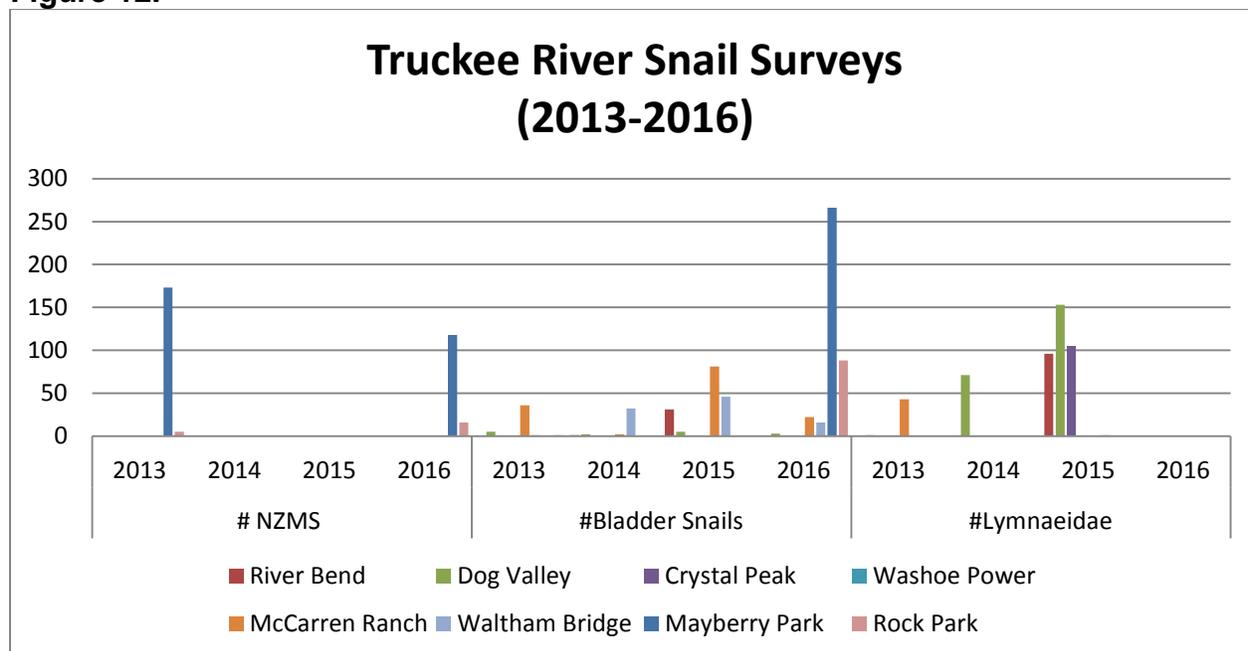
Table 8. 2016 New Zealand Mud Snail Survey Results

Date	Waypoint	Location	Bank (N/S)	Temp. (F)	# Total Snails	# NZMS	# Physa
7/12/2016	16MS 14	Crystal Peak Park	N (W)	56	0	0	0
7/12/2016	16MS 13	Dog Valley Bridge	S	61	3	0	3
7/12/2016	16MS 12	River Bend	S	59	0	0	0
7/13/2016	16MS 022	McCarran Ranch	N	62	22	0	22
7/13/2016	16MS 23	Waltham Bridge	S	62	16	0	16
7/12/2016	16MS10	Mayberry Park	N	63	384	118	266
7/13/2016	16MS001	Rock Park	S	62	104	16	88

Two species of gastropods, an unnamed species of snail (*Lymnaeidae sp.*) and bladder snails (*Physa sp.*) are native to the Truckee River basin. Of note is that no *Lymnaeidae sp.* was observed in any 2016 transect, but was observed at its highest numbers in 2015 since the survey began. Similarly, bladder snail (*Physa sp.*) densities decreased at most transects in 2016. The most notable decrease was at River Bend transect where the number of snails collected decreased from 31 in 2015 to none in 2016. These sharp declines may be attributed to this being the first average water year since the surveys began in 2013. The higher flows obscure some of the more suitable snail habitat and make locating them more difficult. In addition, surges in discharge cause increased flow rates making it difficult for snails to attach successfully to substrates. There is also the possibility that the extremely low flows realized in late

summer of 2015 (no flow in some reaches), may have led to substantial die offs of gastropod species due to exposure. Figure 3 shows the survey results from 2013 to the present.

Figure 12.



MANAGEMENT REVIEW

The winter of 2015/2016 provided a slightly above average snowpack to the region, which was realized in the return of a more normal flow regime in the Truckee River. Continual flow was provided to all reaches of the river throughout 2016 and evidence of compensatory response was found in most species of fish that were found in the 2016-electroshocking surveys. The improved flow in 2016 enabled the USFWS to stock more than 60,000 Pilot-Peak Lahontan cutthroat trout into the Truckee River. This effort was met with approval from most anglers contacted during creel surveys along the river and was valuable in providing recreational fishing for the only native trout species to the Truckee River. Hatchery raised triploid rainbow trout were also stocked in 2016 to augment the recreational fishery. As a whole, the Truckee River has started the process of rebuilding a wild fishery that was negatively impacted by the historic drought experienced from 2012 to 2016. Future management of the Truckee River should focus on persistence of the wild component in the river. The wild fishery has proven to be resilient and survivors are expected to repopulate the river. Stocking with hatchery fish should continue in a limited capacity to provide opportunity for the angling community, but it should not be utilized as a means of repopulating the river.

Angler success rates documented through opportunistic contacts, the drop-box survey, and the Mail-in Angler Questionnaire Survey were lower in 2015 and 2016 than the long-term averages, but the fishery currently meets the guidelines prescribed in a coldwater General Fishery Management Concept. With the return of flow rates more

consistent to the long-term averages, it is expected that anglers will once again return to the river.

LCT recovery on the Truckee River continues to prove challenging. Having hatchery LCT available for 2016 has increased recreational angling opportunity and was met with support from the majority of anglers contacted on the river. In conversations with USFWS and PLPT, it has been expressed that the potential for lake-run Pilot-Peak strain LCT to reach the Nevada managed portion of the Truckee River is a real possibility in the next one to three years. For this reason, the Nevada board of wildlife commissioners approved a regulation change recommended by NDOW. The regulation will make the portion of the Truckee River that runs from 1,000 feet downstream of Derby Dam to the boundary of the Pyramid Lake Reservation boundary catch and release for trout only and limit the tackle to artificial lures with single barbless hooks. This regulation will be in place annually from February 1 to May 31 and goes into effect in 2017. This will protect lake-run LCT from harvest, while at the same time allowing recreational anglers to fish that portion of the river. These steps and actions bode well for the potential of LCT recovery in the Truckee River, but numerous other challenges will need to be addressed in the coming years.

RECOMMENDATIONS

- Monitor water quantity (discharge) through USGS Stream Flow data.
- Monitor fish populations by conducting tote-barge electroshocking surveys at nine transects during three days in the fall.
- Collect fin samples from rainbow trout and LCT during electroshocking surveys for genetic analysis by the University of Nevada Genetics Lab.
- Conduct a general assessment of angler use, success, and harvest through opportunistic angler contacts, return on angler drop-box surveys, and mail-in angler questionnaire data.
- Maintain the angler information center and angler drop-boxes.
- Conduct two days of presence/absence surveys for New Zealand mud snails at suitable locations upstream and downstream of the area they are known to occupy.
- Conduct 10 days of creel survey to determine angler support for and success on Pilot-Peak strain Lahontan cutthroat trout.

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Fisheries Biologist III

Date: January 5, 2017

Appendix A

Truckee River Fish Per Mile Estimates – 1997 – 2016

Brown Trout																			
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2015	2016
Painted Rock	520.6	130.2	257.0	40.4	19.8	10.1	701.6	0.0	0.0		15.3	16.7	22.2			25.4	46.9		5.4
Derby Dam	57.3		15.6	0.0	37.7		35.2		34.3		41.4	21.6	51.0			28.6	68.7		14.3
McCarran Ranch																48.7	115.5	8.9	28.7
Rock Park 1								70.4			82.4	187.1	63.4	50.7		335.8	71.5		6.4
Rock Park 2												13.5	227.8	117.6		314.4	150.0		21.4
Patagonia			319.6	437.7	104.7	224.4	207.7		317.0	32.8	627.7	195.6	46.8	112.3		63.6	33.3		11.4
River Bend Dam							528.0	440.0	139.0		845.2	517.5	962.6	661.8	120.7	482.4	125.7	113.6	113.1
Crystal Peak Park	584.0		117.3	98.9	75.4	112.8	98.6		271.6	86.9	167.2	154.0	130.5	228.4	87.1				80.6
Verdi Power Dam (river)	55.6	63.0	74.3	406.2	208.2	132.5	71.6		122.8		81.9	388.9	344.9	325.7	115.2	282.9	225.4	31.6	73.1
Average fish per mile:	304.4	96.6	156.8	196.6	89.2	120.0	273.8	220.0	136.4	59.9	265.9	186.9	231.2	249.4	107.7	197.7	104.6	51.4	39.4
Rainbow Trout																			
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2015	2016
Painted Rock	0.0	0.0	276.8	336.7	13.2	5.0	0.0	0.0	0.0		117.0	116.9	94.3			96.6	17.6		32.5
Derby Dam	24.6		78.1	301.8	37.7		23.5		11.4		48.3	215.5	85.0			114.3	112.5		66.7
McCarran Ranch																324.9	313.5	8.9	69.0
Rock Park 1								61.6			314.6	386.7	133.1	354.8		528.7	64.3		19.3
Rock Park 2												36.1	58.8	176.4		142.9	235.8		21.4
Patagonia			257.7	386.2	74.8	134.6	655.9		306.1	240.5	861.5	240.1	168.4	177.8		1017.8	849.5		122.9
River Bend Dam							404.8	422.4	0.0		1,126.9	414.0	902.4	421.1	90.5	443.3	50.3	52.4	62.9
Crystal Peak Park	73.0		39.1	98.9	50.3	56.4	151.7		282.5	97.8	281.6	242.0	119.6	184.9	119.8				389.6
Verdi Power Dam (river)	166.7	88.2	334.5	496.4	189.3	56.8	296.7		133.0		153.5	370.4	498.1	517.3	288.0	361.4	273.7	94.7	201.0
Average fish per mile:	66.1	44.1	197.2	324.0	73.1	63.2	255.4	211.2	113.5	169	414.8	252.7	257.5	305.4	166.1	378.7	239.7	52.0	109.5

Appendix B

Table 3. Truckee River Stocking History 2009 – 2015.

Year	Species	Number	Size Range (in.)
2009	Rainbow	39,999	8.5 – 10.8
	Lahontan Cutthroat	40,465	8.4 – 12.1
2009 Total		80,464	
2010	Rainbow	33,501	2.8 – 10.6
	Lahontan Cutthroat	55,115	6.4 – 9.5
2010 Total		88,616	
2011	Rainbow	24,586	9.7 – 10.8
	Lahontan Cutthroat	15,736	2.0 – 9.5
2011 Total		40,322	
2012	Rainbow	71,130	2.1 – 10.2
2012 Total		71,130	
2013	Rainbow	76,845	9.1 -- 10.8
2013 Total		76,845	
2014	Rainbow	41,029	2.1 – 10.2
2014 Total		41,029	
2015	Rainbow	29,069	9.3 - 9.8
2015 Total		29,069	
Total Rainbow		316,159	
Total Lahontan Cutthroat		111,316	