

NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

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2016

Third Creek
Lahontan Cutthroat Trout Feasibility Study
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: Third Creek Lahontan Cutthroat Trout Feasibility Study
Period Covered: January 1, 2016 through December 31, 2016

SUMMARY

US Geological Survey (USGS) data was used to assess water discharge (cfs) in Third and Incline creeks throughout the year. Flow rates were more consistent to the 40-year average than during the first year of the study (2015).

Beginning in late April and continuing through November, monthly single pass electroshocking surveys were conducted at three transects on Third and Incline creeks. Species sampled were identified, measured, and released unharmed at each transect. Brook trout, rainbow trout, and mountain whitefish made up the complex of sportfish sampled, while speckled dace, Tahoe sucker, and Lahontan reddsides made up the nongame component. All species sampled corresponded with their expected spawning run times. Young of the year rainbow trout were also sampled in both creeks, with Incline Creek having higher densities than Third Creek.

For the second consecutive year, a management barrier was installed on Third Creek directly below Lakeshore Blvd. A total of 30 adfluvial rainbow trout were captured in the stream reach below the barrier while it was in place.

BACKGROUND

Lake Tahoe is situated in the eastern portion of the Sierra Nevada Mountains and approximately 30 percent of the lake lies within Nevada. It is 22 miles long and 12 miles wide, has 123,300 surface acres, holds 122,160,280 acre-feet, has a maximum depth of 1,645 feet, and an average depth of 989 feet. A natural rim occurs at 6,223.0 feet above mean sea level (MSL), but a permanent concrete dam built in 1913 extends the lake elevation to 6,229.1 feet above MSL.

Since its discovery in the 1880's, many species of fish have been introduced into Lake Tahoe for expanding angling opportunities. Rainbow trout *Oncorhynchus mykiss* was first stocked in 1885. Lake trout (mackinaw) *Salvelinus namaycush* was presumed to be stocked as early as 1888. Brook trout *Salvelinus fontinalis* was introduced in 1891, as were Atlantic salmon *Salmo salar*. Chinook salmon *Oncorhynchus tshawytscha* was first stocked in 1910 and silver salmon *O. kisutch* in 1913. The introduction of kokanee salmon, landlocked sockeye salmon *Oncorhynchus nerka*, was in 1949. Bonneville cisco *Prosopium gemmiferum* was stocked in 1964 to expand the food base of lake trout. Other introduced fishes include brown trout *Salmo trutta*, largemouth bass *Micropterus salmoides*, brown bullhead *Ictalurus nebulosus*, mosquito fish *Gambusia affinis*, and golden shiner *Notemigonus crysoleucas*. However, many of

these introductions quickly failed and today lake trout, rainbow trout, brown trout, and kokanee salmon represent the bulk of the sport fish community in Lake Tahoe. Increased sightings of largemouth bass from around the lake, on the other hand, suggest it is expanding into new habitats.

Native fish communities in Lake Tahoe consist of mountain whitefish *Prosopium williamsoni*, although it was also stocked abundantly in the early 1900's, Tahoe sucker *Catostomus tahoensis*, Lahontan mountain sucker *C. platyrhynchus*, speckled dace *Rhinichthys osculus*, Lahontan redbreast *Richardsonius egregius*, Lahontan tui chub *Siphateles bicolor pectinifer*, and Paiute sculpin *Cottus beldingii*. Lahontan cutthroat trout *Oncorhynchus clarkii henshawi* was native to Lake Tahoe. This fish once was very abundant and grew to 30 pounds. However, the natural population was extirpated by the 1940's. Habitat disturbance, competitive interaction from introduced fishes, lack of spawning habitat resulting from tributary dewatering or impediments, and substantial commercial harvest have been noted to precipitate the extinction of LCT from Lake Tahoe.

Sixty-three tributary creeks enter Lake Tahoe including Third and Incline creeks, which are situated in Crystal Bay near Incline Village, Nevada. These tributaries are important for resident sport fishes (e.g., brook and rainbow trout), spawning of lacustrine fishes including native non-game fish, and rearing of juvenile fishes. These streams also play an increasing role in transporting nutrients into the lake. Within the Nevada portion of Lake Tahoe, Third and Incline creeks have been noted for the possibility of Lahontan cutthroat trout reintroduction; this study is ongoing to assess the feasibility of an introduction. The Truckee River is the only natural outlet from Lake Tahoe.

OBJECTIVES

- Install a temporary migration barrier on Third Creek downstream of Lakeshore Boulevard when rainbow and/or LCT are utilizing the creek for spawning, generally from March through May.
- Measure, sex, weigh, and tag (Floy and PIT) all rainbow trout captured downstream of the barrier. Once processing is complete, return them to Lake Tahoe.
- Measure, sex, weigh, and tag (Floy and PIT) all Lahontan cutthroat trout captured downstream of the barrier. Once processing is complete, move all LCT upstream of the barrier.
- Conduct three electrofishing surveys at established transects once monthly in both Third and Incline creeks to determine presence and relative density of native and non-native fish populations throughout the year.

PROCEDURES

Install a temporary migration barrier on Third Creek downstream of Lakeshore Boulevard. On March 16, 2016, half-inch aluminum pipe spaced approximately one inch apart and affixed by welds in four foot pieces was used to construct a temporary fish barrier on Third Creek (Figure 1). Immediately downstream of the Lakeshore

Boulevard box culvert, the barrier was erected using T-posts to provide a frame and the aluminum pipe was wired to the frame. Boulders and rocks were used to firm up the base of the barrier to avoid any heavy flows washing out the structure. The structure was modified from the 2015 version to accommodate the heavier flow rates in 2016. The barrier was pitched at a 45 degree angle to alleviate stress on the frame.

Measure, sex, weigh, and tag (Floy and PIT) all rainbow trout captured downstream of the barrier. Once processing is complete, return them to Lake Tahoe. Once the barrier was erected on Third Creek, daily trips were made to check for fish congregating directly downstream. If fish were observed below the barrier, a backpack electroshocker was used to stun and capture them. They were then placed into holding pens until all fish were captured for the day. Fish were identified to species, measured to fork length, weighed, sexed, and given individual Floy and PIT tags. All ripe rainbow trout were anesthetized and hand spawned as part of the Lake Tahoe Rainbow Trout Study. Fish were then released unharmed into Lake Tahoe.

Measure, sex, weigh, and tag (Floy and PIT) all Lahontan cutthroat trout captured downstream of the barrier. Once processing is complete, move all LCT upstream of the barrier. No Lahontan cutthroat trout were captured downstream of the barrier in 2016.

Conduct three electrofishing surveys at established transects once monthly in both Third and Incline creeks to determine presence and relative density of native and non-native fish populations throughout the year. Beginning in April and continuing through November, monthly single pass electroshocking surveys were conducted at three previously established transects on Third and Incline creeks. Transects on each creek were spaced approximately 0.25 miles apart, with the most downstream transect being located just upstream of Lake Tahoe (Figure 2). All six transects were 200 feet in length and were shocked in an upstream direction. All species captured were identified, measured, and released back into the creek. Flow rate and water temperatures were also recorded on each visit.

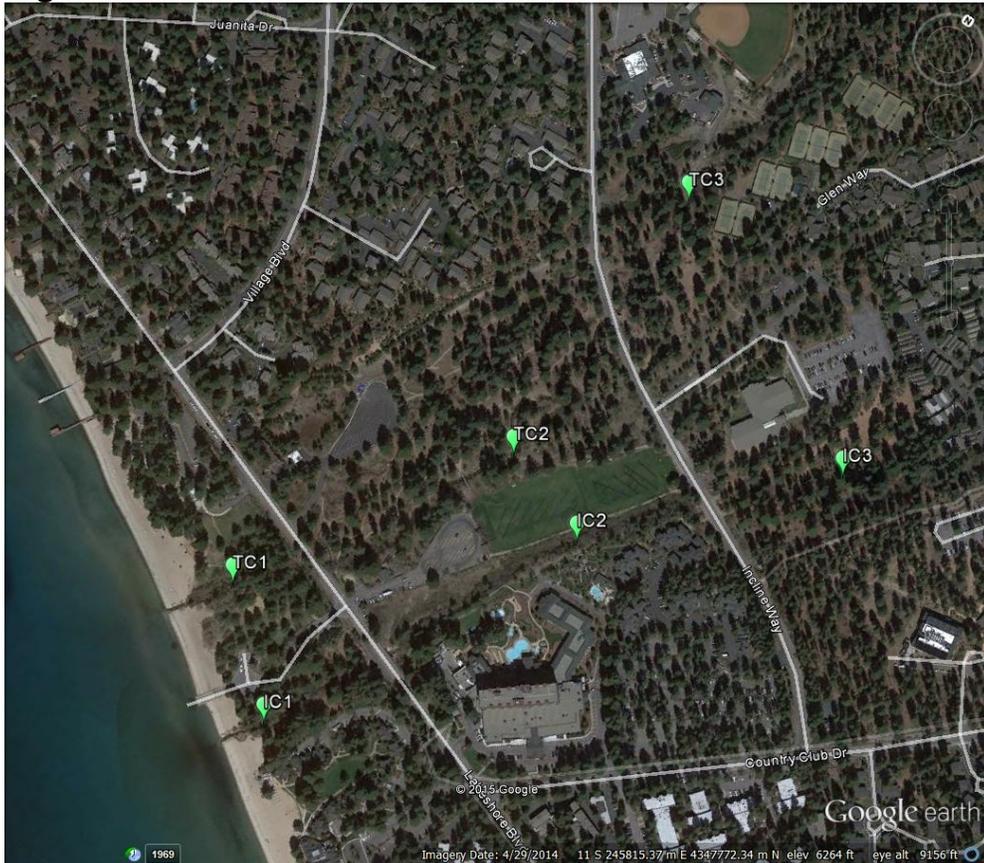
FINDINGS

Install a temporary migration barrier on Third Creek downstream of Lakeshore Boulevard. The 2016 barrier functioned for the entire duration of the adfluvial rainbow trout spawning run. Large flushes of water resulting in debris coming down the system caused the barrier to back up water and the flow overtopped the barrier several times. While this was undesirable, it did not compromise the effectiveness of the structure. The angled barrier design used in 2016, as opposed to the vertical structure used in 2015, appears to be more tolerant of flow fluctuation.

Figure 1. Third Creek Management Barrier 2016.



Figure 2. Transect Locations on Third and Incline Creeks.



Measure, sex, weigh, and tag (Floy and PIT) all rainbow trout captured downstream of the barrier. Once processing is complete, return them to Lake Tahoe. All rainbow trout captured at the Third Creek barrier in 2016 were checked for Floy and PIT tags. If a fish had not been tagged, then it was measured to fork length, weighed, and fitted with both Floy and PIT tags. Fish were released back into Lake Tahoe unharmed. A total of 30 rainbow trout were captured while the barrier was in place (Table 1 and Figure 3).

Table 1. Third Creek Barrier – Tagged Rainbow Trout Data.

2015	n	FL (mm)	Weight (g)
M	27	447	1,149
F	32	472	1,121
2016			
M	16	374	693
F	14	476	1,310

The 2016 spawning run began on April 5, which was two weeks later than the run in 2015 (March 16). The peak of the 2016 run was around May 4 while the 2015 run peaked on April 21. The timing of the spawning run in Third Creek appears to be influenced by a combination of flow rate and water temperature. Runoff in 2016 was substantially greater than in 2015 and higher than the 43-year average for the system. While this increased runoff was needed for the overall health of the basin, it appeared to have a negative effect on the number of fish utilizing Third Creek for spawning in 2016. Numerous storm systems resulted in large pulses of water running down the Third Creek system during the peak spawning period; this may have limited the ability of individual fish to navigate the system.

During the 2016 spawning run, 17 percent of the fish captured were recaptures from the 2015-spawning run (Attachment 1). Five of the six recaptures were found to be spawning in the same stream as the year before, while one individual that was tagged in Third Creek in 2015 was captured in Incline Creek in 2016. All recaptured fish were female and, on average, were 38 mm (1.5 in) longer and 466 g (1.0 lb) heavier than the prior year. These fish had an average condition factor (K) of 1.3, which is considered good.

Measure, sex, weigh, and tag (Floy and PIT) all Lahontan cutthroat trout captured downstream of the barrier. Once processing is complete, move all LCT upstream of the barrier. No Lahontan cutthroat trout were captured downstream of the barrier in 2016.

Figure 3.

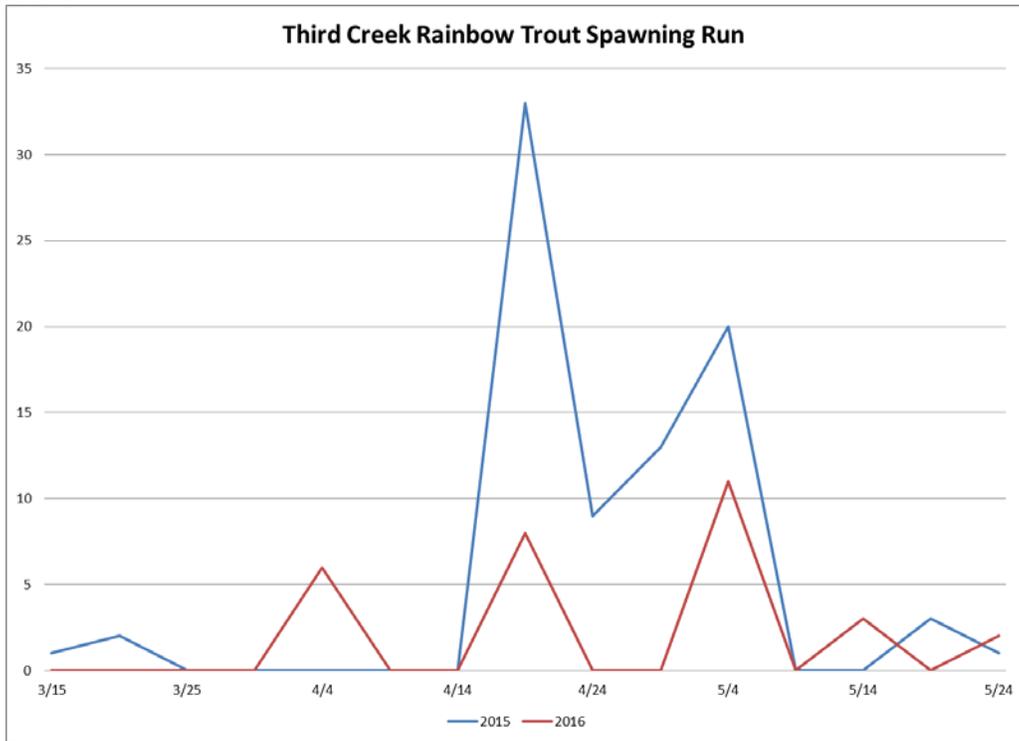
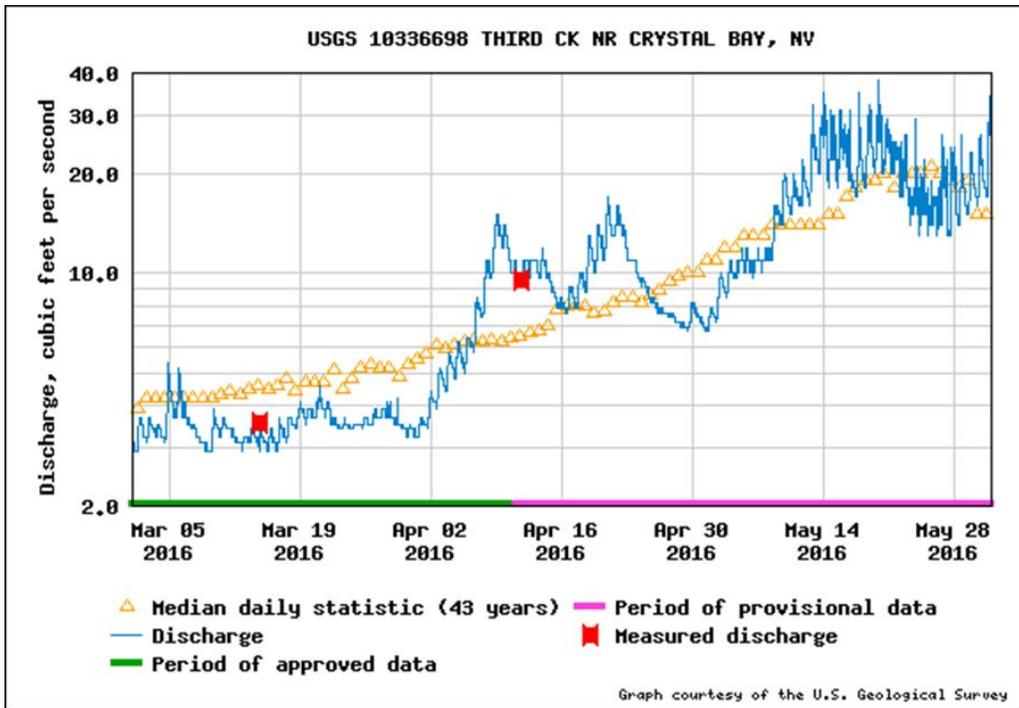


Figure 4.



Conduct three electrofishing surveys at established transects once monthly in both Third and Incline creeks to determine presence and relative density of native and non-native fish populations throughout the year.

Incline Creek

Similar to 2015, brook trout were consistently the most prevalent species found, while numerous other species showed spikes in abundance throughout the year (Figure 5). The largest population increase, and subsequent decline, throughout the course of the surveys was seen in the young of the year rainbow trout. These influxes corresponded with expected spawning runs of each species and resulting gravel emergences.

On June 29, a single Tahoe sucker was sampled within the surveyed reach of stream. No other nongame species was observed during surveys on Incline Creek. The reason for the continued decline in nongame species entering Incline Creek since 2014 is unclear but may be a simple timing issue. Monthly surveys have the potential to be missing the major influxes of these nongame species. It should be noted that during June and July, several speckled dace and Tahoe suckers were sampled during spot shocking below transect IC1.

Rainbow trout larger than 300 mm (lacustrine spawners) were sampled in Incline Creek during both the April and May surveys. Adfluvial rainbows were only sampled at IC1; however, during the June 29 survey a deceased spawner was observed upstream of IC2. No Kokanee salmon were sampled during the 2016 survey and this marks the third consecutive year that numbers have declined. A similar decline has been reported at spawning locations around the Tahoe Basin. A single mountain whitefish was sampled during the July 20 survey at IC1 marking this the first time this species has been found in either Third or Incline creeks in the three-year history of this project. The expected influx of young of the year (<100) rainbow trout was observed beginning in late July.

Third Creek

As with Incline Creek, brook trout were consistently the most prevalent species, while numerous other species showed estimated density spikes throughout the year. These influxes corresponded with expected spawning runs and gravel emergences of each species.

Nongame species (Tahoe sucker, Lahontan redbside, and speckled dace) were first detected during the June survey and remained in the system at TC1 until the October surveys (Figure 6). This was similar to the 2014 surveys and was expected on a year following an average winter with consistent flows throughout the summer.

Sport fish trends in Third Creek (Figure 7) mirrored that of Incline Creek regarding timing of influxes and the relative consistency of fluvial rainbow trout (less

than 300 mm). Similar to 2015, the barrier placed at the upstream end of TC1 relegated all lacustrine spawning rainbow trout to the lowest reach of the stream. No Kokanee salmon were sampled in Third Creek for the second consecutive year.

Figure 5.

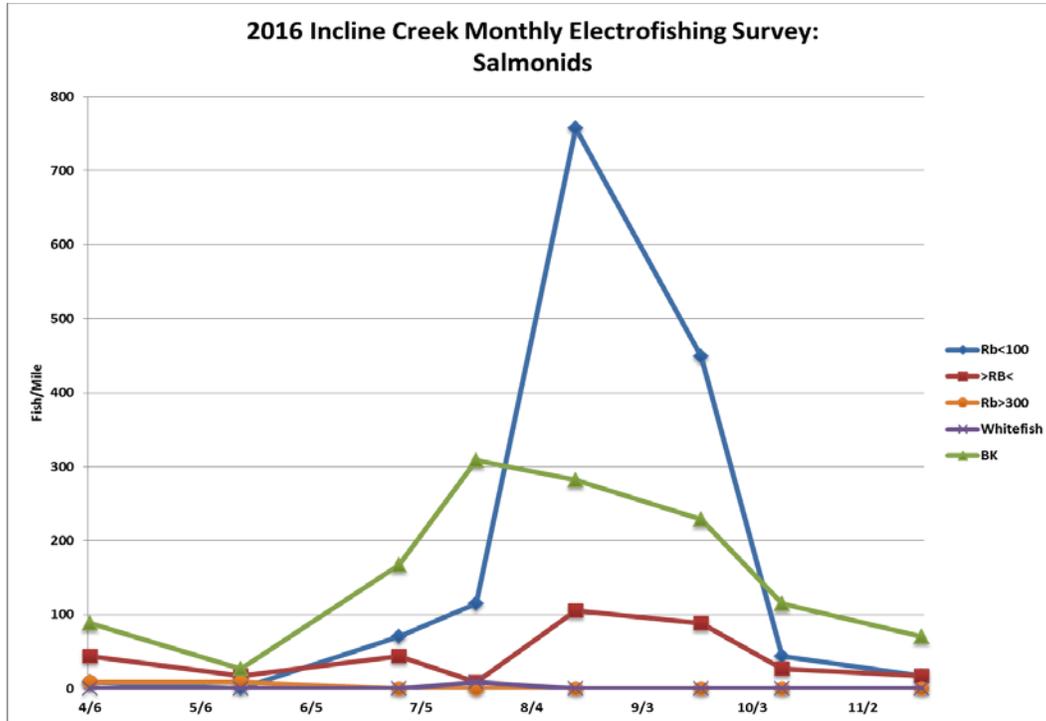


Figure 6.

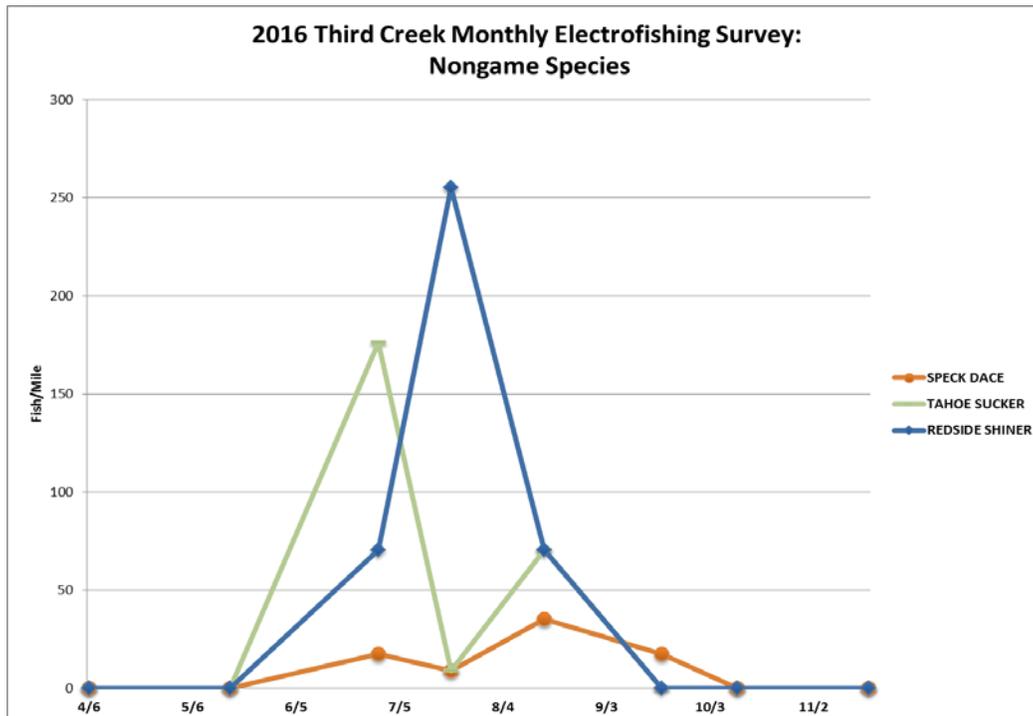
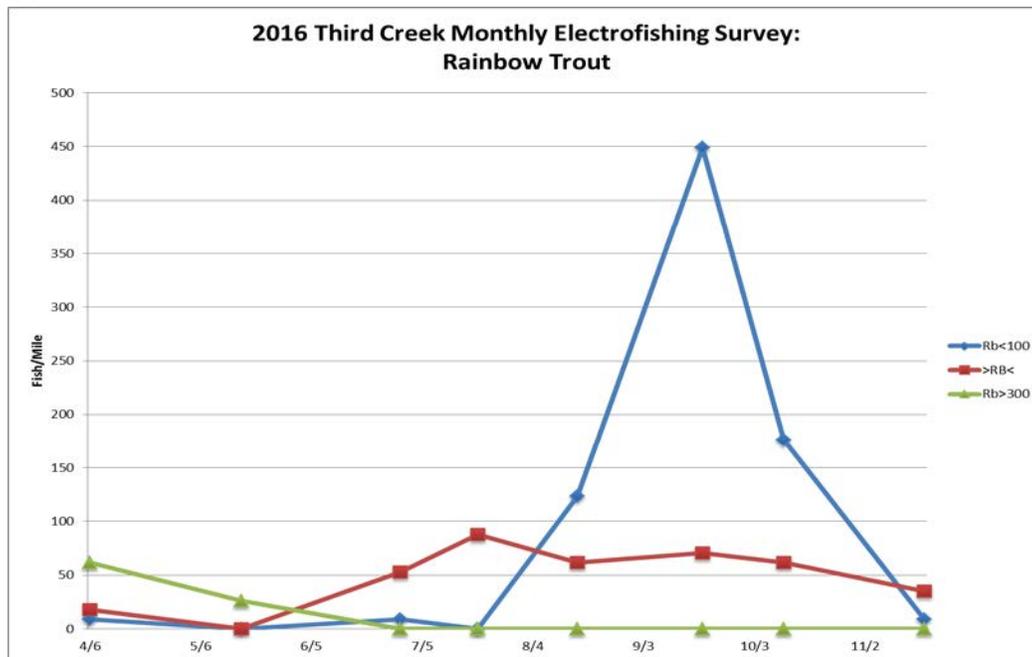


Figure 7.



As in past years, juvenile rainbow trout numbers in both creeks fluctuated similarly throughout the year. Both creeks had a spike in the number of sampled fish beginning in late July. These spikes corresponded with the expected emergence of young of the year fish and the likelihood of capturing them during surveys. When comparing all three years of data (2014, 2015, 2016), patterns emerge that suggest both streams have similar recruitment based on environmental factors. While patterns from year to year are different, patterns between streams within the same year are similar (Figure 8). For the first time in this study, Incline Creek had a higher level of recruitment than Third Creek. Whether or not this is a function of the downstream barrier on Third Creek restricting adfluvial fish to the lowest reach of the system and, therefore, limiting their ability to spawn is unknown at this time and further monitoring will be necessary.

For the purposes of this study, rainbow trout that fall within 100 mm and 300 mm are classified as resident fluvial fish. Data collected throughout the study has confirmed that, in general, fish that fall into this size class are present in the system year round and are not subject to the seasonal fluctuations that the lacustrine spawners (>300 mm) and the young of the year fish (<100 mm) exhibit. Since 2014 when the study began, fluvial rainbow trout populations in Third Creek have declined by 78 percent. Compare this to stream resident brook trout in Third Creek, which have only declined 16 percent in this same period and experienced a slight population increase from 2014 to 2015 (Table 2). Fluvial rainbow trout populations in Incline Creek have also experienced a decline since 2014 although not as drastic as in Third Creek.

Figure 8.

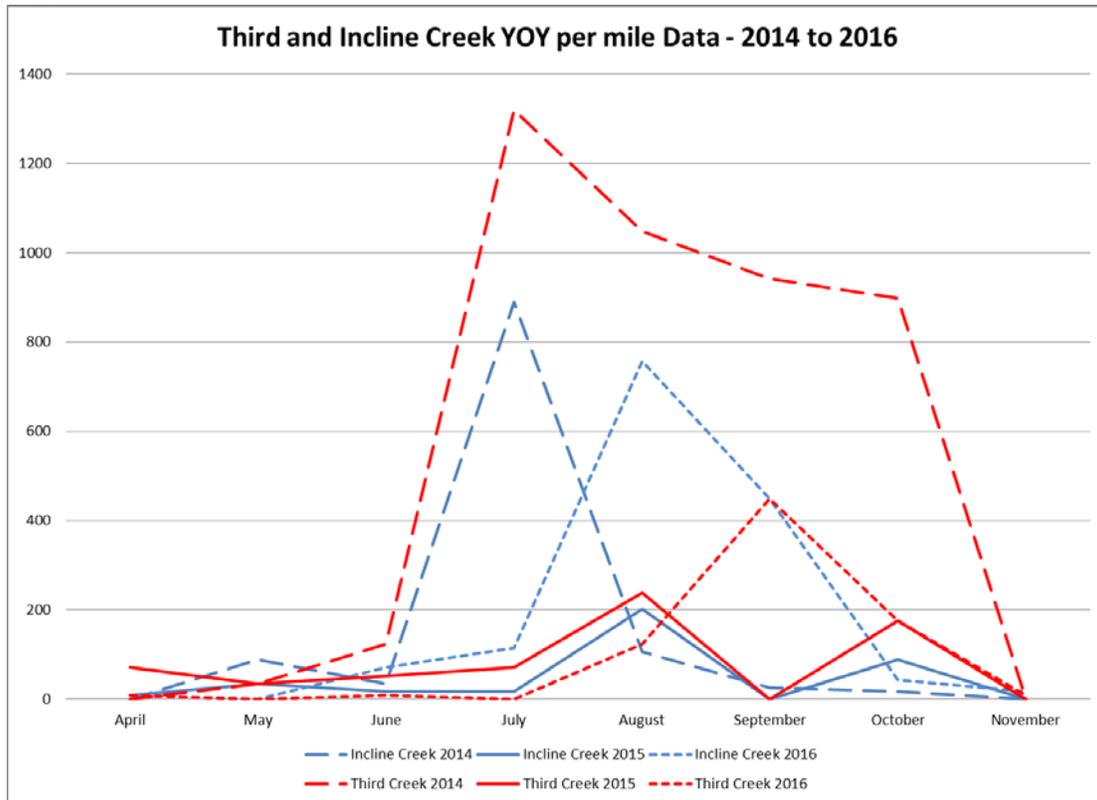


Table 2. Third Creek Fluvial Rainbow Population Decline Over Time.

	2014	2015	2016	% change
Fluvial RB	222	75	48	-78.2
Bk	258	280	217	-15.9

MANAGEMENT REVIEW

During this second year of the Third Creek Lahontan Cutthroat Trout Feasibility Study, many of the findings first noted in 2015 were verified with a second consecutive year of study. The installation of a temporary management barrier on Third Creek appeared to once again limit the upstream recruitment of rainbow trout and for the first time since the study began in 2014, Incline Creek had a higher level of rainbow trout recruitment than Third Creek. Continued research is needed to understand the full complexity of recruitment in Third and Incline creeks but it does appear that with some manipulation, a limited amount of reduction to the level of rainbow trout recruitment is achievable.

A total of six female rainbow trout were captured during the 2016 spawning run that had been previously tagged during the 2015 spawning run. This made up 17 percent of the total fish captured in 2016 and is revealing in that only one of these six fish was found in a different stream than it was originally tagged. This demonstration of limited site fidelity may prove useful as it relates to the potential for Lahontan cutthroat

trout to exhibit the same behavior in a future population within Third Creek. More data is needed in this area of the study.

The observed decline in fluvial resident rainbow trout in Third Creek is an interesting and promising development. Looking towards the future goal of a self-sustaining Lahontan cutthroat trout population, one of the main questions is whether non-native salmonid populations can be controlled to allow LCT to take hold. After two years of manipulating the system and not allowing adfluvial fish to spawn in the upper reaches of the study area, a 78 percent decline in resident rainbow populations has been documented. Continuing the study and manipulating the system should help to further understand this decline and determine whether the decline is related to our efforts in the system.

The Tahoe Basin benefited from a slightly above average water year, which resulted in above average flow rates in both Third and Incline creeks throughout 2016. While flow rates were higher than average, a somewhat atypical flow regime, especially during the spring, was experienced. Severe spikes in flow rate occurred on numerous occasions from March to May that carried large amounts of sediment and debris down the Third Creek drainage. This may be a reason for the lower number of lacustrine spawners entering Third Creek in 2016 as opposed to 2015 when flow rates were some of the lowest on record.

RECOMMENDATIONS

- Install a temporary migration barrier on Third Creek downstream of Lakeshore Boulevard.
- Measure, sex, weigh, and tag (Floy and PIT) all rainbow trout captured downstream of the barrier. Once processing is complete, return them to Lake Tahoe.
- Measure, sex, weigh, and tag (Floy and PIT) all Lahontan cutthroat trout captured downstream of the barrier. Once processing is complete, move all LCT upstream of the barrier.
- Conduct three electrofishing surveys at established transects once monthly in both Third and Incline creeks to determine presence and relative density of salmonids.
- Collect fin clips for genetic analysis from all rainbow trout sampled during the course of the year.

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Western Region

Date: December 7, 2016

Attachment 1

Third and Incline Creek Lacustrine Spawner Recapture Data

Capture	Creek	Recapture	Creek	Sex	Length (mm)	Growth (mm)	Weight (g)	Growth (g)	K Value
4/21/2015	Third	4/20/2016	Third	F	580	50	1,860	520	1.0
4/21/2015	Third	4/20/2016	Third	F	465	55	1,430	600	1.4
4/21/2015	Third	5/4/2016	Third	F	482	3	1,440	100	1.3
4/30/2015	Third	5/4/2016	Third	F	403	38	860	300	1.3
5/6/2015	Third	5/4/2016	Incline	F	473	73	1,440	810	1.4
5/6/2015	Incline	5/17/2016	Incline	F	480	10	n/a	n/a	n/a
				Average	480.5	38	1,406	466	1.3