

NEVADA DEPARTMENT OF WILDLIFE  
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-54  
2018

MARLETTE LAKE  
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:** *Marlette Lake*  
**Period Covered:** *January 1, 2018 through December 31, 2018*

**SUMMARY**

Twenty-four surveys were received from the Marlette Lake drop-box. Anglers reported fishing 111 hrs to catch 139 fish consisting of 100 rainbow trout, 22 brook trout, 13 LCT, and 4 tui chub. Catch rates (all species included) were 5.8 fish per angler and 1.2 fish per hour. All fish were reported as released since regulations prohibit harvest. Numbers were consistent or slightly better than what was reported in 2017.

In 2017, the Mail-in Angler Questionnaire Survey estimated 176 anglers fished 272 days. The estimated number of anglers and days were both substantially lower than long-term averages for the fishery (i.e., 449 anglers and 992 days).

Marlette Lake was stocked on two occasions in 2018. In July and September, the lake received 5,357 fish consisting of 375 Pyramid Lake (contemporary) LCT and 5,357 rainbow trout (Incline and Tahoe strains).

Four days in June were spent conducting spawning activities. Hand spawning occurred with 1,364 rainbow trout and 220 Pyramid (contemporary strain) LCT and resulted in a take of 421,844 eggs.

**BACKGROUND**

Sitting at an elevation of 7,825 ft in the Carson Range, Marlette Lake is a 381 surface acre oligotrophic reservoir that has a maximum depth of approximately 44 ft. The land surrounding the lake is dominated by high elevation conifer/aspens habitat that transition into subalpine habitat near the top of many adjunct peaks. The reservoir is located on the east side of the Lake Tahoe Basin and is entirely within Lake Tahoe State Park.

Marlette Lake was constructed in 1873, when a small earth-filled dam was erected at the outlet to a broad glaciated basin. Lake water was piped to Virginia City via a series of flumes and pipes (inverted siphon) made famous by Hermann Schussler.

During the early 1880's, Marlette Lake was solely a brook trout fishery. From 1883 until 1930, the Nevada Fish Commission artificially spawned brook trout for propagation and stocking. In 1963, the reservoir was purchased by the State of Nevada and the Nevada Department of Fish and Game assumed management responsibility for the fishery. Following a need for broodstock to support Lahontan cutthroat trout (LCT, *Oncorhynchus clarkii henshawi*) stocking in Pyramid and Walker lakes, LCT were

introduced in 1964. Demand for large numbers of LCT eggs diminished in 1975 with the termination of the Pyramid Lake Agreement.

Starting in 1984, rainbow trout (*Oncorhynchus mykiss*) brood of artificially spawned fish from Lake Tahoe were stocked into Marlette Lake to establish another much-needed wild brood stock. To date, over nine million rainbow trout eggs have been harvested from brood stock in Marlette Lake. When possible, the broodstock is enhanced with progeny of wild rainbow trout stocks collected from Lake Tahoe. The performance of the current brood stock will be assessed through the Marlette Lake Rainbow Trout Study initiated in 2009.

Since broodstock operations at Big Springs Reservoir (Humboldt County) failed due to insufficient water supplies, LCT was restocked into Marlette Lake for production of hybrids (i.e., bowcutts and cuttbows). Pyramid Lake strain LCT and Independence Lake strain LCT were stocked between 2002 and 2007. In 2008, Pilot Peak LCT became available to produce bowcutt trout eggs for sport fish management. The success of Pilot Peak strain LCT will be assessed through the Marlette Lake Pilot Peak LCT Study, which was initiated in 2009. The fishery at Marlette Lake is currently comprised of rainbow trout, brook trout, Lahontan cutthroat trout, Tahoe suckers, speckled dace, and tui chub.

In 2006, Marlette Lake was opened as a public sport fishery. The lake is managed under the Quality Coldwater Fisheries Management Concept, which establishes angler success rates at 0.30-1.25 fish per hour and 2.0-3.5 fish per angler day. Fishing is allowed from July 15 to September 30, one hour before sunrise until two hours after sunset. There is a zero-limit on fish and tackle is restricted to artificial lures with single barbless hooks.

## **OBJECTIVES**

- Conduct a general assessment of angler use and success through opportunistic angler contacts, return of angler drop-box surveys, and mail-in angler questionnaire data.
- Assist with the trout spawning operation during the spring to ensure fulfillment of eggs for NDOW's hatchery program.
- Monitor the performance of tagged LCT by utilizing data collected during NDOW spawning operations.
- Monitor the performance of tagged rainbow trout by utilizing data collected during NDOW spawning operations.
- Collect fin clips from rainbow trout for genetic analysis to assess the genetic viability of the Marlette Lake rainbow trout broodstock.
- Work with the statewide hatchery supervisor to finalize a broodstock management plan for Marlette Lake.
- Explore the possibility of replacing the culvert at Trelease Creek and improving the spawning trap.

## PROCEDURES

**Conduct a general assessment of angler use and success through opportunistic angler contacts, return of angler drop-box surveys, and mail-in angler questionnaire data.** Seven anglers were contacted at Marlette Lake between three creel survey trips during the 2018-fishing season. Another 8 anglers were observed on these days but were unable to be contacted due to their locations on the lake.

During the course of other duties, a volunteer angler survey drop-box at Marlette Lake was maintained and restocked. At the end of the fishing season, data was collected and summarized. Angler satisfaction in 2018 was rated on a scale of -2 to +2, with -2 being unsatisfied and +2 representing satisfaction.

Angler use and success in 2017 was also assessed through the statewide Mail-in Angler Questionnaire Survey. Angler questionnaire data was derived from a survey mailed to 30,000 license purchasers in 2017.

**Assist with the trout spawning operation during the spring to ensure fulfillment of eggs for NDOW's hatchery program.** Beginning in late-May and concluding in late-June, NDOW and volunteers staffed the fish spawning station at Marlette Lake. During this time, pre-spawn rainbow trout and LCT were captured from a fish trap at the mouth of Trelease Creek, a main tributary to the reservoir. Twice daily, fish were counted and sorted by species, gender, and ripeness and placed into separate holding pens within the creek until artificially spawned. Fish caught in the creek were augmented with fish captured in frame nets set throughout the lake.

On-site artificial spawning activities occurred on four occasions. During the egg take, fish were anesthetized, rinsed, hand spawned, and fertilized by mixing eggs and sperm. After cleaning and water hardening, eggs were transported to Mason Valley Hatchery for rearing.

Additionally, sex was identified and fork length and weight of the first 25 fish of each species were measured from each lot of fish spawned. All rainbow trout and LCT captured were examined for previous markings - fin clips and/or tags. Tagged fish were subsequently measured and weighed on an electronic scale. Fin clips, tag types (Floy vs PIT), and/or tag numbers were recorded.

**Monitor the performance of tagged LCT by utilizing data collected during NDOW spawning operations.** In cooperation with USFWS, untagged but adipose clipped LCT (Pilot Peak strain) caught were classified by gender and scanned electronically for a PIT tag. Fish without an existing tag were anesthetized, measured, weighed, sexed, and surgically implanted with a PIT tag. A fin clip was also taken from untagged LCT for later genetic analysis. During the 2018 spawning season, two Pilot Peak strain LCT were captured.

In order to maximize genetic diversity during spawning, the USFWS maintains a comprehensive database detailing the strain, life history, and family origin of all LCT PIT

tagged at Marlette Lake. Beginning in 2011, all adipose clipped Pilot Peak LCT captured during spawning operations are implanted with a PIT tag.

Tagged fish captured were used to determine growth rate, longevity, and performance of each strain in Marlette Lake.

**Monitor the performance of tagged rainbow trout by utilizing data collected during NDOW spawning operations.** Data (length, weight, and body condition) gathered this year from tagged rainbow trout was used to examine growth rate, longevity, and performance of multiple strains of rainbow trout in Marlette Lake.

**Collect fin clips from rainbow trout for genetic analysis to assess the genetic viability of the Marlette Lake rainbow trout broodstock.** During the course of the spawning season, a subset of the rainbow trout captured was utilized for genetic sampling. Fin clips from 50 individual fish were taken for analysis. Length, weight, and gender were recorded for each fish sampled.

**Work with the statewide hatchery supervisor to finalize a broodstock management plan for Marlette Lake.** During 2018, a Marlette Lake Broodstock Management Plan was developed by the statewide hatchery manager and circulated for review and editing. Several drafts of this document were developed throughout the course of the year with a final document still pending.

**Explore the possibility of replacing the culvert at Trelease Creek and improving the spawning trap.** In the summer of 2018, a proposal was submitted to Question 1 bond and was approved. The title of the project proposal was the “Marlette Lake Broodstock Facilities/Passage Improvement Project,” and its overall purpose was to replace the culvert at Trelease Creek. This culvert replacement will better allow spawning salmonids to reach the Nevada Department of Wildlife spawning station that sits immediately upstream of the culvert. Upon approval, several meetings were scheduled with all involved parties and the project was scheduled for 2019.

## FINDINGS

**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.** A total of 24 surveys were received from the Marlette Lake drop-box. Anglers reported fishing 111 hrs to catch 139 fish consisting of 100 rainbow trout, 22 brook trout, 13 LCT, and 4 tui chub (Figure 1). Catch rates (all species included) were 5.8 fish per angler and 1.2 fish per hour. All fish were reported as released since regulations prohibit harvest at Marlette Lake. All reported numbers were consistent or slightly better than what was reported in 2017.

An examination of length found all tui chub were less than 12.0 in (Figure 2), while trout species were evenly distributed throughout most size classes. Cutthroat trout ( $n=13$ ) ranged from 12.0 in to greater than 20 in with the majority (45%) falling into the 12.0 to 13.9 in size bracket, while rainbow trout ranged from less than 10.0 in and up to 19.9 in ( $n=100$ ).

Figure 1.

2018 Marlette Lake - Angler Drop Box  
Species Composition

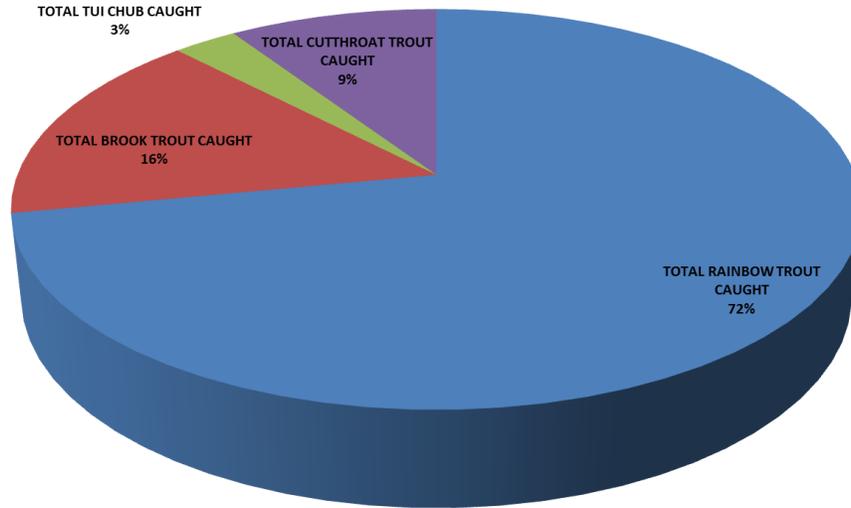
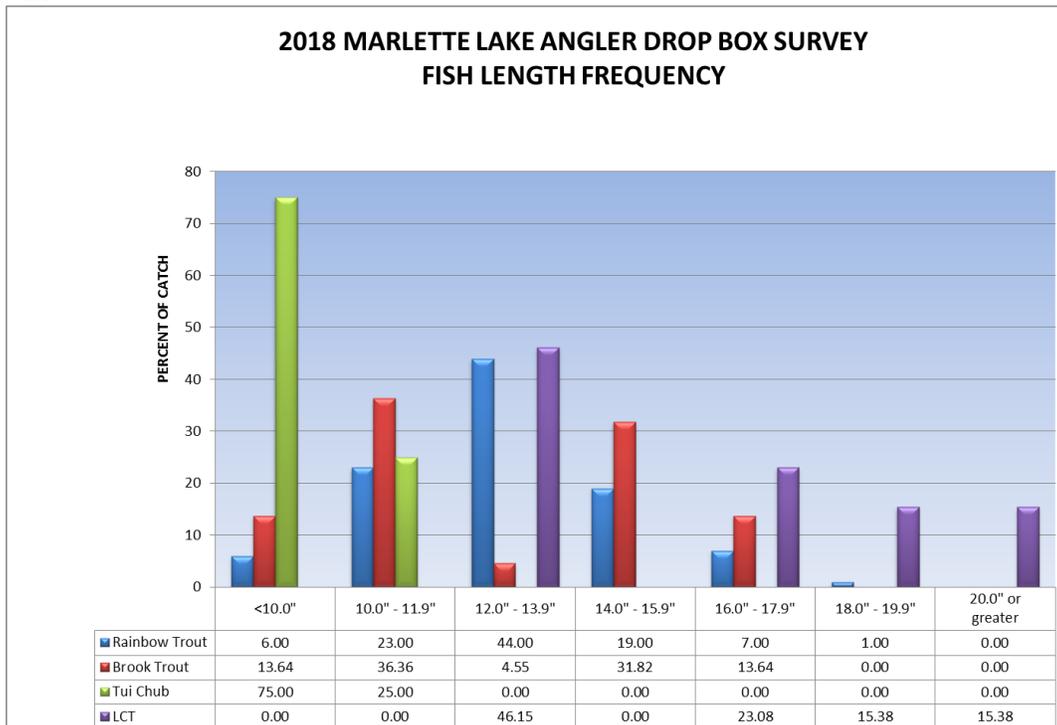


Figure 2.



Continuing with the long-term trend, shore anglers outnumbered anglers fishing from boats or float tubes by a factor of four, which is expected at a hike-in fishery. Angler satisfaction ratings were positive, averaging 1.3 for total fishing experience, 1.0 for size of fish, and 0.7 for number of fish. However, ratings were slightly lower than the 7-year

average (1.4, 1.3, and 1.2, respectively). Based on drop-box data, it appears angling productivity has become slightly less productive over the past two seasons. Further monitoring will be necessary to determine its cause.

In 2017, the Mail-in Angler Questionnaire Survey estimated 176 anglers fished 272 days. The estimated number of anglers and days fished were substantially lower than long-term averages of 449 anglers and 992 days. This can be attributed to the winter of 2016/17 that brought record snowfall to the Marlette Lake Basin. The lake itself was still frozen over until a month into the fishing season, which resulted in the inaccessibility of anglers reaching the lake causing lower use than normal. The estimated catch rates of 12.4 fish/angler and 1.6 days/angler were slightly lower than long-term averages (15.7 fish/angler and 2.2 days/angler). On the other hand, fish per day was 8.0 and was higher than the long-term average of 7.1 fish/day. All estimates are well above the Quality Coldwater Fishery Management Concept assigned to Marlette Lake. Long-term averages from 2006 to 2016 appeared to be skewed, however, due to a couple of anomalous years (2011 and 2013) when estimates were well above the averages. The winter of 2016/17 resulted in an excessive amount of water in the Marlette Basin in 2017 and complications resulted in the State of Nevada Public Works Division draining the lake to make room for the runoff. The lake did not entirely fill until late in the 2017 fishing season and this may have negatively affected the productivity of the fishery.

### Stocking Program

Marlette Lake was stocked on two occasions in 2018. In July and September, the lake received 5,357 fish consisting of 375 Pyramid Lake LCT (contemporary LCT strain) and 5,357 rainbow trout (Incline and Tahoe strains). All stocked fish were of catchable size. One thousand each of Incline and Tahoe strain rainbow trout were tagged with colored Floy tags as part of the “Lake Tahoe Rainbow Trout Study.” The nine-year stocking history is presented in Appendix 1.

**Assist with the trout spawning operation during the spring to ensure fulfillment of eggs for NDOW’s hatchery program.** Four days in June were spent conducting spawning activities and 1,364 rainbow trout and 220 Pyramid LCT (contemporary LCT strain) were hand spawned to produce 421,844 eggs. Results of the 2018 Marlette Lake spawning operation are presented in Tables 1 and 2.

**Table 1. 2018 Marlette Lake Spawning Operation.**

Species	Sex	Average Fork Length (mm)	# Spawned
Rainbow	M	284.3	786
Rainbow	F	292.4	578
		<b>288.4</b>	<b>1,364</b>
LCT (Pyramid)	M	340.1	110
LCT (Pyramid)	F	372.6	110
		<b>355.0</b>	<b>220</b>

**Table 2.** 2018 Marlette Lake Egg Totals.

Species	Egg Totals
Rainbow	225,446
BC/CB	159,327
Triploid RB	37,071
<b>Total</b>	<b>421,844</b>

Prior to the 2016 spawning operation, it was determined that length and weight would be recorded from the majority of fish spawned to examine body condition (K). Results prior to being spawned are presented in Table 3. For the third consecutive year, both species showed K-factors from fair to poor, with rainbow trout the healthiest. Pilot Peak LCT showed a low spawning return in 2017 and 2018, therefore, no condition factors were examined. Rainbow trout exhibited similar health to 2017 except for females, which declined from 1.19 (good) in 2017 to 1.03 (poor). Since condition factor monitoring began in 2016, the condition of salmonids in Marlette Lake has remained in the fair to poor range. It is becoming apparent that the oligotrophic nature of the lake and the short growing season most likely limits the overall condition of fish.

In 2017, no Pilot Peak LCT was stocked. The numbers of Pyramid strain LCT and rainbow trout stocked were also reduced because of extenuating circumstances. Monitoring LCT condition factors will be valuable and any improvement in observed condition can indicate there is some correlation with population density and biomass in the lake. The absence of any observable improvement in 2019 will lend more support to the idea that Marlette Lake Fishery is limited mainly by environmental factors and no amount of stocking adjustments will benefit the condition of individual fish.

**Table 3.** Condition Factor of Salmonids in Marlette Lake.

Species	K Value		
	2016	2017	2018
RB Male	1.02	0.97	0.98
RB Female	1.14	1.19	1.03
<hr/>			
Pyramid Male	0.87	0.86	0.88
Pyramid Female	1.04	0.97	0.98

The overall number of eggs collected during the 2018 spawning operation fell well short of the goal set prior to the season. A sufficient number of fish were captured during 2018 and it was surprising that the number of eggs collected was low. When comparing 2018 rainbow/rainbow cross data to previous years, it becomes apparent that the average size of fish captured in 2018 was substantially smaller and is the main factor in low egg yield (Table 4). Increasing the size of fish at the time of stocking may prove to be beneficial for the broodstock program in the future.

**Table 4.** Fecundity Data 2016 to 2018.

Year	Avg. size of Female	Number Spawned	Eggs	Eggs/Female
2018	292.4	477	225,446	472.6
2017	320.8	86	59,632	693.4
2016	320	1,047	742,591	709.3

**Monitor the performance of tagged LCT by utilizing data collected during NDOW spawning operations.** A total of 430 LCT consisting of 251 males and 179 females were captured during spawning operations in 2018. LCT with having an adipose fin were Pyramid Lake strain LCT ( $n=428$ ), while fish without an adipose fin ( $n=2$ ) were Pilot Peak strain LCT (the Lahontan National Fish Hatchery clips the adipose fin of all Pilot Peak LCT stocked into Marlette Lake). LCT trapping, stocking, and return data is presented in Table 5.

Comparing the return of LCT is difficult due to the low number of Pilot Peak strain LCT captured, other than in 2018. Despite being stocked at numbers almost double that of Pyramid Lake strain LCT (since 2009), the Pilot Peak strain has shown lower returns than the Pyramid Lake strain each year since 2015 (Table 6). In all, 428 Pyramid Lake strain LCT were captured during the 2018 spawning season whereas two Pilot Peak strain LCT were captured. No length or weight data was recorded from the Pilot Peak fish, but it was noted that they appeared to be poor body condition.

**Table 5.**

2018 NDOW SPAWN STATION DATA				
	# Trapped	Avg. length (mm)	# Stocked Since 2009	%Return (2018)
<b>Pyramid Lake</b>	<b>428</b>	<b>355.0</b>	<b>12,579</b>	<b>3.4</b>
Male	250	340.1	Stocked 2013, 2015-2017	
Female	178	372.6		
<b>Pilot Peak</b>	<b>2</b>		<b>22,699</b>	<b>0.0</b>
Male	1		Stocked 2009 - 2017	
Female	1			
<b>Total</b>	<b>430</b>			

**Table 6.** Percent Return by Strain of Cutthroat Trout.

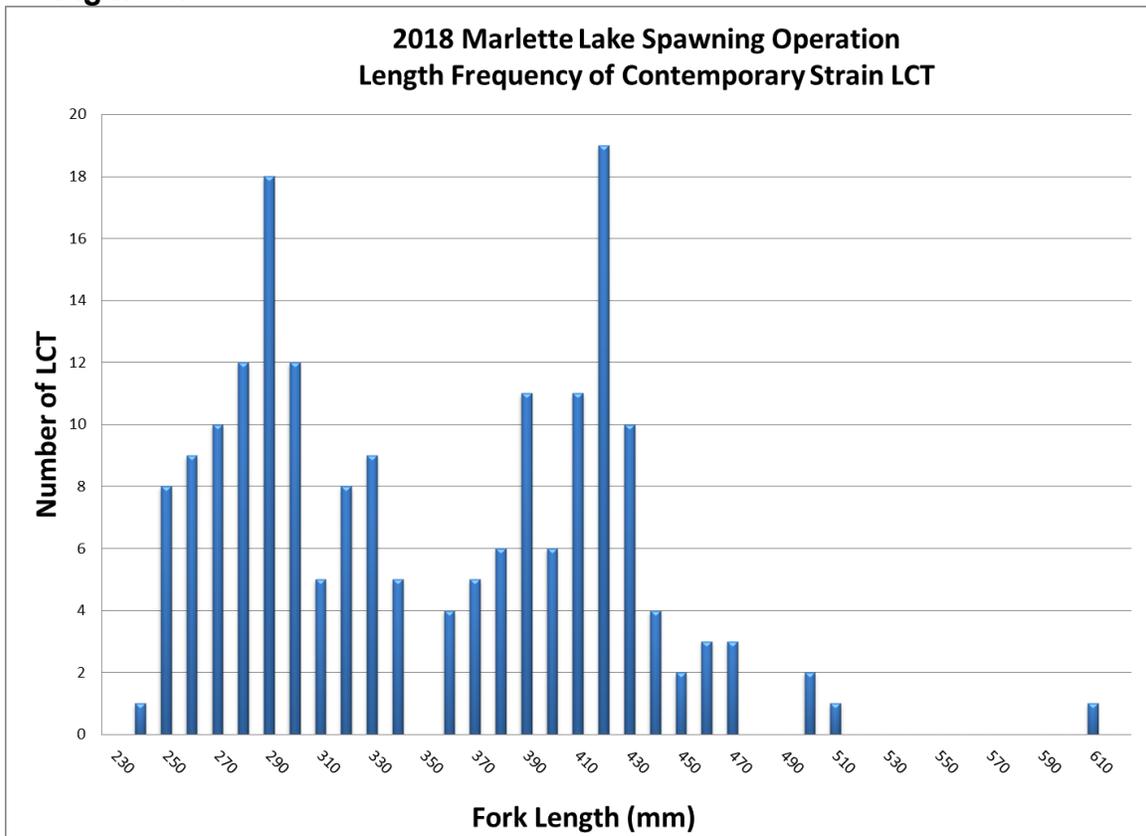
	2015	2016	2017	2018
<b>Pyramid Lake</b>	2.3	10.7	1.1	3.4
<b>Pilot Peak</b>	2.4	0.4	0.1	0

A length frequency analysis of Pyramid Lake strain LCT reveals four size classes that loosely relate with stocking events over the past five years. The majority of captured fish represented the first three size classes with length breakpoints at 310 mm, 340 mm, and 470 mm. The final size class was represented by a small number of fish, but the upper limit was in excess of 600 mm. These larger fish were likely remnants from 2013 stocking and was evidence of this strain to persist in Marlette Lake. Based on the assumption that fish corresponded with four separate years of stocking events, the Pyramid Lake strain LCT exhibited a 58.5 mm (2.3 in), 61 mm (2.4 in), and a 59.7 mm (2.4 in) growth increase per year (i.e., stocked in 2013, 2015, and 2016, respectively) (Table 5). Fish stocked in 2017 showed a growth of 44.1 mm (1.7 in) over nine months.

Based on close to ten years of data that has repeatedly shown the Pyramid Lake strain of LCT to outperform the Pilot Peak strain in Marlette Lake it is recommended that the stocking of Pilot Peak strain LCT be discontinued at Marlette Lake. The strain is not

offering a benefit to either the fishery or the broodstock program and the summation of the last four years return and growth data (2015-2018) suggests that the overall fisheries program at Marlette Lake would be better suited to expend resources and time toward the Pyramid Lake strain of Lahontan cutthroat trout.

**Figure 3.**



**Monitor the performance of tagged rainbow trout by utilizing data collected during NDOW spawning operations.** Tagged rainbow trout in Marlette Lake represent six lots of stocked fish. Four lots of fish were hand-spawned from Third and Incline creeks (2008, 2009, 2015, and 2016) while the remaining two were traditional “Tahoe” strain that was spawned at Marlette Lake each year. All lots were hatched and reared at Mason Valley Hatchery and stocked into Marlette Lake for augmenting the broodstock of the spawning program. Two types of colored Floy tags were used to identify each lot of fish (Table 7).

**Table 7. Marlette Lake Tagged Rainbow Trout Lot Identification**

Strain	Spawn Year	Tag Color	Tag Type	Stock Size (mm)	Stock Size (in)
Incline	2008	Yellow	Blank	241.3	9.5
Incline	2009	Blue	Blank	233.7	9.2
Incline	2015	Red	Numbered	215.9	8.5
Tahoe	2015	Yellow	Numbered	223.5	8.8

There were 244-tagged fish captured during the 2018 spawning operation. Tagged fish consisted of 6 from 2010, 43 from 2009, and 195 from 2017. Tagged fish represented 17.9 percent of the total rainbow trout spawned in 2018.

The six fish from the 2010-stocking event that were captured in 2018 had an average fork length of 432.8 mm (17.0 in) and weight of 713.3 g (1.6 lbs). They showed an 8-year average growth rate of 33.0 mm (1.3 in) per year. Since the initial stocking of Incline strain rainbow trout, there has been a 9.2 percent ( $n=282$ ) total return. The longevity and growth rate of these fish were exceptional for being raised in a high altitude oligotrophic system such as Marlette Lake. While only six fish were captured from these lots in 2018, numerous other fish caught with similar phenotypic characteristics were believed to be Incline strain rainbow trout from the same lots, but had shed their Floy tag at some point. No fish during the 2018 spawn had an original yellow Floy tag. These fish would have been 10 years old in 2018 and it was not surprising that they probably reached their life expectancy. All growth and return data can be found in Table 8.

**Table 8.** Growth Rate of Marlette Lake LCT

Stock Year	Years in Lake	Avg. capture size 2018	Stock Size (mm)	mm growth	mm/year	inches/year
Pyramid Strain						
2017	0.5	282.9	238.8	44.1	n/a	
2016	2	327.7	210.8	116.9	58.5	2.3
2015	3	410.4	227.3	183.1	61.0	2.4
2013	5	514.3	215.9	298.4	59.7	2.4

**Table 9.** Tag Return Data for Incline Strain Rainbow Trout in Marlette Lake

Year Stocked	2010	2009	2010	2009
Tag Color	Blue	Yellow	Blue	Yellow
	Average Size		Number Captured	
Stock Year	9.2	9.5	3065	2986
2010				84
2011	12.3	12.3	30	5
2012	13.2	13.6	24	37
2013	13.6	14	116	21
2014	13.9	14.6	81	2
2015	17	15.8	16	3
2016	16.1		2	
2017	19.3	20.1	7	1
2018	17		6	
Inch/Year	1.1	n/a		
		Return	282	153
		% Return	9.2	5.1

A comparison of the data collected from the four-tagged lots of fish stocked in 2016 and 2017 are presented in Tables 10 and 11. Incline strain fish stocked in 2016 showed a quicker growth rate while the Tahoe strain fish showed a higher return rate (4.9 to 2.2%). These trends were similar in 2017. When looking at the data gathered from fish stocked in 2017, the same trends were apparent. Incline strain fish exhibit a higher growth rate

while Tahoe strain fish show a higher return (17.4 to 2.1%). Knowing average growth rates and percent returns will provide utility when examining which strain to stock in different fisheries across the state. A fecundity analysis would also be beneficial in helping to inform which strain is best suited for the broodstock program at Marlette Lake.

**Table 10.** 2016 Stock Year Comparison Data for Rainbow Trout in Marlette Lake.

Year Stocked	2016	2016	2016	2016
Strain	Tahoe	Incline	Tahoe	Incline
Tag Color	Yellow	Red	Yellow	Red
	Average Size		Number Captured	
Stock Year	8.8	8.5	1000	1000
2017	10.6	11.6	20	8
2018	11.3	11.2	29	14
Inch/Year	1.25	1.35		
		Return	49	22
		% Return	4.9	2.2

**Table 11.** 2017 Stock Year Comparison Data for Rainbow Trout in Marlette Lake.

Year Stocked	2017	2017	2017	2017
Strain	Tahoe	Incline	Tahoe	Incline
Tag Color	Green	Blue	Green	Blue
	Average Size		Number Captured	
Stock Year	8.3	8.9	1000	1000
2018	10.1	11.2	174	21
Inch/Year	1.8	2.3		
		Return	174	21
		% Return	17.4	2.1

**Collect fin clips from rainbow trout for genetic analysis to assess the genetic viability of the Marlette Lake rainbow trout broodstock.** During the course of the spawning season at Marlette Lake, a subset of rainbow trout captured was utilized for genetic sampling. Fifty individuals (25 male and 25 female) were fin clipped for analysis. The samples are being held in the Nevada Department of Wildlife Valley Road office pending the acquisition of an agreement with a genetics lab to run the samples.

**Work with the statewide hatchery supervisor to finalize a broodstock management plan for Marlette Lake.** During 2018, a Marlette Lake Broodstock Management Plan was developed by the statewide hatchery manager and circulated for review. Several drafts of this document were developed throughout the course of the year with a final document pending.

**Explore the possibility of replacing the culvert at Trelease Creek and improving the spawning trap.** In the summer of 2018, a Question 1 application for funds was developed, submitted, and approved for improving the Marlette Lake broodstock facility. Its overall purpose was to replace the culvert at Trelease Creek to better allow spawning salmonids to reach the Nevada Department of Wildlife spawning station that sits immediately upstream of the culvert. Upon approval, several meetings were scheduled with involved parties and the project was scheduled for 2019.

Currently, the project is being designed by an environmental engineering contractor. Once plans are completed and conditions permitted, initial on the ground surveying and design will commence. The project is scheduled to be completed in the fall of 2019.

## **MANAGEMENT REVIEW**

Angler success rates of 1.2 fish per hour documented from the Angler Drop-Box Survey and 8.0 fish per angler day from the Mail-in Angler Questionnaire Survey meet or exceed the General Coldwater Fishery Management Concept guidelines of 0.30-1.25 fish per hour and 2.0-3.5 fish per angler day. Although use at the lake tends to fluctuate from year to year, fishing remains good for anglers willing to make the 4.5-mile hike. Because the water level does not dramatic fluctuate, trout populations remain stable from year to year. Marlette Lake offers a unique fishing experience and an angler satisfaction rating of 1.3 for fishing experience is on the upper end of the rating scale for most Western Region fisheries.

The winter of 2017/18 brought sufficient snowpack to Marlette Lake Basin and the lake remained near full for the duration of the 2018 trout-spawning season. Egg take goals set prior to the 2018 season were not met and it appears that the average size of female rainbow was down from previous years. It is recommended that every effort be made to stock fish at as large a size as possible in future years to improve the chances of reaching the egg take goals from year to year.

With average to above average winters, the Marlette Lake fishery should continue to provide an excellent recreational fishery along with a stable brood stock of trout for the Nevada Department of Wildlife's hatchery program. Condition factors from fish spawned in 2018 again suggests that the quality of fish is limited by environmental conditions and not density related. The oligotrophic nature of Marlette Lake does not contribute to high growth rates or healthy trout. Continuing to monitor this will help to make decisions on stocking levels in future years.

Analysis of both strains of Lahontan cutthroat trout in Marlette Lake has once again shown that the Pyramid Lake strain LCT outperforms the Pilot Peak strain LCT. Pilot Peak LCT were not utilized during spawning activities for the second consecutive year as only a single female was captured. Pyramid Lake strain LCT made up the entire allotment of fish utilized for bowcutt/cuttbow trout production in 2018. The return rate of Pyramid Lake strain LCT in 2018 was 3.4 percent of the total number stocked since 2009, while no Pilot Peak strain LCT have been returned since 2009. The calculated growth

rate over five years for the Pyramid Lake strain LCT averaged 2.4 in per year and was extremely impressive considering the oligotrophic nature of Marlette Lake. It is difficult to assess growth rate for the Pilot Peak strain LCT based on the absence of the strain during the spawning operation.

It is recommended that Pyramid strain LCT be used for the brood stock program within Marlette Lake. Marlette Lake is a manmade reservoir and Lahontan cutthroat trout are not native here. Based on this and the available data, it is recommended that Pyramid strain LCT be used as a sport fish for the reservoir. Based on close to ten years of data repeatedly showing the Pyramid Lake strain LCT outperforming the Pilot Peak strain LCT in Marlette Lake, it is recommended that the stocking of the latter strain be discontinued at Marlette Lake. The strain is not offering a benefit to either the fishery or the broodstock program and the summation of the last four years (2015-2018) return and growth data suggests that the overall fisheries program at Marlette Lake would be better suited to expend resources and time toward the Pyramid Lake strain of Lahontan cutthroat trout.

Data collected from one lot of tagged Incline strain rainbow trout initially stocked in 2010 provided valuable information for future management direction. This strain has shown good growth rates and has a long lifespan, up to nine years old, with fish continuing to show up in the spawning trap. The results from these fish led to the "Lake Tahoe Rainbow Trout Study" that compares growth rates, longevity, and fecundity between Incline strain rainbow trout spawned in Third Creek (Lake Tahoe) to traditional Tahoe strain rainbow spawned at Marlette Lake. To date, approximately 2,000-tagged individuals of each strain have been stocked into Marlette Lake. The 2010 spawning season being the year data was collected from these fish. After two years of study, the Incline strain rainbows appear to be growing at a faster rate than the Tahoe strain but are returning at a much lower rate. Continuing to monitor these fish for the next few years will provide numerous benefits to fisheries management and the angling public in Nevada.

Years of sediment buildup at the confluence of Trelease Creek and Marlette Lake has led to a shallow bay that appears to hinder the spawning operation when the lake is not at capacity. The finalization and implementation of plans to replace the culvert that has become a migration barrier to spawning fish will benefit the broodstock program at Marlette Lake into the foreseeable future.

## **RECOMMENDATIONS**

- 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.
- Assist with the trout spawning operation during the spring to ensure fulfillment of eggs for the statewide hatchery program.
- Monitor performance of different strains of rainbow trout by utilizing data collected during spawning operations.

- Work with engineers to replace the culvert at Trelease Creek and improve fish passage to the Marlette Lake spawning facility.

Prepared By: Travis Hawks  
Biologist III, Western Region

Date: December 18, 2018

Appendix 1

Marlette Lake Stocking Summary 2009 - 2018

Year	Species	Number	(in.)	Clips	Comment
2009	Rainbow (Incline)	2986	9.5		Yellow Floy tagged
	LCT (Pilot Peak)	2984	9		Gray Floy Tagged
	<b>Total Rainbow</b>	<b>2986</b>			
	<b>Total LCT (Pilot Peak)</b>	<b>2984</b>			
<b>2009 Total</b>		<b>5970</b>			
2010	Rainbow (Incline)	3065	9.2		Blue Floy tagged
	LCT (Pilot Peak)	2993	9.2	Adipose	
	LCT (Pilot Peak)	500	17.3	Adipose	LNFH broodstock, Pit tagged
	<b>Total Rainbow</b>	<b>3065</b>			
	<b>Total LCT (Pilot Peak)</b>	<b>3493</b>			
<b>Total</b>		<b>6558</b>			
2011	Rainbow (Tahoe)	3001	9.2		
	LCT (Pilot Peak)	1001	9	Adipose	7/25/11
	<b>Total Rainbow</b>	<b>3001</b>			
	<b>Total LCT (Pilot Peak)</b>	<b>1001</b>			
<b>Total</b>		<b>4002</b>			
2012	N/A	0			
<b>Total</b>		<b>0</b>			
2013	LCT (Pyramid Lake)	2857	8.5		
	LCT (Pilot Peak)	730	12.51	Adipose	
	LCT (Pilot Peak)	1918	9.07	Adipose	
	Rainbow (Tahoe)	3000	9.5		
	Rainbow (Tahoe)	3885	9.9		
	Rainbow (Tahoe)	2150	9.9		
	<b>Total Rainbow</b>	<b>9035</b>			
	<b>Total LCT (Pyramid)</b>	<b>2857</b>			
<b>Total LCT (Pilot Peak)</b>	<b>2648</b>				
<b>Total</b>		<b>14540</b>			
2014	LCT (Pilot Peak)	1944	8.9	Adipose	
	Rainbow (Tahoe)	7280	8.8		
	<b>Total Rainbow</b>	<b>7280</b>			
	<b>Total LCT (Pilot Peak)</b>	<b>1944</b>			

Appendix 1

Marlette Lake Stocking Summary 2009 - 2018

2015	PILOT PEAK	2,778	8	Adipose	
	PILOT PEAK	2,222	8	Adipose	
	PYRAMID LAKE	2,028	9		
	PYRAMID LAKE	2,390	8.9		
	TAHOE	5,596	8.7		
	<b>Total Rainbow</b>	<b>5596</b>			
	<b>Total LCT (Pyramid)</b>	<b>4418</b>			
<b>Total LCT (Pilot Peak)</b>	<b>5000</b>				
<b>Total</b>	<b>15014</b>				
2016	PILOT PEAK	1,500	9.67	Adipose	
	PILOT PEAK	1,500	9.67	Adipose	
	PYRAMID LAKE	2,507	8.3		
	INCLINE	999	8.5		Red Floy tagged
	TAHOE	4,007	8.8		1,000 yellow Floy tagged
	<b>Total Rainbow</b>	<b>5006</b>			
	<b>Total LCT (Pyramid)</b>	<b>2507</b>			
<b>Total LCT (Pilot Peak)</b>	<b>3000</b>				
<b>Total</b>	<b>10513</b>				
2017	PILOT PEAK	2,629	3.8	Adipose	
	PYRAMID LAKE	2,797	9.4		
	INCLINE	999	8.5		Blue Floy tagged
	TAHOE	4,995	8.8		1,000 green Floy tagged
	<b>Total Rainbow</b>	<b>5994</b>			
	<b>Total LCT (Pyramid)</b>	<b>2797</b>			
<b>Total LCT (Pilot Peak)</b>	<b>2629</b>				
<b>Total</b>	<b>11420</b>				
2018	PYRAMID LAKE	375	9.3		
	INCLINE	1680	10.1		1,000 white Floy tagged
	TAHOE	3677	9.9		1,000 orange Floy tagged
	<b>Total Rainbow</b>	<b>5357</b>			
<b>Total LCT (Pyramid)</b>	<b>375</b>				
<b>Total</b>	<b>5732</b>				
	<b>Total Rainbow</b>	<b>47320</b>			
	<b>Total LCT (Pilot Peak)</b>	<b>22699</b>			
	<b>Total LCT (Pyramid)</b>	<b>12954</b>			
<b>Total</b>	<b>82973</b>				