NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE SPORT FISHERIES MANAGEMENT

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STREAMS AND RIVERS MANAGEMENT
EASTERN REGION

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROGRESS REPORT

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NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL JOB PROGRESS REPORT

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Eastern Region Streams and Rivers Management*
Period Covered: *January 1, 2013 through December 31, 2013*

SUMMARY

Humboldt River

The 2013 survey efforts were the second year of surveys to document densities and distribution of New Zealand mudsnails (NZMS) in northeastern Nevada. The three transect sites were surveyed and resulted in an increase in snail densities at the upper two sites. These surveys were also considered follow-up surveys to evaluate the success of the dewatering event that occurred in 2012. Because the dewatering event was not successful, due to the high water table, the snail densities were only slightly impacted and a prolific snail reproduction allowed for an increase in snail densities at the Maggie Creek site. Although no snails were observed in the lower Humboldt River transect plots, they were detected upstream of the transect. Additionally, one new site occupied by mudsnails was detected in Thousand Springs Creek, in the Bonneville drainage.

South Fork Humboldt River

The upper South Fork Humboldt River (SFHR), from Lucky Nugget causeway to the gauge station, was surveyed to monitor spring spawning trout sites (redds). The survey produced 63 redds, with 34 of them being active, and with 84 fish being documented. The South Fork Humboldt River was also checked for anglers three times in 2013. During these random angler contacts, four anglers were surveyed. It was found that these 4 anglers spent 5.5 hrs to catch 13 fish. Extrapolating this data indicates that there was 3.25 fish per angler, with an average of 1.4 hrs fished per angler and a catch rate of 2.4 fish per hour. Two days were also spent monitoring the spring spawning trout below the reservoir, with no fish or redds being found. Monitoring of fall spawning trout consisted of a one-day survey above and below the reservoir. This survey resulted in finding no fish or redds. In August, two brown trout and one wiper were collected below SFHR reservoir for mercury analysis.

Other Eastern Region Streams

In White Pine County, three population surveys were conducted to determine status of trout present in Ellison Creek, Goshute Creek, and McCoy Creek. In Ellison Creek, a population survey revealed 123.6 fish per mile. This population has remained relatively stable since it has not been stocked since 1958. Goshute Creek contains a remnant population of Bonneville cutthroat trout, which has persisted even though

habitat conditions are less than optimal. The population survey revealed that there were 396 fish per mile throughout Goshute Creek. There will be a need to have further surveys done in order to ensure persistence of this population, as well as status of habitat throughout the drainage. Finally, in McCoy Creek, a standard population survey resulted in 213.2 fish per mile. A combination of brown trout and a hybrid rainbow trout x cutthroat trout population in McCoy Creek should make for a popular fishery.

BACKGROUND

Humboldt River

Prior to August 2012, Nevada was thought to have only two populations of New Zealand mud snails (*Potamopyrgus antipodarum*), one in the Salmon Falls River in northeast Nevada, and the other in Lake Mead in southern Nevada. In August 2012, Nevada Department of Environmental Protection personnel identified what was thought to be New Zealand mud snails (NZMS) in Maggie Creek (Humboldt River drainage) near Carlin, Nevada. Samples collected by NDOW were analyzed by EcoAnalysis in September and positively identified as NZMS.

Further investigation revealed the infestation to be in lower Maggie Creek, with its uppermost extent being approximately three miles below the Newmont Mining Company cooling towers. All flow in this portion is provided by the Newmont Mining Company dewatering project as Maggie Creek is intermittent upstream of the dewatering flow. NZMS were also detected in the Humboldt River downstream of the Maggie Creek confluence to the Highway 278 crossing.

South Fork Humboldt River

Completion of the South Fork Reservoir Dam in 1988 essentially split the South Fork Humboldt River (SFHR) into two sections. The upper river, from South Fork Reservoir to the highway bridge in Lee, has provided a fair sport fishery in the past. The primary limiting factors for trout in this stretch includes a lack of suitable pools and cover (stream channelization and willow eradication) and increased water temperatures during the critical summer months (reduction of flows due to irrigation diversions). This section of river is now managed as a trophy fishery to provide some protection for the spring and fall spawning runs that emanate from the reservoir.

The lower river, from South Fork Reservoir to the confluence with the Humboldt River, had never maintained much of a fishery due to poor habitat conditions and poor water quality. Excessive livestock use has led to poor bank stability and cover, poor pools, and very high summer water temperatures. Subsequent releases from the dam have created the potential for a much improved sport fishery in the lower river. The releases have not only improved water quality, but have essentially stocked the lower river with fish from the reservoir. Evidence of surviving natural reproduction of brown and rainbow trout has been increasing in the lower rive since the mid-1990's to 2000.

Other Eastern Region Streams

Ellison Creek

Ellison Creek originates at 8,160 ft elevation in the White Pine Range. It then flows approximately 15 mi east into White River Valley and connects with the White River. In 1997, NDOW received a scoping document regarding Alta Gold Company's proposed Griffon Mine pit expansion. Modifications to the road moved it further into the Ellison Creek riparian area, which has resulted in an increased amount of sedimentation in the creek due to heavy vehicle traffic. As recently as fall of 2012, there has been renewed interest in mineral resources around the Griffon Mine and additional exploratory drilling is proposed. In June of 2013, dredging applications were filed out of the Reno NDOW office for a recreational dredger in Ellison Creek.

Ellison Creek was first planted with rainbow trout *Oncorhynchus mykiss* in 1936 and brook trout *Salvelinus fontinalis* in 1939. The last time rainbow trout were stocked into Ellison Creek was 1958 and the population existing today is believed to have descended from this stocking.

The original stream survey conducted in 1956 found no fish in the areas sampled. A single station population survey in 1982 recovered rainbow trout, resulting in a population estimate of 106 fish per mile. This station was located two miles above the forest boundary. An icthyofauna survey conducted in 1991 (Seattle National Fishery Research Center for NDOW) found rainbow trout 1.9 mi below the Ellison Creek guard station. A total of 13 fish from an 82 ft transect were recovered, resulting in a population estimate of 837 fish per mile. In addition, a "presence/absence" survey was conducted in 1996 and found rainbow trout at intervals of 0.1, 0.65, 2.0, 2.8, 3.45, and 4.0 mi below the guard station.

Historically, White River spinedace *Lepidomeda albivallis* were found in Ellison Creek. Throughout the years, anthropogenic influences caused White River spinedace to become extirpated from the Ellison Creek drainage. Ellison Creek is identified as "highly desirable" for a recovery population of spinedace in the "White River spinedace (*Lepidomeda albivallis*) 5 Year Review: Summary and Evaluation" written by the U.S. Fish and Wildlife Service, Reno, Nevada Office.

On two separate occasions NDOW, USFS, and USFWS personnel moved White River desert sucker *Catostomus clarki intermedius* and White River speckled dace *Rhinichthys osculus* into Ellison Creek in an attempt to reestablish native endemics into the system. The first movement resulted in 100 White River speckled dace and 7 White River desert suckers being moved into Ellison Creek. The second trip resulted in 541 White River speckled dace and 8 White River desert sucker being transplanted.

Goshute Creek

Flowing eastward into Steptoe Valley from the Cherry Creek Mountains lies Goshute Creek containing one of 13 established populations of Bonneville Cutthroat trout *Oncorhynchus clarki utah* in Nevada. This stream lies outside the native range of the Bonneville Cutthroat Trout (BCT) and represents a population introduced from Pine Creek (South Snake Range) in 1960. Goshute Creek contains approximately 3.5 to 4.0 mi of suitable habitat, with the uppermost 3.0 mi located in a BLM Wilderness Study Area.

Two large gabion dams were built on Goshute Creek by the BLM in 1976 in an effort to improve habitat for trout. Floods in 1983 and 1984 destroyed one structure, leaving the stream to flow through a deep gully in places that still exist today.

Population surveys were conducted annually on Goshute Creek from 1972 to 1986 and biennially from 1988 to 1996. The BLM has also conducted habitat surveys of the stream periodically in the past. Fish per mile estimates have ranged from a low of 158 in 1992 to a high of 1,500 in 1979. A population survey conducted in the fall of 2000 resulted in a BCT density of 1,214 fish per mile, which is the third highest figure recorded at Goshute Creek.

The Goshute Basin has had a history of blowing out during mid- to late summer thunderstorm events. In 2001, a large thunderstorm system moved in depositing approximately 2 in of rain in a short period. BLM employees reported that the headwaters of the stream showed evidence of erosion, which deposited a substantial amount of rock and gravel into the upper portion of the stream. Additionally, in August of 2001 another large rainstorm moved over the basin and caused substantial flooding in Goshute Creek.

Due to the high gradient of the basin, it was thought that these flood events could have possibly extirpated the resident population of Bonneville cutthroat trout. Investigations in 2001 and surveys in 2002 located BCT in Goshute Creek; however, equipment failure has hindered both instances of determining the status of the BCT population.

McCoy Creek

McCoy Creek is located in the Schell Creek Mountains of White Pine County, Nevada. The stream originates at an elevation of approximately 10,330 ft and ends at approximately 5,600 ft. McCoy Creek drains a small portion of the east side of the Schell Mountains and into the Spring Valley drainage. The stream is approximately 4.8 mi in length. Of the 4.8 mi, 3.5 mi flow through land administered by the U.S. Forest Service and the remaining 1.3 mi flows through land administered by the BLM.

McCoy Creek was originally stocked in 1925 with “black spotted” trout (cutthroat). It was subsequently stocked five more times between 1948 and 1952 with cutthroat

trout, possibly Heenan strain Lahontan cutthroat. Brook trout *Salvelinus fontinalis* were stocked in 1928, 1929, and 1930. Rainbow trout were first stocked in 1928, and then nearly annually from 1936 through 1973. Currently inhabiting McCoy Creek are brown trout *Salmo trutta* and cutthroat x rainbow hybrids. Even though brown trout are currently found in McCoy Creek, there are no NDOW records of brown trout being stocked.

In the past, fish population surveys were conducted in 1953, 1984, 1977, and 1995. In 1995, there was a population estimate of 832 fish per mile. In 1984, densities were lower at 528 fish per mile. In 1977, the fish population survey resulted in 3,200 fish per mile between brown trout and rainbow trout. In 1953, there was a density of 245.5 fish per mile. There have been changes in equipment, techniques, and station locations throughout the years that could change effectiveness of the surveys. Consequently, it is difficult to compare results from surveys that span 42 years when there are advances in technology and techniques.

Habitat alterations can be attributed to the riparian areas of McCoy Creek being burned in 1984. Habitat conditions improved and, preceding the last survey (1995), there was limited use of the grazing allotment by the permittee. In the last 18 years, fires have not affected the stream itself; however, grazing has intensified in the upper reaches of McCoy Creek by domestic sheep.

OBJECTIVES and APPROACHES

Objective: General Native Sport Fisheries Management

Approaches:

<u>Humboldt River</u>

1. Conduct a general fisheries assessment through opportunistic angler contacts.
2. Visually inspect substrate for New Zealand mudsnails (NZMS) below the Highway 278 bridge to assess downstream distribution, and in other locations of the Humboldt River Drainage to assess mudsnail presence.
3. Sample three permanent transects utilizing grid or plot frames in lower Maggie Creek and the Humboldt River in the fall and after spring runoff to assess relative abundance of NZMS.
4. Assist cooperators in implementation of control treatments in lower Maggie Creek.
5. Implement outreach efforts including installation of warning signage to inform the public of NZMS presence and decontamination needs.

South Fork Humboldt River

1. Visually monitor the spawning migrations of rainbow trout for 3 days during spring and brown trout for 3 days during fall at established transects above and below the reservoir.
2. Conduct a general fisheries assessment through opportunistic angler contacts.
3. Collect 5 brown trout from below the reservoir for mercury analysis.

Other Eastern Region Streams

1. Conduct a general fisheries assessment through opportunistic angler contacts.
2. Collect 5 yellow perch from the EF Owyhee River for mercury analysis in cooperation with NDEP.
3. Utilize electrofishing to assess the status of non-native trout populations in McCoy Creek.

PROCEDURES

Humboldt River

Detect/nondetect surveys were conducted using tactile and visual surveys of substrate and aquatic vegetation for the presence of NZMS snails, while the permanent transects required a more in-depth, random grid system. The three transects that were identified for survey were lower Maggie Creek and two on the Humboldt River downstream of the Maggie confluence. The Maggie creek transect was located at the Chestnut street bridge, at UTM 11T 576483 4508074. The first Humboldt transect was located at the HWY 287 bridge at UTM 11T 573519 4505835 and the second Humboldt transect was located several miles downstream at UTM 11T 570269 4498301.

Each transect was marked with stakes on each bank to designate the sample transect that stretched across the water, with the exception of the upper Humboldt transect that used a fence line that was on the upstream side of the bridge. The sampling grid, made up of nine-10 cm squares, was placed on the downstream side of the transect line at three locations, one meter from each bank and in the center of the stream. Three-10 cm squares were randomly chosen for sampling, which consisted of the removal of the top layer of substrate within each square. This was done by using a small aquarium net handle to scrape the sample into a larger aquarium net that was placed downstream of the square. This netted sample was then rinsed in the water to remove as much fine sediments as possible. The finished sample, consisting of three sampled squares per plot, was placed in a sample jar and preserved with isopropyl alcohol.

Preserved samples were taken to the office and examined under a dissecting microscope at low power. Each sample was subdivided and individual snails were

counted. This number was then extrapolated to calculate the number of snails per square meter.

The dewater of Maggie Creek was achieved by Newmont Mine Co. diverting their dewatering flows to a storage reservoir, rather than directly to Maggie Creek. Due to the available amount of storage space in the reservoir, there was only a two-week window to divert this water.

South Fork Humboldt River

Spawning Monitoring

During the spring and fall of 2013, trout redd transects were surveyed on the South Fork Humboldt River to monitor spawning activity. Transects were located on the upper river section above the reservoir, from the causeway to the gauging station, and the .55 miles below the dam. All transects were walked and visually surveyed with all redds being noted as to whether they were active, occupied and/or abandoned.

Opportunistic Angler Contacts

Angler surveys were conducted in the spring and summer by use of the creel clerk as well the biologist. Fish length, fish species, and total hours fished were recorded during the angler contacts.

Mercury Samples

The South Fork Humboldt River (below the reservoir) was electroshocked using a Smith-Root backpack electroshocker to collect fish for mercury analysis. The fish were measured and weighed and were sent to the USEPA Region IX Lab in Richmond, CA for mercury analysis.

Other Eastern Region Streams

Ellison Creek

An ETS ABP-3 backpack electroshocker was used to sample five stations along Ellison Creek. Water temperature was taken with a standard bulb thermometer and flow was measured using the floating chip method. Fish were captured using standard dip nets and placed in 5 g buckets for processing. Captured fish were measured (total length) and then returned to the stream.

In an effort to sample similar to previous population surveys, distances sampled varied. Station locations were indentified using a topographic map 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. Digital

photos were taken for future reference (upstream, across, and downstream). All raw data and pictures are on file at the Ely Field Office.

Goshute Creek

An ETS ABP-3 backpack electroshocker was used to sample 100 ft (30.5 m) stations along Goshute creek. Each station was comprised of three transects (0, 50 ft, and 100 ft). Water temperature was taken with a standard bulb thermometer and flow was measured using the floating chip method. Fish were captured using standard dip nets and placed in 5 g buckets for processing. Captured fish were measured (total length) and then returned to the stream.

Station locations were indentified using a topographic map 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. Digital photos were taken for future reference (upstream, across, and downstream). All raw data and pictures are on file at the Ely Field Office.

McCoy Creek

An ETS ABP-3 backpack electroshocker was used to sample 100 ft (30.5 m) stations along McCoy Creek. Fish were captured using standard dip nets and placed in 5 g buckets for processing. Captured fish were measured (total length) and then returned to the stream. Flow was not recorded due to high flows and steep gradient throughout the survey area.

Station locations were identified using a topographic map 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. All raw data is on file at the Ely Field Office.

FINDINGS

Humboldt River

NZMS Detect/Non-Detect Surveys

Due to the current, known distribution of mudsnails in northeastern Nevada, detect/non-detect surveys were conducted in conjunction with other work activities within the region. During a native nongame fish survey in the Thousand Springs drainage (Bonneville drainage), mudsnails were found in a side spring channel upstream from Highway 93. This location is within 50 mi of the known population of mudsnails located at the Jackpot rest stop along the Salmon Falls River. To check for further mudsnail occupancies, the streams that run between Thousand Springs Creek and Jakes Creek were checked near the road crossing to assess the presence of mudsnails within these streams. No invasive snails were located at these sites,

however, due to the small survey area, it cannot be confirmed that mudsnails are not currently occupying streams in this system. Jakes Creek Reservoir is now located between two known mudsnail sites and is frequented by waterfowl year round. Due to these factors, several samples of substrate and aquatic vegetation were collected from the inlet portion of the reservoir. Upon examination of these samples, no mudsnails were found. Due to the reservoirs location and prevalence of waterfowl, a similar survey protocol should be conducted yearly to evaluate the presence of mudsnails at this small fishery.

Transect Monitoring

On November 26, each of the three transects were surveyed for NZMS. Maggie Creek has shown to have the highest densities of snails and after an unsuccessful dewatering attempt, it is expected that densities will still be high. Due to increased beaver activity in the proximity of the Maggie Creek transect, water depths were too great to conduct the survey at the original transect. Three sites were randomly chosen upstream of the transect that had water depths conducive to sampling. The results were an average snail density of 34,967 snails per square meter, with a range of 10,900 to 70,767 snails per square meter (Table 1). These numbers are somewhat higher than the previous year, even with the attempted drying/freezing attempt earlier in the year. It should be noted that there was a substantially higher number of sub-adult sized snails in this survey than was observed in 2012. This increase in sub-adult snails could be a product of a reproductive response following the impacts from the drying/freezing event. It could also be contributed to the fact that the only areas that allowed for sampling appeared to be flooded bank areas that had been recently inundated by the beaver activity.

Although a comparison between the two sampling years is difficult, due to the adjustment in the sample site, it does appear that there was an increase in snail density, which was attributed to an increase in sub-adult snails. All three sites contained rooted and clinging vegetation within the plots, but once again, the highest density of snails was associated with a dense, calcium crusted fiber layer on top of the silt.

Table 1. Maggie Creek NZMS Transect.

Sample Location	Max Depth (m)	Quadrants	Feet/sec	Substrate	Vegetation	NZMS	MS/m²	
1		6,7,1	NA	Silt, Calcified veg	Clinging, rooted	327	10,900	
2		2,7,1	NA	Silt, Calcified veg	Clinging, rooted	2,123	70,767	
3		4,5,2	NA	Silt, Gravel	Clinging, rooted	697	23,233	
							34,967	Average

The upper Humboldt transect was found to have a low density of snails in 2012. Three plots were set along the original transect with three squares per plot being sampled, resulting in an average snail density of 2,833 snails per square meter and a range of 600 to 7,200 snails per square meter (Table 2).

Although substantially lower densities than Maggie creek, this survey shows a much higher density of snails than the 2012 survey, particularly due to the center

transect that showed over a 10-fold increase in snails. All plots were dominated by silt-covered gravel, but the center plot had no vegetation and had the highest water velocity, at 0.8 feet per second.

Table 2. Upper Humboldt NZMS Transect.

Sample Location	Max Depth (m)	Quadrants	Feet/sec	Substrate	Vegetation	NZMS	MS/m²	
Right	0.15	2,4,8	0.56	Silt covered gravel	Clinging, rooted	18	600	
Center	0.35	2,3,5	0.8	Silt covered gravel	None	216	7,200	
Left	0.25	1,4,8	Near 0	Silt covered gravel	Some clinging	21	700	
							2,833	Average

The lower Humboldt transect has not shown any mudsnails in the two sampling events that have previously occurred, the fish population survey and the 2012 mudsnail survey. Three plots were set along the original transect, with three squares per plot being sampled, resulting in no NZMS being observed. See Table 3 for survey summary. This substrate was predominantly sands and gravel, with some areas of vegetation. After completion of the transect plots, a random visual and tactile survey was conducted along the shoreline. Approximately 15 yards above the transect, two mudsnails were found in a dense mat of vegetation. It will be interesting to follow the increase of mudsnails at this transect as future plot surveys should document any snail density increases. Due to the presence of snails at this site, it would be beneficial to conduct additional visual/tactile sampling downstream to locate the lower distribution of this species.

Table 3. Lower Humboldt NZMS Transect

Sample Location	Max Depth	Quadrants	Feet/sec	Substrate	Vegetation	NZMS
Right	235	2,3,9	1.85	Sand, gravel	No veg.	0
Center	125	1,7,9	0.87	Sand, silt	Clinging, rooted	0
Left	235	1,4,6	0.48	Sand, gravel	Rooted	0

Overall, this survey appears to be successful in determining the relative densities of NZMS and providing baseline data for future mudsnail comparisons. Yearly surveys should be continued to track the expansion of this species though time.

Dewatering

After the winter dewatering event to remove or reduce New Zealand mudsnails in Maggie creek was unsuccessful due to an increased water table, monitoring of snail densities post treatment was necessary. As described above, the yearly transect survey on Maggie Creek showed a very high density of snails in lower Maggie creek, and possibly a small increase from 2012. This increase in snail density can be partly attributed to a large increase in observed sub-adult snails. Typically, when a population is recovering from a reduction in population size, such as a drying/freezing event, the population response can be seen in an increase of progeny, or reproductive output. Our post treatment monitoring appears to show that the dewatering event did have an impact on the snail population, but without wiping out a majority of the population, the

remaining population was easily capable of rebuilding its numbers through very successful reproduction.

Outreach

Attempts have been made to place signs in areas of known mudsnail occurrence. Department of Transportation (DOT) owns the Jackpot rest area located along the Salmon Falls River and conversations to get the signs in place have been initiated. Once the appropriate paperwork is completed, signs will be placed and maintained. It is expected that this will be completed in the spring of 2014. Placing signage around Maggie Creek has been hampered by locating the appropriate landowners to authorize the placement of signs. These efforts will continue and it is expected that some level of signage will be placed in common access areas by the end of 2014.

South Fork Humboldt River

Spawning Monitoring

The upper South Fork Humboldt River (SFHR), from Lucky Nugget causeway to the gauge station, was surveyed to monitor spring spawning trout sites (redds). The survey produced 63 redds, with 34 of them being active and 84 fish being documented. Two days were also spent monitoring the spring spawning trout below the reservoir, with no fish or redds being found. Monitoring of fall spawning trout consisted of a one-day survey above and below the reservoir. This survey resulted in finding no fish or redds.

Opportunistic Angler Contacts

The South Fork Humboldt River was checked for anglers three times during 2013. During these random angler contacts, four anglers were surveyed. It was found that these 4 anglers spent 5.5 hrs to catch 13 fish. Extrapolating this data indicates that there was 3.25 fish per angler, with an average of 1.4 hrs fished per angler and a catch rate of 2.4 fish per hour.

Mercury Samples

One wiper and two brown trout were collected from below the South Fork Reservoir. Table 4 shows the length, weight, and mercury content.

Other Eastern Region Streams

Ellison Creek

The population survey began below the Ellison Creek guard station and extended approximately 3.4 mi downstream. Within those 3.4 mi, a total of 470 ft (143.2 m) of stream was shocked during the survey. Rainbow trout were found at each station

with the exception of EC5. A total of 11 fish were contacted during the survey resulting in 123.6 fish per mile (Table 5). If station EC5 was removed from the population estimate, it reveals a population estimate of 138.3 fish per mile.

Table 4. Mercury content in brown trout and wipers below South Fork Dam.

Water	Species	Length cm	Length mm	Weight grams	Mercury_Wet (mg/kg)	%_Solids	County
SF Humboldt River	BN	25.2	252.0	90.0	0.18	27	EL
SF Humboldt River	BN	52.6	526.0	1050.0	0.52	24	EL
SF Humboldt River	WI	60.4	604.0	3500.0	1.40	26	EL

Table 5. Interpreted data from the fish population survey of Ellison Creek.

Station	Average Width (Feet)	Average Depth (Inches)	Discharge (cfs)	Length Sampled (Feet)	Number of trout (Captured & Missed)	Population Estimate (Captured + Missed)
EC1	3.61	5.47	1.07	200	1	52.8
EC2	6.38	1.66	1.90	85	4	211.2
EC3	3.39	2.97	1.55	90	2	105.6
EC4	3.89	5.34	2.00	45	4	211.2
EC5	0	0	0	50	0	0
	4.32	3.86	1.63	470	11	123.6

Total length of all trout captured was measured and recorded. The total length of captured trout ranged from 4.3 in (110 mm) to 15.0 in (380 mm), with an average of 8.3 in (210.8 mm). It was clear that there were three age classes present from the trout captured during the survey. Of six trout captured, three were in an age class break of 4.3 in (110 mm) to 5.5 in (140 mm). Two trout were in an age class break between 10.2 in (260 mm) to 10.6 in (270 mm). The largest trout was in an age class at 15.0 in (380 mm). All trout contacted were deemed to be in excellent body condition and free of any external parasites or deformities.

The population estimate for the 2013 survey was below the average of the previous three surveys. The average of these surveys was 385 fish per mile, with the outlier being the 1991 survey at 837 fish per mile. If the 1991 survey is left out, the average fish per mile is 160 and that makes this year's population estimate (123.6) more comparable. The 1998 and 2013 fish population estimates were surveyed in the same locations; therefore, these estimates give a better idea of change over time. Previous fish population surveys were done as single station population surveys.

Upstream of the survey area, Ellison Creek was in poor shape. The stream flows through a large meadow that has received intense grazing in the past. This has caused incised banks, upwards of 15 ft, and large sections of stream silted up to 100%. In

addition to sedimentation and incised banks, there was no riparian canopy starting at EC1 and moving upstream. This is obviously not conducive to trout habitat, even though they have been observed in sections of the stream that run through the meadow in the past.

However, habitat conditions seemed to be favorable throughout the surveyed area. In a few areas, anthropogenic influences have caused detrimental affects to the habitat. Particularly, station EC1 has incised banks and increased sedimentation due to grazing activity. Station EC3 had extreme sedimentation due to road maintenance. The sedimentation was so severe that bank vegetation was limited and there was no vegetation in the stream.

Between natural and human variation it stands to reason that fish populations have never been robust in Ellison Creek. If grazing strategies are not modified, sedimentation in upper Ellison Creek will only intensify aggradations in areas of Ellison Creek that trout inhabit. These trout are most likely descendants of the last stocking event, which shows there must be some limiting factor keeping fish populations suppressed rather than bolstering a large population.

Goshute Creek

Population surveys began approximately 214 ft above the county road (GC1), and extended three miles up the Goshute Creek basin (GC7). The bottom three stations and the top station did not have any fish. Flows were extremely low at the road crossing and upon return to the county road in the afternoon; the water went sub-surface at GC1. Of the six stations that were surveyed on Goshute Creek, only four had enough water to allow fish to subsist. Out of the four stations that had adequate water, only three stations had fish located within them. A total of 21 fish were captured in 400 ft of electroshocking. This resulted in a population estimate of 277.2 fish per mile. Factoring in known misses (9) into the population estimation results in 396.0 fish per mile (Table 6). If stations GC1 through GC3 were removed, the population estimate would be 528.0 fish per mile.

Table 6. Interpreted data from the BCT population in Goshute Creek.

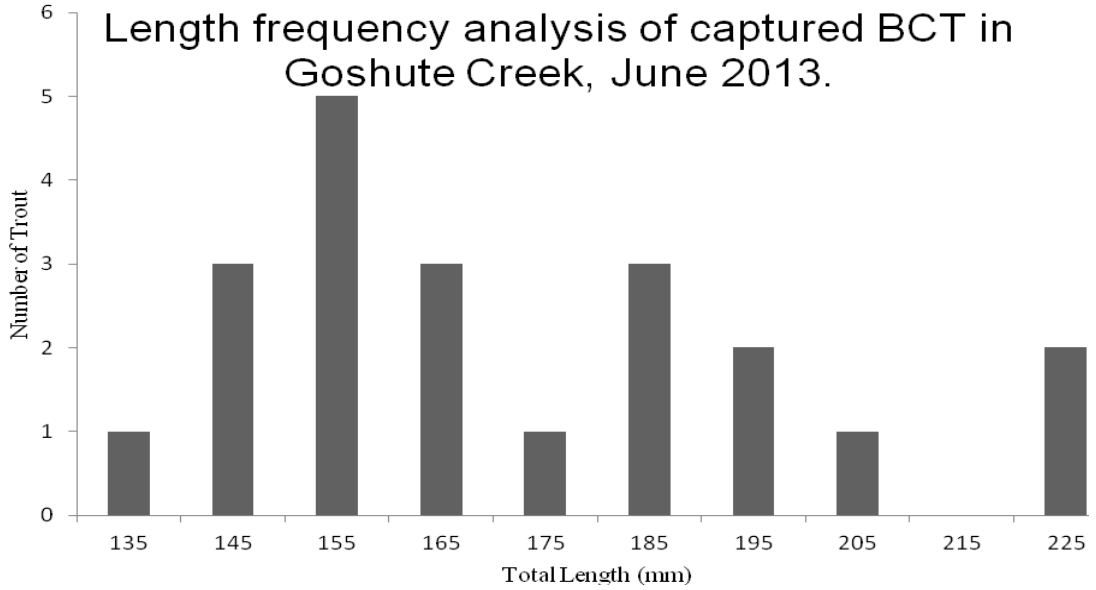
Station	Average Width (m)	Average Depth (m)	Discharge (c.f.s)	Length Sampled (m)	Number of trout (Captured & Missed)	Population Estimate (Captured + Missed)
GC1	0	0	0	0	0	N/A
GC2	2.30	2.48	0.74	100	0	N/A
GC3	3.84	2.99	0.74	100	0	0
GC4	5.15	2.54	3.00	100	10	528.0
GC5	4.12	3.89	5.06	100	9	475.2
GC6	4.64	3.25	3.98	100	11	580.8
GC7	N/A	N/A	N/A	N/A	N/A	N/A
Total	4.01	3.03	2.70	400	30	396

Total length of all BCT captured was measured and recorded. The total length of captured trout ranged from 5.2 in (132 mm) to 8.5 in (217 mm), with an average of 6.6 in (167 mm). A length frequency analysis revealed at least three age classes (Figure 1). Age class breaks should be considered to be from 5.3 in (135 mm) to 6.5 in (165 mm), 6.9 in (175 mm) to 8.1 in (205 mm), and +8.8 in (225 mm). During both days of survey activities, all fish captured or observed were found to be in excellent body condition. Continually low population numbers reduce competition for food resources; therefore, body condition should remain excellent in upcoming years.

The population estimate for the 2013 survey was a third of what the population estimate was during the 2000 population survey (1,214 per mile). A characteristic of Goshute Creek is that it has incised banks and a steep gradient, which has resulted in increased sedimentation. One constraint of the BCT population is lack of spawning habitat. It was noted that throughout Goshute Creek that embeddedness was extremely high. This not only affects a trout's ability to spawn, but also for eggs to successfully hatch and trout fry to rear. Even though there were multiple age classes present, the potential for the population to grow will always be limited. In the 2000 Goshute Creek Fish Population Survey field trip report, aggradation processes were of issue and only time will tell how severely it would impact Goshute Creek. Other than increased sedimentation, fish habitat throughout Goshute Creek is in good or excellent condition.

In 1999, the population was deemed sufficient that 100 BCT were captured and transplanted to Deep Creek in the Grant Range and Quinn Canyon Range of Nye County. In just over a decade, the population present in Goshute Creek has changed drastically. Goshute Creek is a highly dynamic system that has had a propensity for flash flooding due to the size of its basin. Originally, a major flash flood washed out resident fish populations in the 1950's that resulted in the establishment of Bonneville cutthroat trout.

Figure 1.



McCoy Creek

The population survey began at the mouth of the canyon (MC1) and extended approximately 2.25 mi upstream to the last station (MC4). Trout were found at all four stations on McCoy Creek. A total of 32 trout were captured in 400 ft of shocking, resulting in 128.8 fish per mile. If the number of missed trout were added in, 53 trout were contacted, resulting in 213.2 fish per mile (Table 7). Brown trout were found at the first two stations, while a cutthroat like specie was found beginning at the upper third of MC2, and was the only species present above that point. Of the two species found in McCoy Creek, brown trout were found at densities of 112.7 fish per mile. The cutthroat trout specie was found at densities of 136.8 fish per mile.

Table 7. Interpreted data from the fish population survey of McCoy Creek

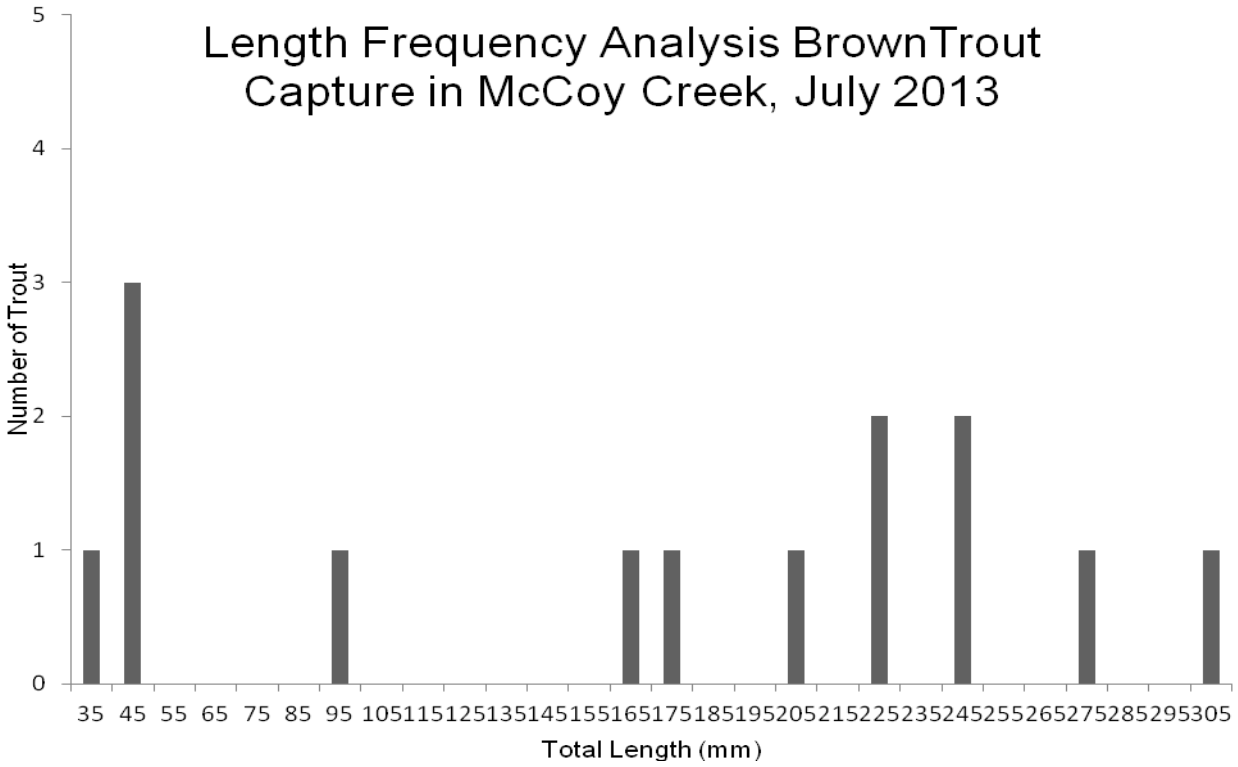
Station	Length Sampled (Feet)	Number of trout (Captured & Missed)	Population Estimate (Captured + Missed)
GC1	100	13	209.2
GC2	100	13	209.2
GC3	100	15	241.4
GC4	100	12	193.1
Total	400	53	213.2

Total length of all captured trout was measured and recorded. The total length of captured brown trout ranged from 1.4 in (35 mm) to 11.8 in (299 mm), with an average length of 6.3 in (161 mm). The cutthroat trout species ranged from 2.6 in (66 mm) to 9.8 ins (249 mm), with an average length of 6.7 in (171 mm). There was three age class breaks for brown trout; 1.4 in (35 mm) to 3.7 in (95 mm), 6.5 in (165 mm) to 8.1 in (205 mm), and 8.9 in (225 mm) to 11.8 in (299 mm) (Figure 2). The cutthroat trout species had four age class breaks; 2.6 in (66 mm) to 3.9 in (100 mm), 5.7 in (145 mm) to 6.9 in (175 mm), 7.4 in (190 mm) to 8.7 in (220 mm), and finally +9.8 in (249 mm) (Figure 3).

Habitat conditions in McCoy Creek seemed to be stable. There were some relatively steep banks throughout the survey area. Given the size of the collection basin in higher elevations and the gradient throughout the area, it is no surprise to see some erosion. There was little aggradation present throughout the survey area, resulting in excellent spawning habitat for trout. The first three stations (MC1-MC3) were in a good condition, with abundant canopy cover as well as large woody debris present to create pooling and holding water.

In the last station (MC4), there was riparian degradation due to grazing by domestic sheep. It was noted that shrubs, forbs, and grasses were grazed heavily in this area. The last station is in the High Schell Wilderness and has obvious anthropogenic impacts to it. The intense grazing should not adversely impact the trout populations in McCoy Creek due to the stability of the system; however, they should be closely monitored.

Figure 2.



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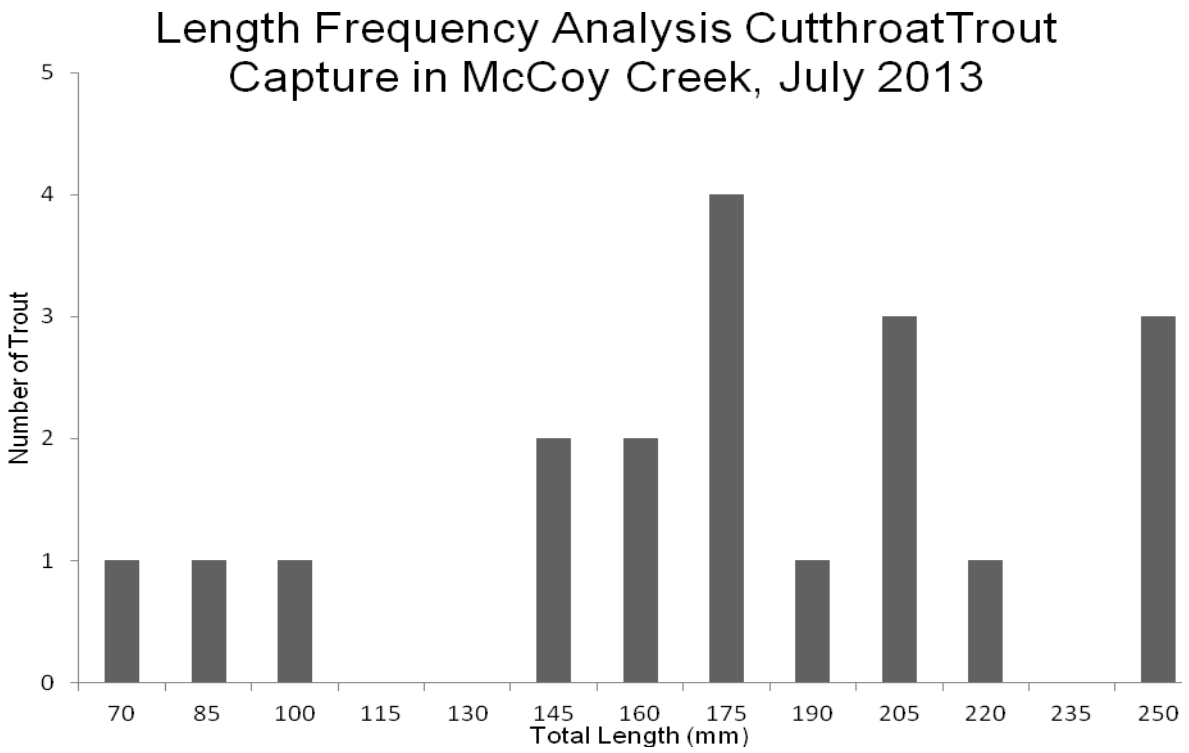
Results from this survey are well below previous population estimates. As stated earlier, due to changes in sampling techniques, locations and equipment it is difficult to determine effectiveness over time of these surveys. In order to identify long-term trends of fish populations in McCoy Creek, similar equipment and techniques should be used. Station locations should remain the same and are easily found using a GPS.

Historically, at least four trout species occupied McCoy Creek. Hybridization could explain why there are no “pure” looking cutthroat trout or rainbow trout in McCoy Creek. A rainbow trout x cutthroat trout most likely currently exists in the creek now. Brook trout may have not been able to establish a large enough population to out-compete other trout species present at the time. Since there are no records of brown trout being stocked by NDOW into McCoy Creek, it can only be assumed that brown trout were moved most likely from Cleve Creek, a nearby stream.

Figure 3.



MANAGEMENT REVIEW

Humboldt River

All objectives were completed in 2013, with this being the second year of a two-year study on NZMS in the Humboldt River system. The first year of the study included a dewatering event of lower Maggie Creek during the winter in an attempt to remove mudsnails via desiccation and freezing. Once this process was initiated, it was clear that an increase in the area water table would not allow the creek to go fully dry; hence, the entire population of mudsnails was not impacted. The 2013 post dewatering surveys showed that a large population of snails had survived the dewatering event and were able to successfully reproduce. The 2013 survey showed an increase in snail densities at all three transects and a large increase in sub-adult snails at the Maggie Creek transect.

Detect/non-detect surveys, whether specific to mudsnail surveys or incidental contacts during other work activities, have been able to locate one additional site occupied by mudsnails. This site, located in the Thousand Springs drainage (Bonneville drainage), is in close proximity to the Salmon Falls occupied site and has shown a need for additional surveys in the vicinity of Jakes Creek Reservoir.

As this invasive species continues to spread, it is critically important that public awareness and cooperation continue to be an essential tool in reducing the impacts of this and all invasive species. Signs can be easily placed at sites of interest as a

sedentary information point that can be maintained easily. New signs can be placed in new areas of concern.

South Fork Humboldt River

Both the spring spawning trout and fall spawning trout surveys were conducted in 2013. The objective to collect mercury samples was also completed. The general fishery assessment could be bolstered during the summer months by spending more time on angler contacts, perhaps by utilizing the creel clerk.

Other Eastern Region Streams

McCoy Creek population survey was conducted in 2013 to determine the status of non-native trout populations. Trout populations in McCoy Creek are doing well and trout body conditions are excellent for a stream fishery. Since there is current data on the stream, NDOW can provide the public with better knowledge of what could be a popular mountain stream fishery.

As part of other job duties, a population survey was completed in 2013 on Goshute Creek. Population numbers are well below that of previous surveys. This is likely due to the flashy, steep gradient system that could cause a population to blink-out. The GAWS III habitat survey will provide better insight into the status of the Bonneville cutthroat trout present in Goshute Creek.

Ellison Creek is a potential sight for the re-introduction of the endangered White River Spinedace. The population survey was conducted to determine status of the non-native trout present that have not been stocked since 1958. Right now, between non-native trout and habitat conditions, it is unsure if an endangered species should be introduced there as an experimental population. Future surveys will provide better insight.

RECOMMENDATIONS

- To conduct a general fisheries assessment of the Humboldt River through opportunistic angler contacts.

- To visually monitor the spawning migrations of rainbow trout for three days during spring and brown trout for three days during fall at established transects on the South Fork Humboldt River above and below South Fork Reservoir.

- To conduct a general fisheries assessment of the South Fork Humboldt River through opportunistic angler contacts.

- To revise the South Fork Humboldt River Fisheries Management Prescription.

- To continue to collect sport fish species from Eastern region streams/rivers for mercury analysis in cooperation with NDEP.

- To assess the status of non-native trout populations in Eastern Region streams through electroshocking surveys.

- To conduct a fall survey of the two Humboldt River transects to document any change in mud snail densities and distribution.

- To conduct visual/tactile surveys downstream of the lower transect site to evaluate the spread of the mud snails.

- To place signs at areas of known mudsnail occupancy and areas of concern.

- To conduct detect/non-detect surveys in conjunction with other work activities.

- To continue to monitor Jakes Creek Reservoir and the surrounding water systems for the presence of mud snails.

- To provide information to agency personnel so that any incidental sighting of New Zealand mudsnail can be documented.

- To monitor sedimentation levels to determine what affects Ellison Creek grazing and traffic have on aggradation.

- To continue to be imposed regulations that close fishing at Goshute Creek in order to protect BCT remaining in the stream.

- To complete a full GAWS Level III survey in 2014 as part of the Bonneville Cutthroat Trout CA/CS.

- To Take genetics on all cutthroat trout contacted in McCoy Creek to determine their true strain as well as identify any introgression that may be taking place.

- To set up point picture references to determine significance of grazing along the riparian area in upper portions of McCoy Creek.

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