NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE SPORT FISHERIES MANAGEMENT

FEDERAL AID JOB PROGRESS REPORTS
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2013

BONNEVILLE CUTTHROAT TROUT
EASTERN REGION

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROGRESS REPORT

Table of Contents

Contents Page

SUMMARY 1

BACKGROUND 1

OBJECTIVES and APPROACHES 2

PROCEDURES 3

FINDINGS 3

MANAGEMENT REVIEW 10

RECOMMENDATIONS 10

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROGRESS REPORT

List of Tables

Number	Title	Page
1	Silver Creek Drainage Valley Bottom and Riparian Area Widths	4

List of Figures

Number	Title	Page
1	Silver Creek Velocity and Discharge	5
2	Silver Creek Stream Bottom Composition	6
3	Silver Creek GAWS Station Locations	11

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROGRESS REPORT

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Bonneville Cutthroat Trout*
Period Covered: *January 1, 2013 through December 31, 2013*

SUMMARY

In 2013, NDOW personnel attended the annual BCT range-wide meetings in Salt Lake City, Utah. It was a productive meeting allowing all field and staff biologists to voice the status of Bonneville cutthroat trout (BCT). In additional to voicing their status, biologists would also provide an update to upcoming projects and surveys in BCT waters.

In addition to objectives outlined in the 2013 Federal Aid work program, one of the last major components of Conservation Agreement Conservation Strategy for Bonneville Cutthroat Trout in the State of Nevada was completed in 2013. That component was the chemical eradication of non-native trout species present in the Silver Creek drainage and Silver Creek Reservoir. The treatment was deemed successful in killing 100% of all non-native trout present in Silver Creek and the reservoir. Also, prior to the treatment of Silver Creek, a GAWS Level III survey was conducted on the Silver Creek mainstem and its tributaries. The GAWS survey provided valuable insight to stream habitat conditions and likely spawning habitat for Bonneville cutthroat trout.

Both of these projects were completed using funding from the Southern Nevada Public Lands Management Act (SNPLMA) grant. The SNPLMA funding has allowed NDOW and Great Basin National Park to conduct surveys and other projects that are needed for BCT restoration and management in the State of Nevada.

BACKGROUND

Bonneville cutthroat trout (*Oncorhynchus clarki utah*) restoration activities initiated in the early 1990's continues today throughout its historic range in eastern Nevada. The Conservation Agreement and Conservation Strategy (CA/CS) for Bonneville Cutthroat Trout in the State of Nevada (NDOW, Crookshanks, 2006), which was implemented in January of 2007, guides management activities concerning BCT in Nevada. The CA/CS identifies objectives, strategies, and actions that are necessary to eliminate or reduce threats and provide for the long-term conservation of the species in Nevada such that listing under the Endangered Species Act can be precluded. Through the implementation of the CA/CS, degraded habitat will be improved and natural functions of associated riparian systems will be restored. Other species, including sensitive plants and animals that share these ecosystems, will also benefit from

restoration activities. Moreover, hydrologic function and ecosystem health will be maintained and improved.

This strategy was developed to provide a framework for long-term conservation of BCT throughout its historic range in Nevada. This document serves as a local strategy, tiered under the Range-Wide Conservation Agreement and Strategy for Bonneville Cutthroat Trout (Utah Division of Wildlife Resources – Publ. No. 00-19), which governs conservation activities for the species throughout its entire historic range.

OBJECTIVES and APPROACHES

Objective: General Native Sport Fisheries Management

Approaches:

- Participate in coordination activities required within the Bonneville Cutthroat Trout (BCT) Conservation Agreement and Conservation Strategy.
- Assist other agencies (National Park Service, BLM, U.S. Forest Service) as needed in BCT conservation.
- Attend annual BCT range-wide coordination team meetings in Salt Lake City, Utah.
- Meet with the landowner at Silver Creek to discuss and coordinate the future treatment of the stream.

Silver Creek Treatment

Located in the North Snake Range, Silver Creek drains the south side of the Mount Moriah Wilderness Area into Snake Valley. The stream originates at an elevation of approximately 8,280 ft (2,524 m) and flows approximately 11.7 mi (18.9 km) before reaching its terminus at Silver Creek Reservoir. Aside from the Main Fork, Silver Creek also has three named tributaries, the Left Fork, Second Fork, and Spring Creek. Since 1925, the Silver Creek watershed has been stocked on numerous occasions with rainbow, brown, brook, and cutthroat (LCT, Heenan strain) trout. Previous population surveys were conducted in 1952, 1984, 1995, and 2007. Comprehensive GAWS Level III habitat surveys were completed in 1995, 2007, and 2013.

An objective of the Conservation Agreement and Strategy for Bonneville Cutthroat Trout in the State of Nevada (Haskins, 1999) is to “Manage and restore for a minimum of 14 conservation populations of Bonneville cutthroat trout in Nevada.” In autumn of 2012, a gabion fish passage barrier was constructed to prohibit the movement of non-native trout species within the Silver Creek drainage. The construction of the gabion fish passage barrier allowed the Nevada Department of Wildlife (NDOW) to complete pretreatment surveys and continue with the fish eradication project that was set forth by the conservation strategies in the Conservation Agreement and Strategy for Bonneville Cutthroat Trout in the State of Nevada (Haskins, 1999). A concerted effort between NDOW, Great Basin National Park (GBNP), the U.S.

Forest Service, and Baker Ranches helped to make this project possible from the headwaters to the privately owned reservoir.

PROCEDURES

The U.S. Forest Service Region 4, Level III General Aquatic Wildlife System (GAWS) survey method was used to sample 18 stations in seven pre-determined reaches based on landform and political boundaries. Station locations were indentified using a 7 1/2 min USGS topographic map of the area and general descriptions in field trip files, and then digitally transferred to ExpertGPS. In the field, station locations were marked using a Garmin GPSmap 62s handheld GPS. A map plotted using ExpertGPS mapping software is attached on the last page (Figure 3). All raw data is on file at the Ely Field Office.

Generally, a fish population survey is completed as part of the standard survey; however, since Silver Creek was scheduled for chemical treatment, a population survey was not conducted.

FINDINGS

Silver Creek GAWS Level III

Watershed Description

Silver Creek is a second order stream and drains a watershed of approximately 14,830 acres. Elevations range from 1,707 m (5,600 ft) at the Silver Creek Reservoir inflow to 2,682 m (8,800 ft) at R1S3 of the Second Fork. The geological landform substrate (Million-Scale Geologic Map of Nevada, 1977) consists of carbonate and transitional assemblages in the upper elevations of the stream and tuffaceous sedimentary rocks in the lower elevations. Valley forms ranged from wide, flat-floored to narrow, V-shaped and were varied throughout the length of the stream, with seven distinct types represented in the survey. Valley bottom width ranged from 9 m (29.5 ft) at SCM R4S1 to 315 m (1,033.5 ft) at SCM R1S3, with an average of 85.9 m (28.8 ft, Table 1). Riparian area width ranged from 9 m (19.7 ft) at R1S1 of the Spring Creek tributary to 30 m (98.4 ft) at R1S2 of the Second Fork, with a watershed average of 17.1 m (56.4 ft).

Water Status

On the Main Fork of Silver Creek, discharge measurements ranged from 2.03 cfs at the lowermost station sampled that had water (SCM R1S1) to 8.61 cfs at SCM R2S1 (Figure 1), and averaged 4.34 cfs for all stations that had water. Average discharge on the Second Fork tributary was 1.03 cfs, while the Spring Creek tributary averaged a discharge of 0.39 cfs. It is noted that the uppermost station (SCM R5S2) on the mainstem of Silver Creek (SCM R4S2) and a portion of the lower station on the Spring

Creek tributary (SCSC R1S1) were dry at the time of the survey. Flows and discharges were much higher in the 2013 survey compared to the 2007 survey.

Table 1. Silver Creek and Tributaries Valley Bottom and Riparian Area Widths.

STATION	VALLEY BOTTOM WIDTH (m)	RIPARIAN AREA WIDTH (m)
SCM R1S1	230	25
SCM R1S2	15	9
SCM R1S3	315	10
SCM R1S4	145	20
SCM R1S5	140	25
SCM R2S1	44	27
SCM R2S2	55	10
SCM R3S1	55	18
SCM R3S2	66	15
SCM R4S1	9	15
SCM R4S2	120	9
SCM R5S1	34	18
SCM R5S2	91	30
SC2ND R1S1	15	25
SC2ND R1S2	75	30
SC2ND R1S3	15	20
SCSC R1S1	110	9
SCSC R1S2	13	13
AVERAGE	**85.9**	**17.1**

The average discharge in 2013 was almost four times higher than discharge in 2007 on the mainstem of Silver Creek. In the fall of 2012, most of White Pine County received substantial water input from rain that helped recharge springheads and improve the overall condition of flows throughout the Silver Creek drainage. Even with the increase of flow and discharge, this is the second time that Spring Creek did not meet Silver Creek at its confluence (the first time being in 2007).

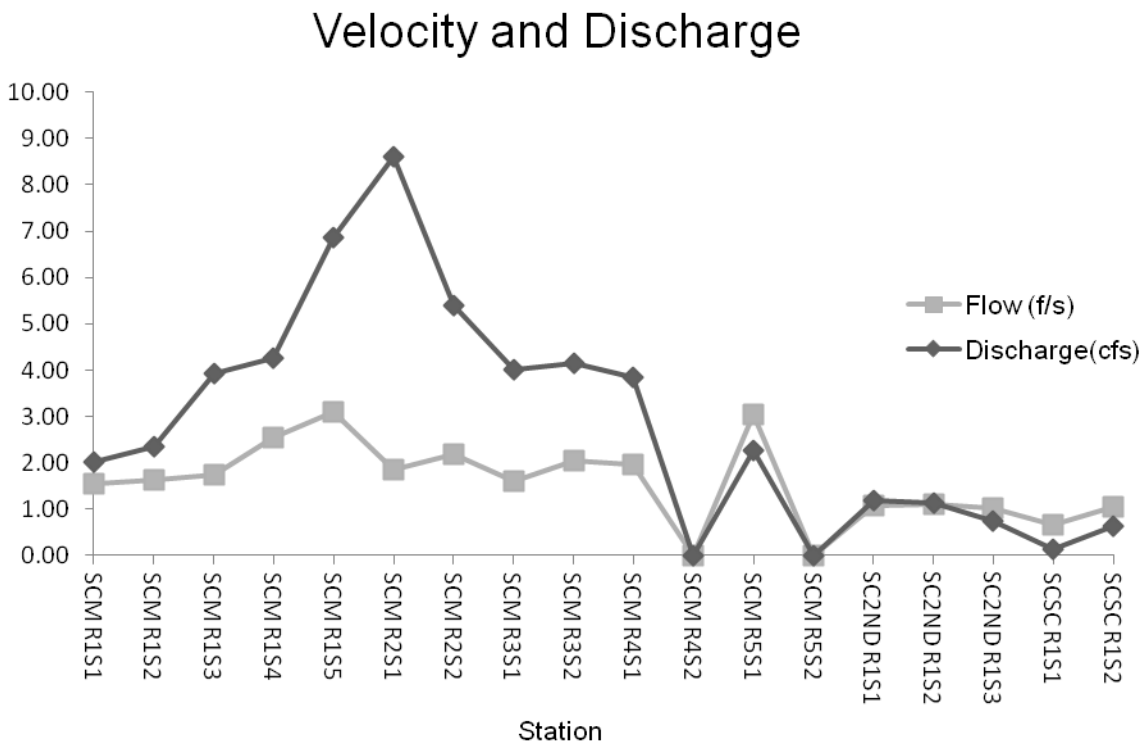
Stream Habitat Condition Index (HCI)

The average HCI rating for Silver Creek and its tributaries was 54.6% and considered to be in fair condition. This condition rating is based on the U.S. Forest Service rating system of 0-39 (poor), 40-69 (fair), 70-89 (good), and 90-100 (excellent). The average HCI rating dropped from 67.1% in 2007 to 54.6% in 2013. The three variables that had the most influence on the HCI for Silver Creek was pool measure, bank soil stability, and bank vegetation stability.

One site throughout the survey was found to be in poor condition and that was SCM R1S2. This area was on private land and was heavily impacted by grazing. Throughout the survey, both grazing and incised banks influenced bank soil stability and bank vegetation. There seems to have been notable erosive processes from high flows,

particularly from the runoff in 2008 and again in 2011. Each year could have caused significant erosion from banks, removing vegetation, and lowering the stability of soil.

Figure 1. Silver Creek and Tributaries Velocity and Discharge



Stream bottom carried an average of 61.1% (fair), where three reaches were found to be rated as good, two reaches rated as fair, and one reach rated as poor. Once again, pool measure was found to be a limiting factor in the HCI and was rated in the poor category for Silver Creek and its tributaries (36.8%). This should not be cause for alarm as pool measure, as reflected in the GAWS methodology, may not be entirely accurate. In regard to the percentages derived in the GAWS methodology, pool measure serves as a deviation from a 50-pool:50-riffle ratio, which is considered ideal. However, recent studies have shown that ratios ranging from 25:75 to 75:25 produce high numbers of trout. Even thought this is lower than previous surveys (63% in 2007), the abundant trout population that resided in Silver Creek and its tributaries prior to the eradication project could not persist without quality pools.

Although room for improvement exists in relation to livestock impacts, habitat conditions at Silver Creek and its tributaries are considered stable at this time and sufficient to sustain its salmonid populations.

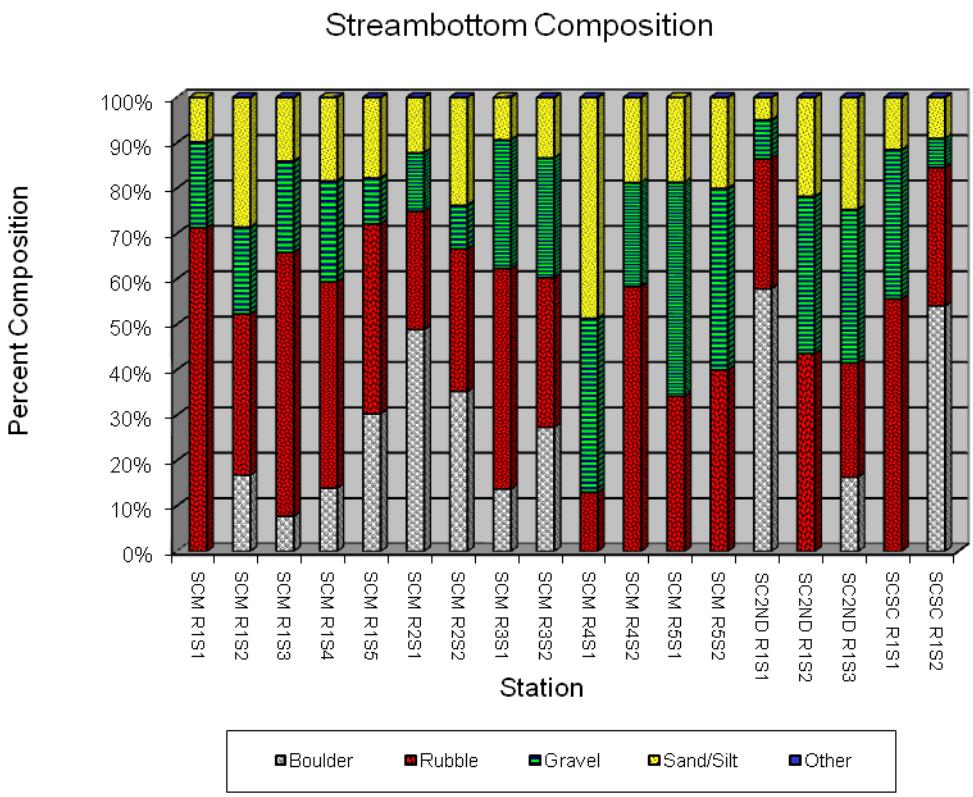
Stream Channel Type and Stability

Utilizing *Rosgen's Stream Classification Guide*, Reach 1 consisted of B1, B3, C3, and C4 channel types, while Reaches 2 and 3 were represented totally by a B3 channel

type. Reach 4 was comprised entirely of a B4 channel type and Reach 5 was made up of a combination of B3 and B4 channel types. The Second Fork consisted of A3, A4, and B3 channel types, while the Spring Creek tributary was comprised of an A2 channel type. Stream bottom embeddedness averaged 75.4% (heavy) overall and ranged from 28% (moderate) in Reach 4 to 80% (severe) in Reach 1. Studies indicate that embeddedness greater than 35% can deleteriously affect spawning success for salmonid species. During survey activities, many stations on the lower part of the stream were noted to be heavily calcified. Poor embeddedness rating must be taken into consideration when BCT are reintroduced into Silver Creek. Transect measurements showed that gravel (24.2%) and rubble (40.4%) averaged 64.6% of the substrate. This indicates an adequate amount for spawning and rearing habitat for fish as well as for adequate production of macroinvertebrates (Figure 2).

Stream channel stability averaged in the range of 75.2 for the surveyed portion of Silver Creek and its tributaries. Stability was found to be good in four reaches and each tributary (Reaches 2, 3, 4, 5, Spring Creek tributary, and Second Fork tributary) and fair in Reach 1. Stability ratings are based on scores of 0-38 (excellent), 39-76 (good), 77-114 (fair), and 115+ (poor). The primary limiting factor for stream channel stability in Reach 1 can be attributed to grazing intensity. Bank soil stability and bank vegetation stability has suffered accordingly.

Figure 2. Silver Creek and Tributaries Creek Stream Bottom Composition



The channel width ranged from 1.1 m (3.6 ft) to 32.4 m (106.3 ft), and averaged 5.25 m (17.2 ft) overall. Water width averaged 1.85 m (6.1 ft), and ranged from 1 m (3.3

ft) to 2.66 m (8.73 ft). The average width to depth ratio for Silver Creek and its tributaries was 22.8.

Riparian Description

Riparian habitat conditions for Silver Creek and its tributaries rated fair to good throughout most stations surveyed. Eight stations rated as good, nine rated in the fair range, and the only remaining station was rated as poor. It must be noted that the one station rated as poor (SCM R1S3) was located on private property that is currently used as an active pasture for livestock.

Tree PNC was the dominant plant community type in the Silver Creek drainage and was found at 13 of the 18 stations surveyed. Early to late tree community types were found at three stations (SCM R1S3, SCM R1S5, and SCM R2S1), while early to late shrub and shrub PNC were found at a single station each (SCM R4S2 and SCM R5S1, respectively). In tree PNC and early to late tree community types, limiting factors were a low density of shrubs, a dominance of increasers in the shrub component, and a lack of ground cover. This should not be a cause for alarm as these limiting factors are to be expected in the presence of a dense tree canopy. A common limiting factor in the early to late shrub community (SCM R4S2) was increased damage to understory plants that was likely caused by heavy grazing that was documented in the area. At this time, the riparian areas of the two tributaries to Silver Creek (Second Fork and Spring Creek) remain in good condition. However, attention should be given to those areas of the Main Fork of Silver Creek that show substantial livestock-related impacts.

Riparian canopy density averaged 58.5% (moderate) overall and varied among reaches from 3.9% (open) in Reach 5 to 97.3% (dense) in Reach 3.

Fish Population

Since there was an eradication project scheduled only a few weeks after the GAWS survey was completed, fish population data was not collected due to their impending demise. However, it should be noted that the non-native trout population consisted of brown trout, brook trout, rainbow trout, and cutthroat x rainbow trout hybrids. Even though uncalculated, trout densities in Silver Creek were considered excellent.

Angler Use

Compared to other streams in White Pine County, Silver Creek receives a moderate amount of angler use. The Department of Wildlife's Mail-in Angler Questionnaire Survey shows a 27-year average (1980 to 2006) of 66 anglers and 236 angler use days per year. Estimated angler use for the past 27 years has ranged from 0 anglers and 0 angler days (1980, 1989, and1994) to 268 anglers and 1,089 angler days in 1984.

Aquatic Macroinvertebrates

Varieties of macroinvertebrates were found during the survey. Three species of Tricoptera (free-swimming, stone-case, and vegetation-case caddis) were found in varying densities throughout the length of the stream. Plecoptera nymphs (stonefly) were found in all reaches, while Ephemeroptera nymphs (mayfly) were represented in Reach 1 and the Spring Creek tributary. Diptera larvae (black fly) were found in Reaches 2 and 3, while Oligocheata (aquatic earthworms) were found in Reaches 1 and 2. Amphipoda (scuds) were found in Reach 2, while Reach 1 was also home to Hemiptera (water striders) and Decopoda (crayfish).

Beaver Status

Beaver activity (past or present) was noted at three stations surveyed. Both stations in Reach 2 (SCM R2S1 and SCM R2S2) were noted to show evidence of old beaver activity that included historic cuttings on trees in the vicinity. At both stations, however, there was no current effect on the stream channel. On the other hand, station SCM R4S1 was located directly upstream of an inactive beaver complex. With an inactive beaver dam directly downstream and the section that was flowing through what was once a pond, heavy sedimentation along with abundant amounts of watercress and Chara were noted. Even as such, the beaver activity still had little current effect on the stream.

Silver Creek Treatment

Pretreatment surveys were conducted the week prior to dispensing of rotenone (August 5 through 10). During the pretreatment surveys, the upper distribution of all fish species present in the Silver Creek drainage were found in order to identify the treatment area and locations of upper most drip buckets. Additionally, areas that require special attention during the treatment such as spring, seeps, and backwater areas were identified and flagged. Discharge measurements were recorded and evaluated to determine the amount of rotenone needed for the entire project. It was determined that the Silver Creek project would have a total of 30 drip buckets based on flows and distance from headwaters to Silver Creek Reservoir. Prior to the treatment, the remaining water in Silver Creek Reservoir was seined and surviving fish were transported to Sacramento Pass Pond.

Prior to the treatment, rotenone powder/gelatin/sand formulation was mixed according to the Rotenone Standard Operating Procedures Manual (Finlayson et al. 2010) at the Elko NDOW office at the following formulation: 1 pound of powdered to 1 pound of fine-to-medium sand to 2 ounces of unflavored gelatin. Liquid rotenone was also stored at the Elko and Winnemucca NDOW offices and transported to the field the day prior to the treatment.

On August 10, 2013, NDOW personnel met with Dave Baker of Baker Ranches to obtain official documentation that gave approval to conduct the eradication project through Baker Ranch land down to Silver Creek Reservoir.

Dispensing of the liquid rotenone formulation, CFT Legumine, occurred on August 12 through 15, 2013. There were 20 individuals present from NDOW and four present from Great Basin National Park (GBNP) each day of the treatment. NDOW and GBNP personnel were assigned to drip buckets and spray crews for the duration of the treatment. Individuals assigned to spray crews used backpack sprayers and powered rotenone/sand mixture to treat backwater areas, springs, and seeps.

Due to issues with manpower and resources, four NDOW employees arrived at Silver Creek on 12 August 2013 and treated the upper most section of the Silver Creek mainstem. Treating the upper most section separately allowed personnel to simplify logistics pertaining to the overall treatment. To ensure a successful kill of all fish, a second round of treatment occurred on the upper most section of the mainstem on 15 August 2013. On each day, there were two three-hour treatments at 2 ppm concentration.

The first day (8/12) and fourth day (8/15) of the treatment, only four buckets were dispensing rotenone. The first day rotenone was dispensed at 1530 hrs and was drained by 2130 hrs. On the fourth day, rotenone was dispensed starting at 0800 hrs and buckets were drained by 1400 hrs. On the second day of the treatment rotenone was dispensing began at 0930 hrs and buckets were drained by 1530 hrs. The third day of treatment began with rotenone being dispensed at 0830 hrs and buckets were drained by 1430 hrs. Reasoning for the discrepancies in time from the second day to the third day was to allow individuals enough time to hike to drip bucket locations and to become accustomed to the area.

Individuals assigned to the drip buckets would treat the Silver Creek drainage at 2 ppm for two three-hour treatments. Varying amounts of rotenone was dispensed from a five gallon bucket depending on discharge of the stream at that location. To achieve the duration needed of three hours per treatment, the dispense rate was set at 105ml per minute. Spray crews were assigned to 1.5 mi sections of stream and would treat all areas that were flagged and identified as potential problem areas. Spray crews were allotted 18 oz of liquid rotenone to be dispensed throughout their assigned area. The liquid rotenone formulation, CFT Legumine, was mixed at a concentration of 6 oz per gallon in a 3 g capacity backpack sprayer.

With landowner cooperation, the reservoir was as low as it could possibly be, which allowed personnel to treat using a small johnboat and backpack sprayer. As one person rowed the johnboat, the other would stick the nozzle of the backpack sprayer in the water. The rowing would allow the water to mix the rotenone and distribute the chemical throughout the water column. The rotenone concentrations applied to the reservoir were mixed at a ratio of 50:50 in the backpack sprayer.

After each day of the treatment, the project leader would meet with all drip bucket personnel as well as spray crews to determine if any new problem areas had arose. Both days of treatment had not presented any additional problem areas to either the spray crews or drip bucket personnel. The rotenone project used 59 g of CFT Legumine. Drip stations used 40 g of rotenone, the crew treating the reservoir used 10 g, and the spray crews used 9 g. Additionally, there was 100 lbs of sand used during the four days of treatment.

After the treatment project, personnel expressed confidence that all fish were killed within the Silver Creek drainage. However, given the length and complexity of the system it cannot be guaranteed that there was a 100% kill of all fish. In the summer of 2014, NDOW personnel will conduct a post-treatment survey to determine successfulness of the 2013 Silver Creek treatment. This will include shocking Silver Creek from the reservoir to the headwaters attempting to locate any surviving fish.

MANAGEMENT REVIEW

During 2013, all objects and approaches were completed. In addition to the outlined approaches, there was an informative survey of the habitat of future BCT waters as well as the eradication of non-native trout species in those same waters.

RECOMMENDATIONS

- Conduct the post-treatment survey on Silver Creek and its tributaries to confirm the success of the 2013 treatment.

- To continue to participate in coordination activities required within the Bonneville Cutthroat Trout Conservation Agreement and Conservation Strategy.

- To continue to attend annual BCT range-wide coordination team meetings in Salt Lake City, Utah.

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Biologist II, Eastern Region

Date: March 2014

Figure 3.

SCM R5 S2
SCM R5 S1
SCM2NDR1 S3
SCM R4 S2
SC2ND R1 S2
SCM R4 S1
SC2ND R1 S1
SCM R3 S2
SCSC R1 S2
SCMR3 S1
SCSC R1 S1
SCM R2 S2
SCM R2 S1
SCM R1 S5
SCM R1 S4
SCM R1 S3
SCM R1 S2
SCM R1 S1
B O L D T
F O R E S T
H U M B O L D T
N A T I O N A L F O R E S T
Black Horse
Silver Creek Reservoir
CalTopo.com